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

ICES stock advice

ICES advises that when the MSY approach is applied, catches during 1 November 2016–31 October 2017 should be no more than 358 471 tonnes.

Stock development over time

The stock size is highly variable from year to year, due to recruitment variability and a short life span. Stock size has increased and is above B_{pa} in 2016. Fishing mortality has been below the long-term average F (0.45) since 1995. Recruitment in 2014 and 2016 are high, while recruitment in 2015 is around average.

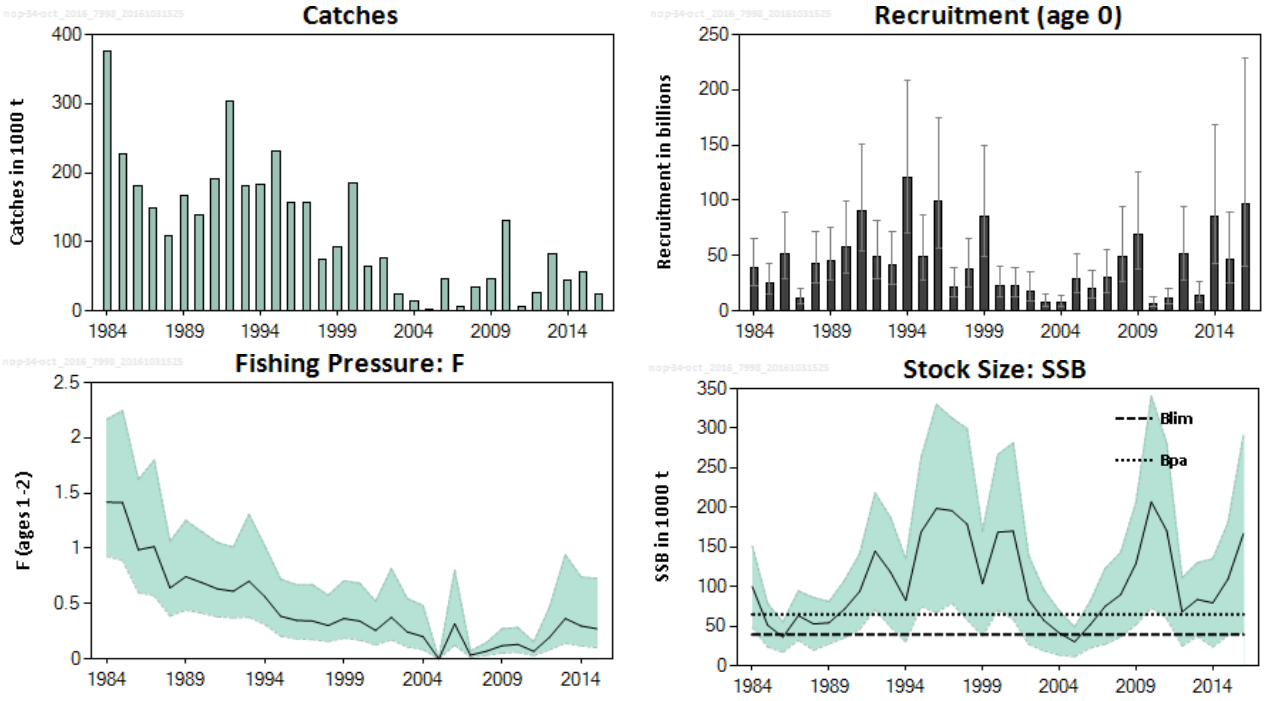

Figure 6.3.34.1 Norway pout in Subarea 4 and Division 3.a. Summary of the stock assessment (weights in thousand tonnes). Catch values are shown by calendar year, recruitment at the beginning of the 3rd quarter, and SSB at the beginning of the 4th quarter.

Stock and exploitation status

Table 6.3.34.1 Norway pout in Subarea 4 and Division 3.a. State of the stock and fishery relative to reference points.

		Fishing pressure					Stock size			
		2013	2014	2015			2014	2015	2016	
Maximum sustainable yield	F_{MSY}	?	?	?	Undefined	MSY $B_{escapement}$	?	?	?	Undefined
	F_{cap}	?	?	?	Undefined					
Precautionary approach	F_{pa}, F_{lim}	?	?	?	Undefined	B_{pa}, B_{lim}	✓	✓	✓	Full reproductive capacity
Management plan	F_{MGT}	-	-	-	Not applicable	SSB_{MGT}	-	-	-	Not applicable

Catch options

Table 6.3.34.2 Norway pout in Subarea 4 and Division 3.a. The basis for the catch options.

