

PREFACE

A manager is someone that makes decisions regarding the activities of others, and these are normally important income-related decisions. A living resource are organisms, wild or farmed, that can be exploited by mankind as food, or for any other purposes that imply its elimination. The two first questions that a population manager asks is how much wild living resource can be utilized without jeopardizing future yields (sustainability), and how to avoid conflict among resource users (harmony). The question of how much to take is obviously quantitative. It is also often related to another question: how much resource will be left un-exploited in the water. There are many solutions to this trade-off between leaving the resource in the water, where it can grow or die, or harvest it and make use of it right away. Ultimately, the decision has economic, social, ethical and political tones, all depending on the context of the industry. It is often the job of a population biologist to study the life-strategies, abundance and resilience of the resource, and to calculate the potential harvests for different levels of human input. In a fishery, this input comes in the form of fishing effort and fishing method. These calculations are the focus of the first chapters of this work.

A manager normally tries to avoid conflict among users. But, some of the users may not be immediately apparent, because the same resource may be targeted by many, in different places and times. Thus, some of these invisible competitors, which can be people or other wildlife, may easily be the loosing part, or, on the contrary, take the largest share. The managers or the agents have three ways to find acceptable yields and mitigate disputes. One would be to make use of some historical rules that have functioned adequately there or elsewhere for unknown reasons. A second solution would be experimentation: by trial and error the agents could find suitable solutions in the future, but they should be careful (conservative) along the way. With time one would learn something about the dynamics of the resource and user behaviour, even without fully understanding the underlying mechanisms. These two solutions require experience, common sense and, often, self-control to resist precipitation and all sorts of pressures. The third solution relies on some sort of quantitative prediction, also called a simulation model. With a fair mathematical description of the dynamics of the resource, one can try to predict future trends of yield and revenue. The advantage of these forecast models is that we can make an endless number of “experiments” with slight variations of the input, for instance of the fishing effort or season. We can quickly get a grasp of the consequences of our actions. Along our courses, we tend to discuss the two first types of solutions in class and in case-studies. The aim of the second part of this manual is to train in the utilization of these simulation models. These predictive models attempt to mimic fluctuating environments, uncertainty about many factors, as well as competing fleets and predators. Both deterministic and stochastic formulations of these computer models are used.

Quantitative methods are not immediately attractive or understandable to everybody. Here, an attempt is made to introduce some of the mathematical methods often used in

fishery biology in a gradual way. We start with simple statistics and statistical methods and proceed to more and more complex simulation models. This gradient reflects also the cost of information in real life: simple models are normally used where there is not much information available for research; complex models require large amounts of expensive information, and are thereby only utilized in some industrial fisheries. A fishery manager should be familiar with the different approaches, and be able to make suitable and conservative decisions even in the absence of complex science. The aim of the course is to train and assist managers to understand biological advice without being unduly distracted by the mathematical aspects. Teachers like Per Grotnes introduced me to the idea of learning serious matters with simple exercises, simulations and games. Fishery mathematicians with good pedagogical skills like Haddon, Hilborn, Pope and Punt were other important sources of knowledge and inspiration.