

ICES advice on management of Baltic Sea salmon

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Chair of WGBAST and
WKBALSAL

Request letter to ICES (Oct 2007)

“...In order to define a comprehensive and effective management scheme for the further recovery and the long-term sustainable management of Baltic salmon the following steps are envisaged to establish an information basis for discussions with stakeholders and subsequent drafting of a new management scheme:

- Evaluation of the IBSFC SAP in terms of its objectives and technical efficiency
- Assessment and quantification of the status quo of Salmon and the main factors impacting its stock dynamics
- Advice on the definition of short-term and long-term objectives and respective measures and indicators
- Impact Assessment (economic, social and ecological) of the identified options”

“...ICES is inquired for their availability/capacity to provide the biological evaluation of the current management plan and advice for a new SAP...”

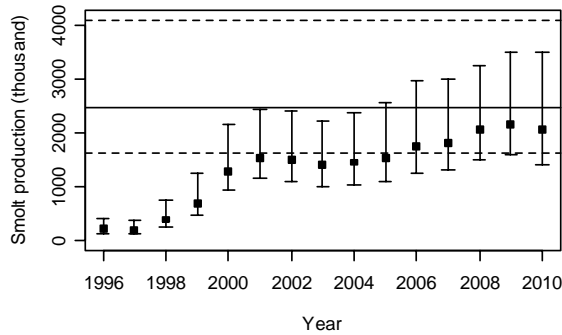
WKBALSAL (May 2008)

= ICES Workshop on Baltic Salmon Management Plan Request

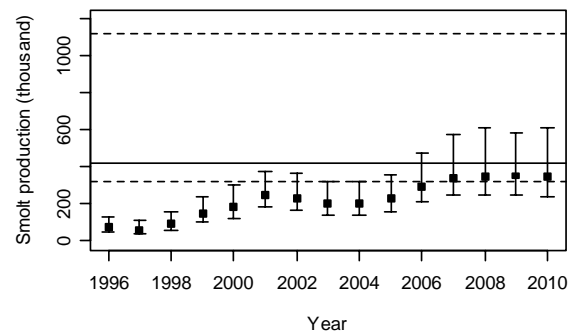
- Preparation of ICES advice (analogy to WGBAST in preparation of annual advice)
 - analyses, reporting, suggestions for the contents of advice
- Report available on ICES website ('ICES Work' → 'Working Groups' → choose from the list or search 'WKBALSAL')
- Report complements the actual advice

Main conclusions, current status

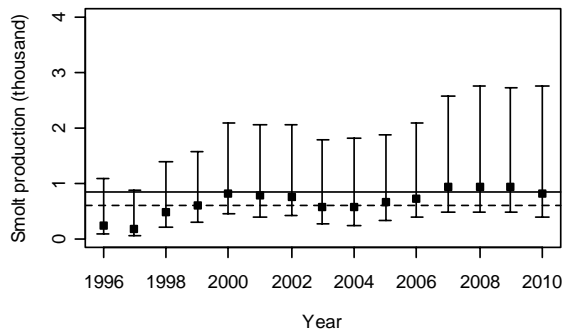
Assessment unit 1



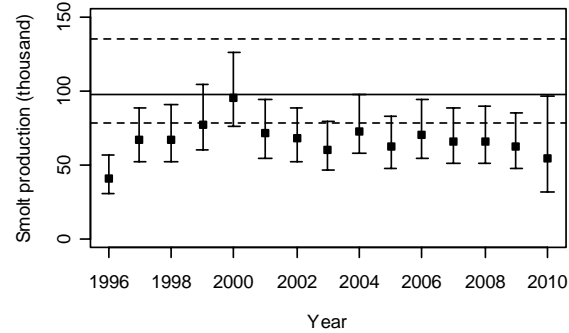
Assessment unit 2



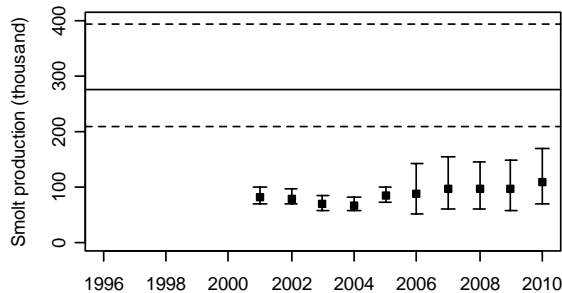
Assessment unit 3 (upper bound for R is 20)



