Herring (*Clupea harengus*) in subareas 1, 2, and 5, and in divisions 4.a and 14.a, Norwegian spring-spawning herring (Northeast Atlantic and Arctic Ocean)

ICES advice on fishing opportunities

ICES advises that when the long-term management strategy agreed by the UK, the Faroe Islands, Iceland, Norway, the Russian Federation, and the European Union is applied, catches in 2024 should be no more than 390 010 tonnes.

ICES advice on conservation aspects

ICES has not identified any conservation aspects.

Stock development over time

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

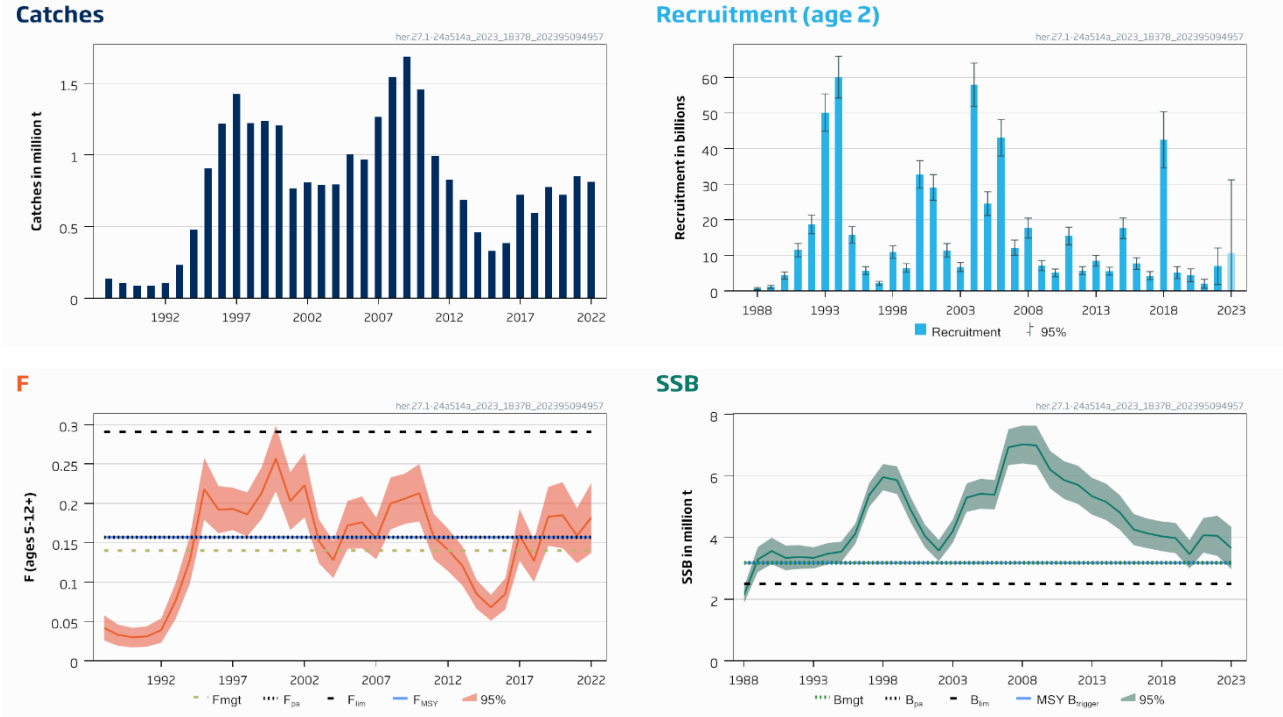

Figure 1 Herring in subareas 1, 2, and 5, and in divisions 4.a and 14.a (Norwegian spring-spawning herring). Summary of the stock assessment. The assumed recruitment value for 2023 is shaded in a lighter colour.

Conservation status

ICES is not aware of any information on stock/species-specific conservation status.

Catch scenarios

Table 1 Herring in subareas 1, 2, and 5 and in divisions 4.a and 14.a (Norwegian spring-spawning herring). Values in the forecast and for the interim year.

Variable	Value	Notes
$F_{ages\ 5–12+}$ (2023)	0.186	Based on assumed catches in 2023.
SSB (2024)	3 059 464	From the assessment model; tonnes.
$R_{age\ 2}$ (2023)	10.619	Median stochastic recruitment based on the years 1988–2022; billions.
$R_{age\ 2}$ (2024)	10.619	Median stochastic recruitment based on the years 1988–2022; billions.
Catch (2023)	692 942	Sum of declared unilateral quotas; tonnes.

Table 2 Herring in subareas 1, 2, and 5 and in divisions 4.a and 14.a (Norwegian spring-spawning herring). Annual catch scenarios. All weights are in tonnes.

Basis	Total catch (2024)	F (2024)	SSB (2025)	% SSB change*	% catch change**	% advice change***	% probability of falling below B_{lim} in 2025
ICES advice basis							
Agreed management strategy^	390010	0.124	2913275	−5	−44	−24	15.7
Other scenarios							
MSY approach: $F_{MSY} \times SSB_{2024}/MSY\ B_{trigger}$	469953	0.151	2844892	−7	−32	−8	20.8
F = 0	0	0	3248398	6	−100	−100	1.9
F_{pa}	487686	0.157	2829739	−8	−30	−5	21.2
F_{lim}	850085	0.291	2521394	−18	23	66	51.4
$SSB_{2025} = B_{lim}$^^	875324	0.301	2500022	−18	26	71	52.9
$SSB_{2025} = B_{pa} = MSY\ B_{trigger}$^^	74667	0.023	3184058	4	−89	−85	2.9
$F = F_{2023}$	570511	0.186	2759039	−10	−18	12	27.7

* SSB_{2025} relative to SSB_{2024} (3 059 464 tonnes)
** Catch in 2024 relative to ICES estimated catch in 2023 (692 942 tonnes).
*** Advice value 2024 relative to advice value 2023 (511 171 tonnes).
^ According to the harvest control rule in the management strategy F(2024) = 0.124, since the SSB is forecasted to be below SSB_{mgt} on 1 January 2024 (the −20% catch constraint in the management strategy does not apply when SSB is below SSB_{mgt}).
^^ SSB_{2025} values are the closest available approximation to B_{lim} and $B_{trigger}$.

The advice for 2024 is 24% lower than for 2023 because: (1) the adult stock size is declining because of low recruitment since the large 2016 year class; and (2) F advised is reduced compared to last year since the SSB in 2024 is predicted to be below SSB_{mgt} (= MSY $B_{trigger}$).

Basis of the advice

Table 3 Herring in subareas 1, 2, and 5 and in divisions 4.a and 14.a (Norwegian spring-spawning herring). The basis of the advice.

Advice basis	Management strategy
Management strategy	A long-term management strategy was agreed by the European Union, the Faroe Islands, Iceland, Norway, and Russian Federation in 2018 (Anon, 2018) and subsequently by the UK (Anon, 2020). ICES has evaluated the long-term management strategy and found it to be precautionary (ICES, 2018a).

Quality of the assessment

The estimated SSB and fishing mortality are consistent with the estimates from last year's assessment. The 2016 year class has been revised upward over the last years.

The Russian Barents Sea survey (IESNS; A3675) was not conducted in 2022 or 2023. There was no survey information on age 2, and therefore median stochastic recruitment based on the years 1988–2022 was used instead in the forecast. However, this has a negligible impact on the advised catches.

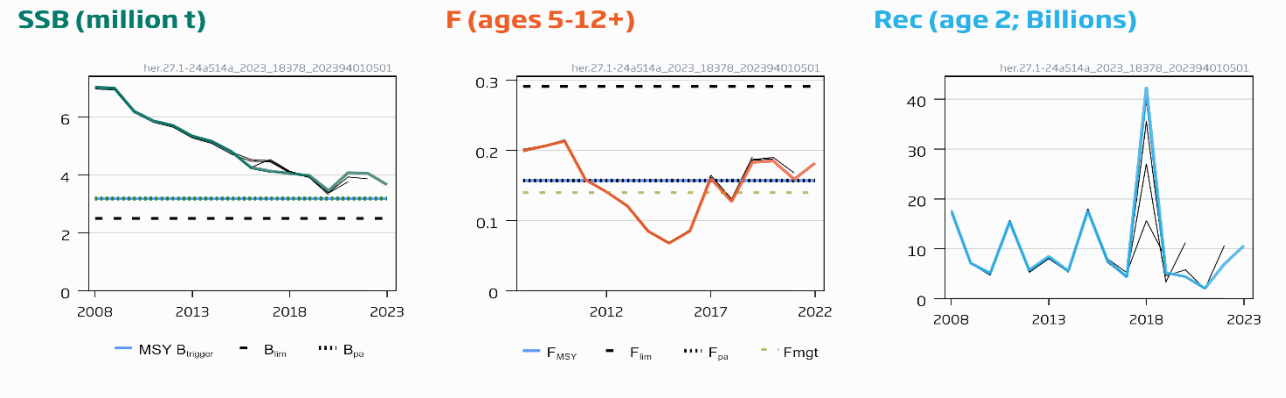

Figure 2 Herring in subareas 1, 2, and 5 and in divisions 4.a and 14.a (Norwegian spring-spawning herring). Historical assessment results.

Issues relevant for the advice

The 2016 year class is expected to dominate the catches in 2024 (45%), and the subsequent year classes recruiting to the fishery are estimated to be weak.

SSB is predicted to be below SSB_{mgt} in 2025 even if the management plan is applied in 2024.

There has been an overshoot of the catches in relation to the advised TAC since 2013. The advice is based on the target fishing mortality in the long-term management strategy agreed by the European Union, the Faroe Islands, Iceland, Norway, and the Russian Federation; it does not consider the deviations from the long-term management strategy as evident from the sum of declared unilateral quotas. During the evaluation of the long-term management strategy (ICES, 2018a), a consistent overshooting of the TAC was not included in the simulations. Therefore, failing to adhere to the advised catches as derived from the application of the long-term management strategy may not be precautionary. Specifically, this may result in an increased risk for the stock to fall below B_{lim} and loss of catch in the long term.

Reference points

Table 4 Herring in subareas 1, 2, and 5 and in divisions 4.a and 14.a (Norwegian spring-spawning herring). Reference points, values, and their technical basis. F values correspond to fishing mortality weighted by the population numbers, for ages 5–12+.

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY $B_{trigger}$	3.184	B_{pa}; in million tonnes.	ICES (2018b)
	F_{MSY}	0.157	Stochastic simulations with Beverton–Holt, segmented regression, and Ricker stock–recruitment relationships, capped to F_{P05}.	ICES (2018a)
Precautionary approach	B_{lim}	2.5	MBAL (accepted in 1998); in million tonnes.	ICES (2018b)
	B_{pa}	3.184	Based on B_{lim} and assessment uncertainties. $B_{lim} \times \exp(1.645 \times \sigma)$, with $\sigma = 0.147$; in million tonnes.	ICES (2018b)
	F_{lim}	0.291	Equilibrium scenarios with stochastic recruitment: F value corresponding to 50% probability of SSB < B_{lim}.	ICES (2018a)
	F_{pa}	0.157	F_{P05}; the F that leads to SSB ≥ B_{lim} with 95% probability.	ICES (2018a, 2021)
EU–Faroes–Iceland–Norway–Russian Federation long-term management strategy	SSB_{mgt_lower}	2.5	Precautionary HCR evaluated by MSE; SSB values in million tonnes.	ICES (2018a)
	SSB_{mgt}	3.184		
	F_{mgt_lower}	0.05		
	F_{mgt}	0.14		

Basis of the assessment

Table 5 Herring in subareas 1, 2, and 5 and in divisions 4.a and 14.a (Norwegian spring-spawning herring). Basis of the assessment and advice.

ICES stock data category	1 (ICES, 2023a).
Assessment type	Statistical assessment model (XSAM; ICES, 2016).
Input data	Assessment period 1988–2023: commercial catches-at-age (stock weight-at-age from surveys and, since 2009, from catch sampling). Three survey indices: Norwegian acoustic survey on spawning grounds in February/March (NASF [A7918]; 1988–1989, 1994–1996, 1998–2000, 2005–2008, 2015–2023); International Ecosystem Survey in the Nordic Seas (IESNS; A3675) covering the adult stock in the Nordic seas (1996–2023), and the juvenile stock in the Barents Sea (1991–2002, 2005–2007, 2009-2019, 2021). Maturity ogive variable by year-class strength. Natural mortalities are fixed values from historical analyses (age 2 = 0.9; ages greater than 2 = 0.15).
Discards and bycatch	Not included, considered negligible.
Indicators	None.
Other information	This stock was benchmarked in 2016 (ICES, 2016). A re-evaluation of reference points and the current management plan took place in 2018 (ICES, 2018a, 2018b).
Working group	Working Group on Widely Distributed Stocks (WGWIDE; ICES 2023b).

History of the advice, catch, and management

Table 6 Herring in subareas 1, 2, and 5 and in divisions 4.a and 14.a (Norwegian spring-spawning herring). ICES advice and landings. All weights are in tonnes.

Year	ICES advice	Catch corresponding to advice	Sum of agreed quotas	ICES catch
1987	TAC	150000	115000	127306
1988	TAC	120000–150000	120000	135301
1989	TAC	100000	100000	103830
1990	TAC	80000	80000	86411
1991	No fishing from a biological point of view	0	76000	84683
1992	No fishing from a biological point of view	0	98000	104448
1993	No increase in F	119000	200000	232457
1994	Gradual increase in F towards $F_{0.1}$; TAC suggested	334000	450000	479228
1995	No increase in F	513000	900000*	905501
1996	Keep SSB above 2.5 million tonnes	-	1425000*	1220283
1997	Keep SSB above 2.5 million tonnes	-	1500000	1426507
1998	Do not exceed the harvest control rule	-	1300000	1223131
1999	Do not exceed the harvest control rule	1263000	1300000	1235433
2000	Do not exceed the harvest control rule	≤ 1500000	1250000	1207201
2001	Do not exceed the harvest control rule	753000	850000	766136
2002	Do not exceed the harvest control rule	853000	850000	807795
2003	Do not exceed the harvest control rule	710000	711000*	789510
2004	Do not exceed the harvest control rule	825000	825000*	794066
2005	Do not exceed the harvest control rule	890000	1000000*	1003243
2006	Do not exceed the harvest control rule	732000	967000*	968958
2007	Do not exceed the harvest control rule	1280000	1280000	1266993
2008	Do not exceed the harvest control rule	1518000	1518000	1545656
2009	Do not exceed the harvest control rule	1643000	1643000	1687371
2010	Do not exceed the harvest control rule	1483000	1483000	1457015
2011	See scenarios in the 2010 advice	988000–1170000	988000	992997
2012	Follow the management plan	833000	833000	826000
2013	Follow the management plan	619000	692000*	684743
2014	Follow the management plan	418487	436893*	461306
2015	Follow the management plan	283013	328206*	328740
2016	Follow the management plan	≤ 316876	376612*	383174
2017	Follow the management plan	≤ 437364**	805142*	721566
2018	Follow the management plan	≤ 384197	546448*	592899
2019	Follow the management strategy, F_{mgt} = 0.14 and B_{mgt} = 3.184 million tonnes	≤ 588562	773750*	777165

Year	ICES advice	Catch corresponding to advice	Sum of agreed quotas	ICES catch
2020	Follow the management strategy, F_{mgt} = 0.14 and B_{mgt} = 3.184 million tonnes	≤ 525594	693915*	720937
2021	Follow the management strategy, F_{mgt} = 0.14 and B_{mgt} = 3.184 million tonnes	≤ 651033	881097*	851813
2022	Follow the management strategy, F_{mgt} = 0.14 and B_{mgt} = 3.184 million tonnes	≤ 598588	827963*	813834
2023	Follow the management strategy, F_{mgt} = 0.14 and B_{mgt} = 3.184 million tonnes	≤ 511171	692942*	
2024	Follow the management strategy	≤ 390010		

* There was no agreement on the TAC; the number is the sum of the declared unilateral quotas.
** Value corrected in October 2017 (previously 646 075 tonnes).

History of the catch and landings

Table 7 Herring in subareas 1, 2, and 5 and in divisions 4.a and 14.a (Norwegian spring-spawning herring). Catch distribution by fleet in 2022 as estimated by ICES.

Catch (2022)	Landings		Discards
813 834 tonnes	46% purse seine	54% pelagic trawl	Discarding is considered to be negligible, but some slippage is known to occur.
	813 843 tonnes		

Table 8 Herring in subareas 1, 2, and 5 and in divisions 4.a and 14.a (Norwegian spring-spawning herring). History of commercial landings; ICES estimated values are presented for each country participating in the fishery. All weights are in tonnes.

Year	Norway	Russian Federation*	Denmark	Faroes	Iceland	Ireland	Netherlands	Greenland	UK	Germany	France	Poland	Sweden	Total
1986	19925	26000	-	-	-	-	-	-	-	-	-	-	-	22525
1987	10841	18889	-	-	-	-	-	-	-	-	-	-	-	12730
1988	11507	20225	-	-	-	-	-	-	-	-	-	-	-	13530
1989	88707	15123	-	-	-	-	-	-	-	-	-	-	-	10383
1990	74604	11807	-	-	-	-	-	-	-	-	-	-	-	86411
1991	73683	11000	-	-	-	-	-	-	-	-	-	-	-	84683
1992	91111	13337	-	-	-	-	-	-	-	-	-	-	-	10444
1993	19977	32645	-	-	-	-	-	-	-	-	-	-	-	23245
1994	38077	74400	-	2911	21146	-	-	-	-	-	-	-	-	47922
1995	52983	10198	30577	57084	17410	-	7969	2500	881	556	-	-	-	90550
1996	69916	11929	60681	52788	16495	19541	19664	-	46131	11978	-	-	22424	12202
1997	86096	16890	44292	59987	22015	11179	8694	-	25149	6190	1500	-	19499	14265
1998	74392	12404	35519	68136	19778	2437	12827	-	15971	7003	605	-	14863	12231
1999	74064	15732	37010	55527	20338	2412	5871	-	19207	-	-	-	14057	12354
2000	71350	16326	34968	68625	18603	8939	-	-	14096	3298	-	-	14749	12072
2001	49503	10905	24038	34170	77693	6070	6439	-	12230	1588	-	-	9818	76613
2002	48723	11376	18998	32302	12719	1699	9392	-	3482	3017	-	1226	9486	80779
2003	47757	12284	14144	27943	11791	1400	8678	-	9214	3371	-	-	6431	78951
2004	47707	11587	23111	42771	10278	11	17369	-	1869	4810	400	-	7986	79406
2005	58080	13209	28368	65071	15646	-	21517	-	-	17676	0	561	680	10032
2006	56723	12083	18449	63137	15747	4693	11625	-	12523	9958	80	-	2946	96895
2007	77908	16243	22911	64251	17362	6411	29764	4897	13244	6038	0	4333	0	12669
2008	96160	19311	31128	74261	21760	7903	28155	3810	19737	8338	0	0	0	15456
2009	10166	21010	32320	85098	26547	10014	24021	3730	25477	14452	0	0	0	16873
2010	87111	19947	26792	80281	20586	8061	26695	3453	24151	11133	0	0	0	14570
2011	57264	14442	26740	53271	15107	5727	8348	3426	14045	13296	0	0	0	99299

Year	Norway	Russian Federation*	Denmark	Faroes	Iceland	Ireland	Netherlands	Greenland	UK	Germany	France	Poland	Sweden	Total
2012	49100	11859	21754	36190	12095	4813	6237	1490	12310	11945	0	0	705	82600
2013	35945	78521	17160	10503	90729	3815	5626	11788	8342	4244	0	0	23	68474
2014	26325	60292	12513	38529	58828	706	9175	13108	4233	669	0	0	0	46130
2015	17632	45853	9105	33031	42625	1400	5255	12434	55	2660	0	0	0	32874
2016	19750	50455	10384	44727	50418	2048	3519	17508	4031	2582	0	0	0	38317
2017	38938	91118	19037	98170	90400	3495	6679	12569	4358	5201	0	1	1155	72156
2018	33202	64185	17052	82062	83393	2428	4290	2465	2582	1989	0	0	425	59289
2019	43050	84364	21207	11394	10804	2775	5111	3190	1801	4188	0	1327	705	77716
2020	40943	74936	16523	10302	98173	2704	5060	3546	143	2969	0	1352	3065	72093
2021	48963	92841	15854	11429	11429	1793	10939	6456	0	3365	0	1242	1101	85181
2022	44593	85870	15014	12208	11273	3209	3783	6818	9620	5600	0	0	3160	81383

* USSR before 1992.

^ From ICES preliminary catch database.

Table 9 Herring in subareas 1, 2, and 5 and in divisions 4.a and 14.a (Norwegian spring-spawning herring). Catches inside and outside the NEAFC regulatory areas (RAs), as estimated by ICES, as well as total landings. Weights are in tonnes.

Year	Inside the NEAFC RAs	Outside the NEAFC RAs	Total catches	Percentage inside the NEAFC RAs
2019	281092	496073	777165	36
2020	95322	625615	720937	13
2021*	20347	738626	758972	2
2022*	65015	662949	727964	10

* Without catches from the Russian Federation, which did not report catches inside/outside the NEAFC RAs for 2021 or 2022. In the past, around 50% of Russian catches were taken inside the NEAFC RAs.

Summary of the assessment

Table 10 Herring in subareas 1, 2, and 5 and in divisions 4.a and 14.a (Norwegian spring-spawning herring). Assessment summary. All weights are in tonnes and recruitment in millions. F is the fishing mortality weighted by population numbers.

Year	Recruitment (age 2)			SSB			Total catch	F (ages 5–12+)		
	Low	Value	High	Low	Value	High		Low	Value	High
1988	355	673	991	1865000	2128000	2392000	135301	0.026	0.042	0.058
1989	699	1172	1644	2884000	3292000	3700000	103830	0.0190	0.033	0.046
1990	3332	4345	5358	3134000	3566000	3998000	86411	0.0170	0.030	0.042
1991	9613	11486	13358	2940000	3343000	3747000	84683	0.0180	0.031	0.044
1992	16075	18699	21323	2985000	3371000	3757000	104448	0.023	0.039	0.054
1993	44891	50139	55387	2997000	3344000	3691000	232457	0.053	0.076	0.099
1994	54208	60080	65952	3130000	3476000	3822000	479228	0.098	0.128	0.159
1995	13489	15817	18145	3212000	3543000	3874000	905501	0.179	0.22	0.26
1996	4620	5733	6846	3795000	4126000	4456000	1220283	0.162	0.192	0.22
1997	1594	2151	2708	4996000	5385000	5775000	1426507	0.166	0.193	0.22
1998	9171	10937	12704	5538000	5966000	6394000	1223131	0.158	0.186	0.21
1999	5277	6486	7696	5415000	5865000	6315000	1235433	0.180	0.21	0.25
2000	28879	32755	36631	4471000	4884000	5298000	1207201	0.22	0.26	0.30
2001	25496	29101	32706	3683000	4055000	4427000	766136	0.166	0.20	0.24
2002	9574	11450	13326	3234000	3579000	3925000	807795	0.182	0.22	0.26
2003	5456	6733	8010	3828000	4209000	4590000	789510	0.124	0.152	0.180
2004	51898	57974	64050	4837000	5300000	5763000	794066	0.105	0.128	0.152
2005	21212	24559	27906	4936000	5426000	5915000	1003243	0.142	0.172	0.20
2006	37913	43071	48228	4912000	5393000	5873000	968958	0.143	0.176	0.21
2007	10047	12179	14310	6351000	6937000	7523000	1266993	0.129	0.155	0.182
2008	14874	17671	20469	6410000	7025000	7640000	1545656	0.167	0.20	0.23
2009	5724	7135	8546	6351000	6997000	7643000	1687373	0.174	0.21	0.24
2010	4010	5094	6178	5592000	6205000	6819000	1457014	0.177	0.21	0.25
2011	12955	15441	17926	5253000	5867000	6482000	992998	0.129	0.158	0.187
2012	4569	5712	6855	5088000	5712000	6335000	825999	0.114	0.141	0.168
2013	6964	8495	10026	4744000	5344000	5944000	684743	0.096	0.121	0.146
2014	4455	5577	6700	4571000	5164000	5758000	461306	0.066	0.085	0.103
2015	14728	17619	20510	4252000	4816000	5380000	328740	0.051	0.068	0.084
2016	6071	7702	9333	3755000	4263000	4771000	383174	0.065	0.085	0.105
2017	3182	4314	5445	3653000	4136000	4619000	721566	0.127	0.160	0.193
2018	34551	42477	50403	3563000	4046000	4528000	592899	0.100	0.127	0.154
2019	3486	5170	6854	3494000	3986000	4479000	777165	0.146	0.183	0.22
2020	2600	4424	6247	2998000	3461000	3923000	720937	0.143	0.185	0.23
2021	783	2043	3303	3512000	4077000	4642000	851813	0.124	0.159	0.194
2022	1790	6944	12099	3406000	4060000	4714000	813834	0.137	0.182	0.23
2023	0	10619	31256	2974000	3664000	4353000				

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Download the stock assessment data and figures.

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