

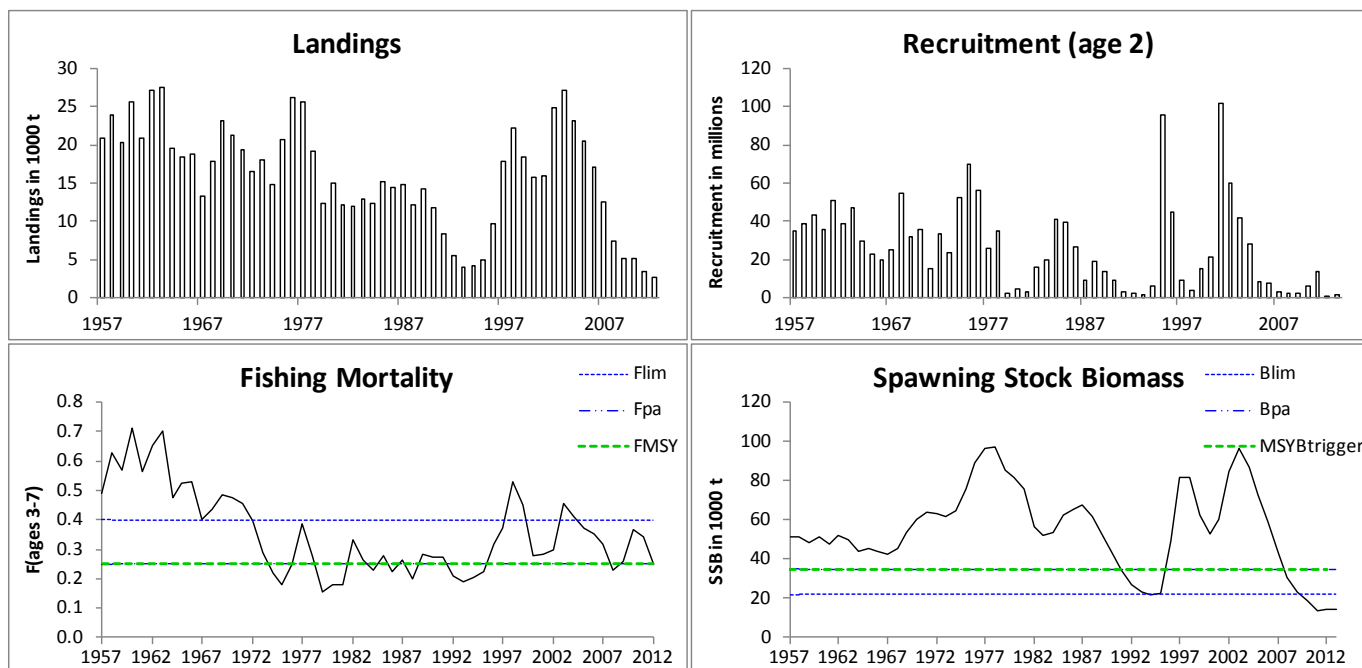
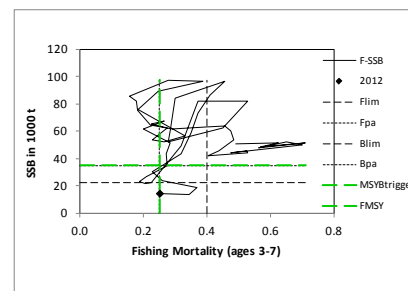
**ECOREGION** Faroe Plateau ecosystem  
**STOCK** Haddock in Division Vb

**Advice for 2014**

ICES advises on the basis of the MSY approach that there should be no directed fishery on haddock in 2014. Measures should be put in place to minimize bycatches of haddock in other fisheries. A recovery plan should be developed and implemented as a prerequisite to reopening the directed fishery. All catches are assumed to be landed.

