# Mackerel Egg Survey, March 5th – 29th, 2010

**by**

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**Keywords**: Mackerel, Horse mackerel, eggs, surveys, plankton.

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## Abstract

Every three years the International Council for the Exploration of the Sea (ICES) coordinates a series of mackerel and horse mackerel egg surveys covering the eastern Atlantic from Gibraltar to the north coast of Scotland between January and July. The aim of this survey programme is to assess the northeastern Atlantic mackerel and horse mackerel stock. The Marine Institute participates in this programme and covers stations in the Celtic Sea. Plankton samples were collected at 105 stations, and the eggs they contained were preserved in 4% buffered formaldehyde. Preliminary analysis shows that egg numbers were concentrated close to the shelf edge, around the 200m contour line. Four fishing hauls were made to collect mackerel and horse mackerel samples for fecundity analysis. Samples were collected to ensure maximum temporal and geographical spread.

# 1 Introduction

Every three years the International Council for the Exploration of the Sea (ICES) coordinates a series of mackerel, *Scomber scombrus,* and horse mackerel, *Trachurus trachurus*, egg surveys covering the eastern Atlantic from Gibraltar to the north coast of Scotland between January and July. The aim of this survey programme is to estimate the spawning stock biomass of the northeastern Atlantic mackerel and horse mackerel stock. The Marine Institute participates in this programme and in this survey covered stations in the Celtic Sea.

This was one of twelve surveys covering the Celtic Sea, west of Ireland, west of Scotland, and Faeroese waters in the coming months. Five further surveys will target the Bay of Biscay and the Cantabrian Sea. This reflects the spawning area of both mackerel and horse mackerel. Preliminary results from onboard sample analysis of egg numbers are presented, but full laboratory analysis will be carried out in the coming months. The data will be submitted to the Working Group on Mackerel and Horse Mackerel Egg Surveys, WGMEGS, in March 2011. Preliminary data will be used by the Working Group on Widely Distributed stocks, WGWIDE, in August - September 2010.

# 2 Materials and Methods

## 2.1 Scientific Personnel

| Name | Service area/Affiliation | Role |
|---|---|---|
| Helen McCormick | MI - FSS | Scientist-in-charge Leg 1 |
| Selene Hoey | MI - FSS | Scientist-in-charge Leg 2 |
| Marcin Blaszkowski | MI - FSS | Scientist Leg 1 |
| Turloch Smith | MI - FSS | Scientist Leg 1 |
| Sean O' Connor | MI - FSS | Scientist Leg 1 |
| Kyle Sweeney | MI - FSS | Scientist Leg 1 |
| Imelda Hehir | MI - FSS | Scientist Leg 2 |
| Gráinne Ni Chonchuir | MI - FSS | Scientist Leg 2 |
| Gráinne Ryan | MI - FSS | Scientist Leg 2 |
| Dermot Fee | MI - FSS | Scientist Leg 2 |
| Dave Wall | IWDG | Cetaceans Leg 1 |

## 2.2 Survey Plan

### 2.2.1 Area of operation

The survey was carried out in the Celtic Sea and Southwest of Ireland, from 48.75N to 51.75N, and from 6W to 17W. This covered ICES areas VIIg, VIIh, VIIj and VIIk, (Figure 1). Survey sites were at 0.5 degrees spacing, both latitudinally and longitudinally. The survey was adaptive, and while theoretical eastern and western limits were set, in practice the presence or absence of eggs dictated moving to the next transect. Two consecutive zero samples would lead to a transect change. Survey protocols called for the survey area to be sampled on alternate transects. The intervening transect could be sampled on the return leg.

For operational reasons the survey was split in two. Leg 1 was conducted on board the *Celtic Explorer* from March 5$^{th}$ to 17$^{th}$. This leg targeted the southern transects of the sampling area, and also carried out all the fishing tows. Leg 2 was carried out on the *Celtic Voyager* from March 19$^{th}$ to 29$^{th}$ and concentrated on the two northern transects of the area.

### 2.2.2 Specific operations

***Plankton Hauls***

At each station the GULF VII plankton sampler was towed at four knots on a V-shaped profile. The GULF was deployed over the stern, using a winch with 11mm co-axial cable in an armoured sheath. The water column was sampled to within five metres of the bottom, or a maximum depth of 200m. Attached to the sampler was a real-time CTD and flowmeter system, (Pronet), which collected temperature and salinity data, and measured the volume of water filtered during the tow. Once back aboard the cod-end was removed, a second cod-end was attached and the plankton net was washed down. The cod-ends were then brought to the lab, and the plankton sample was washed out. The sample was preserved in 4% buffered formalin. It was examined under a microscope after an hour and any eggs and fish larvae were removed. A second examination of each sample took place after 36 hours. A count was kept of mackerel and horse mackerel stage 1 eggs, mackerel and horse mackerel eggs of later stages, and other fish eggs. Note was also taken of the volume of water sampled by the GULF during each haul, as well as the salinity at 20m, and the water temperature at 5m, 20m, 50m, 100m, and deepest temperature.

***Fishing Hauls***

As part of the survey samples of mature mackerel and horse mackerel were collected at various latitudes. Fishing sites were selected close to the 200m contour line (Figure 2). Hauls were made using a herring pelagic net. Sampling targets were 80 mackerel gonads of stage 3 - 6, and 30 horse mackerel samples from stages 3 - 5, over four weight categories. Three 25µl replicate samples were collected from one gonad of each fish, and stored in tubes containing 1.2ml of 3.6% buffered formalin. The second ovary was stored, undamaged, also in 3.6% buffered formalin. The sampling protocols for both species are attached in the appendix.

A sample of 10 mackerel stomachs were also collected from each fishing tow for Faeroese scientists. They wish to check if adult mackerel are major predators on Blue whiting eggs and larvae.

## 2.3 Equipment and system details and specifications

GULF VII plankton sampler

11mm armoured co-axial cable

Pro-net CTD and flow sensor

Pro-monitor CTD and flow sensor

Pelagic Herring net

Seabird 911 CTD

Simrad ER-60

## 2.4 Protocols used

The protocols for the plankton are listed in the 2009 WGMEGS report. The gonad sampling of the mackerel and horse mackerel are listed in the 2009 WGMEGS report, and in the appendix of this report.

# 3 Results

### *Plankton Hauls*

A total of 105 hauls were carried out, over five transects, (Figure 1, Table 1). Leg 1 was scheduled to carry out four transects. However eggs were encountered outside the "core" sampling area. As the survey is adaptive sampling continued along the transects until two zero counts were recorded. Due to the increased distribution of the eggs it was only possible to sample three of these transects, comprising 64 stations. Egg numbers for the missing transect will be interpolated.

Leg 2 sampled the two northern transects and covered 41 stations. During Leg 2 it was also possible to resample six stations, close to the 200m contour line, within a short space of time. This will help with the variance estimate. Weather conditions encountered by the *Celtic Voyager* were difficult. It was also necessary to change over to the backup CTD system, the Pro-monitor, mid way through the cruise. This change had no impact on data collection.

All eggs and larvae were extracted from the plankton samples while at sea. The eggs were subsequently identified and staged in the laboratory ashore.

Mackerel stage 1 eggs were recorded at 70% of the stations, and were found mainly found on the three southern transect and close to the 200m contour line, (Figure 3). The highest station count was 1298 at station 73.

Horse mackerel were found at only 21% of stations and in very low numbers, (Figure 4). The highest number recorded was 13 at station 91. The eggs were mainly found on the southern transect and close to the 200m contour line on all other transects.

### *Fish Hauls*

A total of four hauls were carried out. Mackerel and horse mackerel samples were collected from hauls 1, 3 and 4. In total 52 mackerel and 28 horse mackerel were sampled for fecundity and atresia.

It was only possible to fill the bottom three of the mackerel weight categories with samples well spread between the weights. Samples were collected for all four horse mackerel categories, but the majority of the samples were in the 151 – 250g group. There was only one fish in both the largest and smallest categories.

These samples will be analysed in the laboratory over the next few months.

# 4 Discussion and Conclusions

The survey was very successful. Despite the fact that the survey area increased five transects were sampled, which facilitated the interpolation of figures for the sixth transect. By carrying out all the fishing operations on the *Celtic Explorer* it meant that the *Celtic Voyager*, with its more limited space, could concentrate on plankton sampling.

## Acknowledgements

Much appreciation is expressed to the skippers and crews of the *Celtic Explorer* and *Celtic Voyager.* Their many skills kept the survey functioning. Thanks are also expressed to the scientists who worked on the survey.

## References\Bibliography

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ICES, 2009. Report of the workshop on mackerel and horse mackerel egg staging and identification. ICES CM 2009/LRC:13

ICES, 2010. Report of the working group on mackerel and horse mackerel egg surveys. ICES CM 2010/SSGESST:02

