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Sea trout (*Salmo trutta*) in subdivisions 22–32 (Baltic Sea)

ICES stock advice

ICES advises that new data (landings and surveys) available for sea trout do not change the perception of the stock status and that the advice for this stock is valid for 2018 and 2019.

ICES advises that when the precautionary approach is applied, commercial and recreational fisheries in the Gulf of Bothnia (subdivisions 30 and 31) should be reduced to safeguard the remaining wild sea trout populations in the region, both locally and on their migration routes. Commercial and recreational fishing should also be reduced in the eastern part of subdivision 26 and in the southern parts of subdivisions 22 and 24 to protect weak wild populations in these areas. Reductions in exploitation should include fisheries that target other species, but where sea trout are caught as bycatch.

Management measures to help achieve exploitation reductions include minimum mesh size for gillnets, minimum landing sizes, effort reductions, size restrictions, and temporal and spatial fishing closures in the river mouths and in certain coastal areas.

Existing fishing restrictions in other Baltic Sea areas (subdivisions 25, 27–29, and 32) should be maintained.

Habitat improvement by restoration, as well as improved accessibility to spawning and rearing areas in many Baltic Sea rivers is needed to allow for recovery of sea trout populations.

Stock development over time

A high variation in densities of trout parr is observed in the southern Baltic Sea (subdivisions 22–25), with no obvious trends. The differences seen from country to country (Figure 1) partly reflects differences in the selection of monitoring sites and the types of rivers/streams that are included. The number of sites also varies greatly by area and year.

The status in 2016 for southern Baltic stocks (subdivisions 22–25) remained about the same as in recent years. Danish sea trout populations generally have a lower recruitment status (Figure 3). The other southern populations seem to be in a relatively better state. Estimates of recruitment status are not available from Germany in 2015 or 2016, but in the last assessment (in 2015, based on 2014 data), the status of some German streams was found to be poor (ICES, 2015a).

In the eastern Main Basin (subdivisions 26, 28, and the eastern part of 29), average parr densities have increased in the last decade (Figure 1). Assessed recruitment status in many populations is relatively high (Figures 2 and 3). However, in Lithuania the recruitment status for the last few years has been low. The main reason is believed to be low water flows during the spawning period in recent years.

In the Gulf of Bothnia (subdivisions 30 and 31), average parr densities are low and highly variable (Figure 1). Sea trout stocks are still considered to have poor status as a result of depressed spawning runs. Although increasing spawner numbers have been observed over the last fifteen years, absolute numbers in most rivers are still considered low. Bycatch of immature sea trout in sea fisheries (mainly coastal gillnets) continues to be high.

In the Gulf of Finland (Subdivision 32) average parr densities are highly variable (Figure 1). Estonia is considered to have the highest current stock status, whereas the status in Russia and Finland is still relatively poor (Figure 3). Fishing regulations (e.g. release of wild fish, larger minimum size) recently introduced in Finland are likely to have contributed positively to stock status. Poaching is still considered to be a problem for sea trout populations in Russia.

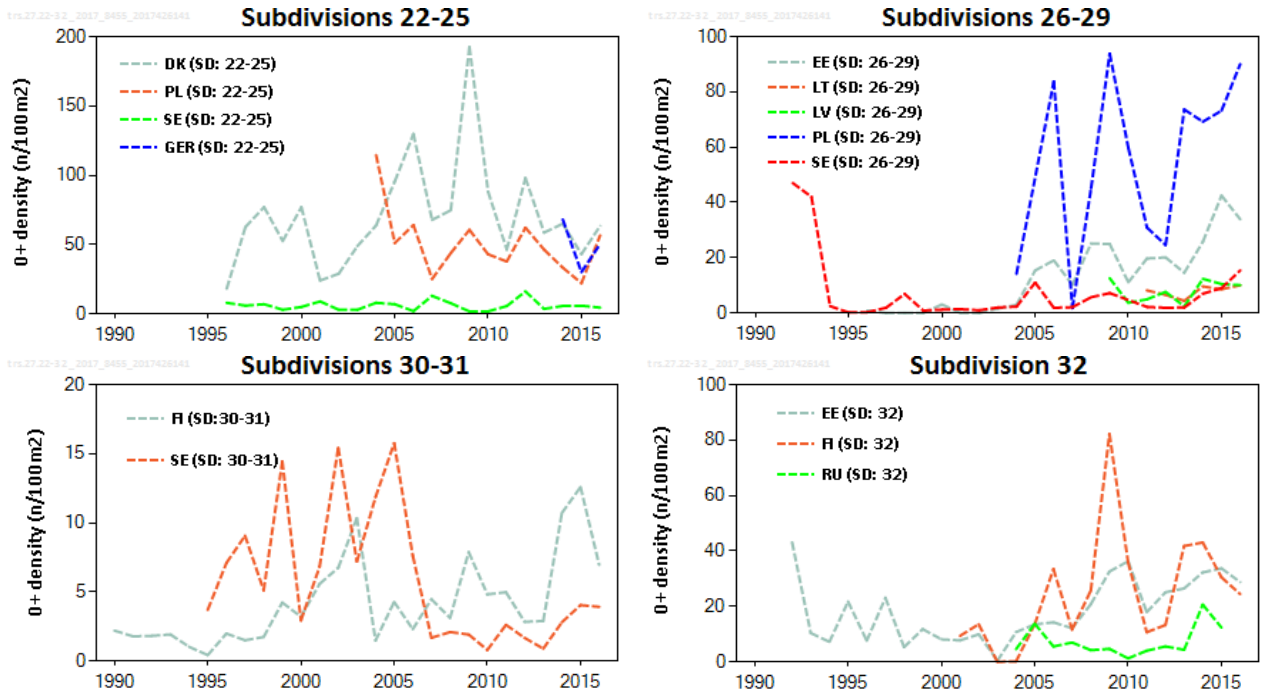

Figure 1 Sea trout in subdivisions 22–32 (Baltic Sea). Average densities of 0+ sea trout in (top left) Danish (DK), Polish (PL), Swedish (SE), and German (GER) rivers in ICES subdivisions 22–25 (Note: in 2017, previously unavailable older data were added to the Danish time-series); (top right) Estonian (EE), Lithuanian (LT), Latvian (LV), Polish (PL), and Swedish (SE) rivers in ICES subdivisions 26–29; (bottom left) Finnish (FI) and Swedish (SE) rivers in ICES subdivisions 30–31; and (bottom right) in Estonian (EE), Finnish (FI), and Russian (RU) rivers in ICES Subdivision 32 (Note: no density estimates were available from Russia in 2016).

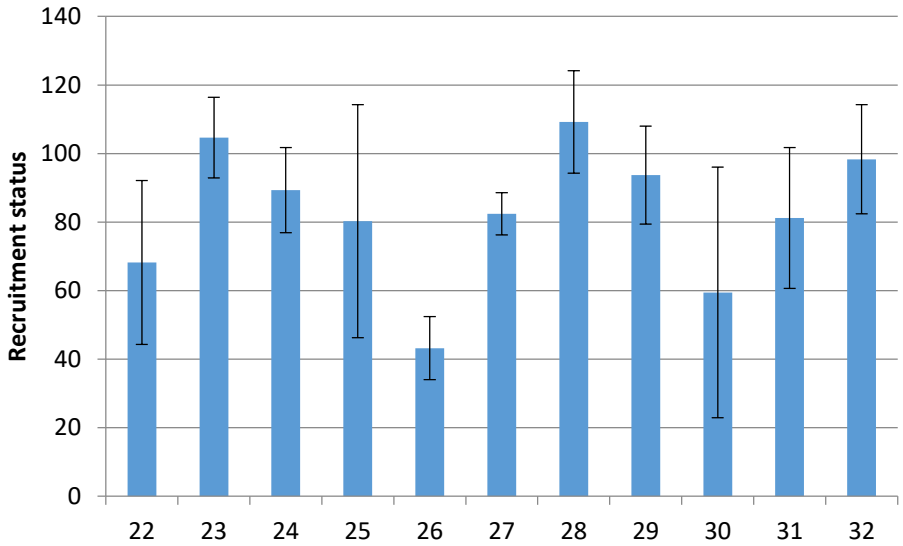

Figure 2 Sea trout in subdivisions 22–32 (Baltic Sea). Average relative recruitment status of 0+ sea trout parr (with 95% confidence limits) by subdivision in the Baltic Sea. Recruitment status is calculated as observed parr densities compared to modelled optimum parr densities by river system (100% = optimum level). The recruitment status is derived from the relationship between observed and expected optimal densities, based on habitat quality (ICES, 2017).

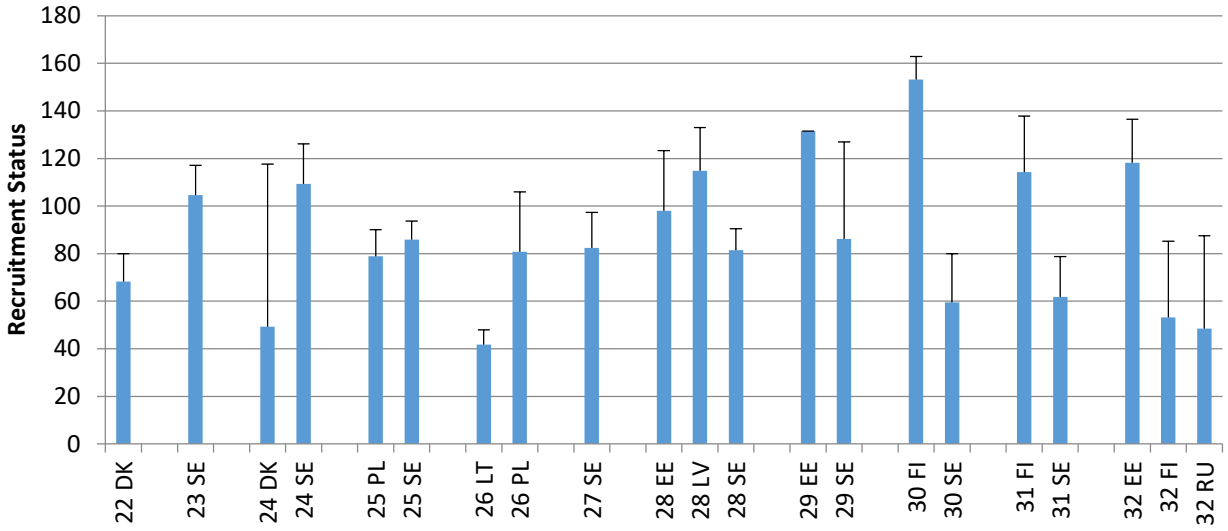

Figure 3 Sea trout in subdivisions 22–32 (Baltic Sea). Average relative recruitment status of 0+ sea trout parr (with 95% confidence limits) by country (within subdivisions) in the Baltic Sea. Recruitment status is calculated as the observed parr densities compared to modelled optimum parr densities by river system (100% = optimum level).

Catch options

No quantitative assessment or forecast could be provided.

Basis of the advice

Table 1 Sea trout in subdivisions 22–32 (Baltic Sea). The basis of the advice.

Advice basis	Precautionary approach.
Management plan	There is no management plan for sea trout in the Baltic Sea.

Quality of the assessment

The assessment of sea trout status is mainly based on electrofishing surveys, habitat data , other available information (e.g. spawner and smolt counts, sea ages of sea trout caught as bycatch), and expert knowledge. The approach used for the assessment of sea trout is still under development.

The quality, continuity, and comparability of results from electrofishing surveys is variable and could be improved through a standardized approach for data collection as well as by the inclusion of index rivers. In some areas of the Baltic Sea, monitoring of sea trout in rivers is restricted to sites that have been established specifically for salmon; these sites may not be optimal for monitoring of sea trout. The quality of the assessment could also be improved by including information from life stages at sea and during migration, such as results from tracking studies and genetic assignment.