**Stock status**

F (Fishing Mortality)			
	2010	2011	2012
MSY ( $F_{MSY}$ )	✗	✗	✓ At target
Precautionary approach ( $F_{pa}, F_{lim}$ )	○	○	○ Increased risk
SSB (Spawning-Stock Biomass)			
	2011	2012	2013
MSY ( $B_{trigger}$ )	✗	✗	✗ Below trigger
Precautionary approach ( $B_{pa}, B_{lim}$ )	✗	✗	✗ Reduced reproductive capacity



**Figure 4.4.3.1** Haddock in Division Vb. Summary of stock assessment (weights in thousand tonnes). Top right: SSB/F for the time-series used in the assessment.

SSB has decreased since 2003 and has since 2010 been estimated to be below  $B_{lim}$ . The fishing mortality has decreased from above  $F_{lim}$  in 2003 to  $F_{MSY}$  in 2012; average F for the last three years is, however, above  $F_{MSY}$ . Recruitment from 2003 onwards has been well below the long-term average.

**Management plans**

There is no explicit management plan for this stock. A group representing the Ministry of Fisheries, the Faroese industry, the University of the Faroe Islands, and the Faroe Marine Research Institute has, however, proposed a management plan based on general maximum sustainable yield (MSY) principles developed by ICES. The plan has not yet been approved by the authorities.

## Biology

Since the mid-1970s, recruitment has fluctuated with 1–3 strong year classes followed by several weak to moderate ones. Mean weights-at-age have also fluctuated in this period.

### Environmental influence on the stock

A positive relationship has been documented between primary production and the individual fish growth and recruitment 1–2 years later.

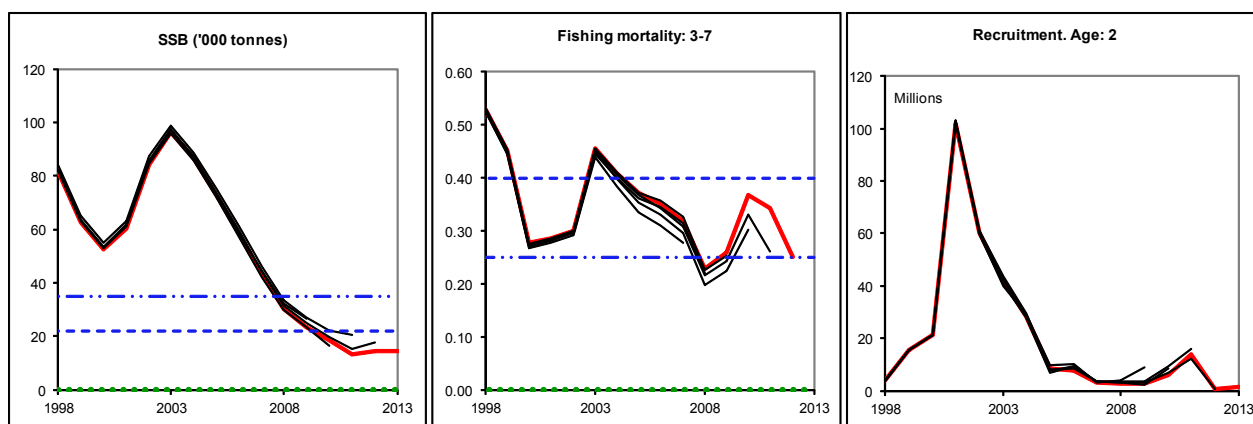
### The fisheries

Haddock are mainly caught in a directed longline fishery for cod and haddock and as bycatches in trawl fisheries for saithe. Normally, longline gears account for 80–90% of the catches. In 2012 longlines accounted for 81% of the catches.

**Catch distribution** Total landings (2012) are 3 kt, where longliners accounted for 81% and trawlers for 19%. No discards and no unaccounted removals.

### Quality considerations

The landings data are considered accurate. There are no incentives to discard fish under the effort management system. The sampling of the landings is believed to be adequate. No major problems have been observed with the tuning indices (the two surveys).



**Figure 4.4.3.2** Haddock in Division Vb. Historical assessment results (final-year recruitment estimates included).

### Scientific basis

<b>Assessment type</b>	XSA using landings-at-age data and age-disaggregated indices.
<b>Stock data category</b>	Category 1.
<b>Input data</b>	Commercial catches (mainly Faroese catches, ages and length frequencies from catch sampling); survey indices (FO-GFS-Q1&3); no commercial indices; annual maturity data from FO-GFS-Q1; natural mortalities set at 0.2.
<b>Discards and bycatch</b>	Discards are not included and are assumed negligible.
<b>Indicators</b>	Primary productivity index.
<b>Other information</b>	Biomass indices from two commercial fleets.
<b>Working group report</b>	<a href="#">NWWG</a> (ICES, 2013).

**ECOREGION** Faroe Plateau ecosystem  
**STOCK** Haddock in Division Vb

**Reference points**

	<i>Type</i>	<i>Value</i>	<i>Technical basis</i>
MSY Approach	MSY $B_{trigger}$	35 000 t.	$B_{pa}$
	$F_{MSY}$	0.25	Stochastic simulations.
Precautionary Approach	$B_{lim}$	22 000 t.	Lowest observed SSB.
	$B_{pa}$	35 000 t.	$B_{lim} e^{1.645\sigma}$ , with $\sigma$ of 0.3.
	$F_{lim}$	0.40	$F_{pa} e^{1.645\sigma}$ , with $\sigma$ of 0.3.
	$F_{pa}$	0.25	$F_{med}$ (1998) = 0.25.

$F_{MSY}$  and MSY  $B_{trigger}$  updated in 2012

*Yield and spawning biomass per Recruit F-reference points (2012):*

	Fish Mort	Yield/R	SSB/R
	Ages 3–7		
Average last 3 years			
$F_{max}$	0.32	0.61	2.14
$F_{0.1}$	0.61	0.63	1.29
$F_{med}$	0.20	0.55	2.98
	0.24	0.58	2.62

[\*]  $F_{max}$  is poorly defined.

**Outlook for 2014**

Basis:  $F$  (2013) =  $F$  (2010–2012) = 0.32; SSB (2014) = 15; R (2013) = 2 million; catch (2013) = 4.

Rationale	F (2014)	Landings (2014)	Basis	SSB (2015)	%SSB change <sup>1)</sup>
MSY approach	0.10	1	$F_{MSY} \times B_{2013}/MSY$ $B_{trigger} = F_{sq} \times 0.50$	15	0
MSY and $F_{pa}$	0.25	2	$F_{sq} \times 0.78$	14	-7
Zero catch	0.00	0	$F = 0$	16	7
<i>Status quo</i>	0.16	2	$F_{sq} \times 0.50$	14	-7
	0.32	3	$F_{sq}$	13	-13
	0.45	4	$F_{sq} \times 1.40$	12	-20

Weights in thousand tonnes.

<sup>1)</sup> SSB 2015 relative to SSB 2014.

**Management plan**

A management system based on number of fishing days, closed areas, and other technical measures was introduced in 1996 to ensure sustainable demersal fisheries in Division Vb. This was before ICES introduced precautionary approach (PA) and MSY reference values, and at that time it was believed that the purpose was achieved if the total allowable number of fishing days was set such that on average 33% in numbers of the haddock exploitable stock would be harvested annually. This translates into an average  $F$  of 0.45, above the  $F_{pa}$  and  $F_{MSY}$  of 0.25. ICES considers this to be inconsistent with the PA and the MSY approaches. The Faroese authorities have realized this and have reduced the number of allocated days substantially. In addition, some areas close to land have recently been closed in order to protect young cod; this will also have a protection effect on haddock. At present, there is no explicit management plan for this stock. A group representing the Ministry of Fisheries, the Faroese industry, the University of the Faroe Islands, and the Faroe Marine Research Institute has, however, proposed a management plan based on general maximum sustainable yield (MSY) principles developed by ICES. This management plan includes a stepwise reduction of the fishing mortality to  $F_{MSY}$  in 2015 and a recovery plan if the SSB declines below the MSY  $B_{trigger}$ . The MSY  $B_{trigger}$  has been defined at 35 kt (the former  $B_{pa}$ ) and  $F_{MSY}$  at 0.25. If the SSB declines below the MSY  $B_{trigger}$ , the fishing mortality

