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Lars Håkanson · Henrik Ragnarsson Stabo ·  
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# The Fish Production Potential of the Baltic Sea

A New General Approach for Optimizing  
Fish Quota Including a Holistic Management  
Plan Based on Ecosystem Modeling

 Springer

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*What is wanted is not the will to believe, but the  
will to find out, which is the exact opposite*

**Bertrand Russell**



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# Prologue

Two books related to coastal studies and management strategies with a focus on the conditions in the Baltic Sea were published in 2008 by our group at Uppsala University, “Tools and criteria for sustainable coastal ecosystem management – examples from the Baltic Sea and other aquatic systems” and “Eutrophication in the Baltic Sea – present situation, nutrient transport processes, remedial strategies”. We will complete the series with this book, and discuss and model the bioproduction potential of the Baltic Sea system with a focus on the production and biomass of prey and predatory fish. Our ambition has been that a reader of this book should be able to understand the motivation and structuring of the model used (CoastWeb) without consulting other publications, therefore there is a slight overlap between these books.

Our aim is not to write a literature review on aspects already covered by a plethora of other publications; instead we will provide key references to the particular problems discussed in this book. Our aim with this book has been to do what has not been done before and we will also explain and motivate the particular perspective on ecosystem modeling taken in this work. This is a book on “how it works” with a focus on the conditions in the Baltic Sea at the ecosystem scale and related to monthly quantifications of production and biomasses of ten key functional groups of organisms. The actual work carried out by functional groups of organisms rather than by individual species will be in focus. For example, predatory fish does the work of eating prey fish. The second target group in this book, prey fish, has a much more varied diet ranging from zoobenthos in the sediments to zooplankton in the water. The ten functional groups are: (1) predatory fish, (2) prey fish, (3) zoobenthos, (4) herbivorous zooplankton, (5) predatory zooplankton, (6) jellyfish, (7) phytoplankton, (8) bacterioplankton, (9) benthic algae and (10) macrophytes.

This book deals with the quantification of what these functional groups of organisms eat, how much they eat, when they eat, and how this relates to basic abiotic properties of the system, such as salinity, water temperature, oxygen conditions and nutrient concentrations, and how those things relate to fundamental transport process, such as water fluxes, stratification/mixing, sedimentation of suspended particulate matter, particulate and dissolved forms of nutrients, resuspension, burial, biouptake of nutrients, etc. In spite of the fact that so much has been written on

eutrophication and ecosystem conditions in the Baltic Sea and on strategies to “save” the Baltic Sea, there are no previous studies on the holistic ecosystem modeling addressed in this book, except by members of our team at Uppsala University. Pluralism benefits the progress of science, and we believe that the science presented in this work increases our understanding of how natural aquatic ecosystems work. However, we do not disregard other alternatives and complementary approaches to Baltic Sea studies.

The ecosystem represents an important scale in aquatic science and management, e.g., in contexts of impact assessment of water pollutants and when remedial measures are discussed. Few people are interested in the content of a sampling bottle and most people in science and management are interested in what this content may actually represent. There is, however, no contradiction between work at this larger ecosystem scale and sampling and work at smaller scales, since, e.g., the mean or median values characterizing ecosystem conditions of necessity must emanate from sampling at individual sites.

Most of the data discussed in this book come from comprehensive “data-mining” of public sources available via the Internet. Several persons in our group at Uppsala University have participated in the data-mining and the work discussed in this book, especially Dan Lindgren.