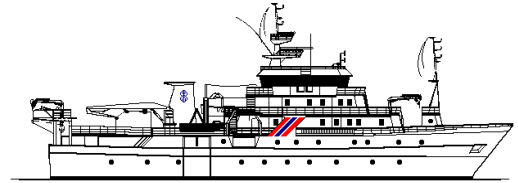


<b>Country:</b> Angola				
<b>Research vessel:</b> R/V DR. FRIDTJOF NANSEN				
<b>Survey number:</b> 2011403				
<b>Number of days:</b> 21				
<b>General objectives:</b> Survey of the Demersal Resources of Angola				
	Port	Date	Coverage	Specific objectives
<b>Departure</b>	Pointe Noire, Congo	20 March	Angola	<ul style="list-style-type: none"> <li>To map and describe the distribution, composition and abundance of the main demersal species, with emphasis on seabreams (Sparidae), croakers (Sciaenidae), grunts (Haemulidae), groupers (Serranidae), hakes (Merlucciidae), cephalopods and shrimps (<i>Parapenaeus longirostris</i> and <i>Aristeus varidens</i>) on the Angolan shelf and slope (down to 800 m), from Benguela (12°35'S) to Congo River (06°00'S) using bottom trawl and the swept-area method. Due to time constraints, it had been agreed to cover the southern region from Tombua (15°40'S) to Cunene River (17°14'S) at the end of the pelagic survey in July-August.</li> <li>To collect biological data such as length, weight, sex and maturity stage of <i>Dentex macrophthalmus</i>, <i>D. angolensis</i>, <i>Pagellus bellottii</i>, <i>Pseudolithus senegalensis</i>, <i>Umbrina canariensis</i>, <i>Merluccius polli</i>, <i>Brachydeuterus auritus</i>, <i>A. varidens</i>, <i>P. longirostris</i>, <i>Chaceon maritae</i>, <i>Panulirus regius</i> and cephalopods.</li> <li>To collect stomach contents for <i>D. angolensis</i>, <i>Merluccius polli</i>, <i>P. senegalensis</i>, <i>U. canariensis</i> and <i>B. auritus</i>, for subsequent analyses in the INIP Lab.</li> <li>To monitor the general hydrographical conditions using thermosalinograph and CTD sondeon trawl station and map the temperature, salinity and oxygen.</li> <li>To carry out four monitoring lines (Namibe, Lobito, Palmerinhas and Congo River mouth) using INIP's new standard hydrographical profiles for collection of temperature, salinity and oxygen, water nutrients, phytoplankton and zooplankton.</li> </ul>
<b>Arrival</b>	Luanda, Angola	9 April		
<b>Cruise leader:</b> Sigbjørn Mehl				





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### Participants:

From INIP, Angola (22.03-09.04): Silvi Nsiangango (Local Cruise Leader), Virgílio Estêvão, Fátima Delicado, Mário Fortunato, Pedro Panzo, David Kissungo, Euzébio dos Santos, Bomba Bazika Sangolay and Paulo Coelho.

From IMR, Norway: (20.03-09.04) Sigbjørn Mehl (Cruise Leader), Inês Dias Bernardes, Jan Frode Wilhelmsen and Terje Svoren.

### Summary of the results:

From 23 March to 8 April the 2011 demersal fish resources survey, off Angola, was carried out using R/V "Dr. Fridtjof Nansen". Due to time constraints, only the shelf and upper slope (20-800m) from Benguela to Congo River was covered. In the Central Region the number of trawl stations was reduced by almost 30%, while in the Northern Region the number of stations was reduced by 15%.

In total, 133 trawl stations were carried out, of which 131 were valid and used in the biomass estimation of the demersal stocks. To map the oceanographic conditions 110 CTD stations were taken.

### Hydrographical conditions

The 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 due to the freshwater coming from the coastal rivers. This can be observed clearly in the Central Region; the temperature ranged from 26°C to 30°C rising from coast to offshore, with salinity decreasing northwards. The lowest values of both temperature and salinity were found near the coast, probably due to the freshwater intrusion from coastal rivers (Catumbela, Longa, Keve and Kwanza). The seasonal saline front area which is the characteristic pattern of this region during summer period can be observed. Another important feature is the presence of gyres near the coastal rivers possibly due to increased river flows from heavy inland rains.

The Northern Region was also characterized by transport of surface water flowing towards the coast. The surface temperature ranged from 29°C to 30°C, while salinity was about 33.0 to 33.5, but lower in at the Congo River outlet ( $S < 30$ ). Oxygen showed normal values over the whole region.

### Biomass estimates

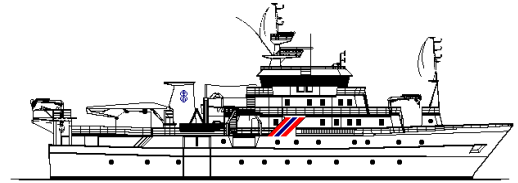
Angola has a high biodiversity regarding fish and invertebrate marine species. These species, despite having a low biomass individually, constitute an important fishery. Abundance trends within stocks of low biomass may show great variation, from year to year, due to low frequency of occurrence and large variability in catch rates; that, consequently, can be observed by a high CV connected to the biomass estimate. These low biomass estimates with individually large CVs may sometimes obscure the greater picture. We have therefore chosen to look at the overall trend in catch rates this year and compare these with the catch trends the last ten years when the survey methodology has been kept reasonably constant. The pelagic species (*Trachurus capensis*, *T. trecae*, *Sardinella aurita*, *S. maderensis*, *Sardina pilchardus* and *Engraulis capensis*) have been excluded from the analyses as these species are schooling pelagic species and may be caught in great abundance where they are caught, obscuring the overall tendency for the demersal species. Overall on the shelf, there has been a declining trend in catch rates since the recent peak in 2003 when the average catch rate was approximately 630 kg/hour. In 2011, this catch rate (excluding the pelagic species) had decreased to below 400 kg/hour. The situation on the shelf should be closely monitored, being the declining catches reason for concern.

On the slope between 200 and 800 m depth, the average catch rates have been more stable





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around 200 kg/hour. In 2003 the average catch rate was almost 500 kg/hour, being thus an exception to this trend. Also, the 2010 and 2011 estimates were lower than in the previous years and well below 200 kg/hour.

### Seabreams

In the Central and Northern regions, the biomass estimate of seabreams in 2011 was 20 900 tonnes, a decrease from the 2010 estimate of 25 700 tonnes. The 2010 estimate was, however, the highest estimated biomass since 2005. *D. angolensis* and *D. macrophthalmus* were the most abundant species.

### Hakes

*M. polli* was the only hake species caught in the trawl. The estimated biomass in 2011 was 6 700 tonnes, slightly below the 7 000 tonnes estimated the previous year. There has been a continuous declining abundance of hake in the two regions since 2004 and this year's estimate is the lowest since 1999.

### Shrimps

The biomass estimate of *P. longirostris* in 2011 was 1 500 tonnes, which is about the same as in the four previous surveys. A high CV value indicates that the estimate is relatively uncertain. The 2011 estimate for *A. varidens* was 1 300 tonnes, similar to 2010, 2008 and 2007 but lower than the estimate of 2 200 tonnes in 2009.

### Grunts

The biomass estimate of grunts in the Central and Northern regions in 2011 was 14 700 tonnes, higher than the 2010 estimate (10 900 tonnes)

### Croakers

The biomass estimate of croakers, mainly *U. canariensis*, *A. aequidens*, *P. senegalensis* and *P. typus*, was about 13 900 tonnes in 2011. This is an increase from 2010 when 8 300 tonnes was estimated. *U. canariensis* contributed about 43% of the total biomass of croakers in 2011.

### Groupers and snappers

In the Central and Northern regions the biomass estimates for these groups are relatively imprecise as shown by the high CV values. The biomass estimate of groupers decreased from 1 200 in 2008 to 800 tonnes in 2009 and to 640 tonnes in 2010, while the 2011 estimate was 700 tonnes. The biomass estimate of snappers increased from 90 tonnes in 2008 to 290 tonnes in 2009, decreased to 70 tonnes in 2010 and increased again to 270 tonnes in 2011. The estimates in the time series show large fluctuations, making it difficult to identify any trends and conclude on the current state of these stocks.

### Pelagic species

For the pelagic species, the estimates of biomasses are characterized by 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 these species estimates do not allow establishing reliable trends for these resources.

### Report: status: final References:

NORAD - FAO PROJECT GCP/INT/003/NOR. INIP. CRUISE REPORTS "DR. FRIDTJOF NANSEN" EAF - N/2011/1. **Surveys of the fish resources of Angola. Cruise report No 2/2011. Survey of the Demersal Resources. Part I. North and Central regions: Congo River – Benguela. 23 March – 8 April 2011** Bergen, 2011

### Constraints/Comments:

