8.3.15 Salmon (*Salmo salar*) in Subdivision 32 (Gulf of Finland)

ICES stock advice

ICES advises that when the precautionary approach is applied, fishing mortality on wild salmon from the Gulf of Finland should be as low as possible. Most of the salmon in the Gulf of Finland are of reared origin. Effort in fisheries catching salmon should not increase and improved measures to focus selection on the reared stocks should be implemented. Such measures should include relocation of coastal fisheries away from sites likely to be on the migration paths of Gulf of Finland wild salmon. Fin-clipping of reared salmon stocks would allow to distinguish wild from non-wild salmon and assist in identifying the locations with wild salmon and fisheries on wild salmon. Relocation of fisheries away from rivers and rivers mouths supporting wild stocks, or mixed stocks with only supportive releases, should also be considered. Wild salmon should be protected from poaching when they return to rivers.

Assuming that the amount of reared salmon released in 2015 is similar to previous years, the total commercial sea catch in 2016 should not exceed 11 800 salmon (where the fisheries selection should be focused on the reared stocks). Applying the same proportions estimated to have occurred in 2014, this catch would be split as follows: 10% unwanted catch (previously referred to as discards) and 90% wanted catch (83% reported and 7% unreported). Setting a TAC under a discard ban needs to take account of wanted and unwanted catch. In setting the TAC, consideration should also be given to expected unreporting levels in 2016.

Effort in the salmon fishery in the Main Basin (Subdivisions 24-29) should not increase, as wild salmon from the Gulf of Finland use the Main Basin as a feeding area.

Stock development over time

Wild stocks: The only wild salmon stocks in Subdivision 32 exist in three Estonian rivers. According to expert judgment, the smolt production has been below 50% of the potential smolt production capacity (PSPC) in most years in rivers Keila and Vasalemma (Figure 8.3.15.1). Despite a decrease in 2013, smolt production increased in 2014 and is expected to further increase in 2015 and to remain relatively high in 2016 (based on recently observed parr densities; Figure 8.3.15.2). Smolt production in river Kunda has varied significantly (from less than 10% to 100% of the potential).

Mixed stocks: On aggregated stocks, wild smolt production for mixed rivers in Subdivision 32 is considered to be below 50% of the PSPC (Figure 8.3.15.1). Of the seven Estonian mixed salmon stocks in the Gulf of Finland only two are currently expected to be over 50% of their PSPC (Figure 8.3.15.3). Smolt production in Estonian rivers is variable and has generally been higher in the last decade. Wild smolt production in the mixed rivers Luga (Russia) and Kymijoki (Finland) has stayed well below 50% of their potential, without any obvious trends (Figure 8.3.15.4).

Reared stocks: Most of the salmon in the Gulf of Finland originate from smolt releases (Figure 8.3.15.5). Despite major releases, the catches have decreased considerably in the last decade, indicating low post-smolt survival of reared salmon. However, some increase in catches has been observed in recent years.

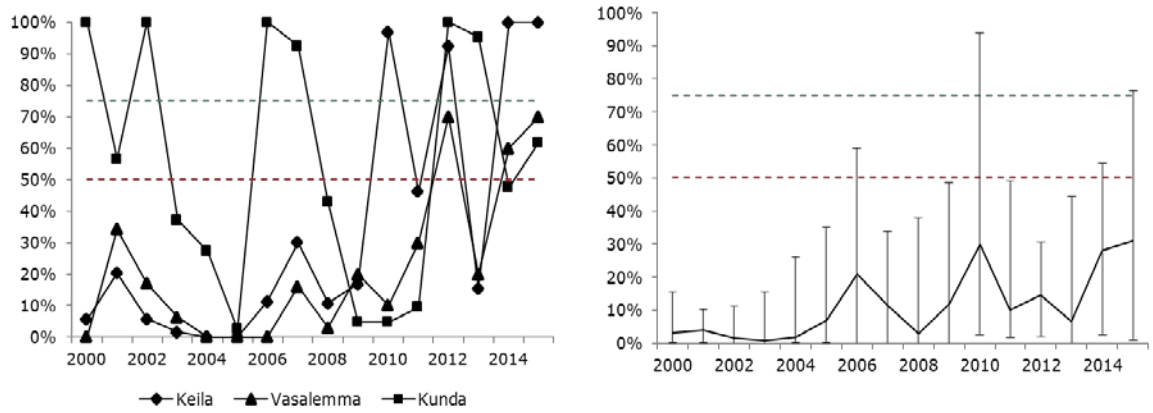

Figure 8.3.15.1 Salmon in Subdivision 32. Smolt production in Subdivision 32 in relation to the potential smolt production. Left panel: The three wild salmon stocks. Right panel: The mixed salmon populations, presenting the median and 90% interval across these stocks. The results are based on monitored parr densities and expert judgement. The potential smolt production is calculated only up to the lowermost impassable migration obstacle; many rivers have considerably higher total potential.

Catch options

No quantitative assessment or forecast could be provided.

Reaching at least 75% of the potential smolt production capacity has been suggested by ICES if the objective is to recover salmon populations to MSY (ICES, 2008a, 2008b). The expert judgement used to approximate the status of stocks suggests that current wild smolt production is below MSY levels.

In order to improve the status of wild salmon stocks, fishing mortality on wild salmon from the Gulf of Finland should be as low as possible. Effort in fisheries catching salmon in the Gulf of Finland should not increase and improved measures to focus selection on the reared stocks should be implemented. Effort in the fishery in the Main Basin should not increase, as salmon from the Gulf of Finland use the Main Basin as a feeding area.

The new data available (catch statistics and parr densities) do not change the perception of the Gulf of Finland salmon stocks. Therefore, the same catch advice provided last year is still applicable for 2016. Assuming that the amount of reared salmon released in 2015 is similar to previous years, and provided that the fisheries do not target wild salmon, this corresponds to a total commercial catch at sea not exceeding 11 800 salmon (where the fisheries selection should be focused on the reared stocks).

Applying the same proportions estimated to have occurred in 2014, the 11 800 total commercial sea catch would be split as follows: 10% unwanted catch (previously discarded) and 90% wanted catch (83% reported and 7% unreported).

Basis of the advice

Table 8.3.15.1 Salmon in Subdivisions 32. The basis of the advice.

Advice basis	Precautionary approach
Management plan	EC proposal (EU, 2011), not formally adopted

Quality of the assessment

Information about the exploitation rate of wild salmon in the mixed-stock fisheries is limited, and there is a lack of knowledge about the level of mixing of stocks during the migrations between the Gulf of Finland, Main Basin, and Gulf of Bothnia.

The establishment of an index river, where electrofishing and counting of smolts and spawners is regularly carried out, is needed in the Gulf of Finland. Currently all of these variables are monitored only in river Pirita (Estonia), where a monitoring programme is in place for 2014–2017.

The magnitude of the recreational sea and river catch is uncertain.

Gulf of Finland salmon stocks are treated as a group separate from salmon in Subdivisions 22–31 for assessment purposes and advice. Including these stocks in the current assessment model for Subdivisions 22–31 has been an objective of ICES for several years, but substantial modelling development would be required as well as further exploration of migratory patterns. Therefore, it is not considered to be immediately feasible.

Issues relevant for the advice

Unwanted catch was previously discarded. This catch is composed of undersized salmon, seal-damaged salmon, and salmon discarded for other reasons (Table 8.3.15.5). A proportion of the undersized discards were expected to survive. There is considerable uncertainty about the amount of salmon discarded and even greater uncertainty about the proportion that survives when discarded. Seal damaged salmon is all dead, but there is also uncertainty on the amount of seal-damaged salmon. The values used in this advice represent the current available knowledge and are based on data from a variety of sources (such as logbooks or DCF sampling data), but these data are generally sparse. Expert judgement has been applied to supplement these data, or when no data are available. Because of this uncertainty, current estimates of discards should be considered only as an order of magnitude and not as precise estimates.

In the absence of a quantitative assessment, it is difficult to evaluate the response of Gulf of Finland wild stocks to management measures. Making the TAC restrictive on catches would not necessarily protect wild stocks. Any TAC consistent with the production of reared salmon in this area could still cause a bycatch of wild salmon leading to unsustainable exploitation, so a key aspect is to conduct fisheries in a way that catches of wild salmon are minimized. Rather than merely restricting mixed-stock fisheries through a TAC system, the protection of wild salmon requires the adoption of management measures and fishing methods that strongly focus selection on the reared stocks.

In Estonia, regulations to relocate the coastal fisheries away from river mouth areas where it is likely to catch Gulf of Finland wild salmon have been in force since 2011. As part of those regulations, the closed area at the river mouth was extended to 1500 m during the main spawning migration period in all wild and most of the mixed rivers. Extra effort has been directed towards protecting wild salmon from poaching in the rivers when they return to spawn. These measures have at least partly resulted in the recent positive trend in natural reproduction.

The fact that salmon from the Gulf of Finland also migrate to the Main Basin suggests that effective protection of these wild stocks would need coordinated management of the Main Basin and Gulf of Finland fisheries. The recent decrease in the longline fishery in the Main Basin most likely has positive effects on the recovery possibilities of Gulf of Finland salmon.

Reference points

To evaluate the current state of salmon stocks in the Baltic Sea, ICES uses the smolt production relative to the 50% and 75% level of the natural production capacity (potential smolt production capacity; PSPC) on a river-by-river basis. Preliminary PSPC values have been proposed based on expert opinion. No stock–recruit data exist at the moment, precluding validation of these preliminary PSPC values.

Basis of the assessment

ICES has established six assessment units for salmon in the Baltic Sea, where the Gulf of Finland constitutes assessment unit six (Figure 8.3.15.6). The division of stocks into units is based on biological and genetic characteristics. Stocks of a particular unit are assumed to exhibit similar migration patterns. It can therefore be assumed that they are subjected to the same fisheries, experience the same exploitation rates, and could be managed in the same way.

Table 8.3.15.2 Salmon in Subdivision 32. The basis of the assessment.

ICES stock data category	4 (see ICES, 2015b)
Assessment type	Qualitative assessment based on monitored parr densities and expert judgement.
Input data	Commercial catches (international landings, fishing effort, tag returns). Survey indices (parr densities from all wild and salmon mixed rivers, smolt counts in some mixed rivers).
Discards and bycatch	Taken into account in the advice.
Indicators	None.
Other information	Latest benchmark was in 2012 (IBP Salmon; ICES, 2012b).
Working group	Assessment Working Group on Baltic Salmon and Trout (WGBAST).

Information from stakeholders

There is no information available.

History of the advice, catch, and management

Table 8.3.15.3 Salmon in Subdivision 32 (Gulf of Finland). ICES advice, catch corresponding to advice, and agreed TAC for the Gulf of Finland (Subdivision 32). All numbers are in thousands of fish.

Year	ICES advice	Catch corresp. to advice	Agreed TAC[1]
1993	TAC for reared stock.	109	109
1994	TAC for reared stock.	65	120
1995	Catch as low as possible in offshore and coastal fisheries.	-	120
1996	Catch as low as possible in offshore and coastal fisheries.	-	120
1997	Offshore and coastal fisheries should be closed.	-	110
1998	Offshore and coastal fisheries should be closed.	-	110
1999	Offshore and coastal fisheries should be closed.	-	100
2000	Only fishery on released salmon should be permitted.	-	90
2001	Only fishery on released salmon should be permitted.	-	70
2002	Only fishery on released salmon should be permitted.	-	60
2003	Only fishery on released salmon should be permitted.	-	50
2004	Only fishery on released salmon should be permitted.	-	35
2005	Only fishery on released salmon should be permitted.	-	17
2006	Only fishery on released salmon should be permitted.	-	15
2007	Retain sea fishery low. Special stock rebuilding measures for Estonian wild salmon rivers.	-	15
2008	No catch of wild salmon in the Gulf of Finland.	-	15
2009	Same advice as last year.	-	15
2010	Same advice as last year.	-	15
2011	No catch of Estonian wild salmon in the Gulf of Finland. Any increase in total catches from present levels should be prevented.	13	15
2012	No catch of Estonian and Russian wild salmon in the Gulf of Finland. No increase in total catches from present levels (2006–2010 average).	12	15
2013	Catch of wild salmon should be kept to a minimum. Reduce effort.	-	15
2014	No effort increase in fisheries catching salmon in SD 32. No fishing targeting wild salmon from the Gulf of Finland and measures to reduce bycatch of wild salmon in fisheries. Advice is for total commercial removals (dead catch) in SD 32 (corresponding landings are given in brackets).	9 (8)	13
2015	No effort increase in fisheries catching salmon in SD 32. No fishing targeting wild salmon from the Gulf of Finland and measures to reduce bycatch of wild salmon in fisheries. Advice is for total commercial sea catch in SD 32 (estimates of the split of the catch in 2013 into: unwanted, wanted and reported, wanted and unreported – percentages are given in brackets).	11.8 (11%, 81%, 8%)	13.1
2016	Fishing mortality on wild salmon as low as possible. No effort increase in fisheries catching salmon and improved measures to focus selection on the reared stocks. Advice is for total commercial sea catch in SD 32 (estimates of the split of the catch in 2014 into: unwanted, wanted and reported, wanted and unreported – percentages are given in brackets).	11.8 (10%, 83%, 7%)	

