ECOREGION Baltic Sea
STOCK Salmon in Subdivisions 22–31 (Main Basin and Gulf of Bothnia)

Advice for 2012

On the basis of the MSY approach, ICES advises a TAC of not more than 54 000 salmon for 2012. This reflects a 50% reduction in fishing effort compared to 2010.

Salmon management should be based on the assessments of the status of individual stocks in the rivers. Fisheries on mixed stocks, either in coastal waters or open sea areas, pose particular difficulties for management. These fisheries cannot target only those stocks that are close to or above their targets, but will also exploit weaker stocks. Fisheries in estuaries and rivers are more likely to fulfil this requirement.

Salmon stocks in the rivers Rickleån and Öreälven in the Gulf of Bothnia, Emån in southern Sweden, and in a majority of the rivers in the southeastern Main Basin are especially weak and need longer-term stock rebuilding measures, including fisheries restrictions, habitat restoration, and removal of physical barriers. In order to maximize the potential recovery of these stocks, further decreases in exploitation are required along their feeding and spawning migration routes. The offshore fishery in the Main Basin targets all weak salmon stocks on their feeding migration. The coastal fishery targets weak stocks from northern rivers when the salmon pass the Åland Sea and Gulf of Bothnia on their spawning migration.

Stock status

To evaluate the current state of the wild stocks, ICES uses the smolt production relative to the potential smolt production capacity (PSPC) on a river-by-river basis. Stocks are considered *very likely* to reach the reference points of 50% or 75% of PSPC when the probability is more than 90%. They are considered *likely* to reach the reference points when the probability is between 70% and 90% and *uncertain* when the probability lies between 30% and 70%. When the probability of reaching the reference points is less than 30%, it is considered *unlikely*.

Among the 27 assessed rivers, eight rivers are likely or very likely to reach 50% of the PSPC in the short term (Table 8.4.14.2). For six rivers the situation is uncertain, and 13 rivers are unlikely to reach the 50% objective. Only one river among the 27 assessed rivers is likely to reach 75% of the PSPC in 2011. With a few exceptions, the reference points are more likely to be met in rivers in the Northern Baltic Sea area, while the status of southern wild stocks is more variable and in many cases much poorer as compared to the northern rivers.

The total wild smolt production has increased almost tenfold in the assessment units 1–2 since the Salmon Action Plan was adopted in 1997 (Figure 8.4.14.1). In assessment unit 3 the smolt production has remained at the same level, and in assessment unit 4 a slightly decreasing trend in smolt production has been observed during the period. Since 2003, the total wild smolt production of all the assessment units combined has increased by more than 60% but has now levelled off. The current smolt production of all assessment units is estimated to be 65–70% of the PSPC. However, smolt production is still low in a few of the northern and a majority of the southern small streams, particularly in the 'potential' rivers, i.e. rivers where salmon were extirpated and are now being reintroduced. In many rivers, salmon populations are maintained by compensatory releases of reared smolts.

Post-smolt survival has declined during the last 15 years and has remained very low since 2005 (Figure 8.4.14.2). The post-smolt survival is a key factor influencing the abundance and the decline in survival has suppressed recovery of wild salmon stocks. In addition, information from rivers in Baltic Main Basin and Gulf of Bothnia indicates a lower than expected number of spawners in 2010.

The harvest rate of salmon has decreased considerably since the beginning of the 1990s (Figure 8.4.14.3), and harvest rate in the offshore fishery in particular shows a clear downward trend during the period. In 2008, when the driftnet ban was implemented, the offshore catch went down to a record low level. However, the exploitation in the longline fishery has increased substantially since 2008 and the current offshore harvest rate is now approaching the combined harvest rate for longlines and driftnets in the mid-2000s.

Management plans

No explicit management objectives have been agreed for Baltic salmon since the International Baltic Sea Fishery Commission (IBSFC) ceased to exist after 2006. Since then, the EU Commission has initiated the development of a management plan for Baltic salmon.

Biology

The Atlantic salmon *Salmo salar* colonized the Baltic Sea by at least three glacial lineages, today represented by salmon in the Gulf of Bothnia, southeastern Sweden, and the southern Baltic Sea including Gulf of Finland. The salmon reproduce in rivers across the whole Baltic Sea, but the most productive rivers are found in the Gulf of Bothnia. Juvenile salmon stay in the freshwater stream for one to four years and then spend one to several years at sea on a feeding migration before they return to spawn in the natal river. The Baltic salmon is characterized by a distinct population structure which mirrors the postglacial colonization history. Salmon from different rivers (populations) are mixed in the southern Baltic during the feeding migration, but then follow different migration routes back to the home rivers. The Baltic salmon feed mainly on herring and sprat during the sea migration.

Environmental influence on the stock

Environmental conditions in both freshwater and marine environments have a marked effect on the status of salmon stocks. In many rivers in the southern Baltic, a range of problems in the freshwater environment play a significant role in explaining the poor status of stocks. In many cases river damming and habitat deterioration have had a devastating effect on freshwater environmental conditions.

The reasons for the decrease in post-smolt survival are still unclear, but the post-smolt survival has been found to be negatively correlated with seal and smolt abundance, and positively correlated with herring recruitment in the Gulf of Bothnia.

The reason behind the relatively weak spawning run in 2010 is not clear, but the cold winter 2009/2010 may be of significance. Previous studies of wild and reared Baltic salmon have found a correlation between spawner run size and spring sea surface temperatures in the Main Basin; following a cold winter, the salmon tended to arrive in lower numbers and vice versa. Such a correlation can also be seen during recent years for data on spawning run strength from several rivers in the Baltic Sea.

The fisheries

The nominal catch in the Baltic Sea (including rivers) has declined from 5636 tonnes (1990) to 886 tonnes (2010) (Table 8.4.14.3). The nominal catch in numbers is presented in Table 8.4.14.4. Only 49% of the TAC of salmon in Subdivisions 22–31 was utilized in 2010 (Tables 8.4.14.1 and 5). The nominal catch in the offshore fishery increased by 31% from 2009 to 2010. Preliminary data for 2010 indicate that catches in the coastal fishery decreased by 31%, and in river fisheries the catches decreased by 39% compared to 2009 (Table 8.4.14.5).

The salmon fishery has changed considerably since the beginning of the 1990s. The very high exploitation rate in the offshore and coastal fisheries has decreased successively due to e.g. 1) regulatory measures such as closed areas and changes in the opening time of fishery, 2) marketing restrictions on large salmon in certain countries due to high dioxin level, and 3) increased seal damage to catches and gear. The driftnet ban in 2008 decreased offshore catches in 2008 to the lowest value recorded since 1972. However, changes in the application of dioxin regulations in 2009, increases in market price for salmon, and reduced opportunities for income in other fisheries have resulted in an increase in offshore fishing effort from 2008 to 2010. For the near future, the effort in the longline fishery is predicted to increase further. Despite the changes in dioxin regulations, the existing marketing rules probably still suppress some of the fisheries, particularly in Latvia and Denmark.

Effects of the fisheries on the ecosystem

The current salmon fishery probably has no or minor influence on the marine ecosystem. However, the exploitation rate on salmon may affect the riverine ecosystem through changes in species compositions. There is limited knowledge on the magnitude of these effects.

Quality considerations

A considerable amount of total catches are comprised of an estimate of unreported catches (Table 8.4.14.4), which introduces uncertainties in the assessment. Catch per unit effort in the Polish offshore fishery indicates large-scale misreporting of salmon as sea trout, and this misreporting constitutes a significant amount of the unreported catches (Table 8.4.14.4).

Estimates of post-smolt survival are dependent on tag recapture data. A reduced exploitation rate in combination with decreased survival has resulted in fewer tag returns, which affects the precision of survival estimates. In addition,

Swedish tagging data from the last few years are not available. An uncertain rate of non-reported recaptures affects the quality of the remaining tagging data.

Scientific basis

The assessment uses a Bayesian estimation procedure. This technique allows an explicit incorporation of prior knowledge (from previous studies, literature, and/or expert opinions) about parameters in the assessment. With this approach uncertainties about estimated quantities are formulated as probability distributions.

The results of the assessment models are used to update expert information on the potential smolt production capacities for the different rivers based on a full life history model of all stocks. The estimation of potential smolt production capacity is based on expert knowledge and the available spawner/smolt estimates (river-specific stock–recruit relationships). The models incorporate new information annually and thus updates both smolt production historically and the potential smolt production capacity for each river. Inclusion of new information causes annual changes in these as well as in other parameter estimates.

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ECOREGION Baltic Sea
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Reference points

To evaluate the current state of the stock ICES uses the smolt production in 2011 relative to the 50% and 75% level of the natural production capacity on a river-by-river basis. To evaluate the effects of fisheries in 2012 ICES uses the smolt production in 2016 relative to the 75% level of the natural production capacity on a river-by-river basis. The 75% level is based on the MSY framework.

Outlook for 2012

Total sea catch, reported commercial catch in total and divided by different fisheries (OLL=offshore longline; CTN=coastal trapnet), and total number of spawners (in thousands) in 2012 under five different effort scenarios (Figure 8.4.14.4: 1 – expert opinion on the development in effort; 2 – 2010 effort; 3 – 25% reduction of 2010 effort; 4 – 50% reduction of 2010 effort; 5 – 75% reduction of 2010 effort). According to expert opinions the effort in the longline fishery is expected to increase in most of the countries, and this increase is possible because the fishery is presently not restricted by the TAC because the reported catch is below the TAC. Median values for OLL and CTN catches do not exactly coincide with the median values of total reported catch in the table below due to asymmetrical posterior distributions of catch estimates.

Effort	Sea catch in 2012 (x % of TAC 2011)			Reported median catch in 2012		Spawners total 2012	
	median	95%PI	reported commercial	OLL	CTN	median	95%PI
1	265	131 - 524	110 (44%)	68	42	77	37 - 157
2	228	115 - 444	98 (39%)	55	44	81	40 - 167
3	179	90 - 347	77 (31%)	43	36	92	45 - 188
4	124	63 - 241	54 (22%)	30	26	103	51 - 211
5	65	33 - 126	28 (11%)	15	14	115	58 - 238

Table 8.4.14.6 shows the probabilities for 15 individual rivers of obtaining the 75% smolt production target in 2016 by using the effort scenarios. The number of rivers likely attaining the 75% target under especially the effort scenario predicted by experts and the 2010 effort scenario is low. An increasing trend in the probability to reach the 75% target is only evident under scenarios in which effort has been reduced by 50% or more compared to the 2010 level (Figure 8.4.14.5a–c). Scenarios based on either expert opinions about the development in effort, the 2010 effort, or a 25% reduction in effort compared to 2010 result in either decreasing or non-changing probabilities to reach the smolt production target.

MSY approach

Reaching at least 75% of the potential smolt production capacity has been suggested by ICES if the objective is to recover salmon populations to the MSY level (ICES, 2008a, 2008b). The PSPC estimates therefore form the basis of the current reference points for the assessment of the Baltic salmon stocks and for evaluation of the effects of fisheries on future development of the stocks.

Management plan(s)

The management of salmon in the Baltic Sea has been subjected to the Salmon Action Plan (SAP) adopted by the IBSFC in 1997. Since the time period covered by SAP ended in 2010, the European Commission has decided to develop options for a new management plan for Baltic salmon. However, options for a new management plan had not been presented when this advice was formulated.

The HELCOM Ministerial Meeting, Krakow, Poland, 15 November 2007, agreed a Baltic Sea Action Plan (BSAP), which includes development of long-term management plans for salmon by 2010, as well as short-term plans. The short-term plans include safeguarding the genetic variability, monitoring issues, "…the active conservation of at least ten endangered/threatened wild salmon river populations in the Baltic Sea region as well as the reintroduction of native Baltic Sea salmon in at least four potential salmon rivers, by 2009,…", and "By 2015, as the short-term goal, to reach production of wild salmon at least 80%, or 50% for some very weak salmon river populations, of the best estimate of potential production, and within safe genetic limits, based on an inventory and classification of Baltic salmon rivers,…". ICES has not specifically evaluated these in relation to the PA approach or the MSY approach, but notes that the target suggested by ICES in recent years of 75% of potential production is broadly in accordance with the BSAP short-term targets.

Additional considerations

ICES points out the substantial discrepancy between the biological advice and the agreed TAC in the last few years (Table 8.4.14.1). This has led to overexploitation and a further decrease in fishing possibilies in the near future. To correct the situation a major (>15%) reduction in the TAC for 2012 would be needed. ICES notes that the method used in negotiations of fishing possibilities for 2011 (communication from the Commission on consultation on fishing opportunities for 2011, COM(2010)241) is unsuitable for Baltic salmon as the method is unable to handle situations where opportunities for exploitation change rapidly. The decrease in post-smolt survival has resulted in a reduced pre-fishery abundance, and conditions for changing TAC accordingly do not exist in the system of categories used in negotiations of fishing possibilities for 2011. ICES suggests a more flexible method when deciding upon TAC for 2012, focusing on exploitation levels in relation to biological status and development of the stocks.

The ban of the driftnet fishery in 2008 abruptly decreased offshore catches from 2007 to 2008, which contributed to an increase in the number of spawners in 2008. However, a pronounced increase in the longline effort from 2008 to 2010 has changed the situation. The effort in the longline fishery is predicted to increase, resulting in a further increase in the exploitation of salmon, and in the Polish offshore fishery an increase in the number of salmon misreported as trout is foreseen. Fishery inspections data are needed to give a reliable estimate of the salmon catch in the Polish longline fishery.

Exploitation in the Main Basin offshore fisheries affects possibilities for recovery of the Gulf of Finland salmon stocks as 10–40% of catches of Gulf of Finland salmon have been taken in the Main Basin. The recent increase in the longline fishery in the Main Basin and the predicted increase of this fishery in the near future will most likely reduce possibilities for recovery of the Gulf of Finland salmon.

The M74 syndrome is a reproduction disorder disease of Baltic salmon, affecting mixed and wild stocks of Baltic salmon, and it can cause high mortality rates in yolk-sac fry. The prevalence of M74 has been decreasing since the mid-1990s to a low level from the mid-2000s. The present advice has taken into account this pattern of incidence of M74.

Recent efforts to re-establish self-sustaining salmon stocks in 'potential' rivers, where salmon stocks existed in the past, but have now been extirpated, present exceptional challenges to management. The numbers of spawners in the 'potential rivers' are likely to be particularly low following the initial re-introductions, and productivity is likely to be lower than average. The considerations presented above for the existing weak salmon stocks also apply to re-established stocks. Therefore, even small mortality rates in fisheries may be enough to deter re-establishment and recovery of salmon in these 'potential' rivers. Exploitation presents a particularly high risk at low levels of post-smolt survival.

The estimated population parameters for rivers in the southern Baltic suggest low productivity. This implies that mixed-stock fisheries pose a special problem in managing these stocks. In the absence of explicit management objectives a precautionary approach would be to move fisheries towards stock-specific harvesting, i.e. fishing mainly in estuaries and rivers. The reasons for the low productivity may, at least partly, be tracked down to special problems in the freshwater environment. For instance, in the river Emån the poor functioning of a fish ladder is likely the main reason for the limited response of the stock to the management measures. Tagging results from reared salmon indicate that post-smolt survival among the southern stocks is even lower than that of the northern stocks.

Data and methods

The main information on the abundance and exploitation of wild salmon in the Baltic comes from electrofishing, smolt-trapping, tag returns from the fisheries, catch and effort data from the fisheries, fish ladder counts, and data on the proportion of wild and reared salmon in catches.

Uncertainties in assessment and forecast

The Bayesian approach is based on a number of assumptions; the effect of changing these assumptions on the resulting production and capacity estimates has not yet been fully explored. Post-smolt survival has major implications for both the fisheries and predictions of the development of the stocks. It should be noted that post-smolt survival estimates are based mainly on tag recapture data, and are particularly sensitive to changes in tag reporting rates. The decreased exploitation of salmon has resulted in fewer tag returns. In addition, Swedish tagging data is not available for the last few years.

Adjustments for the misreporting of salmon as trout in the Polish offshore fishery, based on Polish longline effort and catch per unit effort data from other countries, have improved the assessment. However, it causes additional uncertainty in the modelling.

The current EU Data Collection Framework requires establishment of at least one index river in each assessment unit (AU). In these rivers parr density data, smolt trapping data, and spawner abundance data must be collected. Furthermore, a tagging programme should be implemented in at least one wild salmon index river within each assessment unit. The combination of parr density data from every wild salmon river with data from index rivers would allow ICES to apply the same assessment methods across all rivers within the Baltic Sea.

Disagreement about the proportion of wild and reared salmon in the Main Basin between estimates derived from catches (based on mixed-stock analyses) and model predictions indicates that the assessment model would likely benefit from having independent stock proportion estimates from catches included as supplemental information. Work to include information on catch composition into the assessment model has been initiated.

The decline in spawner abundance in 2010 was more pronounced than predicted by the assessment model. If the decline was caused by low winter temperatures it could be temporary and would not necessarily have negative effects on the future development. On the other hand, should the 2010 poor spawning run turn out to mirror a further decline in natural survival and/or underestimation of the most recent exploitation, this may have severe consequences for the wild stocks. In that case, this year's stock projections would be too optimistic.

Comparison with previous assessment and catch options

A few changes in the assessment procedure were made in 2011:

1) The instantaneous natural mortality rate for adult salmon is now allowed to differ between wild and reared salmon, but within each origin it is assumed to be constant over the years;
2) The extra source of natural mortality caused by seals capturing salmon at the entrance or outside trapnets is assumed to have increased proportionally to the increase of the Baltic seal population since 1989;
3) The number of salmon mauled by seals (discards) in coastal trapnets in the Gulf of Bothnia has been updated based on reports of Finnish fishers;
4) The model has been fitted to fish ladder counts of spawners for river Ume/Vindelälven, and the smolt production estimate for Vindelälven from 2009 has been updated to take into account the fact that the early part of the smolt migration was missed.

The latest information about the recent spawner and smolt abundances together with the latest changes in the model structure have resulted in some changes in the updated estimates of the potential smolt production capacities (PSPCs) compared to last year. The largest update is in the PSPC of Ume/Vindelälven which increased by 45% due to fitting of the model to the fish ladder counts and to updated smolt production estimates. The total PSPC for assessment units 1–5 increased by 10% compared to last year's assessment, and this is mainly due to increases in assessment units 1 and 2.

There is a general decline in the river-specific probabilities of reaching the smolt production targets compared to last year's assessment, mainly because of updated estimates of PSPC and the revision of some data and the sub-model of assessment unit 5. This has, in combination with high exploitation rates in 2009 and 2010, reduced the probability of recovery and possibilities for future exploitation potential. As a result, the advised catch level ensuring recovery of wild stocks has been reduced compared to last year.

Assessment and management area

In order to better support the management of wild salmon stocks, ICES has established five assessment units for the Baltic Main Basin and the Gulf of Bothnia (Figure 8.4.14.6). The division of stocks into units is based on management objectives and biological and genetic characteristics of the stocks. 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 (e.g. through the use of coastal management measures it might be possible to improve the status of stocks in a specific assessment unit). Even though stocks of units 1–3 have the highest current smolt productions and therefore have an important role in sustaining economically viable fisheries, the stocks in units 4 and 5 contain a relatively high proportion of the overall genetic variability of Baltic salmon stocks.

Assessment unit	Name	Salmon rivers included
1	Northeastern Bothnian Bay stocks	On the Finnish–Swedish coast from Perhonjoki northward to the river Råneälven, including River Tornionjoki.
2	Western Bothnian Bay stocks	On the Swedish coast between Lögdeälven and Luleälven.
3	Bothnian Sea stocks	On the Swedish coast from Dalälven northward to Gideälven and on the Finnish coast from Paimionjoki northwards to Kyrönjoki.
4	Western Main Basin stocks	Rivers on the Swedish coast in Divisions 25–29.
5	Eastern Main Basin stocks	Estonian, Latvian, Lithuanian, and Polish rivers.

Sources of information

ICES. 2008a. Report of the ICES Advisory Committee, 2008. ICES Advice, 2008, Book 8. 133 pp.

ICES. 2008b. Report of the Workshop on Baltic Salmon Management Plan Request (WKBALSAL), 13–16 May 2008, ICES, Copenhagen, Denmark. ICES CM 2008/ACOM:55.

ICES. 2011. Report of the Baltic Salmon and Trout Assessment Working Group 2011 (WGBAST), 22–30 March 2011, Riga, Latvia. ICES CM 2011/ACOM:08.

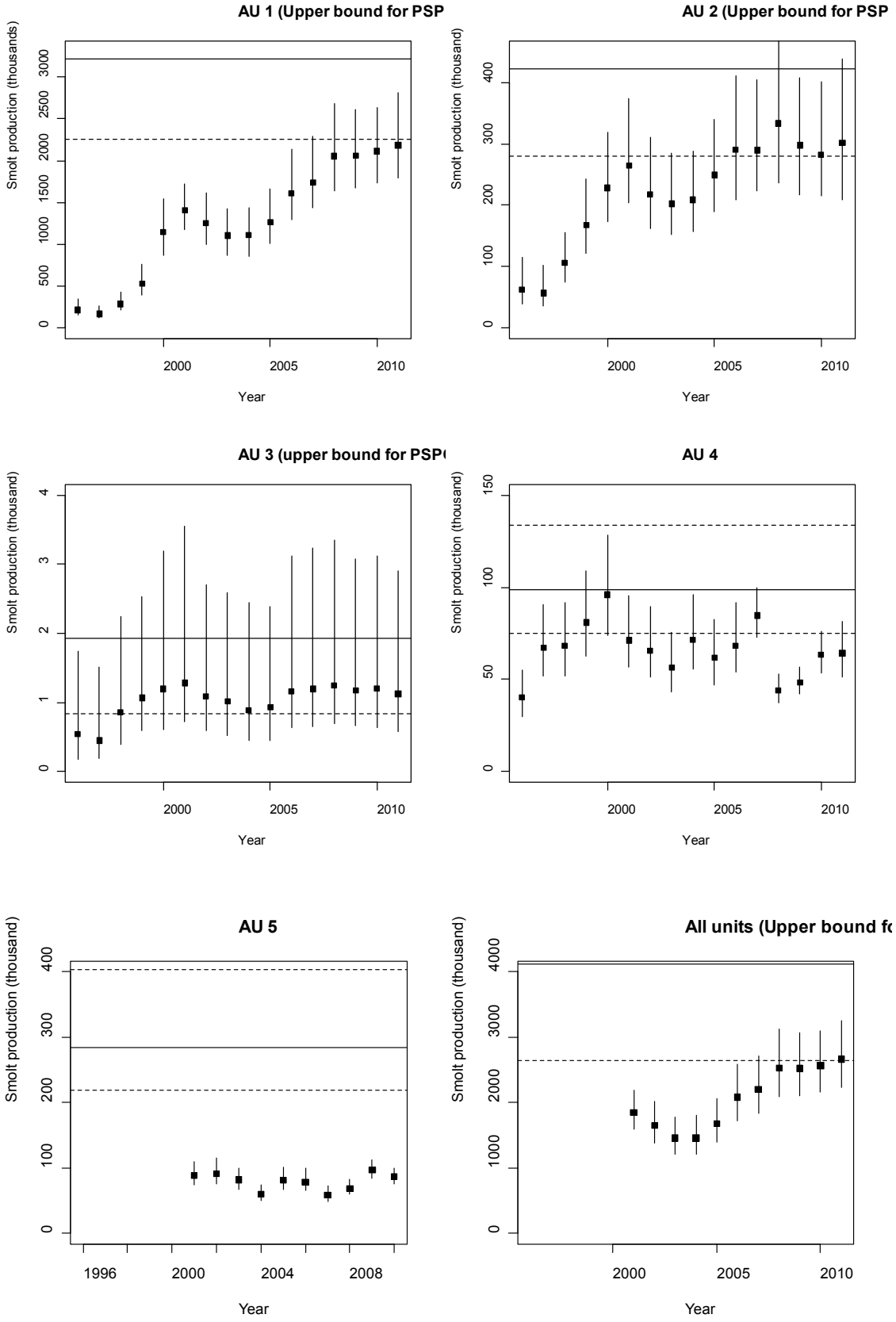

Figure 8.4.14.1 Salmon in Subdivisions 22–31 (Main Basin and Gulf of Bothnia). Posterior probability distribution (median and 95% PI) of the total smolt production within assessment units 1–5 and in total. Horizontal lines show the median (solid line) and 95% PI (dashed lines) for potential smolt production capacity (PSPC).

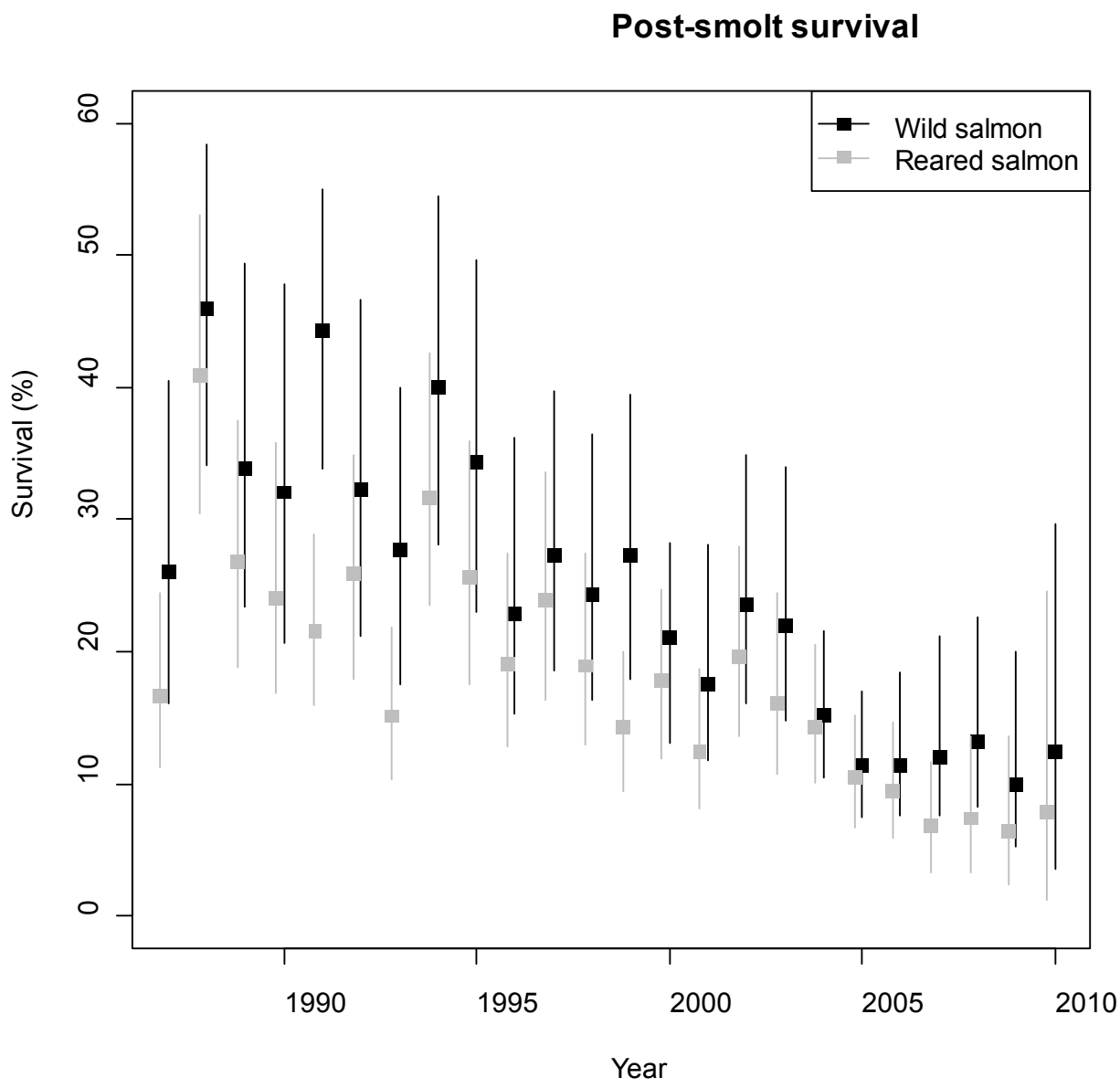

Figure 8.4.14.2 Salmon in Subdivisions 22–31 (Main Basin and Gulf of Bothnia). Post-smolt survival for wild and hatchery-reared salmon. Posterior probability distribution (median and 95% PI).

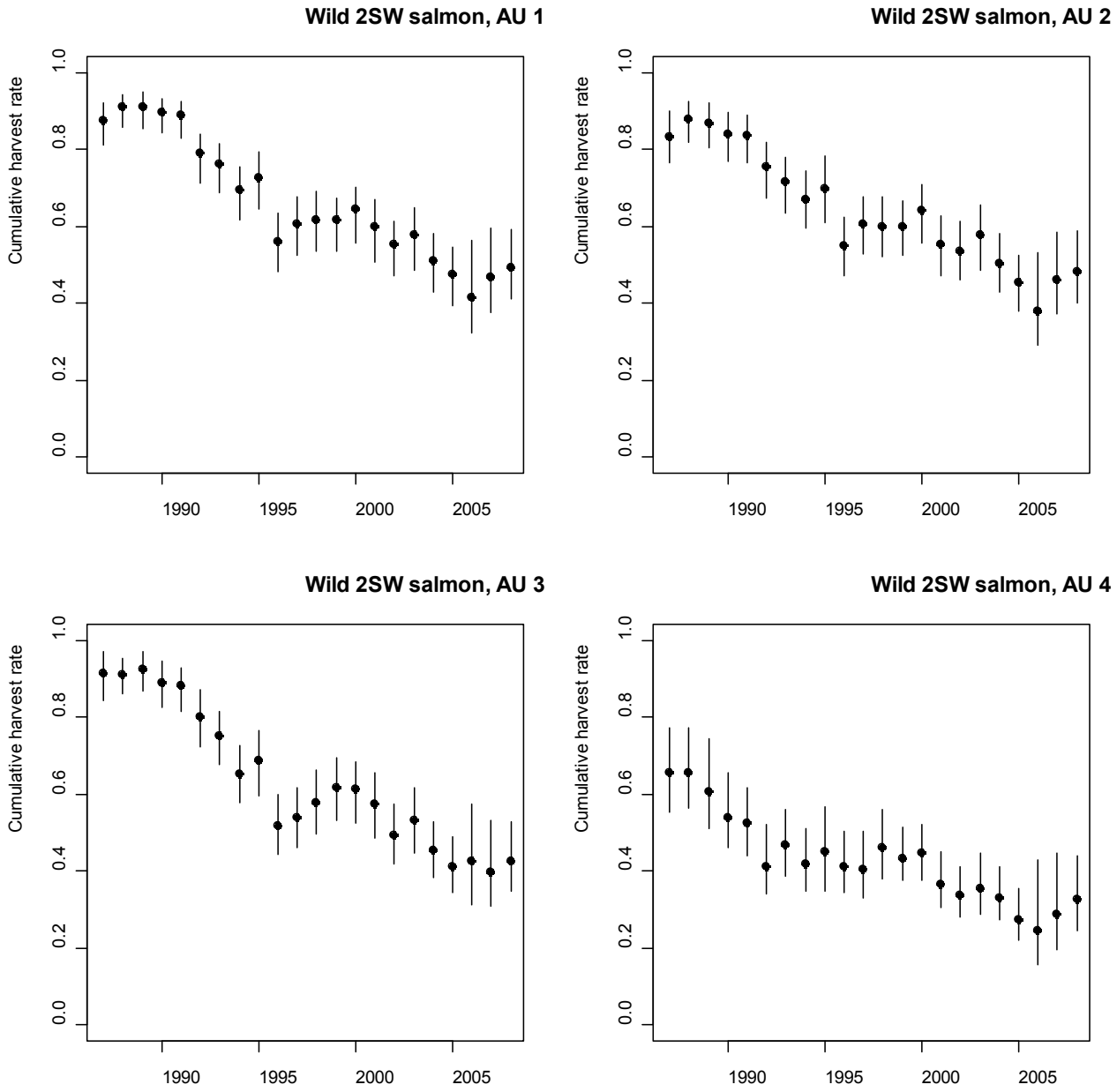

Figure 8.4.14.3 Salmon in Subdivisions 22–31 (Main Basin and Gulf of Bothnia). Harvest rates for wild two sea-winter salmon in different assessment units for smolt cohorts 1987–2008. Posterior probability distribution (median and 95% PI).

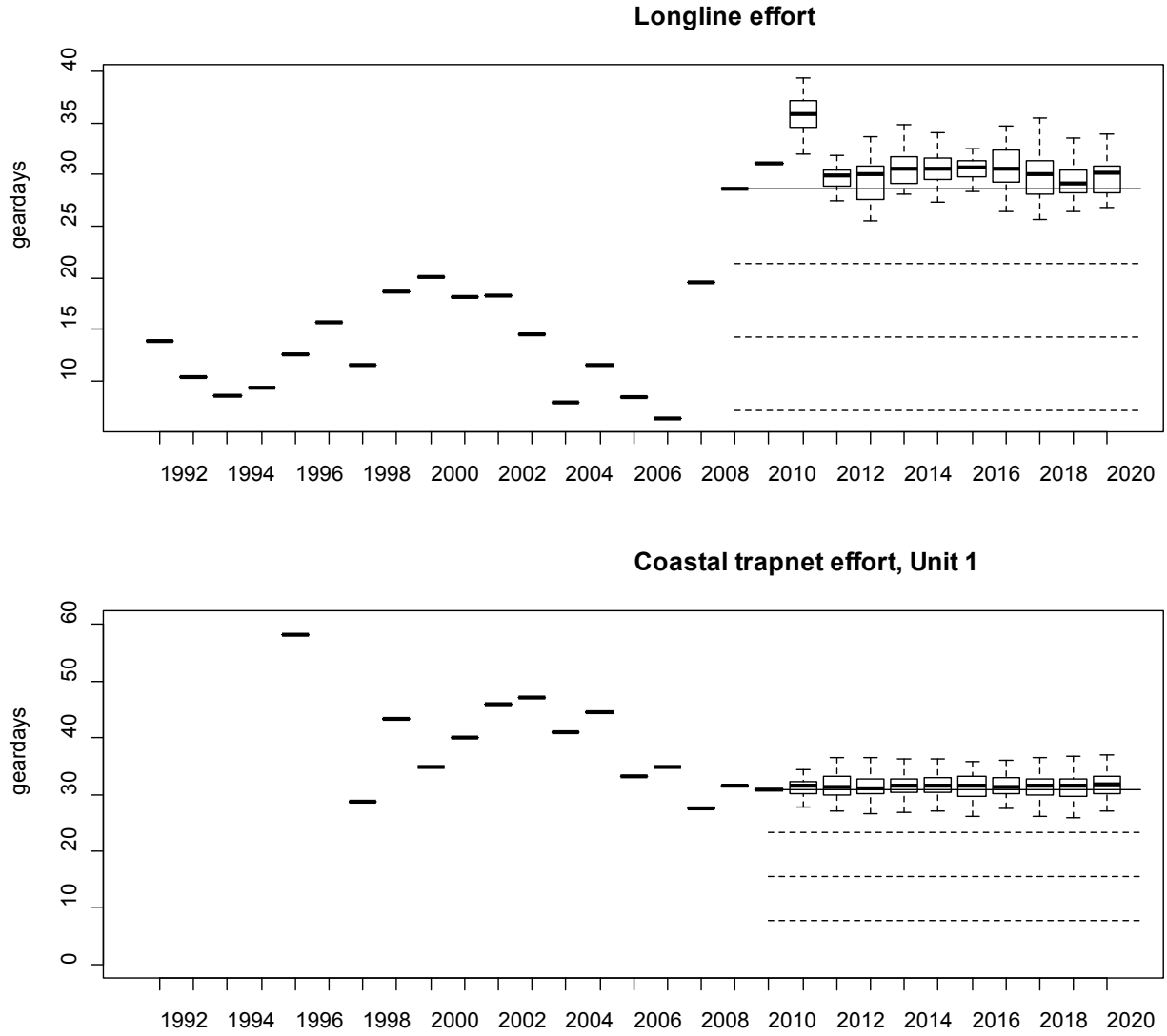

Figure 8.4.14.4 Illustration of fishing efforts for offshore longlines and coastal trapnets in historical years (1992–2010) and in future years (2011–2020) based on the following scenarios: (1) development in effort according to expert opinions (boxplots), (2) 2010 effort (solid line), (3) −25% of 2010 effort (top dotted line), (4) −50% of 2010 effort (middle dotted line), and (5) −75% of 2010 effort (bottom dotted line). For longline effort, the x-axis indicates the starting year of the fishing season, e.g. 2009 indicates fishing season 2009/2010. For coastal trapnetting, the effort before 1996 has been much higher than thereafter, and effort figures from those early years are not included for illustrative purposes.

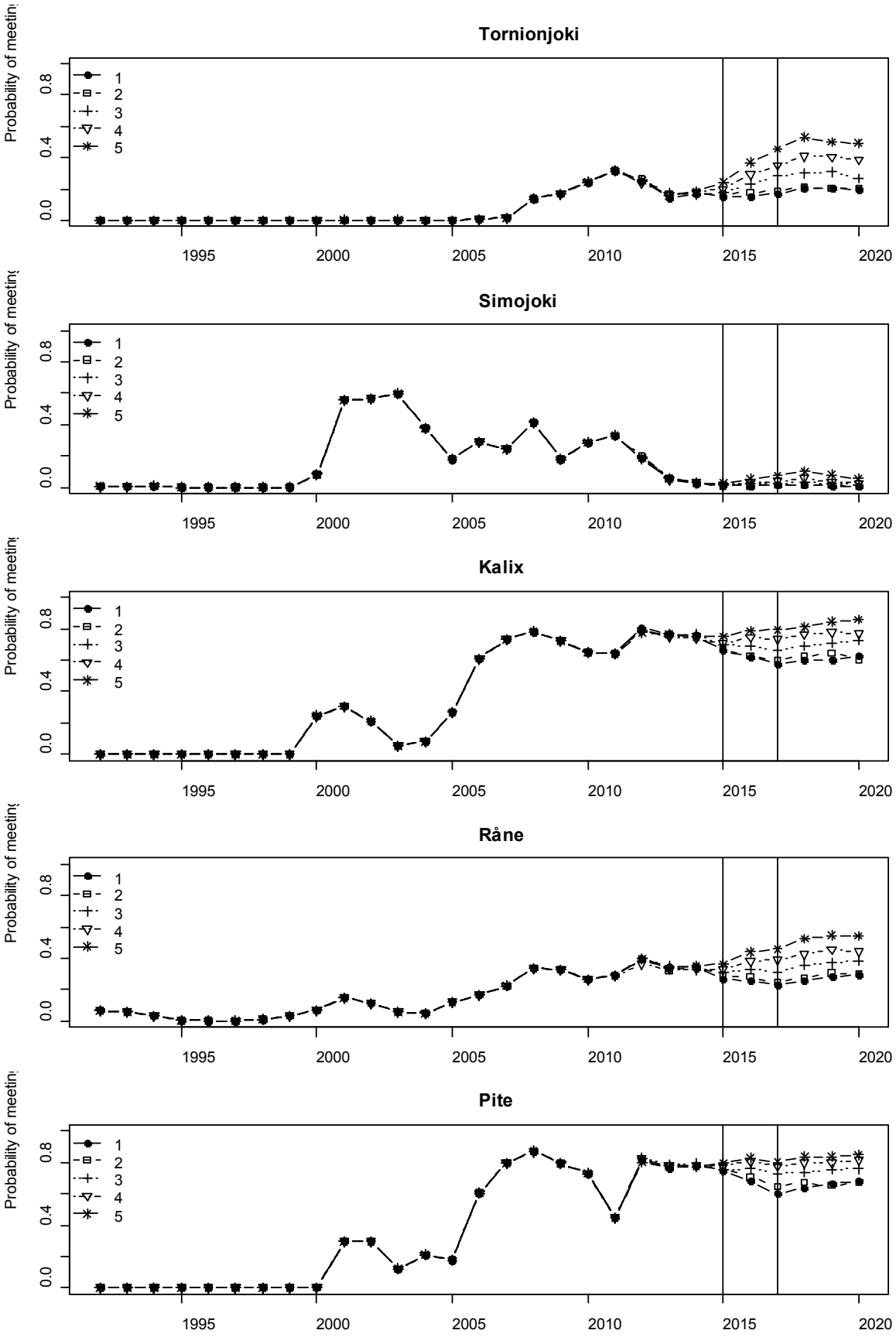

Figure 8.4.14.5a Salmon in Subdivisions 22–31 (Main Basin and Gulf of Bothnia). Probabilities of different stocks meeting an objective of 75% of potential smolt production capacity under different effort scenarios. Fishing in 2012 will primarily affect years 2015–2017. Effort scenarios: 1 – expert opinion on the development in effort; 2 – 2010 effort; 3 – 25% reduction of 2010 effort; 4 – 50% reduction of 2010 effort; 5 – 75% reduction of 2010 effort.

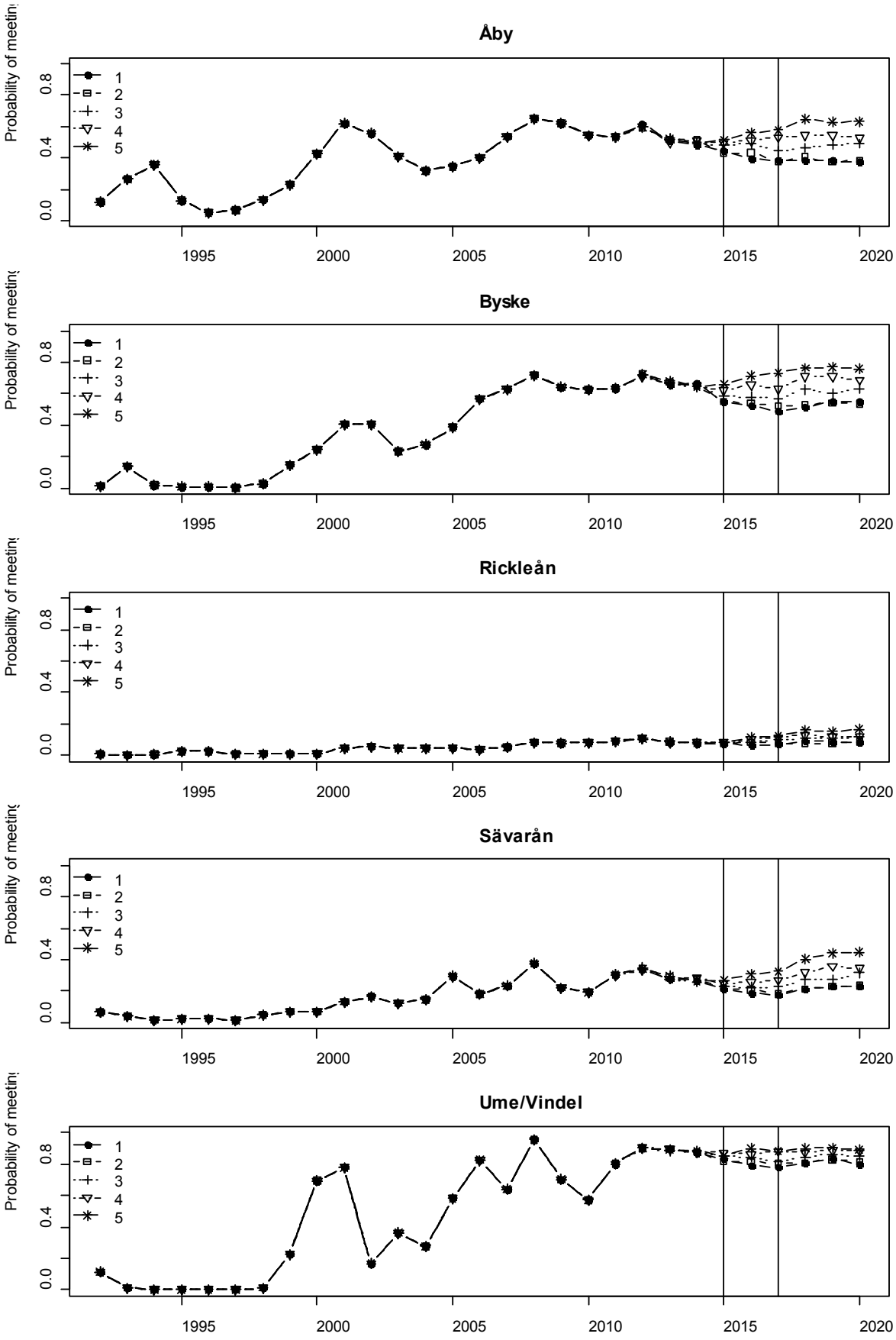

Figure 8.4.14.5b Salmon in Subdivisions 22–31 (Main Basin and Gulf of Bothnia). Probabilities of different stocks meeting an objective of 75% of potential smolt production capacity under different effort scenarios. Fishing in 2012 will primarily affect years 2015–2017. Effort scenarios: 1 – expert opinion on the development in effort; 2 – 2010 effort; 3 – 25% reduction of 2010 effort; 4 – 50% reduction of 2010 effort; 5 – 75% reduction of 2010 effort.

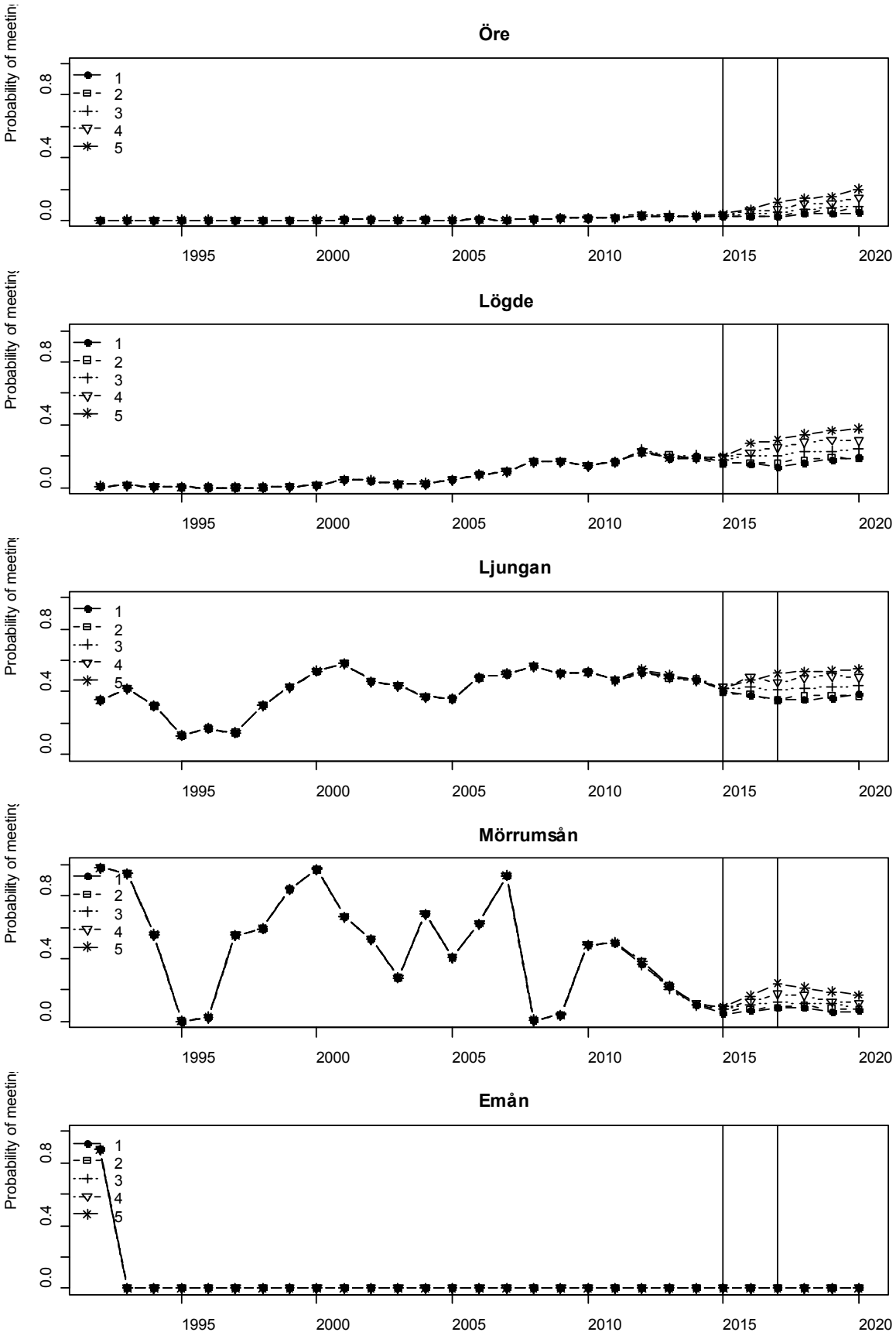

Figure 8.4.14.5c Salmon in Subdivisions 22–31 (Main Basin and Gulf of Bothnia). Probabilities of different stocks meeting an objective of 75% of potential smolt production capacity under different effort scenarios. Fishing in 2012 will primarily affect years 2015–2017. Effort scenarios: 1 – expert opinion on the development in effort; 2 – 2010 effort; 3 – 25% reduction of 2010 effort; 4 – 50% reduction of 2010 effort; 5 – 75% reduction of 2010 effort.

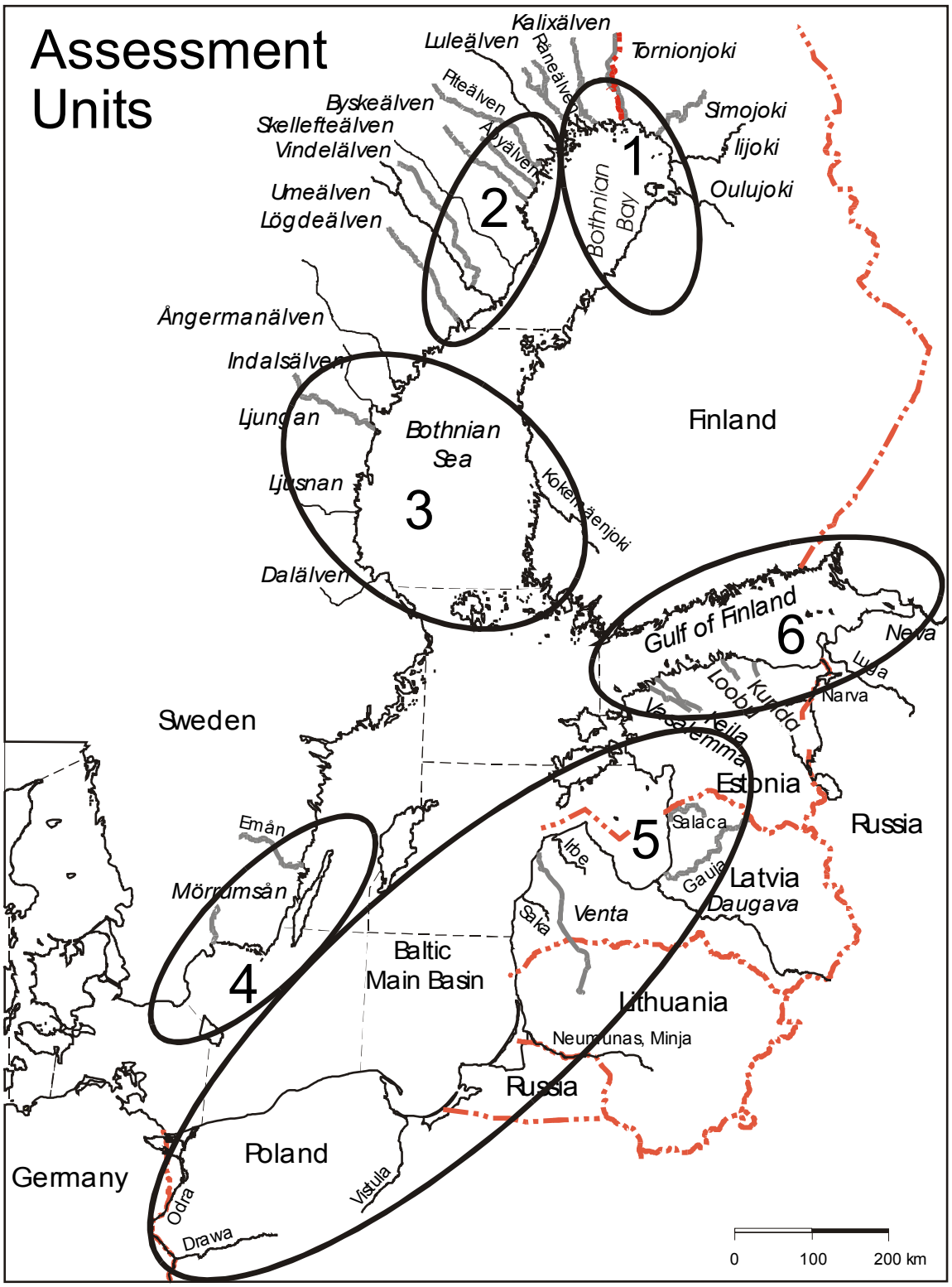

Figure 8.4.14.6 Grouping of salmon stocks in 6 assessment units in the Baltic Sea. The genetic variability between stocks of an assessment unit is smaller than the genetic variability between stocks of different units. In addition, the stocks of a particular unit exhibit similar migration patterns.

Table 8.4.14.1 Salmon in Subdivisions 22–31 (Main Basin and Gulf of Bothnia). ICES advice for Subdivisions 22–31, landings, and agreed TACs for the Baltic (Subdivisions 22–31 and 32).

Year	ICES Advice	Rec TAC '000 fish	Landings (22–32) tonnes	Landings (22–32) '000 fish	Catch[1] tonnes	Catch '000 fish	TAC32[2] '000 fish	TAC2231[3] '000 fish
1987	No increase in effort	-	3995		5262			
1988	Reduce effort		3177		4226			
1989	TAC	850	4401		5880			
1990	TAC		5636		7745			
1991	Lower TAC	-	4803		6572			
1992	TAC	688	4548		6290			
1993	TAC	500	3968	676	5461	588	109	650
1994	TAC	500	3181	584	4370	687	120	600
1995	Catch as low as possible in offshore and coastal fisheries	-	3040	553	4455	673	120	500
1996	Catch as low as possible in offshore and coastal fisheries	-	3138	650	4658	631	120	450
1997	Catch as low as possible in offshore and coastal fisheries	-	3030	553	4619	629	110	410
1998	Offshore and coastal fisheries should be closed	-	2494	489	3709	686	110	410
1999	Same TAC and other management measures as in 1998	410	2162	421	3614	601	100	410
2000	Same TAC and other management measures as in 1999	410	2342	477	3923	478	90	450
2001	Same TAC and other management measures as in 2000	410	2076	440	3519	734	70	450
2002	Same TAC and other management measures as in 2001	410	1841	406	3201	692	60	450
2003	Same TAC and other management measures as in 2002	410	1627	388	3045	705	50	460
2004	Same TAC and other management measures as in 2003	410	2086	432	4297	898	35	460
2005	Current exploitation pressure will not impair the possibilities for reaching the management objective for the stronger stocks.	-	1736	341	3076	605	17	
2006	Current exploitation pressure will not impair the possibilities for reaching the management objective for the larger stocks. Long-term benefits for the smaller stocks are expected from a reduction of the fishing pressure, although it is uncertain whether this is sufficient to rebuild these stocks to the level indicated in the SAP.	-	1208	227	2009	377	15	460
2007	ICES recommends that catches should not increase.	324	1123	217	1889	367	15	429
2008	ICES recommends that catches should be decreased in all fisheries	-	1011	198	1542	292	15	364
2009	ICES recommends no increase in catches of any fisheries above 2008 level for SD 22 31.	-	1103	219	1936	389	15	310
2010	TAC for SD 22–31	133	886	168	1641	320	15	294
2011	TAC for SD 22–31	120					15	250
2012	TAC for SD 22–31	54						

[1] Includes only some recreational fish data.
[2] Agreed TAC for Subdivision 32.
[3] Agreed TAC for Subdivisions 22–31.

Table 8.4.14.2 Salmon in Subdivisions 22–31 (Main Basin and Gulf of Bothnia). Overview of the status of the Gulf of Bothnia and Main Basin stocks in terms of their probability of reaching 50 and 75% of the smolt production capacity by 2011. Stocks are considered very likely to reach this objective when the probability is more than 90%. They are likely to reach the objective when the probability is between 70 and 90% and unlikely when the probability is less than 30%. When the probability of reaching the objective lies between 30 and 70%, it is considered uncertain whether they will reach the objective in 2011.

	Prob to reach 50%				Prob to reach 75%			
	V.likely	Likely	Uncert.	Unlikely	V.likely	Likely	Uncert.	Unlikely
Unit 1								
Tornionjoki		X					X	
Simojoki			X				X	
Kalixälven	X						X	
Råneälven			X					X
Unit 2								
Piteälven	X						X	
Åbyälven		X					X	
Byskeälven	X						X	
Rickleån				X				X
Sävarån			X				X	
Ume/Vindelälven	X					X		
Öreälven				X				X
Lögdeälven			X					X
Unit 3								
Ljungan		X					X	
Unit 4								
Emån				X				X
Mörrumsån	X						X	
Unit 5								
Pärnu				X				X
Salaca				X				X
Vitrupe				X				X
Peterupe				X				X
Gauja				X				X
Daugava				X				X
Irbe			X					X
Venta			X					X
Saka				X				X
Uzava				X				X
Barta				X				X
Nemunas				X				X

Table 8.4.14.3 Salmon in Subdivisions 22–31 (Main Basin and Gulf of Bothnia). Nominal catches, discards (incl. seal-damaged salmon) and unreported catches of Baltic salmon in tonnes round fresh weight, from sea, coast, and river by country for the whole Baltic Sea (Subdivisions 22–32) (mode = most likely value, PI = probability interval).

Year	Reported catches by country										Reported catches	Non commercial catch.	Discard		Total unreported catches [3]		Total catches	
	Denmark	Estonia	Finland	Germany	Latvia	Lithuania	Poland [1]	Russia	Sweden	USSR	total	included in tot. catch.	mode	95% PI	mode	95% PI	mode	95% PI
1972	1045	na	403	117	na	na	13	na	477	107	2162		na	na	na	na	na	
1973	1119	na	516	107	na	na	17	na	723	122	2604		na	na	na	na	na	
1974	1224	na	703	52	na	na	20	na	756	176	2931		na	na	na	na	na	
1975	1210	na	697	67	na	na	10	na	787	237	3008		na	na	na	na	na	
1976	1410	na	688	58	na	na	7	na	665	221	3049		na	na	na	na	na	
1977	1011	na	699	77	na	na	6	na	669	177	2639		na	na	na	na	na	
1978	810	na	532	22	na	na	4	na	524	144	2036		na	na	na	na	na	
1979	854	na	558	31	na	na	4	na	491	200	2138		na	na	na	na	na	
1980	886	na	668	40	na	na	22	na	556	326	2498		na	na	na	na	na	
1981	844	25	663	43	184	36	45	61	705		2606		318	192-495	460	138-1100	3474	3051-4063
1982	604	50	543	20	174	30	38	57	542		2058		246	147-384	355	105-864	2731	2401-3199
1983	697	58	645	25	286	33	76	93	544		2457		301	181-467	434	130-1037	3277	2877-3833
1984	1145	97	1073	32	364	43	72	88	745		3659		428	256-673	620	181-1533	4836	4254-5673
1985	1345	91	963	30	324	41	162	84	999		4039		457	270-729	660	180-1690	5304	4661-6244
1986	848	76	1000	41	409	57	137	74	966		3608		436	262-680	629	186-1520	4798	4216-5618
1987	955	92	1051	26	395	62	267	104	1043		3995		463	277-730	659	184-1673	5262	4625-6188
1988	778	79	797	41	346	48	93	89	906		3177		380	226-596	561	170-1339	4226	3713-4944
1989	850	103	1166	52	523	70	80	141	1416		4401		541	325-842	789	240-1865	5880	5161-6874
1990	729	93	2294	36	607	66	195	148	1468		5636		798	477-1239	1104	323-2549	7745	6734-9091
1991	625	86	2171	28	481	62	77	177	1096		4803		651	377-1030	942	278-2170	6572	5713-7719
1992	645	32	2121	27	278	20	170	66	1189		4548		637	349-1040	919	253-2175	6290	5414-7466
1993 [2]	575	32	1626	31	256	15	191	90	1134		3966		558	336-861	794	252-1796	5461	4758-6395
1994	737	10	1209	10	130	5	184	45	851		3181	302	408	244-632	674	262-1442	4370	3836-5085
1995	556	9	1324	19	139	2	133	63	795		3040	331	421	252-651	888	475-1646	4455	3923-5164
1996	525	9	1316	12	150	14	125	47	940		3138	532	473	280-735	928	478-1758	4658	4073-5435
1997	489	10	1357	38	170	5	110	27	824		3030	563	449	256-715	1022	577-1851	4619	4042-5396
1998	495	8	850	42	125	5	118	36	815		2494	332	351	212-539	777	439-1388	3709	3272-4281
1999	395	14	720	29	166	6	135	25	672		2162	296	318	189-492	1056	752-1612	3614	3220-4137
2000	421	23	757	44	149	5	144	27	771		2342	360	240	133-390	1263	950-1828	3923	3527-4444
2001	443	16	606	39	136	4	180	37	616		2076	339	311	189-475	1057	772-1588	3519	3148-4008
2002	334	16	509	29	108	11	197	66	572		1841	246	296	180-453	960	695-1454	3201	2857-3658
2003	454	10	410	29	47	3	198	22	454		1627	207	263	165-397	1034	803-1461	3045	2743-3438
2004	370	7	654	35	34	3	88	16	879		2087	349	339	195-537	1711	1391-2332	4297	3872-4871
2005	214	8	616	24	23	3	114	15	719		1736	359	278	159-442	933	665-1439	3076	2726-3552
2006	178	8	370	18	14	2	117	5	497		1208	207	203	120-319	500	315-855	2009	1763-2340
2007	79	7	408	15	26	2	95	6	484		1123	232	163	91-264	515	347-829	1889	1670-2183
2008	34	9	451	25	9	2	44	6	460		1039	365	166	77-292	252	62-627	1542	1294-1897
2009	78	7	434	9	15	1	51	2	507		1103	312	199	98-344	545	336-969	1936	1660-2336
2010	145	6	272	3	10	1	29	2	418		886	200	170	96-268	522	372-811	1641	1441-1917

All data from 1972-1994 includes sub-divisions 24-32, while it is more uncertain in which years sub-divisions 22-23 are included. The catches in sub-divisions 22-23 are normally less than one ton. From 1995 data includes sub-divisions 22-32.

Catches from the recreational fishery are included in reported catches as follows: Finland from 1980, Sweden from 1988, Denmark from 1998. Other countries have no or very low recreational catches.

Danish, Finnish, German, Polish and Swedish catches are converted from gutted to round fresh weight w by multiplying by 1.1.

Estonian, Latvian, Lithuanian and Russian catches before 1981 are summarized as USSR catches.

Estonian, Latvian, Lithuanian and Russian catches are reported as whole fresh weight.

Sea trout are included in the sea catches in the order of 3 % for Denmark (before 1983), 3% for Estonia, Germany, Latvia, Lithuania, Russia, and about 5% for Poland (before 1997).

Estimated non-reported coastal catches in Sub-division 25 has from 1993 been included in the Swedish statistics.

Danish coastal catches are non-profesional trolling catches.

1) Polish reported catches are recalculated for assessment purposes (see Section 5)

2) In 1993 fishermen from the Faroe Islands caught 16 tonnes, which are included in total Danish catches.

3) Including both unreporting for all countries and the estimated additional Polish catch

Table 8.4.14.4 Salmon in Subdivisions 22–31 (Main Basin and Gulf of Bothnia). Nominal catches, discards (incl. seal-damaged salmon) and unreported catches of Baltic salmon in numbers from sea, coast, and river by country for the whole Baltic Sea (Subdivisions 22–32) (mode = most likely value, 95% PI = probability interval).

Year	Country									reported	Discard		Estimated additional	Total unreported catches [2]		Total catches	
	Denmark	Estonia	Finland	Germany	Latvia	Lithuania	Poland	Russia	Sweden	total	mode	95% PI	Polish catch	mode	95% PI	mode	95% PI
1993 [1]	111840	5400	248790	6240	47410	2320	42530	9195	202390	676115	95162	57550-146900	4100	136604	44110-307000	588428	511900-689600
1994	139350	1200	208000	1890	27581	895	40817	5800	158871	584404	74979	45150-116300	16572	126716	51191-267771	686732	593271-813971
1995	114906	1494	206856	4418	27080	468	29458	7209	161224	553113	76541	46060-118500	64046	173150	98095-310945	673022	594245-776545
1996	105934	1187	266521	2400	29977	2544	27701	6980	206577	649821	97938	58360-152200	62679	196649	103608-368478	631025	556778-728978
1997	87746	2047	245945	6840	32128	879	24501	5121	147910	553117	81897	46910-130500	85861	202355	121361-353661	628670	558961-720261
1998	92687	1629	154676	8379	21703	1069	26122	7237	166174	479676	67571	41080-103800	60378	157603	92777-275177	685736	599977-800877
1999	75956	2817	129276	5805	33368	1298	27130	5340	139558	420548	61785	36980-95760	122836	209558	150425-317635	600905	535635-688635
2000	84938	4485	144260	8810	33841	1460	28925	5562	165016	477297	71015	39450-115200	159251	261698	190230-397350	478282	435850-534750
2001	90388	3285	115756	7717	29002	1205	35606	7392	149391	439742	63942	38830-98250	126060	214482	154689-325459	733986	656459-836359
2002	76122	3247	104641	5762	21808	3351	39374	13230	138255	405790	65576	40520-99460	114964	198536	141503-306163	691745	616463-791063
2003	108845	2055	99149	5766	11339	1040	40870	4413	115347	388824	63861	39700-96700	143146	224436	168885-328645	705339	632245-801645
2004	81425	1452	132105	7087	7700	704	17650	5480	192856	446459	71477	41670-112600	254267	348355	280937-477167	897707	808667-1016467
2005	42491	1618	115068	4799	5629	698	22896	3069	144584	340852	54040	31120-85790	111396	184746	133165-282895	605080	536895-696595
2006	33723	1516	64501	3551	3195	488	22207	1002	97285	227468	37278	22330-57970	45533	94388	60653-158433	376817	332233-436133
2007	16145	1378	75092	3086	5318	537	18988	1408	95241	217193	32024	18070-51620	53793	101024	68503-162093	367467	324993-424293
2008	7363	1890	80735	4944	2016	539	8650	1382	90584	198103	32118	15160-56620	2282	47629	11602-119882	292199	244882-360682
2009	16072	2209	77897	1757	2741	519	10085	584	107406	219270	40985	20660-70400	63988	108818	67090-194511	389286	333511-469611
2010	29637	1756	45521	606	1534	427	5774	491	82177	167923	32837	19220-51080	70511	107454	80219-159601	320015	283311-369811

All data from 1993-1994, includes sub-divisions 24-32, while it is more uncertain in which years sub-divisions 22-23 are included.
The catches in sub-divisions 22-23 are normally less than one tonnes.
From 1995 data includes sub-divisions 22-32.
Catches from the recreational fishery are included in reported catches as follows: Finland from 1980, Sweden from 1988, Denmark from 1998.
Other countries have no, or very low recreational catches.
1) In 1993 Fishermen from the Faroe Islands caught 3200 individuals, which is included in the total Danish catches.
2) Including both unreporting for all countries and the estimated additional Polish catch

Table 8.4.14.5 Salmon in Subdivisions 22–31 (Main Basin and Gulf of Bothnia). Nominal landings of Baltic salmon in round fresh weight and in numbers from sea, coast, and rivers in Subdivisions 22–31.

Year	Rivers		Coast		Offshore		Coast and Offshore[1]		Total	
	'000 t	'000 fish	'000 t	'000 fish	'000 t	'000 fish	'000 t	'000 fish[2]	'000 t	'000 fish[2]
1987	0.05		0.39		3.21		3.59	891	3.64	897
1988	0.06		0.41		2.43		2.85	784	2.90	791
1989	0.08		0.65		3.27		3.92	1035	4.00	1049
1990	0.13		1.31		3.65		4.96	1113	5.08	1131
1991	0.12		1.03		3.00		4.03	757	4.15	776
1992	0.12		1.24		2.66		3.90	710	4.02	727
1993	0.11		0.83		2.57		3.40	679	3.52	657
1994	0.10		0.58		2.25		2.83	584	2.93	595
1995	0.12		0.67		1.98		2.65	553	2.77	571
1996	0.21	35	0.77	168	1.73	366	2.50	534	2.71	570
1997	0.28	45	0.80	149	1.50	282	2.31	431	2.59	476
1998	0.19	30	0.59	104	1.52	314	2.11	418	2.30	449
1999	0.17	30	0.59	104	1.23	256	1.82	360	1.99	391
2000	0.18	30	0.52	100	1.45	313	1.97	413	2.15	442
2001	0.16	30	0.57	121	1.19	262	1.76	383	1.92	413
2002	0.14	28	0.59	126	1.03	234	1.62	360	1.75	388
2003	0.12	28	0.43	113	1.00	235	1.43	348	1.56	376
2004	0.13	25	0.77	161	1.11	247	1.88	408	2.01	433
2005	0.17	31	0.61	118	0.86	175	1.47	293	1.64	323
2006	0.10	19	0.40	71	0.63	124	1.03	194	1.12	213
2007	0.14	23	0.35	69	0.55	111	0.90	180	1.04	204
2008	0.26	45	0.46	92	0.21	43	0.67	135	0.93	180
2009	0.18	32	0.55	113	0.27	58	0.82	171	1.00	203
2010[3]	0.11	17	0.38	67	0.36	76	0.74	143	0.85	160

[1]For comparison with TAC. [2]Catch in numbers before 1993 based on estimates. [3]Preliminary.

Table 8.4.14.6 Salmon in Subdivisions 22–31 (Main Basin and Gulf of Bothnia). Probability of different rivers meeting 75% of PSPC by 2016 with different effort scenarios. Effort scenarios: 1 – expert opinion on the development in effort; 2 – 2010 effort; 3 – 25% reduction of 2010 effort; 4 – 50% reduction of 2010 effort; 5 – 75% reduction of 2010 effort.

Effort scenario	Tornionjoki	Simojoki	Kalixälven	Råneälven	Piteälven	Åbyälven	Byskeälven	Rickleån	Sävarån	Ume/Vindelälven	Öreälven	Lögdeälven	Ljungan	Mörrumsån	Emån
1	0.2	0	0.6	0.3	0.7	0.4	0.5	0.1	0.2	0.8	0.0	0.2	0.4	0.1	0
2	0.2	0	0.6	0.3	0.7	0.4	0.5	0.1	0.2	0.8	0.0	0.2	0.4	0.1	0
3	0.2	0	0.7	0.3	0.8	0.5	0.6	0.1	0.2	0.8	0.0	0.2	0.4	0.1	0
4	0.3	0	0.7	0.4	0.8	0.5	0.7	0.1	0.3	0.9	0.1	0.2	0.5	0.1	0
5	0.4	0.1	0.8	0.4	0.8	0.6	0.7	0.1	0.3	0.9	0.1	0.3	0.5	0.2	0