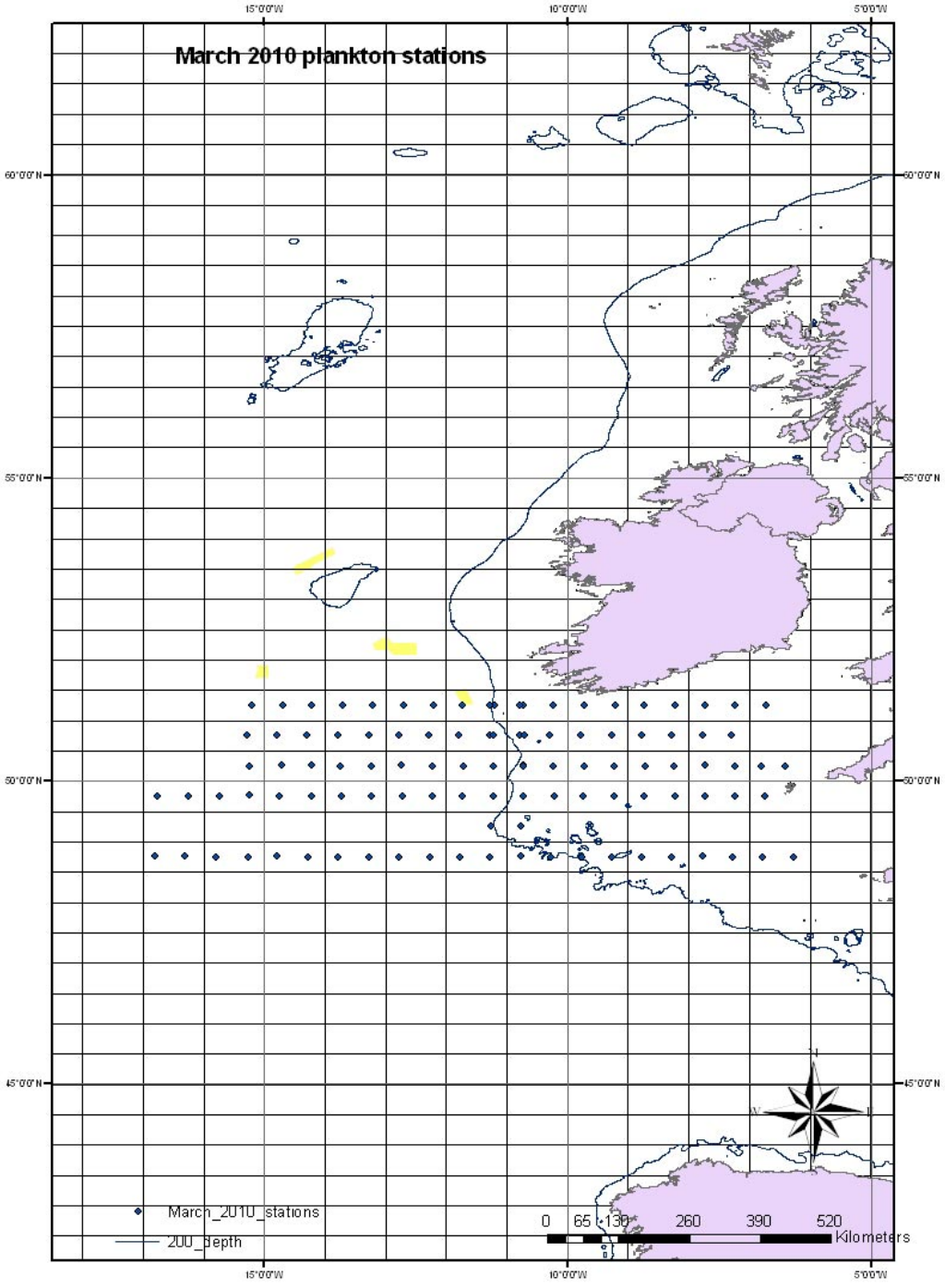


Figure 1 Survey plankton stations.

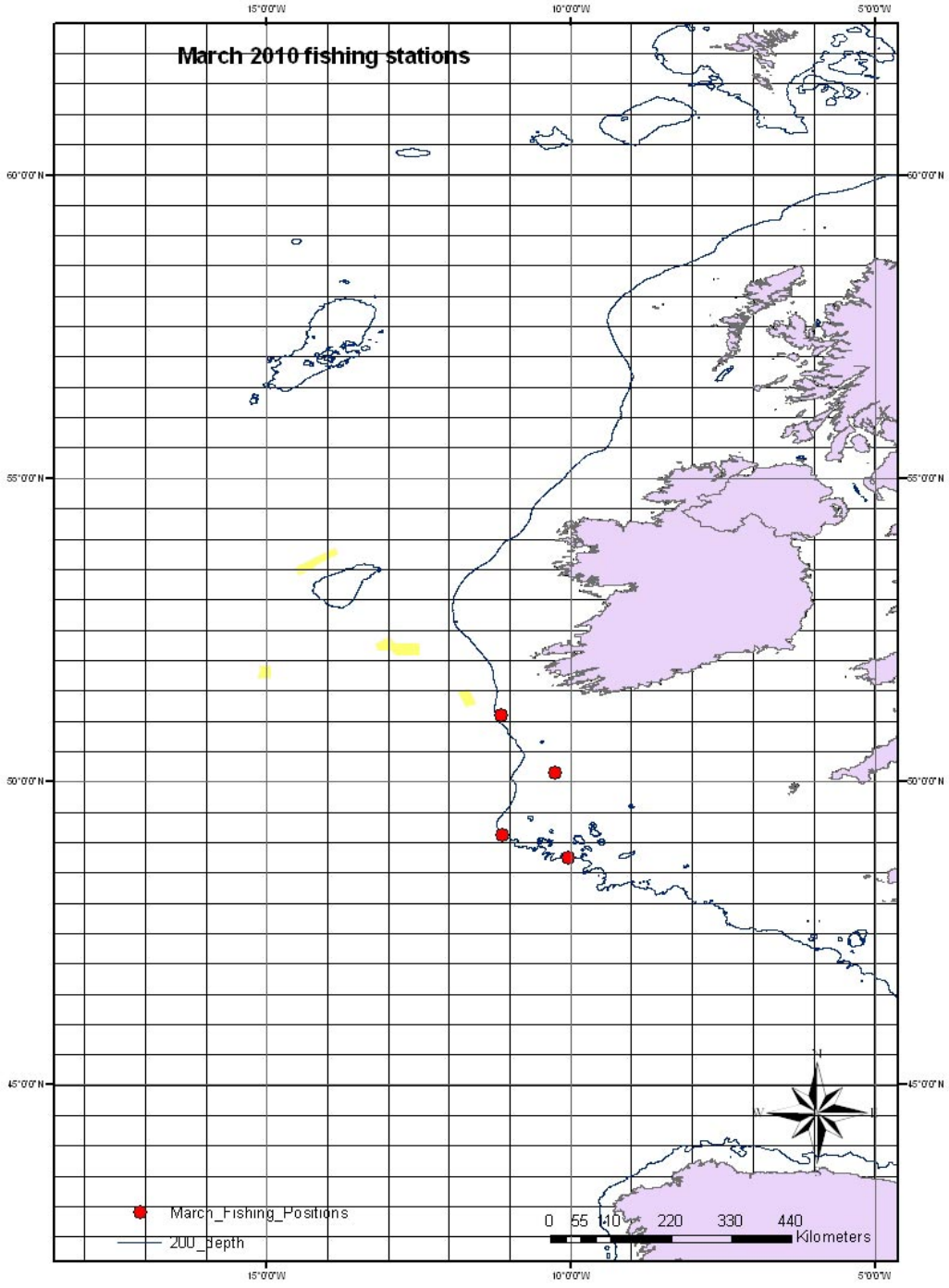


Figure 2 Fishing sites

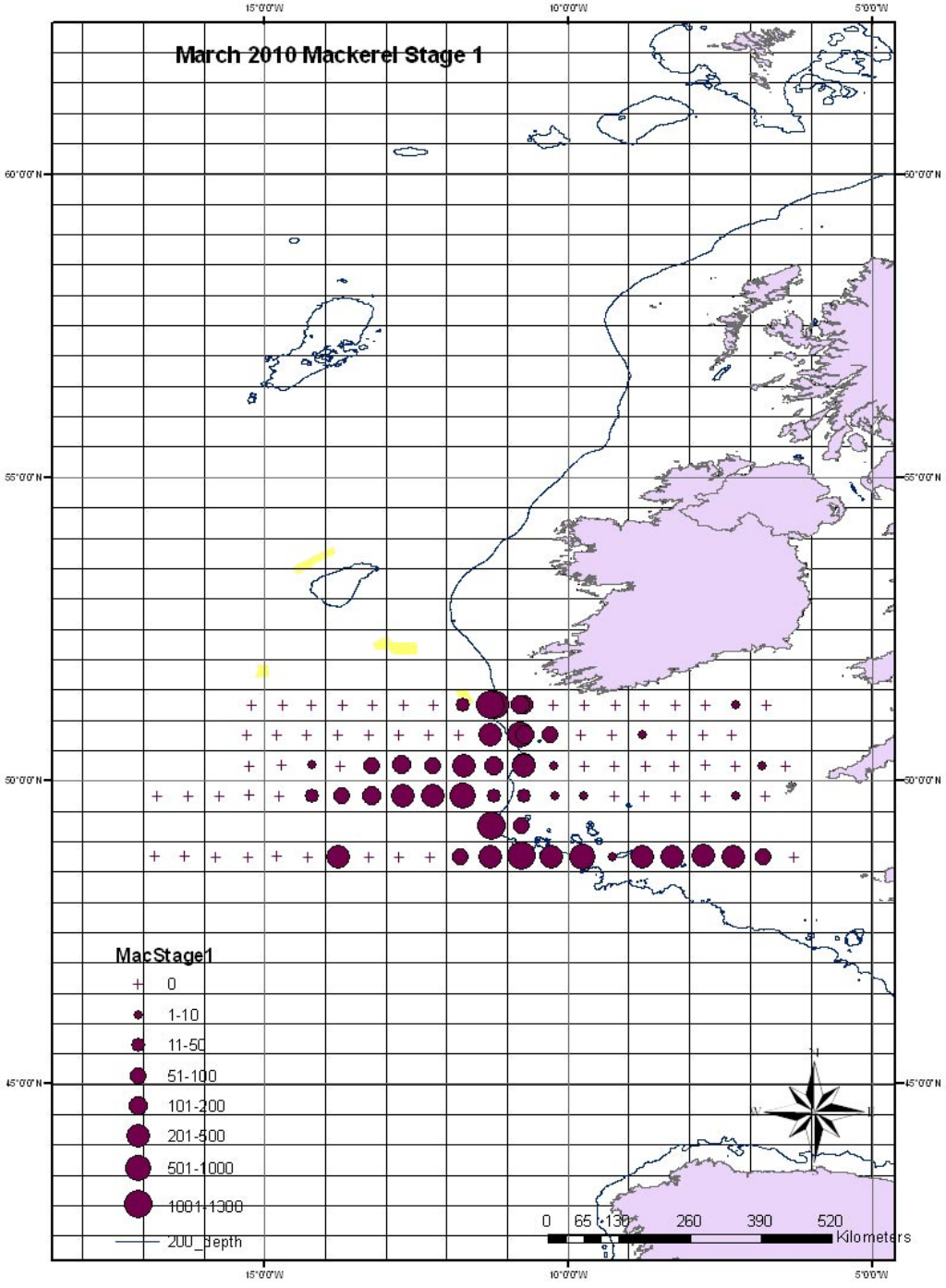


Figure 3 Numbers of Stage 1 mackerel eggs.

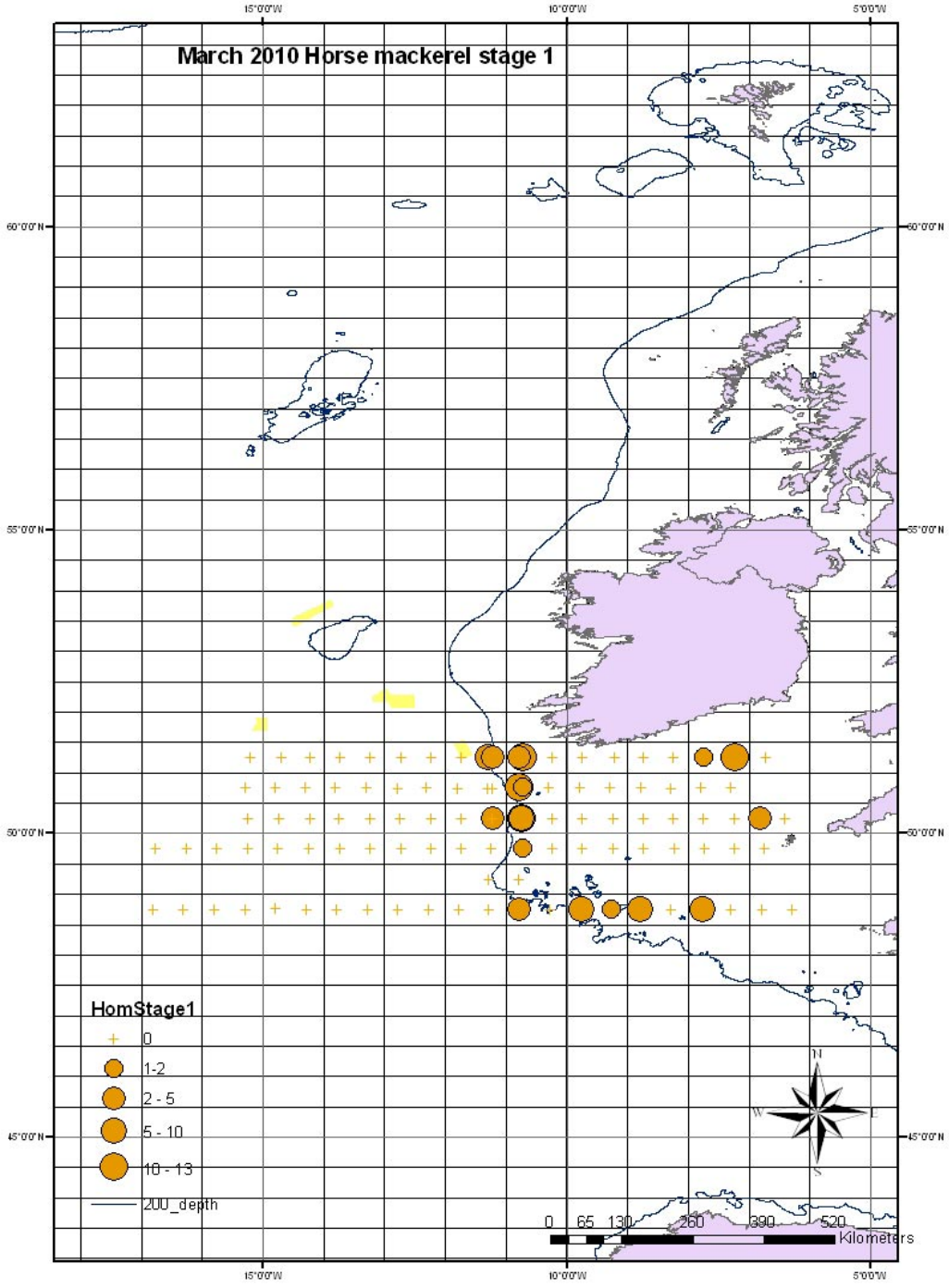


Figure 4 Numbers of Stage 1 horse mackerel eggs.

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Table 1 Plankton stations and associated Stage 1 egg numbers.

| Haul no | Date | Time Start | Latitude | Longitude | Sample Depth Metres | Mac 1a | HOM 1a |
|---|---|---|---|---|---|---|---|
| 1 | 08/03/2010 | 06:40 | 49.7523 | -6.7375 | 95 | | |
| 2 | 08/03/2010 | 09:34 | 49.7510 | -7.2342 | 112 | 11 | |
| 3 | 08/03/2010 | 11:46 | 49.7492 | -7.7243 | 127 | 5 | |
| 4 | 08/03/2010 | 13:50 | 49.7518 | -8.2202 | 128 | 2 | |
| 5 | 08/03/2010 | 16:02 | 49.7508 | -8.7247 | 93 | 4 | |
| 6 | 08/03/2010 | 18:09 | 49.7490 | -9.2232 | 135 | 4 | |
| 7 | 08/03/2010 | 20:28 | 49.7515 | -9.7388 | 136 | 12 | |
| 8 | 08/03/2010 | 22:44 | 49.7498 | -10.2170 | 136 | 12 | |
| 9 | 09/03/2010 | 01:02 | 49.7510 | -10.7263 | 151 | 35 | 2 |
| 10 | 09/03/2010 | 03:16 | 49.7510 | -11.2270 | 200 | 23 | |
| 11 | 09/03/2010 | 05:41 | 49.7500 | -11.7280 | 200 | 465 | |
| 12 | 09/03/2010 | 08:05 | 49.7518 | -12.2220 | 201 | 167 | |
| 13 | 09/03/2010 | 10:29 | 49.7498 | -12.7195 | 200 | 258 | |
| 14 | 09/03/2010 | 12:52 | 49.7498 | -13.2290 | 200 | 76 | |
| 15 | 09/03/2010 | 15:18 | 49.7510 | -13.7283 | 200 | 40 | |
| 16 | 09/03/2010 | 17:43 | 49.7527 | -14.2260 | 201 | 25 | |
| 17 | 09/03/2010 | 20:11 | 49.7565 | -14.7437 | 201 | 2 | |
| 18 | 09/03/2010 | 22:40 | 49.7590 | -15.2357 | 197 | | |
| 19 | 10/03/2010 | 01:15 | 49.7498 | -15.7465 | 200 | | |
| 20 | 10/03/2010 | 05:22 | 49.7435 | -16.2543 | 201 | | |
| 21 | 10/03/2010 | 07:48 | 49.7457 | -16.7652 | 200 | | |
| 22 | 10/03/2010 | 16:03 | 48.7533 | -16.8068 | 200 | | |
| 23 | 10/03/2010 | 18:45 | 48.7535 | -16.3053 | 200 | | |
| 24 | 10/03/2010 | 21:39 | 48.7495 | -15.7920 | 201 | | |
| 25 | 11/03/2010 | 00:19 | 48.7478 | -15.2695 | 201 | 2 | |
| 26 | 11/03/2010 | 03:01 | 48.7637 | -14.7840 | 200 | | |
| 27 | 11/03/2010 | 05:47 | 48.7508 | -14.2762 | 200 | | |
| 28 | 11/03/2010 | 08:32 | 48.7505 | -13.7758 | 200 | 199 | |
| 29 | 11/03/2010 | 11:14 | 48.7497 | -13.2715 | 200 | | |
| 30 | 11/03/2010 | 13:38 | 48.7493 | -12.7725 | 199 | | |
| 31 | 11/03/2010 | 16:03 | 48.7503 | -12.2665 | 201 | 1 | |
| 32 | 11/03/2010 | 18:19 | 48.7502 | -11.7745 | 201 | 43 | |
| 33 | 11/03/2010 | 20:37 | 48.7415 | -11.2722 | 202 | 263 | |
| 34 | 12/03/2010 | 01:42 | 49.2498 | -11.2638 | 202 | 825 | |
| 35 | 12/03/2010 | 03:48 | 49.2495 | -10.7730 | 155 | 48 | |
| 36 | 12/03/2010 | 06:41 | 48.7527 | -10.7737 | 201 | 877 | 4 |
| 37 | 12/03/2010 | 09:06 | 48.7505 | -10.2752 | 153 | 214 | |
| 38 | 12/03/2010 | 12:50 | 48.7513 | -9.7617 | 175 | 357 | 6 |
| 39 | 12/03/2010 | 14:45 | 48.7507 | -9.2688 | 161 | 17 | 3 |
| 40 | 12/03/2010 | 16:42 | 48.7502 | -8.7795 | 165 | 277 | 7 |
| 41 | 12/03/2010 | 20:45 | 48.7498 | -8.2755 | 135 | 312 | |
| 42 | 12/03/2010 | 22:59 | 48.7523 | -7.7678 | 150 | 217 | 6 |
| 43 | 13/03/2010 | 01:05 | 48.7485 | -7.2790 | 133 | 199 | 1 |
| 44 | 13/03/2010 | 03:04 | 48.7502 | -6.7792 | 135 | 52 | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 45 | 13/03/2010 | 05:05 | 48.7497 | -6.2753 | 129 | | |
| 46 | 13/03/2010 | 16:29 | 50.2492 | -6.3973 | 92 | 5 | |
| 47 | 13/03/2010 | 18:24 | 50.2493 | -6.8067 | 100 | 11 | 4 |
| 48 | 13/03/2010 | 20:11 | 50.2495 | -7.2260 | 105 | 1 | |
| 49 | 13/03/2010 | 22:14 | 50.2515 | -7.7315 | 95 | 1 | |
| 50 | 14/03/2010 | 00:20 | 50.2502 | -8.2333 | 121 | 2 | |
| 51 | 14/03/2010 | 02:30 | 50.2507 | -8.7232 | 125 | 1 | |
| 52 | 14/03/2010 | 04:45 | 50.2507 | -9.2260 | 133 | 3 | |
| 53 | 14/03/2010 | 07:01 | 50.2497 | -9.7277 | 122 | 5 | |
| 54 | 14/03/2010 | 09:06 | 50.2498 | -10.2238 | 130 | 10 | |
| 55 | 14/03/2010 | 13:49 | 50.2527 | -10.7315 | 177 | 217 | 7 |
| 56 | 14/03/2010 | 16:16 | 50.2492 | -11.2210 | 200 | 130 | 4 |
| 57 | 14/03/2010 | 18:34 | 50.2508 | -11.7227 | 200 | 296 | 1 |
| 58 | 14/03/2010 | 20:52 | 50.2507 | -12.2218 | 200 | 43 | |
| 59 | 14/03/2010 | 23:14 | 50.2523 | -12.7305 | 200 | 84 | |
| 60 | 15/03/2010 | 00:38 | 50.2503 | -13.2233 | 195 | 38 | |
| 61 | 15/03/2010 | 04:01 | 50.2498 | -13.7378 | 200 | 4 | |
| 62 | 15/03/2010 | 06:13 | 50.2530 | -14.2208 | 201 | 9 | |
| 63 | 15/03/2010 | 08:35 | 50.2520 | -14.7190 | 200 | | |
| 64 | 15/03/2010 | 11:05 | 50.2492 | -15.2377 | 200 | | |
| 65 | 20/03/2010 | 23:13 | 51.2543 | -7.2327 | 80 | 14 | 10 |
| 66 | 21/03/2010 | 01:41 | 51.2498 | -7.7355 | 86 | 2 | 3 |
| 67 | 21/03/2010 | 04:20 | 51.2507 | -8.2287 | 90 | | |
| 68 | 21/03/2010 | 06:21 | 51.2512 | -8.7295 | 95 | | |
| 69 | 21/03/2010 | 09:00 | 51.2498 | -9.2077 | 99 | | 1 |
| 70 | 21/03/2010 | 11:30 | 51.2490 | -9.7290 | 96 | 2 | |
| 71 | 21/03/2010 | 13:52 | 51.2507 | -10.2315 | 85 | 1 | |
| 72 | 21/03/2010 | 16:15 | 51.2508 | -10.7262 | 162 | 113 | 11 |
| 73 | 22/03/2010 | 17:32 | 51.2508 | -11.2040 | 193 | 1298 | 5 |
| 74 | 22/03/2010 | 20:28 | 51.2518 | -11.7238 | 200 | 31 | |
| 75 | 23/03/2010 | 01:18 | 51.2510 | -12.2160 | 201 | | |
| 76 | 23/03/2010 | 10:54 | 51.2497 | -12.7050 | 200 | 1 | |
| 77 | 23/03/2010 | 13:45 | 51.2493 | -13.2218 | 200 | | |
| 78 | 23/03/2010 | 16:27 | 51.2508 | -13.7112 | 200 | 4 | |
| 79 | 23/03/2010 | 19:14 | 51.2498 | -14.2140 | 201 | 1 | |
| 80 | 23/03/2010 | 21:54 | 51.2468 | -14.6827 | 200 | | |
| 81 | 24/03/2010 | 00:47 | 51.2502 | -15.1982 | 201 | | |
| 82 | 24/03/2010 | 06:36 | 50.7512 | -15.2862 | 201 | | |
| 83 | 24/03/2010 | 10:41 | 50.7507 | -14.7852 | 201 | | |
| 84 | 24/03/2010 | 13:12 | 50.7503 | -14.3007 | 197 | | |
| 85 | 24/03/2010 | 15:45 | 50.7505 | -13.7900 | 200 | 1 | |
| 86 | 24/03/2010 | 18:30 | 50.7527 | -13.2813 | 201 | | |
| 87 | 24/03/2010 | 21:25 | 50.7490 | -12.7773 | 201 | | |
| 88 | 25/03/2010 | 00:55 | 50.7515 | -12.2938 | 198 | | |
| 89 | 25/03/2010 | 04:29 | 50.7497 | -11.7863 | 201 | | |
| 90 | 25/03/2010 | 07:59 | 50.7495 | -11.2838 | 201 | 178 | |
| 91 | 25/03/2010 | 12:02 | 50.7505 | -10.7827 | 166 | 445 | 13 |
| 92 | 25/03/2010 | 15:26 | 50.7508 | -10.2887 | 131 | 44 | 1 |
| 93 | 25/03/2010 | 18:50 | 50.7500 | -9.7803 | 104 | | |
| 94 | 25/03/2010 | 21:51 | 50.7500 | -9.2727 | 117 | 2 | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 95 | 26/03/2010 | 01:22 | 50.7517 | -8.7730 | 101 | 7 | |
| 96 | 26/03/2010 | 04:57 | 50.7492 | -8.2770 | 106 | | |
| 97 | 26/03/2010 | 08:22 | 50.7505 | -7.7762 | 100 | 3 | |
| 98 | 26/03/2010 | 11:41 | 50.7500 | -7.2850 | 96 | 6 | |
| 99 | 26/03/2010 | 16:28 | 51.2495 | -6.7222 | 80 | 1 | |
| 100 | 27/03/2010 | 11:11 | 50.7630 | -10.7128 | 161 | 92 | 2 |
| 101 | 27/03/2010 | 15:06 | 50.2497 | -10.7298 | 166 | 175 | 10 |
| 102 | 27/03/2010 | 17:46 | 50.2497 | -11.2132 | 201 | 5 | |
| 103 | 27/03/2010 | 22:10 | 50.7473 | -11.2113 | 201 | | |
| 104 | 28/03/2010 | 03:26 | 51.2498 | -11.2830 | 191 | 919 | 6 |
| 105 | 28/03/2010 | 05:58 | 51.2502 | -10.7810 | 161 | 82 | 4 |

