1.4.3 Faroe Haddock ICES Division Vb

State of the stock

Spawning biomass in relation to precautionary limits	Fishing mortality in relation to precautionary limits	Fishing mortality in relation to highest yield	Fishing mortality in relation to agreed target	Comment
Full reproductive capacity	Increased risk	Overexploited	Below agreed target	

Based on the most recent estimates of SSB and fishing mortality, ICES classifies the stock as having full reproductive capacity and at risk of being harvested unsustainably. The 2004 estimate of fishing mortality is above $\mathbf{F}_{pa}$. SSB has increased in recent years to the highest in the observed series. This is a result of recent strong recruitment, including the record high 1999 year class.

Management objectives

The effort management system implemented in the Faroese demersal fisheries in Vb since 1996 aims at harvesting on average 33% of the haddock exploitable stock in numbers. This translates into an average F of 0.45, above the $\mathbf{F}_{pa}$ of 0.25. ICES considers this to be inconsistent with the Precautionary Approach.

Reference points

	ICES considers that:	ICES proposed that:
Precautionary Approach reference points	$\mathbf{B}_{lim}$ is 40 000 t	$\mathbf{B}_{pa}$ be set at 55 000 t
	$\mathbf{F}_{lim}$ is 0.40	$\mathbf{F}_{pa}$ be set at 0.25

Yield and spawning biomass per Recruit
F-reference points:

	Fish Mort Ages 3-7	Yield/R	SSB/R
Average last 3 years	0.347	0.670	2.430
$\mathbf{F}_{0.1}$	0.190	0.605	3.449
$\mathbf{F}_{med}$	0.299	0.662	2.597

Technical basis:

$\mathbf{B}_{lim}$: Former MBAL	$\mathbf{B}_{pa}$: based on inspection of the SSB-R scatter plot
$\mathbf{F}_{lim}$: 2 *std. Dev. Above $\mathbf{F}_{pa}$	$\mathbf{F}_{pa}$: $\mathbf{F}_{med}$ (1998) = 0.25

Single-stock exploitation boundaries

Exploitation boundaries in relation to existing management plans

No management plan is available for this stock, but the management objectives are an exploitation rate equivalent to a fishing mortality of 0.45 on average. The current F estimate (0.31) is below the management target.

Exploitation boundaries in relation to high long-term yield, low risk of depletion of production potential and considering ecosystem effects

The current fishing mortality estimated as 0.31 is above $\mathbf{F}_{0.1}$ (0.19).

Exploitation boundaries in relation to precautionary limits

The fishing effort should be reduced to correspond to a fishing mortality below $\mathbf{F}_{pa}$ = 0.25, corresponding to an effort reduction of about 23% assuming linearity in the realtionship between fishing effort and fishing mortality.

Short-term implications

Outlook for 2006

Basis: F(2005) =0.33; SSB(2006) = 77; catch (2005) = 29
The fishing mortality applied according to the agreed management plan (F(management plan)) is 0.45.
The maximum fishing mortality which would be in accordance with precautionary limits (F (precautionary limits)) is 0.25.

Rationale	**F (2006)**	**Basis**	**SSB 2006**	**Landings** 2006	**SSB (2007)**	**%SSB change** [1)]
Zero catch	0	F=0	77	0	79	3
Target reference point	0.45	$\mathbf{F}_{target}$	77	29	50	-35
Status quo	0.33	$\mathbf{F}_{sq}$	77	22	57	-26
High long-term yield	0.19	F(long term yield) $\mathbf{F}_{0.1}$	77	14	65	-16
Agreed management plan	0.05	F(man. plan) * 0.1	77	4	75	-3
	0.11	F(man. plan) * 0.25	77	9	70	-9
	0.23	F(man. plan) * 0.50	77	16	63	-18
	0.34	F(man. plan) * 0.75	77	23	56	-27
	0.41	F(man. plan) * 0.90	77	27	52	-32
	0.45	F(man. plan)	77	29	50	-35
	0.50	F(man. plan) * 1.1	77	31	48	-38
	0.56	F(man. plan) * 1.25	77	34	45	-41
Precautionary limits	0.03	F($\mathbf{F}_{pa}$)* 0.1	77	2	77	0
	0.06	F($\mathbf{F}_{pa}$)* 0.25	77	5	74	-4
	0.13	F($\mathbf{F}_{pa}$)* 0.5	77	10	69	-10
	0.19	F($\mathbf{F}_{pa}$)* 0.75	77	14	65	-15
	0.23	F($\mathbf{F}_{pa}$)* 0.90	77	16	63	-18
	0.25	$\mathbf{F}_{pa}$ (=$\mathbf{F}_{sq}$ *0.77)	77	18	61	-20
	0.28	F($\mathbf{F}_{pa}$)* 1.1	77	19	60	-22
	0.31	F($\mathbf{F}_{pa}$)* 1.25	77	21	57	-25
Mixed fisheries	0.17	Coupling with cod; $\mathbf{F}_{sq}$ * 0.5	77	12	67	-13

