ICCAT STANDING WORKING GROUP FOR ENHANCING THE DIALOGUE BETWEEN FISHERIES SCIENTISTS AND MANAGERS

8 Framework for the development of Harvest Control Rules (HCRs)

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8.2 Possible process for assessing HCRs, particularly in the context of the development of Management Strategy Evaluations (MSE)

8.2.1 Precautionary Approach

When managing fisheries decisions often have to be made with incomplete knowledge the Precautionary Approach (PA) requires that

- Undesirable outcomes should be be anticipated, measures taken to reduce their risk of occurring, corrective measures applied immediately and to be effective within an acceptable time frame.
- **L**imit and **t**hreshold **R**eference **P**oints used as part of a **H**arvest **Control Rule**; and
- Consideration must be given to major uncertainties. e.g. status of the stocks relative to reference points, biology and environmental events.

However, **HCR**s will not necessarily be precautionary if they are not formally evaluated to determine how well they actually achieve their goals given uncertainty. Therefore at the Third Joint Tuna RFMO meeting (Kobe III) it was recognised that Management Strategy Evaluation (MSE) needs to be widely implemented in the tRFMOs in order to implement a Precautionary Approach for tuna fisheries management.

8.2.2 Management Strategy Evaluation

Management Strategy Evaluation involves the use of simulation modelling to evaluate the impact of the main sources of uncertainty. Benefits of the approach are

- It allows a fuller consideration of uncertainty as required by the Precautionary Approach;

- Provides stability if management objectives and how to evaluate how well alternative management strategies meet them are agreed through a dialogue between scientists and stakeholders; and
- Can be used to guide the scientific process by identifying where the reduction of scientific uncertainty improve management and so help to ensure that expenditure is prioritised to provide the best research, monitoring and enforcement.

8.2.3 Process

Conducting an MSE requires various steps i.e.

1. Identification of management objectives and mapping these to performance measures to quantify how well they are achieved
2. Selection of hypotheses about system dynamics.
3. Conditioning of OMs on data and knowledge and possible rejecting and weighting the different hypotheses.
4. Identifying candidate management strategies and coding these up as MPs, i.e.the combination of pre-defined data, together with an algorithm to which such data are input to set control measures.
5. Projecting the OMs forward using the MPs as feedback control procedures; and
6. Agreeing the MPs that best meet management objectives.

8.2.4 Examples

Currently there are various initiative being conducted by the SCRS related to MSE, i.e. the development of a Generic MSE that can be applied to the Albacore and Swordfish stocks in the North and South Atlantic and Mediterranean and the work under the GBYP.

Generic MSE A framework that can be used for highly migratory tuna stocks is being developed. This uses an Operating Model conditioned on a range of assumptions about biological processes. The OM can be based either on an existing age based stock assessment, e.g. Multifan-CL for North Atlantic Albacore, or life history characteristics for data poor stocks. The Management Procedure is based on a biomass dynamic stock assessment model, which is currently being used to provide management advice in the form of the Kobe II Strategy Matrix (K2SM) for Northern and Southern Atlantic stocks of albacore and swordfish, and potentially for the Mediterranean stocks as well.

Mediterranean Bluefin Tuna An initial MSE is being developed for Mediterranean Bluefin Tuna. This is intended to identify the impact of the main sources of quantified and unquantified uncertainties on management. In this work the relative value-of-information for model based and empirical Management Procedures will be compared. This is done by conditioning

an Operating Model on alternative hypotheses about population and fishery dynamics. Data, fisheries and fisheries independent are then sampled from the Operating Model to evaluate different harvest control rules as part of a Management Procedure. This allows scenarios and data sets to be simulated that reflect uncertainty about our knowledge of biology, ecology and our ability to observe and control the fisheries. Different Management Strategies will be evaluated with respect to their ability to meet multiple management objectives. This is done by considering the trade-offs between the objectives for different choices (e.g. to invest in fisheries independent surveys, tagging studies to estimate natural mortality) and the robustness of the MPs, e.g. to environmental variability. This allows the relative benefits of improving knowledge on population and fishery dynamics to be evaluated.