# MANAGING DATA-POOR FISHERIES

MALCOLM HADDON

CSIRO OCEANS AND ATMOSPHERE, HOBART, TASMANIA

**SUBTHEME: ABC Specification for Data-Limited and Model-Resistant Stocks**

## BIO

**Associate Professor Malcolm Haddon** is a Senior Fisheries Scientist in Australia's Commonwealth Scientific and Industrial Research Organization (CSIRO). He spent 10 years as an associate professor at University of Tasmania. He was a lead editor for *New Zealand Journal of Marine and Freshwater Research.*

Malcolm's expertise is with age-based and size-based fisheries stock assessment models, simulation modelling, quantitative and statistical methods, the use of *AD-Model Builder*, *C++*, *Fortran 2003*, *R*, *SS3*, producing risk assessments, conducting Management Strategy Evaluations, and resource management. Interactions with stakeholders at all levels: within the State of Tasmania, Nationally within Australia, and Internationally in various fisheries.

**Externally Funded Projects**:

- Data-Poor Assessments in the South East Scalefish and Shark Fishery (PI)
- Management Strategy Evaluation of Abalone Harvest Strategies (PI)
- Improvement and uses of Catch Rate Standardizations (PI)
- Development of methods for estimating acceptable levels of incidental catches. (PI)
- South East Scalefish and Shark Fishery stock assessments and assessment groups (CI)

## ABSTRACT

Influential FAO documents in the mid-1990s appear to have stimulated the evolution of modern harvest strategies focused around target and limit reference points along the scales of different stock performance measures combined with harvest control rules that define management actions in the face of an assessment of the stock status relative to those pre-defined reference points. This approach has been successful; the Commonwealth Harvest Strategy Policy was introduced in Australia in 2007, and 2013 was the first year that no stocks were classified as being subject to over-fishing and only 6 were classified as over-fished. Such successes appear to have stimulated a wish to expand the application of government fishery related policies, which means that more fisheries will become formally managed to achieve the objectives of such policies. To fit into the agreed process this in turn means that there is a need to assess the status of many more stocks. Naturally, the earlier work would have focused mostly on those species considered to be important,

either financially or socially; this is certainly the case in Australia. It is also the case that those species initially considered less important generally have not been subject to any systematic data collection. Despite this lack of information, to meet current policy some way of assessing a stock's relative status through time is required; but how is that to be done if a stock is data-poor?

For data-poor fisheries, difficulties can arise in almost every component of its harvest strategy – for example, irregular or no monitoring means time series are rare, any assessment method is undertaken with an unknown degree of uncertainty, reference points are poorly defined and associated control rules do not necessarily address risk clearly. This latter is a problem in Australia where an explicit component of the present Harvest Strategy Policy is the application of a consistent degree of risk across all fisheries, irrespective of fishery type.

Recently many data-poor assessment methods have been developed and some have been tested using management strategy evaluation. Where there is catch and an index of relative abundance then a simple model of the dynamics can be fitted (e.g. surplus production), where there is only catch then consistency with a simple model can be used (e.g. Catch-MSY) to bound the dynamics, and where a model cannot be fitted then an empirical harvest strategy can be used. The use of a tiered system of assessment methods and associated control rules allows for the development of detailed, integrated stock assessments (Tier 0 and 1) down to the lowest Tiers where data is limited to catch rates and catches, or even just catches (Tiers 6 and 7). Below these tiers is the Ecological Risk Assessment, which aims to determine whether there are particular species that are exceptionally vulnerable to the effects of fishing.