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Norway pout (*Trisopterus esmarkii*) in Subarea 4 and Division 3.a (North Sea, Skagerrak, and Kattegat)

ICES stock advice

Please note: The present advice replaces the catch advice given for 1 November 2017 to 31 October 2018 (released in October 2017). †

ICES advises that when the MSY approach is applied, catches during 1 November 2017 to 31 October 2018 should be no more than 212 531 tonnes.

Stock development over time

The stock size is highly variable from year to year, due to recruitment variability and a short life span. Spawning-stock biomass (SSB) is above B_{pa} in 2017. Fishing mortality (F) has been fluctuating at a lower level than previously since 1995. Recruitments in 2014 and 2016 were high, while recruitments in 2015 and 2017 are below the long-term average recruitment.

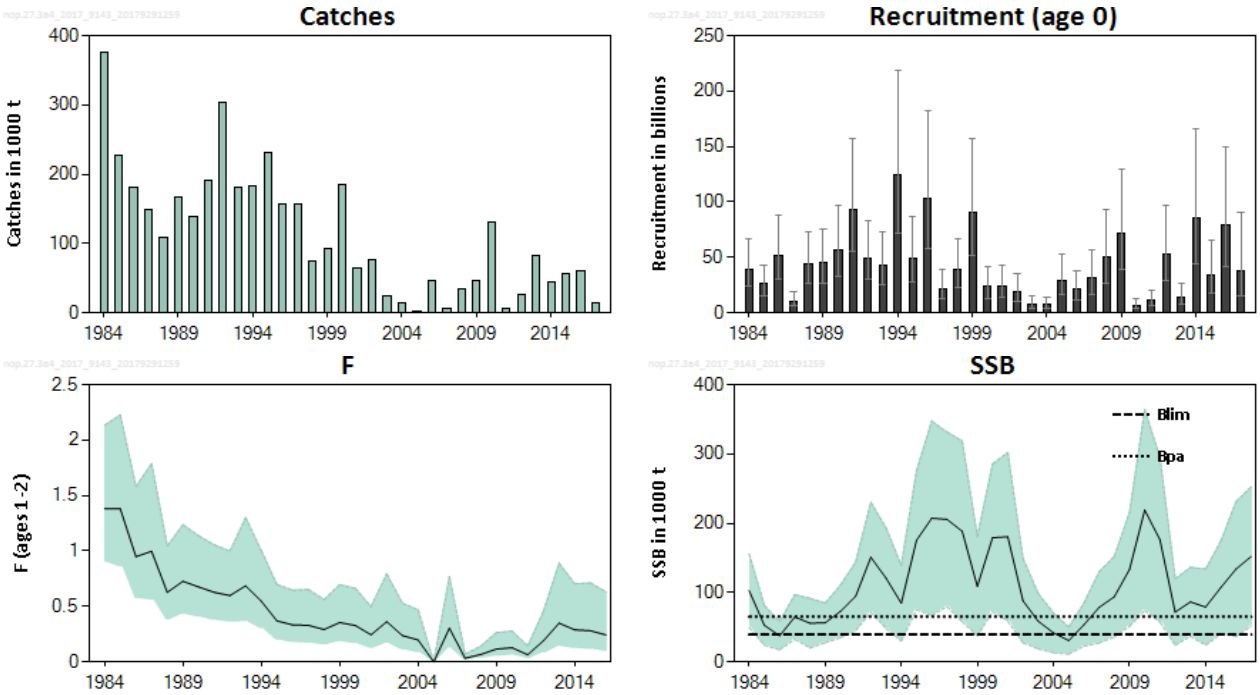

Figure 1 ‡ Norway pout in Subarea 4 and Division 3.a. Summary of the stock assessment with 95% confidence intervals (shaded).

† Version 3. During preparations for the Norway Pout MSE workshop, an error was found in how the forecast had been calculated in the Norway Pout assessment conducted in 2017. This was a result of a coding error in the calculation of catch where some of the mortality rates were not scaled to the seasonal time step. The revision leads to an increase in advised TAC from 151 995 t to 212 531 t.
‡ Version 3: plots updated to reflect the corrected assessment.

Stock and exploitation status

Table 1 Norway pout in Subarea 4 and Division 3.a. State of the stock and fishery relative to reference points.

	Fishing pressure					Stock size				
		2014	2015	2016			2015	2016	2017	
Maximum Sustainable Yield	F_{MSY}	?	?	?	Undefined	MSY $B_{Trigger}$	?	?	?	Undefined
Precautionary Approach	F_{pa}, F_{lim}	?	?	?	Undefined	B_{pa}, B_{lim}	✓	✓	✓	Full reproductive capacity
Management plan	F_{MGT}	–	–	–	Not applicable	B_{MGT}	–	–	–	Not applicable

Catch options

Table 2[§] Norway pout in Subarea 4 and Division 3.a. The basis for the catch options.

