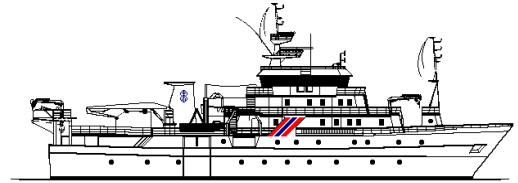


<b>Countries:</b> Ghana				
<b>Research vessel:</b> R/V DR. FRIDTJOF NANSEN				
<b>Survey number:</b> 2010404				
<b>Number of days:</b> 8				
<b>General objectives:</b> Investigate the fish resources on the slope of Ghana.				
	<b>Port</b>	<b>Date</b>	<b>Coverage</b>	<b>Specific objectives</b>
<b>Departure</b>	Tema, Ghana	29 April	Ghana	<p>The main objectives of the survey were:</p> <ul style="list-style-type: none"> <li>to describe the distribution, composition and estimate the abundance of the main demersal species on the outer shelf and slope from 100 – 1000 m depth by a swept-area trawl programme</li> <li>to collect zooplankton samples for distribution and abundance estimation</li> <li>to map the general hydrographic regime along the survey transect</li> <li>to provide on-the-job training to local participants in relation to the main survey routines</li> </ul>
<b>Arrival</b>	Tema, Ghana	7 May		
<b>Cruise leader:</b> Jens-Otto Krakstad				
<b>Participants:</b>				
<p><u>Marine Fisheries Research Division, Tema, Ghana:</u> Richmond Quartey (team leader), Eunice Anum-Ofoli, Edmund Nii-Anme, Jones Tetteh, Serwa Abogaye and Damoah Kwame</p> <p><u>University of Ghana:</u> Solomon Owiredu Amoah and Ignatius Kweku Williams</p> <p><u>California Academy of Sciences, USA:</u> Tomio Iwamoto</p> <p><u>Institute of Marine Research, Bergen, Norway:</u> Jens-Otto Krakstad, Oddgeir Alvheim, Tore Mørk and Thor Egil Johansson</p>				
<b>Summary of the results:</b>				
<p>The composition of the fish fauna on the continental shelf and slope of the western Gulf of Guinea changes with depth (Williams 1968). This survey only focused on the outer shelf and deep water slope off Ghana and the catch-distribution analyses were therefore performed for four depth strata, outer shelf (&lt; 100 m), upper slope (100-300 m) mid slope (300-600 m) and lower slope (&gt;600 m). In the analyses the “Demersal” group includes commercially important families as Sciaenidae, Haemulidae (=Pomadasyidae), Serranidae, Sparidae and Lutjanidae, and especially in deeper waters the Merluccidae, Macrouridae and Moridae. The “Pelagic” group includes Engraulidae, Clupeidae, Carangidae, Scombridae, Sphyraenidae, Gempylidae and Trichiuridae (the latter family is actually mainly benthopelagic). For the analysis the “other” group includes all species not accounted for in the groups listed.</p> <p><b>Catch rates</b></p> <p>A total of 35 swept-area trawl hauls were made in Ghana. Of these 7 trawls were conducted on the outer shelf, 12 on the upper slope, 8 on the mid slope, and 8 on the lower slope. The catch data are presented as catch/h per depth region. No trawling was conducted on the inner shelf and no swept area biomass estimates are available from this survey. The catch rates declined with depth. The catch rates within each depth region was 1622 kg/h on the outer shelf, 1093 kg/h on the upper slope, 612 kg/h on the mid slope and 813 kg/h on the lower slope. As expected also the valuable demersal species declined rapidly with depth while the non commercial species in the “other” group increased. In general, the average catch rates were highest in the western part of Ghana as has also been observed on the surveys on the shelf. The most abundant variance group on the outer shelf was the pelagic group with average catch rates of 759 kg/h. However the variance was high and the large average catch was mainly due to a large catch on one station. The pelagic group contributed 47% to the overall catch in this depth region. Within this group it was <i>Trachurus trecae</i> that was the most important species. Commercially important demersal species where the</p>				





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second most important group with 38 % and average catch rates of 615 kg/h. *Boops boops* and *Dentex congolensis* were the most dominant species. Cephalopods, sharks and shrimps were not important in the catches in this depth region. The group of other species contributed 12% and 200 kg/h to the overall catch. On the upper slope the “other” group was the most abundant. This group contributed 67% of the total catch with catch rates of 731 kg/h. Both the demersal and the pelagic group contributed with 15% of the total catch. The average catch rate was 164 and 169 kg/h respectively. Sharks, cephalopods and shrimps contributed 1.6%, 0.9% and 0.2% of the catch.

The most abundant group on the mid slope continued to be the group of “other” species with average catches of 444 kg/h and 73% of the overall catch. Shrimps were the second most important group with average catches of 101 kg/h and 17%. The most abundant species in this group was *Nematocarcinus africanus*, a non commercial small shrimp. Sharks had average catch rates of 34 kg/h, 5.5% of total. Pelagic species had average catch rates of 22 kg/h and 3.5% of the overall catch. Cephalopods had mean catch rate of 7 kg/h and 1.2% while demersal species contributed with 0.9% of the overall catch with average catch rates of 5 kg/h.

The group of “other” species continued to dominate on the lower slope with 87% of the overall catch and average catch rates of 708 kg/h. Sharks contributed with 70 kg/h and 8.5% of the overall catch while the demersal group contributed with 21 kg/h and 2.6%. Shrimps and Cephalopods were not important

### Biodiversity

The fish fauna of the outer shelf and slope of Ghana are poorly known and have been little collected, although several major initiatives in the past have focused on investigating the marine fauna of the broad area encompassing the Gulf of Guinea.

The paucity of past deep-water trawl collections made off Ghana make it likely that a large percentage of the slope fishes taken during the current *Nansen* survey represent species that have not previously been recorded in these waters. Because there is no current list of marine fish species of Ghana, confirming such records becomes a laborious task that will require searches of the primary literature. It is for that reason that we cannot now provide a list of the new records. With some confidence, however, we can say that certain groups collected during the survey likely contain species that have not been previously recorded, including the grenadiers (Macrouridae, Bathygadidae), deepsea anglerfishes (Ceratiidae, Diceratiidae), Congrid eels, tripod fishes (Bathypterois 3 spp.), cusk eels (Ophidiidae), slickheads (Alepocephalidae), soles (Soleidae), and snake mackerels (Gempylidae).

The pelagic *Trachurus trecae* was the most common single species both on the outer shelf and the upper slope; however the catch rate decreased rapidly below 100 m depth. *Priacanthus arenatus* became the second most important species on the upper slope. It was frequently caught but only in very low numbers also on the outer shelf. The species composition changed considerably when moving to deeper waters. At the mid slope the three most common species, *Synagrops bellus*, *Chlorophthalmus atlanticus* and *Nematocarcinus africanus* was not found among the 25 most common species in the depth regions above.

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At the lower slope *Yarella blackfordi*, *Stereomastis sp.* and *Aristeus varidens* were the three most common species. All three species has a distribution also in the mid slope but with lower concentrations. The total number of species and species group identified was 277 (including species only identified to Genus or higher taxa). The total number of species and species group identified per depth region were 84 on the outer shelf, 126 on the upper slope, 127 on the mid slope and 102 at the lower slope. Not taking into account the sampling intensity in each depth the biodiversity is highest on the upper and middle slope.

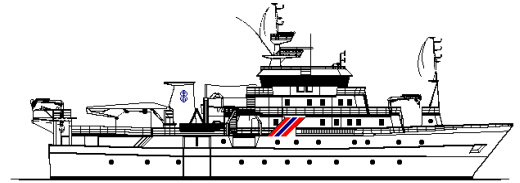
A number of new species previously not recorded in Ghana was reported during this survey. These species has been identified by Oddgeir Alvheim and Tomio Iwamoto and specimens have been stored for future reference at the California Academy of Sciences, USA.

A total of 183 species of fishes were identified, but this number should be used cautiously because not all specimens could be determined to species because of limitations in time and references available on the ship. The whole specimens will be deposited in the California Academy of Sciences in San Francisco, USA; the tissue samples will be sent to the University of Kansas for deposit in the Tissue Collection. The preserved specimens and tissues will serve to document the species of the survey and will be used to more-definitively determine their correct identifications.





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### Consideration for commercial trawling

The purpose of this survey was to investigate the fish resources on the slope of Ghana. Previous surveys have only covered the shelf of Ghana with an occasional trawl in deeper depths. The observations from this survey will guide in the management also of the deep water slope. The slope off Ghana is falling rapidly at depths around 100 m to depths beyond 1000 m. Large areas of the slope is steep and rugged with canyons tearing trough making these areas mostly inaccessible to bottom trawling. This applies specifically to an area just of Volta river mouth, to the south west of Accra and off three points. Commercially valuable demersal species were only caught in very small amounts on the slope with declining densities with depth

### Report: status: final References:

#### Preliminary report

FAO PROJECT: CCP/INT/003/NOR CRUISE REPORTS "DR. FRIDTJOF NANSEN"

EAF - N2010/4. **Surveys of the demersal fish resources of the outer shelf and slope off Ghana. 30 April - 07 May 2010.** Bergen, November 2010

### Constraints/Comments:

