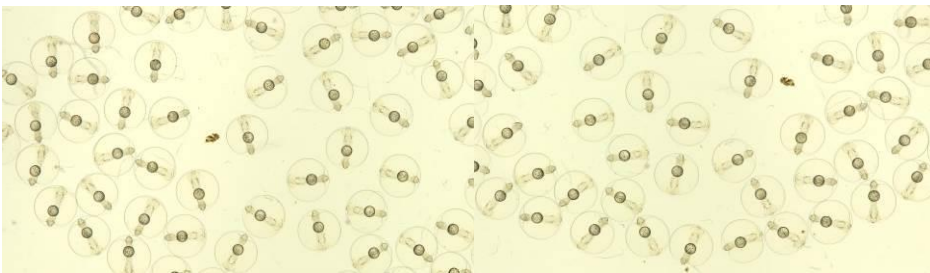


# **Mackerel winter spawning surveys 2014-2015 January survey: Survey report**

C.J.G. van Damme<sup>1</sup> & G. Holst<sup>2</sup>

Report number C014/15



## **IMARES Wageningen UR**

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Publication date:

24 March 2015

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## **Summary**

In recent years the western Atlantic mackerel stock has expanded, resulting in an earlier start of spawning and earlier occurrence of the mackerel peak of spawning. In 2014 and 2015, mackerel winter spawning surveys have been conducted to determine the start date of mackerel spawning in the western area. During the surveys both plankton sampling and trawl hauls are carried out.

This report contains the results of the January 2015 survey, carried out on board the CETON S205. Due to the bad weather circumstances we could not follow the planned station grid, and were only able to carry out one plankton haul and four pelagic trawl hauls. The plankton sample did not contain any eggs. In one of the pelagic trawl hauls one mackerel female just starting to develop her ovary for first time spawning and one small running mackerel male were caught.

It seems unlikely mackerel spawned in the Bay of Biscay and Celtic Sea during this January survey, but the amount of results from this survey are too limited to underpin that conclusion.

Despite the very friendly and helpful crew on board CETON S205, it should be understood that fishing vessels are not ideal platforms for performing plankton surveys for practical reasons. On one hand collection of samples is suboptimal, and there is no proper area to sort out and identify eggs from the samples.

## **1. Introduction**

In recent years the western Atlantic mackerel stock has expanded, resulting in an earlier start of spawning and earlier occurrence of the mackerel peak of spawning. Recent surveys in 2010 and 2013 have clearly shown that spawning starts earlier and that the spawning peak occurs earlier than has been observed previously. The net result is that potentially an unknown part of the spawning early in the season was missed in the 2010 and 2013 Atlantic mackerel egg surveys. The current triennial mackerel egg survey is designed to cover the whole spawning area and period. To get a reliable estimate of the spawning stock biomass from an egg survey, the egg survey needs to cover the whole spawning area and period.

## **2. Aim of the project**

The aim of this mackerel winter surveys project is to determine the start time for mackerel spawning in the western spawning component area in 2015, preparatory for a full triennial egg survey in 2016. Four surveys will be carried out, the second one in January 2015. This project is a collaboration between fisheries research institutes and the pelagic industry.

The principle purpose of these surveys is to identify where and when mackerel spawning starts in the western area. This information is vital in planning the appropriate spatial and temporal coverage for the next ICES Triennial Mackerel Egg Survey in 2016. Any new information on spawning start will also inform the analysis of the egg survey results to produce the estimate of the stock biomass for use in the analytical assessment.

This report contains the cruise report of the January survey.

### **3. Materials and Methods**

#### **3.1 Vessel**

The survey was carried out on board the "CETON S205" a trawler and purse seiner, registered in Denmark with Swedish crew (Figure 3.1).



Figure 3.1. The vessel CETON S205.

#### **3.2 Sampling gear**

The sampling of the mackerel eggs was performed with a "Nackthai", a High Speed Plankton Sampler similar to the "Gulf VII" (Nash *et al.* 1998), with a plankton net with mesh size 250  $\mu\text{m}$ . A small Scripps depressor (25 kg) was attached to the plankton sampler for stabilisation of the torpedo in the water. The amount of water filtered during each haul was measured using a mechanical flowmeter mounted inside the nosecone.

A small Seabird SBE 37-SM MicroCAT was mounted on the sampler frame to measure temperature and salinity during deployment. The trawl sensor from the vessel was mounted on the winch cable, just above the attachment of the plankton sampler, and used to capture a 'real-time' graphical display of the depth of the plankton sampler in the water column.

Mackerel were sampled using the pelagic trawl of the vessel.

#### **3.3 Fishing method**

The speed during fishing with the plankton sampler was 4 knots through the water. A 'double oblique' haul (a V-shaped haul through the water column) was performed, trying to sample each 10 meters of the water column 1 minute going down and going up.

When markings were visible on the echo sounder a trawl haul would be carried out to try and catch adult mackerel.

#### **3.4 Proposed sampling grid**

Figure 3.2 shows the proposed sampling grid for the survey. The setup of the survey was to sample around the 200m depth contour (shelf edge) where highest spawning concentrations occur during the standard mackerel egg surveys.

At planned stations a haul with the Nackthai would be performed to sample mackerel eggs. A total of 100 mackerel gonads were planned to be collected for oocyte development and fecundity analysis.

**Survey: Mackerel Winter Egg Survey 2015 January Period 2**

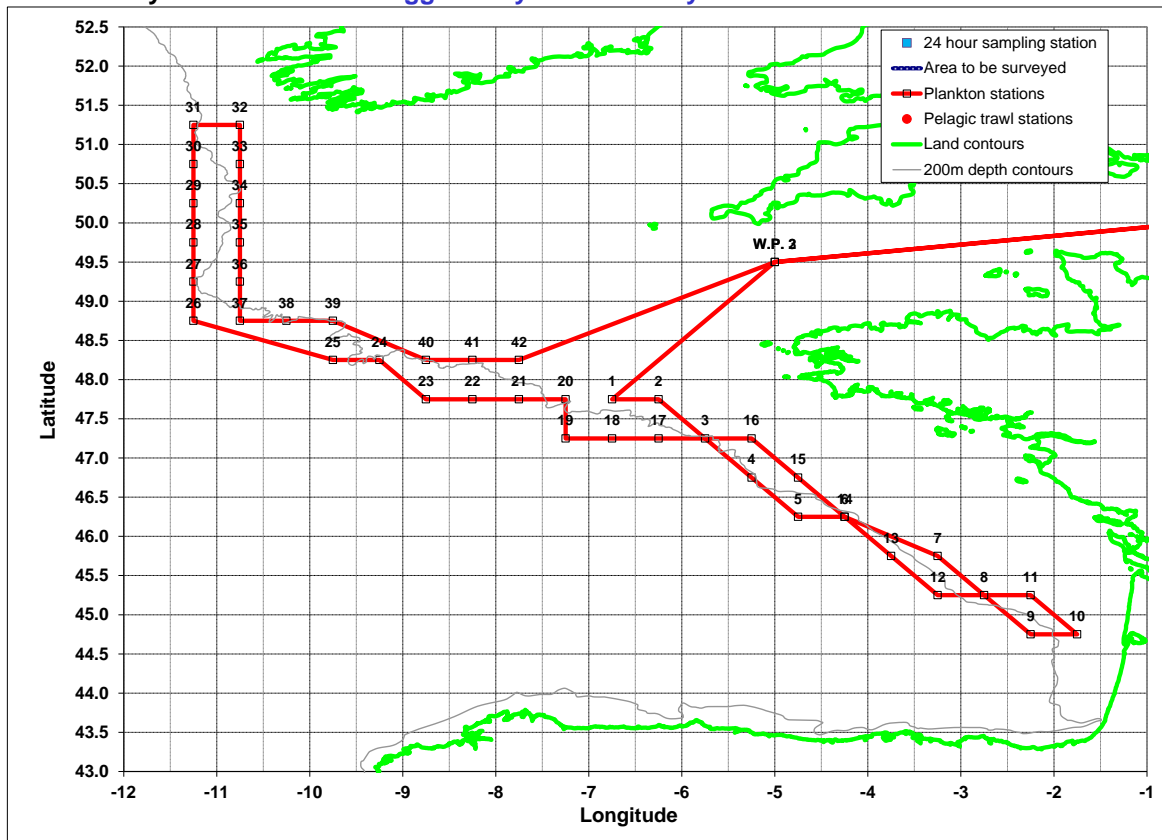


Figure 3.2. Proposed sampling grid.

## 4. Results

### Date, time and harbours

From (harbour)	Date	Time (UTC)	To (harbour)	Date	Time (UTC)
IJmuiden	09-01-2015	08:00	IJmuiden	17-01-2015	20:00

**Scientific crew** Cindy van Damme (cruise leader)  
Gert Holst

### Deviations from the planned sampling grid

Due to very bad weather circumstances during the whole survey the proposed sampling grid could not be followed. Figure 4.1 shows the positions of the plankton and the trawls hauls carried out.

#### Survey: Mackerel Winter Egg Survey 2015 January Period 2

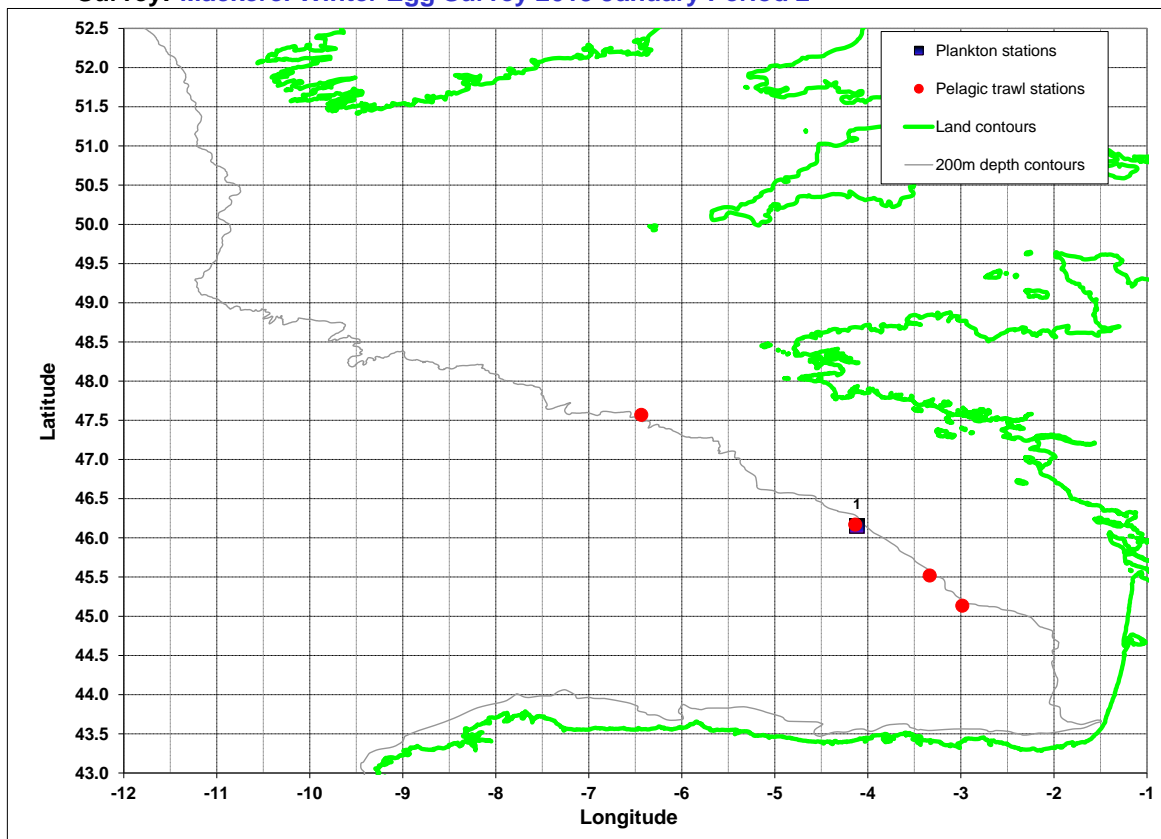


Figure 4.1. Stations sampled in January 2015.

### Damage to sampling equipment

No damage to the sampling equipment occurred during this survey.

### Survey

CETON arrived in IJmuiden at 05:00 (UTC) on the 9<sup>th</sup> of January. It was first checked if all necessary gear was on board. Before arrival in IJmuiden, it was already agreed that IMARES would supply a scale and printer cable. No drogue was available to attach to the Nackthai.



A drogue, an open bag attached, on a long line, at the back of the plankton sampler to pull the plankton sampler away from the vessel, was essential since the plankton sampler would be set and hauled from the stern of the vessel. We went to IMARES to collect a drogue for the survey.

CETON left IJmuiden harbour on Friday 9<sup>th</sup> January at 08:00 (UTC). Weather circumstances were bad and declined rapidly moving south in the North Sea and through the English Channel. It became clear that the circumstances would probably not allow for plankton sampling. The current and wind against us, meant that the ground speed was very low. Due to these bad weather circumstances it was decided to change the survey plan and head immediately south into the Bay of Biscay. The weather forecast predicted better circumstances in the southern part of the sampling area.

We arrived Monday 12<sup>th</sup> January in the southern Bay of Biscay. The weather was still not ideal to conduct a Nackthai haul. Some markings were seen on the echosounder so we carried out a trawl haul. The catch consisted of small juvenile horse mackerel. We moved a bit further north along the 200m depth contour. Again, markings were seen on the sounder and we decided to try another trawl haul. The catch this time consisted of juvenile mackerel of approximately 8-10 cm. Two larger specimens of about 15 cm were also found. One turned out to be a running male. The second one was a recruiting female, which had started to develop the ovary, but in a very early stage (Walsh scale stage 2). After the second haul we moved further north again. No more markings were seen on the echosounder during the night and we did not do any trawl hauls.

On Tuesday we decided to try a Nackthai haul. It was difficult to deploy the plankton sampler from the stern, but the crew managed to do it. Bottom depth was 176m, and we managed to lower the Nackthai down to 150m. We used 900m cable and we could not get the sampler any deeper in the water column since no more cable was available. We therefore decided to haul the sampler back to the surface. Close to the surface the trawl sensor showed that the sampler was breaking the water surface and going up and down. This could however not be seen from the ship, so this was probably a defect of the trawl sensor. The plankton sample did not contain any fish eggs, although it is advised to thoroughly check the sample once back in the laboratory. Circumstances on board did not allow for a proper sorting, even though only small amounts of plankton were in the sample.

We did a third trawl haul on Tuesday. This time the catch was big horse mackerel and a few hake and blue whiting.

There were also two Dutch freezer trawlers in the area, the "Frank Bonefaas" and "Carolien". We contacted the Frank Bonefaas. They were further on the shelf at around 150m depth. They told us they had been in the area for two days and seen no mackerel. Before that they had caught some mackerel at 48°N.

We decided to move further north again and stay along the 200m depth contour. We saw markings on the echosounder again on Wednesday and decided to do another trawl haul. This time we saw gannets, gulls and skuas behind the vessel, suggesting there was fish in the area. We had not seen any birds before. The catch was quite big, but only contained boarfish. During the triannual Atlantic mackerel egg surveys in May and June we normally catch some mackerel with the boarfish, but this time there were none.

We moved further north again but the weather was awful and we could not trawl. We decided to stop the survey on Thursday and return to IJmuiden.

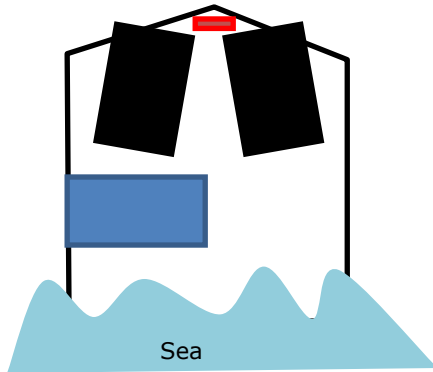
### **Samples and data**

We sampled 1 plankton stations and 4 pelagic trawl hauls.

### **Remarks for the next surveys**

The crew of CETON was very nice and helpful. However, fishing vessels are not ideal to carry out plankton sampling with a Nackthai or Gulf VII type plankton sampler, mainly for practical reasons.

On board the CETON the Nackthai was deployed from the stern using the trawl sensor winch of the vessel. The CETON has a flat high stern, with the winch about 5-6 meters above the water surface, though the level of putting the sampler in the water is only about 2 meters above the water surface (see schematic drawing). This does however mean that you have a long end (3-4 meter) of the winch cable to be pulled down to the deck and it is difficult to manoeuvre the plankton sampler in and out of the water. A drogue is certainly essential when employing a plankton sampler from the stern of any vessel and certainly where the winch is high above the water surface.



*Schematic drawing of the stern of the CETON looking from behind towards the vessel (black line: outline of the stern; red: position of the winch; blue rectangle is the open area of the stern where the trawl and plankton sampler are hauled and set from; black rectangles are the fishing doors for the pelagic trawl).*

Furthermore, a commercial fishing vessel contains limited space for sorting and identification of the plankton samples and do not contain the necessary equipment to analyse the samples (e.g. no fume hood, no good table with chair to sit one while working behind the microscope).

It is advised that for the next plankton survey on board a fishing vessel, the scientist in charge should go on board the vessel to check the circumstances and decided whether the vessel is suitable and what equipment is necessary to take on board.

### **Numbers of mackerel (eggs)**

No mackerel eggs were found on board in the one plankton sample. One female mackerel just starting to develop her ovary for first time spawning and one small running mackerel male were caught in the second trawl haul.

## **5. Concluding remarks**

It is not possible to reliably conclude anything from the results of this January survey. Based on the trawl hauls and the plankton sample, it seems likely that mackerel is not yet spawning in the southern Bay of Biscay. This was supported by the fact that the freezer trawlers in the area did not catch any mackerel either.

If mackerel is spawning in the north of the area in the Celtic Sea, we are not able to say. We did not catch mackerel at 47.35°N, which was the northernmost trawl haul. We did not see any markings up to 48°N, but we could not sample in the northern area due to the bad weather circumstances.

One can speculate whether the weather circumstances might have delayed mackerel spawning, but there is no proof of that either.

The crew of CETON were very welcoming, helpful and friendly, but the fact remains that fishing vessels are less ideal platforms to carry out plankton surveys. On one hand collection of samples is suboptimal, and furthermore there is actually no proper area to sort out and identify eggs from the samples.

## **6. Acknowledgements**

We would like to thank the crew of the CETON S205 for welcoming us on board their vessel and their helpful, relaxed and easy way they helped us during the survey.

## **ISO**

IMARES utilises an ISO 9001:2008 certified quality management system (certificate number: 124296-2012-AQ-NLD-RvA). This certificate is valid until 15 December 2015. The organisation has been certified since 27 February 2001. The certification was issued by DNV Certification B.V. Furthermore, the chemical laboratory of the Fish Division has NEN-EN-ISO/IEC 17025:2005 accreditation for test laboratories with number L097. This accreditation is valid until 1st of April 2017 and was first issued on 27 March 1997. Accreditation was granted by the Council for Accreditation.

## **References**

Nash RDM, Dickey-Collas M, Milligan SP (1998) Descriptions of the Gulf VII/PRO-NET and MAFF/Guildline unencased high-speed plankton samplers. *J. Plankton Res.* 20(10): 1915-1926.

## Justification

Report : C014/15  
Project Number : 4302507801

The scientific quality of this report has been peer reviewed by a colleague scientist and the head of the department of IMARES.

Approved: Ing. I.J. de Boois  
Project leader WOT surveys

Signature:



Date: 24 March 2015

Approved: Drs. J.H.M. Schobben  
Head of Fish Department

Signature:



Date: 24 March 2015