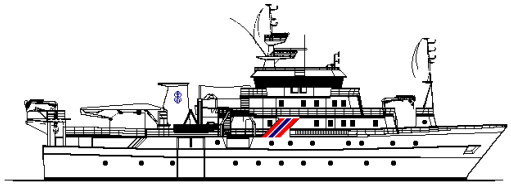
NANSEN PROJECT



Country: Angola

Research vessel: R/V DR. FRIDTJOF NANSEN

Survey number: 2011402

Number of days: 30

General objectives: Improving the general knowledge of the biology, ecology and population dynamics of the main pelagic species in relation to the environment and the ecosystem as such

	Port	Date	Coverage	Specific objectives
Departure	Walvis Bay	17 February	Angola	• To estimate the abundance and map the distribution of the main commercially important pelagic and semi-pelagic fish species in Angolan waters, including the two sardinella species *Sardinella aurita* and *Sardinella maderensis*, the Cunene horse mackerel *Trachurus trecae*, the Cape horse mackerel *Trachurus capensis* and other clupeid and carangid pelagic species. • To collect stomachs from both horse mackerel species for analyses of diet composition. • To collect stomachs and otoliths from both sardinellas species for analyses of diet composition and length-age relationships. • To collect depth-stratified samples of zoo- and phytoplankton in order to continue the studies on feeding biology, relating stomach contents to estimated zooplankton compositions and densities. • To map the general meteorological, hydrographical and biological conditions in the survey area by means of continuous recordings of weather data, CTD-casts (Temperature, Salinity and Oxygen), ADCP measurements (Acoustic Doppler Current Profiler) and plankton sampling along acoustical and hydrographical transect lines. • On-the-job training of cruise participants on the main survey routines, including using the Nansis database and scrutinizing acoustical data using IMR post-processing system, the Large Scale Survey System (LSSS). • To collect seal scats from the breeding fur seal colonies (with pups) in the Tiger Bay area in order to study their diet composition as basis for subsequent evaluations of their impact on the fish communities in the region.
Arrival	Pointe Noire	19 March		

Cruise leader: Diana ZAERA and Bjørn Erik AXELSEN

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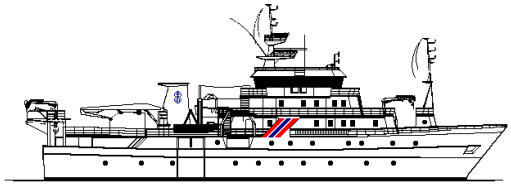


Participants:

From INIP, Luanda**:** António BARRADAS (Co-cruise leader), Quilanda FIDEL, Henriette Lutuba NSILULU, Francisco de ALMEIDA, Eusébio dos SANTOS and Geraldina SALVADOR. Pedro PANZO and Wsaso ANDRÉ.

From IMR, Bergen: Bjørn Erik AXELSEN (Cruise leader), Diana ZAERA, Tore MØRK and Ole Sverre FOSSHEIM.

Summary of the results:

Oceanographic conditions this year seem to differ from those found in previous years during the same season. This year the registrations show abnormal high temperatures and lower salinity values. This combination can be the cause that pelagic species appeared to be more dispersed and thus less available to acoustic estimation.

Sardinella

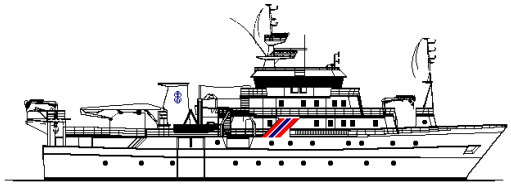
The estimated biomass of sardinella shows a cyclically fluctuating pattern throughout the time series. This is commonly found in pelagic species, usually reflecting actual changes in abundance but also variation in the availability of the surveyed populations, often caused by changes in the environmental conditions. The total biomass estimate for sardinellas was 259 800 tonnes. Although this result is not directly comparable with those of previous years, due to the season in which the survey has taken place, the trend follows the same downwards pattern. Nevertheless, the biomass calculated this year as compared with the one estimated during the last summer survey. This trend warrants for some caution in the management of these stocks. It is therefore now important to follow the landings of these stocks carefully, and the development of the biomass levels over the next years should be followed closely. At this point in time, it is not advisable to increase the fishing pressure on these stocks.

During the present survey both species of *Sardinella* contributed almost equally to the total biomass. By regions, *S. aurita* dominated in the south while *S. maderensis* both in the center and north regions. The overall length frequency distributions were dominated by adult cohorts. The distribution of *S. maderensis* shows well-defined cohorts with modal peaks around 10, 17 and 27 cm total length. For *S. aurita,* the distribution showed three modal peaks at 16, 23 and 30 cm TL.

Cunene horse mackerel

The total biomass of Cunene horse mackerel was estimated at 68 800 tonnes. This is a low estimate in the time series, although not directly comparable with previous years, due to the season when the present survey took place. Although the last pelagic survey carried out in the summer took place more than 10 years ago, when comparing both species' biomass estimates we can observe that this year's estimate is by far lower. The bulk of the biomass was found in the southern region (55 000 tonnes, representing around 80% of the total biomass). The biomass level in the central region was low (12 600 tonnes) while in the northern region the level was too low as to have a reliable estimate. An interesting observation during the present survey is that the horse mackerel was mainly caught in the bottom and was observed to remain there and not lifting as in other years. The current Cunene horse mackerel biomass is very low, and at the same level as in 2008 (winter survey).The reported biomass levels should be taken with considerable caution. The estimates are relative indices rather than absolute estimates of abundance, and the cyclic variation pattern may be accentuated by changes in behavior related to the environmental conditions. This variation is particularly evident in the Benguela Current frontal zone in the Southern region, where the cold Benguela meets the warm, subtropical Angola current. Prior to any conclusion, the results from this survey should be confronted with those from the coming winter pelagic survey.

During the present survey no upwelling in the south was observed and the Angolan-Benguela front (ABF) was located around Baía dos Tigres in the southern part of the south region. This could



have prevented the offshore migration of the Cunene horse mackerel, resulting in a less availability of the fish during this period. The actual position of the ABF might have prevented the Cunene horse mackerel to migrate from Namibian into Angolan waters.
Other biological references also clearly indicate that the Cunene horse mackerel stock is still under considerable pressure. From the reference year 1996, the length distributions have been shifting towards smaller fish, indicating high fishing pressure on the adult stock. In addition to this, estimates for the last years have shown clear indications of recruitment failure
Within this frame, increasing the fishing pressure on the Cunene horse mackerel could involve a high risk for failure on the long-term recovery of the stock.

Report: status: final References:

NORAD - FAO PROJECT GCP/INT/003/NOR CRUISE REPORTS "DR. FRIDTJOF NANSEN" EAF - N/2011/1. **Surveys of the fish resources of Angola. Cruise report No 1/2011. Survey of the Pelagic Resources. 19 February – 20 March 2011** Bergen, 2011

Constraints/Comments: