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Advice on fishing opportunities for Northeast Arctic haddock in 2023 in ICES subareas 1 and 2

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Advice on fishing opportunities for Northeast Arctic haddock in 2023 in ICES subareas 1 and 2

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Stock Name: Northeast Arctic haddock (ICES areas 1 and 2)

Advice on fishing opportunities

The Joint Russian-Norwegian working group on Arctic Fisheries (JRN-AFWG) advises that when the Joint Norwegian–Russian Fisheries Commission management plan is applied, catches in 2023 should be no more than 170 067 tonnes.

Stock development over time

Fishing pressure on the stock is between F_{pa} and F_{lim} and above F msy , and the spawning stock biomass is above B_{pa} and B_{lim}.

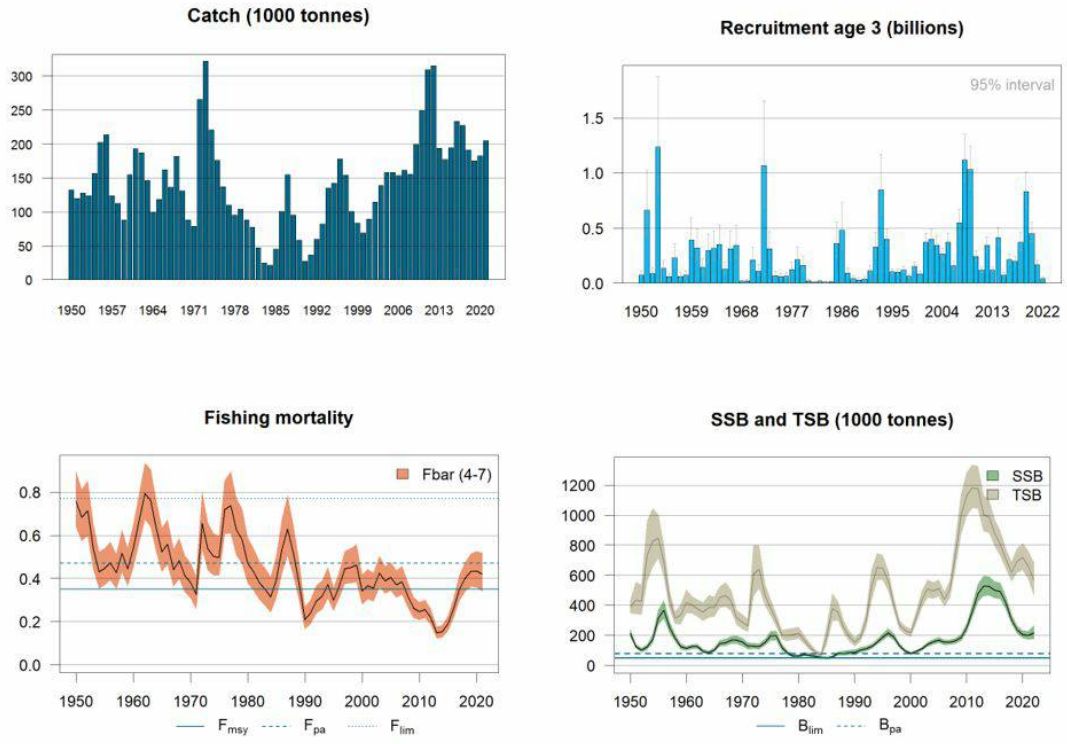

Figure 1 Haddock in ICES subareas 1 and 2 (Northeast Arctic). Catch, recruitment, F, SSB and TSB (total stock biomass, age 3+) with 95 % confidence levels. The biomass reference points relate to SSB.

The stock is declining and is expected to continue to decline. This decline is expected to continue at least until the 2021 year-class enters the fishery.

Catch scenarios

Table 1 Haddock in ICES subareas 1 and 2 (Northeast Arctic). SSB, catch in tonnes and recruitment in thousands.