[1] No agreement between EU and Russia in the last years.

History of catch and landings

Exploitation of salmon in the Gulf of Finland over the last twenty years has changed substantially (Table 8.3.15.6), from targeting mixed stocks offshore to focusing on local stocks in coastal areas and rivers.

The major commercial salmon fishery in the area is the trapnet fishery at the Finnish coast. The Finnish salmon fisheries have caught about 90% of the commercial landings in Subdvision 32 in the years 2010–2014. The fishing effort has been of an equal magnitude for the last ten years. The coastal fishery with trapnets has moved from the outer archipelago to areas closer to the coast and river mouths. Trapnets with modifications to prevent seals entering the trap are in use.

Off the Estonian coast salmon are caught as bycatch. The coastal fishery mainly targets herring, European flounder, and perch, and the share of salmon forms less than 1% of the total annual catches. In 2014, the salmon catch reported by commercial fishers represented about 68% of all salmon caught in Estonia.

In Russia there has been no reported salmon catch in the sea fisheries in the last few years. There is no fishery targeting salmon but salmon may be caught as a bycatch in the coastal fishery (by trapnets and gillnets), where the main targeted species are herring, sprat, smelt, perch, and pikeperch.

Estimates of recreational salmon catch are very uncertain. Estimates are available from Finland and also from Estonia in some years. The major part of the recreational salmon catch is taken from sea by gillnets. The river fishery takes place in the Finnish and Estonian rivers and it is mostly rod fishing. The river Kymijoki comprises the major proportion of the recreational river catches in the area.

Table 8.3.15.4 Salmon in Subdivision 32. Catch distribution in 2014.

Catch distribution	Total removal (dead catch in 2014) was 101 t (including also non-commercial and river catches), where 89% were nominal landings, 6% estimated dead discards, and 5% unreported landings.

Table 8.3.15.5 Salmon in Subdivision 32 (Gulf of Finland). Catches in sea and river fisheries by year (in numbers). Commercial sea landings are split into reported (nominal) and unreported (proportional to the reported component based on expert evaluation). Discard estimates of undersized fished are proportional to the reported commercial landings based on expert evaluation. Estimates of seal damages are based partly on logbook data and partly on expert evaluations. Estimates of discards for other reasons are from logbooks. Recreational catch at sea is only Finnish and is estimated by national surveys. River catches are based on the catch reports from the recreational fishers. The final column of the table (total commercial sea removal) is obtained by subtracting from the total commercial sea catch the undersized discards estimated to survive (around 50% survival, although the survival estimate is very uncertain). With the exception of commercial reported landings, all values in the table are imprecise and should be considered only as an order of magnitude.

YEAR	Sea fisheries					Recreational catch (±95% C.I.)	River fishery	Total commercial sea catch	Total commercial sea removal (dead catch)
	Commercial fisheries								
	Landings		Discards						
	Reported	Unreported	Discarded undersized (died + survived)	Seal damages	Damaged for other reasons				
2001	14 191	1 093	455	3 701	15	14 180 (±5 780)	2 943	19 455	19 259
2002	11 465	826	358	3 412	32	2 550 (±750)	3 608	16 093	15 965
2003	8 298	690	268	3 759	2	2 550 (±750)	2 056	13 017	12 894
2004	7 933	660	255	4 019	14	3 090 (±1430)	1 814	12 881	12 756
2005	10 801	903	348	1 872	2	3 090 (±1430)	3 326	13 926	13 754
2006	11 744	979	377	2 804	9	180 (±110)	2 363	15 913	15 716
2007	11 251	941	361	1 826	1	180 (±110)	1 957	14 380	14 180
2008	14 863	1 251	483	2 319	0	730 (±350)	1 909	18 916	18 648
2009	13 049	1 114	426	1 876	2	730 (±350)	2 734	16 467	16 245
2010	6 233	538	204	974	2	360 (±400)	1 076	7 950	7 848
2011	7 787	667	257	932	31	360 (±400)	1 255	9 674	9 536
2012	11 331	974	377	1 062	73	3 450 (±3 170)	1 214	13 818	13 625
2013	9 721	835	338	593	227	3 450 (±3 170)	1 358	11 714	11 546
2014	9 430	804	312	748	54	3 450 (±3 170)	998	11 348	11 182

Table 8.3.15.6 Salmon in Subdivision 32 (Gulf of Finland). Nominal landings of Baltic salmon in round fresh weight, from sea, coast, and river in Subdivision 32.

Year	River	Coast	Offshore	Commercial coastal and offshore[1]		Total[2]	
	tonnes	tonnes	tonnes	tonnes	thousand fish	tonnes	thousand fish
1987	2	61	290			353	
1988	2	112	156			270	
1989	2	145	254			401	
1990	6	369	178			553	
1991	5	398	250			653	
1992	3	418	111			532	
1993	6	310	133			449	111
1994	7	142	106			255	57
1995	7	201	58			266	39
1996	12	327	93			432	80
1997	10	345	93			448	77
1998	13	160	21			194	31
1999	10	137	29			176	30
2000	16	144	37	125	23	197	35
2001	16	121	20	86	14	157	26
2002	16	56	18	60	11	90	18
2003	9	57	3	46	8	69	13
2004	11	62	3	47	8	75	13
2005	17	79	3	64	11	99	18
2006	13	70	3	72	12	86	14
2007	11	69	3	71	11	83	13
2008	10	100	2	96	15	112	18
2009	14	80	1	77	13	96	16
2010	5	39	0	38	6	45	7
2011	5	48	0	45	8	53	9
2012	7	91	0	72	11	98	16
2013	7	84	0	64	10	92	15
2014*	6	84	0	63	9	90	14

*Preliminary.

[1] For comparison with TAC. Catch data in 1987–1999 are missing because commercial and recreational catches could not be separated in those years.

[2] Total catch includes catches from recreational fisheries.

Summary of the assessment

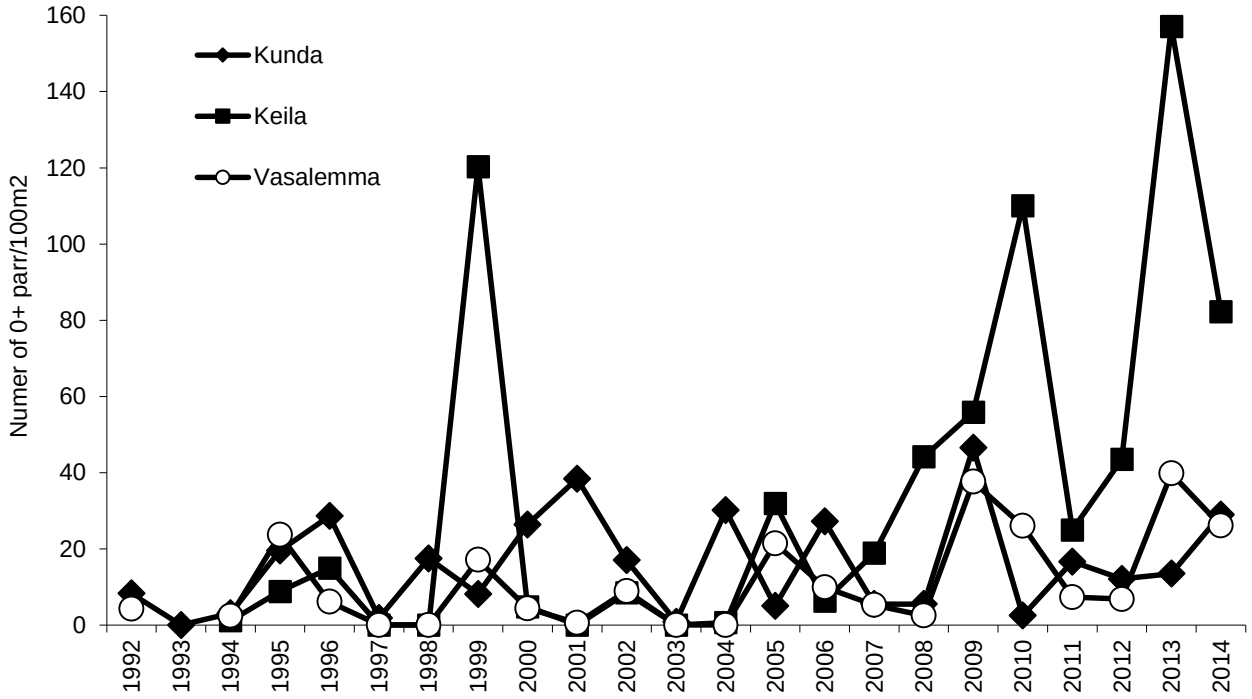

Figure 8.3.15.2 Salmon in Subdivision 32 (Gulf of Finland). Densities of 0+ (one-summer-old) salmon parr in the three wild Estonian salmon rivers. The exceptionally high parr density in river Keila in 1999 was observed under conditions of summer drought.

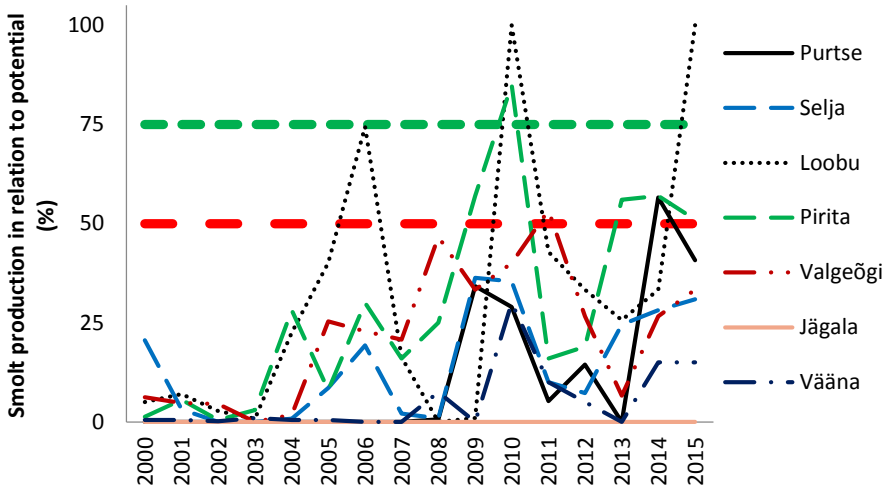

Figure 8.3.15.3 Salmon in Subdivision 32 (Gulf of Finland). Smolt production in relation to the potential smolt production in the seven Estonian mixed salmon stocks. The results are based on monitored parr densities and expert judgement.

