Annex 3 Technical minutes from the Salmon Review Group

- RGSalmon
- 21–22 April 2009 at ICES, Copenhagen, Denmark
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- Working Group: WGBAST

General aspects raised during the RG meeting

The Review Group (RG) received the Working Group (WG) report two business days before the start of the Review Group meeting; one of those days was a travel day. As a result, the Reviewers did not have the time to give the Report the attention such a large body of work deserves. Earlier WG-meeting for preparation of the WG report is therefore suggested for the future, to have more time for the reviewers to do a proper job.

Concerns from the WG on suggestions from ICES Secretariat to change the schedule for assessments, i.e. not making full assessments each year. The concern from the WG was that this is not a proper time for reducing the frequency of full assessments since the post-smolt survival, together with M74, are key factors affecting the dynamics of salmon stocks in the Baltic Sea, and both these components have been observed to change considerably over time. The post-smolt survival has decreased during the last decade and dropped considerably during 2004–2006.

General comments on the report

The WG has applied a state of the art approach to their efforts to model and assess Baltic salmon resources. A compilation of data on sea trout is included in the Report, but no model based assessment has been applied for that species. Overall, the WG Report was very well written and carefully prepared.

Contents

The RG suggests that the WG add a section to the Report next year outlining how they dealt with the Technical Minutes arising from the deliberations of the RG. It is not intended that this be an extensive section, but rather a vehicle to facilitate the efficient use of constructive criticism provided by the RG. It will also be useful to the RG as a means of judging how its advice is being used and what types of advice is proving to be most effective.

Executive Summary

Salmon stocks in the Main Basin and Gulf of Bothnia (Subdivision 24–31) were assessed using Bayesian methodology. A stock projection model implemented in R and conditioned on the Bayesian stock assessment was used for the computation of the impacts of different future scenarios on the stocks. New assessment of the sea trout populations, based on the work of SGBALANST, was reviewed and adopted.

The Group recommends a TAC for salmon in Subdivision 24–32. For sea trout, the Group recommends strict technical measures to be taken in the Gulf of Bothnia and

Gulf of Finland to decrease exploitation of the threatened wild sea trout populations in the areas.

Section 2: Salmon fisheries data

Missing reference to Table 2.1.4

2.7 Estimation of proportions of wild salmon and individual salmon stocks in catches based on genetic studies and scale readings

The potential use of stock proportion estimates in catches to improve the assessment model has been discussed previously and was highlighted in the last year Technical minutes. The Working Group took notice of this, but before stock proportion estimates could be used as an input in the assessment model, a further evaluation of the DNA approach must be undertaken including reanalysis of historic catch samples using the latest baseline; both to evaluate the precision in the analyses and to compare smaller scale temporal and spatial variation in stock proportions estimates in order to evaluate the representativeness of catch samples (see Section 8.2 and Annex 2 "Recommendations").

2.9.3. Tag reporting rate

Due to the declining reporting rate of tags, possibly due to low interest of reporting, it was noted in last year's TM a request to the WG to take an objective look at where tagging is still useful in a quantitative context. A review of older investigations was included in this year's report and the results indicate underreporting. In addition, the Working Group suggests that a more comprehensive plan may be considered during the Working Group meeting in 2010.

2.10 Tagging data in the Baltic salmon stock assessment

The problem with the Swedish tagging data/database still exists despite attempts to recover as much as possible of the poorly archived information during the period when the Swedish Fisheries Board was not in charge of the database. Therefore no reliable Swedish tagging data have been available after 2005 hence the large decrease in the tagging data used in the assessment for salmon in Areas 2 and 3.

Section 3: River data on salmon populations

3.2 Wild salmon populations in Main Basin and Gulf of Bothnia

Monitoring of parr densities are carried out by standardized electrofishing surveys. The method is carried out in a similar way in all assessment units. The need to extrapolate these data to the entire rives has received attention both in WGBAST and in WGNAS in last year's report and was stressed also in the TM. No progress on this issue is reported in this year's report, but this issue is still important to consider in the future work.

