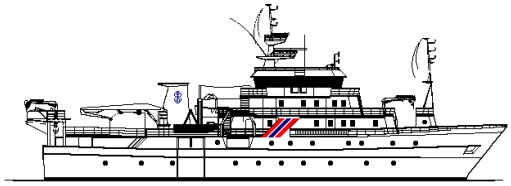
NANSEN PROJECT



Country: Angola				
Research vessel: R/V DR. FRIDTJOF NANSEN				
Survey number: 2010402				
Number of days: 31				
General objectives: Survey of demersal fish resources of Angola				
	Port	**Date**	**Coverage**	**Specific objectives**
Departure	Walvis Bay	1 March	Angola	• 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 (*Parapenaeus longirostris* and *Aristeus varidens*) on the Angolan shelf and slope (down to 800 m), from Cunene River (17°14‟S) to Tombua* (15°40‟S), and from Benguela (12°35‟S) to Congo River (06°00‟S) using bottom trawl and the swept-area method. • To collect biological data such as length, weight, sex and maturity stage of *Dentex macrophthalmus*, *D. angolensis*, *Pagellus bellottii, Pseudotolithus senegalensis, Umbrina canariensis, Merluccius polli, Brachydeuterus auritus, A. varidens, P. longirostris, Chaceon maritae, Panulirus regius* and Cephalopods. • To collect stomach contents for some species such as *D. angolensis*, *P. bellottii*, *P.senegalensis*, *U. canariensis* and *B. auritus,* for subsequent analyses at INIP. • To monitor the general hydrographical conditions using CTD-Sonde on each trawl station and map the temperature, salinity and oxygen. • 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.
Arrival	Luanda	31 March		
Cruise leader: Jens-Otto Krakstad (16.03-31.03), Diana Zaera (01.03-16.03) Silvi Nsiangango (01.03-31.03, local cruise leader)				

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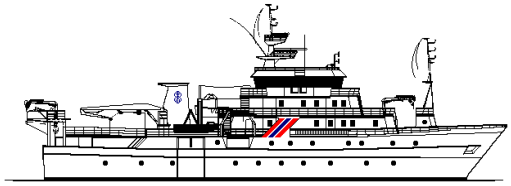

Participants:

From INIP, Angola: Silvi Nsiangango (local cruise leader), Virgílio Estévão, Antonio Bucu, Fátima Delicado, Mário Fortunato, Pedro Panzo, David Quissungo, Manuel Domingos, Euzébio dos Santos, Margarida de Sousa, Fidel Quilanda, Domingos Pedro, Bomba Sangolay.
From IMR, Norway: Jens-Otto Krakstad, Diana Zaera, Jan Frode Wilhelmsen, Thor Egil Johansson
From UiB, Norway: Aksel Voldsund, Trond Pripp.

Summary of the results:

Between the 1st and the 31st March, the demersal resource survey off Angola was successfully carried out on board the R/V *Dr. Fridtjof Nansen*. Except from the area between Tombua and Benguela, which is unsuitable for trawling due to poor bottom conditions, the shelf and upper slope (20-800 m) from Cunene River to Congo River was covered.
A total of 191 trawl stations were carried out of which, 188 were valid and used in the biomass estimation of the demersal stocks. To map the oceanographic conditions 253 CTD stations were taken.

Hydrographical conditions

The demersal surveys in March coincided with the end of the rainy season, which causes a drop in salinity at surface waters on the shelf off northern and central Angola due to the freshwater coming for the coastal rivers.
Both temperature and salinity parameters in the southern region were dominated by the zonal transport of surface waters from offshore to the coast. This phenomenon was more pronounced in the Namibe. The main feature of this zonal transport is the presence of tropical waters characterized by high temperature (24.5 °C) and high salinity (S>36).
Zonal transport of surface water was also characteristic for the central region except in the northern area of this region (from Cabo Ledo to Ponta das Palmeirinhas). The temperature ranged from 24ºC to 28ºC increasing from towards offshore and with salinity decreasing northwards. The lowest values for both temperature and salinity, were found near the coast probably due to the freshwater discharge from coastal rivers (*i.e.* Catumbela, Longa, Keve and Kwanza) The seasonal saline front area which is characteristic of this region during summer period could be observed. Another important feature was the presence of gyres near the coastal rivers possibly due to increased river flows.
The northern region was characterized by transport of surface water flowing towards the coast. However this zonal transport met a counter-current carrying inshore coastal waters offshore, most evident in the N'zeto .The northern part of this region was dominated by the presence of surface water with lower salinity (S<35) indicating the presence of water from the Congo River. Gyres observed south off the Congo River mouth were characterized by high temperature (30 ºC) and low salinity (S≤28.5) in the centre than in the surrounding areas. It was observed that as the temperature increased from coast to open sea, the salinity decreased offshore. The results indicate that 2010 was warmer than last year.

Biomass estimates

The report presents the time series from 1985 to 2010 of the biomass estimates for the most important species on the shelf and slope in the central and northern regions of Angola. The southern region is not included, as the surveys in this region have not been properly standardized throughout the years. However, the effort, *i.e*. the number of stations by stratum on the southern shelf, is relatively similar from 2000 to 2010 (Annex VIII) 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.

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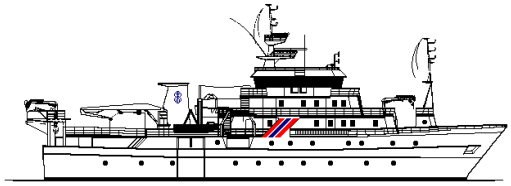


General trend

Angola has a large number of fish and invertebrate marine species which individually have a relatively low biomass, but together form 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 as 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 were they are caught obscuring the overall tendency for the demersal species. Overall on the shelf there has been a declining trend in the catch rates since the recent peak in 2003, where the average catch rate was approximately 630 kg/hour. In 2010 this catch rate (excluding the pelagic species) had decreased to 450 kg/hour. The situation on the shelf should be closely monitored and it is reason for concern.

In the region offshore of 200 m depth catch rates have been more stable and there is, with the exception of this year's survey, no clear trend in declining biomass.

Seabreams

The seabreams biomass estimate in the southern region in 2010 was 9 200 tonnes. The abundance continued the decline observed every year since 2007 (highest value). The biomass consisted almost entirely of *D. macrophthalmus*. In the central and northern regions, the biomass estimate in 2010 was of 25 200 tonnes, an increase from the 2009 estimate of 18 000 tonnes and the highest value observed since 2005. *D. angolensis* and *D. macrophthalmus* were the most abundant species.

Hakes

M. capensis is generally the dominating hake species in the south, and Angola shares this stock with Namibia. The proportion of *M. polli* in this region varies greatly. In 2010, 99% of the shelf biomass (2 500 tonnes) was *M. capensis*. This estimate is in line with surveys with declining catch rates before 2009. Also in 2009 *M. capensis* dominated, and there was estimated an exceptionally high biomass (31 000 tonnes). In the central and northern regions, *M. polli* is the only hake species found. Here, the estimated biomass of hake (*M. polli*) was 7000 tonnes, (8 100 tonnes in 2009). There has been a continuous declining abundance in hake in the two regions since the 2004 and this year's estimate is the lowest since 1985.

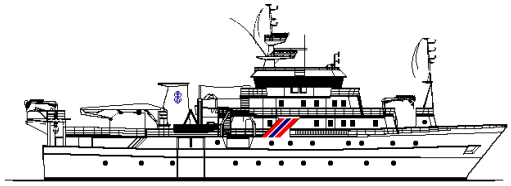
Shrimps

The two commercially important shrimp species *P. longirostris* and *A. varidens* are never found in high densities south of Tombua, and they were not caught neither in 2006 nor 2007. In 2008 both *P. longirostris* and *A. varidens* were caught in small quantities in the southern region. In 2009 no *P. longirostris* was caught, while the 600 tonnes estimated of *A. varidens* was the highest in the time series. In 2010 only *A. varidens* were caught with an estimated biomass of 200 tonnes. The biomass estimate of *P. longirostris* for the central and northern regions was of 1 600 tonnes which is at the same level as in 2008 but represents an increase from the 2009 estimate. The high CV value indicates that the estimate is relatively uncertain.

The 2010 estimate for *N. africana* was of 1 100 tonnes, which is less than half of the abundance estimate of 2009, but in line with the 2008 and 2007 estimates.

Grunts

Commercially important grunt species are *P. incisus* and *P. rogeri*, but no grunts were caught in



the southern region. The biomass estimate of grunts in the central and northern regions in 2010 was 10 800 tonnes. In 2009 the estimate was 8 200 tonnes, while in 2007 the estimate was 17 000 tonnes, which is 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. However, the 2010 estimate of 320 tonnes is the lowest in the time series and follow the declining trend seen in the 2009 and 2008 estimates (700 and 400 tonnes respectively) and represent a large decrease from the 2007 estimate of 4 200 tonnes. The biomass estimate of croakers, mainly *U. canariensis*, *A. aequidens, P.senegalensis* and *P. typus*, in the central and northern regions was about 8 200 tonnes in 2010. This is an increase from 2009 when 6 000 tonnes were estimated. *U. canariensis* contributed with about 50% to the total biomass of croakers in 2010

Groupers and snappers

Groupers and snappers were not caught in the region south of Tombua. In the central and northern regions the biomass estimates for these groups are relatively imprecise as shown by the high CVs. The biomass estimate of groupers continued the decreased from 1 200 tonnes in 2008 to 800 tonnes in 2009 and to 640 tonnes in 2010, while the biomass estimate of snappers increased from 90 tonnes in 2008 to 290 tonnes in 2009 but decreased to 70 tonnes in 2010. The estimates in the time series show large fluctuations, making it difficult to identify any trend and conclude on the current state of these stocks.

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. In 2010 the biomass was 77 000 tonnes in the southern region, this is in contrast with the high biomass estimates in 2008 (215 000 tonnes) and 2009 (322 000 tonnes). More adequate results are achieved from the acoustic surveys conducted later in the year.

Report status final References:

FAO PROJECT: CCP/INT/003/NOR, Cruise reports "Dr. Fridtjof Nansen". J.O. Krakstad, D. Zaera, S. Nsiangango and B. Sangolay. **Survey of the fish resources of Angola. Survey of the demersal resources. 1-31 March 2010.** Institute of Marine Research, Bergen. 2011

Constraints/Comments: