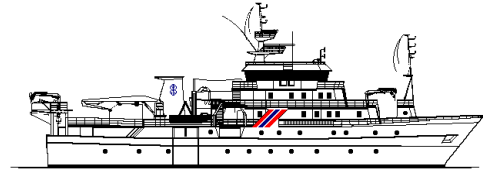


Country: South Africa, Namibia				
Research vessel: R/V DR. FRIDTJOF NANSEN				
Survey number: 2008401				
Number of days: 49				
General objectives: Transboundary survey between Namibia and South Africa with focus on the shared stocks of deep water hake.				
	Port	Date	Coverage	Specific objectives
Departure	Cape Town South Africa	7 January 2008	South Africa, Namibia	<ol style="list-style-type: none"> 1. To plan and conduct a transboundary survey from Cape Agulhas to Orange River to produce distribution maps and abundance estimates of the two species of hake to be later merged with similar data from a co-occurring Namibian national demersal survey, to enable complete mapping and assessment of shared stocks, thus providing a measure of the degree of sharing of the stocks at the time of the survey. 2. To do plankton sampling at transects off Hondeklip Bay and between Orange River and Lüderitz to check for retentions areas for eggs and larvae and local spawning of hake respectively. 3. To collect data on the maturity stages of the hakes to check for possible spawning activity. 4. To do an acoustic mini-survey of Hondeklip Bay to map aggregations of pelagic juvenile hake. 5. To collect other relevant data to better understand the environment impact on the distribution of hakes, and the fish community structure in the distribution areas of the hake. The environmental data will be analysed later.
Arrival	Cape Town South Africa	26 February 2008		
Cruise leader: Tore Strømme (cruise leader 13-28.01), Erling Kåre Stenevik (until 28.01, cruise leader 7-13.01), Oddgeir Alvheim (cruise leader 28.01-14.01).				
Participants:				
<p>From MCM, South Africa: Marek Lipinski (teamleader), Sharon de Plessis, Hans Verheye (13-28.1), Felicia Keulder (7-28.01), Sakhile Tsotsobe (until 20.01), Tebello Mainoane (from 20.01),</p> <p>From NATMIRC, Namibia: Ernestus Kangombe, Renate Lemke, Erasmus Kakonya</p> <p>Interns, South Africa: Robert Williamson, Nickolas Nicolle, Alice Johnson, Lutz Auerswald, Amir Sadat Rezaei, Quaygiso Mketsu, Bronwen O'Connel, Jessica Escobar, Andrea Bernatzeder, Dorette du Plessis</p> <p>From IMR, Norway: Tore Strømme (cruise leader 13-28.01), Erling Kåre Stenevik (until 28.01, cruise leader 7-13.01), Oddgeir Alvheim (cruise leader 28.01-14.01), Tore Mørk, Thor Egil Johansson</p>				





Summary of the results:

Hydrography: Due to manpower and resources constraints there could be no further analysis of the hydrographical data for this report. All data are stored and are awaiting later analysis.

Ichthyoplankton: All samples were preserved for genetic analyses, but since the genetic analyses were not available when this report was written it is not possible to know which of the two hake species the eggs and larvae belong to.

Horizontal distribution: During the survey a total of 61 Multinet stations and 35 Methot stations were conducted during the first two legs of the survey in the northern area. In the Multinet, hake eggs were only found in Namibian waters with highest concentrations (between 30 and 100 eggs 10m⁻²) on the innermost stations between Lüderitz and Orange River. A total of 55 eggs were caught in this area. Only three hake larvae were caught during the survey; two larvae on a station in Namibian waters and one larva in South African waters. Three hake juveniles were caught in the Methot net; two juveniles off Orange River and one juvenile on one of the southernmost Methot stations.

Fish biology: Dense concentrations of adult fish are found on the slope between Cape Agulhas and north to 31 °N much similar to the survey in 2007. Dense concentrations of juvenile fish are found mid-shelf between Doring Bay and Hondeklip Bay, suggesting a 'gate' to the slope off St. Helena Bay. The young fish has a more southern distribution compared to earlier surveys as high densities does not extend north to off Hondeklip Bay in 2008. Likewise there is not observed any major spill-over of juveniles north over the Orange Banks into Namibia, which has been observed on some previous surveys. The distribution of shallow water hake (*M. capensis*) is more uniform and at low level. One concentration was found on the shelf off Cape Agulhas.