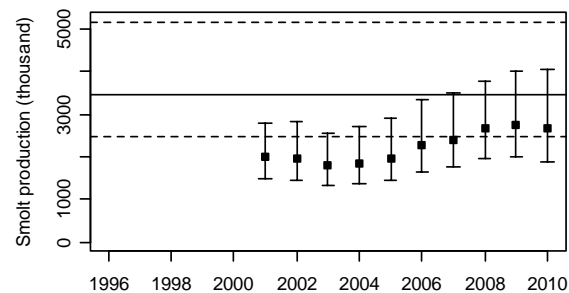
Assessment unit 4



Assessment unit 5

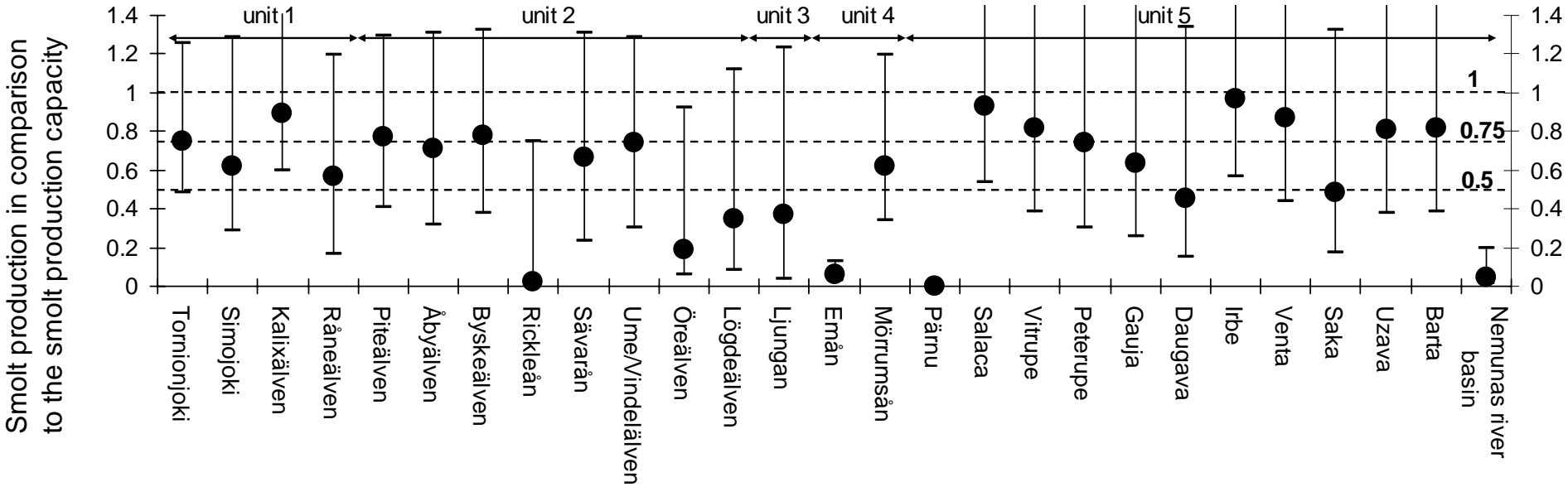


All units

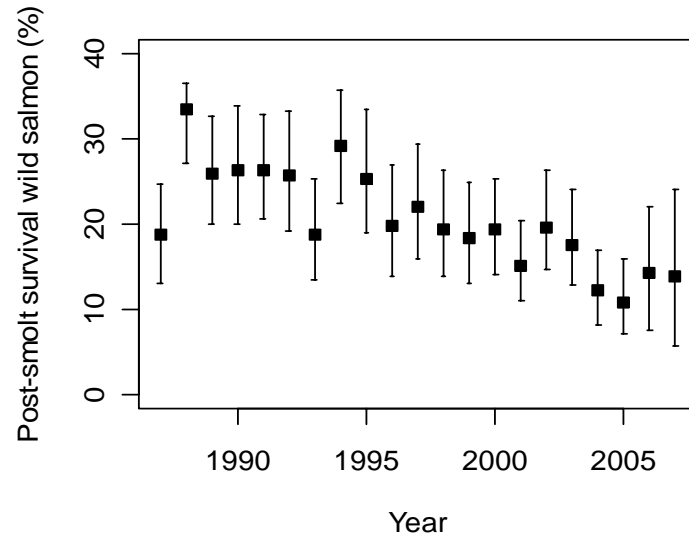


← Potential production in all rivers ~3.5 million wild smolts (high uncertainty)

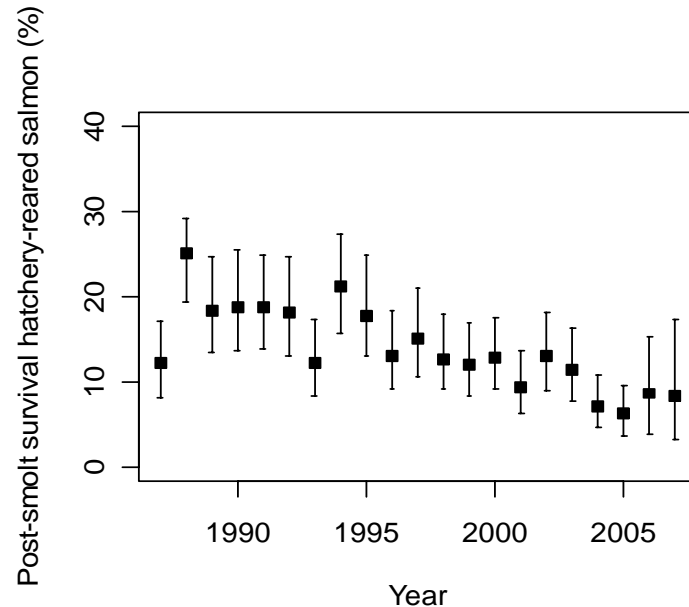
Main conclusions, current status



Main conclusions, current status

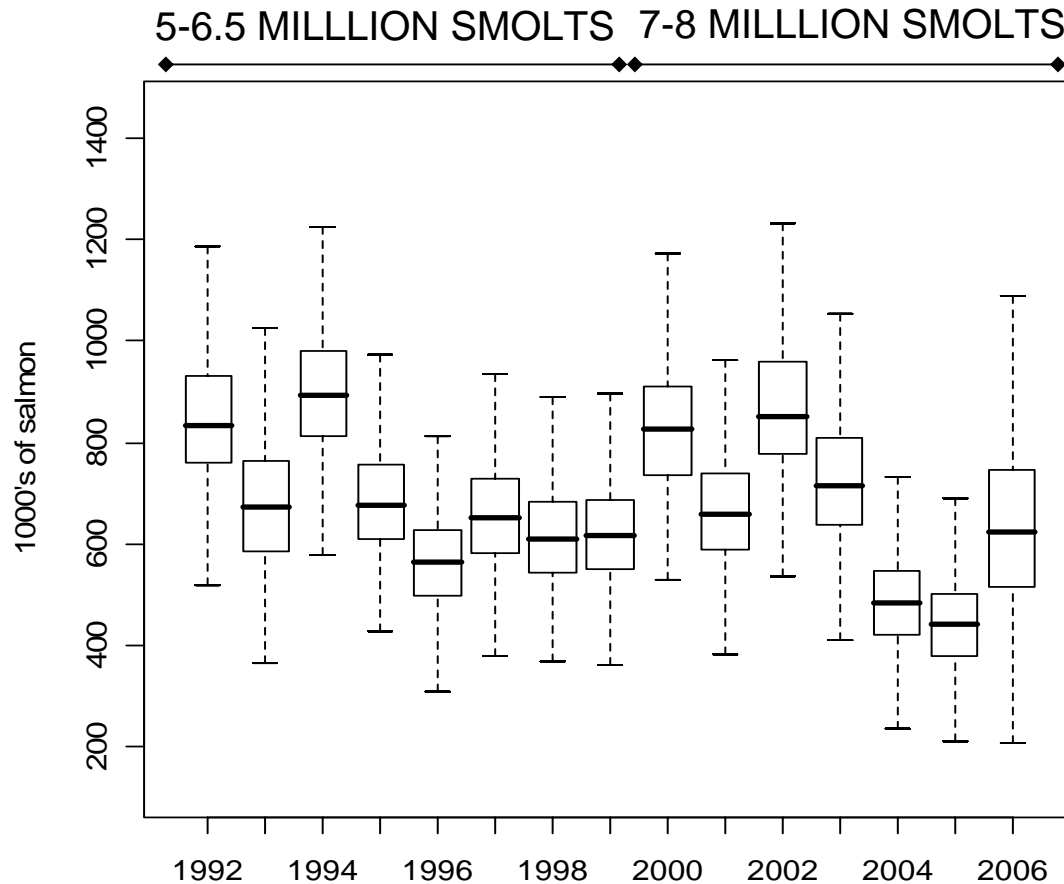


POST-SMOLT SURVIVAL,
WILD SALMON



POST-SMOLT SURVIVAL,
REARED SALMON

Main conclusions, current status



TOTAL ABUNDANCE (WILD+REARED) OF YOUNG SALMON IN THE SEA
(SURVIVING OVER POST-SMOLT PERIOD), BY SMOLTING YEAR

Main conclusions, evaluation of IBSFC SAP

Table 2.3.1. Probability of an increase in smolt production from year 1997 to years 2008 and 2010.

Probability of an increase		
River	By 2008	By 2010
Tornionjoki	100%	84%
Simojoki	100%	71%
Kalixälven	100%	65%
Råneälven	100%	74%
Piteälven	100%	61%
Åbyälven	98%	58%
Byskeälven	100%	56%
Rickleån	99%	91%
Sävarån	97%	71%
Ume/Vindelälven	100%	72%
Öreälven	100%	83%
Lögdeälven	100%	76%
Ljungan	97%	58%
Mörrumsån	56%	50%
Emån	0%	82%

1. “To prevent the extinction of wild populations, further decrease of naturally produced smolts should not be allowed”

Main conclusions, evaluation of IBSFC SAP

2. “The production of wild Salmon should gradually increase to attain by 2010 for each Salmon river a natural production of wild Baltic Salmon of at least **50% of the best estimate potential** and within safe genetic limits, in order to achieve a better balance between wild and reared Salmon”