Weights in ´000 tonnes.
Shaded scenarios are not considered consistent with the Precautionary Approach.
[1)] SSB 2007 relative to SSB 2006.

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 (cod, haddock, or saithe), thus reducing the fishing mortality on stocks that are in bad shape. However, low prices on saithe and haddock and high prices for cod have kept the fishing mortality lower than expected for haddock. Targeting appears to be more influenced by economic factors than relative abundance of the stocks.

Management plan evaluations

The effort management system translates to an average F of 0.45. The management plan has not been fully evaluated by ICES in relation to the defined $\mathbf{B}_{lim}$. A full evaluation should take into account the relationship between fishing mortality and fishing days.

Ecosystem considerations

The effort management system needs to consider changes in fishery catchability. For baited hook gear, catchability is related to the amount of other food available. Therefore, low ecosystem production may decrease cod production and increase the catchability of longline gear. Primary productivity of the Faroe ecosystem in 2005 appears to be about average, but may vary by a factor of five and has profound effects on fish stocks. Extended periods of low ecosystem production may require a reconsideration of the effort management system and a shift to catch-based management.

Factors affecting the fisheries and the stock

Regulations and their effects

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

Changes in fishing technology and fishing patterns

The effort management system invites improvement of fishing technology and fishing patterns. Some improvements were evident just after the introduction of the system, but no major improvements have been evident in subsequent years.

Scientific basis

Data and methods

The advice is based on an analytical assessment (XSA) using commercial catch-at-age data and age-disaggregated indices from two research surveys. Recruitment estimates were available from the surveys.

Comparison with previous assessment and advice

With the additional year of data the 2005 assessment of Faroe haddock is slightly more optimistic than last year's assessment. The basis of the advice is the same.

Uncertainties in assessment and forecast

There is a systematic overestimation of fishing mortality and underestimation of SSB in recent years, based on the current model formulation.

