

Catch scenarios

Table 2 Norway pout in Subarea 4 and Division 3.a. The basis for the catch scenarios.

Variable	Value	Notes
F ages 1–2	0.181	F in the 4th quarter 2017 to the 3rd quarter 2018. From the assessment.
R _{age 0} (2018)	80801 millions	Age 0 in the 3rd quarter 2018; from the assessment.
R _{age 0} (2019)	43626 millions	Resampling from the vector of estimated historical recruitments, including uncertainty.
Total catches	29077 tonnes	Based on landings statistics from the 4th quarter 2017 to the 3rd quarter 2018.
Discards	0 tonnes	Industrial fishery with no discards.

Table 3 Norway pout in Subarea 4 and Division 3.a. Annual catch scenarios. All weights are in tonnes.

Basis	Catch (1 November 2018–31 October 2019)*	F (1 November 2018–31 October 2019)	5th percentile SSB in the 4th quarter 2019	Median SSB (4th quarter 2019) **	% SSB change **	% Catch change ***	% Advice change ^
ICES advice basis							
MSY approach: (escapement strategy) 95% probability of SSB being above B _{lim} in the 4th quarter of 2019, with an F _{cap} (F _{bar(1–2)}) = 0.7	135459	0.70	44030	119310	–5	366	–36
Other options							
MSY approach: (escapement strategy) 95% probability of SSB being above B _{lim} in the 4th quarter of 2019	156798	0.84	39450	112160	–11	439	–26
F = 0	0	0	83790	175250	39	–100	–100
F = F _{status quo}	40593	0.181	69560	157000	25	40	–81
Median SSB at B _{lim} in the 4th quarter of 2019	416498	4.0	8020	39450	–69	1332	96
Median SSB at B _{pa} in the 4th quarter of 2019	313109	2.3	17170	65000	–48	977	47
F = 0.3 (F _{cap} of 0.3)	64925	0.30	61540	146150	16	123	–69
F = 0.4 (F _{cap} of 0.4)	83976	0.40	56160	138890	10	189	–60
F = 0.5 (F _{cap} of 0.5)	102076	0.50	51590	131760	5	251	–52
F = 0.6 (F _{cap} of 0.6)	119149	0.60	47570	125010	–1	310	–44
F = 0.7 (F _{cap} of 0.7)	135459	0.70	44030	119310	–5	366	–36

* The catch forecast is for the period 1 October to 30 September. ICES considers that this forecast can be used directly for management purposes for the period 1 November 2018–31 October 2019.

** SSB at the beginning of the 4th quarter 2019 relative to SSB at the beginning of the 4th quarter 2018 (= 125 940 t).

*** Catches 1 October 2018–30 September 2019 relative to catches 1 October 2017–30 September 2018 (= 29 077 t).

^ Advice value 2019 relative to advice value 2018 (= 212 531 t).

The change in advice (–36%) is due to a combination of a weak 2017 yearclass and the application of an F_{cap} in the advice.

Basis of the advice

Table 4 Norway pout in Subarea 4 and Division 3.a. The basis of the advice.

Advice basis	MSY approach (escapement strategy based on stochastic projections) with an F _{cap} (F _{bar(1–2)}) = 0.7.
Management plan	ICES is not aware of any agreed precautionary management plan for Norway pout in this area. Norway and EU have requested ICES to evaluate different options for a proposed management plan. The present advice is in response to the additional request from EU and Norway in September 2018.

Quality of the assessment

Norway pout was benchmarked in 2016 (ICES, 2016a). The assessment this year is fairly consistent with the assessments in the previous two years.

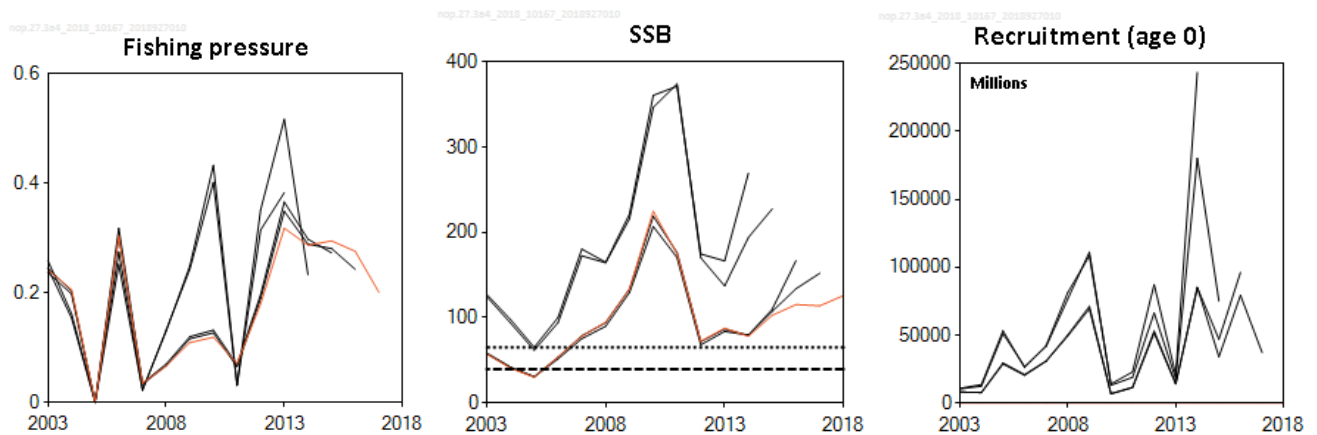


Figure 2 Norway pout in Subarea 4 and Division 3.a. Historical assessment results.

Issues relevant for the advice

Norway pout is a short-lived species. Recruitment is highly variable and strongly influences the spawning stock and total biomass. The ICES approach to MSY-based management for short-lived species has been used here in the form of an escapement strategy based on a stochastic forecast, i.e. to maintain, with 95% probability, SSB above B_{lim} after the fishery has taken place. This includes an F_{cap} at 0.7.

The current procedure for providing TAC advice for Norway pout is based on an escapement strategy, where the probability of SSB being below B_{lim} by 1st October in the forecast year is less than 5%. According to the long-term management strategy evaluation based on the joint EU–Norway request from November 2017 and the resulting ICES advice released in May 2018 evaluating long-term management strategies for Norway pout in Subarea 4 and Division 3.a (ICES 2018a; 2018b), it was shown that the current TAC advice procedure for Norway pout is only precautionary if an F_{cap} at 0.7 is added.

For the implementation of the escapement strategy, which aims to maintain the SSB above B_{lim} after the fishery has taken place, SSB is calculated at the beginning of quarter 4 as a proxy for SSB at spawning time (quarter 1).

The catch forecast is for the period 1 October to 30 September. ICES considers that this forecast approximates sufficiently the TAC period and can be used directly for management purposes for the period 1 November 2018–31 October 2019.

Reference points

Table 5 Norway pout in Subarea 4 and Division 3.a. Reference points, values, and their technical basis.

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY $B_{\text{escapement}}$	Not defined		
	F_{MSY}	Not defined		
	F_{cap}	0.7	A long-term management strategy evaluation indicating that the current procedure for providing TAC advice for Norway pout, based on an escapement strategy, is only precautionary with the addition of an F_{cap} ($F_{\text{bar}(1-2)}$) at 0.7.	ICES (2018b)
Precautionary approach	B_{lim}	39 450 t, 4th quarter	$B_{\text{lim}} = B_{\text{loss}}$, the lowest observed biomass in 2005.	ICES (2016a)
	B_{pa}	65 000 t, 4th quarter	$B_{\text{pa}} = B_{\text{lim}} e^{0.3 \times 1.645}$	ICES (2016a)
	F_{lim}	Not defined		
	F_{pa}	Not defined		
Management plan	SSB_{MGT}	Not applicable		
	F_{MGT}	Not applicable		

Basis of the assessment

Table 6 Norway pout in Subarea 4 and Division 3.a. Basis of the assessment and advice.

ICES stock data category	1 (ICES, 2016b).
Assessment type	Age-based analytical assessment (quarterly SAM model, SESAM).
Input data	Commercial catches (quarterly catches; catch-at-age and mean weight-at-age from catch sampling from the main Danish and Norwegian fisheries), four survey indices (IBTS Q1, IBTS Q3, EngGFS-IBTS-Q3, ScoGFS-IBTS-Q3). Constant maturity data from survey estimates, constant natural mortality estimated from survey indices (IBTS Q1&3), and constant mean weight-at-age in the stock from long-term commercial catch estimates.
Discards and bycatch	Discarding and bycatch of Norway pout is considered negligible and not included in the assessment.
Indicators	None.
Other information	Benchmarked in 2016 (ICES, 2016a).
Working group	Working Group on the Assessment of Demersal Stocks in the North Sea and Skagerrak (WGNSSK)

Information from stakeholders

There is no additional available information for this stock.

History of the advice, catch, and management

Table 7 Norway pout in Subarea 4 and Division 3.a. ICES advice, TACs, official catch, and ICES catch estimate. All weights are in tonnes. Values of catch prior to 2004 are presented to the nearest thousand tonnes.

Year	ICES advice	Predicted catch corresponding to advice**	TAC Norway	TAC EU	Official catch	ICES catch
1987	No advice	-	No TAC	200000	215000	147000
1988	No advice	-	No TAC	200000	187000	102000
1989	No advice	-	No TAC	200000	276000	167000
1990	No advice	-	No TAC	200000	212000	140000
1991	No advice	-	No TAC	200000	223000	155000
1992	No advice	-	No TAC	200000	335000	255000
1993	No advice	-	No TAC	220000	241000	176000
1994	No advice	-	No TAC	220000	214000	176000
1995	Can sustain current F	-	No TAC	180000	289000	181000
1996	Can sustain current F; take bycatches into consid.	-	No TAC	220000	197000	122000
1997	Can sustain current F; take bycatches into consid.	-	No TAC	220000	155000	133000
1998	Can sustain current F; take bycatches into consid.	-	No TAC	220000	72000	62000
1999	Can sustain current F; take bycatches into consid.	-	No TAC	220000	93000	85000
2000	Can sustain current F; take bycatches into consid.	-	No TAC	220000	182000	175000
2001	Can sustain current F; take bycatches into consid.	-	No TAC	211200	63000	57000
2002	Can sustain current F; take bycatches into consid.	-	No TAC	198000	93000	74000
2003	Can sustain current F; take bycatches into consid.	-	No TAC	198000	24000	21000
2004	The stock is at risk of decreasing below B_{lim}	-	No TAC	198000	7640	13500
2005	Fishery should be closed		Only bycatch	5000	1927	1927
2006	Fishery closed until 4th August where a TAC of 95 000 t was set		No TAC	95000	53599	46626
2007	Fishery closed because $SSB < B_{pa}$ in 2008	0	Only bycatch	5000	5792	5792
2008	$F = 0.35$ or 50 000 t for first half of 2008	< 50000 in first 6 months		41000		
In-year *	Maintain $SSB > B_{pa}$	< 148000	80000	114616	39222	36138
2009	Reduce F to increase $SSB > B_{pa}$	< 35000		28300		
In-year *	Maintain $SSB > B_{pa}$	< 157000	128000	116279	57170	54500
2010	Maintain $SSB > B_{pa}$	< 307000	86000	76000		
In-year *	Maintain $SSB > MSY B_{escapement}$	< 434000		162950	136974	125955
2011	No directed fisheries	0				
In-year *	Maintain $SSB > MSY B_{escapement}$	< 6000	3000	4500	7283	6524
2012	No fisheries	0		0		
In-year *	No fisheries	0			30148	27073
In-year **	Maintain $SSB > MSY B_{escapement}$	< 101000	25000	70683		
2013	Maintain $SSB > MSY B_{escapement}$	< 458000 (Catch ₂₀₁₂ = 0) < 393000 (Catch ₂₀₁₂ = 101)	157000	165700	84969	82100
In-year *	Maintain $SSB > MSY B_{escapement}$	< 457000				
2014	Maintain $SSB > MSY B_{escapement}$	< 216000	108000	128250	47120	44170

Year	ICES advice	Predicted catch corresponding to advice**	TAC Norway	TAC EU	Official catch	ICES catch
In-year *	Maintain SSB > MSY B _{escapement}	< 108000	123000			
2015	Precautionary considerations (F = 0.6)	< 326000	178000	150000	63430	63400
2016	MSY approach (escapement biomass with F _{cap})	< 390000	210000	150000	62772	63400
2017	MSY approach (escapement strategy; probability of SSB falling below B _{lim} is less than 5%)	≤ 358471	204235	141950	33871	33933
2018	MSY Approach (escapement strategy; probability of SSB falling below B _{lim} is less than 5%)	≤ 212531	90978	55000*		
2019	MSY Approach (escapement strategy; probability of SSB falling below B _{lim} is less than 5%) with F _{cap} = 0.7	≤ 135459				

* TAC for EU Member States fishing in EU waters from 1 November 2017 to 31 October 2018.

** Starting with the advice for 2016, ICES advice has been provided for the period 1 November of the previous year to 31 October of the current year.

History of the catch and landings

Table 8 Norway pout in Subarea 4 and Division 3.a. Catch distribution by fleet in 2017 as estimated by ICES.

Total catch (2017)	Landings	Discards
33933 t	100% taken by the small-meshed trawl fleet	Discarding is considered negligible
	33933 t	

Table 9 Norway pout in Subarea 4 and Division 3.a. History of commercial catch and landings; both the official and ICES estimated values are presented by area for each country participating in the fishery. All weights are in tonnes.

Norway pout ICES Division 3.a	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Denmark	110	-	18	24	156	-	51	2	118	6945	538	2220	918	110
Faroe Islands	45	-	-	-	-	-	-	-	-	-	-	-	-	-
Norway	41	-	2	-	-	209	711	-	-	147	9	41	82	72
Sweden	-	-	-	-	-	-	10	-	-	1	1	1	1	2
Germany	54	-	-	-	4	-	-	-	-	-	-	-	-	2
Total	250	0	20	24	160	209	772	2	118	7093	548	2262	1001	186
Norway pout ICES Division 4.a	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Denmark	10762	941*	39531	59	32158	19226	71032	4038	25431	31375	27894	10760	21125	12312
Faroe Islands	1085	24	-	-	-	-	-	-	-	-	-	5270	3156	-
Netherlands	-	-	-	-	-	22	18	-	-	-	-	17	8	1
Germany	-	-	15	-	-	-	-	-	-	-	-	22	27	38
Norway	4953	962	13618	4712	6650	36961	64303	3189	4528	45839	18647	43742	35959	21275
Sweden	-	-	-	-	10	-	**	1	3	4	1	12	-	1
UK(Scotland)	-	-	-	-	-	-	29	-	6	-	8	3	12	-
Total	16800	1927	53164	4771	38818	56209	135353	7228	29962	77218	46542	59823	60275	33627
Norway pout ICES Division 4.b	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Denmark	473	-	394	-	244	595	229	32	9	43	16	53	1465	45
Faroe Islands	29	-	-	-	-	-	-	-	-	-	-	-	-	-
Germany	-	-	19	-	-	75	-	-	-	-	-	-	-	-
Netherlands	-	-	-	-	-	-	-	-	-	-	-	1	-	-
Norway	-	-	2	-	-	82	620	21	59	615	8	577	11	10
Sweden	88	-	-	-	-	-	-	-	-	0	0	714	1	3
UK (E/W/Nl)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UK (Scotland)	-	-	-	-	-	-	-	-	-	-	6	-	18	-
Total	590	0	415	0	244	752	849	53	68	658	30	1345	1495	58
Norway pout ICES Division 4.c	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Denmark	-	-	-	-	-	-	-	-	-	-	-	-	1	-
France	-	-	-	**	**	-	-	-	-	-	-	-	-	-
Netherlands	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UK (E/W/Nl)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	0	0	0	0	0	0	0	0	0	0	0	0	1	0

Table 9 (cont.) Norway pout in Subarea 4 and Division 3.a. History of commercial catch and landings; both the official and ICES estimated values are presented by area for each country participating in the fishery. All weights are in tonnes.

Norway pout Subarea 4 and Division 3.a (Skagerrak) combined	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Denmark	11345	941*	39943	83	32558	19821	71312	4072	25558	38363	28448	13033	23509	12467
Faroe Islands	1159	24	0	0	0	0	0	0	0	0	0	5270	3156	0
Norway	4994	962	13622	4712	6650	37252	65634	3210	4587	46601	18664	44360	36052	21357
Sweden	88	0	0	0	10	0	10	1	3	5	2	727	2	6
Netherlands	0	0	0	0	0	22	18	0	0	0	0	18	8	1
Germany	54	0	34	0	4	75	0	0	0	0	0	22	27	40
UK	0	0	0	0	0	0	0	0	0	0	6	0	18	0
Total nominal landings	17640	1927	53599	4795	39222	57170	136974	7283	30148	84969	47120	63430	62772	33871
Bycatch of other species	-4140	-	-6973	-	-3084	-2670	-11019	-759	-3075	-2869	-2950	-30	628	62
ICES estimate of total landings (Subarea 4 + Division 3.aN)	13500	1927	46626	4795	36138	54500	125955	6524	27073	82100	44170	63400	63400	33933

* 781 tonnes from trial fishery (directed fishery); 160 tonnes from bycatches in other fisheries.

** Landings less than 1 tonne.

Table 10 Norway pout in Subarea 4 and Division 3.a. History of the commercial catch. ICES estimates of catches by country. Weights are in tonnes. Prior to 2017, values are presented to the nearest hundred tonnes.

Year	Denmark		Faroes	Norway	Sweden	UK (Scotland)	Others	Total
	North Sea	Skagerrak						
1961	20500	-	-	8100	-	-	-	28600
1962	121800	-	-	27900	-	-	-	149700
1963	67400	-	-	70400	-	-	-	137800
1964	10400	-	-	51000	-	-	-	61400
1965	8200	-	-	35000	-	-	-	43200
1966	35200	-	-	17800	-	-	*	53000
1967	169600	-	-	12900	-	-	*	182500
1968	410800	-	-	40900	-	-	*	451700
1969	52500	-	19600	41400	-	-	*	113500
1970	142100	-	32000	63500	-	200	200	238000
1971	178500	-	47200	79300	-	100	200	305300
1972	259600	-	56800	120500	6800	900	200	444800
1973	215200	-	51200	63000	2900	13000	600	345900
1974	464500	-	85000	154200	2100	26700	3300	735800
1975	251200	-	63600	218900	2300	22700	1000	559700
1976	244900	-	64600	108900	*	17300	1700	437400
1977	232200	-	48800	98300	2900	4600	1000	387800
1978	163400	-	18500	80800	700	5500	-	268900
1979	219900	9000	21900	75400	-	3000	-	329200
1980	366200	11600	34100	70200	-	600	-	482700
1981	167500	2800	16400	51600	-	*	-	238300
1982	256300	35600	12300	88000	-	-	-	392200
1983	301100	28500	30700	97300	-	*	-	457600
1984	251900	38100	19110	83800	-	100	-	393010
1985	163700	8600	9900	22800	-	100	-	205100
1986	146300	4000	2500	21500	-	-	-	174300
1987	108300	2100	4800	34100	-	-	-	149300
1988	7000	7900	1300	21100	-	-	-	109300
1989	95700	4200	800	65300	*	100	300	166400
1990	61500	23800	900	77100	*	-	-	163300
1991	8000	32000	1300	68300	*	-	*	186600
1992	146900	41700	2600	105500	*	-	100	296800
1993	97300	6700	2400	76700	-	-	*	183100
1994	97900	6300	3600	74200	-	-	*	182000
1995	138100	46400	8900	43100	100	*	200	236800
1996	74300	33800	7600	47800	200	100	*	163800
1997	94200	29300	7000	39100	*	*	100	169700
1998	39800	13200	4700	22100	-	-	*	79800
1999	4000	6800	2500	44200	*	-	-	94500
2000	12000	9300	-	48000	100	-	*	184400
2001	40600	7500	-	16800	700	*	*	65600
2002	50200	2800	3400	23600	-	-	-	80000
2003	9900	3400	2400	11400	-	-	-	27100
2004	8100	300	-	5000	-	-	100	13500
2005	900	-	-	1000	-	-	-	1900
2006	35100	100	-	11400	-	-	-	46600
2007	2000	-	-	3700	-	-	-	5800
2008	30400	-	-	5700	*	-	*	36100
2009	17500	-	-	37000	*	-	*	54500
2010	64900	200	-	60900	*	*	*	126000

Year	Denmark		Faroes	Norway	Sweden	UK (Scotland)	Others	Total
	North Sea	Skagerrak						
2011	3300	-	-	3200	*	*	*	6500
2012	22300	100	-	4600	*	*	*	27000
2013	29000	6200	-	46900	*	*	*	82100
2014	25000	500	-	18700	*	*	*	44200
2015	10800	2200	5300	44400	700	*	*	63400
2016	23200	900	3200	36100	*	*	*	63400
2017	12345	109	-	21479	*	*	*	33933

* Catches less than 100 tonnes.