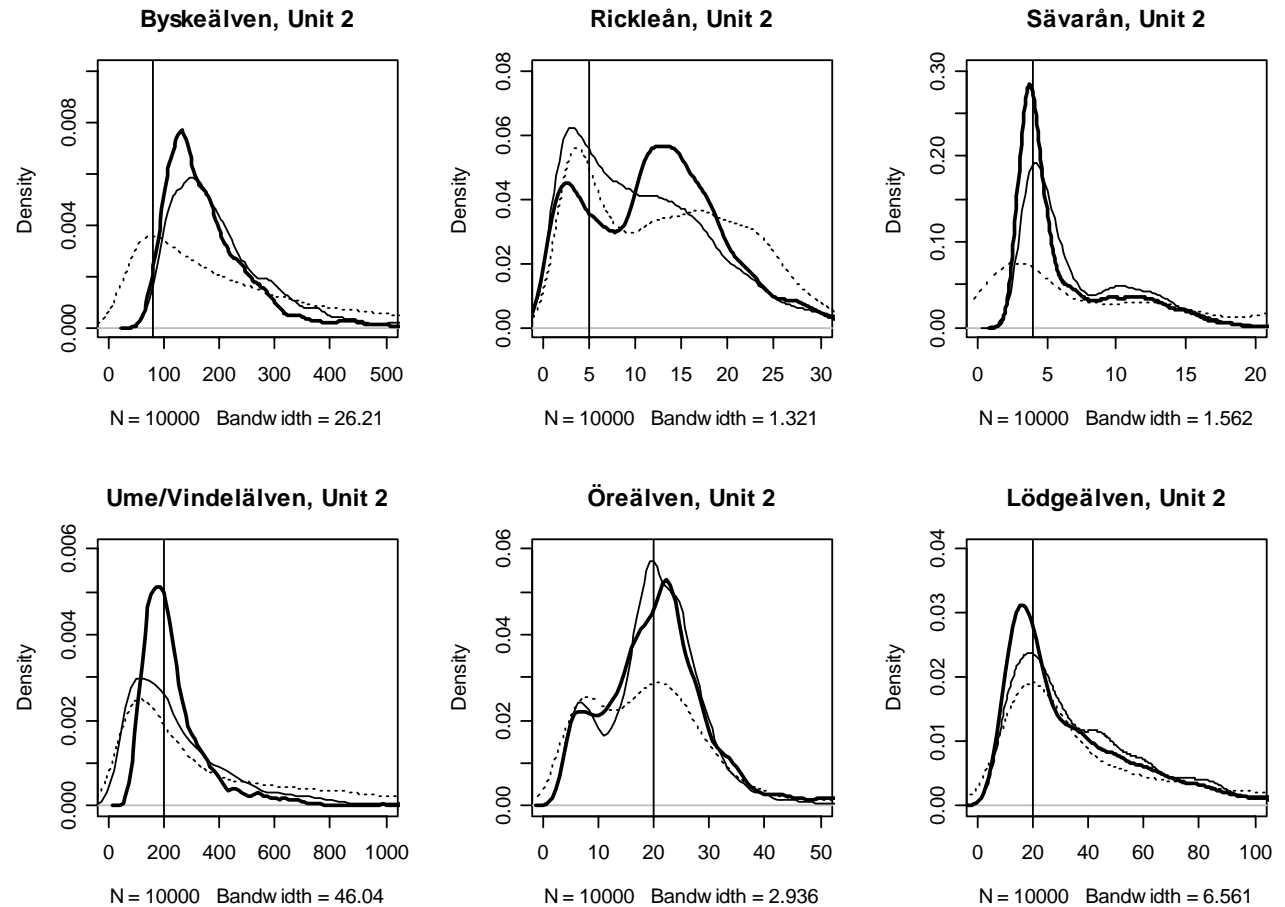


Figure 2.3.2.2. Old point estimates (vertical line), prior probability distributions (dotted line) and posterior probability distributions of the smolt production capacity obtained in the assessment of 2007 (thin line) and 2008 (bold line).

Main conclusions, evaluation of IBSFC SAP

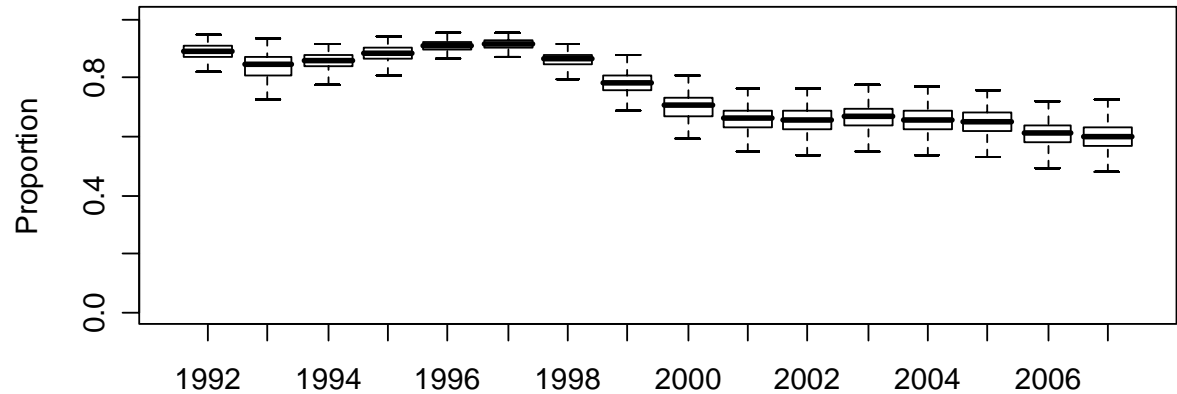
2. “The production of wild Salmon should gradually increase to attain by 2010 for each Salmon river a natural production of wild Baltic Salmon of at least 50% of the best estimate potential and **within safe genetic limits**, in order to achieve a better balance between wild and reared Salmon”

“...In conclusion, the development of genetic diversity in wild Baltic salmon stocks is poorly known. However, model predictions indicate that number of spawners has increased in most rivers, although a few rivers still have very few spawners and must be regarded as being outside safe genetic limits. In this evaluation, each river was treated as an isolated population. This is not true as we know that straying and geneflow occurs in the wild and many rivers therefore should be regarded as subpopulations belonging to larger meta-populations...”

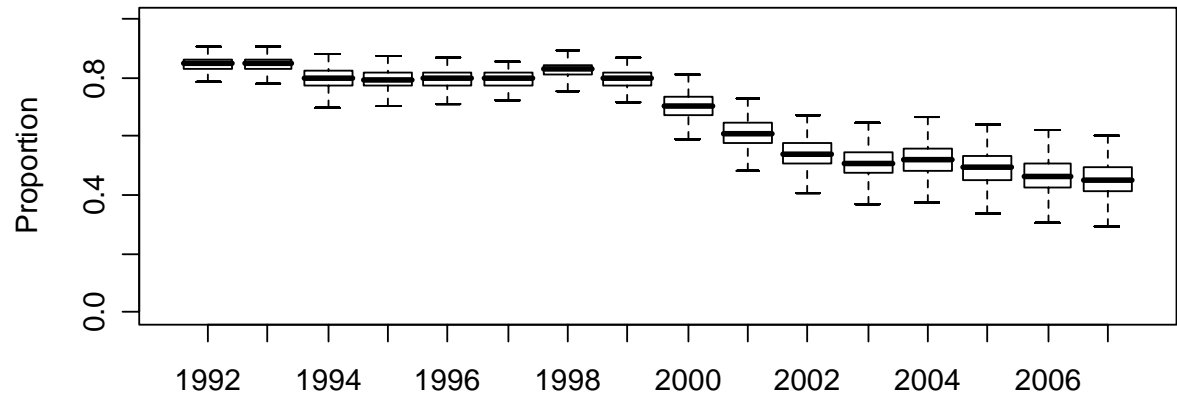
Main conclusions, evaluation of IBSFC SAP

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Proportion of reared smolts in the Baltic



Proportion of reared salmon in catch in the Baltic



Main conclusions, evaluation of IBSFC SAP

3. **“Wild Salmon populations shall be re-established in potential Salmon rivers”**

“...In order to fully evaluate the success of re-establishment of salmon to former salmon rivers, a time period of one generation is needed after the last release. At present it is too early to make such evaluation in any of the potential salmon rivers. Preliminary results, however suggest that there are only few rivers, which have a promising development, meanwhile most of the rivers do not show any signs of success...”

Main conclusions, evaluation of IBSFC SAP

4. **“The level of fishing should be maintained as high as possible. Only restrictions necessary to achieve the first three objectives should be implemented”**

“...The statement in the last part of this objective suggests that the other three management objectives are more important... ..As a result we would expect a TAC-level that allows preferably all salmon rivers to attain a smolt production rate of at least 50% of the potential...”

“...As the fishery has decreased to lower levels than those suggested by the TAC, this objective has not been fulfilled successfully... ..On the other hand it is evident that the lower exploitation resulting from lower catches has contributed to restoration of wild salmon stocks, but all salmon stocks have still not achieved 50% of their potential...”

Main conclusions, evaluation of IBSFC SAP

- Stocking data base, annual updates
- Straying has not increased as a result of decreased exploitation (ICES 2001)
- Problems with Swedish tagging data base → poorer info?

4. “Reared smolts and releases of earlier salmon life stage shall be closely monitored”

“...Enhancement releases have been carried out in many countries around the Baltic Sea in order to support weak populations. According to the management plan such releases were meant to be time-limited. Considerable amounts of fish, however, are still released to support the populations... ..in Sweden most of the releases for re-establishment and enhancement of populations have gradually been terminated (Figure 2.3.5.1). In Finland enhancement releases have been carried also in wild salmon rivers but there releases have been stopped now. In the potential salmon rivers enhancement releases are still carried out...”

Main conclusions, special questions concerning small and weak salmon populations

“...Several of the small salmon rivers in the Gulf of Bothnia are often regarded as having had no positive reaction to the decreased exploitation. When the results from electrofishing surveys are looked upon more in detail it can be seen that there is a trend of increasing parr densities, but it is limited and when compared to the development in large rivers, it may be easily overseen...”

- Emån, Rickleån: problems for fish to ascend fishladders/pass old dam constructions
- General problems also fluctuations of environmental conditions and various anthropogenic pressures → possible reasons that present management measures are not effective in case of small rivers salmon populations
- Data on number of ascending spawners, M74 impact and post-smolt survival rate in small salmon stocks often non-existing → less reliable assessment results than from large stocks

Main conclusions, evaluation of alternatives for future management

Principal objectives:

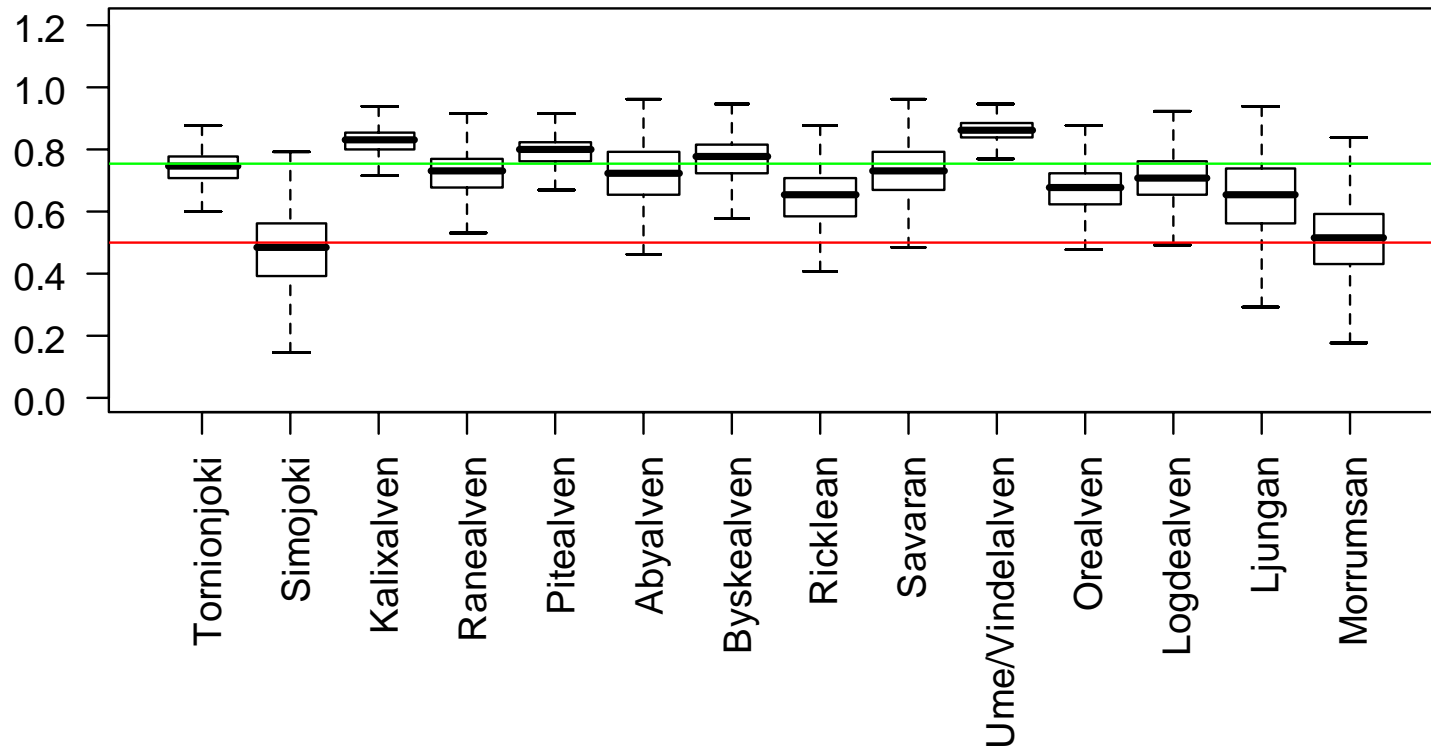
- conserve within safe biological limits individual strains of salmon
- ensure the conservation of genetic variation and future evolutionary potential in wild salmon populations
- in addition to fisheries itself the management should encompass also all phases of the salmon life-cycle subjected to human influence
- A management plan should both encompass the recovery of populations from below reference points and ensure the continued maintenance of all existing populations

Acknowledging schedules for management: recovery phase and maintenance phase

- Recovery to any desired target above current target may take long even without any fishing

Main conclusions, evaluation of alternatives for future management

Smolts/CC (assymptote) at MSY by river



“...Current management targets based on 50% of potential production estimates are not consistent with the precautionary approach based on the MSY principle which is generally recognized in various international and European treaties and agreements to be an appropriate basis for management...” → **SHOULD BE AT LEAST 75%**

Main conclusions, evaluation of alternatives for future management

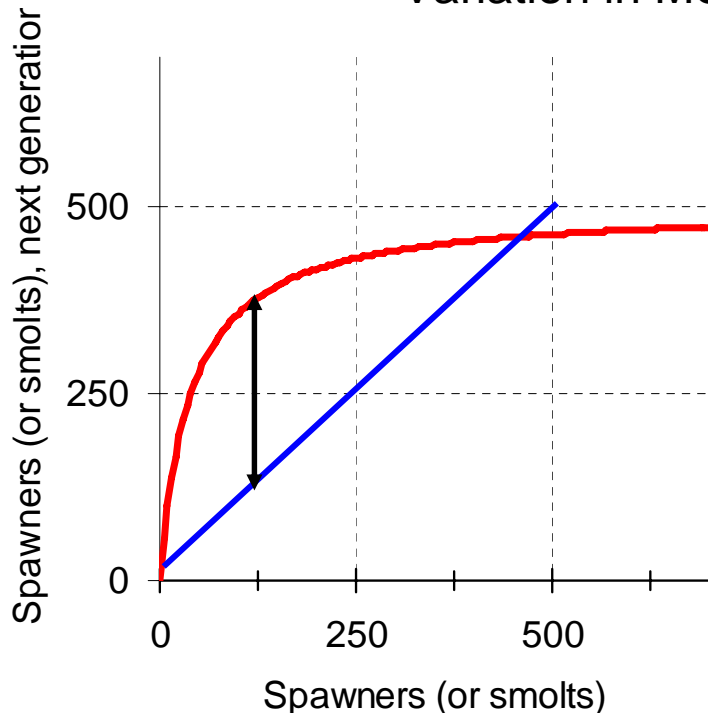
MSY based limit reference points can be expressed in various ways, e.g.,

- limit harvest rates
- limit number of spawners
- limit number of smolts

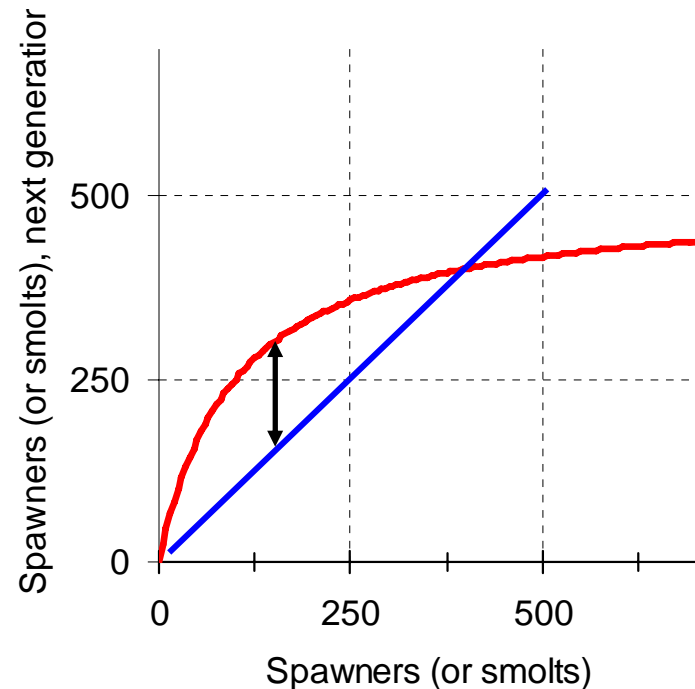
Main conclusions, evaluation of alternatives for future management

“...The lower productivity of salmon stocks in the Southern Baltic Sea (e.g. Emån and Mörrumsån) implies that these stocks can not support harvest rates that are as high as for the northern stocks...”

Variation in MSY between rivers:



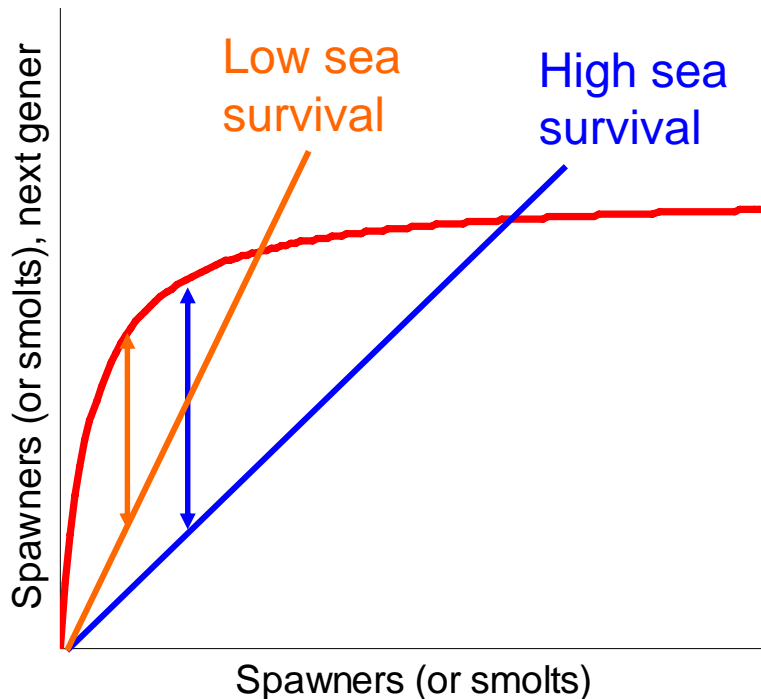
High productivity & yield, high F ('north')



Low productivity & yield, low F ('south')

Main conclusions, evaluation of alternatives for future management

Temporal variation in MSY:



“...The concept of MSY implies that survival parameters both in freshwater and in the sea affect the point at which the MSY is reached, making the associated reference points temporally varying. The large variation in post-smolt and M74 mortalities affect more the variability in the abundance levels at which MSY is reached than they do the variability of the MSY harvest rates...”

“...It is hardly a sensible approach to strive for annual updates in MSY and the related reference points. Instead, less frequent updates could be applied ...”

Main conclusions, evaluation of alternatives for future management

Incorporation of genetic conservation aspects

- The minimum effective population size of 500 spawners
- Above applies to totally isolated populations
- Natural straying occurs → how to define a population from the point of view of conserving genes?

Concept of metapopulation → pending more data collection and analysis to define these conservation units
→ possible to establish limit reference points aiming at safeguarding genetic diversity

Main conclusions, small rivers with weak populations

“...Small and weak salmon populations are more vulnerable than major populations to environmental fluctuations and anthropogenic impact. Management of weak populations must include locally adapted programs taking into account needs for habitat restoration and other improvements...”