# Horse mackerel sampling procedure at sea

Before the cruise:

Fill the labelled 2.5 ml eppendorf tubes with 1,2 ml of 3,6% buffered (sodium phosphate) formaldehyde

During the cruise:

Measure the weight of the whole catch and select a subsample of 100 fish and measure the total weight of the subsample.

Measure total length, weight, maturity (Walsh scale) and sex of each fish in the subsample.

Select females in maturity stages 3-5 (see table 3.1.2 WGMEGS 2006) from the subsample for fecundity analysis. Be sure to divide the females equally into the 4 weight categories: < 150g, 151-250g, 251-350g and >351g. If the size range of fish is restricted in the catch the remaining sample quota should be taken from the more abundant classes to fill the weight classes.

Measure or take:

- Total length
- Total weight
- Maturity
- Otoliths for age reading
- Weight of gut, ovary and liver. (if it is not possible to take these weights at sea, take the pipette and atresia samples and fix the remainder of the ovary. Subsequently weigh the ovary in the lab. Gut and liver should also be frozen and weighed in the lab. The fixed and frozen weights should be corrected to fresh weights.)

Ovary sampling:

- From the ovary take 3 * 25µl samples with a pipette and immediately put each sample in individual coded eppendorf tubes.
- Make sure that all the ovary samples are covered with formaldehyde.

After the cruise :

Send the eppendorf samples for analysis to the different institutes referred to in table 1.

| Colour code | Country | Institute and address | Responsible person |
|---|---|---|---|
| Blue | Norway | IMR, Nordnesgaten 50,PB 1870, 5817 Bergen-Nordnes, Norway | Merete Fonn |
| Pink | Ireland | MI, Rinville, Oranmore, Co. Galway, Ireland | Selene Hoey |
| Green | Netherlands | IMARES, Haringkade 1, 1976 cp Ymuiden, Netherlands | Cindy van Damme |
| White | Spain | IEO, Cabo Estay-Canido, 36280 - VIGO (Pontevedra) Spain | Jose Ramon Perez |

## Fecundity whole mount analysis procedure for horse mackerel

Transfer the unstained sample to a tray and try to separate the oocytes.

Under the microscope check for spawning markers, if there are hydrated oocytes, atretic hydrated oocytes or ≥ 5 POFs, the sample should not be analysed for fecundity.

Distribute the sample randomly in the tray and measure the oocyte diameters for the whole sample.

Count all oocytes >185µm in the sample

Formula to calculate Potential Fecundity:

Pot. fec. = Number of oocytes / weight of the pipette sample * ovary weight

Formula to calculate Relative Potential Fecundity:

Rel. Pot. Fec. = Potential fecundity / total fish weight

# Mackerel sampling procedure at sea

Before the cruise:

Fill the labelled 2,5 ml eppendorf tubes with 1,2 ml of 3,6% buffered (sodium phosphate) formaldehyde

During the cruise:

Measure the weight of the whole catch and select a subsample of 100 fish and measure the total weight of the subsample.

Measure total length, weight, maturity (Walsh scale) and sex of each fish in the subsample.

Select females in maturity stages 3-6 from the subsample of 100 ( if there are less than 100 fish take them all) for fecundity and atresia analysis. Be sure to divide the females equally into the 4 weight categories: < 250g, 251-400g, 401-550g and >551g. If the size range of fish is restricted in the catch the remaining sample quota should be taken from the more abundant classes to fill the weight classes.

Measure or take:

- Total length
- Total weight
- Maturity
- Otoliths
- Weight of gut, ovary and liver. (If it is not possible to take these weights at sea, take the pipette and atresia samples and fix the remainder of the ovary. Subsequently weigh the ovary in the lab. Gut and liver should also be frozen and weighed in the lab. The fixed and frozen weights should be corrected to fresh weights.)

Ovary sampling:

- From the ovary take 3 * 25µl samples with a pipette and immediately put each sample in individual coded eppendorf tubes.
- Make sure that all the ovary samples are covered with formaldehyde.

Atresia sampling:

- Place the other ovary in a bottle filled with 3.6% buffered, (sodium phosphate) formaldehyde.
- Make sure that all the ovary sample is covered with formaldehyde

After the cruise:

From the fixed half ovary cut two 5mm thick slices and put them in a labelled cassette. If the ovary is very large you may have to use two cassettes. Separate the cassettes into 4 colour coded bottles filled with 70% ethanol.

Send the cassettes and eppendorf samples for analysis to the different institutes referred to in table 1.

**Table 1**

| Colour code | Country | Institute and address | Responsible person |
|---|---|---|---|
| Blue | Norway | IMR, Nordnesgaten 50,PB 1870, 5817 Bergen-Nordnes, Norway | Merete Fonn |
| Red | Ireland | MI, Rinville, Oranmore, Co. Galway, Ireland | Selene Hoey |
| Yellow | Scotland | FRS, Marine Laboratory, Victoria Road, Torry, Aberdeen AB9 8DB, Scotland. | Findlay Burns |
| White Even numbers | Spain | IEO, Cabo Estay-Canido, 36280 - VIGO (Pontevedra) Spain | Jose Ramon Perez |
| White Uneven numbers | Spain | AZTI, Foundation Herrera Kaia, Portualde z/g 20110, Pasaia, Basque Country, Spain | Maria Santos |