There are doubts about the accuracy of the reported commercial landings. Discarding of undersized sea trout takes place mainly in the coastal fisheries, but there are no available data from any fisheries. The available information (e.g. tagging data) suggests that a significant amount of undersized sea trout are caught as bycatch in the gillnet fishery for other species. A recent pilot study conducted in Finnish waters suggested a survival rate of approximately 60% in spring and late autumn for sea trout released from whitefish gillnets (ICES, 2016a). However, the survival rate of small sea trout released back to the sea in warmer waters is likely much lower than 60%. The amount of seal-damaged sea trout is unknown in most countries, but could be significant (Larsen *et al.*, 2015). A proportion of catches in the long-line salmon fishery is misreported as being sea trout, resulting in overestimation of sea trout catches in that fishery. Recreational catches are significant in many countries, but the catch estimates are uncertain and incomplete or totally missing for several areas. More emphasis should be given to estimating these catches as they will have the highest impact on the populations.

Sea trout is an anadromous form of brown trout (*Salmo trutta L.*). Sea trout parr usually live in the same water system as resident brown trout, and they breed together and genetically belong to the same population. This increases the

uncertainty of parr data for sea trout assessment. Studies using microchemistry on parr otoliths should be used to estimate the reproductive contribution of resident and anadromous trout females.

Issues relevant for the advice

In some areas, parr densities are low and total exploitation (recreational and commercial) is considered to be too high to allow recovery. Therefore, exploitation rates should be reduced in those areas (subdivisions 30 and 31, the eastern part of Subdivision 26, and the southern parts of subdivisions 22 and 24). Because of the migratory behaviour of sea trout, the same advice applies to nearby areas.

Most of the sea trout in the Baltic Sea migrate to coastal areas near their home river and are therefore exploited locally, but stocks, subpopulations, and individuals with much longer migrations exist. Recent genetic studies indicate that long migrations are more common than previously recognized. This migratory behaviour necessitates international cooperation when managing sea trout stocks.

There is a large variability in the habitat quality of sea trout rivers. Although many rivers should be suitable habitats for sea trout, many populations are reported to be limited by poor habitat conditions and migration obstacles. Habitat restoration and improved connectivity should be promoted where needed, and accessibility to spawning and rearing areas should be secured.

There is growing evidence that increased predation pressure, mainly from seals and birds, in some areas constitutes a high additional mortality factor that is much higher than human exploitation.

Reference points

No reference points are available for sea trout.

To evaluate the state of sea trout stocks in different areas, ICES uses densities of sea trout parr expressed as a percentage of model-predicted maximal densities, derived using the highest observed values from the last fifteen years (ICES, 2011, 2017).

Basis of the assessment

Table 2 Sea trout in subdivisions 22–32 (Baltic Sea). The basis of the assessment and advice.

ICES stock data category	3 (ICES, 2016b).
Assessment type	Evaluation of the relative status of stocks by comparing the observed parr densities to model-predicted maximal parr densities.
Input data	Parr densities from most of the rivers, smolt and spawner counts in some rivers (1990–2016). Catches 1979–2016; international landings, tag returns, age composition.
Discards and bycatch	Not included in the assessment, but bycatch is known to be high in some areas. There is no available information on discards.
Indicators	None.
Other information	None.
Working group	Assessment Working Group on Baltic Salmon and Trout (WGBAST).

Information from stakeholders

There is no available information.

History of the advice, catch, and management

Table 3 Sea trout in subdivisions 22–32 (Baltic Sea). ICES advice, management, and landings.

Year	ICES advice	Predicted catch corresp. to advice	Agreed TAC	Nominal commercial landings (t)*
2003	No advice	-	-	934
2004	No advice	-	-	926
2005	Implement spatial restrictions, min. mesh size, and effort limitation	-	-	732
2006	Implement spatial restrictions, min. mesh size, and effort limitation. Urgent need to reduce exploitation in SDs 30–32.	-	-	707
2007	Implement spatial restrictions, min. mesh size, and effort limitation. Urgent need to reduce exploitation in SDs 30–32.	-	-	678
2008	Framework for advice under revision. No new advice.	-	-	328
2009	Reduce exploitation in SDs 30–32 and implement fishing restrictions. In SDs 22–29, improve river habitats.	-	-	530
2010	Reduce exploitation in SDs 30–32 and enforce fishing restrictions. In SDs 22–29, improve river habitats and maintain current restrictions.	-	-	568
2011	In SDs 30–32 enforce fishing restrictions, implement min. mesh size and effort limitations, and increase protective areas. In SDs 22–29, improve river habitats and maintain current restrictions.	-	-	350
2012	No new advice, same as for 2011	-	-	281
2013	Reduce exploitation in SDs 30–32 and maintain current fishing restrictions in SDs 22–29. Improve river habitats.	-	-	212
2014	No new advice, same as for 2013	-	-	220
2015	No new advice, same as for 2014	-	-	192
2016	Reduce exploitation in SDs 30–31, eastern parts of SD 26, and southern parts of SDs 22 and 24. Maintain current fishing restrictions in other Baltic Sea areas. Improve river habitats.	-	-	**232
2017	Same as for 2016	-	-	
2018	Reduce exploitation in SDs 30–31, eastern parts of SD 26, and southern parts of SDs 22 and 24. Reduce bycatch of sea trout in fisheries targeting other species. Maintain current fishing restrictions in other Baltic Sea areas. Improve river habitats.	-	-	
2019	Same as for 2018	-	-	

* Total sea trout catches are expected to be much larger, as there are also recreational catches, discards, and potential unreporting.
** Preliminary.

History of catch and landings

Historically, commercial catches have been much larger than present catches. There has been a significant decrease in the commercial catch from 2004 to 2013. The Main Basin is the most important area for the commercial fisheries.

Data on recreational catches are incomplete. It is considered that recreational catches could at present be up to three times the commercial catch.

There is no specific sea trout fishery in the Gulf of Bothnia and the Gulf of Finland, but sea trout are caught as bycatch in fisheries targeting whitefish, pikeperch, and perch. A significant part of this fishery is recreational.

Table 4 Sea trout in subdivisions 22–32 (Baltic Sea). Nominal catches (commercial + recreational, and in tonnes round fresh weight) of sea trout in the Baltic Sea in the years 1979–2000. Commercial catches after 2000 are presented in Table 5 and recreational catches after 2000 in Table 6. S = sea, C = coast, and R = river.

Year	Main Basin																Total Main Basin	Gulf of Bothnia						Total Gulf of Bothnia	Gulf of Finland				Total Gulf of Finland	Grand Total
	Denmark[1,4]	Estonia	Finland[2]			Germany[4]	Latvia		Lithuania		Poland			Sweden[4]				Finland[2]			Sweden				Estonia	Finland[2]				
	S + C	C	S	S + C	R	C	S + C	R	C	R	S[8]	S + C	R	S[5]	C[5]	R		S	C	R	S[5]	C[5]	R		C	S	C	R		
1979	3	na		10		na	na		na		na	81[3]	24	na	na	3	121		6	na	na	na	na	6	na		73	0	73	200
1980	3	na		11		na	na		na		na	48[3]	26	na	na	3	91		87	na	na	na	na	87	na		75	0	75	253
1981	6	na		51		na	5		na		na	45[3]	21	na	na	3	131		131	na	na	na	na	131	2		128	0	130	392
1982	17	na		52		1	13		na		na	80	31	na	na	3	197		134	na	na	na	na	134	4		140	0	144	475
1983	19	na		50		na	14		na		na	108	25	na	na	3	219		134	na	na	na	na	134	3		148	0	151	504
1984	29	na		66		na	9		na		na	155	30	na	na	5	294		110	na	na	na	na	110	2		211	0	213	617
1985	40	na		62		na	9		na		na	140	26	na	na	13	290		103	na	na	na	na	103	3		203	0	206	599
1986	18	na		53		na	8		na		na	91	49	7	9	8	243		118	na	1	24	na	143	2		178	0	180	566
1987	31	na		66		na	2		na		na	163	37	6	9	5	319		123	na	1	26	na	150	na		184	0	184	653
1988	28	na		99		na	8		na		na	137	33	7	12	7	331		196	na	na	44	42	282	3		287	0	290	903
1989	39	na		156		18	10		na		na	149	35	30	17	6	460		215	na	1	78	37	331	3		295	0	298	1089
1990	48[3]	na		189		21	7		na		na	388	100	15	15	10	793		318	na	na	71	43	432	4		334	0	338	1563
1991	48[3]	1		185		7	6		na		na	272	37	26	24	7	613		349	na	na	60	54	463	2		295	0	297	1373
1992	27[3]	1		173		na	6		na		na	221	60	103	26	1	618		350	na	na	71	48	469	8		314	0	322	1409
1993	59[3]	1		386		14	17		na		na	202	70	125	21	2	897		160	na	na	47	43	250	14		704[6]	0	718	1865
1994	33[7,3]	2		384		15[7]	18		+		na	152	70	76	16	3	769		124	na	na	24	42	190	6		642	0	648	1607
1995	69[7,3]	1		226		13	13		3		na	187	75	44	5	11	647		162	na	na	33	32	227	5		114	0	119	993
1996	71[7,3]	2		76		6	10		2		na	150	90	93	2	9	511		151	25	na	20	42	238	14		78	3	95	844
1997	53[7,3]	2		44		+	7		2		na	200	80	72	7	7	474		156	12	na	16	54	238	8		82	3	93	805
1998	60	8		103		4	7		na		208	184	76	88	3	6	747		192	12	0	9	39	252	6		150	3	159	1158
1999	110[7,3]	2		84		9	10		1		384	126	116	51	2	3	898		248	12	0	18	41	319	8		93	3	104	1321
2000	58	4		64		9	14		1		443	299	70	42	4	3	1011		197	12	0	14	36	259	10		56	3	69	1339

[1]Additional sea trout catches are included in the salmon statistics for Denmark until 1982.

[2]Finnish catches include about 70 % non-commercial catches in 1979 - 1995, 50 % in 1996-1997, 75% in 2000-2001.

[3]Rainbow trout included.

[4]Sea trout are also caught in the Western Baltic in Sub-divisions 22 and 23 by Denmark, Germany and Sweden.

[5]Catches reported by licensed fishermen and from 1985 also catches in trapnets used by nonlicensed fishermen.

[6]Finnish catches include about 85 % non-commercial catches in 1993.

[7]ICES Sub-div. 22 and 24.

[8]Catches in 1979-1997 included sea and coastal catches,since 1998 costal (C) and sea (S) catches are registered separately

na=Data not available

\+ Catch less than 1 tonne.

Table 5 Sea trout in subdivisions 22–32 (Baltic Sea). Nominal commercial catches (in tonnes round fresh weight) of sea trout in the Baltic Sea (2001–2015). S = sea, C = coast, and R = river.

Year	Main Basin																		Total Main Basin	Gulf of Bothnia				Total Gulf of Bothnia	Gulf of Finland				Total Gulf of Finland	Grand Total
	Denmark	Estonia	Finland		Germany		Latvia			Lithuania			Poland			Sweden				Finland		Sweden			Estonia	Finland		Russia		
	S	C	S	C	S C	S	S	C	R	S	C	R	S	C	R	S	C	R		S	C	C	R		C	S	C	R		
2001	54	2	5	14		10	1	11			2		486	219	11	23	2	3	844	2	54	16	44	115	8	0	17		25	984
2002	35	5	2	8		12	0	13			2		539	272	53	11	2		954	0	49	25		74	11	0	11		23	1051
2003	40	2	1	4		9	1	5					583	169	32	8	3		858	0	41	21	0	62	7	0	7		14	934
2004	46	3	1	5		12		7			1		606	122	36	9	3		851	1	39	21	0	61	7	0	7		14	926
2005	14	4	1	7		14		7	1		1	0	480	86	20	5	3		644	0	46	24	0	70	6	0	11		18	732
2006	44	10	1	10		12		7			1	0	414	98	17	6	2		623	1	40	20	0	61	9	0	13		23	707
2007	26	4	2	8		9		8			1	0	354	133	39	6	3		592	0	45	15	0	61	13		12		26	678
2008	18	4	1	11		13		8	0	0	2	0	34	90	48	4	3		236	0	47	19	0	67	8	0	18		26	328
2009	12	7	1	8		4		10	0	0	2		259	103	26	3	3		439	0	46	17	1	64	11		17		28	530
2010	8	5	0	6		3		5	0	0	2	0	343	81	30	2	3		489	0	37	20	1	58	11	0	10		22	568
2011	6	5	0	5		3			6	0	2	0	139	65	39	1	2		275	0	33	18	1	53	12		10		22	350
2012	11	8	0	5		18		4	1	0	3	0	37	74	26	0	3		191	0	41	18	2	61	14	0	16	0	29	281
2013	4	7	0	6		14		5	1	0	11	0	43	44	8	0	3		148	0	29	14	1	44	12		9	0	21	212
2014	10	5		6		14		5	1	0	5		21	72	28	0	3		170	0	22	11	0	33	10	0	7	0	17	220
2015	8	5		4	14			4	0	0	6		13	83	7	0	2		145	0	16	13	1	30	11		6	0	17	192
2016	1	6		3	12			5	0	0	4		62	86	3	0	2		184	0	18	10	0	29	14		6	0	19	232

Table 6 Sea trout in subdivisions 22–32 (Baltic Sea). Nominal recreational catches (in tonnes round fresh weight) of sea trout in the Baltic Sea (2001–2015). S = sea, C = coast, and R = river.

Year	Main Basin							Total Main Basin	Gulf of Bothnia			Total Gulf of Bothnia	Gulf of Finland		Total Gulf of Finland	Whole of the Baltic Finland	Grand Total
	Denmark	Estonia	Finland	Latvia		Poland	Sweden		Finland	Sweden			Estonia	Finland			
	C	C	R	C	R	R	R		R	C	R		C	R		C	
2001	n.a.							0.0	7.0			7.0		3.0	3.0	324.0	334.0
2002	n.a.		0.2				2.8	3.0	6.5		38.4	44.9		2.6	2.6	116.0	166.5
2003	n.a.		0.2				3.6	3.8	11.1		31.5	42.6		1.6	1.6	116.0	164.0
2004	n.a.		0.5				2.6	3.1	10.6		28.2	38.8		2.1	2.1	80.0	123.9
2005	n.a.		0.5				1.5	2.0	10.6		30.9	41.5		2.7	2.7	80.0	126.2
2006	n.a.		0.1				1.3	1.4	5.3		32.5	37.8		3.3	3.3	187.0	229.4
2007	n.a.		0.3				1.3	1.6	8.2		31.5	39.6		3.1	3.1	187.0	231.3
2008	n.a.		0.2				2.6	2.7	8.9		39.7	48.6		2.3	2.3	163.0	216.6
2009	n.a.		0.4				2.3	2.7	10.6		45.8	56.4		5.5	5.5	163.0	227.6
2010	346.0		0.4		0.1	1.6	3.3	351.3	7.3		39.1	46.4		1.2	1.2	56.0	454.9
2011	224.0		0.4			1.7	2.2	228.3	7.5	1.7	39.3	48.5		2.2	2.2	56.0	335.0
2012	260.0		0.3			2.4	2.2	264.9	10.6	2.5	38.9	51.9		3.8	3.8	109.0	429.6
2013	301.0	1.4	0.2	3.0		n.a.	1.3	306.9	10.6	1.5	46.2	58.3	3.3	3.8	7.1	109.0	481.3
2014	521.0	1.5	0.3	3.8		n.a.	0.7	527.3	5.2	1.4	43.0	49.6	3.1	2.2	5.3	71.0	653.3
2015	395.7	1.7	0.3	2.9		n.a.	0.6	401.2	1.7		27.6	29.3	4.6	1.0	5.6	71.0	507.1
2016	n.a.	2.3	0.2	5.0	0.1	n.a.	0.4	8.0	1.8		21.7	23.6	4.9	0.5	5.4	71.0	108.0

Summary of the assessment

Assessment results are presented at the beginning of the advice document (Figures 1–3).

Table 7 Sea trout in subdivisions 22–32 (Baltic Sea). Summary of the assessment. Average densities of 0+ sea trout in rivers in ICES subdivisions 22–32, by country: Finland (FI), Sweden (SE), Estonia (EE), Russia (RU), Lithuania (LT), Latvia (LV), Poland (PL), Denmark (DK), and Germany (GER). All values are in n 100 m^{-2}.

Year	FI SDs 30–31	SE SDs 30–31	EE SD 32	FI SD 32	RU SD 32	EE SDs 26–29	LT SDs 26–29	LV SDs 26–29	PL SDs 26–29	SE SDs 26–29	DK SDs 22–25	PL SDs 22–25	SE SDs 22–25	GER SDs 22–25
1990	2.2													
1991	1.78													
1992	1.825		43.128							47				
1993	1.92		10.403							42				
1994	1.03		7.229							2.5				
1995	0.425	3.707	21.746							0.2				
1996	1.987	7.091	7.639			0.919				0.3	18.297		8	
1997	1.5	9.06	23.096			0				1.9	62.65		6	
1998	1.74	5.115	5.309			0				6.9	77.017		7	
1999	4.228	14.434	11.817			0				0.9	52.59		3	
2000	3.206	2.941	8.134			3.103				1.2	77.01		5	
2001	5.58	6.825	7.762	9.4		0				1.4	24.038		9	
2002	6.745	15.426	9.949	13.6		0				1	28.997		3	
2003	10.339	7.198	0.444	0		1.61				2	48.947		3	
2004	1.481	11.853	10.764	0.2	4.588	2.97			14.2	2.3	63.778	114.521	8	
2005	4.275	15.76	13.502	13.6	13.786	15.387				11	95.532	51.15	7	
2006	2.3	7.609	14.266	33.5	5.559	19.036			83.767	1.9	129.75	64.079	2	
2007	4.468	1.677	12.152	11.7	7	10.193			1.8	2.1	67.81	25.178	13	
2008	3.122	2.095	20.806	25.7	4.24	25.177			45.133	5.7	74.75	43.825	7.7	
2009	7.877	1.918	32.592	82.2	4.7	24.957		12.6	93.818	7.2	192.5	60.643	1.8	
2010	4.822	0.8	36.301	35.9	1.271	11.124		3.7	59.758		88.18	43.009	1.8	
2011	4.977	2.62	17.946	10.7	4.038	19.731	8.17	4.95	30.909	2.2	46.377	37.758	5.66	
2012	2.835	1.676	25.098	13.3	5.588	20.116	6.59	7.65	24.6	1.9	98	62.22	16.2	
2013	2.897	0.895	26.48	41.794	4.379	14.581	4.42	2.4	73.6	1.98	58.65	46.333	3.63	
2014	10.71	2.806	32.269	43.056	20.644	25.797	9.617	12.35	69.2	7	65.044	33.38	5.73	68.09
2015	12.587	4.044	33.738	30.5	12.389	42.465	8.585	10.5	73.2	9	43.14	22.16	5.91	30.161
2016	6.958	3.918	28.819	24.48		33.924	10.028	10.1	90	15.4	63.38	56.636	4.52	50.34

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