WHAT IS AN OPERATIONAL MANAGEMENT PROCEDURE (OMP)? (With some Examples Related to Namibian Hake)

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1) *What is the traditional approach used to make scientific recommendations for TACs for fisheries*?

   a) The resource is "assessed" by scientists. This involves a mathematical exercise which integrates all available pertinent information about the fishery (e.g. CPUE, survey results, past catches). Typical outputs are the current abundance of the resource, how this compares to historic levels, and what production the resource can achieve (i.e. what sustainable yields are possible).

   b) A formula (usually called a "harvest control rule") is then applied to the output from the assessment in a) to calculate a scientific recommendation for a TAC. Often the formula used has the objective that over time the resource size will be modified to become close to that capable of providing MSY (maximum sustainable yield).

2) *What particular difficulties arise with the traditional approach*?

   a) Each year scientists attempt to provide a "best" assessment. But this can produce results which vary appreciably from one year to the next for two reasons. First the best assumptions to use in undertaking the assessment tend to be re-argued and changed. Secondly new monitoring data have become available; these are typically noisy, and can lead to substantial modifications to past assessment results. In turn this can lead to TAC recommendations that change substantially from one year to the next, in contradiction to the objective of orderly industrial development.

   b) Longer term objectives, and the desired trade-offs between them, are usually not clarified. TAC variability can be reduced, but at the expense of a reduction in average catch over time – a rational basis for management decisions requires that the potential gains and losses involved in this comparison be quantified.

   c) Lengthy "haggling" debates can develop between scientists - representing possibly ministry or industry or NGO groups - over exactly how "best" to perform computations and recommend TACs each year. (In one "uncelebrated" instance in South Africa, 40 scientific meetings were needed before consensus was achieved!)

   d) Fisheries assessment is an inexact science. The "best" assessment at any time could be wrong to a not insubstantial extent. But then will the TAC

recommended damage the resource by depleting it unduly, or waste it by unnecessarily limiting catches?

3) *What is an OMP*?

A formula to provide the scientific TAC recommendation, together with pre-specified inputs to the formula (e.g. a CPUE index, and how this is to be calculated).

4) *But isn't this the same as the traditional approach*?

Almost: the formula often takes the form of the combination of an assessment and a harvest control rule, as in that approach.

5) *So what's the difference*?

a) With the formula to be used and the data to be input both pre-specified, there's no haggling (or, at least, the time spent on haggling is greatly reduced).

b) The formula to be used is tested by computer simulation, in particular to check that it will still "work" reasonably even if the current best assessment of the resource turns out to be wrong. This is in line with the requirements of the Precautionary Principle.

6) *How is the OMP formula chosen from amongst alternative candidates*?

a) The computer simulations provide indications of anticipated medium-term performance in terms of aspects such as catches, risk of depleting the resource to too low a level, and how much TACs will vary from year to year. Optimum performance on all such aspects simultaneously is impossible: for example, the higher the catches, the higher also the risk. Appropriate trade-off choices have to be made, and these determine the eventual selection.

b) The anticipated performance has to be acceptable not only if the current best assessment is right, but also if it is (within bounds) wrong. In other words, performance must be reasonably robust to such uncertainties, which should also include uncertainties of effects at the ecosystem level (e.g. what if there is a regime shift and the size of population the environment can support changes?).

7) *What are the advantages of the approach*?

a) Less time-consuming scientific "haggling" (of little long term value) in the TAC recommendation process. (In the South African example referenced above, an OMP was put in place the following year, and the number of scientific meetings required to develop the TAC recommendation dropped from 40 to 4!)

b) Risk is properly evaluated – generally risk cannot meaningfully be associated with a TAC decision for a single year (as in the traditional approach); rather,

risk relates to following the same procedure over a number of years, as is evaluated in the OMP testing process.

c) Consistency with the Precautionary Principle – the approach constitutes a structured framework to take account of scientific uncertainties.

d) Provision of a framework for meaningful interaction between stakeholders (e.g. managers and industry) with scientists through the process of quantifying medium-term objectives and deliberating acceptable trade-offs.

e) Scientific "haggling" time saved can be more profitably expended on longer term research requirements.

8) *What are the disadvantages of the approach*?

a) Evaluations to provide a basis to choose between alternative formulae take longer than the traditional approach (though this is offset by later savings on "haggling" time).

b) An overly rigid framework (though OMPs are re-evaluated and revised typically every 3-5 years, and earlier if scientific advances show that the basis for previous OMP development computations to have been appreciably in error).

Some Examples in the Context of Namibian Hake

It is important to appreciate that TACs for the Namibian hake resource need to be set in a situation of considerable scientific uncertainty. For example, at the time the current OMP was recommended (early in 2002), available best assessments of the status of the resource were unable to distinguish MSY over a range of 200-400 thousand tons, and the ratio of current to pre-exploitation abundance over 10% - 70% (the target for MSY was in the 40% - 50% range).

The Figures shown below project the possible behaviour of both catch (Fig. 1) and resource abundance (Fig. 2) trends for three scenarios all compatible with the information available from the assessment of the resource three years ago. These scenarios span a range from low to high possible productivity, with the central case corresponding to the best estimated. Each scenario is evaluated under the three management procedures that have been applied to provide TAC recommendations for the resource since Namibian independence. There are multiple future possible trajectories for each scenario because allowance is made for alternative future recruitment variations, as well as errors in CPUE and survey indices.

I) *TAC a fixed fraction of an annual abundance estimate from a research survey – used in the early 1990s. (First column of plots in Figures)*

Advantages:
- Simple formula

Disadvantages:
- High variation in TAC from year to year (typically 40-50%)

- Doesn't necessarily achieve MSY – could lead to either under- or over-exploitation

II) *IMP: TAC moved up or down according to recent trends in surveys and CPUE – used in the late 1990s. (Second column of plots in Figures)*

Advantages:
- Again relatively simple formula
- Appropriate direction of change to TAC in late 1990s.

Disadvantages:
- TAC variability still high, though not as high as for I).
- Doesn't necessarily move stock towards level which provides MSY (it was in any case intended only as interim, to move the TAC in the correct direction)

III) *OMP: Assessment method plus harvest control law form for TAC formula – used since 2002. (Third column of plots in Figures)*

Advantages:
- Limitation (which has been computer-tested for acceptable performance) of 10% in maximum TAC changes between years (plus other features to reduce such variability)
- Resource to be moved to slightly above level that provides MSY

Disadvantages:
- Complicated formula

In summary, the main feature evident from Figs 1 and 2 is that the current OMP leads to much steadier and consistent trends in TACs than would the other two approaches, but this is <u>not</u> on the expense of putting the resource at greater risk (i.e. of appreciably increasing the risk of unintended depletion to a low level).

