

**CRUISE REPORTS “DR FRIDTJOF NANSEN”**  
**SURVEY OF THE PELAGIC FISH STOCKS AND ECOSYSTEM OFF**  
**NORTHWEST AFRICA**

**Leg 4.2: Mauritania9 - 20 October 2019**

This survey is part of a synoptic coverage of the pelagic resources and ecosystem off West Africa, from South Africa to Morocco, undertaken by R/V *Dr Fridtjof Nansen* in 2019. These surveys, covering the continental shelf and upper slope from approximately 20 to 500 m depth, had multiple objectives and were hence multidisciplinary. The physical and chemical oceanography was intensively sampled both underway and with a series of fixed stations along transects perpendicular to the coast. Plankton and chemical samples were taken along a series of transects perpendicular to the coast, along with samples of microplastics. Simultaneously, the pelagic stocks were assessed using acoustics complimented by trawling. All surveys used standardised methods to ensure comparability.

This summary presents the preliminary results from Leg 4.2, i.e. off the coast of Mauritania from 9 to 20 October 2019. Many of these results have not yet been verified and therefore should not be distributed. A draft of the full report will be available by the end of November 2019.

An east-west acoustic sampling grid, with a transect spacing of 10 NM, covered the shelf from 20 m and slope to the 500 m bottom depth contour. Biological sampling of the fish was carried out using pelagic and bottom trawls. Standard hydrographic sections were sampled along the acoustic transects. Phytoplankton, zooplankton, ichthyoplankton and micro-plastics were also sampled.

With the expanding scope of the research to be carried out in the context of the EAF-Nansen Programme, the survey objectives and related sampling strategy have been expanded to support research on life cycles, stock identities, and trophic relationships of pelagic fish. For these facets, special effort was made to sample several biological parameters for post-survey age and growth, stock structure, population biology and trophic interaction studies.

Altogether 36 trawl hauls were carried out to identify acoustic targets during the survey. A total of 25 CTD casts were made to describe the hydrography of the survey area, 15 plankton stations were also sampled.

The information presented below is a brief summary of the results of the data analysed during the surveys. Some samples and data have been transported to research institutes in the region, and also farther afield (notably IMR in Bergen, Norway). Samples will be analysed in close cooperation with partner institutions and the resulting datasets will support research as part of the EAF-Nansen Science Plan.

### **Ecosystem**

The hydrographic data suggested a well-stratified system with below saturated dissolved oxygen concentration in the surface layers and hypoxic waters below 100 m. The stratification was stronger north 16°05'N reaching a maximum at 19°05'N. The region where the oxygen minimum zone (OMZ) was most pronounced, offshore on 19°N, anoxic waters were recorded with a value under 50 µMol/kg. Away from the frontal zone anoxic waters, to below 50 µMol/kg, were recorded close to the bottom on the shelf-break from 100 m and below.

A hydrographic front was recorded around 19°05'N where permanent upwelling to the north of Mauritania starts to impact the Mauritanian hydrographic system creating less stratified waters with more oxygen in the surface and upper layer.

The Senegal River seems to have impacted the salinity and the oxygen concentration near the shore at 16°05'N.

Low phytoplanktonic activity was recorded throughout the region, with a chlorophyll maximum at around 25 m depth.

### **Fish abundance and distribution**

Pelagic fish were present over large parts of the region, with greater densities towards the north. The main densities of pelagic fish were found inshore of 50 m bottom depth, and was believed to sometimes extend inshore of the survey area.

The estimated biomasses of the main pelagic groups are summarised in the following table.

<b>2019</b>	St Loius – Cap Timiris	Cap Timiris – Cap Blanc	Total
<i>S. aurita</i>	40,600	23,300	68,500
<i>S. maderensis</i>	200	4,400	
<i>S. pilchardus</i>	To be confirmed		64,400
<i>E. engrasicolus</i>	33,600	30,600	
<i>S colias</i>	Minimal		222,900
<i>T. trecae</i>	131,100	76,000	
<i>T. trachurus</i>	0	15,800	
<b>Total</b>	<b>205 500</b>	<b>150 100</b>	<b>355 800</b>

*Note that these estimates need to be carefully checked and verified. It is believed that they will not change substantially but this cannot be guaranteed*

A comparable survey was conducted by the R/V *Dr Fridtjof Nansen* in 2017. Below is a summary of those results.

<b>2017</b>	St Loius – Cap Timiris	Cap Timiris – Cap Blanc	Total
<i>S. aurita</i>	34,000	0	149,900
<i>S. maderensis</i>	109,400	6,500	
<i>S. pilchardus</i>	0	61,300	61,300
<i>E. engrasicolus</i>	44,300	34,000	78,200
<i>S colias</i>	4,900	20,400	25,300
<i>Horse mackerels</i>	24,800	67,000	91,800
<b>Total</b>	<b>217 400</b>	<b>189,200</b>	<b>406,500</b>

The overall biomass of all pelagic species is similar, however these preliminary results suggest that the biomass of sardinella is considerably less in 2019. In contrast the estimated horse mackerel biomass appears to be more than double. As has already been noted, these estimates need to be checked, including that the acoustic values have been allocated to the correct species.

Small pelagics are short-lived, highly fecund fish. They live in an unstable part of the marine system, the near surface environment varying more than any other habitat in the ocean. The abundance of small pelagics can therefore change dramatically in a short period of time, hence the changes in abundance of the various species may be simply part of natural changes that would have occurred without any harvesting. However, the apparent reduction in sardinella biomass is considerable and should be carefully monitored. *S. aurita*, which comprised the majority of the sardinella biomass, were almost entirely juveniles of less than 1-year old. This indicates that, if these fish survive, the biomass of the stock may increase during the coming year.