Section 4: Present management measures and other factors influencing salmon fishery

4.1 Description of the Present Management Measures

Page 102, TAC-section: First table. The Total quota 2009 for Sub-division 32 does not correspond to the sum of the components.

4.2.2 National regulatory measures

ICES 2007 concluded that the delayed opening of the coastal fishery is an effective tool for saving a proportion of the spawning run from the coastal harvest. However, there are concerns in the WG Report that the variation in the run timing between years would result in higher harvesting of late-migrating than early-migrating salmon. As older fish and females dominate in the early part of the spawning run, late opening of the fishery saves the most valuable part of the run. The RG suggests to evaluate alternative rules to save a proportion of the run, e.g. by using a fixed number of closed days per week, which should remove the problems addressed by the WG but still save a proportion of the salmon run.

4.4 Development in post-smolt survival and factors affecting it

The report this year includes additional analyses to clarify the variation over time in the post-smolt survival. The strong correlation with the seal abundances and herring recruitment still exists, even when using a model independent (i.e. a purely empirical dataset). It is especially important to find the reasons to the sudden declines in the survival during some years and the correlations may be used as hypotheses for the decline. One further step in the analyses should be to try to associate the decline with regional covariate data (regional seal abundances and herring recruitment) to investigate if the main problem is related to some restricted region of the Baltic. It is not clear from the report if the calculated consumption of smolt by seals is an average for all seals in the Baltic, restricted to the seals in the main basin or in the northern region. One way of identifying the reason to the low post-smolt survival could be to use separate datasets from different regions (e.g. Umeälven, Dalälven, Gulf of Finland) in order to investigate if the phenomenon is large-scale or restricted to certain areas. This year's analyses focused on the Umeälven stock.

According to the new assessment of the post-smolt survival, the decline does not seem as severe as in previous assessments, except during the period 2004–2006. The main reason for the change is a modified use of the Polish catches, for which a fraction of the reported sea trout catches has been changed to unreported-misreporting salmon.

The predation and food availability hypotheses

Page 114, "No relationships were observed between survival and total trawl effort in Bothnian Bay or pelagic trawl effort in Bothnian Sea." The influence of the trawl fishery on the post smolt survival may be delayed due to the delayed effect on herring recruitment. This option should be tested as well.

In addition there might (should?) be an indirect effect, delayed by a few years, of the seals on the post-smolt as well, mediated through increased predation on adult herring. If so, the lagged seal abundance should also give a high degree of explanation to the decreasing post-smolt survival. However, the sudden drop in post-smolt survival during 2004–2006 indicates that the seals are not responsible for the extremely low post-smolt survival since the seal abundance did not change drastically during these years. The WG points out that future studies should focus on collecting such data in order to evaluate if the present seal population is actually able to regulate salmon survival downwards, which would indicate a possible causal relationship. Therefore, also alternative explanations and covariate also needs to be taken into account in future analyses.

4.5 Conclusions for the salmon fishery

Section 4.5, 1st paragraph. total catch decreased over 200% comparing to 2007. How can a decrease be more than 100%? Or is it the decrease that is 200% larger than the decrease in 2007?

Section 5. Reference points and assessment of salmon in Main Basin and Gulf of Bothnia (Subdivisions 22–31)

The WG should stay alert to climate scale changes occurring in the Baltic and NE Atlantic affect the physical habitat and the nature of biological food webs of consequence to Atlantic salmon. A related question is whether or not to include environmental variables in the model.

5.2 Reference points for Baltic Salmon

There are no objectives with corresponding reference points agreed for the current management of Baltic salmon. The Working Group evaluated the probability to reach 50% and 75% of the Potential Smolt Production Capacity (PSPC) in each river.

5.3.8.2 Methodology

In the Bayesian model, all adults are assumed to die after spawning. Since the kelt survival is high in Baltic salmon this will lead to biased sea-mortality estimates since a fraction of the harvested salmon in the sea-fishery should belong to kelts. Catch analyses should be aimed at investigating the fraction of re-spawners in the catches to see if the abundance is sufficiently high to affect the model estimates of the marine survival.

