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Finnish Game and Fisheries Research Institute, Finland

International Council for the Exploration of the Sea, Denmark

FishBase Information & Research Group Inc., Philippines

Aristotle University, Greece

Agencia Estatal Consejo Superior de Investigaciones Científicas, Spain

Marine Institute, Ireland

Imperial College of Science, Technology and Medicine, UK

Department of Fisheries and Oceans, Canada

Swedish Board of Fisheries, Sweden

Institut National de la Recherche Agronomique, France

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ecoknows

ecoknows

Effective use of ecosystem and biological knowledge in fisheries

www.ecoknows.eu

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EU 7th Framework Programme
Collaborative Project
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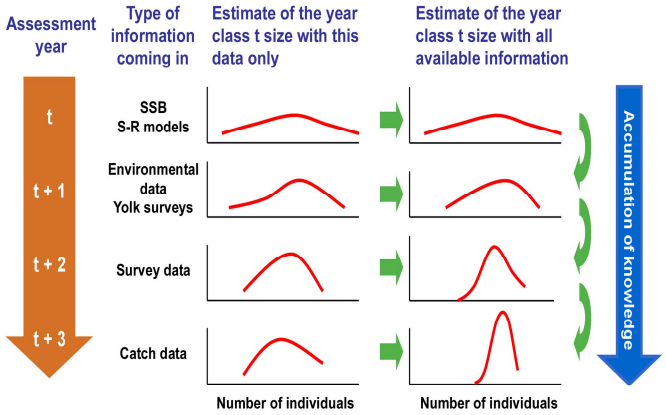
COOPERATION

Background

Most of the European stock assessment methods currently applied rely on assumptions that contradict the basic understanding about ecological characteristics of fish life-cycle. These assumptions undermine the credibility of fisheries science. In addition, the uncertainties about important biological processes are not taken into account in estimation or in prediction of the population status. Instead, they are assumed to be known exactly in point estimate models.

Development of New Assessment Methodology

The current available methodology in probabilistic modelling provides a consistent framework for dealing with the issues that cannot be addressed by traditional methods. According to the Bayesian paradigm, the existing biological knowledge becomes first integrated into a stock assessment model in the form of a set of alternative model structures and prior distributions that represent plausible parameter values. This body of prior knowledge will then be updated by available stock assessment data. If the quality and/or quantity of data are poor, then the resulting inference is going to be dominated by the initial knowledge described by priors. The management advice at any given point of time can be based on best available knowledge at the time of decision making without speculation of insufficient amount of data. The Bayesian approach offers a sound framework for including information from multiple sources: ecological knowledge, experimental data, similar populations, published papers, and observed fishery data. At the same time, the assessment of uncertainty supports the applicability of precautionary approach.



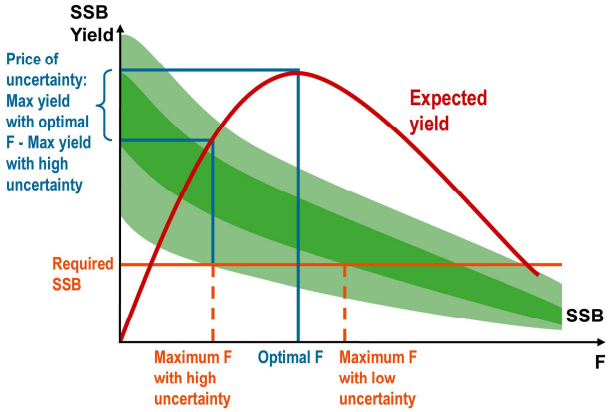
How the Bayesian approach works with new data sets coming in for a year class estimate over time

Strategic Impact

ECOKNOWS will have four major impacts:

- It will provide improved biological reference points and S/R models for case study species and a methodology by which these can be estimated for all EU stocks. These findings can be used in current ICES and other assessments.
- It will significantly improve the Bayesian models to be used in EU and world-wide stock assessments.
- It will disseminate the findings to all stakeholder groups, including a large investment in academic education.
- It will help developing countries to generate simple biological risk indicators for poorly studied species.

A simplified illustration of the impact of uncertainty analysis structure. The improved estimates of SSB will allow the increase in catch rates, if a risk averse attitude is applied. This means that the uncertainty also has an impact on TAC. This can be seen as one potential implementation of a precautionary approach. Dark green area = simulation with hierarchically estimated S/R parameters. Lighter green area = simulation without learning from other populations.



Contribution to European Fisheries Management

ECOKNOWS develops the required methodology to support CFP, especially in the new challenges of EAFM and to make data resources, such as FishBase, more functional tools for ecosystem based risk assessments. The EAFM approach suggests that the allowed exploitation level should be based on the "weakest link", i.e. on the species most vulnerable to fisheries activity. If we keep the survival probability of these populations at an accepted level, the uncertainty estimate related to these populations will have a direct impact on the catch levels of target populations. This will require computational methods to utilise all existing knowledge to the best possible level.

The outputs of the project are also valuable in developing countries, which do not have access to the same survey capacity as EU countries.