Theme session Q

Harvest control rules: beyond FMSY for an ecosystem approach to fisheries?

Conveners: Didier Gascuel (France), Lisa Borges (Belgium), Dave Reid (Ireland)

There are increasing demands for data with documented quality to support stock assessments, advice, and the ecosystem-approach to management. An increase in the volume and complexity of data collection alongside the need to meet quality standards within logistical and economic constraints requires prioritization and optimization of national and regional sampling programmes. This can be achieved through better regional coordination, improved survey sampling designs and analytical methods, development of new technology, quality documentation, and cost-benefit analyses. Stock assessments are based on data from fisheries-independent and fisheries-dependent sampling surveys, which have inherent uncertainty due to sampling errors and various sources of systematic errors (bias). It is important to quantify how errors in each of the input datasets propagate through assessments and influence management decisions, so that improvements in data collection can be prioritized. At the same time, there is a need for rigorous analytical and simulation methods to demonstrate the relationships between data quality, costs of collection and management outcomes, and to identify the most cost-efficient survey designs. Many of the talks presented in this session had a direct link to ICES science and advisory functions among others how to optimise surveys presently used in many stock assessments and the effect of a changed design on the assessment and advice.

This session aimed to bring together fisheries scientists and statisticians with expertise in survey sampling design and analysis, data collection methods and implementation, stock assessment modelling, simulation studies, and statistical analysis. There were 26 oral presentations and 10 posters. The oral presentations were grouped into three sessions dealing with: 1) fishery independent survey data; 2) fishery-dependent data; and 3) the value of information from the data. The presentations fitted closely to the main theme session topics of optimisation and cost - benefit, and many talks had slides that specifically addressed the question "When is enough, enough?"

A wide range of topics was covered. Some examples for surveys included adapting trawl surveys for multiple purposes, evaluating the effect of different tow duration in surveys, novel use of video cameras to record continuous data on fish passing through a survey trawl, evaluating design and sampling intensity for surveys in freshwater, and using existing data and simulations to test the performance of sampling designs, and in some cases taking this through to impacts on assessments and advice. Commercial catch sampling talks addressed a wide range of topics on designing and optimising fishery sampling programmes on shore and at sea, including evaluating data quality and using simulations to analyse sampling designs and improving the design by having a regional approach. Presentations on the value of information included the impact of sampling designs and data quality on assessments and advice, collecting data to support near real-time fishery management procedures, improving cost-efficiency of otolith collections, using global sensitivity analysis of assessments with management strategy evaluations to define sampling priorities, improving the quality assurance of data, reducing the frequency of assessments and advice, and evaluating the economic benefit from sampling surveys. Two talks looked at the use of model-based

estimators that accounted for spatial-temporal correlation in data (e.g., geostatistical tools) to improve input-data to assessments and management.

Some common questions arose from the presentations and discussions, including:

- How do we best consider fishery objectives (both managers and stakeholders) in designing data collections?
- What do we mean by optimise? We need to define what we are optimising for and consider costs as well, e.g., trade-off between optimal variance and costs per trip.
- How do we simulate realistic enough data, especially length and age composition data?
- How do we reflect the importance of spatial patterns – e.g. impacts and analysis of spatial distribution and stratification?
- Who should be informing the weighting of indices of abundance versus estimates of catch in numbers of fish by length/age in assessments - survey sampling experts, experts in statistical modelling, or assessment scientists?
- Should more emphasis be placed on developing combined, weighted indices from multiple research vessel surveys, where it is appropriate – for example for surveys covering different parts of a species' range - rather than including the series independently in assessment models?
- How can we strengthen the dialogue between survey, catch monitoring and assessment teams? Clearly these are all parts of the same decision-making system.

Future developments in work covered by Session O should address such questions, and aim to broaden the skills-base and collaborations across the ICES area in the use of analytical methods for end-to-end evaluation of cost-effective data collection schemes that best meet end users' needs. This is an important process for supporting ICES' science and advisory strategies. ICES has started a workshop series to develop methods for evaluating cost-benefit and improving cost-efficiency in data collections (WKCOSTBEN), and session participants are encouraged to find out more about this and contribute if possible.
http://www.ices.dk/community/groups/Pages/WKCOSTBEN.aspx