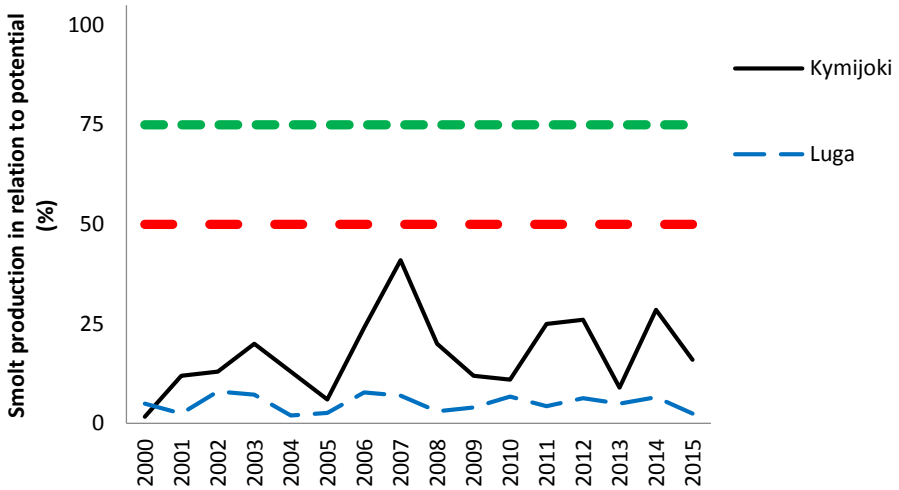

Figure 8.3.15.4 Salmon in Subdivision 32 (Gulf of Finland). Smolt production in relation to the potential smolt production in the mixed salmon stocks of Russia (river Luga) and Finland (river Kymijoki). The results are based on monitored parr densities and expert judgement.

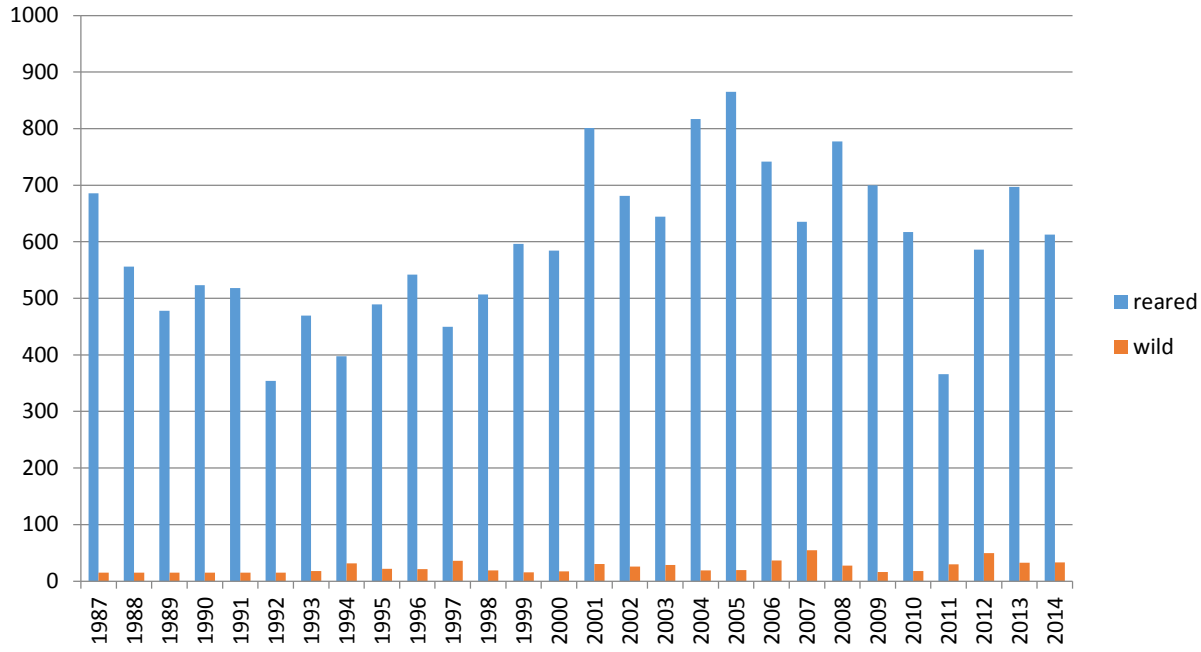

Figure 8.3.15.5 Salmon in Subdivision 32 (Gulf of Finland). Annual production (in thousands of fish) of wild and reared smolts in the Gulf of Finland.

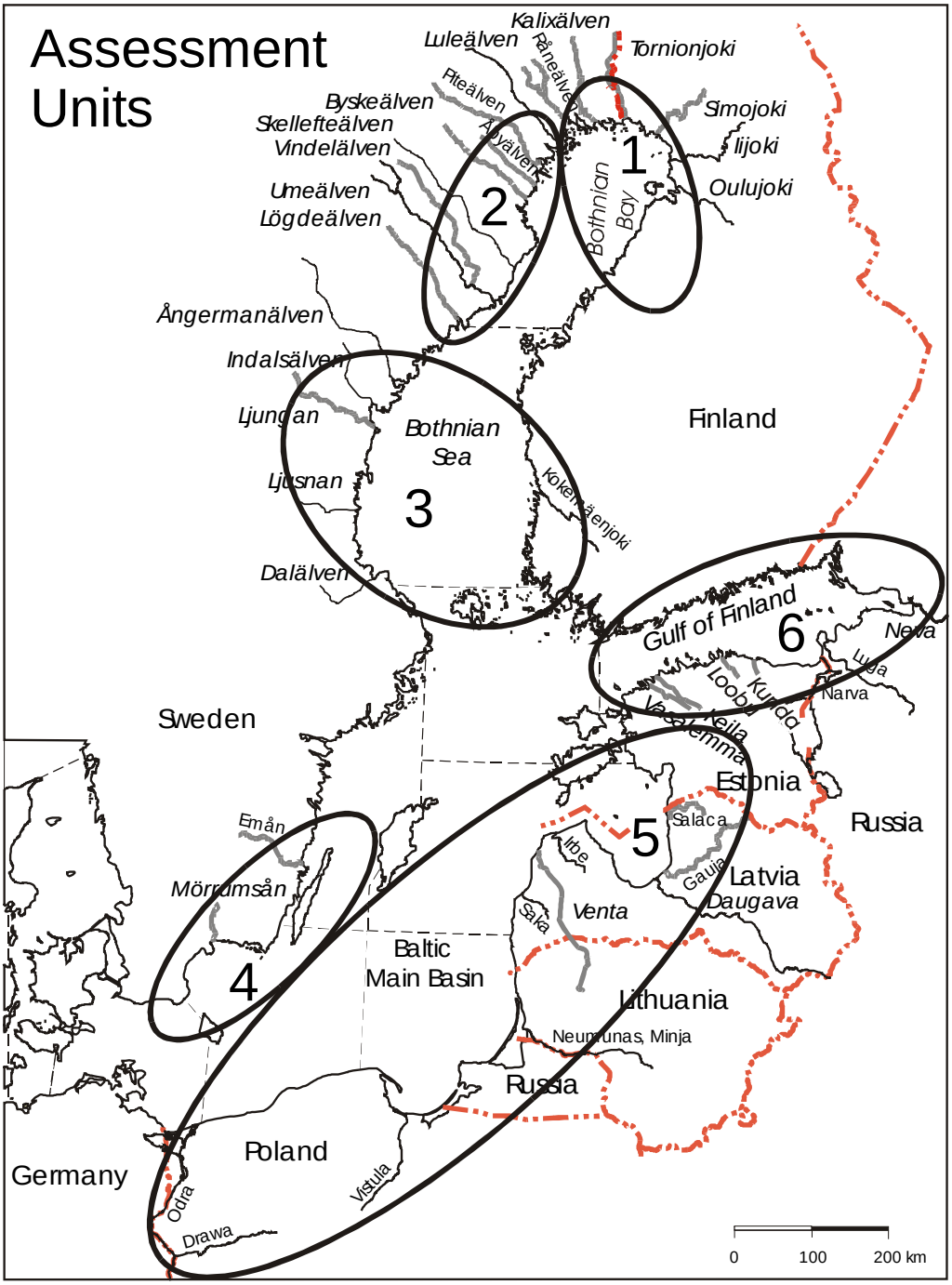

Figure 8.3.15.6 Salmon in Subdivision 32 (Gulf of Finland). Grouping of salmon stocks in six assessment units in the Baltic Sea. Assessment Unit 6 corresponds to Subdivision 32.

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