Variable	Value	Notes
F ages 4–7 (2022)	0.303	TAC constraint
SSB (2023)	231 868	
Rage 3 (2022)	38 431	SAM estimates
Rage 3 (2023)	89 327	RCT3 estimates
Rage 3 (2024)	303 267	RCT3 estimates
Total catch (2022)	178 532	TAC set by 51 st JRNFC

Table 2 Haddock in ICES subareas 1 and 2 (Northeast Arctic). Annual catch options. All weights are in tonnes.

Basis	Total catch (2023)	F ages 4-7 (2023)	SSB (2024)	% SSB change*	% TAC change**	% Advice change***
Advice basis						
Management plan	170 067	0.35	205 549	-11	-5	-5
Other scenarios						
MSY approach: F_{MSY}	170 067	0.35	205 549	-11	-5	-5
F = 0	0	0.00	321 974	39	-100	-100
F 2023 = F2022	151 269	0.30	218 188	-6	-15	-15
$F = F_{pa}$	213 495	0.47	176 638	-24	20	20
$F = F_{lim}$	298 284	0.77	121 687	-48	67	67

* SSB 2024 relative to SSB 2023

** Catch in 2023 relative to TAC in 2022 (178 532 t).

*** Advice value for 2023 relative to advice value for 2022

The advice for 2023 is 5 % lower than the advice and TAC for 2022 due to a declining stock trend.

Basis of the advice

Table 3 Haddock in ICES subareas 1 and 2 (Northeast Arctic). The basis of the advice.

Advice basis	Joint Norwegian-Russian Fisheries Commission management plan
Management plan	The current harvest control rule (HCR) for haddock is as follows (see details in Protocol of the 46th Session of the Joint Norwegian–Russian Fisheries Commission [JNRFC, 2016]): • *TAC for the next year will be set at level corresponding to F_{MSY}.* • *The TAC should not be changed by more than ±25% compared with the previous year TAC.* • *If the spawning stock falls below B_{pa} , the procedure for establishing TAC should be based on a fishing mortality that is linearly reduced from F_{MSY} at B_{pa} to F = 0 at SSB equal to zero. At SSB-levels below B_{pa} in any of the operational years (current year and a year ahead) there should be no limitations on the year-to-year variations in TAC.* At the 46 th Session of the Joint Norwegian–Russian Fisheries Commission in 2016 it was decided to keep the existing HCR for haddock for the next five years. Quota flexibility: In 2014, JNRFC decided that from 2015 onwards, Norway and Russia can transfer to, or borrow from, the following year up to 10% of the country's quota. ICES evaluated this HCR in 2016 (ICES, 2016) and rechecked it in 2020 (ICES, 2020). ICES concluded that the HCR is precautionary.

Quality of the assessment

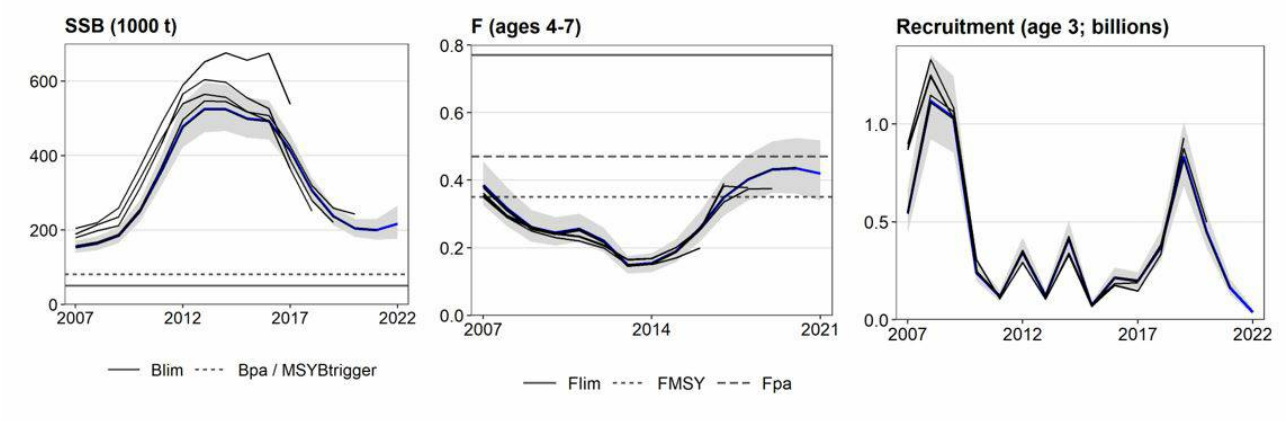

Figure 2 Haddock in ICES subareas 1 and 2 (Northeast Arctic). Historical assessment results. The shaded areas indicate the 95% confidence intervals for the 2022 assessment.

Issues relevant for the advice

Due to the temporary suspension of Russian scientists from ICES this assessment was conducted by a Joint Russian-Norwegian working group on Arctic Fisheries (JRN-AFWG) consisting of scientists from VNIRO (Russia), and IMR (Norway) (Howell et al. 2022).

This advice has been conducted outside ICES and should not be considered as ICES advice. However, this assessment and advice has been produced following the methodology agreed at the ICES benchmark in 2020 (ICES, 2020).

$F_{bar(4-7)}$ has been above F_{MSY} from 2018 and onwards. The assessments from 2017 to 2019 on which the TAC advice for 2018-2020 were based, had large positive retrospective biases for TSB and SSB, implying that the stock sizes were overestimated. The retrospective bias was reduced after the revision at the 2020 benchmark.

The catch in 2021 was 12% lower than the TAC.

Reference points

Table 4 Haddock in ICES subareas 1 and 2 (Northeast Arctic). Reference points, values, and their technical basis.

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY $B_{trigger}$	80 000 tonnes	B_{pa}	ICES (2020)
	F_{MSY}	0.35	Stochastic long-term simulations	ICES (2020)
Precautionary approach	B_{lim}	50 000 tonnes	B_{loss}	ICES (2020)
	B_{pa}	80 000 tonnes	$B_{lim} \times \exp(1.645 \times \sigma)$, where $\sigma = 0.3$	ICES (2020)
	F_{lim}	0.77	Determined from replacement line leading from SSB = 0 to the geometric mean recruitment at SSB = B_{lim}	ICES (2020)
	F_{pa}	0.47	$F_{lim} \times \exp(-1.645 \times \sigma)$, where $\sigma = 0.3$	ICES (2020)
Management plan	SSB_{MGT}	80 000 tonnes	B_{pa}	ICES (2020)
	F_{MGT}	0.35	F_{MSY}	ICES (2020)

Basis of the assessment

Table 5 Haddock in ICES subareas 1 and 2 (Northeast Arctic). Basis of the assessment and advice.

ICES stock data category	1
Assessment type	Age-based analytical assessment (SAM) that uses catches in the model.
Input data	Commercial landings (international landings, ages, and length frequencies from catch sampling); four survey indices (RU-BTr-Q4 (Btr), BS-NoRU-Q1(Aco), BS-NoRu-Q1 (BTr), and Eco-NoRu-Q3 (Btr)); annual maturity and stock weight-at-ag data from surveys; from 1984, the natural mortalities are derived from the consumption of haddock (ages 3–6) by cod.
Discards and bycatch	Discarding is considered negligible in recent years.
Indicators	None.
Other information	Last benchmarked in February 2020 (ICES, 2020).
Working group	Joint Russian-Norwegian working group on Arctic Fisheries (JRN-AFWG)

History of the advice, catch, and management

Table 6 Haddock in ICES subareas 1 and 2 (Northeast Arctic). ICES advice, agreed TACs, the official and unreported landings, and ICES catches. All weights are in tonnes.

Year	ICES advice	Catch corresponding to advice	Agreed TAC	Official catches	Unreported landings (included in ICES catches)	ICES catches
1987	No increase in F; TAC	160000	250000	154916		154916
1988	No increase in F	< 240000	240000	95255		95255
1989	Large reduction in F	69000	83000	58518		58518
1990	No directed fishery	-	25000	27182		27182
1991	No directed fishery	-	28000	36216		36216
1992	Within safe biological limits	35000	63000	59922		59922
1993	No long-term gains in increasing F	56000	72000	82379		82379
1994	No long-term gains in F > F_{med}	97000**	120000	135186		135186
1995	No long-term gains in F > F_{med}	122000**	130000	142448		142448
1996	No long-term gains in F > F_{med}	169000**	170000	178128		178128
1997	Well below F_{med}	< 242000	210000	154359		154359
1998	Below F_{med}	< 120000	130000	100630		100630
1999	Reduce F below F_{pa}	< 74000	78000	83195		83195
2000	Reduce F below F_{pa}	< 37000	62000	68944		68944
2001	Reduce F below F_{pa}	< 66000	85000	89640		89640
2002	Reduce F below F_{pa}	< 64000	85000	96062	18736	114798
2003	Reduce F below F_{pa}	< 101000	101000	105700	33226	138926
2004	Reduce F below F_{pa}	< 120000	130000	124502	33777	158279
2005	Reduce F below F_{pa}	< 106000	117000	118015	40283	158298
2006	Reduce F below F_{pa}	< 112000	120000	131706	21451	153157
2007	Limit catches	< 130000	150000	146972	14553	161525
2008	Limit catches to 2001–2004 average	< 130000	155000	149776	5828	155604
2009	Apply management plan	< 194000	194000	200061	0	200061
2010	Apply management plan	< 243000	243000	249200	0	249200
2011	Apply management plan	< 303000	303000	309785	0	309785
2012	Apply management plan	< 318000	318000	315627	0	315627
2013	Apply management plan	< 238000	200000	193744	0	193744
2014	Apply management plan	< 150000	178500	177522	0	177522
2015	Apply management plan	< 165000	223000	194756	0	194756
2016	Apply management plan	< 244000^	244000	233416	0	233416
2017	Apply management plan	≤ 233000	233000	227588	0	227588
2018	Apply management plan	≤ 202305	202305	191276	0	191276
2019	Apply management plan	≤ 152000	172000	175402	0	175402
2020	Apply management plan	≤ 215000	215000	182468	0	182468
2021	Apply management plan	≤ 232537	232537	204743	0	204743 ^^
2022	Apply management plan	≤ 178532	178532			
2023	Apply management plan	≤ 170067 ^^				

* Coastal haddock in Norwegian statistical areas 06 and 07 (south of Lofoten) are included.

** Predicted landings at F_{med} .

^ This advice was updated on 7 July 2015 in response to a special request (ICES, 2015) after a mid-year change in TAC in 2015 (from 178500 tonnes to 223000 tonnes) .

^^ In 2022 assessment and advice was carried out by the Joint Russian-Norwegian working group on Arctic Fisheries (JRN-AFWG) which compiled catches for 2021 and gave advice for 2023.

History of catch and landings

Table 7 Haddock in ICES subareas 1 and 2. History of official commercial catch and landings by country. All weights are in tonnes.

Year	Faroe Islands	France	Fed. Rep. Germany.	Greenland	Norway^	Russia**	Spain	United Kingdom	Others	Unreported catches***	Total
1960	172	-	5597		46263	57025		45469	125	-	154651
1961	285	220	6304		60862	85345		39650	558	-	193224
1962	83	409	2895		54567	91910		37486	58	-	187408
1963	17	363	2554		59955	63526		19809	-	-	146224
1964	-	208	1482		38695	43870		14653	250	-	99158
1965	-	226	1568		60447	41750		14345	242	-	118578
1966	-	1072	2098		82090	48710		27723	85	-	161778
1967	-	1208	1705		51954	57346		24158	26	-	136397
1968	-	-	1867		64076	75654		40129	0	-	181726
1969	2	-	1490		67549	24211		37234	334	-	130820
1970	541	-	2119		37716	26802		20423	656	-	88257
1971	81	-	896		45715	15778		16373	62	-	78905
1972	137	-	1433		46700	196224		17166	4493	-	266153
1973	1212	3214	9534		86767	186534		32408	2557	-	322226
1974	925	3601	23409		66164	78548		37663	10847	-	221157
1975	299	5191	15930		55966	65015		28677	4680	-	175758
1976	536	4459	16660		49492	42485		16940	6692	-	137264
1977	213	1510	4798		40118	52210		10878	431	-	110158
1978	466	1411	1521		39955	45895		5766	408	-	95422
1979	343	1198	1948		66849	26365		6454	466	-	103623
1980	497	226	1365		66501	20706		2948	261	-	92504
1981	381	414	2402		63435	13400		1682	22	-	81736
1982	496	53	1258		43702	2900	-	827	0	-	49236
1983	428	-	729		22364	680	139	259	1	-	24600
1984	297	15	400		18813	1103	37	276	4	-	20945
1985	424	21	395		21272	22690	77	153	20	-	45052
1986	893	12	1079		52313	45738	22	431	75	-	100563
1987	464	7	3105		72419	78211	59	563	88	-	154916
1988	1113	116	1323		60823	31293	72	435	80	-	95255
1989	1217	-	171		36451	20062	1	590	26	-	58518
1990	705	-	167		20621	5190	-	494	5	-	27182
1991	1117	-	213		22178	12177	-	514	17	-	36216
1992	1093	151	387	1719	36238	19699	38	596	1	-	59922
1993	546	1215	1165	880	40978	35071	76	1802	646	-	82379
1994	2761	678	2412	770	71171	51822	22	4673	877	-	135186
1995	2833	598	2675	1097	76886	54516	14	3111	718	-	142448
1996	3743	6	942	1510	94527	74239	669	2275	217	-	178128

Year	Faroe Islands	France	Fed. Rep. Germany.	Greenland	Norway^	Russia**	Spain	United Kingdom	Others	Unreported catches***	Total
1997	3327	540	972	1877	103407	41228	364	2340	304	-	154359
1998	1903	241	385	854	75108	20559	257	1229	94	-	100630
1999	1913	64	641	437	48182	30520	652	694	92	-	83195
2000	631	178	880	432	42009	22738	502	747	827	-	68944
2001	1210	324	554	553	49067	34307	1497	1068	1060	-	89640
2002	1564	297	627	858	52247	37157	1505	1125	682	18736	114798
2003	1959	382	918	1363	56485	41142	1330	1018	1103	33226	138926
2004	2484	103	823	1680	62192	54347	54	1250	1569	33777	158279
2005	2138	333	996	15	60850	50012	963	1899	1262	40283	158751
2006	2390	883	989	1830	69272	53313	703	1164	1162	21451	153157
2007	2307	277	1123	1464	71244	66569	125	1351	2511	14553	161525
2008	2687	311	535	1659	72779	68792	283	971	1759	5828	155604
2009	2820	529	1957	1410	104354	85514	317	1315	1845	0	200061
2010	3173	764	3539	1970	123384	111372	379	1758	2862	0	249200
2011	1759	268	1724	2110	158202	139912	502	1379	3929	0	309785
2012	2055	322	1111	3984	159602	143886	441	833	3393	0	315627
2013	1886	342	500	1795	99215	85668	439	639	3260	0	193744
2014	1470	198	340	1150	91306	78725	187	355	3791	0	177522
2015	2459	145	124	1047	95094	91864	246	450	3327	0	194756
2016	2460	340	170	1401	108718	115710	200	575	3838	0	233416
2017	2776	108	170	1810	113132	106714	228	372	2279	0	227588
2018	2333	183	385	1317	93839	90486	169	453	2173	0	191276
2019	1515	143	204	1208	93860	76125	280	456	1611	0	175402
2020	1392	96	282	910	88108	89030	45	320	2286	0	182468
2021*^^	1722	105	365	1101	100673	98296	131	78	2272	0	204743

* Provisional figures.

** USSR prior to 1991.

*** Figures based on Norwegian/Russian illegal, unreported, and unregulated fisheries (IUU) estimates.

^ Landings of coastal haddock in Norwegian statistical areas 06 and 07 (south of Lofoten) are included from 1983.

^^In 2022 assessment and advice was carried out by the Joint Russian-Norwegian working group on Arctic Fisheries (JRN-AFWG) which compiled catches for 2021 and gave advice for 2023.

Summary of the assessment

Table 8 Haddock in ICES subareas 1 and 2 (Northeast Arctic). Assessment summary. High and low refer to 95% confidence bounds.

Year	Recruitment (thousands)			SSB (tonnes)			Total catch (tonnes)	F		
	Age 3	High	Low	SSB	High	Low		Ages 4–7	High	Low
1950	71954	46160	112161	214279	192049	239082	132125	0.757	0.64	0.895
1951	662668	429436	1022572	126110	112047	141939	120077	0.683	0.576	0.811
1952	87684	56210	136781	101799	88941	116517	127660	0.713	0.597	0.852
1953	1236112	814474	1876024	120561	104157	139550	123920	0.536	0.443	0.648
1954	132692	85171	206726	174538	148014	205816	156788	0.43	0.354	0.522
1955	58481	37134	92100	313360	267430	367179	202286	0.447	0.371	0.539
1956	229412	146973	358093	367219	312961	430885	213924	0.472	0.392	0.569
1957	60191	38357	94452	253094	217114	295035	123583	0.426	0.355	0.512
1958	72727	46696	113271	181736	157983	209059	112672	0.517	0.43	0.622
1959	388917	256300	590152	125293	108818	144263	88211	0.444	0.366	0.538
1960	319617	209398	487852	112867	99564	127948	154651	0.54	0.45	0.646
1961	144191	94743	219445	124747	111163	139991	193224	0.663	0.561	0.785
1962	294721	194343	446943	125047	111195	140626	187408	0.793	0.674	0.934
1963	313728	208414	472257	94205	82955	106980	146224	0.761	0.638	0.907
1964	352219	232640	533263	84357	74141	95980	99158	0.632	0.525	0.762
1965	126309	82135	194241	103060	89956	118073	118578	0.524	0.433	0.633
1966	313027	205139	477656	145581	126799	167144	161778	0.559	0.465	0.671
1967	341917	223471	523142	151115	130284	175276	136397	0.441	0.364	0.534
1968	18033	11181	29084	168049	145535	194044	181726	0.483	0.398	0.585
1969	20492	12780	32859	167756	144118	195271	130820	0.412	0.336	0.504
1970	209907	135812	324426	155327	131740	183137	88257	0.383	0.31	0.473
1971	108513	69785	168732	127578	107522	151376	78905	0.326	0.261	0.407
1972	1066297	686314	1656659	128558	111671	147997	266153	0.655	0.536	0.8
1973	309863	204061	470519	125538	107980	145951	322226	0.537	0.439	0.657
1974	65777	42815	101054	153803	134044	176476	221157	0.502	0.414	0.609
1975	59215	38571	90908	195116	167179	227722	175758	0.497	0.415	0.595
1976	61657	39505	96230	196497	168938	228551	137264	0.72	0.606	0.854
1977	120878	76578	190806	118927	100298	141017	110158	0.738	0.609	0.894
1978	214299	141229	325173	81230	67275	98081	95422	0.625	0.507	0.769
1979	161196	105893	245381	62550	52626	74344	103623	0.582	0.468	0.722
1980	22214	13770	35836	62876	53385	74055	87889	0.472	0.378	0.588
1981	10373	6182	17404	72926	61649	86267	77153	0.433	0.347	0.54
1982	16685	10270	27106	68721	56827	83105	46955	0.38	0.302	0.478
1983	8517	5013	14472	58413	47945	71166	24600	0.35	0.274	0.448
1984	13170	8117	21369	53238	43378	65339	20945	0.315	0.244	0.406
1985	360421	236188	550001	49175	40893	59134	45052	0.395	0.31	0.504

Year	Recruitment (thousands)			SSB (tonnes)			Total catch (tonnes)	F		
	Age 3	High	Low	SSB	High	Low		Ages 4–7	High	Low
1986	480423	315598	731331	54932	46581	64781	100563	0.535	0.425	0.673
1987	90168	58164	139782	77886	66612	91068	154916	0.63	0.506	0.784
1988	39086	24572	62172	79981	67314	95032	95255	0.51	0.408	0.637
1989	28690	17838	46145	84497	69604	102576	58518	0.373	0.296	0.47
1990	36995	23783	57547	85921	69888	105632	27182	0.211	0.165	0.269
1991	111064	78155	157832	100599	84419	119880	36216	0.239	0.191	0.3
1992	328345	233437	461840	111029	95914	128527	59922	0.295	0.238	0.365
1993	847060	614155	1168288	125586	110671	142511	82379	0.317	0.258	0.39
1994	398541	321655	493805	154808	138283	173307	135186	0.372	0.307	0.451
1995	101169	79053	129473	188058	167539	211090	142448	0.298	0.25	0.355
1996	100698	79043	128284	217720	194150	244150	178128	0.365	0.31	0.429
1997	120498	94753	153239	188657	168178	211630	154359	0.444	0.376	0.525
1998	63525	49193	82032	131664	116654	148606	100630	0.451	0.378	0.539
1999	151800	121599	189502	95277	84396	107561	83195	0.463	0.384	0.557
2000	83531	65493	106537	78591	69508	88860	68944	0.341	0.28	0.417
2001	369908	302935	451687	92000	82049	103159	89640	0.367	0.305	0.442
2002	397842	324975	487048	109706	97927	122903	114798	0.353	0.294	0.425
2003	342420	275510	425581	137919	123784	153669	138926	0.425	0.359	0.503
2004	262688	214934	321052	156548	140497	174432	158279	0.388	0.33	0.457
2005	369114	303533	448865	168006	150852	187110	158298	0.404	0.344	0.475
2006	158484	128452	195538	152111	136464	169553	153157	0.369	0.313	0.436
2007	546307	446462	668482	154138	138541	171491	161525	0.385	0.326	0.456
2008	1118238	923680	1353778	163581	145927	183371	155604	0.316	0.264	0.379
2009	1032328	855199	1246143	184743	164860	207025	200061	0.261	0.218	0.312
2010	242169	197117	297516	250124	222925	280640	249200	0.245	0.207	0.291
2011	118630	94061	149618	358639	319475	402603	309785	0.256	0.218	0.301
2012	343696	280562	421036	477985	422713	540483	315627	0.221	0.187	0.26
2013	120201	95747	150901	525035	462748	595705	193744	0.148	0.124	0.176
2014	415161	340548	506123	524516	465653	590819	177522	0.154	0.128	0.184
2015	73229	57412	93404	499511	448301	556572	194756	0.189	0.158	0.225
2016	214907	173580	266072	492548	442909	547750	233183	0.259	0.219	0.307
2017	197724	160085	244212	412857	373794	456002	227588	0.349	0.296	0.412
2018	370008	299579	456994	306676	276535	340103	191276	0.402	0.34	0.475
2019	831409	682866	1012264	237709	213456	264719	175402	0.432	0.362	0.515
2020	449467	366822	550732	204215	181387	229916	182468	0.435	0.36	0.525
2021	164246	128805	209438	199550	173606	229372	204743	0.42	0.34	0.518
2022	38431	25191	58630	216456	176604	265300				

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