



# DISTRIBUTION OF FIN WHALES AND KRILL AGGREGATIONS OBSERVED OFF THE GALICIAN COASTS DURING THE CODA-IEO SURVEY

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## INTRODUCTION.

In July 2007 the internationally coordinated project CODA (*Cetacean Offshore Distribution and Abundance in the European Atlantic*) involving 5 ships from 4 countries surveyed the offshore waters of the Northeast Atlantic (MacLeod et al., 2008). The objectives were to obtain abundance estimates of cetaceans and to model habitat preference of selected species. The CODA-IEO survey was carried out from the 17th of July to the 1st of August on board the R/V Cornide de Saavedra and covered the SW (block 3) of the CODA surveyed area (fig. 1). During the cruise additional data on the physical and biological characteristics of the water column was obtained to investigate the relationship between the distribution of fin whales and their main prey, the krill (*Meganyctiphanes norvegica*).

## MATERIAL AND METHODS.

Observations of cetaceans were carried out with two teams of observers following the SCANS methodology (SCANS, 2008). Data on the physical and biological characteristics of the water column was collected both by automatic recording and by sampling at predetermined stations. A thermo-salinometer and a fluorometer were continuously recording on the surface waters while temperature and salinity of the water column up to a depth of 300m were measured with XBT probes and CTD at fixed stations (fig.2). At the same stations zooplankton was sampled using a WP2 net. The scattering layer was continuously recorded with a split-beam EK-60 Simrad echosounder working at 5 frequencies (18, 38, 70, 120 and 200 KHz). Groundtruthing of the acoustic echoes was carried out at night at selected stations with a modified Juday-Bogorov net with a 2m diameter.

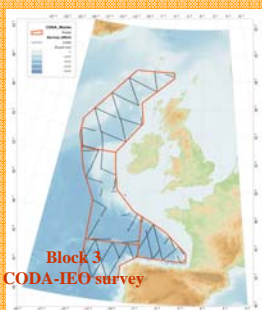


Fig. 1. The four blocks of the CODA surveys

## RESULTS AND DISCUSSION.

The XBT data is represented horizontally to show the distribution of the temperature at different depths (fig. 3a) and in profiles along transects (fig 3b). We found stratification of the surface water in the survey area, with the thermocline located between 40-60m depth in most transects.

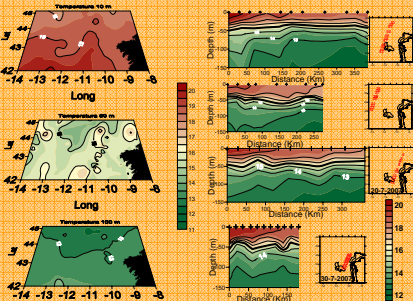


Fig. 3a. Temperatures at 10, 50 and 100 m. depth.

Fig. 3b. Temperature profiles along transects.

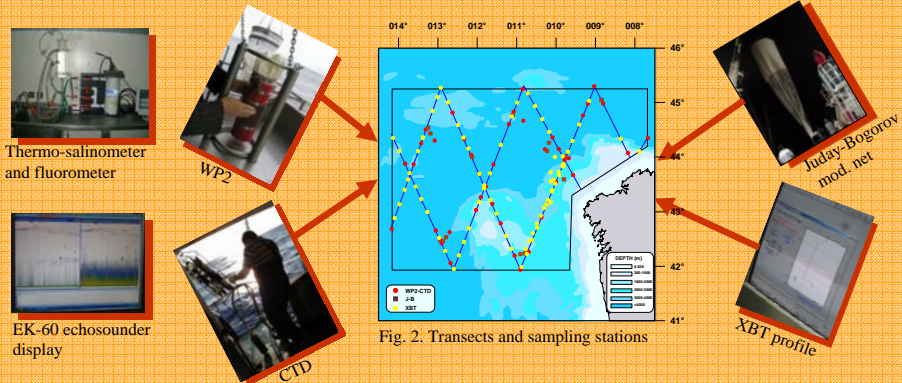


Fig. 2. Transects and sampling stations

A total of 2134 km divided in 8 transects were searched on effort during the survey. Fin whale was the species most frequently sighted (more than 60% of the sightings). The majority of fin whale sightings were of single individuals although pairs and groups of 3 whales were also recorded. Fin whales were present throughout all the surveyed area, showing a patchy distribution. Most fin whales were found in the area between the Galicia Bank and the Galician (NW Spain) shelf (fig. 4).

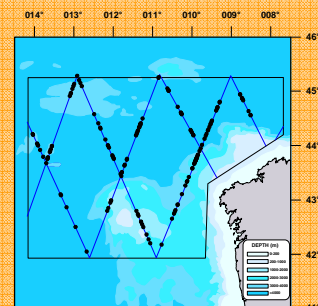


Fig. 4. Fin whale sightings

The pelagic fauna sampled with the J-B net comprised a variety of organisms such as salps, copepods, amphipods, euphausiids, brachyurid decapods, mysidophid and syngnathid fish (fig. 5). The euphausiid *Meganyctiphanes norvegica* was the most abundant species at station 5 (98% in number of individuals) with a mean size of 28.4 mm (n = 215) (fig. 6). It was also the most abundant species (65-70%) at two close stations (14 and 15). Salps appeared at several stations, sometimes as the dominant species (70-98%). Amphipods, syngnathidae fish and the brachyurid decapod (*Polybius henslowii*) also appeared in important numbers (>20%) at certain stations.

A visual inspection of the echograms obtained along the survey was carried out to identify different eco types. Echoes similar to the ones found in station 5 were detected along the survey.

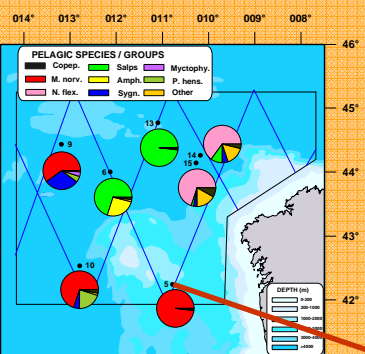


Fig. 5. Composition and distribution of pelagic fauna

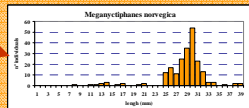


Fig. 6. Ground truthing with the J-B net in station 5 and corresponding EK 60 echotracés at the five working frequencies

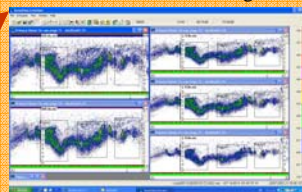


Fig. 7. Distribution of krill-like echotracés

It could be provisionally assumed that this eco type may identify krill biomass along the echogram. Figure 7 shows its distribution in the surveyed area, that could correspond to concentrations of krill. The presence of *M. norvegica* at stations 9 and 10 coincides with locations where this eco type was found.

Some echograms, including the one obtained at station 5, showed the presence of some unusual echoes with a red nucleus. It has been estimated that they were produced by objects with a size of about 15x 3 m. It is proposed that these red spots correspond to individual fin whales adopting different positions while feeding on the krill layer (Fig. 8).

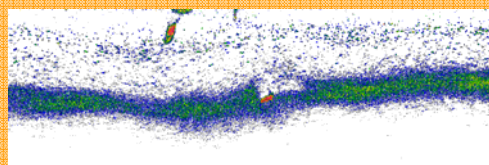


Fig. 8. Echotrace (120 KHz) in station 5 at sampling speed (2.5 knots)

## CONCLUSIONS.

Information derived from the whaling period had shown summer concentrations of fin whales feeding on krill between the Galician Bank and the continental shelf (Lens, Santos and Miranda, 2007). We have now identified for the first time the presence of euphausiids as an important component of the scattering layer in this area. Evidence obtained during this survey contributes to confirm the role of the area as a feeding ground for fin whales.

The association between oceanographic features, krill aggregations and fin whale distribution at a finer temporal and spatial scale needs further investigation.

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