

### 1.4.3 Herring in Subdivisions 22–24 and Division IIIa (spring spawners)

#### 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
Reference points not defined	Reference points not defined	unknown	unknown	

In the absence of defined reference points, the state of the stock cannot be evaluated with regard to these. An analytical assessment demonstrates that SSB has been slightly increasing over a number of years. The fishing mortality estimates for 2004 are 0.36 for adults and 0.11 for the juveniles (0- and 1-ringers). The age structure in the catch over the last three years consistently reflects that the large 1999 year class is now part of the spawning stock. The 2003 year class seems to be above average.

#### Management objectives

There are no explicit management objectives for this stock.

#### Reference points

There are no reference points for this stock.

	Fish Mort Ages 3-6	Yield/R	SSB/R
Average last 3 years	0.413	0.025	0.051
$F_{0.1}$	0.212	0.023	0.099
$F_{med}$	0.529	0.025	0.037

If target reference points are to be established,  $F_{0.1}$  would be associated with high long-term yields and low risk of reduced reproductive capacity.

#### Single-stock exploitation boundaries

*Exploitation boundaries in relation to precautionary limits*

Current fishing mortality has led to stable or increased SSB and the fishing mortality should not be allowed to increase. This corresponds to landings of less than 95 000 t in 2006.

## Short-term implications

### Outlook for 2006

Basis:  $F(2005) = F_{sq} = 0.358$ ;  $SSB(2005) = 194$ ; catch (2005) = 92.

Landings are for Division IIIa (spring-spawning herring and western Baltic (Subdivisions 22–24) combined), see further in Section 1.4.18.

Rationale	Catches (2006)	Basis	F(2006)	SSB(2007)
Zero catch	0	$F=0$	0	325
Proportion F	78	$F_{sq} * 0.8$	0.286	249
Proportion F	87	$F_{sq} * 0.9$	0.322	240
<i>Status quo</i>	95	$F_{sq}$	0.358	233
Proportion F	104	$F_{sq} * 1.1$	0.393	225
Proportion F	111	$F_{sq} * 1.2$	0.429	218
Proportion F	119	$F_{sq} * 1.3$	0.465	211
$F_{0.1}$	60	$F_{0.1}$	0.212	266

Weights in '000 t.

## Management considerations

North Sea Autumn-Spawning and the Western Baltic Spring-Spawning herring stocks are exploited and managed simultaneously in Division IIIa. Hence, the management of the herring fisheries in Division IIIa influences both stocks. The advisory emphasis on one or the other stock will vary between periods and depends on their relative status.

In the second half of the 1990s and the beginning of the 2000s the North Sea Autumn-Spawning stock was depleted and advice on management of herring fisheries in Division IIIa focused on rebuilding the North Sea herring. The herring fishery in Division IIIa was then managed in a manner consistent with the management of the North Sea Autumn-Spawning herring. With the rebuilding of the North Sea stock, concerns for the North Sea Autumn-Spawning herring are less and advice on management of the herring fisheries in Division IIIa is now more focused on the Western Baltic stock.

Catch options for the whole stock of Western Baltic Spring-Spawning herring can be partitioned into catches by area. Likewise, the catches of WBSS in Division IIIa also imply catches of North Sea Autumn-Spawning herring which constitute part of the total catch in that area. The basis for the split of the Western Baltic Spring-Spawning herring catch by area and of the catch in Division IIIa by stock was the ratios between the catches in 2004. The current relevant fleet definitions are:

### *Division IIIa*

Fleet C: Directed herring fisheries with purse seiners and trawlers

Fleet D: Bycatches of herring caught in the small-mesh fisheries

### *Subdivision 22-24*

The WBSS are exploited by other fleets as well, in Subdivisions 22–24.

The text table below shows the 2004 share of the total catch in tonnes of Western Baltic Spring-Spawning herring by fleet:

WBSS	Fleet C (IIIa)	Fleet D (IIIa)	SD 22-24 + Fleet A (IV)	Total
2004	16 825 (22%)	11 175 (15%)	48 815 (64%)	76 815

The text table below shows the proportion of Western Baltic Spring-Spawning herring in the catches by fleet in Division IIIa, as well as for the fleets in SD 2224.

WBSS	Fleet C	Fleet D	SD22-24 + Fleet A (IV)*
2004	0.56	0.51	1

\* Only WBSS caught in Subarea IV are accounted for in the calculations

The text table below shows the expected catches for each stock and in each area corresponding to a range of total catch options for the Western Baltic Spring-Spawning herring stock:

Management considerations for Division IIIa based on short-term predictions (2006)						
Western Baltic Spring-Spawners			North Sea Autumn-Spawners		Both Stocks together	
All fleets total catches	Fleet C (22% of TAC)	Fleet D (15% of TAC)	Fleet C (WBSS/56%)	Fleet D (WBSS/51%)	Fleet C	Fleet D
60,000	13,100	8,700	10,500	8,400	23,600	17,100
65,000	14,200	9,500	11,400	9,100	25,600	18,600
70,000	15,300	10,200	12,200	9,800	27,500	20,000
75,000	16,400	10,900	13,100	10,500	29,500	21,400
80,000	17,500	11,600	14,000	11,200	31,500	22,800
85,000	18,600	12,400	14,900	11,900	33,500	24,300
90,000	19,700	13,100	15,700	12,600	35,400	25,700
95,000	20,800	13,800	16,600	13,300	37,400	27,100
100,000	21,900	14,500	17,500	14,000	39,400	28,500

A TAC of up to 37 400 t for the C-fleet is in accordance with the largest advised total catch of 95 000 t Western Baltic Spring-Spawning herring, under assumptions of retained catch share among areas and retained proportions among stocks. The corresponding number for the D fleet is 27 100 t.

Low recruitment of the three most recent NSAS year classes together with an increase in the WBSS stock is expected to lead to changes in stock composition as well as area distribution and thereby affect near future catch options. Especially consequences for the D-fleet catch options should be closely followed.

### Factors affecting the fisheries and the stock

#### *Regulations and their effects*

ICES considered the effects on the WBSS of the present EU-Norway agreement in 2005 on quota transfer in Division IIIa. The agreement sets 12 800 tonnes for Norway of which 50% can be taken in the North Sea. A bycatch TAC for Division IIIa herring in the small-meshed fishery (fleet-D) is set at 24 150 tonnes, none of which is taken by Norway and thus no transfer in this fleet category is possible.

The effect of a transfer of 50% of Norwegian catches amount to 6400 t and will at the most equal a reduction in outtake of 3600 t in the exploitation of WBSS, since part of the catches will anyway be taken in the transfer area where WBSS are taken. The changes in F and SSB for WBSS will thus be marginal.

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

Since 2001 the fishery behavior has changed in the German fleet. In former years the dominant part of herring was caught in the passive gears, bottom-set gillnets and trapnets. The proportion of herring, which was caught by trawlers in the area off the Rügen Island coast up to the Arcona Sea (Subdivision 24), increased from 26% in 2001 to 52% in 2004. This change was caused by new requirements from a new fish factory on the Rügen Island.

#### *The environment*

Herring in Division IIIa and Subdivisions 22–24 make age- and stage-specific migrations. There are feeding migrations from the Western Baltic into more saline waters of Division IIIa and the eastern parts of Division IVa.

## **Scientific basis**

### *Data and methods*

The otolith microstructure method to calculate the proportion of spring and autumn spawners caught in these areas has been used for all catch and IBTS data for the period 1991–2004. Analytical assessment is based on catch data and acoustic and trawl survey results.

In order to continue to improve the assessment, an acoustic survey covering the whole stock is needed. Development of stock identification methods using combinations of genetics and otolith analyses continues. Results from such methods allow exploration of the importance of stock migrations and local stock components in the area.

### *Uncertainties in assessment and forecast*

There is a tendency to overestimate the fishing mortality in the five-year retrospective analysis.

The historical bias in the assessment is small, except in the recruitment. Apparently, the strength of a year class is not firmly estimated before the year class has been followed for 2–3 years.

### *Comparison with previous assessment and advice*

The current procedure for assessing the stock has given consistent results with respect to fishing mortality and spawning biomass for several years. Compared to last year's assessment, the change in the estimate is +1% for the fishing mortality in 2003 and -2% for the SSB in 2003.

The assessment carried out in 2004 is in line with the 2003 assessment.

### *Information from the fishing industry*

The fishing industry suggests that substantial area misreporting occurs from the North Sea to Kattegat.

## **Source of information**

Report of the Baltic Fisheries Assessment Working Group Hamburg, 12–21 April 2005, ICES CM 2005/ACFM:19.

