

# ICES WGBAST REPORT 2009

ICES ADVISORY COMMITTEE

ICES CM 2009/ACOM:05

## Report of the Baltic Salmon and Trout Assessment Working Group 2009 (WGBAST)

24–31 March 2009

Oulu, Finland



**ICES**

International Council for  
the Exploration of the Sea

**CIEM**

Conseil International pour  
l'Exploration de la Mer

## **International Council for the Exploration of the Sea Conseil International pour l'Exploration de la Mer**

H. C. Andersens Boulevard 44–46  
DK-1553 Copenhagen V  
Denmark  
Telephone (+45) 33 38 67 00  
Telefax (+45) 33 93 42 15  
[www.ices.dk](http://www.ices.dk)  
[info@ices.dk](mailto:info@ices.dk)

Recommended format for purposes of citation:

ICES. 2009. Report of the Baltic Salmon and Trout Assessment Working Group 2009 (WGBAST), 24–31 March 2009, Oulu, Finland. ICES CM 2009/ACOM:05. 280 pp.

For permission to reproduce material from this publication, please apply to the General Secretary.

The document is a report of an Expert Group under the auspices of the International Council for the Exploration of the Sea and does not necessarily represent the views of the Council.

© 2009 International Council for the Exploration of the Sea

## Contents

---

<b>Executive Summary .....</b>	<b>5</b>
<b>1 Introduction.....</b>	<b>6</b>
1.1 Terms of reference .....	6
1.2 Participants.....	6
<b>2 Salmon fisheries data.....</b>	<b>7</b>
2.1 Catches .....	7
2.2 Discards, misreporting and unreporting of catches.....	9
2.3 Fishing Effort.....	10
2.4 Catch per Unit Effort.....	11
2.5 Description of basic collection of catch data .....	12
2.6 Biological sampling from the catch of salmon.....	13
2.7 Estimation of proportions of wild salmon and individual salmon stocks in catches based on genetic studies and scale readings.....	16
2.8 Description of gears used in salmon fisheries .....	17
2.9 Present tagging and marking.....	17
2.9.1 Fin-clipping.....	17
2.9.2 External tagging .....	18
2.9.3 Tag reporting rate .....	18
2.10 Tagging data in the Baltic salmon stock assessment.....	19
<b>3 River data on salmon populations.....</b>	<b>52</b>
3.1 Current wild and potential salmon rivers.....	52
3.2 Wild salmon populations in Main Basin and Gulf of Bothnia .....	52
3.2.1 Rivers in the assessment unit 1 (Gulf of Bothnia, Subdivision 31).....	52
3.2.2 Rivers in the assessment unit 2 (Gulf of Bothnia, Sub- division 31).....	55
3.2.3 Rivers in the assessment unit 3 (Gulf of Bothnia, Sub- division 30).....	58
3.2.4 Rivers in the assessment unit 4 (Western Main Basin, Subdivisions 25 and 27) .....	58
3.2.5 Rivers in the assessment unit 5 (Eastern Main Basin, Subdivisions 26 and 28) .....	60
3.3 Potential salmon rivers .....	62
3.3.1 General .....	62
3.3.2 Potential rivers by country .....	62
3.4 Reared salmon populations.....	65
3.5 M74 .....	67
3.6 Summary of the information on wild and potential salmon rivers .....	69

<b>4</b>	<b>Present management measures and other factors influencing salmon fishery .....</b>	<b>104</b>
4.1	Description of the Present Management Measures .....	104
4.1.1	International regulatory measures .....	104
4.1.2	National regulatory measures.....	104
4.2	Evaluation of the Management Measures.....	108
4.2.1	International regulatory measures .....	108
4.2.2	National regulatory measures.....	109
4.3	Other factors influencing the salmon fishery.....	109
4.3.1	Dioxin .....	109
4.3.2	Size (weight) distributions of catches.....	110
4.3.3	Predation on salmon by seals and damage caused by seals to fishing gears and to salmon in fishing gears .....	110
4.3.4	Fisheries economics .....	111
4.4	Development in post-smolt survival and factors affecting it .....	111
4.4.1	Objective.....	111
4.4.2	Background.....	112
4.4.3	Methods.....	113
4.4.4	Results .....	116
4.4.5	Conclusions and future studies .....	117
4.5	Conclusions for the salmon fishery .....	118
4.6	Considerations for developing management towards AU or fishery specific quotas.....	119
<b>5</b>	<b>Reference points and assessment of salmon in Main Basin and Gulf of Bothnia (Subdivisions 22–31) .....</b>	<b>137</b>
5.1	Introduction.....	137
5.2	Reference points for Baltic Salmon.....	138
5.3	Methodology for the assessment of Baltic salmon.....	138
5.3.1	Definition of assessment units within the Baltic Sea area .....	140
5.3.2	Data of different Baltic salmon stocks available for the assessment .....	141
5.3.3	Prior probability distributions for PSPC.....	141
5.3.4	Mark-recapture analysis of smolt trapping data .....	144
5.3.5	Hierarchical linear regression analysis to estimate wild smolt production of different salmon stocks .....	144
5.3.6	Estimating M74 mortality for different wild salmon stocks .....	146
5.3.7	Hierarchical analysis of Atlantic salmon stock-recruit data .....	147
5.3.8	Sea mark-recapture model for assessing the exploitation of Baltic salmon.....	148
5.3.9	Full life history model of different wild Baltic salmon stocks .....	150
5.4	Stock projection for different Baltic salmon stocks .....	152
5.4.1	Methods.....	152
5.4.2	Assumptions regarding development of fisheries and key biological parameters .....	153

5.4.3	Results .....	153
5.5	Uncertainties affecting the assessment results.....	154
5.6	Conclusions of the assessment for the Main Basin and Gulf of Bothnia stocks.....	157
5.6.1	General conclusions.....	157
5.6.2	Effort and post-smolt survival scenarios .....	158
<b>6</b>	<b>Salmon in the Gulf of Finland .....</b>	<b>205</b>
6.1	Introduction.....	205
6.2	Catch and fisheries .....	205
6.3	Status of salmon populations.....	206
6.3.1	General .....	206
6.3.2	The water level in the small Estonian salmon rivers .....	206
6.3.3	Status of wild and mixed populations .....	206
6.3.4	Status of reared populations .....	207
6.4	M74 .....	207
6.5	Smolt production .....	208
6.6	Indices of post-smolt mortality and yield .....	208
6.7	Harvest pattern of wild and reared salmon.....	208
<b>7</b>	<b>Sea trout.....</b>	<b>220</b>
7.1	Nominal catch .....	220
7.1.1	Sampling of sea trout.....	220
7.2	Status of wild and mixed sea trout populations.....	220
7.2.1	Monitoring methods.....	221
7.2.2	Gulf of Bothnia .....	221
7.2.3	Gulf of Finland .....	222
7.2.4	Main Basin .....	223
7.3	Reared smolt production .....	224
7.4	Tagging .....	226
7.4.1	External tagging.....	226
7.5	Recommendations for management actions .....	226
7.5.1	Gulf of Bothnia and Gulf of Finland .....	227
7.5.2	Main Basin .....	227
<b>8</b>	<b>Data and information needs for assessment.....</b>	<b>252</b>
8.1	Overview on data needs .....	252
8.2	Compatibility of the DCR with the data needs for WGBAST .....	255
<b>9</b>	<b>References .....</b>	<b>256</b>
9.1	Literature .....	256
9.2	Working papers .....	260
<b>Annex 1</b>	<b>List of participants.....</b>	<b>261</b>
<b>Annex 2</b>	<b>Recommendations .....</b>	<b>264</b>

<b>Annex 3</b>	<b>Technical minutes from the Salmon Review Group.....</b>	<b>265</b>
<b>Annex 1. Main results of the revised model runs for effort scenarios made available to the Review Group</b>		<b>270</b>

## Executive Summary

---

Baltic Salmon and Trout Assessment Working Group [WGBAST] (Chair: Atso Romakkaniemi, Finland) met in Oulu, Finland, 24–31 March 2009. 17 persons from 8 Baltic countries attended the meeting. The group was mandated to assess the status of salmon (only for Subdivisions 24–31) and sea trout stocks in the Baltic Sea and to propose consequent management advices for fisheries in 2010.

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.

