World's top scientists focus on hake stocks

In January, seven of the world's leading stock assessment scientists spent a week in Cape Town reviewing the science behind the management of South African and Namibian hake stocks. Claire Attwood reports back.

The week-long scientific workshop was sponsored by the regional scientific programme, BENEFIT, the Benguela Current Large Marine Ecosystem (BCLME) Programme and the National Research Foundation. It was attended by scientists, representatives of the South African and Namibian hake fishing industries, as well as senior fisheries managers from South Africa and Namibia.

The invited scientists were Drs James Ianelli, Joseph Powers and Andre Punt from the USA; Drs Robin Cook and John Pope from the UK; Dr Tore Strømme from Norway and Dr Tony Smith from Australia. The meeting was chaired by Tony Smith and organised by South African stock assessment expert, Professor Doug Butterworth.

Reviewing stock assessment

The primary purpose of the workshop was to review every step of the stock assessment process, from the data inputs through to the models and management procedures that assist in managing the Namibian and South African hake fisheries; and to make recommendations for future research. In addition, the scientific panel was tasked with reviewing the progress of the assessment and Operational Management Procedure (OMP) evaluations for Nambian fur seals, based on the recommendations made during the BENEFIT 2002 workshop. Discussions around seals constituted a complementary theme given that they are an important predator of hake.

A meeting of senior fisheries managers and scientists, including Horst Kleinschmidt and Dr Johann Augustyn of South Africa and Dr Moses Maurihungirire, Paul Nichols and Titus Lilende of Namibia, took place during the course of the workshop. Also present were Drs Neville Sweijd of BENEFIT and Hashali Hamakuaya of the BCLME Programme. The purpose of this meeting was for the international scientists to give their impressions of the hake research that is conducted in South Africa and Namibia and for the managers to ask questions of them in an informal, private setting. Concerns about the availability and quality of recent data on the age of hake was one of the key issues discussed at this forum.

Poor catch rates discussed

From the fishing industry's point of view, a key topic of discussion was the recent downturn in catches of hake in Namibia and South Africa.

In Namibia the hake fishing industry has been hard hit by poor catch rates and a high proportion of juvenile fish in their landings. In South Africa, stock assessments have suggested that the total allowable catch (TAC) for hake is too high. Although two quota cuts of 3 000 tons each have already been implemented in the South African industry, scientists say that a further 3 000 ton cut will have to be made in 2005. Even then, catches may be too high in the short term, but will probably stabilise in the medium- to long-term.

The primary reason for the downturn in hake stocks appears to be some weaker than normal cohorts entering the fishery in the late 1990's. The situation in South Africa is complicated by the fact that scientists believe that there is too much fishing pressure on the shallow water hake, Merluccius capensis.

An underlying theme of the meeting was the question of how many hake stocks are fished off South Africa and Namibia. Discussions centred on three different issues:

- Are there separate west and south coast stocks of shallow-water hake (M. capensis) off South Africa?
- Are there separate west and south coast stocks of deep-water hake (M. paradoxus) off South Africa?
- Are the deep-water hake (M. paradoxus) that are caught off Namibia and South Africa part of the same stock?

The answers to these questions have fundamental bearing on the way in which

Senior South African and Namibian scientists and managers are pictured with the international panel of stock assessment scientists. Back row: Dr Hashali Hamakuaya, BCLME Programme; Dr Jean Paul Roux of Lüderitz Marine Research; Dr Johann Augustyn of Marine and Coastal Management (MCM); Prof. Doug Butterworth of the University of Cape Town.
Centre: Dr Moses Maurihungirire, Ministry of Fisheries and Marine Resources (MFMR); Paul Nichols of MFMR; Phakamani Buthelezi of MCM; Horst Kleinschmidt of MCM; Dr Ndako Mukapuli of Lüderitz Marine Research; Dr Andre Punt, USA.
Front: International scientists, Prof. Robin Cook (UK), Dr Jim Ianelli (USA), Dr Tore Strømme (Norway), Dr Tony Smith (Australia), Dr Joe Powers (USA) and Dr John Pope (UK).

scientists model and manage these fish stocks.

Overlaps in fish stocks

Scientists have always believed that there are separate stocks of shallow water hake on the west and south coasts and that the Namibian and South African stocks of deep-water hake are separated by the Orange River. However, the workshop participants agreed that it is more likely that there is only a single stock of shallow-water hake and a single deep-water hake stock off South Africa. And, there are some indications that there may be greater overlaps in the deep-water hake stocks off Namibia and South Africa than was originally thought.

If this is found to be true, then there are important implications for future TAC sharing arrangements. This is an issue that is already being tackled by the regional BCLME Programme. One of the most important objectives of the Programme is to set up a regional authority to advise on the transboundary management of shared fish stocks.

The workshop recommended that fisheries scientists continue to work with population geneticists in an effort to determine the exact relationship between the hake that is caught on either side of the Orange River.

Age assessments

A second workshop theme concerned the critical importance of ageing information when conducting assessments of hake.

Obtaining reliable estimates of the age of the fish that are landed by the commercial fishery or in the trawl nets of research vessels is a vital component of stock assessment surveys. In the past, representative samples of otoliths (ear bones) were taken from the commercial fleets of South Africa and Namibia, as well as from research surveys.