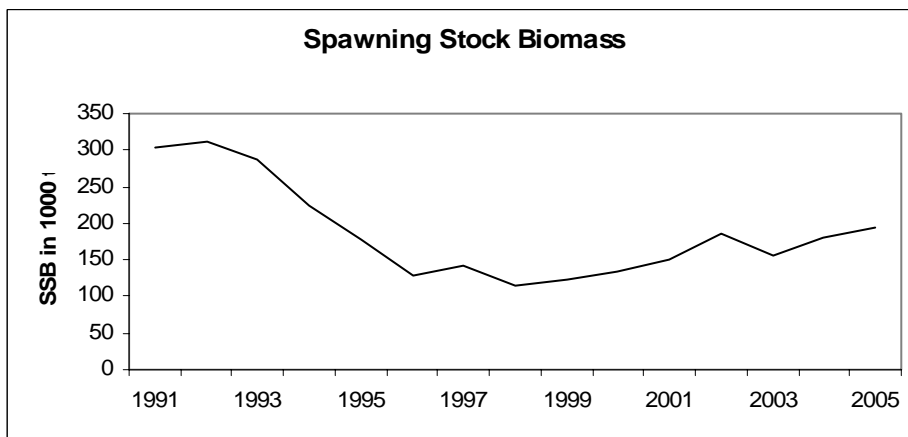
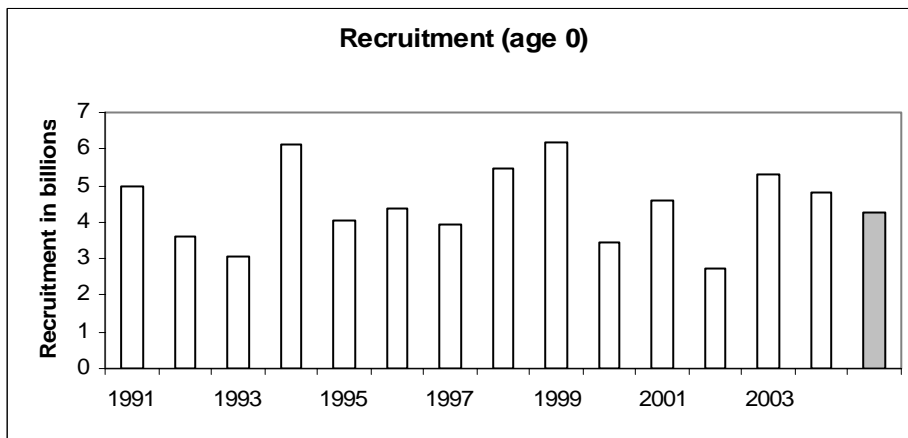
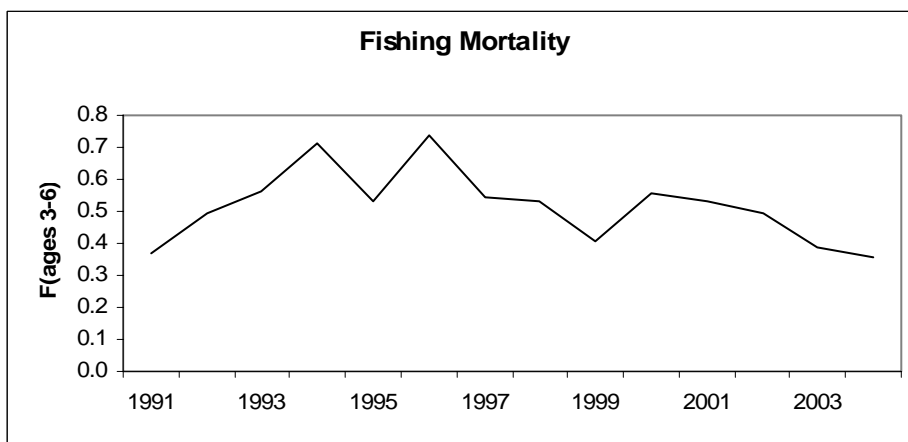
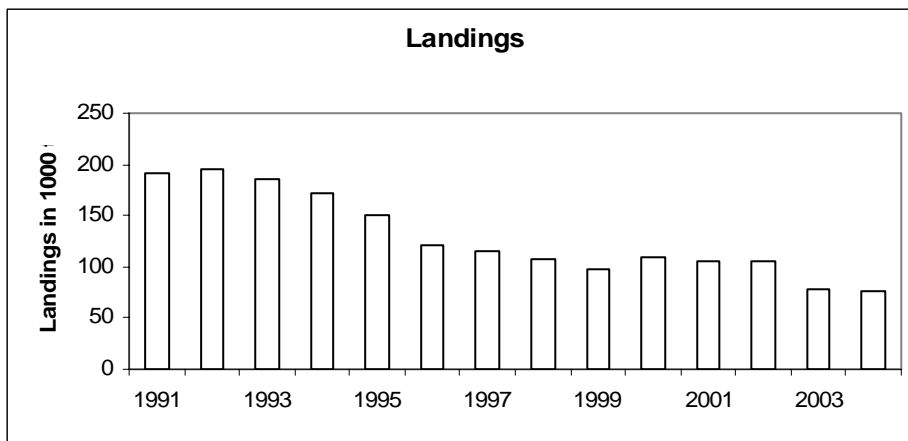
Report of the Herring Assessment Working Group for the Area South of 62°N, 8–17 March 2005 (ICES CM 2005/ACFM:16).

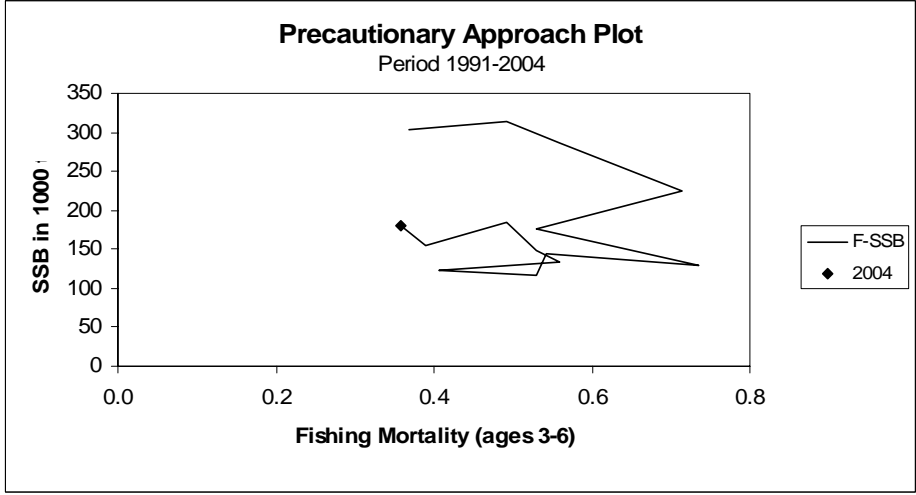
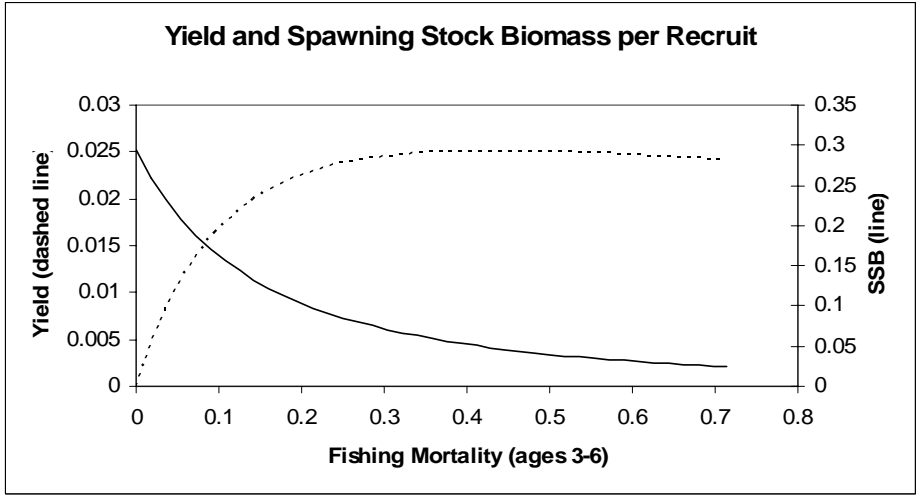
Year	ICES Advice	Pred. Catch Corresp. to advice	Agreed TAC IIIa <sup>2</sup>	ACFM catch of Stock			
				22–24	IIIa	IV	Total
1987	Reduction in F	224	218	102	59	14	175
1988	No increase in F	196	218	99	129	23	251
1989	TAC	174	218	95	71	20	186
1990	TAC	131	185	78	118	8	204
1991	TAC	180	155	70	112	10	192
1992	TAC	180	174	85	101	9	195
1993	Increased yield from reduction in F; reduction in juvenile catches	188	210	81	95	10	186
1994	TAC	130–180	191	66	92	14	172
1995	If required, TAC not exceeding recent catches	168–192	183	74	80	10	164
1996	If required, TAC not exceeding recent catches	164–171	163	58	71	1	130
1997	IIIa: managed together with autumn spawners 22–24: if required, TAC not exceeding recent catches	66–85 <sup>1</sup>	100	68	55	1	124
1998	Should be managed in accordance with North Sea autumn spawners	-	97	51	53	8	112
1999	IIIa: managed together with autumn spawners 22–24: if required, TAC not exceeding recent catches	-	99	50	43	5	98
2000	IIIa: managed together with autumn spawners 22–24: if required, TAC not exceeding recent catches	~60 for Sub-divs. 22–24	101	54	57	7	118
2001	IIIa: managed together with autumn spawners 22–24: if required, TAC not exceeding recent catches	~50 for Sub-divs. 22–24	101	64	42	6	112
2002	IIIa: managed together with autumn spawners 22–24: if required, TAC not exceeding recent catches	~50 for Sub-divs. 22–24	101	53	47	7	107
2003	Reduce F	<80	101	40	36	2	78
2004	Separate management regime for this stock Reduce F	<92	91	42	24	7	77
2005	Separate management regime for this stock <i>Status quo</i> F	95	120				
2006	Separate management regime for this stock <i>Status quo</i> F	95					

Weights in '000 t.

<sup>1</sup>Catch in Subdivisions 22–24. <sup>2</sup>Including mixed clupeoid TAC and bycatch ceiling in small-mesh fishery.

Herring in Subdivisions 22–24 and Division IIIa (spring spawners)





**Table 1.4.17.1 HERRING in Division IIIa and Sub. Division 22-24, 1985 - 2004**  
Landings in thousands of tonnes.

Year	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
<b>Skagerrak</b>										
Denmark	88.2	94.0	105.0	144.4	47.4	62.3	58.7	64.7	87.8	44.9
Faroe Islands	0.5	0.5								
Norway	4.5	1.6	1.2	5.7	1.6	5.6	8.1	13.9	24.2	17.7
Sweden	40.3	43.0	51.2	57.2	47.9	56.5	54.7	88.0	56.4	66.4
<b>Total</b>	<b>133.5</b>	<b>139.1</b>	<b>157.4</b>	<b>207.3</b>	<b>96.9</b>	<b>124.4</b>	<b>121.5</b>	<b>166.6</b>	<b>168.4</b>	<b>129.0</b>
<b>Kattegat</b>										
Denmark	69.2	37.4	46.6	76.2	57.1	32.2	29.7	33.5	28.7	23.6
Sweden	39.8	35.9	29.8	49.7	37.9	45.2	36.7	26.4	16.7	15.4
<b>Total</b>	<b>109.0</b>	<b>73.3</b>	<b>76.4</b>	<b>125.9</b>	<b>95.0</b>	<b>77.4</b>	<b>66.4</b>	<b>59.9</b>	<b>45.4</b>	<b>39.0</b>
<b>Sub. Div. 22+24</b>										
Denmark	15.9	14.0	32.5	33.1	21.7	13.6	25.2	26.9	38.0	39.5
Germany	54.6	60.0	53.1	54.7	56.4	45.5	15.8	15.6	11.1	11.4
Poland	16.7	12.3	8.0	6.6	8.5	9.7	5.6	15.5	11.8	6.3
Sweden	11.4	5.9	7.8	4.6	6.3	8.1	19.3	22.3	16.2	7.4
<b>Total</b>	<b>98.6</b>	<b>92.2</b>	<b>101.4</b>	<b>99.0</b>	<b>92.9</b>	<b>76.9</b>	<b>65.9</b>	<b>80.3</b>	<b>77.1</b>	<b>64.6</b>
<b>Sub. Div. 23</b>										
Denmark	6.8	1.5	0.8	0.1	1.5	1.1	1.7	2.9	3.3	1.5
Sweden	1.1	1.4	0.2	0.1	0.1	0.1	2.3	1.7	0.7	0.3
<b>Total</b>	<b>7.9</b>	<b>2.9</b>	<b>1.0</b>	<b>0.2</b>	<b>1.6</b>	<b>1.2</b>	<b>4.0</b>	<b>4.6</b>	<b>4.0</b>	<b>1.8</b>
<b>Grand Total</b>										
	349.0	307.5	336.2	432.4	286.4	279.9	257.8	311.4	294.9	234.4

Year	1995	1996	1997	1998 <sup>2</sup>	1999 <sup>2</sup>	2000	2001 <sup>3</sup>	2002	2003	2004 <sup>1</sup>
<b>Skagerrak</b>										
Denmark	43.7	28.7	14.3	10.3	10.1	16.0	16.2	26.0	15.5	8.0
Faroe Islands										
Germany									0.7	0.5
Norway										1.4
Sweden	48.5	32.7	32.9	46.9	36.4	45.8	30.8	26.4	25.8	21.8
Misreporting										
<b>Total</b>	<b>95.2</b>	<b>64.4</b>	<b>50.2</b>	<b>60.2</b>	<b>46.5</b>	<b>61.8</b>	<b>47.0</b>	<b>43.4</b>	<b>43.9</b>	<b>31.7</b>
<b>Kattegat</b>										
Denmark	16.9	17.2	8.8	23.7	17.9	18.9	18.8	22.5	14.0	10.9
Sweden	30.8	27.0	18.0	29.9	14.6	17.3	16.2	7.2	10.2	9.6
<b>Total</b>	<b>47.7</b>	<b>44.2</b>	<b>26.8</b>	<b>53.6</b>	<b>32.5</b>	<b>36.2</b>	<b>35.0</b>	<b>29.7</b>	<b>24.2</b>	<b>20.5</b>
<b>Sub. Div. 22+24</b>										
Denmark	36.8	34.4	30.5	30.1	32.5	32.6	28.3	11.0	6.1	7.1
Germany	13.4	7.3	12.8	9.0	9.8	9.3	11.4	22.4	18.8	18.0
Poland	7.3	6.0	6.9	6.5	5.3	6.6	9.3	7.0	4.4	5.5
Sweden	15.8	9.0	14.5	4.3	2.6	4.8	13.9	10.7	9.6	9.9
<b>Total</b>	<b>73.3</b>	<b>56.7</b>	<b>64.7</b>	<b>49.9</b>	<b>50.2</b>	<b>53.3</b>	<b>62.9</b>	<b>51.1</b>	<b>38.9</b>	<b>40.5</b>
<b>Sub. Div. 23</b>										
Denmark	0.9	0.7	2.2	0.4	0.5	0.9	0.6	0.4	2.3	1.2
Sweden	0.2	0.3	0.1	0.3	0.1	0.1	0.2	1.0	0.2	0.3
<b>Total</b>	<b>1.1</b>	<b>1.0</b>	<b>2.3</b>	<b>0.7</b>	<b>0.6</b>	<b>1.0</b>	<b>0.8</b>	<b>1.4</b>	<b>2.6</b>	<b>1.5</b>
<b>Grand Total</b>										
	217.3	166.3	144.0	164.4	129.8	152.3	145.7	125.6	109.6	94.2

<sup>1</sup> Preliminary data.

<sup>2</sup> Data for 1998 and 1999 revised in 2003

<sup>3</sup> German data revised in 2004

**Table 1.4.17.2** Herring in Subdivisions 22-24 and Division IIIa (spring spawners).

Year	Recruitment Age 0 thousands	SSB tonnes	Landings tonnes	Mean F Ages 3-6
1991	4979060	302863	191573	0.3689
1992	3631200	313084	194411	0.4924
1993	3057310	287160	185010	0.5602
1994	6141020	224788	172438	0.7135
1995	4036680	177088	150831	0.5307
1996	4380020	129220	121266	0.7344
1997	3964840	143328	115588	0.5417
1998	5479590	115933	107032	0.5301
1999	6192940	121986	97240	0.4058
2000	3460880	133636	109914	0.5592
2001	4607080	149508	105803	0.5299
2002	2736450	185430	106191	0.4928
2003	5311160	154966	78309	0.3894
2004	4808130	180386	76815	0.3575
2005	*4255743	193981		
Average	4469474	187557	129459	0.5148

\* Geometric mean for the years 1993–2002.