

Hake (*Merluccius merluccius*) in subareas 4, 6, and 7, and in divisions 3.a, 8.a–b, and 8.d, Northern stock (Greater North Sea, Celtic Seas, and the northern Bay of Biscay)

ICES advice on fishing opportunities

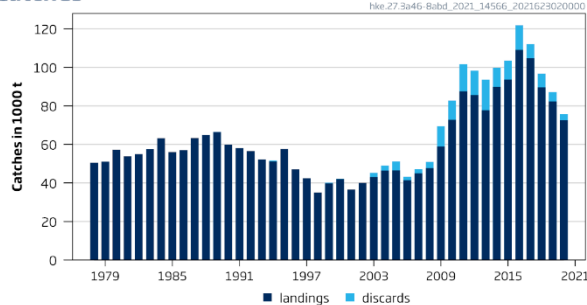
ICES advises that when the MSY approach is applied, catches in 2022 should be no more than 75 052 tonnes.

ICES notes the existence of a precautionary management plan developed and adopted by one of the relevant management authorities for this stock.

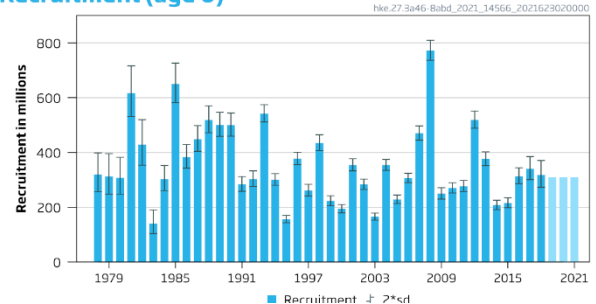
Stock development over time

Fishing pressure on the stock is at F_{MSY} and spawning-stock size is above MSY $B_{trigger}$, B_{pa} , and B_{lim} .

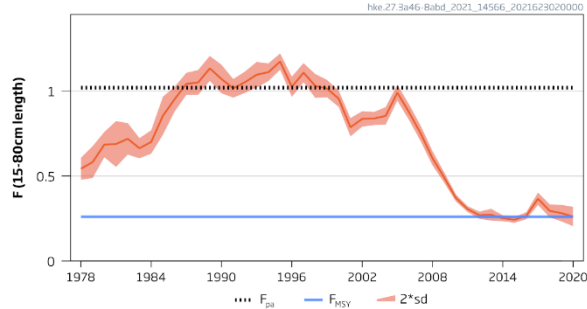
Catches



Recruitment (age 0)



F



SSB

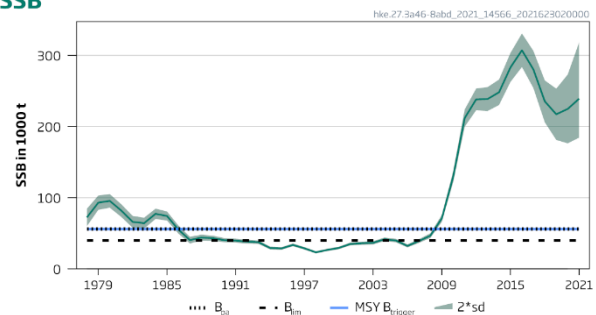


Figure 1 Hake in subareas 4, 6, and 7, and in divisions 3.a, 8.a–b, and 8.d, Northern stock. Summary of the stock assessment. Discard estimates are available since 2003. Assumed recruitment values are shaded in a lighter colour.

Catch scenarios

Table 1 Hake in subareas 4, 6, and 7, and in divisions 3.a, 8.a–b, and 8.d, Northern stock. Assumptions made for the interim year and in the forecast.

Variable	Value	Notes
F (2021)	0.28	F_{sq} = Average F (2018–2020).
SSB (2022)	218924	Short-term forecast fishing at status quo (F_{sq}); tonnes.
R_{age0} (2021–2022)	309417	Geometric mean 1990–2018; thousands.
Total catch (2021)	87708	Short term forecast using F_{sq} ; tonnes.
Projected landings (2021)	82428	Short term forecast using F_{sq} ; Assuming average landings ratio by length 2018–2020; tonnes.
Projected discards (2021)	5280	Short term forecast using F_{sq} ; Assuming average landings ratio by length 2018–2020; tonnes.

Table 2 Hake in subareas 4, 6, and 7, and in divisions 3.a, 8.a–b, and 8.d, Northern stock. Annual catch scenarios. All weights are in tonnes. Note: The % change in TAC is not computed because the stock area does not correspond to the area for the TAC.

Basis	Total catch (2022)	Projected landings [^] (2022)	Projected discards [^] (2022)	F _{total} (2022)	F _{projected landings} (2022)	F _{projected discards} (2022)	SSB (2023)	% SSB change *	% advice change **
ICES advice basis									
MSY approach = F _{MSY}	75052	69608	5444	0.26	0.21	0.055	207398	-5.3	-27
Other scenarios									
EU MAP ***: F _{MSY}	75052	69608	5444	0.26	0.21	0.055	207398	-5.3	-27
F = MAP F _{MSY lower}	54433	50552	3881	0.18	0.142	0.038	227366	3.9	-47
F = MAP F _{MSY upper}	106651	98688	7963	0.40	0.32	0.084	176838	-19.2	3.7
F = 0	0	0	0	0	0	0	280183	28	-100
F = F _{pa}	197425	180948	16477	1.02	0.81	0.21	89303	-59	92
SSB (2023) = B _{lim}	248401	225384	23017	1.80	1.42	0.38	40000	-82	141
SSB (2023) = B _{pa}	231939	211298	20641	1.47	1.16	0.31	56000	-74	125
SSB (2023) = MSY B _{trigger}	231939	211298	20641	1.47	1.16	0.31	56000	-74	125
SSB (2023) = SSB(2022)	63150	58615	4535	0.21	0.168	0.045	218922	0	-39
F = F ₂₀₂₁	79754	73945	5808	0.28	0.22	0.0587	202847	-7.3	-22

[^] "Projected landings" is the predicted landed catch above the minimum conservation reference size. "Projected discards" refers to landings below the minimum conservation reference size and discards.

* SSB 2023 relative to SSB 2022.

** Total catch advice in 2022 relative to the catch advice for 2021 (102 888 tonnes; revised advice for 2021 issued 30 June 2021 (ICES, 2021c).

*** The EU multiannual plan (MAP; EU, 2019).

The advice for 2022 is about 27% lower than the advice for 2021 because the perception of the stock has been revised downwards.

Basis of the advice

Table 3 Hake in subareas 4, 6, and 7, and in divisions 3.a, 8.a–b, and 8.d, Northern stock.

Advice basis	MSY approach
Management plan	The EU multiannual plan (MAP) for stocks in the Western Waters and adjacent has been agreed by the EU for this stock (EU, 2019). This plan is not adopted by Norway and UK; thus, it was not used as the basis of the advice for this shared stock. ICES was requested to provide advice based on the MSY approach and to include the MAP as a catch option.

Quality of the assessment

The collection of data from the commercial fishery and research surveys during 2020 was impacted by COVID-19 restrictions to a varying degree across member states. For this stock, the diagnostics for the assessment were deemed acceptable and the impact on the perception of the stock status and advice is considered minimal.

There is no full survey coverage of the entire stock distribution area and changes in the spatial distribution of the stock are known to increase the uncertainty in the assessment.

The perception of the stock has been revised downwards compared to the previous assessment.

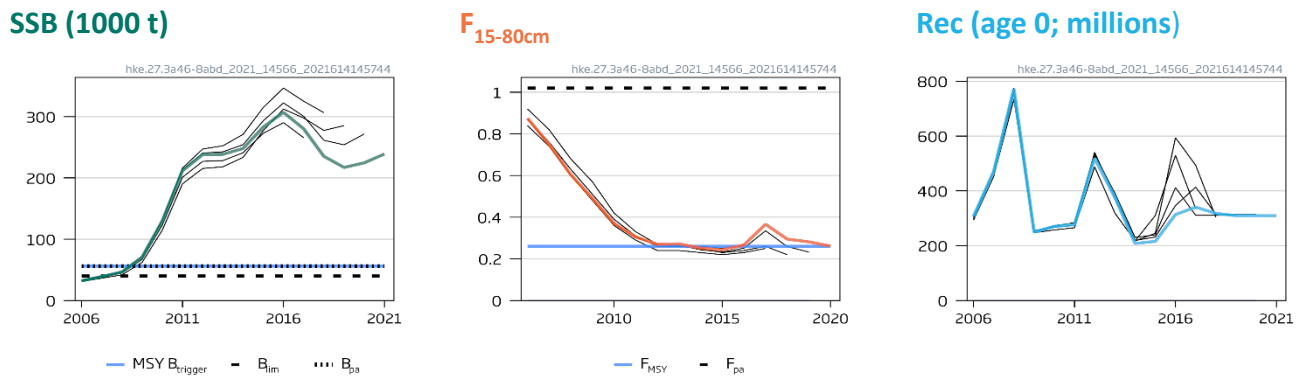


Figure 2 Hake in subareas 4, 6, and 7, and in divisions 3.a, 8.a–b, and 8.d, Northern stock. Historical assessment results. Final two-year recruitment assumption included for the last three recruitment lines corresponding with the last three assessments.

Issues relevant for the advice

There is no information to present for this stock.

Reference points

Table 4 Hake in subareas 4, 6, and 7, and in divisions 3.a, 8.a–b, and 8.d, Northern stock. Reference points, values, and their technical basis. All weights are in tonnes.

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY $B_{trigger}$	56000	B_{pa}	ICES (2019b)
	F_{MSY}	0.26	Stochastic simulations on a segmented regression stock–recruitment relationship	ICES (2019b)
Precautionary approach	B_{lim}	40000	The breakpoint of the segmented regression stock–recruitment relationship	ICES (2019b)
	B_{pa}	56000	$1.4 \times B_{lim}$	ICES (2019b)
	F_{lim}	Undefined	F_{lim} (0.84) is no longer considered appropriate given the estimate of F_{pa}	ICES (2021b)
	F_{pa}	1.02	$F_{p,05}$ with AR: The F that provides a 95% probability for SSB to be above B_{lim} .	ICES(2019b, 2021b)
Management plan	F_{MGT}	Not defined		
	SSB_{MGT}	Not defined		
	MAP MSY $B_{trigger}$	56000	MSY $B_{trigger}$	ICES (2019b), EU (2019)
	MAP B_{lim}	40000	B_{lim}	ICES (2019b), EU (2019)
	MAP F_{MSY}	0.26	F_{MSY}	ICES (2019b), EU (2019)
	MAP range F_{lower}	0.180	Consistent with ranges resulting in no more than 5% reduction in long-term yield compared with MSY (ICES, 2019b).	ICES (2019b), EU (2019)
	MAP range F_{upper}	0.40	Consistent with ranges resulting in no more than 5% reduction in long-term yield compared with MSY (ICES, 2019b).	ICES (2019b), EU (2019)

Basis of the assessment

Table 5 Hake in subareas 4, 6, and 7, and in divisions 3.a, 8.a–b, and 8.d, Northern stock. Basis of the assessment and advice.

ICES stock data category	1 (ICES, 2021a).
Assessment type	Length-based model (SS3; ICES, 2019a) that uses landings and discards in the assessment and forecast.
Input data	Commercial landings; four survey indices including the French Southern Atlantic Bottom trawl survey (EVHOE-WIBTS-Q4 [G9527]), the Spanish Porcupine Bottom Trawl Survey (SpPGFS-WIBTS-Q3 [G5768]), the Irish Groundfish Survey (IGFS-WIBTS-Q4 [G7212]), and FR-RESSGACQ; maturity data: constant maturity (Martin, 1991); natural mortality: constant value of 0.4.
Discards and bycatch	Data series from most fleets are available. All the observed discards are included in the assessment (ICES, 2019a, 2019b).
Indicators	None.
Other information	Last benchmarked in 2014 (ICES, 2014) and interbenchmarking in 2019 (ICES, 2019a).
Working group	Working Group for the Bay of Biscay and the Iberian Waters Ecoregion (WGBIE).

History of the advice, catch, and management

Table 6 Hake in subareas 4, 6, and 7, and in divisions 3.a, 8.a–b, and 8.d, Northern stock. ICES advice and catch. All weights are in tonnes.

Year	ICES advice	Catch corresponding to advice	Landings corresponding to advice	Agreed TAC*	ICES landings	Discards	ICES catch
1987	Precautionary TAC; juvenile protection			63500	63369		
1988	Precautionary TAC; juvenile protection		54000	66200	64823	**	
1989	Precautionary TAC; juvenile protection		54000	59700	66473	**	
1990	Precautionary TAC; juvenile protection		59000	65100	59954		
1991	Precautionary TAC; juvenile protection		59000	67000	58129		
1992	If required, precautionary TAC		61500	69000	56617		
1993	Enforce juvenile protection legislation		-	71500	52144		
1994	F significantly reduced		-	60000	51259	**	
1995	30% reduction in F		31000	55100	57621		
1996	30% reduction in F		39000	51100	47210		
1997	20% reduction in F		54000	60100	42465		
1998	20% reduction in F		45000	59100	35060		
1999	Reduce F below F _{pa}		-	55100	39814	**	
2000	50% reduction in F		-	42100	42026	**	
2001	Lowest possible catch, recovery plan		-	22600	36675		
2002	Lowest possible catch/recovery plan		-	27000	40105		
2003	Lowest possible catch/recovery plan		-	30000	43162	1393	44555
2004	70% reduction in F or recovery plan		-	39100	46416	2614	49029
2005	F = 0.19		33000	42600	46550	4583	51133
2006	F = 0.25		44000	43900	41469	1222	42691
2007	Recovery plan limits		50500	52700	45093	2165	47258
2008	Recovery plan limits		54000	54000	47822	3368	51190
2009	F = 0.25 = F _{pa}		51500	51500	58781	11033	69814
2010	F = 0.25 = F _{pa}		55200	55105	72760	12118	84878
2011	See scenarios		50600	55105	87540	13903	101443
2012	MSY transition		51900	55105	85677	14870	100547

Year	ICES advice	Catch corresponding to advice	Landings corresponding to advice	Agreed TAC*	ICES landings	Discards	ICES catch
2013	MSY transition		45400	69440	77708	15400	93108
2014	MSY approach		81846	81846	89928	9800	99728
2015	MSY approach		78457	90849	95023	10900	105923
2016	MSY approach	≤ 109592	≤ 96651	108764	107530	11114	118644
2017	MSY approach	≤ 123777		119765	104670	7100	111770
2018	MSY approach	≤ 115335		111785	89695	6493	96188
2019	MSY approach	≤ 142240		141160	82298	4940	87238
2020	MSY approach	≤ 104763		112903	72579***	3257 ***	75835***
2021	MSY approach (value revised in June 2021)	≤ 102888		65949 ^			
2022	MSY approach	≤ 75052					

* Sum of area TACs, corresponding to Northern stock plus Division 2.a (EU zone only; from 2021 onwards UK only), and divisions 3.b–d (except for 2019 and 2020).

** Partial discard estimates are available and used in the assessment. For remaining years where values are not presented, there are no valid discard estimates available for the assessment.

*** Preliminary.

^ DEFRA (2021).

History of the catch and landings

Table 7 Hake in subareas 4, 6, and 7, and in divisions 3.a, 8.a–b, and 8.d, Northern stock. Catch distribution by fleet in 2020 as estimated by ICES.

Catch	Landings				Discards
	9% unspecified gear	29% longline	32% gillnet	30% trawl	
75 835 tonnes	72 579 tonnes				3257 tonnes

Table 8 Hake in subareas 4, 6, and 7, and in divisions 3.a, 8.a–b, and 8.d, Northern stock. 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.

Year	Landings *							Discards **						Total catches ***	
	3	4	6	7	8abd	Unallocated	Total	3	4	6	7	8abd	Total		
1961			-	-	-	95600	95600							-	95600
1962			-	-	-	86300	86300							-	86300
1963			-	-	-	86200	86200							-	86200
1964			-	-	-	76800	76800							-	76800
1965			-	-	-	64700	64700							-	64700
1966			-	-	-	60900	60900							-	60900
1967			-	-	-	62100	62100							-	62100
1968			-	-	-	62000	62000							-	62000
1969			-	-	-	54900	54900							-	54900
1970			-	-	-	64900	64900							-	64900
1971		8500		19400	23400	0	51300							-	51300
1972		9400		14900	41200	0	65500							-	65500
1973		9500		31200	37600	0	78300							-	78300
1974		9700		28900	34500	0	73100							-	73100
1975		11000		29200	32500	0	72700							-	72700
1976		12900		26700	28500	0	68100							-	68100
1977		8500		21000	24700	0	54200							-	54200
1978		8000		20300	24500	-2249	50551							-	50551
1979		8700		17600	27200	-2404	51096							-	51096
1980		9700		22000	28400	-2835	57265							-	57265

Year	Landings *							Discards **						Total catches ***	
	3	4	6	7	8abd	Unallocated	Total	3	4	6	7	8abd	Total		
1981		8800		25600	22300	-2782	53918							-	53918
1982		5900		25200	26200	-2306	54994							-	54994
1983		6200		26300	27100	-2093	57507							-	57507
1984		9500		33000	22900	-2114	63286							-	63286
1985		9224		27459	21044	-1628	56099							-	56099
1986		7320		27408	23903	-1539	57092							-	57092
1987		7800		32900	24700	-2031	63369							-	63369
1988		8800		30900	26600	-1477	64823							-	64823
1989		7375		26938	31957	203	66473							-	66473
1990		6680		23011	34424	-4161	59954							-	59954
1991		8328		21546	31635	-3380	58129							-	58129
1992		8561		22475	23465	2116	56617							-	56617
1993		8484		20465	19849	3346	52144							-	52144
1994		5421		21080	24727	31	51259							+	51259
1995		5335		24056	28144	86	57621							-	57621
1996		4445		24738	18036	-9	47210							-	47210
1997		3312		18949	20339	-135	42465							-	42465
1998		3208		18705	13147	0	35060							-	35060
1999		4256		23955	11604	-1	39814							+	39814
2000		4033		25991	11998	4	42026							+	42026
2001		4367		23065	9244	0	36675							-	36675
2002		2944		21226	15935	0	40105							-	40105
2003		3284		25438	14440	0	43162							1393	44555
2004		4438		27483	14494	0	46416							2614	49029
2005		5461		26623	14467	0	46550							4583	51133
2006		6127		24709	10633	0	41469							1222	42691
2007		7017		27456	10620	0	45093							2165	47258
2008		10654		22834	14334	0	47822							3368	51190
2009		13057		25300	20424	0	58781							11033	69814
2010		14187		33500	25073	0	72760							12118	84878
2011		18789		18574	16604	32000 ^	87540							13903	101443
2012		22415		22166	16716	19300 ^	85677							14870	100547
2014	348	12077	11415	40536	25552	0 ^	89928	287	3105	951	4021	1458	9800	99728	
2015	447	14618	7065 ^^	44396	28497	0 ^	95023	93	3444	71	4208	3096	10900	105923	
2016	695	19603	11365 ^^	49377	26490	0	107530	142	4189	344 ^^	2281	4150	11114	118644	
2017	775	19690	9614 ^^	45737	28853	0	104670	148	1777	314	1168	3692	7100	111770	
2018	698	18915	7281 ^^	36906	25894	0	89695	287	1395	273	2281	2257	6493	96188	
2019	1522	15569	6835 ^^	36873	21492	8	82291	235	926	8	297	1423	4940	87238	
2020	605	13080	4113 ^^	35100	19674	7	72579	280	336	7	296	365	3257	75835	

* Data for Subarea 8 for 1973–1978 include data for divisions 8.a and 8.b only. Divisions 3.a and 4.b–c are included in the column "3, 4, and 6" only after 1976. There are some unallocated landings.

** Discard estimates from observer programmes.

*** The working group used total catches from 1978.

^ Unallocated landings for the years 2011–2014 were revised in 2015.

^^ Landings and discards data from Subarea 5 are included.

Table 9 Hake in subareas 4, 6, and 7, and in divisions 3.a, 8.a–b, and 8.d, Northern stock. History of commercial catches by country. All weights are in tonnes.

Year	Belgium	Denmark	France	Germany	Ireland	Netherlands	Norway	Spain	Sweden	UK (England)	UK (Northern Ireland)	UK (Scotland)
2014	218	3407	41290	835	4919	221	3031	30747	106	2310	29	12659
2015	144	4242	46034	786	3873	693	4181	33471	103	3148	134	9154
2016	155	4617	49103	845	4168	883	5781	34503	94	2722	116	15675
2017	451	5125	47557	737	3477	188	3974	33317	90	2329	222	14303
2018	212	4529	41260	1212	4440	519	3960	26078	119	2689	130	11039
2019	362	3427	35341	760	4700	503	4144	25538	148	2763	127	9425
2020	190	4225	31635	409	3701	318	2968	23540	94	1879	96	6737

Summary of the assessment

Table 10 Hake in subareas 4, 6, and 7, and in divisions 3.a, 8.a–b, and 8.d, Northern stock. Assessment summary. Weights are in tonnes and recruitment is in thousands. Highs and lows are 95% confidence intervals.

Year	Recruitment Age 0	High	Low	SSB	High	Low	Landings	Discards	F 15–80 cm	High	Low
1978	319509	398608	256106	72229	84493	59965	50551		0.54	0.61	0.48
1979	313044	395734	247632	92987	103055	82919	51096		0.58	0.68	0.49
1980	307338	382421	246996	95511	105110	85911	57265		0.68	0.76	0.61
1981	616913	716417	531229	81942	90882	73003	53918		0.69	0.82	0.55
1982	428809	519975	353627	66018	74417	57619	54994		0.72	0.81	0.63
1983	140607	190426	103821	64190	71853	56527	57507		0.66	0.72	0.60
1984	303080	352640	260485	77358	84632	70084	63286		0.70	0.77	0.63
1985	650417	726580	582238	74253	80616	67890	56099		0.85	0.97	0.74
1986	383785	429295	343099	55102	60829	49374	57092		0.95	1.03	0.88
1987	448690	497941	404310	40364	45114	35614	63369		1.04	1.11	0.98
1988	518914	570213	472230	43908	48035	39781	64823	2	1.05	1.12	0.98
1989	500919	546761	458921	43036	46642	39429	66473	73	1.13	1.21	1.06
1990	500015	544122	459483	40361	43258	37464	59954		1.07	1.15	0.99
1991	283680	311727	258156	39644	42411	36878	58129		1.02	1.07	0.96
1992	302910	332708	275780	38176	40907	35444	56617		1.05	1.11	0.99
1993	541960	574507	511257	37391	39777	35005	52144		1.10	1.17	1.02
1994	300812	322894	280240	29333	31385	27281	51259	356	1.11	1.16	1.06
1995	156159	170192	143283	28653	30528	26778	57621		1.17	1.22	1.13
1996	377299	400700	355265	33659	35598	31719	47210		1.03	1.08	0.97
1997	261533	283769	241040	28846	30662	27029	42465		1.11	1.16	1.05
1998	434771	464785	406695	23231	24740	21722	35060		1.03	1.10	0.96
1999	222697	241892	205026	26594	28235	24954	39814	349	1.01	1.07	0.96
2000	193857	209709	179203	29381	31166	27595	42026	83	0.95	1.00	0.91
2001	354055	377018	332491	34905	36895	32915	36675		0.79	0.84	0.73
2002	283150	302769	264802	35956	38161	33752	40107		0.84	0.88	0.79
2003	165395	178716	153067	36566	38862	34270	43162	2110	0.84	0.88	0.80
2004	354020	374661	334516	41638	44058	39219	46417	2552	0.85	0.91	0.80
2005	228685	244847	213590	39729	42159	37299	46550	4676	0.99	1.04	0.94
2006	306454	324134	289738	32217	34391	30043	41467	1816	0.88	0.92	0.83
2007	470423	497347	444957	39067	41663	36470	45028	2191	0.75	0.79	0.70
2008	772351	809790	736643	46620	49931	43309	47739	3248	0.60	0.65	0.56
2009	249675	271241	229824	70773	75669	65876	58818	10590	0.49	0.52	0.46
2010	270027	289299	252039	129738	137619	121857	72799	9978	0.37	0.39	0.35
2011	276796	297866	257216	211698	223863	199533	87540	14156	0.31	0.32	0.29
2012	519015	551413	488520	238004	253248	222760	85677	12680	0.27	0.29	0.25
2013	376267	402431	351804	238566	255334	221798	77753	15886	0.27	0.31	0.24

Year	Recruitment Age 0	High	Low	SSB	High	Low	Landings	Discards	F 15–80 cm	High	Low
2014	208076	226105	191484	248043	265980	230106	89940	9913	0.25	0.27	0.23
2015	215682	234673	198228	283027	303407	262647	93670	9820	0.24	0.26	0.23
2016	313605	344036	285866	307092	330674	283510	109106	12741	0.27	0.29	0.25
2017	340551	385430	300898	280165	306313	254017	104671	7386	0.37	0.40	0.33
2018	317969	370535	272861	235279	264719	205839	89671	7034	0.29	0.33	0.26
2019	309417*			217121	253157	181085	82298	4940	0.28	0.33	0.23
2020	309417*			224675	273027	176323	72579	3257	0.26	0.32	0.20
2021	309417*			239091	318333	184335					

* Recruitment estimated by the model; to carry out the short-term forecast, these values were replaced by 309 417, which is the geometric mean (1990–2018).

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