Summary of the assessment

Table 11 Norway pout in Subarea 4 and Division 3.a. Assessment summary. Weights are in tonnes. High and low correspond to 95% confidence intervals.

Year	Recruitment (Age 0) in Q3	High	Low	SSB in Q4	High	Low	Catches* Q1–Q4	F Q1–Q4	High	Low
	millions			tonnes			tonnes	Ages 1–2		
1984	38818	67826	22216	104007	160121	47894	376555	1.35	2.1	0.86
1985	26058	45330	14980	53643	84045	23240	227482	1.34	2.2	0.81
1986	49357	87752	27762	38445	60151	16738	180508	0.95	1.59	0.56
1987	9936	18203	5424	63866	97084	30648	148894	0.97	1.76	0.54
1988	42848	75138	24435	56279	94196	18362	109295	0.64	1.08	0.38
1989	43959	77183	25037	56837	87363	26312	166559	0.71	1.22	0.42
1990	55480	98495	31251	73081	113177	32985	139095	0.67	1.14	0.39
1991	93783	164895	53339	94190	145896	42485	190406	0.63	1.07	0.37
1992	49731	86513	28587	155165	241701	68629	302490	0.59	1.01	0.35
1993	42942	76472	24114	121194	198021	44367	181265	0.66	1.27	0.34
1994	124603	224904	69033	85735	142967	28503	183585	0.53	0.99	0.28
1995	48165	87954	26376	176440	281757	71124	231772	0.37	0.71	0.196
1996	102801	188155	56167	206187	352068	60307	156079	0.34	0.66	0.174
1997	20733	38270	11232	207399	340262	74537	156937	0.33	0.66	0.166
1998	36955	66339	20587	190909	329793	52024	75034	0.30	0.58	0.152
1999	88721	160211	49132	110338	186393	34284	92302	0.35	0.69	0.174
2000	23572	42994	12923	183414	297426	69402	184970	0.32	0.65	0.156
2001	23781	43295	13062	183817	314563	53070	64373	0.25	0.51	0.120
2002	19083	36439	9993	89404	154015	24794	77108	0.35	0.76	0.156
2003	7910	14875	4206	57638	98398	16879	24647	0.24	0.55	0.107
2004	7463	13882	4012	40661	69796	11527	13487	0.21	0.50	0.086
2005	29400	54684	15806	30169	50429	9909	42	0.00	0.001	0.00
2006	20636	38849	10962	53693	86397	20990	46553	0.30	0.80	0.116
2007	30385	56981	16203	78177	132126	24228	5796	0.035	0.077	0.0160
2008	47176	89861	24767	94573	156651	32495	34844	0.066	0.142	0.030
2009	69738	130369	37305	133165	219623	46706	45813	0.109	0.26	0.046
2010	6339	12051	3334	224813	380046	69580	131078	0.119	0.27	0.053
2011	10789	19994	5822	174888	300543	49233	6843	0.071	0.162	0.031
2012	53238	99393	28516	72119	124151	20086	26947	0.180	0.44	0.074
2013	14118	26401	7549	87568	140652	34484	82109	0.32	0.82	0.124
2014	86227	171096	43455	77979	133880	22078	44164	0.29	0.71	0.117

Year	Recruitment (Age 0) in Q3	High	Low	SSB in Q4	High	Low	Catches* Q1–Q4	F Q1–Q4	High	Low
	millions			tonnes			tonnes	Ages 1–2		
2015	32512	64883	16291	102666	168517	36814	57417	0.30	0.76	0.114
2016	67050	128736	34922	115319	200690	29947	60241	0.28	0.70	0.108
2017	21801	42495	11184	113848	190009	37687	33940	0.20	0.51	0.080
2018	80801	202066	32310	125940	223520	28360	12970**			

* The catches presented are the sum of product values from catch- and weights-at-age used in the assessment model and do not match exactly the ICES estimates presented in previous tables.

** Provisional (first three quarters of 2018 only).

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