Section 2 of the report covers catches and other data on salmon in the sea. Section 3 reviews data from the spawning grounds (rivers) of salmon and also stocking statistics. Section 4 summarizes information affecting currently and in the near future the fisheries, the natural survival and the management of salmon. Salmon of the Baltic Main Basin and Gulf of Bothnia is assessed in Section 5. Data on salmon in Gulf of Finland is updated in Section 6. Baltic sea trout is assessed in Section 7. There is a special Section (8) dealing with sampling protocols and data needs.

- The natural smolt production of salmon populations has continued to increase and is currently on a record level of about 2.5 million smolts. This is about 70–75% of the overall Potential Smolt Production Capacity (PSPC) of the rivers with wild salmon stocks.
- Post-smolt survival declined to a low level in 2004–06, but increased in 2007. The declined survival has negatively affected catches of salmon and has suppressed recovery of wild salmon stocks.
- A ban of driftnet fishing started from 2008 and dropped offshore salmon catches to their lowest recorded level. The ban is likely to increase number of spawners and thus may increase the subsequent smolt production, provided that effort in the prevailing fisheries will not increase excessively.
- The former IBSFC established as a management objective for wild salmon rivers reaching at least 50% of the potential smolt production by 2010. The large, northernmost stocks are likely or very likely to reach this objective, while the more southern stocks have varying and on average poorer status.
- Sea trout populations are in a precarious state in the Gulf of Bothnia and in the Gulf of Finland. Trout populations in the Main Basin area are in general in a better status.

The group recommends a TAC for salmon in Subdivision 24–32, which would cut any excessive increase of salmon fishing effort in 2010. For sea trout, group recommends strict technical measures to be taken in the Gulf of Bothnia and Gulf of Finland to decrease exploitation of the threatened wild trout populations.

The salmon assessment highlights the current, pronounced changes both in the fisheries (ban of driftnet fishing) and in natural survival (fluctuation in post-smolt survival) of salmon. Seal abundance, smolt production levels, and recruitment of 0+ and 1+ herring were found to correlate with the survival indices of post-smolts. However, more studies and stronger collaboration across different disciplines is needed to reveal causal links affecting posts-smolt survival.

## 1 Introduction

### 1.1 Terms of reference

The Baltic Salmon and Trout Assessment Working Group [WGBAST] (Chair: Atso Romakkaniemi, Finland) will meet in Oulu, Finland, 24–31 March 2009 to:

- a) address generic ToRs for Fish Stock Assessment Working Groups (see table below);
- b) consider if TAC's by assessment units or groups thereof would better reflect the population structure and fisheries effects and provide information that will allow ACOM to advise accordingly;
- c) evaluate (in coordination with WGNAS) the possible reasons for the low at-sea survival of salmon stocks;

The assessments will be carried out on the basis of the stock annex in National Laboratories, prior to the meeting. This will be coordinated as indicated in the table below.

WGBAST will report for the attention of ACOM by 8 April 2009.

FISHSTOCK	NAME	STOCK COORD.	ASSESS. COORD. 1	ASSESS. COORD. 2	ADVICE
sal-2431	Salmon in the Main Basin and Gulf of Bothnia (Salmon in Subdivisions 22–31)	Finland	Finland	Finland	Advice
sal-32	Salmon in Subdivision 32 (Gulf of Finland)	Finland	Finland	Finland	Same advice as last year
trt-bal	Sea trout in Subdivisions 22–32 (Baltic Sea)	Poland	Denmark	Sweden	Advice

### 1.2 Participants

Janis Birzaks	Latvia (part of meeting)
Johan Dannewitz	Sweden
Piotr Debowski	Poland
Frank Ivan Hansen	Denmark (part of meeting)
Lars Karlsson	Sweden (part of meeting)
Martin Kesler	Estonia
Vytautas Kesminas	Lithuania (part of meeting)
Soile Kulmala	Finland (part of meeting)
Samu Mäntyniemi	Finland (part of meeting)
Tapani Pakarinen	Finland
Stig Pedersen	Denmark
Wojciech Pelczarski	Poland
Henni Pulkkinen	Finland
Atso Romakkaniemi (chair)	Finland
Michal Skora	Poland
Stefan Stridsman	Sweden
Serguei Titov	Russia (part of meeting)