These samples were analysed by a fish ageing specialist, with a view to pinpointing the number of fish of different ages in each sample. The length of fish collected in research surveys would have been matched with the otolith data, in order to formulate an age-length key. This key is used to determine growth curves and the age at which fish are landed by the fishing industry.

In recent years, however, the exodus of highly trained fish ageing specialists from southern Africa, has left a gap in the stock assessment process. The workshop agreed that, even though stock assessment methods can be modified to account for missing catch-at-age data, this was a "patch" and every effort should be made to obtain annual catch-at-age information.

Again, the BCLME Programme is in the process of addressing this issue. The Programme has funded a study that has tested the feasibility of establishing a regional fish age determination facility that would serve Angola, Namibia and South Africa. The study has made recommendations for the structure and location of the proposed facility, and evaluated the costs associated with the establishment and operation of the ageing facility.

OMP sparks debate

Another topic that was intensely debated at the week-long workshop was the use of the Operational Management Procedure (OMP) as a basis for recommending catch quotas in both Namibia and South Africa. Advantages of this approach include its potential for the evaluation of long term consequences and risks, as well as its potential to involve stakeholders in the consideration of a range of management options. One of the weaknesses of the OMP is its complexity and the resultant lack of acceptance and/or understanding of the approach by some key managers, industry

representatives and scientists, particularly in Namibia. One of the scientific panel's strongest recommendations was that this issue be addressed as a matter of urgency.

The international panel suggested that:

"Both the general (OMP) approach and its application to managing hake resources, need to be explained in plain language so that all participants in the process have a clear understanding of what they are agreeing (to)."

The workshop recommended that consideration needs to be given to developing a new OMP for South Africa. There was agreement that the baseline assumption for a new OMP for the South African hake resource should be that there is one coastwide M. capensis stock and one coastwide M. paradoxus stock. Furthermore, computer models should account for the different fleets in the fishing industry (trawl, longline and handline) and the observer programme must play a key role in providing data that can be used to split commercial catches between the two hake species.

The scientific panel agreed that, while the new OMP for South African hake should recommend separate TACs for the two hake species, commercial allocations should not be based on a species split, primarily because it is notoriously difficult for even highly trained observers to differentiate between the two hake species.

It was agreed that the new OMP for the South African hake fishery would not be ready for implementation before the end of 2005, and its introduction might therefore dovetail with the allocation of long-term fishing rights.

No real answers

From the perspective of the fishing industry, the scientific panel drew disappointingly few conclusions about the current status of hake stocks in the region. Instead, the panel focused on the nuts and bolts of the stock assessment process, highlighting weaknesses and recommending remedies.

The panel noted that considerable effort is expended in both countries on monitoring and assessing the hake resources, however, the dearth of high quality data on the age of hake is cause for particular concern. They also stressed the need to monitor all sectors of the fishery, and to ensure that any changes to scientific surveys are accompanied by suitable inter-calibration research and do not compromise long-term data series.

The panel noted with approval the move towards assessing the two hake stocks separately, but noted that this, along with poor age data, had resulted in interim problems in developing consistent assessments.

They regarded all assessments to be "in transition", and said that it was difficult to gain a clear view of the status and recent trends in the hake resources in the region. However, the panel concluded that:

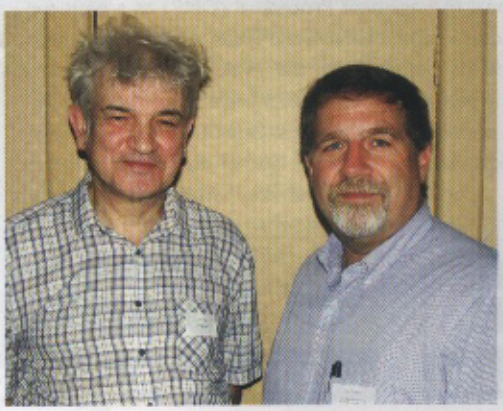
"For South Africa, the deep-water hake stock appears to have increased since the late 1970's, but has declined since 2000. The results for the shallow-water hake (resource) are less certain, in particular because past assessments have been conducted for the west and south coasts separately, while recent studies suggest that the fish from the two coasts most likely are part of the same stock.

"After a period of stability for shallow-water hake over the 1980's and 1990's, there are some indications of a decline, although this is of a lesser extent than that of the deep-water hake. No species disaggregated assessment was presented for Namibian hake resource, but there are concerns about continuing downward trends in catch rates and fishable biomass from surveys. Anecdotal evidence suggests that this is particularly a problem for the shallow-water species."

The panel concluded that the very low estimates for productivity parameters for Namibian hake are also of concern and said that it remains to be seen whether this is resolved by refinements of the analysis, such as moving to a species disaggregated assessment (the separate assessment of the two hake stocks.) ■

■ **BELOW: Drs Ndako Mukapuli and Jean Paul Roux of Lüderitz Marine Research attended the workshop. They are pictured with Jackie Rispel, also of Lüderitz.**

■ **BELOW: Roy Bross of the South African Deep-sea Fishing Industry Association, Professor Doug Butterworth of the University of Cape Town and Dr Mick O'Toole of the Benguela Current Large Marine Ecosystem (BCLME) Programme are pictured at a welcoming function prior to the start of the stock assessment workshop.**



■ **LEFT: John Pope of the University of Trømso and Joe Powers of the National Marine Fisheries Service, were two of the international scientists who attended the workshop.**