

8.3.12 Herring (*Clupea harengus*) in Subdivisions 25–29 and 32 (Central Baltic Sea, excluding Gulf of Riga)

ICES stock advice

ICES advises that when the MSY approach is applied, catches in 2016 should be no more than 201 kt. This applies to all catches from the stock in the Central Baltic Sea and Gulf of Riga.

Stock development over time

Spawning-stock biomass (SSB) decreased until 2001 and then increased, and has been above MSY $B_{trigger}$ since 2006. Fishing mortality increased until 2000 and then decreased, remaining below F_{MSY} since 2004. The 2014 year class is estimated to be the second highest of the whole time-series.

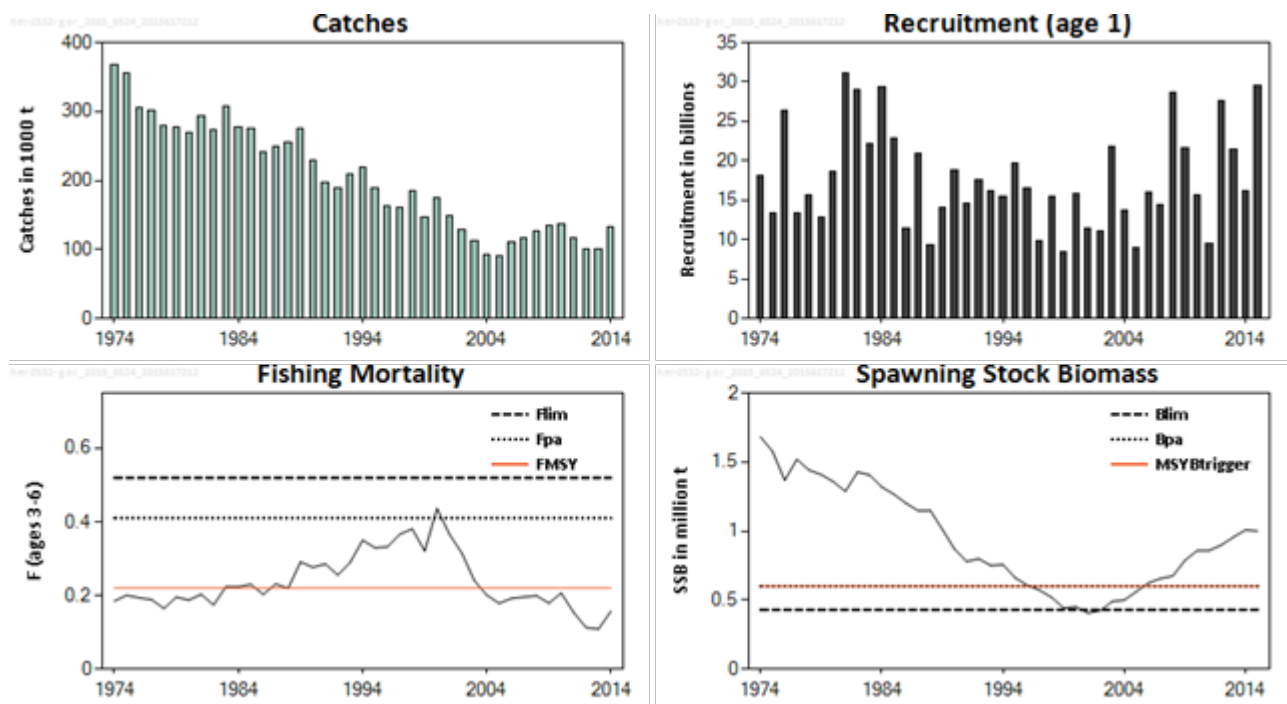


Figure 8.3.12.1 Herring in Subdivisions 25–29 and 32 (excluding Gulf of Riga herring). Summary of stock assessment (SSB in 2015 is predicted).

Stock and exploitation status

Table 8.3.12.1 Herring in Subdivisions 25–29 and 32. State of the stock and fishery, relative to reference points.

		Fishing pressure			Stock size					
		2012	2013	2014	2013	2014	2015			
Maximum Sustainable Yield	F_{MSY}	✓	✓	✓	MSY	✓	✓	✓	Below	Above trigger
Precautionary approach	F_{pa} , F_{im}	✓	✓	✓	B_{pa} , B_{im}	✓	✓	✓	Harvested sustainably	Full reproductive capacity
Management Plan	F_{MGT}	-	-	-	SSB_{MGT}	-	-	-	Not applicable	Not applicable

Catch options

Table 8.3.12.2 Herring in Subdivisions 25–29 and 32 (excluding Gulf of Riga herring). The basis for the catch options.

Variable	Value	Source	Notes
F ages 3–6 (2015)	0.20	ICES (2015a)	TAC constraint*
SSB (2016)	1 000 kt	ICES (2015a)	
R _{age1} (2015)	29.5 billions	ICES (2015a)	RCT3 estimate
R _{age1} (2016–2017)	15.0 billions	ICES (2015a)	Geometric mean 1988–2013
Total catch (2015)	191 kt	ICES (2015a)	
Discards (2015)	0	ICES (2015a)	

* TAC constraint in 2015: EU share 163 451 t + Russian quota 22 900 t + Central Baltic herring stock caught in Gulf of Riga 4 700 t (mean 2009–2013) – Gulf of Riga herring stock caught in central Baltic Sea 220 t (mean 2009–2013) = 190 831 t.

Table 8.3.12.3 Herring in Subdivisions 25–29 and 32 (excluding Gulf of Riga herring). The catch options. Weights in thousand tonnes.

Rationale	Catches (2016)	Basis	F (2016)	SSB (2016)	SSB (2017)	%SSB change*	%Advice change**
MSY approach	201	F _{MSY}	0.22	1 024	943	-8%	4%
F _{MSY} ranges without Advice Rule ***	150	MSY F _{lower}	0.16	1 043	1 002	-4%	-22%
	201	MSY F _{upper}	0.22	1 024	943	-8%	4%
F _{MSY} range with Advice Rule included ***	150	MSY F _{lower(AR)}	0.16	1 043	1 002	-4%	-22%
	250	MSY F _{upper(AR)}	0.28	1 005	888	-12%	29%
Precautionary approach	503	B _{pa} (F ₂₀₁₅ × 2.94)	0.59	908	600	-34%	161%
Zero catch	0	F ₂₀₁₅ × 0	0.00	1 095	1 183	8%	-100%
Other options	134	F ₂₀₁₅ × 0.7	0.14	1 049	1 021	-3%	-31%
	164	F ₂₀₁₅ × 0.87	0.176	1 038	986	-5%	-15%
	169	F ₂₀₁₅ × 0.9	0.18	1 036	980	-5%	-12%
	186	F ₂₀₁₅ × 1	0.20	1 029	960	-7%	-4%
	203	F ₂₀₁₅ × 1.1	0.222	1 023	941	-8%	5%
	222	F ₂₀₁₅ × 1.21	0.25	1 016	919	-10%	15%
	193	F ₂₀₁₅ × 1.04	0.21	1 027	952	-7%	0%
	347	F _{pa}	0.41	966	781	-19%	80%

* SSB 2017 relative to SSB 2016.

** Catches in 2016 relative to 2014 ICES advice for 2015.

*** According to ICES (2015c), F_{MSY} ranges are specified with and without the ICES Advice Rule (AR). For ranges without the AR F_{lower} and F_{upper} are not modified by SSB in the catch advice year. For the ranges with the AR, SSB₂₀₁₅ > MSY B_{trigger}, therefore F_{lower(AR)} and F_{upper(AR)} are not reduced.

Basis of the advice

Table 8.3.12.4 Herring in Subdivisions 25–29 and 32 (excluding Gulf of Riga herring). The basis of the advice.

Advice basis	MSY approach.
Management plan	There is no management plan for herring in this area.

Quality of the assessment

Herring in the central Baltic is composed of a number of local populations differing in growth parameters. Among the factors influencing the future mean weight-at-age of the stock is recruitment success for the individual populations. Separate trial assessments for different populations conducted in 2013 (ICES, 2013), however, showed only a limited impact of this complex stock structure on the perception of the overall stock dynamics.

Species misreporting of herring has occurred in the past; it is presently considered to be negligible.

The recent assessments show an overall upwards revision in SSB and a downwards revision in fishing mortality.

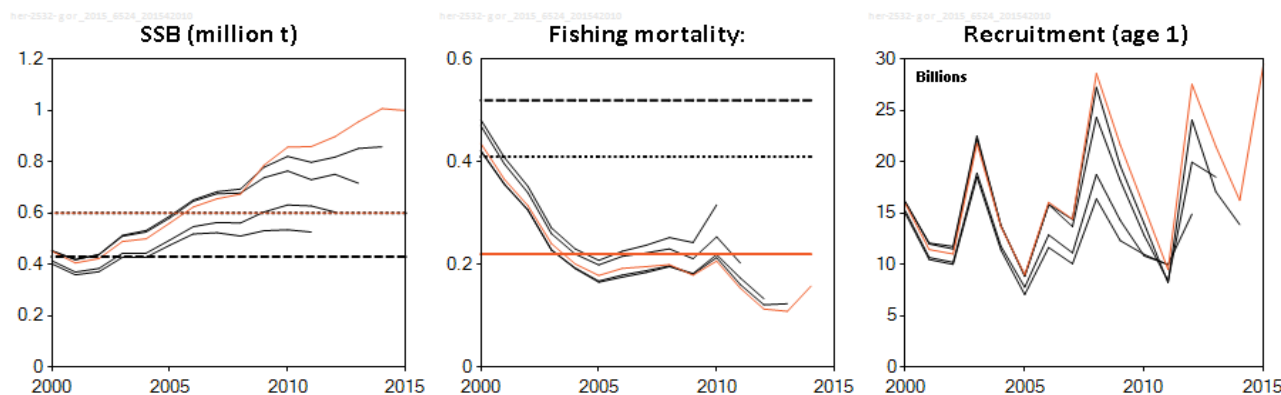


Figure 8.3.12.2 Herring in Subdivisions 25–29 and 32 (excluding Gulf of Riga herring). Historical assessment results (final-year recruitment estimates included).

Issues relevant for the advice

Under the EU landing obligation, which entered into force in 2015, up to 9% interspecies quota transfers are allowed for stocks that are considered to be within safe biological limits (EU, 2013 – Article 15, 1380–2013). Quota transfers were not considered in this catch advice as no information regarding these transfers was available. This should be monitored closely to ensure that catches of herring do not increase above the ICES advised catch. To achieve F_{MSY} exploitation, any transfer under this regulation should be accounted for in setting the TAC.

New fishing mortality reference points were defined in 2015 (ICES, 2015c) and adopted for the stock (see Table 8.3.12.3). F_{MSY} (0.22) was estimated lower than the previous estimate (0.26).

A mixture of central Baltic herring (Subdivisions 25–27, 28.2, 29, and 32) and the Gulf of Riga (Subdivision 28.1) herring is caught in the central Baltic Sea. The assessment and the advice consider that the central Baltic herring stock is caught both in and outside the central Baltic Sea. The TAC (sum of the EU and Russia autonomous quotas) is set for herring caught in the central Baltic management area, which includes also a small amount of Gulf of Riga herring caught in the central Baltic Sea but excludes central Baltic herring caught outside the central Baltic Sea.

The TAC value proposed for the central Baltic area is based on the advised catch for the central Baltic herring stock, plus the assumed catch of the Gulf of Riga herring taken in the central Baltic, minus the assumed catch of herring from the central Baltic stock taken in the Gulf of Riga. The values of the two latter are given by the average over the last five years.

- Central Baltic herring assumed to be taken in the Gulf of Riga in 2016 (Subdivision 28.1) is 4620 t (average 2010–2014);
- Gulf of Riga herring assumed to be taken in Subdivision 28.2 in 2016 is 220 t (average 2010–2014).

Following the ICES MSY approach of catches no more than 201 kt, the corresponding TAC in the central Baltic management area for 2016 would be 196.6 kt, calculated as 201 kt + 0.22 kt – 4.62 kt.

Preliminary investigations indicate that western Baltic spring-spawning herring (Division IIIa and Subdivisions 22–24) and central Baltic herring (Subdivisions 25–29 and 32, excluding Gulf of Riga herring) are mixing in Subdivisions 24–26 (Gröhsler *et al.*, 2013). However, this is not taken into account in the current assessment.

Activities that have a negative impact on the spawning habitat of herring should not occur, unless the effects of these activities have been assessed and shown not to be detrimental (ICES, 2003, 2014).

Reference points

Table 8.3.12.5 Herring in Subdivisions 25–29 and 32 (excluding Gulf of Riga herring). Reference points, values, and their technical basis.

Framework	Reference point	Value	Technical basis	Source
MSY approach	F_{MSY}	0.22		ICES (2015c)
	MSY $B_{trigger}$	600 000 t	B_{pa} .	ICES (2013)
	Multispecies F_{MSY}	0.25–0.35	Multispecies model (SMS). One of several options giving a high sustainable yield of herring as well as of cod and sprat due to low to moderate predation from cod.	ICES (2013)
Precautionary approach	B_{lim}	430 000 t	B_{loss} .	ICES (2013)
	B_{pa}	600 000 t	$1.4 \times B_{lim}$.	ICES (2013)
	F_{lim}	0.52	Consistent with B_{lim} .	ICES (2013)
	F_{pa}	0.41	Consistent with B_{pa} .	ICES (2013)
Management plan	SSB_{MGT}	Not defined.		
	F_{MGT}	Not defined.		

Basis of the assessment

Table 8.3.12.6 Herring in Subdivisions 25–29 and 32 (excluding Gulf of Riga herring). The basis of the assessment.

ICES stock data category	1 (ICES, 2015b).
Assessment type	Age-based analytical assessment (XSA; ICES, 2015a) that uses catches in the model and in the forecast.
Input data	Commercial catches (international landings, age and length frequencies from catch sampling); one survey acoustic index (BIAS); natural mortalities from multispecies model (SMS); fixed maturity ogive.
Discards and bycatch	Not included; considered negligible.
Indicators	None.
Other information	Last benchmark in 2013 (ICES, 2013).
Working group	Baltic Fisheries Assessment Working Group (WGBFAS).

Information from stakeholders

The overall high catch rates for sprat presently are not the only problem for the industry. The advice to reduce the catch for sprat and at the same time increase the advised catch for central Baltic herring, will for some countries create a problem due to a bias between specific national quota shares and the abundance in the area of these two stocks.

History of advice, catch, and management

Table 8.3.12.7 Herring in Subdivisions 25–29 and 32 (excluding Gulf of Riga herring). History of ICES advice, the agreed TAC, and ICES estimates of catches. Weights in thousand tonnes.

Year	ICES advice	Predicted catch corresp. to advice	Agreed TAC*	ICES catch SDs 25–29+32
1988**		204	399	286
1989**		176	399	290
1990**		112	399	244
1991**	TAC for entire area	293	402	213
1992**	F near present level	343	402	210
1993**	Increase in yield at higher F	371	560	231
1994**	Increase in yield at higher F	317–463	560	242
1995**	TAC	394	560	221
1996**	TAC	394	560	195
1997**	No advice	-	560	208
1998**	No advice	-	560	212
1999**	Proposed $F_{pa} = (0.17)$	117	476	178
2000**	Proposed $F_{pa} = (0.17)$	95	405	208
2001**	Proposed $F_{pa} = (0.17)$	60	300	188
2002**	$F < F_{pa}$	< 73	Not agreed	168
2003**	$F < F_{pa}$	< 72	143	154
2004	$F < F_{pa}$	< 80	171	93 ^{^^}
2005	$F < F_{pa}$ (single-stock exploitation boundaries)	< 130	130 ^{***}	92 ^{^^}
2006	$F < F_{pa}$ (single-stock exploitation boundaries)	< 120	128 ^{***}	110 ^{^^}
2007	$F < F_{pa}$ (single-stock exploitation boundaries)	< 164	133 [^]	116 ^{^^}
2008	$F < F_{pa}$ (single-stock exploitation boundaries)	< 194	153 [^]	126 ^{^^}
2009	$F < F_{pa}$ (single-stock exploitation boundaries)	< 147	144 [^]	132 ^{^^}
2010	$F < F_{pa}$ (single-stock exploitation boundaries)	< 103	126 [^]	137 ^{^^}
2011	MSY Framework ($F = 0.19$)	< 95	120.020 ^{^^, #}	117 ^{^^}
2012	MSY transition ($F = F_{pa} = 0.19$)	< 92	93.317 ^{^^, #}	101 ^{^^}
2013	MSY transition ($F = F_{pa} = 0.19$)	< 117	101.480 ^{^^, #, ##}	101 ^{^^}
2014	MSY approach	< 164	132.225 ^{^^, #}	133 ^{^^}
2015	MSY approach ($F_{MSY} = 0.26$)	< 193	186.351 ^{^^, #}	
2016	MSY approach ($F_{MSY} = 0.22$)	≤ 201		

* TAC for Subdivisions 22–29S and 32.

** 1987–2003 incl. Gulf of Riga herring.

*** TAC for Subdivisions 25–28(2), 29, and 32.

[^] EU TAC for Subdivisions 25–28(2), 29, and 32.

^{^^} TAC is calculated as EU (Subdivisions 25–28(2), 29, and 32) + Russian autonomous quotas.

^{^^^} Excl. Gulf of Riga (Subdivision 28.1) herring stock.

[#] Version2: unrounded EU TAC.

^{##} version2: value corrected.

History of catch and landings

Table 8.3.12.8 Herring in Subdivisions 25–29 and 32 (excluding Gulf of Riga herring). Catch distribution by fleet in 2014 as estimated by ICES.

Total catch of stock (2014)	Total catch in area (2014)	Landings	Discards
133 kt	130 kt	Mainly pelagic trawls 133 kt	Discarding is considered to be negligible.

Table 8.3.12.9 Herring in Subdivisions 25–29 and 32 (excluding Gulf of Riga herring). History of central Baltic herring stock catch presented for each country participating in the fishery. Weights in thousand tonnes.

Year	Denmark	Estonia	Finland	Germany	Latvia	Lithuania	Poland	Russia**	Sweden	Total
1977	11.9		33.7	0.0			57.2	112.8	48.7	264.3
1978	13.9		38.3	0.1			61.3	113.9	55.4	282.9
1979	19.4		40.4	0.0			70.4	101.0	71.3	302.5
1980	10.6		44.0	0.0			58.3	103.0	72.5	288.4
1981	14.1		42.5	1.0			51.2	93.4	72.9	275.1
1982	15.3		47.5	1.3			63.0	86.4	83.8	297.3
1983	10.5		59.1	1.0			67.1	69.1	78.6	285.4
1984	6.5		54.1	0.0			65.8	89.8	56.9	273.1
1985	7.6		54.2	0.0			72.8	95.2	42.5	272.3
1986	3.9		49.4	0.0			67.8	98.8	29.7	249.6
1987	4.2		50.4	0.0			55.5	100.9	25.4	236.4
1988	10.8		58.1	0.0			57.2	106.0	33.4	265.5
1989	7.3		50.0	0.0			51.8	105.0	55.4	269.5
1990	4.6		26.9	0.0			52.3	101.3	44.2	229.3
1991	6.8	27.0	18.1	0.0	20.7	6.5	47.1	31.9	36.5	194.6
1992	8.1	22.3	30.0	0.0	12.5	4.6	39.2	29.5	43.0	189.2
1993	8.9	25.4	32.3	0.0	9.6	3.0	41.1	21.6	66.4	208.3
1994	11.3	26.3	38.2	3.7	9.8	4.9	46.1	16.7	61.6	218.6
1995	11.4	30.7	31.4	0.0	9.3	3.6	38.7	17.0	47.2	189.3
1996	12.1	35.9	31.5	0.0	11.6	4.2	30.7	14.6	25.9	166.7
1997	9.4	42.6	23.7	0.0	10.1	3.3	26.2	12.5	44.1	172.0
1998	13.9	34.0	24.8	0.0	10.0	2.4	19.3	10.5	71.0	185.9
1999	6.2	35.4	17.9	0.0	8.3	1.3	18.1	12.7	48.9	148.7
2000	15.8	30.1	23.3	0.0	6.7	1.1	23.1	14.8	60.2	175.1
2001	15.8	27.4	26.1	0.0	5.2	1.6	28.4	15.8	29.8	150.2
2002	4.6	21.0	25.7	0.3	3.9	1.5	28.5	14.2	29.4	129.1
2003	5.3	13.3	14.7	3.9	3.1	2.1	26.3	13.4	31.8	113.8
2004	0.2	10.9	14.5	4.3	2.7	1.8	22.8	6.5	29.3	93.0
2005	3.1	10.8	6.4	3.7	2.0	0.7	18.5	7.0	39.4	91.6
2006	0.1	13.4	9.6	3.2	3.0	1.2	16.8	7.6	55.3	110.4
2007	1.4	14.0	13.9	1.7	3.2	3.5	19.8	8.8	49.9	116.0
2008	1.2	21.6	19.1	3.4	3.5	1.7	13.3	8.6	53.7	126.2
2009	1.5	19.9	23.3	1.3	4.1	3.6	18.4	11.8	50.2	134.1
2010	5.4	17.9	21.6	2.2	3.9	1.5	25.0	9.1	50.0	136.7
2011	1.8	14.9	19.2	2.7	3.4	2.0	28.0	8.5	36.2	116.8
2012	1.4	11.4	18.0	0.9	2.6	1.8	25.5	13.0	26.2	101.0
2013	3.4	12.6	18.2	1.4	3.5	1.7	20.6	10.0	29.5	101.0
2014*	2.7	15.3	27.9	1.7	4.9	2.1	27.3	15.9	34.9	132.7

* Preliminary.

** In 1977–1990 sum of catches for Estonia, Latvia, Lithuania, and Russia.

Table 8.3.12.10 Herring in Subdivisions 25–29 and 32 (excluding Gulf of Riga herring). Catches (in thousand tonnes) from the central Baltic management area and of the central Baltic stock.

Year	Catches of herring from the central Baltic area			Central Baltic herring stock catches	
	Central Baltic herring stock	Gulf of Riga herring stock	Total	Central Baltic herring caught in Gulf of Riga	Total catch of central Baltic herring stock
1977	261.9	-	261.9	2.4	264.3
1978	276.6	-	276.6	6.3	282.9
1979	297.8	-	297.8	4.7	302.5
1980	282.7	-	282.7	5.7	288.4
1981	269.2	-	269.2	5.9	275.1
1982	292.6	-	292.6	4.7	297.3
1983	280.6	-	280.6	4.8	285.4
1984	269.3	-	269.3	3.8	273.1
1985	267.7	-	267.7	4.6	272.3
1986	248.3	-	248.3	1.3	249.6
1987	231.6	-	231.6	4.8	236.4
1988	262.5	-	262.5	3.0	265.5
1989	263.6	-	263.6	5.9	269.5
1990	223.3	-	223.3	6.0	229.3
1991	188.5	-	188.5	6.1	194.6
1992	185.7	1.3	187.0	3.5	189.2
1993	204.0	1.2	205.2	4.3	208.3
1994	213.6	2.1	215.7	5.0	218.6
1995	183.2	2.4	185.6	6.1	189.3
1996	162.3	4.3	166.6	4.4	166.7
1997	167.7	2.9	170.6	4.3	172.0
1998	181.8	2.8	184.6	4.1	185.9
1999	144.4	1.9	146.3	4.3	148.7
2000	170.5	1.9	172.4	4.6	175.1
2001	147.3	1.2	148.5	2.9	150.2
2002	125.6	0.4	126.0	3.5	129.1
2003	109.5	0.4	109.9	4.3	113.8
2004	89.7	0.2	89.9	3.3	93.0
2005	89.3	0.5	89.8	2.3	91.6
2006	107.2	0.4	107.6	3.2	110.4
2007	114.5	0.1	114.6	1.5	116.0
2008	120.1	0.1	120.2	6.1	126.2
2009	129.2	0.1	129.3	4.9	134.1
2010	131.5	0.4	131.9	5.2	136.7
2011	111.3	0.1	111.4	5.5	116.8
2012	97.2	0.2	97.4	3.8	101.0
2013	96.9	0.3	97.2	4.1	101.0
2014	128.2	0.2	130.0	4.5	132.7

Summary of the assessment

Table 8.3.12.11 Herring in Subdivisions 25–29 and 32 (excluding Gulf of Riga herring). Assessment summary with weights (in tonnes). Recruitment (in thousands).

Year	Recruitment (age 1)	SSB*	Total catch	Mean F (ages 3–6)
1974	18 110 344	1 682 419	368 652	0.185
1975	13 326 159	1 575 258	354 851	0.200
1976	26 350 490	1 366 761	305 420	0.194
1977	13 394 848	1 518 769	301 952	0.189
1978	15 694 237	1 441 083	278 966	0.165
1979	12 846 729	1 408 854	278 182	0.196
1980	18 700 946	1 357 466	270 282	0.187
1981	31 164 382	1 286 459	293 615	0.203
1982	29 058 970	1 428 073	273 134	0.174
1983	22 091 726	1 405 746	307 601	0.224
1984	29 392 650	1 318 511	277 926	0.224
1985	22 824 632	1 265 959	275 760	0.230
1986	11 483 686	1 201 430	240 516	0.203
1987	20 931 046	1 146 207	248 653	0.231
1988	9 343 368	1 149 349	255 734	0.219
1989	14 121 048	1 011 683	275 501	0.291
1990	18 773 456	868 697	228 572	0.276
1991	14 572 920	779 047	197 676	0.286
1992	17 654 740	798 752	189 781	0.255
1993	16 212 562	749 694	209 094	0.290
1994	15 530 618	756 137	218 260	0.350
1995	19 746 536	661 870	188 181	0.329
1996	16 616 435	607 154	162 578	0.332
1997	9 807 850	571 598	160 002	0.366
1998	15 502 938	520 056	185 780	0.381
1999	8 445 892	442 120	145 922	0.321
2000	15 888 799	451 656	175 646	0.436
2001	11 448 120	405 680	148 404	0.366
2002	11 018 742	422 897	129 222	0.315
2003	21 788 620	489 399	113 584	0.240
2004	13 692 690	499 874	93 006	0.201
2005	8 999 142	561 197	91 592	0.179
2006	16 051 599	624 152	110 372	0.192
2007	14 419 835	655 926	116 030	0.196
2008	28 616 912	674 088	126 155	0.200
2009	21 645 668	786 991	134 127	0.179
2010	15 590 471	857 453	136 706	0.207
2011	9 499 102	859 512	116 785	0.154
2012	27 564 046	898 035	100 893	0.113
2013	21 514 928	956 055	100 954	0.109
2014	16 238 513	1 007 528	132 700	0.158
2015	29 548 000**	1 000 071***		
Average	17 743 438	939 754	202 897	0.238

* At spawning time.

** Output from survey data (RCT3 analysis).

*** Predicted.

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