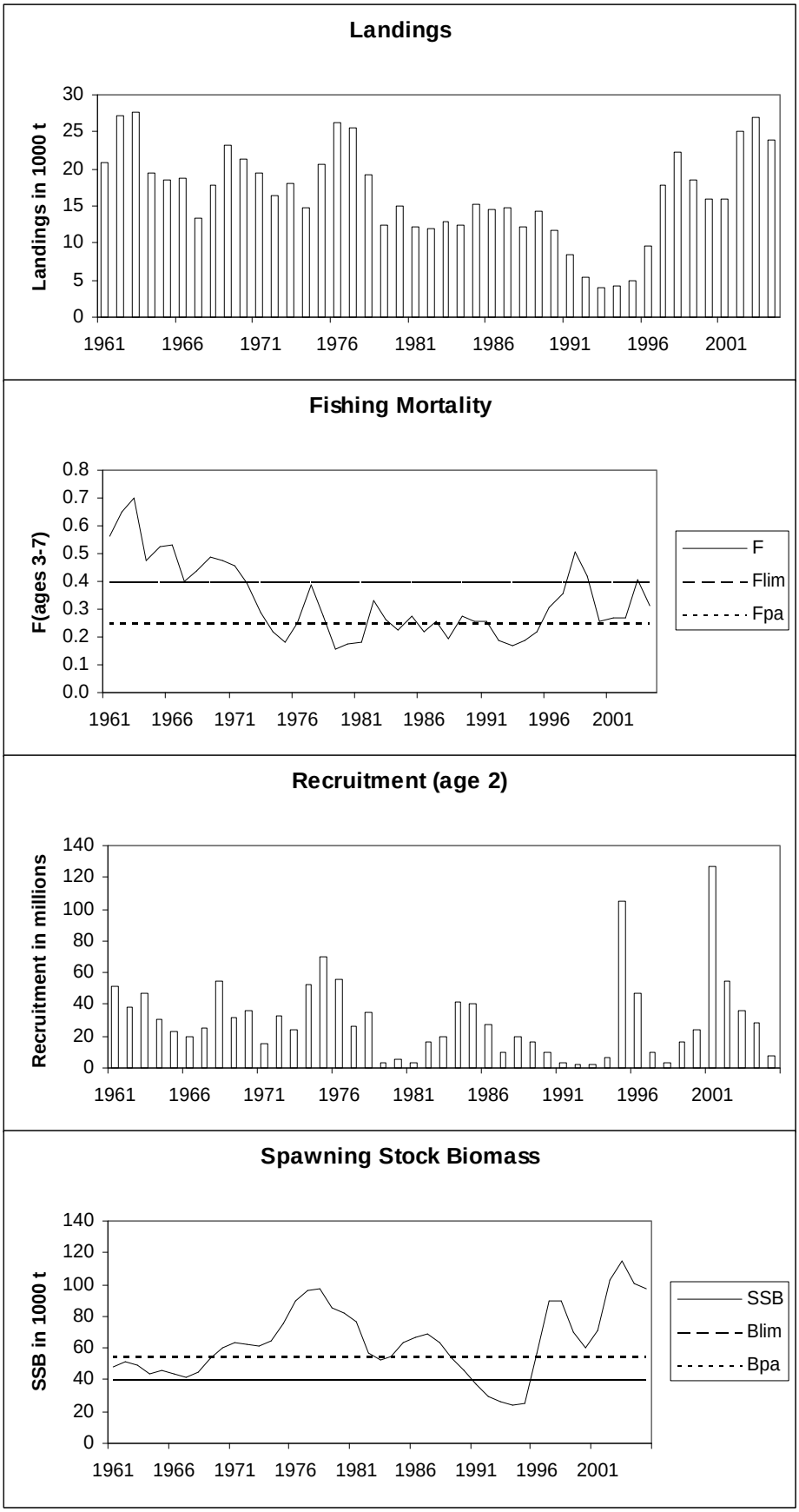
Source of information

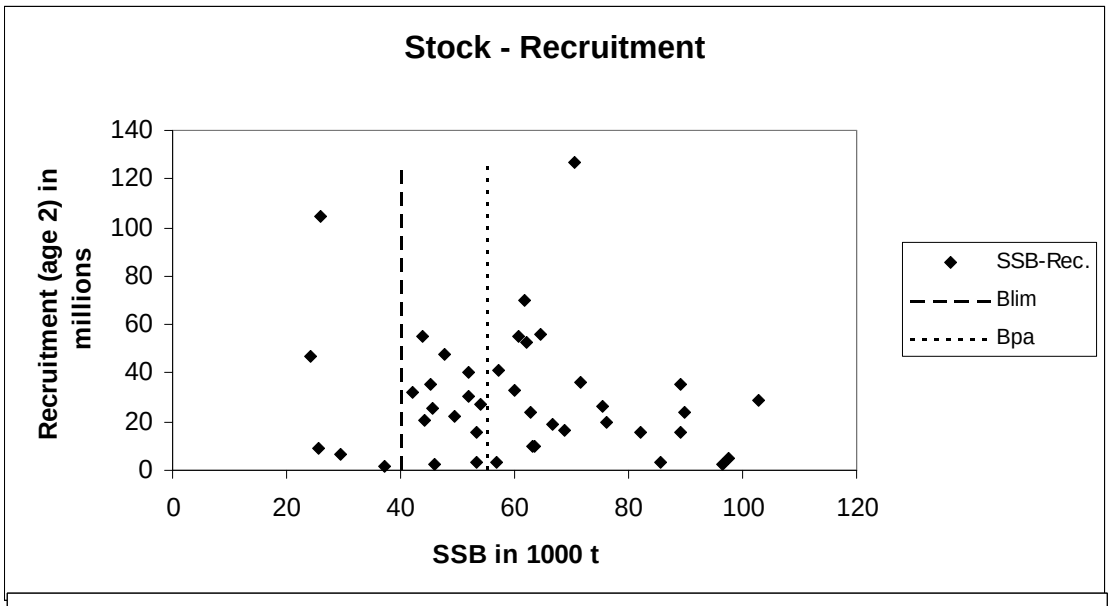
Report of the North-Western Working Group, 26 April–5 May 2005 (ICES CM 2005/ACFM:21).

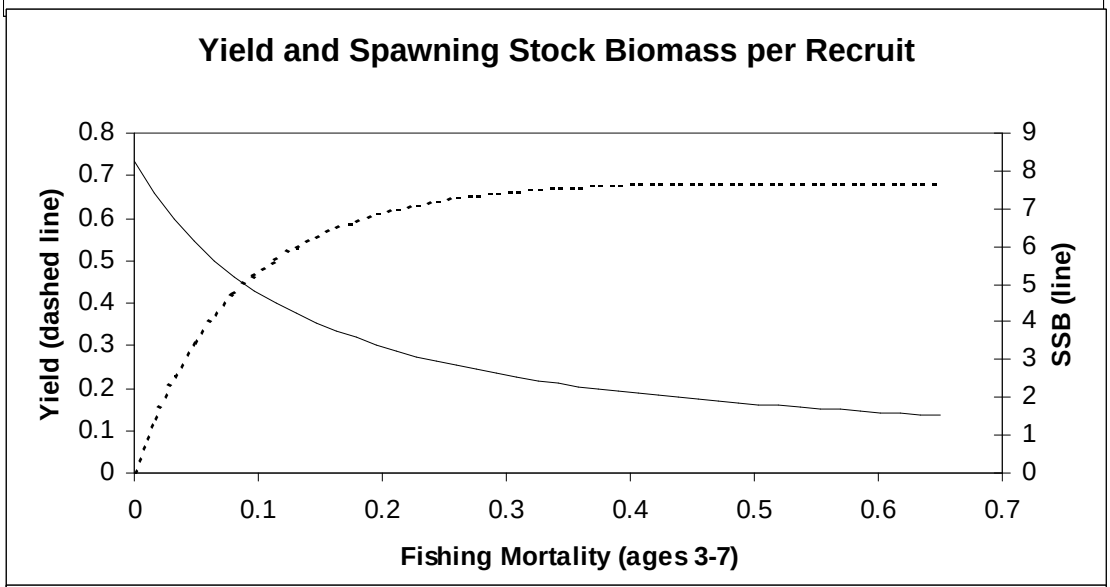
Year	ICES Advice	Predicted catch Corresp. to advice	Agreed TAC	ACFM Catch
1987	No increase in F	17		14.9
1988	No increase in F	18		12.2
1989	No increase in F	11		14.3
1990	No increase in F	11		11.7
1991	TAC	11		8.4
1992	TAC	13-15		5.5
1993	Reduction in F	8		4.0
1994	No fishing	0	6.2	4.3
1995	No fishing	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 $\mathbf{F}_{pa}$ (0.25)	9		18.5
2000	F < proposed $\mathbf{F}_{pa}$ (0.25)	22		15.8
2001	F < proposed $\mathbf{F}_{pa}$ (0.25)	20		15.9
2002	No fishing	0		25.0
2003	F<proposed $\mathbf{F_{pa}}$ (0.25)	12		27.0
2004	F<proposed $\mathbf{F_{pa}}$ (0.25)	21		23.8
2005	F<proposed $\mathbf{F_{pa}}$ (0.25)	19		
2006	F<proposed $\mathbf{F_{pa}}$ (0.25)	18		

Weights in ‘000 t.

Faroe haddock (Division Vb)




Stock - Recruitment
Recruitment (age 2) in millions
SSB in 1000 t
SSB-Rec.
Blim
Bpa


Yield and Spawning Stock Biomass per Recruit
Yield (dashed line)
SSB (line)
Fishing Mortality (ages 3-7)

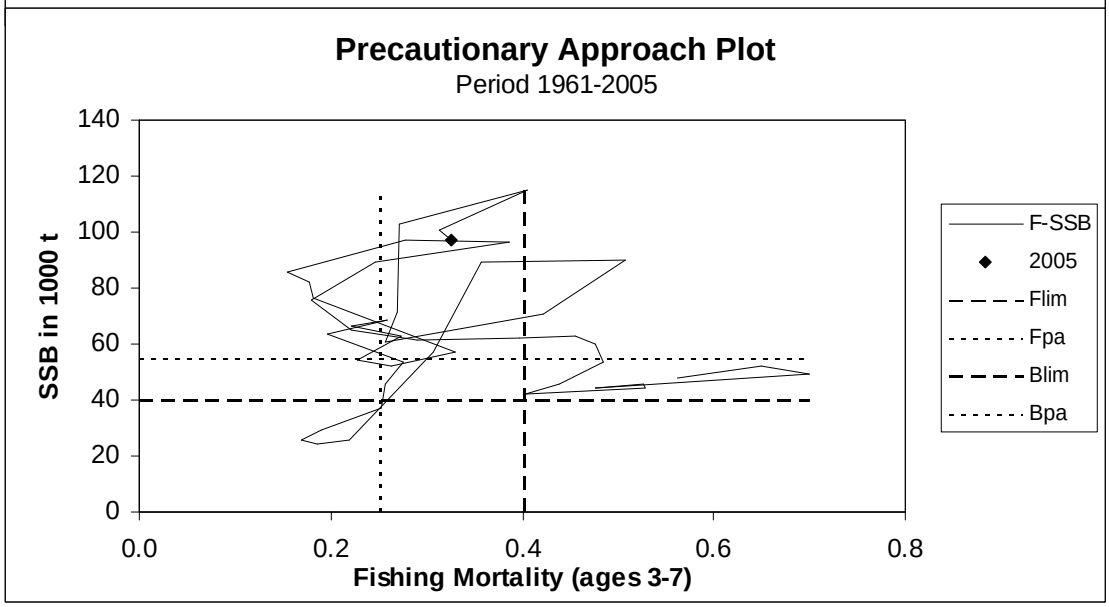

Precautionary Approach Plot
Period 1961-2005
SSB in 1000 t
Fishing Mortality (ages 3-7)
F-SSB
2005
Flim
Fpa
Blim
Bpa

Table 1.4.3.1 Faroe Plateau (Sub-division Vb1) HADDOCK. Nominal catches (tonnes) by countries 1982-2004, as officially reported to ICES , and the total Working Group estimate in Vb.

Country	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Denmark	-	-	-	-	1	8	4	-	-	-	4,655	
Faroe Islands	10,319	11,898	11,418	13,597	13,359	13,954	10,867	13,506	11,106	8,074	164	3,622
France[1]	2	2	20	23	8	22	14	-	-	-	-	-
Germany	1	+	+	+	1	1	-	+	+	+		-
Norway	12	12	10	21	22	13	54	111	94	125	71	28
UK (Engl. and Wales)	-	-	-	-	-	2	-	-	7	-	54	81
UK (Scotland)[3]	1	-	-	-	-	-	-	-	-	-	-	-
United Kingdom												
Total	10,335	11,912	11,448	13,641	13,391	14,000	10,939	13,617	11,207	8,199	4,944	3,731
Working Group estimate[4,8]	11,937	12,894	12,378	15,143	14,477	14,882	12,178	14,325	11,726	8,429	5,476	4,026

Country	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004 [2]
Faroe Islands	3,675	4,549	9,152	16,585	19,135	16,643		13,821	21,337	22,199	19,184
France[1]					2 [2]	- [2]	6	8 [5]	2	4	1
Germany		5	-	-		33	1	2	6	1	6
Greenland											
Iceland									4		
Norway	22	28	45	45 [2]	71	411	355	257 [2]	227 [2]	292	229
UK (Engl. and Wales)	31	23	5	22	30 [1]	59 [5]	19 [5]	4 [5]	11 [5]	14 [5]	
UK (Scotland)[11]	-	-	…	…	…						
United Kingdom											201 [5]
Total	3,728	4,605	9,202	16,652	19,238	17,146	381	14,092	21,587	22,510	19,621
Working Group estimate[4,8,9]	4,252	4,948	9,642	17,924	22,210	18,482	15,821	15,890	25,011	26,970	23,811

1) Including catches from Sub-division Vb2. Quantity unknown 1989-1991, 1993 and 1995-2001.

2) Preliminary data

3)From 1983 to 1996 catches included in Sub-division Vb2.

4) Includes catches from Sub-division Vb2 and Division IIa in Faroese waters.

5) Reported as Division Vb.

6) Included in Vb2

7) Includes 14 reported as Vb

8)Includes French and Greenlandic catches from Division Vb, as reported to the Faroese coastal guard service

9) Includes Faroese landings reported to the NWWG by the Faroese Fisheries Laboratory

Table 1.4.3.2 Faroe Bank (Sub-division Vb2) HADDOCK. Nominal catches (tonnes) by countries, 1982-2004, as officially reported to ICES, and the total Working Group estimate in Vb2.

Country	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Faroe Islands	1,533	967	925	1,474	1,050	832	1,160	659	325	217	338	185
France[1]	-	-	-	-	-	-	-	-	-	-	-	-
Norway	1	2	5	3	10	5	43	16	97	4	23	8
UK (Engl. and Wales)	-	-	-	-	-	-	-	-	-	-	+	+
UK (Scotland)[3]	48	13	+	25	26	45	15	30	725	287	869	102
Total	1,582	982	930	1,502	1,086	882	1,218	705	1,147	508	1,230	295

Country	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004 [2]
Faroe Islands	353	303	338	1,133	2,810	1,110		2,001	3,878	4,934	4,804
France[1]	-	-	-	-							
Norway	1	1	40	4	60	3	48	66	28	55	17
UK (Engl. and Wales)	+	... [1]	… [1]	… [1]	… [1]	[1]	[1]	[1]	[1]	[1]	[1]
UK (Scotland)[3]	170	39	62	135	102	193	185	148	177 [4]	185 [4]	[1]
Total	524	343	440	1,272	2,972	1,306	233	2,215	4,083	5,174	4,821

1) Catches included in Sub-division Vb1.

2) Provisional data

3)From 1983 to 1996 includes also catches taken in Sub-division Vb1 (see Table 2.4.1)

4) Reported as Division Vb.

Table1.4.3.3. Faroe haddock (Division Vb).

Year	Recruitment Age 2 thousands	SSB tonnes	Landings tonnes	Mean F Ages 3-7
1961	51276	47797	20831	0.5624
1962	38537	51875	27151	0.6506
1963	47362	49547	27571	0.7002
1964	30111	44128	19490	0.4753
1965	22645	45556	18479	0.5260
1966	20206	43953	18766	0.5288
1967	25357	41960	13381	0.4030
1968	54849	45381	17852	0.4376
1969	31971	53425	23272	0.4853
1970	35589	59865	21361	0.4762
1971	15455	62918	19393	0.4563
1972	33183	61990	16485	0.3963
1973	23695	61599	17976	0.2893
1974	52351	64658	14773	0.2205
1975	70144	75442	20715	0.1798
1976	56050	89285	26211	0.2474
1977	26238	96488	25555	0.3869
1978	35180	97396	19200	0.2777
1979	2798	85582	12418	0.1547
1980	4956	82112	15016	0.1774
1981	3500	76089	12233	0.1807
1982	15901	57019	11937	0.3294
1983	19804	52063	12894	0.2639
1984	41191	54204	12378	0.2268
1985	40240	63214	15143	0.2733
1986	27050	66532	14477	0.2205
1987	9747	68612	14882	0.2589
1988	19285	63449	12178	0.1955
1989	16305	53393	14325	0.2750
1990	9688	45865	11726	0.2574
1991	3111	37351	8429	0.2537
1992	2723	29603	5476	0.1901
1993	1828	25843	4026	0.1702
1994	6513	24287	4252	0.1857
1995	104824	25570	4948	0.2184
1996	46561	56939	9642	0.3069
1997	9333	89175	17924	0.3568
1998	3666	89717	22210	0.5086
1999	15921	70377	18482	0.4218
2000	23964	60558	15821	0.2560
2001	126449	71418	15890	0.2687
2002	54798	102883	25011	0.2713
2003	35863	115100	26970	0.4043
2004	28964	100749	23811	0.3136
2005	8123	96932		
Average	30073	63509	16879	0.3325