The management of small and weak salmon populations should therefore include measures for:

- a) habitat improvement and/or restoration (both physical habitat and water quality);
- b) improvement and or/restoration of the rivers' riparian zone;
- c) providing river accessibility, removal of obstacles, fish ladders, etc.

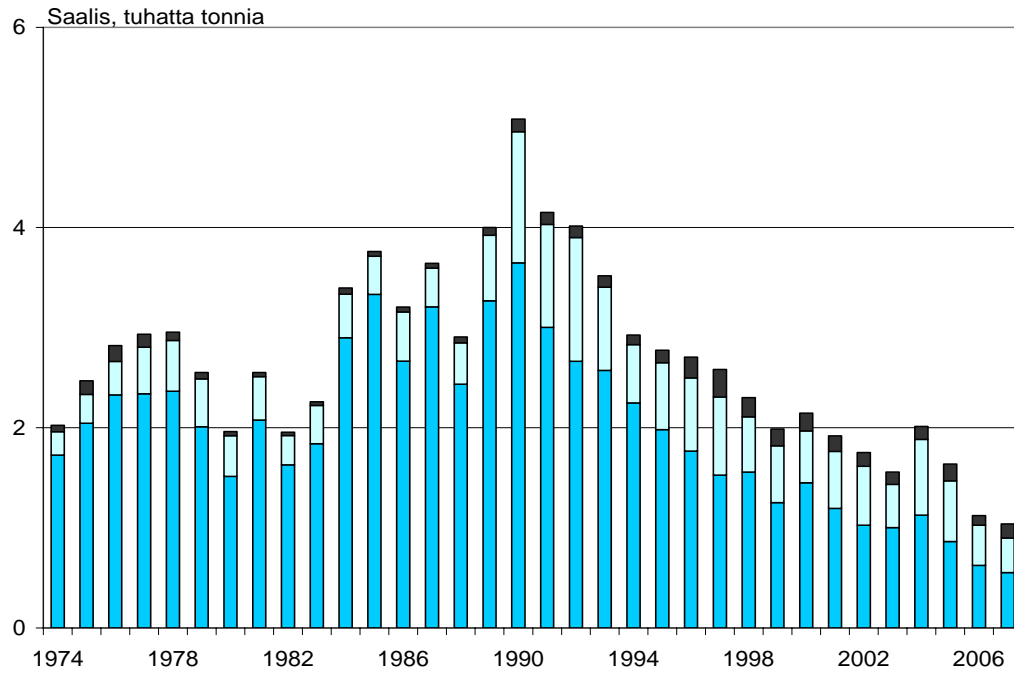
Main conclusions, monitoring

Stock-specific management requires improvement in the current monitoring system

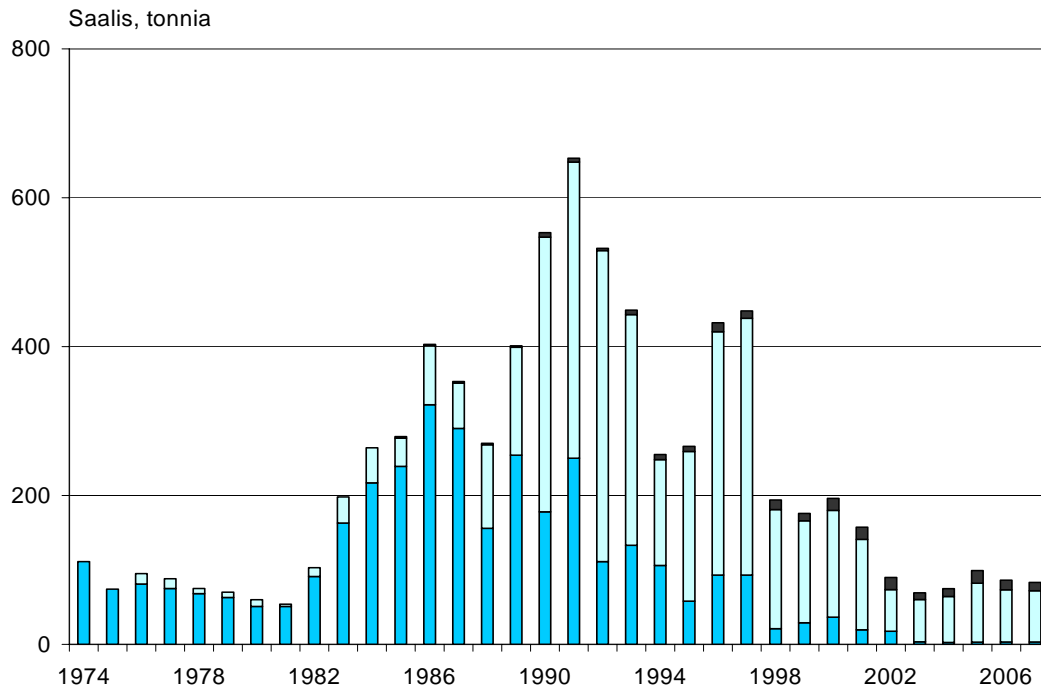
- spawners
- smolts
- index rivers (the most extensive monitoring)
- balance in monitoring efforts across assessment units

Reliable and all-covering catch statistics, control of IUU

EU Data Collection Regulation (just now under revision)



Salmon catches 22-31



Salmon catches 32

