

ICES WGBAST REPORT 2008

ICES ADVISORY COMMITTEE

ICES CM 2008/ACOM:05

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

1 – 10 April 2008

Gydnia, Poland



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
info@ices.dk

Recommended format for purposes of citation:

ICES. 2008. Report of the Baltic Salmon and Trout Assessment Working Group (WGBAST), 1 - 10 April 2008, ICES Headquarters, Copenhagen. ICES CM 2008/ACOM:05. 267 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.

© 2008 International Council for the Exploration of the Sea

Contents

| | |
|--|-----------|
| Contents | i |
| Executive summary | 1 |
| 1 Introduction | 2 |
| 1.1 Terms of reference | 2 |
| 1.2 Participants | 2 |
| 2 Salmon fisheries data..... | 3 |
| 2.1 Catches | 3 |
| 2.1 Distribution of catches by countries in comparison with the TAC..... | 5 |
| 2.2 Discards, misreporting and unreporting of catches..... | 6 |
| 2.3 Fishing Effort..... | 7 |
| 2.4 Catch Per Unit Effort..... | 8 |
| 2.5 Description of basic collection of catch data | 9 |
| 2.6 Age Composition and Mean Weight of the Catches..... | 13 |
| 2.7 Proportion of wild salmon in genetic studies and scale readings of catch samples..... | 14 |
| 2.8 Description of gears used in salmon fisheries | 14 |
| 2.9 Present tagging and marking..... | 15 |
| 2.9.1 Fin-clipping..... | 15 |
| 2.9.2 External Tagging..... | 15 |
| 2.9.3 Tag reporting rate | 16 |
| 2.10 Tagging data in the Baltic salmon stock assessment..... | 17 |
| 3 River data on salmon populations..... | 46 |
| 3.1 Current wild and potential salmon rivers..... | 46 |
| 3.2 Wild salmon populations in Main Basin and Gulf of Bothnia | 47 |
| 3.2.1 Rivers in the assessment unit 1 (Gulf of Bothnia, subdivision 31)..... | 47 |
| 3.2.2 Rivers in the assessment unit 2 (Gulf of Bothnia, sub- division 31)..... | 51 |
| 3.2.3 Rivers in the assessment unit 3 (Gulf of Bothnia, sub- division 30)..... | 54 |
| 3.2.4 Rivers in the assessment unit 4 (Western Main Basin, Subdivisions 25 and 27) | 54 |
| 3.2.5 Rivers in the assessment unit 5 (Eastern Main Basin, subdivisions 26 and 28)..... | 55 |
| 3.3 Potential salmon rivers | 58 |
| 3.3.1 General | 58 |
| 3.3.2 Potential rivers by country | 58 |
| 3.4 Reared salmon populations..... | 61 |
| Releases | 62 |

| | | |
|----------|---|------------|
| 3.5 | M74 | 63 |
| 3.6 | Summary of the information on wild and potential salmon rivers | 65 |
| 4 | Present management measures and other factors influencing salmon fishery | 97 |
| 4.1 | Description of the Present Management Measures | 97 |
| 4.1.1 | International regulatory measures | 97 |
| 4.1.2 | National regulatory measures..... | 98 |
| 4.2 | Evaluation of the Management Measures..... | 101 |
| 4.2.1 | International regulatory measures | 101 |
| 4.3 | Other factors influencing the salmon fishery..... | 102 |
| 4.3.1 | Dioxin | 102 |
| 4.3.2 | Size (weight) distributions of catches..... | 103 |
| 4.3.3 | Predation on salmon by seals and damage caused by seals to fishing gears and to salmon in fishing gears | 103 |
| 4.3.4 | Fisheries economics | 104 |
| 4.3.5 | Reductions in drift netting..... | 105 |
| 4.4 | Development in post-smolt survival and factors affecting it | 105 |
| 4.4.1 | Objective..... | 105 |
| 4.4.2 | Background..... | 105 |
| 4.4.3 | Methods..... | 106 |
| 4.4.4 | Results from initial analyses of predictor variables | 107 |
| 4.4.5 | Formulating relevant hypotheses for salmon survival..... | 108 |
| 4.4.6 | Results from multivariate analyses of predictor variables..... | 109 |
| 4.4.7 | Evaluation of different estimates of post-smolt survival | 110 |
| 4.4.8 | Conclusions | 111 |
| 4.5 | Conclusions for the salmon fishery | 112 |
| 5 | Reference points and assessment of salmon in Main Basin and Gulf of Bothnia (Subdivisions 22-31)..... | 124 |
| 5.1 | Introduction..... | 124 |
| 5.2 | Reference points for Baltic Salmon..... | 126 |
| 5.3 | Methodology for the assessment of Baltic salmon | 126 |
| 5.3.1 | Definition of assessment units within the Baltic Sea area | 128 |
| 5.3.2 | Data of different Baltic salmon stocks available for the assessment | 129 |
| 5.3.3 | Prior probability distributions for smolt production capacities | 129 |
| 5.3.4 | Mark-recapture analysis of smolt trapping data | 132 |
| 5.3.5 | Hierarchical linear regression analysis to estimate wild smolt production of different salmon stocks | 132 |
| 5.3.6 | Estimating M74 mortality for different wild salmon stocks | 134 |
| 5.3.7 | Hierarchical analysis of Atlantic salmon stock-recruit data | 136 |
| 5.3.8 | Sea mark-recapture model for assessing the exploitation of Baltic salmon..... | 137 |

| | | |
|----------|--|------------|
| 5.3.9 | Full life history model of different wild Baltic salmon stocks | 139 |
| 5.4 | Stock projection for different Baltic salmon stocks | 141 |
| 5.4.1 | Methods..... | 142 |
| 5.4.2 | Assumptions regarding development of fisheries and key biological parameters | 143 |
| 5.4.3 | Results | 144 |
| 5.5 | Uncertainties affecting the assessment results..... | 145 |
| 5.6 | Conclusions of the assessment for the Main Basin and Gulf of Bothnia stocks..... | 148 |
| 5.6.1 | General conclusions..... | 148 |
| 5.6.2 | Short term perspectives..... | 149 |
| 5.6.3 | Long term perspectives..... | 150 |
| 6 | Salmon in the Gulf of Finland | 192 |
| 6.1 | Introduction..... | 192 |
| 6.2 | Catch and fisheries | 192 |
| 6.3 | Status of salmon populations..... | 193 |
| 6.3.1 | General | 193 |
| 6.3.2 | The water level in the small Estonian salmon rivers | 193 |
| 6.3.3 | Status of wild and mixed populations..... | 193 |
| 6.3.4 | Status of reared populations | 195 |
| 6.4 | M74 | 195 |
| 6.5 | Smolt Production | 196 |
| 6.6 | Indices of post-smolt mortality and yield | 196 |
| 6.7 | Harvest pattern of wild and reared salmon..... | 196 |
| 6.8 | Management recommendations | 197 |
| 7 | Sea Trout 2008 | 209 |
| 7.1 | Nominal catch | 209 |
| 7.1.1 | Sampling of sea trout..... | 210 |
| 7.2 | Status of wild and mixed sea trout populations..... | 210 |
| 7.2.1 | Monitoring methods..... | 210 |
| 7.2.2 | Gulf of Bothnia..... | 210 |
| 7.2.3 | Gulf of Finland | 211 |
| 7.2.4 | Main Basin | 212 |
| 7.3 | Reared smolt production | 214 |
| 7.4 | Tagging | 215 |
| 7.4.1 | External Tagging..... | 216 |
| 7.5 | Recommendations for management actions..... | 216 |
| 7.5.1 | Gulf of Bothnia and Gulf of Finland | 216 |
| 7.5.2 | Main Basin | 217 |
| 8 | Data and information needs for assessment..... | 236 |
| 8.1 | Overview on data needs | 236 |

| | | |
|----------|--|------------|
| 8.2 | Compatibility of the DCR with the data needs requirements for WGBAST | 237 |
| 9 | References | 239 |
| 9.1 | Working papers | 242 |
| | Annex 1: List of Participants | 243 |
| | Annex 2: Recommendations | 246 |

Executive summary

Salmon stocks in the Main Basin and Gulf of Bothnia were assessed using Bayesian methodology. A stock projection model based on the Fisheries Library in R (FLR) framework and conditioned on the Bayesian stock assessment was used for the computation of the impacts of different future scenarios on the stocks. Salmon catches predicted by the model are almost certainly negatively biased and hence the working group was unable to provide catch predictions or TAC advice. Various tests with the model and comparison with independent observations did not, however, indicate major problems which would prevent use of model to provide an insight into trends in abundance and river-specific smolt productions.

- Post-smolt survival has declined to a low level in 2004-06 and possibly also in 2007. The declined survival would negatively influence catches of salmon and it will also influence wild salmon stocks negatively. The smolt production among wild salmon stocks may therefore decline during the first years of the 2010s.
- A ban of drift net fishing started from 2008 is likely to increase number of spawners during the next few years and thus may increase the subsequent smolt production, provided that effort in any of the prevailing fisheries will not increase from the levels predicted by the working group.
- Salmon catches continue to decline and they are now at their lowest level since a joint catch statistics started in 1972.
- The natural smolt production of salmon populations has improved slightly in recent years and it is estimated to reach record levels in 2007-2009.
- The former IBSFC established as a management objective (Salmon Action Plan) for wild salmon rivers reaching at least 50% of the potential smolt production by 2010. Most of the northernmost stocks (assessment units 1-2) are either likely or very likely to reach the objective, while the stocks in the more southern areas (assessment units 3-5) have slightly more 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, while the populations have improved in the western part of the Baltic Sea.

The latest salmon assessment highlights the estimated current low level of post-smolt survival, which is predicted to have major implications for the fisheries and the stock development in near future. Seal abundance, smolt production levels, and recruitment of 0+ 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.

The point a) in the ToRs was fulfilled in the chapters 2, 3, 4 and 6. Salmon of the Baltic Main Basin and the Gulf of Bothnia was assessed in chapter 5 (ToR b). Status for salmon in Gulf of Finland (chapter 6) and Baltic sea trout populations (chapter 7) were evaluated but no analytic assessment was carried out for these stocks. The point c) in the ToRs was dealt by separate analyses searching for associations between of the post-smolt survival and available data series on biotic and abiotic factors (subsection 4.4). There is a special chapters dealing with sampling protocols and data needs (chapter 8). The point d) in the ToRs will be dealt by an extra meeting arranged in May, 2008.