The density estimates from the point samples have been converted into biomass estimates by length classes. The similar data from the Namibian trawl survey running in the same period have been processed following similar procedures. The joint estimate on deep water hake shows the regional distribution of deep water hake from combining the Namibian and South African data. It is believed that this comprise most part of the stock, except a minor and scattered component extending into Agulhas Banks. There is an increasing share of fish from Namibia from 20 cm onto about 50cm. Between 45 and 55 cm more than 50% of the fish is from Namibian waters. Beyond 55cm the Namibian share is decreasing and from approximately 65cm all the fish is found in South Africa. This is the same general trend as from previous surveys. In this survey very few fish of length less than 20cm was found in Namibian waters. This is consistent with the finding that there is no fish spilling over the Orange Banks from South Africa into Namibia. The distribution of juvenile hake 1-6cm as observed is located between 29°30'S and 31 °S, between 180 and 240m bottom depth. The highest densities are found in the northern and deeper part. Although most of this fish is pelagic its consistent presence in the trawl in this area, and not outside, indicate that this is the nursery area for the very young deep water hake. It is not mixed with shallow water hake in this location.

Both the level and ratio of non-fishable biomass between the two countries seems to be rather stable in the period. The fishable biomass shows a relative stable level in the years 2003, 2005 and 2006. In 2007 the Namibian biomass has increased considerably since the previous year, while in South Africa it remains at a stable level. In 2008 the Namibian stock has increased further, and the South African part of the stock now also shows a considerable growth. The increase in the two year period 2006-2008 is 112% for Namibia and 75% for South Africa. The 'delayed growth' in the South African component is an interesting observation. It could be explained by the recent Namibian efforts to rebuild the hake stocks. It could be that the later years reduced fishing effort in Namibia first shows up as a higher standing stock in Namibia and then, as more fish are able to return to South Africa for spawning, the standing stock after a one year time lag is on the increase there as well. It is too few points in the trendline to draw conclusions at this stage, but the pattern is very interesting and is worth to be followed up in subsequent surveys.

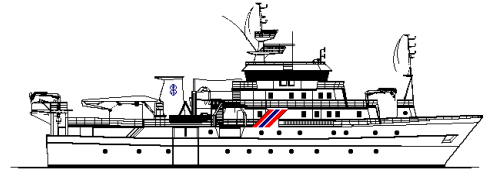
Considerations of the survey results, *M. paradoxus*:

- Minimal spawning takes place at this time of the year, confirmed through few signs of maturing gonads. Some limited spawning activity could be traced through the ichthyoplankton sampling between Hondeklip Bay and Lüderitz, the area south of this was not sampled for plankton during this survey. The spawning is located to shallow waters between Orange River and Luderitz. The biological material has not yet been genetically analysed and split into the two species are thus not yet possible. On basis of





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juveniles recorded in the same region it is most probably *M. capensis*.

- The early pelagic stage is mainly confined to the outer part of the shelf between Port Nolloth and Hondeklip Bay.
- Juveniles between 15 and 24cm are mainly concentrated on the shelf between Hondeklip Bay and St. Helena Bay. In contrast to some earlier years there are no spillover of juvenile fish northwards over the Orange Banks into Namibia. The main interface between Namibia and South Africa seems to be along the slope. The same pattern occurred in 2007.
- The massive migration towards the slope starts in the 25-29cm group and when the fish is bigger than 30cm this movement is mainly completed.
- The adult fish is found from Cunene in the north and southwards beyond Cape Agulhas. The biggest fish, bigger than 70cm is only recorded in South Africa.
- The main part of the stock is at the time of the survey located in South Africa which holds about 56% of the fishable biomass (fish bigger than 35cm) and 73% of the non-fishable biomass.
- The regional standing stock is on a rising trend in the last two years. The regional estimate of adults (>35cm) has increased from 110 thousand tonnes in 2006 to 209 thousand tonnes in 2008. At the same time the Namibian share of the standing stock has increased slightly from 39% to 44%. The general trend could perhaps be explained with reduced fishing effort in Namibia following a new policy to rebuild the stocks. This seems to have benefited both countries, Namibia first in 2007 and both countries in 2008.
- Between 40 and 60cm fish length there is an increased share of the biomass in Namibian waters compared to smaller and bigger fish classes, perhaps indicating a periodic immigration from south.

Report: status: final References:

T. Strømme, M. Lipinski, E. Kåre Stenevik and O. Alvheim. FAO PROJECT: CCP/INT/003/NOR Cruise reports "Dr. Fridtjof Nansen" EAF-N2008/1, (2008) BCC survey n. 1 **Transboundary survey between Namibia and South Africa with focus on the shared stocks of deep water hake**, Cruise report No 1/2008, 7 January – 26 February 2008.

Constraints/Comments:

