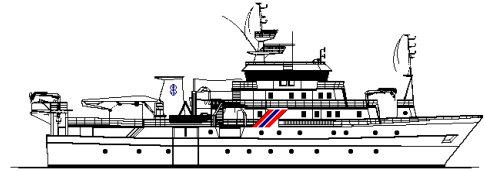


<b>Country:</b> Angola				
<b>Research vessel:</b> R/V DR. FRIDTJOF NANSEN				
<b>Survey number:</b> 2009403				
<b>Number of days:</b> 33				
<b>General objectives:</b> Transboundary survey between Namibia and South Africa with focus on the shared stocks of deep water hake				
	<b>Port</b>	<b>Date</b>	<b>Coverage</b>	<b>Specific objectives</b>
<b>Departure</b>	Walvis Bay, Namibia	24 February 2007	Namibia, Angola	<ul style="list-style-type: none"> <li>To survey, map and describe the distribution, composition and abundance of the main demersal species, with special emphasis on seabreams (Sparidae), croakers (Sciaenidae), grunts (Haemulidae), groupers (Serranidae), hakes (Merlucciidae) and shrimps (<i>Parapenaeus longirostris</i> and <i>Aristeus varidens</i>) on the Angolan shelf and slope (down to 800 m), from Cunene River to Tombua, and from Benguela to Congo River using bottom trawl and the swept-area method.</li> <li>To collect biological data of <i>Dentex macrophthalmus</i>, <i>D. angolensis</i>, <i>Pagellus bellottii</i>, <i>Pseudolithus typus</i>, <i>Merluccius polli</i>, <i>Aristeus varidens</i>, <i>Parapenaeus longirostris</i>, <i>Chaceon maritae</i> and the commercially important flatfish) for future analyses.</li> <li>To monitor the general hydrographic conditions using a CTD-sonde on each trawl stations and map the temperature, salinity and oxygen along standard INIP hydrographic profiles.</li> </ul>
<b>Arrival</b>	Walvis Bay	20 February		
<b>Cruise leader:</b> Espen Johnsen, Kumbi Kilongo (Local Cruise Leader)				
<b>Participants:</b>				
<p><b>From INIP,</b> Kumbi Kilongo (Local Cruise Leader), Virgílio Estêvão, Domingos Pedro, Pedro Panzo, Pedro Tchivalanga, Domingas Adelino, Eusébio dos Santos, Noémia Nganga, Manuel Domingos, Arsénio Cudivila, Silvi Nsiangango, Mario Fortunato, Enoque Canganjo, Fátima Delicado, Mário Rafael, Andom Lusevikueno .</p> <p><b>From IMR, Norway:</b> Espen Johnsen (Cruise Leader), Diana Zaera, Jan Frode Wilhelmsen, Ole Sverre Fossheim,</p> <p><b>From MCM, USA:</b> Tomio Iwamoto.</p>				





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### Summary of the results:

**Hydrographic conditions:** The regular demersal surveys in March are coincident with the late phase of the wet season, which causes low salinity in the surface waters on the shelf off northern and central Angola. The temperature varied between 25–29°C and the salinity was about 35.5-35.7 psu in the southern region. Neither the temperature nor the salinity distribution indicates the typically features of the presence of the Angola-Benguela Front. Furthermore, no signal of upwelled water was observed in the coastal areas of Baía dos Tigres. The horizontal distribution of temperature and salinity in the central region are shown in Figures 3.3–3.4. In the central region, the temperature varied between 27–30 °C, and the smallest values of temperature (27°C) are observed around Cabo Ledo which perhaps is caused by the water from Cuanza River. The salinity values are low in the whole region and ranged between 31 – 34 psu, and decreased offshore. These low salinity values are related to the large discharge of freshwater from the rivers due to the heavy rain inland in 2007. In the northern region the temperature was lowest inshore with about 28°C, while the offshore surface water temperature was between 29 and 30°C. In the inshore waters, the salinity was about 34 psu, and the salinity in the offshore area was between 31 and 33 psu. These conditions are similar to the 2003 condition, but markedly different from the 2004 and 2005 conditions when the sea surface temperatures were about 4°C lower. There is no reason to believe that the abundance estimates of the demersal resources were biased by the oceanographic conditions.

**Biomass estimates:** The effort, *i.e.* the number of stations by stratum on the southern shelf, is relatively similar from 2000 to 2007 and the estimates in this period are comparable. The estimates on the southern slope are very unreliable as the number of tows is very low due to difficult trawling conditions.

**Seabreams** The seabream biomass estimate in the southern region was about 15 500 tonnes and consisted almost entirely of *Dentex macrophthalmus*. This is a small increase from last year, however, the 2005-2007 estimates are the lowest estimates in the time series since 1986. In the central and northern regions, the biomass estimate of seabreams in 2007 was about 22 191 tonnes, which is an 11% reduction from 2006. *D. macrophthalmus* and *D. angolensis* comprised 7% and 25%, respectively, to the 2007 estimate. Other abundant seabreams are *Pagellus bellottii*, *D. canariensis* and *D. barnardi*. The biomass estimates of seabreams have fluctuated since 2000, and there is no clear long-term trend in the time series.

**Hakes** *Merluccius capensis* is generally the dominating hake species in the south, and Angola shares this stock with Namibia. However, whilst no Benguela hake (*M. polli*) was caught on the southern shelf during the 2006 survey the species contributed to about 44% of the biomass in 2007. The total biomass estimate of hake (*Merluccius capensis* and *M. polli*) on the southern shelf and slope in 2007 were 3 000 and 1 500 tonnes, respectively. Only one valid station was carried out on the slope between 200 and 600 meters which make the 2007 estimate for the slope unreliable. On the shelf the hake abundance has declined annually since 2003, and the 2007 estimate is the lowest observed since 2000. The decrease is a reason for concern. In the central and northern regions, *M. polli* is the only hake species. Here, the estimated biomass of hake (*M. polli*) in 2007 was 11 157 tonnes, which is a 19% reduction from the 2006 estimate. Furthermore, the 2007 estimate is about 39% lower than the 2004 estimate.

**Shrimps** The two commercial important shrimp species *P. longirostris* and *A. varidens* are never found in high densities south of Tombua, as in 2006, neither *P. longirostris* nor *A. varidens* were caught in the southern region in 2007. In 2007, the biomass estimate of *P. longirostris* for the central and northern regions was 1 342 tonnes, which is a 33% reduction from the 2006 estimate. Although the high CV indicates show that the estimate is relatively uncertain, the biomass trend in the last years seems to support that the stock has increased since the end of the 1990s. The 2007 estimate of *A. varidens* was 1 026 tonnes, which is a 21% increase from 2006.

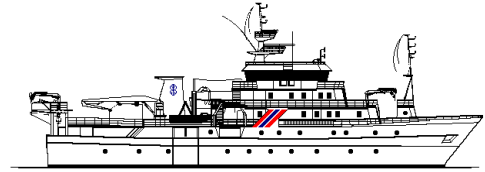
**Grunts** Commercially important grunt species are *Pomadasyus incisus* and *P. rogeri*, and was only caught in one trawl station in the southern region. The biomass estimates of grunts in the central and northern regions in 2007 was 17 242 tonnes, which is a 37% increase from 2006, and the highest biomass estimate registered since 1985.

**Croakers** South of Tombua, the biomasses of the croakers have varied considerably between surveys during the last years. Therefore, no clear trend in the time series can be seen. However, the 2007 estimate of 4 200 tonnes is a large increase from last year's estimate of 900 tonnes, however, it is smaller than the very high 2005 estimate of about 6 200 tonnes. The estimates of *Umbrina canariensis*, which is one of the





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most important croakers, also show large annual variation and there is no evident trend in the time series. The biomass estimate of croakers, mainly *Umbrina canariensis*, *Atractoscion aequidens* and *Pseudotolithus typus*, in the central and northern regions was about 11 991 tonnes in 2007, which is a 20% increase from 2006. Generally, the biomass of *U. canariensis* has contributed to about 30-45% of the total biomass of croakers and has fluctuated in a similar way as the total biomass of croakers.

Groupers and snappers Groupers and snappers are not distributed in the southern region south of Tombua. In the central and northern regions the biomass estimates of groupers and snappers are relatively imprecise as showed by the high CVs. Further, the estimates show large fluctuation between surveys, and it is therefore difficult to identify any trend in the time series and conclude on the on the current state of these stocks. However, the 2007 biomass estimates of 950 tonnes and 113 tonnes of snappers and groupers, respectively, were considerably higher than the 2006 estimates.

Pelagic species For the pelagic species, the estimates of the biomass are characterized by the high variability throughout the years, particularly for horse mackerel, hairtail and barracuda. The bottom trawl is not an adequate sampling gear for the pelagic fish species; therefore no certain conclusion may be drawn for these resources. More adequate results are achieved from the acoustic surveys conducted in July and August.

**Report: status: final References:**

Title not available

**Constraints/Comments:**