Variable	Value	Source	Notes
F ages 1–2	0.224	ICES (2016a)	F in the 4th quarter 2015 to the 3rd quarter 2016 from the assessment.
$R_{age\ 0}$ (2016)	96296	ICES (2016a)	Age 0 in 3rd quarter. From the assessment (thousands).
Total catches	59.270	ICES (2016a)	Based on landings statistics from the 4th quarter 2015 to the 3rd quarter 2016 (in thousand tonnes).
Discards	0	ICES (2016a)	Industrial fishery with no discards.

Table 6.3.34.3 Norway pout in Subarea 4 and Division 3.a. The catch options. All weights in thousand tonnes.

Rationale	Catch 1 November 2016– 31 October 2017*	Basis	F 1 November 2016–31 October 2017	5th percentile SSB in the 4th quarter 2017	Median SSB (4th quarter 2017) **	% SSB change **	% Catch change ***
MSY approach (escapement strategy)	358.471	95% probability of SSB being above B_{lim} in the 4th quarter 2017	0.62	39.450	134.950	−20	505
Zero catch	0	No fishery	0	131.320	240.620	43	−100
Other options	182.064	*Status quo* F	0.23	84.030	190.500	13	207
	541.340	Median SSB being at B_{lim} in the 4th quarter of 2017	2.62	5.590	39.450	−77	813
	513.159	Median SSB being at B_{pa} in the 4th quarter of 2017	1.68	11.310	65.000	−61	766

* 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 2016–31 October 2017.
** SSB in 4th quarter 2017 relative to SSB in 4th quarter 2016 (= 168 190 t), derived from the forecast.
*** Catches 1 October 2016–30 September 2017 relative to catches 1 October 2015–30 September 2016.

Basis of the advice

Table 6.3.34.4 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	There is no management strategy for Norway pout in this area.

Quality of the assessment

With the benchmark changes to the Norway pout assessment (ICES, 2016b), many of the estimates of recruitment and particularly SSB are lower than the previous assessments, but the stock trends are generally similar.

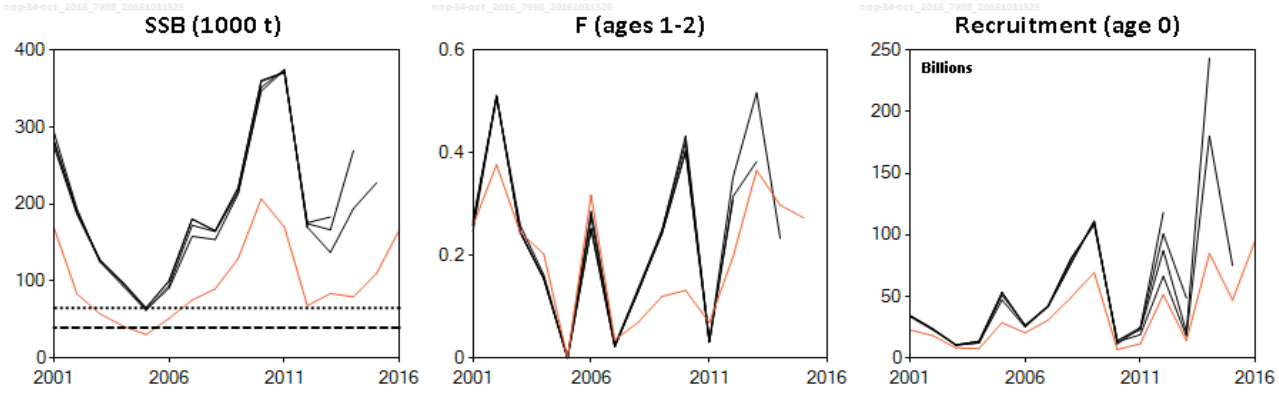

Figure 6.3.34.2 Norway pout in Subarea 4 and Division 3.a. Historical assessment results (final-year recruitment estimates included). Horizontal lines show B_{lim} (dashed) and B_{pa} (dotted).

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 default ICES approach to MSY-based management for short-lived species is an escapement strategy, i.e. to maintain SSB, with 95% probability, above B_{lim} after the fishery has taken place.

The former F_{cap} and MSY $B_{escapement}$ reference points are no longer used because the forecast is now stochastic and uncertainties in the assessment and forecast are directly taken into account to ensure 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). Consequently, the B_{lim} has been adjusted. The B_{lim} estimate in the 4th quarter is lower than the previous value of B_{lim} for the 1st quarter because the 0-group and many of the 1-group fish are not yet included in the estimate of SSB.

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 2016–31 October 2017.

Reference points

Table 6.3.34.5 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 (2016b)
	B_{pa}	65 000 t, 4th quarter	$= B_{lim}\, e^{0.3 \times 1.65}$	ICES (2016b)
	F_{lim}	Not defined		
	F_{pa}	Not defined		
Management plan	SSB_{MGT}	Not applicable		
	F_{MGT}	Not applicable		

Basis of the assessment

Table 6.3.34.6 Norway pout in Subarea 4 and Division 3.a. The basis of the assessment.

ICES stock data category	1 (ICES, 2016c).
Assessment type	Age-based analytical assessment (seasonal SAM).
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 stock from long-term commercial catch estimates, and annual mean weight-at-age in 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, 2016b).
Working group	Working Group on the Assessment of Demersal Stocks in the North Sea and Skagerrak (WGNSSK).

Information from stakeholders

There is no available information.

History of the advice, catch, and management

Table 6.3.34.7 Norway pout in Subarea 4 and Division 3.a. History of ICES advice, the agreed TAC, official catches, and ICES estimates of catch. All weights are in thousand tonnes.

Year	ICES advice	Predicted catch corresp. to advice	TAC Norway	TAC EU	Official catch	ICES catch
1987	No advice	-	No TAC	200	215	147
1988	No advice	-	No TAC	200	187	102
1989	No advice	-	No TAC	200	276	167
1990	No advice	-	No TAC	200	212	140
1991	No advice	-	No TAC	200	223	155
1992	No advice	-	No TAC	200	335	255
1993	No advice	-	No TAC	220	241	176
1994	No advice	-	No TAC	220	214	176
1995	Can sustain current F	-	No TAC	180	289	181
1996	Can sustain current F; take bycatches into consid.	-	No TAC	220	197	122
1997	Can sustain current F; take bycatches into consid.	-	No TAC	220	155	133
1998	Can sustain current F; take bycatches into consid.	-	No TAC	220	72	62
1999	Can sustain current F; take bycatches into consid.	-	No TAC	220	93	85
2000	Can sustain current F; take bycatches into consid.	-	No TAC	220	182	175
2001	Can sustain current F; take bycatches into consid.	-	No TAC	211.2	63	57
2002	Can sustain current F; take bycatches into consid.	-	No TAC	198	93	74
2003	Can sustain current F; take bycatches into consid.	-	No TAC	198	24	21
2004	The stock is in risk of decreasing below B_{lim}	-	No TAC	198	16	14
2005	Fishery should be closed		Only bycatch	5	1	2
2006	Fishery closed until 4th August where a TAC of 95 000 t was set.		No TAC	95	54	47
2007	Fishery closed because SSB < B_{pa} in 2008.	0	Only bycatch	5	6	6
2008	F = 0.35 or 50 000 t for first half of 2008	< 50 in first 6 months		41		
In-year *	Maintain SSB > B_{pa}	< 148	80	114.616	39	36
2009	Reduce F to increase SSB > B_{pa}	< 35		28.3		
In-year *	Maintain SSB > B_{pa}	< 157	128	116.279	55	56
2010	Maintain SSB > B_{pa}	< 307	86	76		
In-year *	Maintain SSB > MSY $B_{escapement}$	< 434		162.95	137	126

Year	ICES advice	Predicted catch corresp. to advice	TAC Norway	TAC EU	Official catch	ICES catch
2011	No directed fisheries	0				
In-year *	Maintain SSB > MSY $B_{escapement}$	< 6	3	4.5	7	7
2012	No fisheries	0		0		
In-year *	No fisheries	0			30	27
In-year **	Maintain SSB > MSY $B_{escapement}$	< 101	25	70.683		
2013	Maintain SSB > MSY $B_{escapement}$	< 458($Catch_{2012}$ = 0) < 393($Catch_{,2012}$ = 101)	157	165.7	82	82
In-year *	Maintain SSB > MSY $B_{escapement}$	< 457				
2014	Maintain SSB > MSY $B_{escapement}$	< 216	108	128.25		44
In-year *	Maintain SSB > MSY $B_{escapement}$	< 108	123			
2015	Precautionary considerations (F = 0.6)	< 326	163	150	65	63
2016	MSY approach (escapement biomass with F_{cap})	< 390	195	150		
2017	MSY approach (escapement strategy; probability of SSB falling below B_{lim} is less than 5%).	≤ 358				

* For Norway pout preliminary advice was given in autumn, while the in-year advice was given in June on the basis of the first surveys and catches in the TAC year.
** Update of in-year advice in October 2012.

History of catch and landings

Table 6.3.34.8 Norway pout in Subarea 4 and Division 3.a. Catch distribution by fleet in 2015 as estimated by ICES.

Total catch (2015)	Landings	Discards
63.4 kt	> 99% taken by the small-meshed trawl fleet	No discards
	63.4 kt	

Table 6.3.34.9 Norway pout in Subarea 4 and Division 3.a. History of commercial catch and landings. Official landings presented by area for each country participating in the fishery. Weights in tonnes.

Norway pout ICES Division 3.a	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Denmark	110	-	18	24	156	-	51	2	118	6945	538	2395
Faroe Islands	45	-	-	-	-	-	-	-	-	-	-	-
Norway	41	-	2	-	-	209	711	-	-	147	9	41
Sweden	-	-	-	-	-	-	10	-	-	1	1	2
Germany	54	-	-	-	4	-	-	-	-	-	-	-
Total	250	0	20	24	160	209	772	2	118	7093	548	2438
Norway pout ICES Division 4.a	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Denmark	10762	941*	39531	59	32158	19226	71032	4038	24829	31376	27894	11355
Faroe Islands	1085	24	-	-	-	-	-	-	-	-	-	5270
Netherlands	-	-	-	-	-	22	18	-	-	-	-	14
Germany	-	-	15	-	-	-	-	-	-	-	-	22
Norway	4953	311	13618	4712	6650	36961	64303	3189	4528	46187	18725	43742
Sweden	-	-	-	-	10	-	**	1	3	4	1	12
UK(Scotland)	-	-	-	-	-	-	29	-	6	-	8	3
Total	16800	1092	53164	4771	38818	56209	135353	7228	29360	77567	46620	60415
Norway pout ICES Division 4.b	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Denmark	473	-	394	-	244	595	229	32	611	43	16	541
Faroe Islands	29	-	-	-	-	-	-	-	-	-	-	-
Germany	-	-	19	-	-	75	-	-	-	-	-	-
Netherlands	-	-	-	-	-	-	-	-	-	-	-	1
Norway	-	-	2	-	-	82	620	21	59	615	8	577
Sweden	88	-	-	-	-	-	-	-	-	0	0	725
UK (E/W/NI)	-	-	-	-	-	-	-	-	-	-	-	-
UK (Scotland)	-	-	-	-	-	-	-	-	-	-	6	-
Total	590	0	415	0	244	752	849	53	670	658	30	1844
Norway pout ICES Division 4.c	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Denmark	-	-	-	-	-	-	-	-	-	-	-	-
France	-	-	-	**	**	-	-	-	-	-	-	-
Netherlands	-	-	-	-	-	-	-	-	-	-	-	-
UK (E/W/NI)	-	-	-	-	-	-	-	-	-	-	-	-
Total	0	0	0	0	0	0	0	0	0	0	0	0

Table 6.3.34.9 (cont.) Norway pout in Subarea 4 and Division 3.a. History of commercial catch and landings. Official landings presented by area for each country participating in the fishery. Weights in tonnes.

Norway pout Subarea 4 and Division 3.a (Skagerrak) combined	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Denmark	11345	941*	39943	83	32558	19821	71312	4072	25558	38364	28448	14291
Faroe Islands	1159	24	0	0	0	0	0	0	0	0	0	5270
Norway	4994	311	13622	4712	6650	37252	65634	3210	4587	46949	18742	44360
Sweden	88	0	0	0	10	0	10	1	3	5	2	739
Netherlands	0	0	0	0	0	22	18	0	0	0	0	15
Germany	54	0	34	0	4	75	0	0	0	0	0	22
UK	0	0	0	0	0	0	0	0	0	0	6	0
Total nominal landings	17640	1252	53599	4795	39222	57170	136974	7283	30148	85318	47198	64697
Bycatch of other species	−4140	-	−6973	-	−3084	−2670	−11019	−759	−3075	−3218	−3028	-1297
ICES estimate of total landings (Subarea 4 + Division 3.aN)	13500	-	46626	-	36138	54500	125955	6524	27073	82100	44170	63400

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

** Landings less than 1 tonne.

Table 6.3.34.10 Norway pout in Subarea 4 and Division 3.a. History of commercial catch and landings. ICES estimates of catches by country. Weights in thousand tonnes.

Year	Denmark		Faroes	Norway	Sweden	UK (Scotland)	Others	Total
	North Sea	Skagerrak						
1961	20.5	-	-	8.1	-	-	-	28.6
1962	121.8	-	-	27.9	-	-	-	149.7
1963	67.4	-	-	70.4	-	-	-	137.8
1964	10.4	-	-	51	-	-	-	61.4
1965	8.2	-	-	35	-	-	-	43.2
1966	35.2	-	-	17.8	-	-	*	53.0
1967	169.6	-	-	12.9	-	-	*	182.5
1968	410.8	-	-	40.9	-	-	*	451.7
1969	52.5	-	19.6	41.4	-	-	*	113.5
1970	142.1	-	32	63.5	-	0.2	0.2	238.0
1971	178.5	-	47.2	79.3	-	0.1	0.2	305.3
1972	259.6	-	56.8	120.5	6.8	0.9	0.2	444.8
1973	215.2	-	51.2	63	2.9	13	0.6	345.9
1974	464.5	-	85.0	154.2	2.1	26.7	3.3	735.8
1975	251.2	-	63.6	218.9	2.3	22.7	1	559.7
1976	244.9	-	64.6	108.9	*	17.3	1.7	437.4
1977	232.2	-	48.8	98.3	2.9	4.6	1	387.8
1978	163.4	-	18.5	80.8	0.7	5.5	-	268.9
1979	219.9	9	21.9	75.4	-	3	-	329.2
1980	366.2	11.6	34.1	70.2	-	0.6	-	482.7
1981	167.5	2.8	16.4	51.6	-	*	-	238.3
1982	256.3	35.6	12.3	88	-	-	-	392.2
1983	301.1	28.5	30.7	97.3	-	*	-	457.6
1984	251.9	38.1	19.11	83.8	-	0.1	-	393.01
1985	163.7	8.6	9.9	22.8	-	0.1	-	205.1
1986	146.3	4	2.5	21.5	-	-	-	174.3
1987	108.3	2.1	4.8	34.1	-	-	-	149.3
1988	79	7.9	1.3	21.1	-	-	-	109.3
1989	95.7	4.2	0.8	65.3	*	0.1	0.3	166.4
1990	61.5	23.8	0.9	77.1	*	-	-	163.3
1991	85	32	1.3	68.3	*	-	*	186.6
1992	146.9	41.7	2.6	105.5	*	-	0.1	296.8
1993	97.3	6.7	2.4	76.7	-	-	*	183.1
1994	97.9	6.3	3.6	74.2	-	-	*	182
1995	138.1	46.4	8.9	43.1	0.1	*	0.2	236.8
1996	74.3	33.8	7.6	47.8	0.2	0.1	*	163.8
1997	94.2	29.3	7.0	39.1	*	*	0.1	169.7
1998	39.8	13.2	4.7	22.1	-	-	*	79.8
1999	41	6.8	2.5	44.2	*	-	-	94.5
2000	127	9.3	-	48	0.1	-	*	184.4
2001	40.6	7.5	-	16.8	0.7	*	*	65.6
2002	50.2	2.8	3.4	23.6	-	-	-	80.0
2003	9.9	3.4	2.4	11.4	-	-	-	27.1
2004	8.1	0.3	-	5	-	-	0.1	13.5
2005	0.9	-	-	1	-	-	-	1.9
2006	35.1	0.1	-	11.4	-	-	-	46.6
2007	2.0	-	-	3.7	-	-	-	5.7
2008	30.4	-	-	5.7	*	-	*	36.1
2009	17.5	-	-	37.0	*	-	*	54.5
2010	64.9	0.2	-	60.9	*	*	*	126.0
2011	3.3	-	-	3.2	*	*	*	6.5
2012	22.3	0.1	-	4.6	*	*	*	27.0
2013	29.0	6.2	-	46.9	*	*	*	82.1
2014	25.0	0.5	-	18.7	*	*	*	44.2
2015	10.8	2.2	5.3	44.4	0.7	*	*	63.4

* Landings less than 100 tonnes.

Summary of the assessment

Table 6.3.34.11 Norway pout in Subarea 4 and Division 3.a. Assessment summary (weights in tonnes).

Year	Recruitment in Q3 age 0			SSB in Q4			Total catch (model estimated)	Fishing mortality ages 1–2 (1 January–31 December)		
	thousands	95% CI Upper	95% CI Lower	tonnes	95% CI Upper	95% CI Lower	tonnes	$F_{ages\ 1–2}$	95% CI Upper	95% CI Lower
1984	38844000	65180000	23149000	100131	151384	48878	376555	1.418	2.168	0.928
1985	25676000	42587000	15481000	51338	78770	23905	227482	1.415	2.245	0.892
1986	51094000	89062000	29313000	36352	55538	17166	180508	0.987	1.623	0.6
1987	11337000	19614000	6553000	63482	94563	32401	148894	1.016	1.798	0.574
1988	42853000	71236000	25779000	53014	86237	19790	109295	0.642	1.063	0.388
1989	45617000	75774000	27462000	54411	81164	27659	166559	0.745	1.253	0.443
1990	58374000	99166000	34362000	71577	107773	35381	139095	0.691	1.152	0.415
1991	90594000	150398000	54570000	93947	141675	46218	190406	0.634	1.053	0.381
1992	48906000	81239000	29441000	144778	218338	71218	302490	0.613	1.011	0.372
1993	41613000	71876000	24092000	118572	187745	49399	181265	0.703	1.308	0.378
1994	120915000	208785000	70026000	82607	134838	30377	183585	0.563	1.02	0.311
1995	48852000	86762000	27507000	168942	262855	75028	231772	0.386	0.722	0.207
1996	99835000	174314000	57178000	198664	330063	67265	156079	0.349	0.671	0.182
1997	21995000	38878000	12443000	195997	312953	79040	156937	0.344	0.673	0.176
1998	37909000	65637000	21894000	178851	299490	58212	75034	0.303	0.577	0.159
1999	86098000	149323000	49643000	103686	169885	37486	92302	0.366	0.708	0.189
2000	22880000	40457000	12940000	168826	267004	70648	184970	0.343	0.685	0.172
2001	22797000	39683000	13096000	170115	281444	58786	64373	0.258	0.522	0.127
2002	18137000	34809000	9450000	83413	139466	27360	77108	0.377	0.817	0.174
2003	8126000	15002000	4401000	57428	95954	18902	24647	0.245	0.548	0.109
2004	7691000	13793000	4288000	41512	69488	13536	13487	0.203	0.484	0.085
2005	28746000	51623000	16007000	30355	49063	11647	42	0	0.001	0
2006	20372000	37152000	11171000	51615	80824	22406	46553	0.318	0.803	0.126
2007	30789000	55913000	16954000	75342	123267	27416	5796	0.035	0.074	0.016
2008	49378000	94180000	25888000	89830	143310	36351	34844	0.07	0.148	0.033
2009	69386000	125403000	38391000	129363	206740	51985	45813	0.12	0.274	0.053
2010	6839000	12574000	3720000	206932	340465	73398	131078	0.132	0.285	0.061
2011	11537000	20526000	6484000	170466	281099	59832	6843	0.069	0.154	0.031
2012	51466000	94295000	28090000	68083	111223	24943	26947	0.197	0.469	0.083
2013	14086000	25972000	7640000	83805	130365	37246	82109	0.366	0.943	0.142
2014	84971000	168321000	42895000	79516	135100	23932	44164	0.298	0.741	0.12
2015	46995000	88912000	24839000	109857	181270	38444	57417	0.273	0.729	0.102
2016	96296000	229189000	40459000	166849	291310	42388	25286			

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