will be reduced by the relationship  $F_{MSY} \times B_{act} / MSY B_{trigger}$  until the SSB has increased again above the  $MSY B_{trigger}$  and is thereafter kept at  $F_{MSY}$ . The plan has not yet been approved by the authorities.

### ***MSY approach***

Based on stochastic simulations in 2012 MSY preliminary analyses suggested an  $F_{MSY} = 0.25$ . Work is still needed to confirm these analyses. Using this  $F_{MSY}$  value, and given that SSB in 2014 is estimated below  $MSY B_{trigger}$ , fishing mortality should be reduced further.  $F$  in 2014 should be no more than  $F_{MSY} \times B_{2013} / MSY B_{trigger}$ , however, because current biomass is estimated to be below  $B_{lim}$ . ICES recommends no directed fishing in 2014 and that measures should be put in place to minimize bycatches of haddock in other fisheries. A recovery plan should be developed and implemented as a prerequisite to reopening the directed fishery.

### ***Precautionary approach***

Given the recent poor recruitment and slow growth and the low SSB, the forecast indicates that even a zero fishing mortality in 2014 will not result in getting the stock above  $B_{lim}$  in 2015. There should therefore be no directed fishery on haddock. Measures should be put in place to minimize bycatches of haddock in other fisheries. A recovery plan should be developed and implemented as a prerequisite to reopening the directed fishery.

### **Additional considerations**

#### *Management considerations*

An expected benefit of the effort management system was more stability for the fishing fleet. The fleets were expected to target the most abundant fish species, thus reducing the fishing mortality on stocks that are in bad shape. This assumption is, however, not always correct; e.g. low prices for saithe and haddock and high prices for cod kept the fishing mortality higher than expected for cod. Management should include measures that avoid a disproportionate targeting of depleted stocks.

The effort management system needs to consider changes in catchability of the fishery. For baited hook gear, catchability may be related to the amount of food available in the ecosystem. Therefore, low ecosystem production may decrease haddock production and increase the catchability of longline gear.

An explicit management plan based on the MSY approach needs to be implemented, clearly stating what to do when the stock is very low.

In recent years only a fraction of the allocated number of fishing days has actually been utilized.

#### *Impacts of the environment on the fish stocks*

The productivity of the Faroe Shelf ecosystem is important to the haddock stock. The recruitment depends both on the spawning-stock biomass and on the productive state of the Faroe Shelf ecosystem. A positive relationship has been demonstrated between primary production and the cod and haddock individual fish growth and recruitment 1–2 years later. The primary production indices were above average in 2008–2010; however, this has resulted in only marginally improved recruitment of haddock, and the indices in 2011 and 2012 were below average.

#### *Regulations and their effects*

An effort management system was implemented 1 June 1996. Fishing days are allocated to all fleets fishing in waters < 380 m depth for the period 1 September–31 August. In addition, the majority of the waters < ca. 200 m depth are closed to trawlers and are mainly utilized by longliners.

#### *Changes in fishing technology and fishing patterns*

The effort management system can lead to improvement of fishing technology efficiency. Presently, ICES is not able to quantify these changes.

#### *Uncertainties in assessment and forecast*

Recent years have revealed a consistent retrospective pattern of overestimating SSB and underestimating  $F$ .

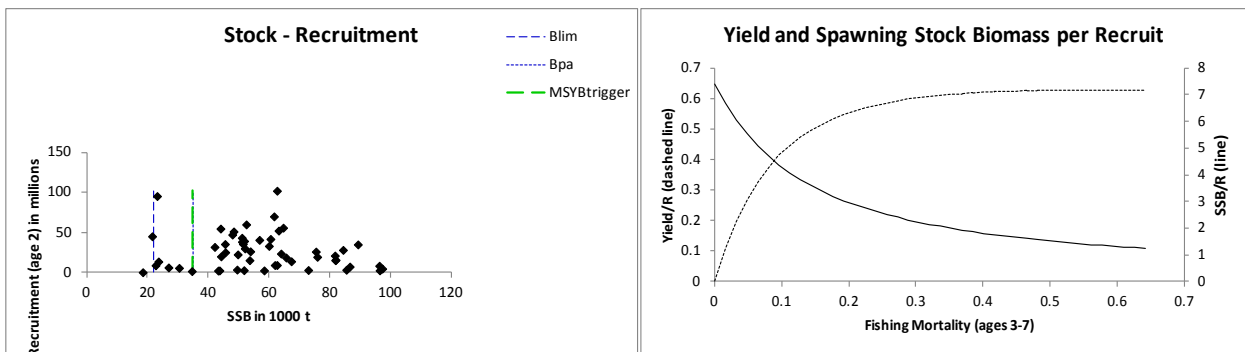
*Comparison with previous assessment and advice*

This year's assessment shows that the 2012 assessment underestimated the 2011 recruitment by around 32%, underestimated the fishing mortality in 2011 by 31%, and overestimated the 2011 total and spawning-stock biomasses by 5% and 11%, respectively.

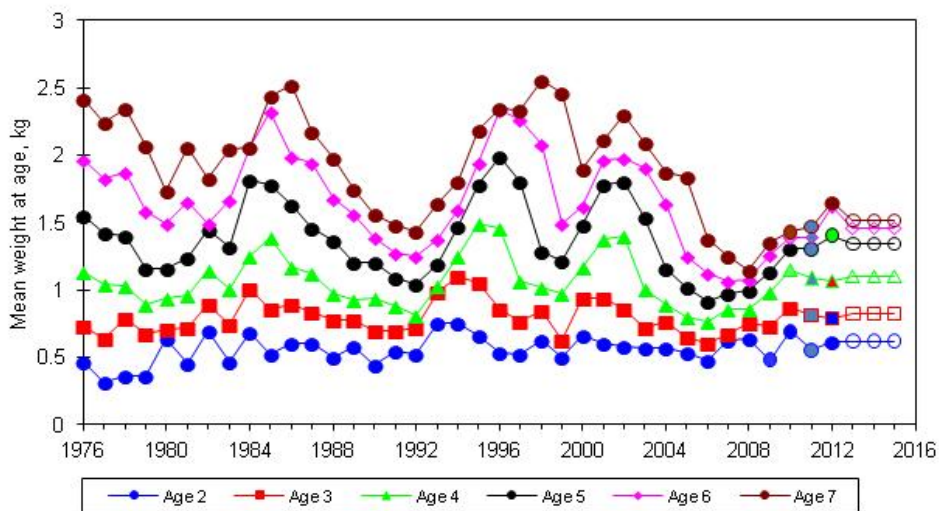
The advice is the same as last year.

**Source**

ICES. 2013. Report of the North-Western Working Group. 25 April–2 May 2013. ICES CM 2013/ACOM:07.



**Figure 4.4.3.3** Haddock in Division Vb. Stock–recruitment and yield- and spawning-stock biomass-per-recruit plots.



**Figure 4.4.3.4** Haddock in Division Vb. Mean weights-at-age (2–7). The 2013–2015 values are the ones used in the short-term prediction (open symbols).

**Table 4.4.3.1** Haddock in Division Vb. ICES advice, management, and catches.

Fishing Year	ICES Advice	Predicted catch corresp. to advice	Agreed TAC	ICES catch
1987	No increase in F	17		14.9
1988	No increase in F	18		12.2
1989	No increase in F	11		14.3
1990	No increase in F	11		11.7
1991	TAC	11		8.4
1992	TAC	13–15		5.5
1993	Reduction in F	8		4.0
1994	No fishing	0	6.2	4.3
1995	No fishing	0	6.2	4.9
1996	TAC	8.3	12.6	9.6
1997	F = F(95)	9.3		17.9
1998	F = F(96)	16		22.2
1999	F < proposed $F_{pa}$ (0.25)	9		18.5
2000	F < proposed $F_{pa}$ (0.25)	22		15.8
2001	F < proposed $F_{pa}$ (0.25)	20		15.9
2002	No fishing	0		24.9
2003	F < proposed $F_{pa}$ (0.25)	12		26.9
2004	F < proposed $F_{pa}$ (0.25)	21		23.1
2005	F < proposed $F_{pa}$ (0.25)	19		20.3
2006	F < proposed $F_{pa}$ (0.25)	18		17.2
2007	F < 0.20	16		12.6
2008	$F_{pa}$	14		7.3
2009	No fishing and recovery plan	0		5.2
2010	No fishing and recovery plan	0		5.2
2011	No direct fishing; minimize bycatch, implement recovery plan	0		3.5
2012	No direct fishing; minimize bycatch, implement recovery plan	0		2.6
2013	No direct fishing; minimize bycatch, implement recovery plan	0		
2014	No direct fishing; minimize bycatch, implement recovery plan	0		

Fishing year: 1 September–31 August the following year.

Weights in thousand tonnes.

**Table 4.4.3.2.** Faroe Plateau (Subdivision Vb1) HADDOCK. Nominal catches (tonnes) by country. 2000–2012 and Working Group estimates in Vb.

Country	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012 <sup>2</sup>
Faroe Islands	13,620	13,457	20,776 <sup>6</sup>	21,615	18,995	18,172	15,600	11,689	6,728	4,895	4,932	3,350	2,475
France <sup>1</sup>	6	8	2	4	1	+	12 <sup>5</sup>	4 <sup>5</sup>	3 <sup>5</sup>	2 <sup>5</sup>	1	3	
Germany	1	2	6	1	6		1						
Greenland	22	0	4 <sup>4</sup>				1	9 <sup>4</sup>		6 <sup>4</sup>	12	+	1 <sup>4</sup>
Iceland			4										3
Norway	355	257	227	265	229	212	57	61	26	8	5		
Russia					16				10				
Spain					49								
UK (Engl. and Wales)	19	4	11 <sup>5</sup>	14	8	1	1						
UK (Scotland) <sup>5</sup>				185	186	126	106	35	60	64			
United Kingdom											73		
<b>Total</b>	<b>14,023</b>	<b>13,728</b>	<b>21,030</b>	<b>22,084</b>	<b>19,490</b>	<b>18,511</b>	<b>15,778</b>	<b>11,798</b>	<b>6,827</b>	<b>4,975</b>	<b>5,023</b>	<b>3,353</b>	<b>2,479</b>
<b>Working Group estimate<sup>4</sup></b>	<b>15,821</b>	<b>15,890</b>	<b>24,933</b>	<b>27,072</b>	<b>23,101</b>	<b>20,455</b>	<b>17,154</b>	<b>12,631</b>	<b>7,388</b>	<b>5,197</b>	<b>5,202</b>	<b>3,540</b>	<b>2,613</b>

1) Including catches from Subdivision Vb2. Quantity unknown 1989–1991, 1993, and 1995–2001.

2) Preliminary data

3) From 1983 to 1996 catches included in Subdivision Vb2.

4) Reported as Division Vb to the Faroese coastal guard service.

5) Reported as Division Vb.

6) Includes Faroese landings reported to the NWWG by the Faroes Marine Research Institute.

**Table 4.4.3.3.** Faroe Bank ( Subdivision Vb2) HADDOCK. Nominal catches (tonnes) by country, 2000–2012.

Country	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012 <sup>2</sup>
Faroe Islands	1,565 <sup>5</sup>	1,948	3,698	4,934	3,594	2,444	1,375	810	556	192	178	194	134
France1						+							
Norway	48	66	28	54	17	45	1	8		3	1		
UK (Engl. and Wales)	<sup>1</sup>			1	1	1							
UK (Scotland)3	185	148	177	4	1	1		15	5	27 <sup>4</sup>			
<b>Total</b>	<b>1,798</b>	<b>2,162</b>	<b>3,903</b>	<b>4,988</b>	<b>3,611</b>	<b>1,944</b>	<b>1,376</b>	<b>833</b>	<b>561</b>	<b>222</b>	<b>179</b>	<b>194</b>	<b>134</b>

1) Catches included in Subdivision Vb1.

2) Provisional data.

3)From 1983 to 1996 includes also catches taken in Subdivision Vb1.

4) Reported as Division Vb.

5) Provided by the NWWG.



Table 4.4.3.4

Haddock in Division Vb. Summary of the assessment.

Year	Recruitment Age 2 thousands	SSB tonnes	Landings tonnes	Mean F Ages 3–7
1957	35106	51049	20995	0.4900
1958	39212	51409	23871	0.6270
1959	43417	48340	20239	0.5696
1960	35763	51101	25727	0.7101
1961	51279	47901	20831	0.5624
1962	38537	52039	27151	0.6506
1963	47362	49706	27571	0.7002
1964	30110	44185	19490	0.4753
1965	22644	45605	18479	0.5260
1966	20203	44027	18766	0.5288
1967	25356	42086	13381	0.4031
1968	54852	45495	17852	0.4377
1969	31975	53583	23272	0.4853
1970	35600	59958	21361	0.4762
1971	15457	63920	19393	0.4564
1972	33213	63133	16485	0.3962
1973	23703	61621	18035	0.2902
1974	52334	64630	14773	0.2206
1975	70055	75404	20715	0.1799
1976	55973	89219	26211	0.2475
1977	26193	96374	25555	0.3873
1978	35100	97230	19200	0.2781
1979	2784	85398	12424	0.1551
1980	4944	81901	15016	0.1779
1981	3491	75845	12233	0.1814
1982	15835	56804	11937	0.3308
1983	19616	51811	12894	0.2654
1984	40761	53820	12378	0.2284
1985	39423	62594	15143	0.2761
1986	26480	65591	14477	0.2238
1987	9436	67287	14882	0.2643
1988	18762	61890	12178	0.2010
1989	14092	51720	14325	0.2853
1990	9393	43681	11726	0.2730
1991	2986	34609	8429	0.2750
1992	2674	26915	5476	0.2108
1993	1826	23156	4026	0.1876
1994	6426	21533	4252	0.2062
1995	95382	22673	4948	0.2263
1996	45255	49455	9642	0.3195
1997	9084	81785	17924	0.3731
1998	3730	81653	22210	0.5298
1999	15452	62608	18482	0.4517
2000	21220	52480	15821	0.2777
2001	102026	60466	15890	0.2850
2002	60042	84323	24933	0.2996
2003	41922	96244	27072	0.4555
2004	28268	86542	23101	0.4095
2005	8527	72891	20455	0.3720
2006	7487	58362	17154	0.3506
2007	3194	43230	12631	0.3194
2008	2712	30393	7388	0.2292
2009	2499	23600	5197	0.2600
2010	5884	18442	5202	0.3684
2011	13828	13492	3540	0.3433
2012	453	14641	2613	0.2505
2013	1633	14618		
Average	26508	54920	15988	0.3565