Variable	Value	Source	Notes
F ages 1–2	0.19	ICES (2017)	F in the 4th quarter 2016 to the 3rd quarter 2017. From the assessment.
$R_{age\ 0}$ (2017)	37204 millions	ICES (2017)	Age 0 in the 3rd quarter 2017 from the assessment.
$R_{age\ 0}$ (2018)	43861 millions	ICES (2017)	Resampling from the vector of estimated historic recruitments including uncertainty. This produces the same average as in historical recruitment.
Total catches	40023 tonnes	ICES (2017)	Based on landings statistics from the 4th quarter 2016 to the 3rd quarter 2017.
Discards	0	ICES (2017)	Industrial fishery with no discards.

[§] Version 3: table values corrected and text for recruitment updated.

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

Basis	Catch (1 November 2017 – 31 October 2018)*	F (1 November 2017– 31 October 2018)*	5th percentile SSB in the 4th quarter 2018	Median SSB (4th quarter 2018) **	% SSB change **	% Catch change ***
ICES advice basis						
MSY approach: (escapement strategy) 95% probability of SSB being above B_{lim} in the 4th quarter of 2018	212531	0.74	39450	122880	−19.2	431
Other options						
F = 0	0	0	113290	225740	48	−100
F = $F_{status\ quo}$	65155	0.19	86750	189090	24	63
Median SSB when it is at B_{lim} in the 4th quarter of 2018	482127	2.97	9770	39450	−74	1105
Median SSB when it is at B_{pa} in the 4th quarter of 2018	383148	1.80	17220	65000	−57	857

* The catch forecast is for the period 1 October to 30 September. ICES considers that this forecast can be used directly for manangement purposes for the period 1 November 2017–31 October 2018.
** SSB in the 4th quarter 2018 relative to SSB in the 4th quarter 2017 (= 152 162 t).
*** Catches 1 October 2017–30 September 2018 relative to catches 1 October 2016–30 September 2017 (= 40 023 t).

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).
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.

Quality of the assessment

Norway pout was benchmarked in 2016 (ICES, 2016a). The assessment this year is consistent with last year's assessment.

** Version 3: table values corrected.

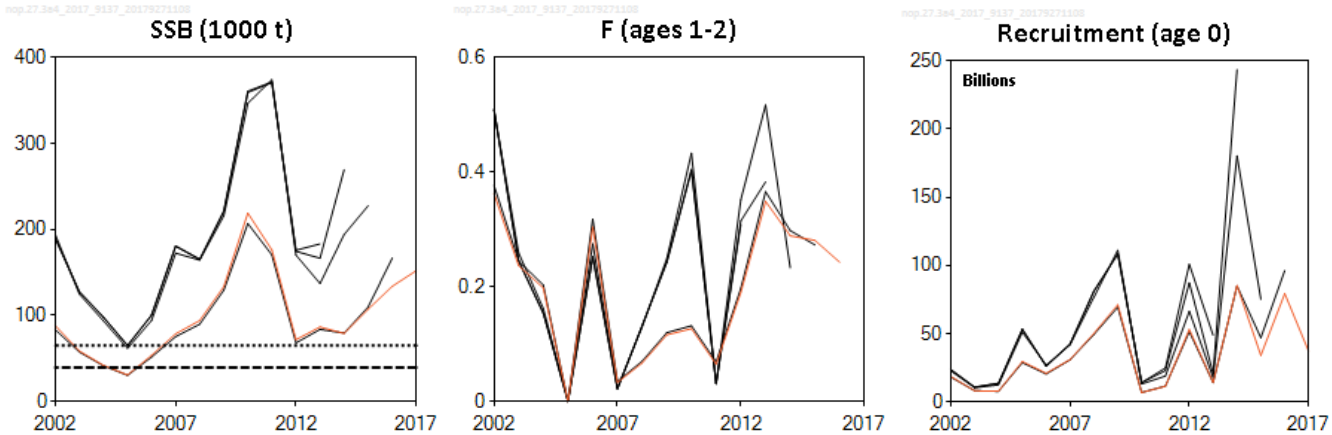

Figure 2[††] Norway pout in Subarea 4 and Division 3.a. Historical assessment results.

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 without an F_{cap}, i.e. to maintain SSB, with 95% probability, above B_{lim} after the fishery has taken place.

The F_{cap} and MSY $B_{escapement}$ reference points are not used because the forecast is now stochastic. Uncertainties in the assessment and forecast are thus directly taken into account to ensure that the SSB stays above B_{lim} with 95% probability.

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 for 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 2017–31 October 2018.

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 $B_{escapment}$	Not defined		
	F_{MSY}	Not defined		
	F_{cap}	Not defined		
Precautionary approach	B_{lim}	39 450 t, 4th quarter	$B_{lim} = B_{loss}$, the lowest observed biomass in 2005.	ICES (2016a)
	B_{pa}	65 000 t, 4th quarter	$= B_{lim}\, e^{0.3 \times 1.645}$	ICES (2016a)
	F_{lim}	Not defined		
	F_{pa}	Not defined		
Management plan	SSB_{MGT}	Not applicable		
	F_{MGT}	Not applicable		

[††] Version 3: plots corrected.

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).
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, and annual mean weight-at-age in the catch.
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 and official landings. All weights are in tonnes. Values of catch prior to 2004 are presented to the nearest thousand tonnes.

Year	ICES advice	Predicted catch corresp. 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

Year	ICES advice	Predicted catch corresp. to advice**	TAC Norway	TAC EU	Official catch	ICES catch
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
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	65155	63400
2017	MSY approach (escapement strategy; probability of SSB falling below B_{lim} is less than 5%)	≤ 358471	204235	141950*		
2018	MSY Approach***	≤ 212531[‡‡]				

*TAC for EU Member States fishing in EU waters from 1 November 2016 to 31 October 2017.
** 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.
*** Version 2: Added advice basis

History of the catch and landings

Table 8 Norway pout in Subarea 4 and Division 3.a. Catch distribution by fleet in 2016 as estimated by ICES.

Total catch (2016)	Landings	Discards
63400 t	> 99% taken by the small-meshed trawl fleet	Discarding is considered negligible
	63400 t	

[‡‡] Version 3. During preparations for the Norway Pout MSE workshop, an error was found in how the forecast had been calculated in the Norway Pout assessment conducted in 2017. This was a result of a coding error in the calculation of catch where some of the mortality rates were not scaled to the seasonal time step. The revision leads to an increase in advised TAC from 151 995 t to 212 531 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
Denmark	110	-	18	24	156	-	51	2	118	6945	538	2220	929
Faroe Islands	45	-	-	-	-	-	-	-	-	-	-	-	-
Norway	41	-	2	-	-	209	711	-	-	147	9	41	82
Sweden	-	-	-	-	-	-	10	-	-	1	1	1	3
Germany	54	-	-	-	4	-	-	-	-	-	-	-	-
Total	250	0	20	24	160	209	772	2	118	7093	548	2262	1014
Norway pout ICES Division 4.a	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Denmark	10762	941*	39531	59	32158	19226	71032	4038	25431	31375	27894	10760	22716
Faroe Islands	1085	24	-	-	-	-	-	-	-	-	-	5270	3156
Netherlands	-	-	-	-	-	22	18	-	-	-	-	17	7
Germany	-	-	15	-	-	-	-	-	-	-	-	22	27
Norway	4953	962	13618	4712	6650	36961	64303	3189	4528	45839	18647	43742	35959
Sweden	-	-	-	-	10	-	**	1	3	4	1	12	1
UK(Scotland)	-	-	-	-	-	-	29	-	6	-	8	3	12
Total	16800	1927	53164	4771	38818	56209	135382	7228	29968	77218	46550	59826	61878
Norway pout ICES Division 4.b	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Denmark	473	-	394	-	244	595	229	32	9	43	16	53	2244
Faroe Islands	29	-	-	-	-	-	-	-	-	-	-	-	-
Germany	-	-	19	-	-	75	-	-	-	-	-	-	-
Netherlands	-	-	-	-	-	-	-	-	-	-	-	1	-
Norway	-	-	2	-	-	82	620	21	59	615	8	577	11
Sweden	88	-	-	-	-	-	-	-	-	0	0	714	1
UK (E/W/NI)	-	-	-	-	-	-	-	-	-	-	-	-	-
UK (Scotland)	-	-	-	-	-	-	-	-	-	-	6	-	18
Total	590	0	415	0	244	752	849	53	68	658	30	1345	2274
Norway pout ICES Division 4.c	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Denmark	-	-	-	-	-	-	-	-	-	-	-	-	1
France	-	-	-	**	**	-	-	-	-	-	-	-	-
Netherlands	-	-	-	-	-	-	-	-	-	-	-	-	-
UK (E/W/NI)	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	0	0	0	0	0	0	0	0	0	0	0	0	1

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
Denmark	11345	941*	39943	83	32558	19821	71312	4072	25558	38363	28448	13033	25890
Faroe Islands	1159	24	0	0	0	0	0	0	0	0	0	5270	3156
Norway	4994	962	13622	4712	6650	37252	65634	3210	4587	46601	18664	44360	36052
Sweden	88	0	0	0	10	0	10	1	3	5	2	727	5
Netherlands	0	0	0	0	0	22	18	0	0	0	0	18	7
Germany	54	0	34	0	4	75	0	0	0	0	0	22	27
UK	0	0	0	0	0	0	0	0	0	0	6	0	18
Total nominal landings	17640	1927	53599	4795	39222	57170	136974	7283	30148	84969	47120	63430	65155
Bycatch of other species	−4140	-	−6973	-	−3084	−2670	−11019	−759	−3075	−2869	−2950	−30	−1755
ICES estimate of total landings (Subarea 4 + Division 3.aN)	13500	1927	46626	5792	36138	54500	125955	6524	27073	82100	44170	63400	63400

* 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 and landings. ICES estimates of catches by country. Weights are in tonnes. 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	79000	7900	1300	21100	-	-	-	109300
1989	95700	4200	800	65300	*	100	300	166400
1990	61500	23800	900	77100	*	-	-	163300
1991	85000	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	41000	6800	2500	44200	*	-	-	94500
2000	127000	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	-	-	-	5700
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

* Landings less than 100 tonnes.

Summary of the assessment

Table 11[7] 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 Ages 1–2 Q1–Q4	High	Low
	thousands			tonnes			tonnes			
1984	39328000	66059000	23413000	102716	155830	49602	376555	1.38	2.1	0.90
1985	25995000	43384000	15576000	52719	81402	24037	227482	1.38	2.2	0.86
1986	51422000	88200000	29979000	37730	58139	17321	180508	0.95	1.58	0.57
1987	10650000	18764000	6045000	64775	97024	32527	148894	1.00	1.79	0.56
1988	43493000	73000000	25913000	55765	91583	19947	109295	0.63	1.05	0.38
1989	44964000	75507000	26775000	56340	84919	27760	166559	0.73	1.24	0.43
1990	56957000	97276000	33349000	72807	110809	34805	139095	0.68	1.14	0.40
1991	93070000	156528000	55338000	94511	143897	45125	190406	0.63	1.06	0.37
1992	49615000	83011000	29655000	150904	230341	71466	302490	0.60	1.00	0.36
1993	42409000	73033000	24626000	120757	193263	48252	181265	0.69	1.30	0.36
1994	125023000	218301000	71602000	84596	139130	30062	183585	0.55	1.00	0.30
1995	48916000	86574000	27639000	175341	275398	75284	231772	0.37	0.70	0.196
1996	102916000	181853000	58244000	207213	347344	67083	156079	0.33	0.65	0.173
1997	21845000	38911000	12264000	205658	331580	79737	156937	0.33	0.65	0.167
1998	38451000	66782000	22139000	188437	318780	58094	75034	0.29	0.56	0.152
1999	89933000	156923000	51541000	109003	180492	37514	92302	0.36	0.70	0.181
2000	23589000	41852000	13296000	179097	285551	72643	184970	0.33	0.66	0.162
2001	24011000	42369000	13607000	180528	302158	58897	64373	0.24	0.450	0.120
2002	18659000	34972000	9955000	88203	148888	27518	77108	0.36	0.79	0.166
2003	8079000	14862000	4392000	58672	98623	18721	24647	0.24	0.53	0.106
2004	7729000	13978000	4274000	41952	70658	13247	13487	0.198	0.47	0.083
2005	29561000	53462000	16346000	30742	50252	11233	42	0	0.001	0
2006	20930000	38388000	11411000	53572	84657	22487	46553	0.30	0.77	0.121
2007	31003000	56584000	16987000	78626	130011	27241	5796	0.033	0.070	0.015
2008	50187000	93179000	27031000	94093	152249	35937	34844	0.067	0.142	0.032
2009	71260000	129610000	39179000	133450	215618	51281	45813	0.116	0.27	0.050
2010	6803000	12584000	3678000	219087	363907	74267	131078	0.127	0.28	0.058
2011	11409000	20478000	6357000	176270	295105	57435	6843	0.065	0.145	0.029

[7] Version 3: table values corrected.

Year	Recruitment Age 0 in Q3	High	Low	SSB in Q4	High	Low	Catches* Q1–Q4	F Ages 1–2 Q1–Q4	High	Low
	thousands			tonnes			tonnes			
2012	53020000	96955000	28994000	71855	119788	23922	26947	0.190	0.46	0.079
2013	14140000	25901000	7719000	86571	136357	36784	82109	0.35	0.89	0.137
2014	85274000	166029000	43798000	79059	133915	24204	44164	0.29	0.70	0.119
2015	34097000	66008000	17613000	107215	174157	40274	57417	0.28	0.71	0.111
2016	79343000	149759000	42036000	133920	231149	36691	60241	0.24	0.63	0.094
2017	37204000	90906000	15226000	152162	252640	51685	13566**			

* 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 2017 only).

Sources and references

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