Uncertainties regarding the model assumptions and model structures of the estimation model

Page 153, "If this phenomenon <stepwise build up of the population due to local density dependence> is valid for the Baltic salmon populations, our analysis of the recent stock-recruit information underestimates long-term (full) carrying capacity of the Baltic rivers." Local density dependence with restricted spawning areas during the initial population build up (recovery) is most likely a general phenomenon due to the homing of salmon and should be expected also in the Baltic rivers, see paper by Finstad *et al*., 2009.

5.6.2 Effort and post-smolt survival scenarios

There was some concern in the RG about how the three scenarios of post-smolt mortality (low, medium, and high) were used in the model scenarios. The predictions started from the high observed post-smolt survival in 2007 (0.22) and run onwards approaching each of the three survival levels. Suggestions of alternative approaches were discussed and especially one where it was suggested to apply an exponential smoother to arrive at a prediction with uncertainty for 2008 to be included in the simulations. However, the use of the time-series autocorrelation structure in the simulation would break down by forcing a fixed value with associated uncertainty for 2008. Therefore, the alternative discussed by the RG would need a major revision of the model. An alternative, that was adopted, was to include the preliminary post-smolt mortality estimate for 2008 to assess the influence of the median-survival alternative. The 2008 estimate (0.14) was somewhat lower than the prediction from the exponential smoother (0.18). Re-runs of the model indicated that the new results

predicted slightly lower probabilities of meeting the reference levels for most of the rivers. The new scenario results are provided in Annex 1 in this document.

Figure 5.3.9.3 Figure legend -...egg abundance (million), plotted against the median smolt abundance ... Should it be the other way around?

Figure 5.3.9.8 "Estimated posterior distributions of catches in comparison to corresponding observed catches." There seems to be some bias produced by the model for the off shore catches in 2003 and 2004 and one year later for the coastal fishery. The reason for these discrepancies was not clear, and should be checked by the WG.

Figure 5.4.3.4 a Harvest rates What time unit is used for the rates?

Section 7. Sea trout

7.2 Status of wild and mixed sea trout populations

Page 215, "Information on average parr densities and status of trout populations were compiled ..." How to separate between resident and migratory brown trout parr when relating the production to the potential? This problem is mainly expected for the northern region since most of the brown trout in the southern region belongs to the migratory type. Overharvesting of the migratory morph should favour the resident type. Information about these aspects are needed in order to have a functional management plan. Genetical studies are probably needed to allow separation between types, and such analyses are encouraged.

Table 7.2.2.3 Densities of sea trout parr in electrofishing surveys in Swedish tributaries in the Gulf of Bothnia.

This legend is misleading since it is not possible to differ between sea trout and resident brown trout during electro-fishing. When scaling up the trout densities for Sävarån it should be expected that the sea trout smolt should out-number salmon smolt at least by an order of magnitude. But, there are more salmon than sea trout in the smolt run.

Section 8: Data and information needs for assessment

Note the high priority accorded to the following: It has high priority to establish one index river, covering both smolt counts and spawner counts, in each Assessment Unit for both salmon and sea trout. The collection of data concerning parr densities, smolt counts and number of spawners has high priority in these rivers…, etc.

ICES also notes the ten Recommendations of the WG as per Annex 2.

References

Finstad *et al*. 2009. Availability of yoy-shelter regulates salmon populations. Journal of Animal Ecology, 78, 226–235.

Annex 1. Main results of the revised model runs for effort scenarios made available to the Review Group

The revised model run resulted in changes in some tables and figures in Chapter 5 in WG report. Below some of the updated tables and figures are shown which had a central role in the evaluation of the stock status and in the compilation of the catch advice.

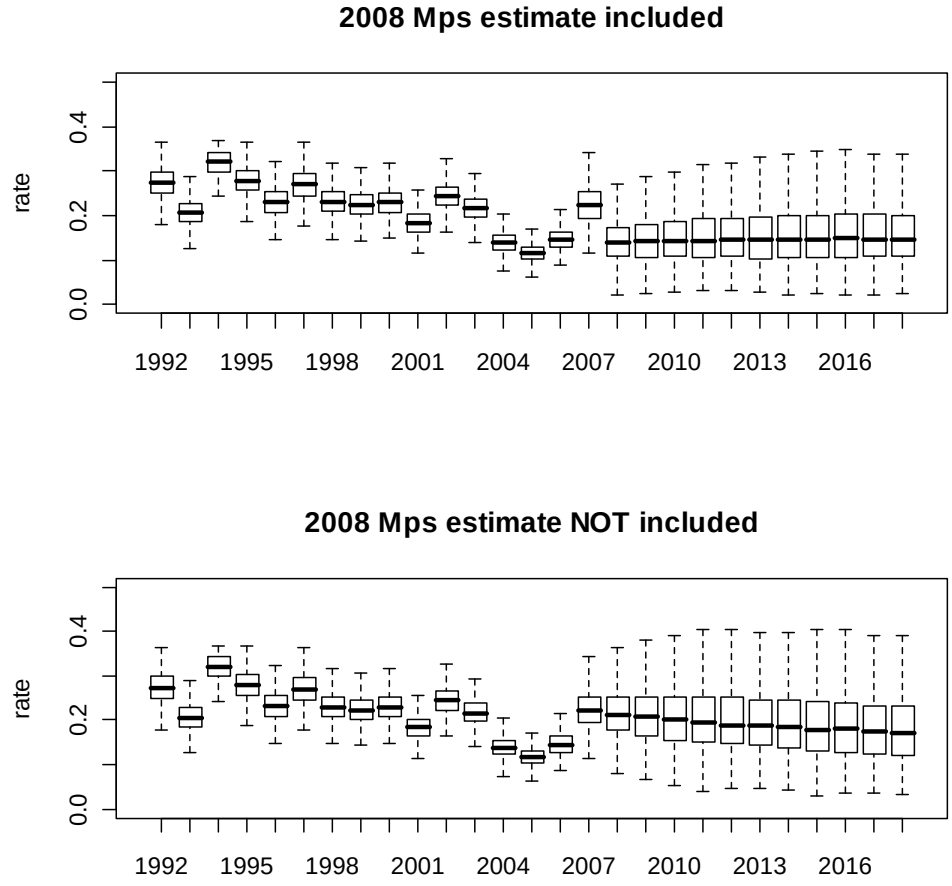

Figure 1. Box plot illustration of the post-smolt survival rates of the median-survival scenario used in the report (lower panel, from Figure 5.4.2.2 in the report), and the median-survival resulting from the inclusion of the 2008 post-smolt survival estimate and used in the re-runs presented below (upper panel).

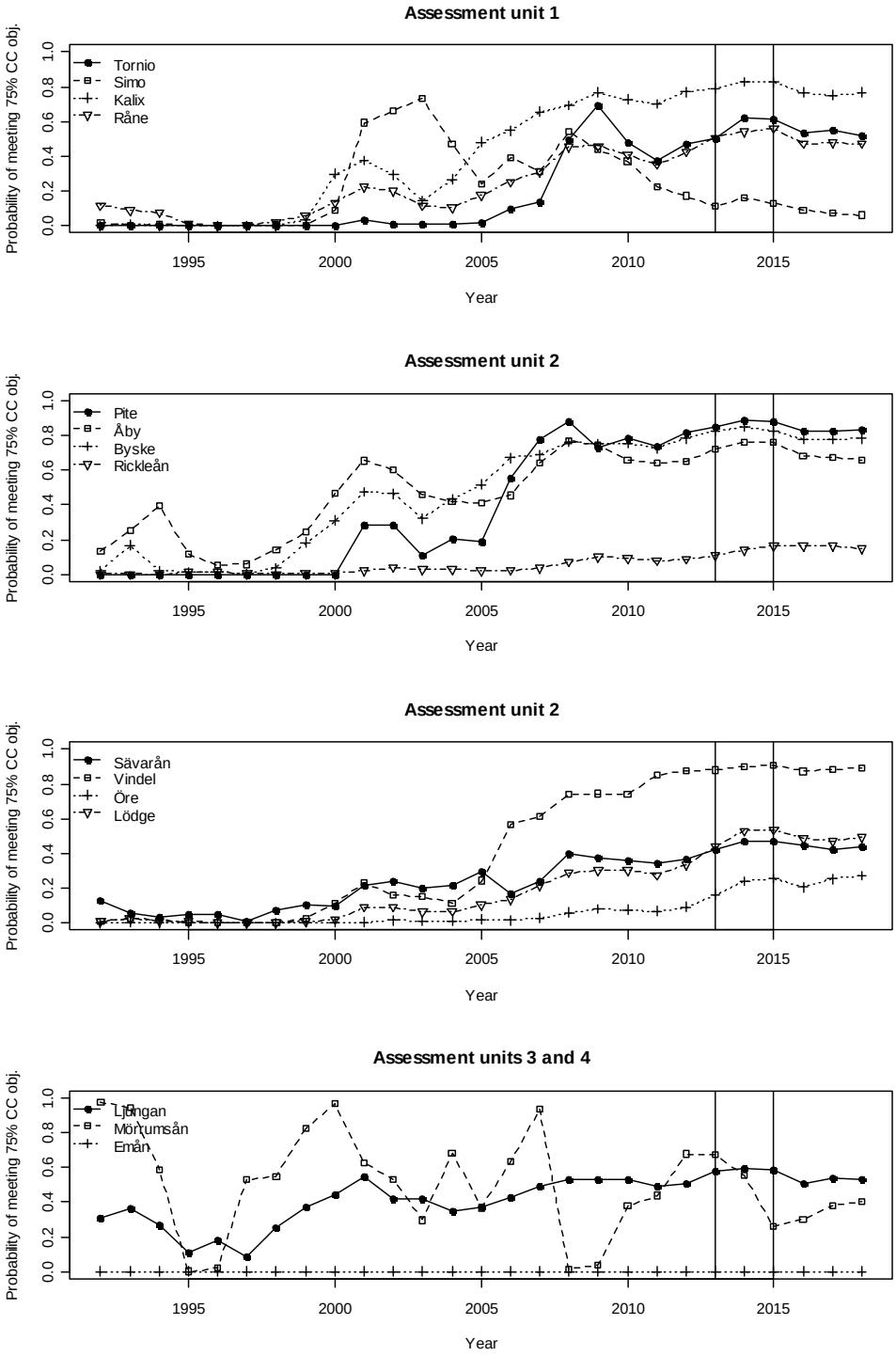

Figure 2a. Probability of reaching 75% of the smolt production capacity for different stocks of the Gulf of Bothnia and Main Basin. This is an update of Figure 5.3.9.7 in the report, here based on the post-smolt survival from 2008 included. The settings for these results were high effort and median long-term post-smolt survival.

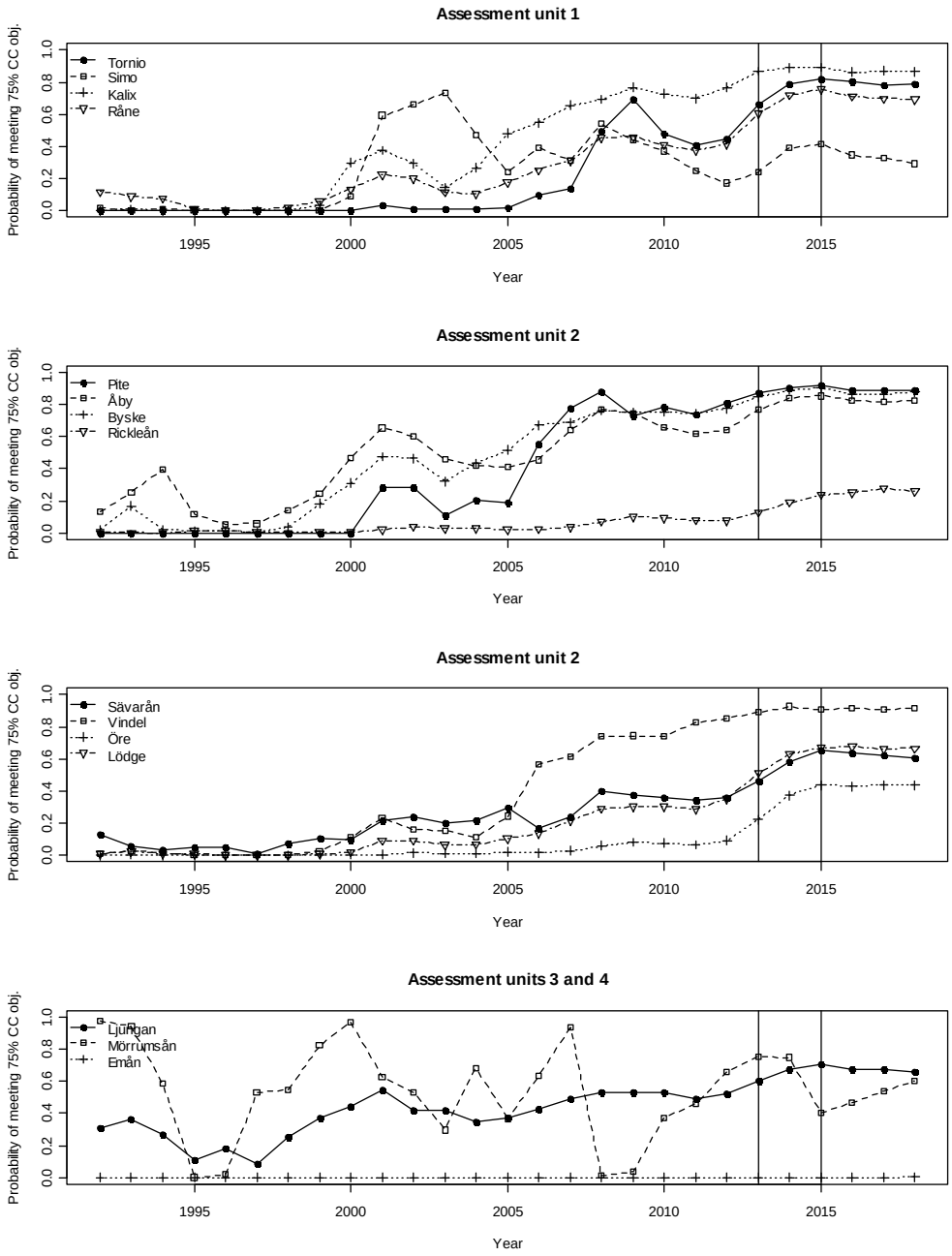

Figure 2b. Probability of reaching 75% of the smolt production capacity for different stocks of the Gulf of Bothnia and Main Basin. This is an update of Figure 5.3.9.7 in the report, here based on the post-smolt survival from 2008 included. The settings for these results were minimum effort and median long-term post-smolt survival.

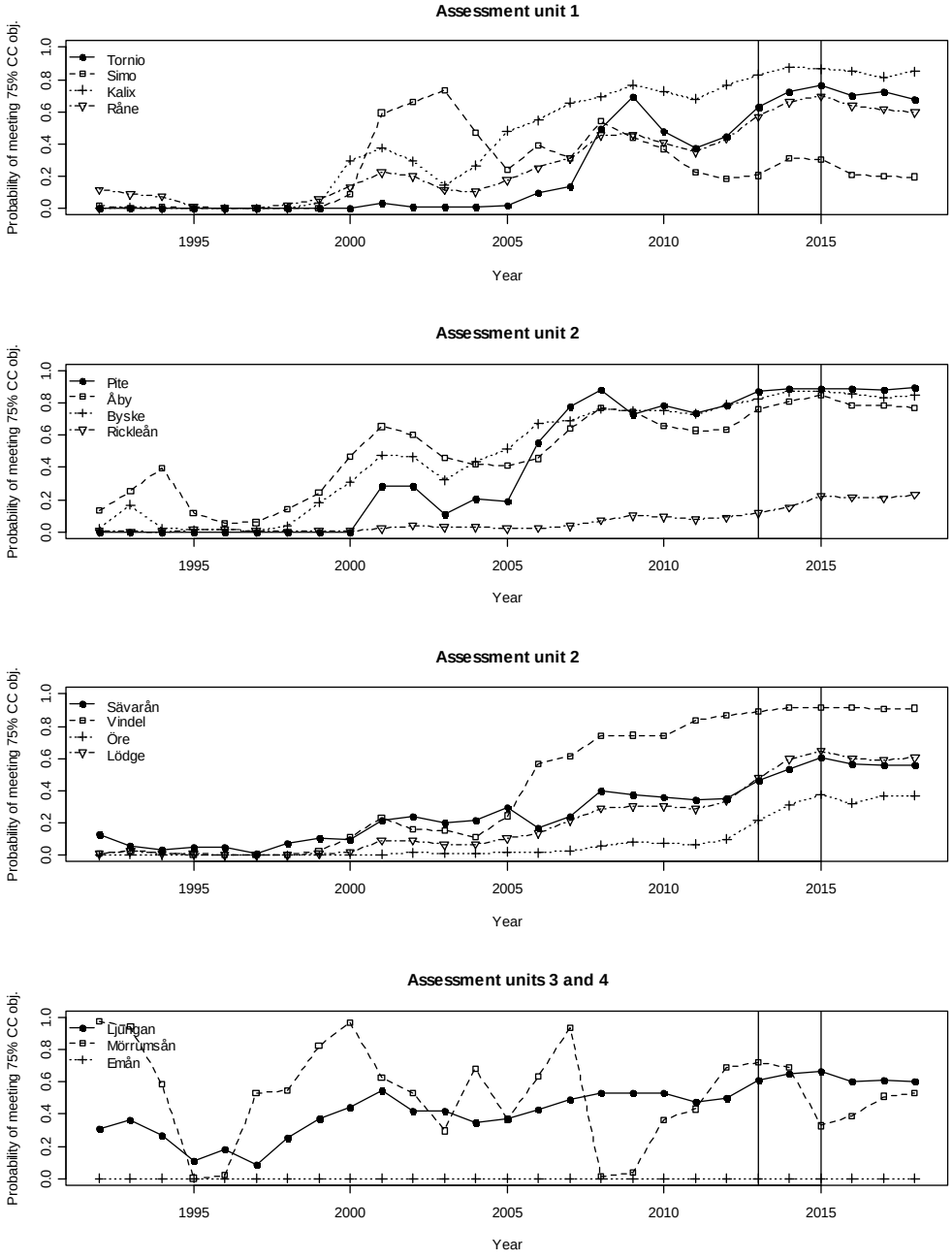

Figure 2c. Probability of reaching 75% of the smolt production capacity for different stocks of the Gulf of Bothnia and Main Basin. This is an update of Figure 5.3.9.7 in the report, here based on the post-smolt survival from 2008 included. The settings for these results were medium effort and median long-term post-smolt survival.

Table 1. Total catch and total number of spawners in 2010 (in thousands). Total reported commercial catch and its share between longlines and trapnets. This table is an update of Table 5.4.3.1 in the Report, here based on the post-smolt survival from 2008 included.

	Catch total in 2010 (x % of TAC 2009)			Reported catch (%) in 2010		Spawners total 2010	
Effort scenario	median	95%PI	reported commercial	OLL	CTN	median	95%PI
1	200	(128 302)	133 (41%)	55	45	166	(89,268)
2	290	(185 438)	193 (59%)	57	43	140	(75 223)
3	419	(267 634)	279 (86%)	59	41	105	(57 168)