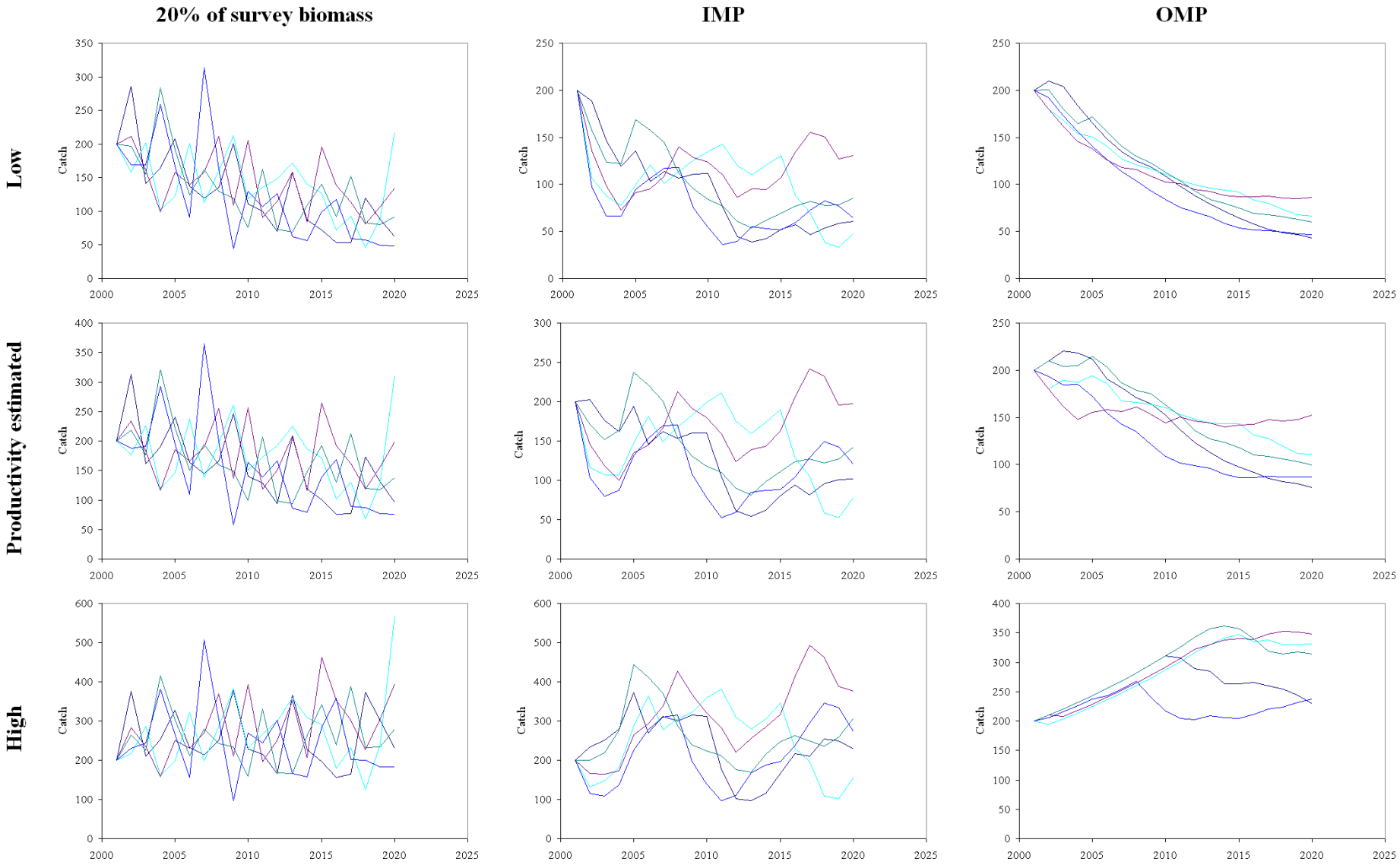

Fig. 1: Possible future catch series for Namibian hake under various management procedures.

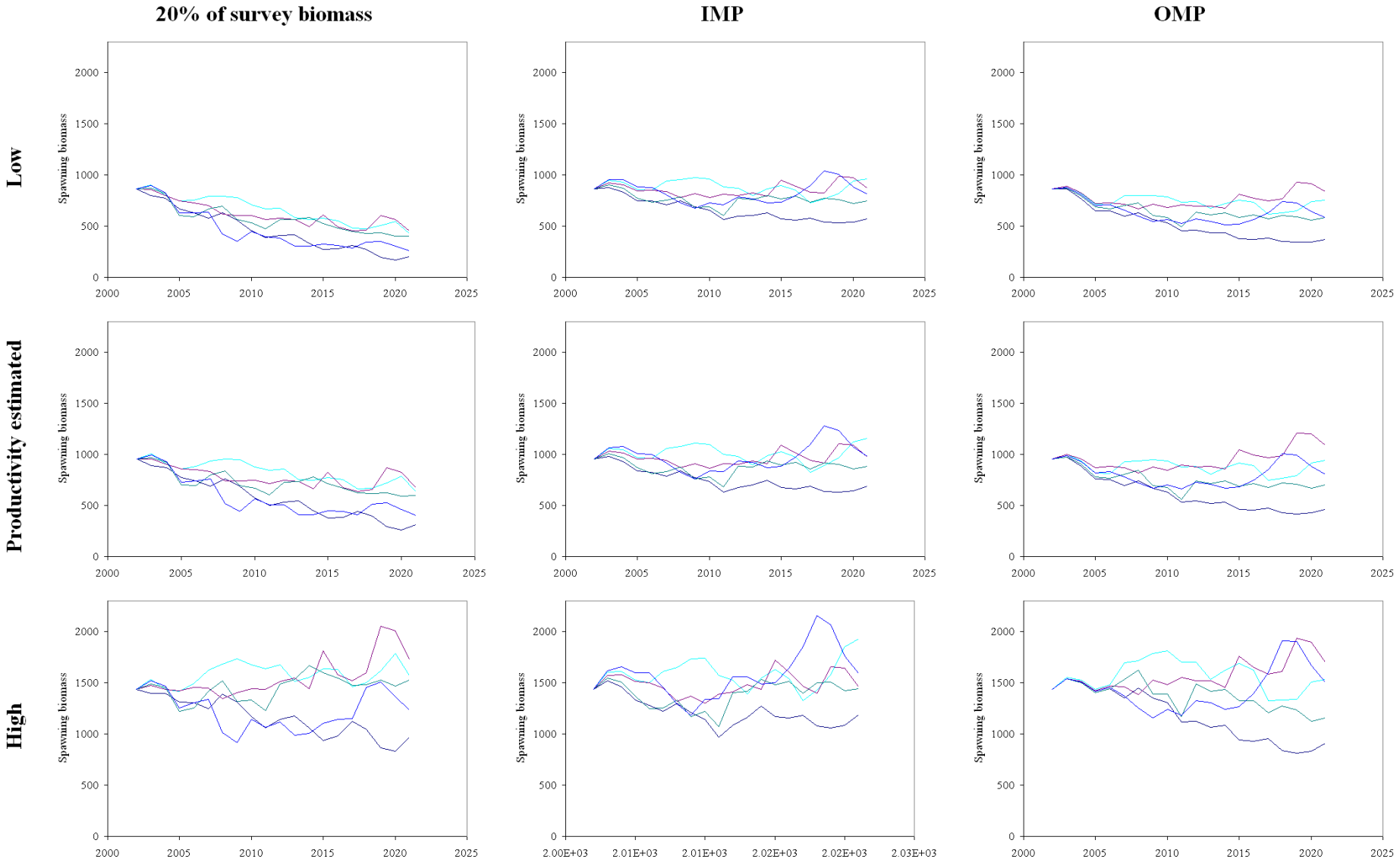

Fig. 2: Future spawning biomass trajectories for Namibian hake corresponding to the catch series in Fig. 1.