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MRV *Scotia*

Survey 0312S

## REPORT

19 February –11 March 2012

**Half-landing:** Belfast, 28 February

### Personnel

F Burns	(SIC)
R Kynoch	(Deck)
J Drewery	
M Gault	
G Jones	(Part 1)
L Morley	(Part 1)
L Allan	(Part 2)
P Clark	(Part 2)
S Kinnear	(Part 1)
C Pinto	(Visitor – Aberdeen Uni)
C Dolan	(Visitor – MI Observer)

**Out-turn days:** 22 days RV1202

**Fishing Gear:** GOV Trawl (BT 137) Atlantic Variant utilising groundgear D

**Plankton Sampling Gear:** Gulf 7, ichthyoplankton sampler.

### Objectives

1. Demersal trawling survey of the grounds off the north and west of Scotland in ICES Subarea VIa.
2. To obtain temperature and salinity data from the surface and seabed at each trawling station.
3. Collect additional biological data in connection with the EU Data Collection Framework (DCF).
4. Opportunistic sampling using the Gulf 7 to determine densities of mackerel eggs within the area covered by the trawl survey.

### Narrative

*Scotia* sailed from Aberdeen at 0800 on 19 February. A familiarisation haul was completed successfully on a clear tow at the Buchan Deeps east of Peterhead with the fishing gear, Scanmar and bottom contact sensors performing well. On completion of the shakedown trawl *Scotia* then made passage north towards the first station west of Orkney. By 0700 on 20 February a full gale was blowing and *Scotia* was forced to dodge until mid afternoon when a lull in the weather allowed the first station to be completed successfully. *Scotia* then

sailed west overnight towards the shelf edge arriving on station for first thing on the morning of 21 February. Four stations were completed successfully in the area north of the Windsock before another gale curtailed fishing operations once more. More settled conditions arrived on 22 February and *Scotia* was able to complete five hauls around the Windsock and Otter bank area, with the fifth station carried out during the hours of darkness.

The following morning *Scotia* completed her first station which was just North of Strathy Point before heading into the Minch with a severe westerly gale expected imminently. By midday the wind was gusting 65 knots, however, *Scotia* was able to complete a further three trawls in the Minch before heading south overnight towards the next trawl station NW of Skye. The presence of static gear buoys around us meant that only a 20 minute trawl was possible although thankfully upon recovery of the trawl there was no evidence of creels or leader lines. *Scotia* then continued on and into the South Minch where another four stations were completed, the last of which was a replacement haul as the original position (SW of Tiree) was unfishable.

An overnight steam SW brought *Scotia* to the stations NW off Donegal and over the next two days, with weather conditions easing considerably *Scotia* successfully completed the nine fishing stations in this SW corner of the survey area and also deployed the Gulf 7 sampler on a total of five stations at locations straddling the 200 m contour. On Monday 27 February *Scotia* headed southeast completing four stations North of the Donegal coast (hauls 98-101).

*Scotia* made passage for Belfast and the mid-cruise break. *Scotia* left Belfast at 0800 on 29 February and headed across the Irish Sea to complete the stations in the Clyde, successfully completing two stations within daylight hours.

During 1 March *Scotia* completed the last station in the Clyde just east of the Mull of Kintyre before proceeding west, completing another three stations just to the south of Islay and Jura.

The second core station at Red Bay being abandoned due to there being no suitable ground for trawling and so the nearest replacement location was sourced 15nm south of Jura. Over the next three days and nights *Scotia*, with fresh westerly winds, worked at Stanton Banks and then NW tackling the deeper stations to the West of St Kilda completing 13 fishing stations. The vessel also deployed the Gulf sampler at night on seven occasions during this period on set stations straddling the 200 m contour. Another five stations were completed on 5 March. The last of these taking place during darkness on account of impending bad weather that was expected for the following day. Three Gulf deployments were also completed in this area NW of the Butt of Lewis before *Scotia* headed east for shelter in the Minch.

Amid strengthening SW winds on 6 March *Scotia* was able to complete two stations at the Northern margins of the Minch before dodging her way towards Broadbay on the east side of Lewis to sit out the storm. Winds that night were ferocious with gusts of over 80 knots being recorded onboard. With the wind strength decreasing slightly and the direction having changed to westerly by mid morning of 7 March *Scotia* was able to repeat in daylight one of the stations (haul 83) that had earlier been completed during darkness and from here proceeded south to complete an additional station at the Northern end of the Sound of Raasay. Still with a full westerly gale blowing *Scotia* headed first west and then south down through the Minch towards Coll and Tiree for first light on 8 March. A secondary position located right off the eastern tip of Coll provided shelter from the continuing westerly gales and this was fished successfully before *Scotia* headed back up through the Minch via Kyle Rhea and under the Skye Bridge. After spending the night once again at Broad Bay with 70 knot winds *Scotia* tentatively headed out of the Minch at 0600 on 9 March and was able to complete the final two stations for the survey. Station 12 was dropped as it was too far west into what were still very large seas so an additional station was sourced within the

same stratum (haul 133) and an additional station was picked up in the North Minch (haul 132). The last haul was aboard by 1700 on 9 March and *Scotia* then proceeded for Aberdeen, docking on Saturday 10 March. Unloading of all scientific gear took place first thing on Sunday 11 March.

## Results

### Survey methodology

The 2012 survey design was the same as that used in 2011 and rather than relying on fixed trawling locations it has migrated to a new random-stratified survey design with trawl locations randomly distributed within ten ‘*a priori*’ sampling strata (see Figure 1.). Trawls are undertaken on suitable ground as near to the specified sampling position as is practicable and within a radius of five nautical miles of the sample position. Fifty seven out of 60 core sample positions were undertaken using these criteria, with three stations being dropped on account of bad weather or unsuitability of terrain. Three replacement stations were completed to negate the impact of the dropped stations. A secondary list of additional stations was created at random for each of the sampling strata and the secondary station that was nearest to the dropped core location was chosen as the replacement. Three additional stations were completed and in addition one station was repeated. There were no foul hauls and a net total of 64 valid stations were completed during the survey.

Despite encountering strong winds for large periods of the survey, *Scotia* managed to proceed at a reduced pace for most of the survey with only 36 hours fishing time being lost to bad weather. Where possible trawls were standardised at 30 minutes duration, however, factors such as large marks of fish on the sounder, bad weather and scarcity of trawl ground in several locations resulted in the duration of 13 of the 64 valid trawls being less than the half hour. It should be noted, however, that there were no valid stations where the duration of the haul was less than 15 minutes, thus complying with the recommendation as stated in the IBTSWG report 2009. Similarly, the intention was to restrict fishing operations to the hours of daylight, however, time lost due to poor weather, coupled with the additional time spent sourcing new tows and running over prospective new trawl ground necessitated a relaxation of this policy with the result that seven out of the 64 valid tows were conducted out with the daylight period.

### Fishing gear

Groundgear ‘D’ was used with the GOV net during the 2012 survey. This is almost identical to the groundgear rig used by Irish institute during their Quarter 4 ICES Subarea VIa survey.

It consists of 400 mm hoppers discs in the centre reducing to 350 mm discs at the quarters and then 300 mm discs out to the wing ends. Instead of being attached to the groundgear using toggle chains – as was the case with ‘C’ - the footrope is lashed directly to the groundgear using a series of steel rings, another feature copied from the Irish rig. Sweep length was altered according to bottom depth. Eighty meters is the cut off for deploying the 110 m sweep rig, thus once again standardising the configuration with the Irish VIa survey. This resulted in six of the shallower stations being completed using the 60 m sweep rig and the remaining deeper 58 stations being completed using the 110 m sweep rig. See Figure 1 for distribution of short sweep tows. Whilst no modifications have been made to the GOV trawl frame ropes nor the mesh sizes used in the different panel sections, tearing strips and guard meshes constructed from 5 mm high tenacity double braided polyethylene twine have been incorporated into the trawl. To maintain consistency with the old netting the overall dimensions of the double netting panels, tearing strips and guard panels were determined by stretched length and not mesh counts. Double netting has also been inserted into upper/lower wing tips, six mesh deep guard inserted into upper/lower first wing sections, first

belly section, second belly section tearing strip and five mesh deep headline guard. This strengthening of the netting in the panels around the fishing line coupled with the other modifications made to both groundgear and sweep rig enable the GOV to complete a comprehensively stratified and random bottom trawl survey of the entire ICES Subarea VIa.

### **New Indices for Juvenile Gadoids for ICES Subarea VIa**

The CPUE index – numbers caught per 10 hours fishing - calculation for 1-group gadoids (cod, haddock, whiting and saithe) weights the indices for each of the 10 new sampling strata (Figure 1) by the surface area of said stratum. These are then pooled to produce the index for the ICES Subarea VIa. This is seen as a more unbiased and more precise method than the previous method that weighted the indices by the number of valid hauls within each of the previous strata (old demersal sampling areas). The indices for the four species can be found below in Table 1.

This is a new index and only two years old and as such is not comparable with the previous index that was created using the old demersal sampling areas and, therefore, the CPUE values for previous years are not displayed.

Overall there was a significant increase in weight recorded for cod in 2012 with 21.24kg/hr caught compared with 9.58kg/hr in 2011. Haddock saw a small increase in 2012 with 153.4kg/hr recorded compared to 148.8kg/hr in 2011, whereas whiting in 2012 was 46.86kg/hr compared with 49.3kg/hr in 2011. An 18% increase in the catch weight for mackerel was observed in 2011 compared with 2010, with 11.2 tonnes for 2012 being recorded compared to 9.2 tonnes for 2011. As in 2011 a large proportion (70%) of the mackerel observed were juveniles or subadults. Total weight of herring recorded for the survey continued to show a considerable decrease as compared to 2012 with only 1.6 tonnes for 2011 being recorded compared to 5.6 tonnes for 2011. Total catches of Norway Pout decreased in weight with 3.9 tonnes in 2012 compared with 7.4 tonnes in 2011.

Unusual species of particular interest that were caught during the survey included a 220 cm bluntnose sixgill shark (*Hexanchis griseus*) that was caught and returned very much alive in haul 73 and a white skate (*Rostroraja alba*) that similarly was returned alive in haul 113. As regards the latter species this is only the second occurrence of this species on the Fisheries Management Database that holds all the Scottish Bottom Trawl Survey data, the only occurrence being back in 1987.

### **Gulf 7 Sampling**

Oblique dips using the Gulf 7 sampler were completed was 16 occasions during six nights when *Scotia* was in close proximity to the shelf edge. Mini transects were performed straddling the 200 m isobath from east to west in order to collect data on mackerel spawning. Stations were typically 15nm apart. Evidence of mackerel spawning was found at 10 of the 16 stations sampled with the largest concentrations (maximum = 81) being located NW of Donegal in the SW corner of the survey area (see Figures 2 and 3).

### **Hydrography**

The CTD (seabird19+) was deployed at each trawling station in order to obtain a temperature and salinity profile. As well as being used by oceanographers at MSS the CTD data was periodically sent to BODC as well as the Met Office. The vessels thermosalinograph was running throughout the survey collecting data on salinity and sea surface temperature.

## **Biological Sampling**

Additional biological data were collected from species listed in the 2010 IBTSWG report in support of EU Data Collection Framework (DCF). Information on length, total weight, gutted weight, sex and maturity was collected for 18 species. A summary of numbers collected by species is displayed below in Table 2.

F Burns  
9 May 2012

**Table 1**

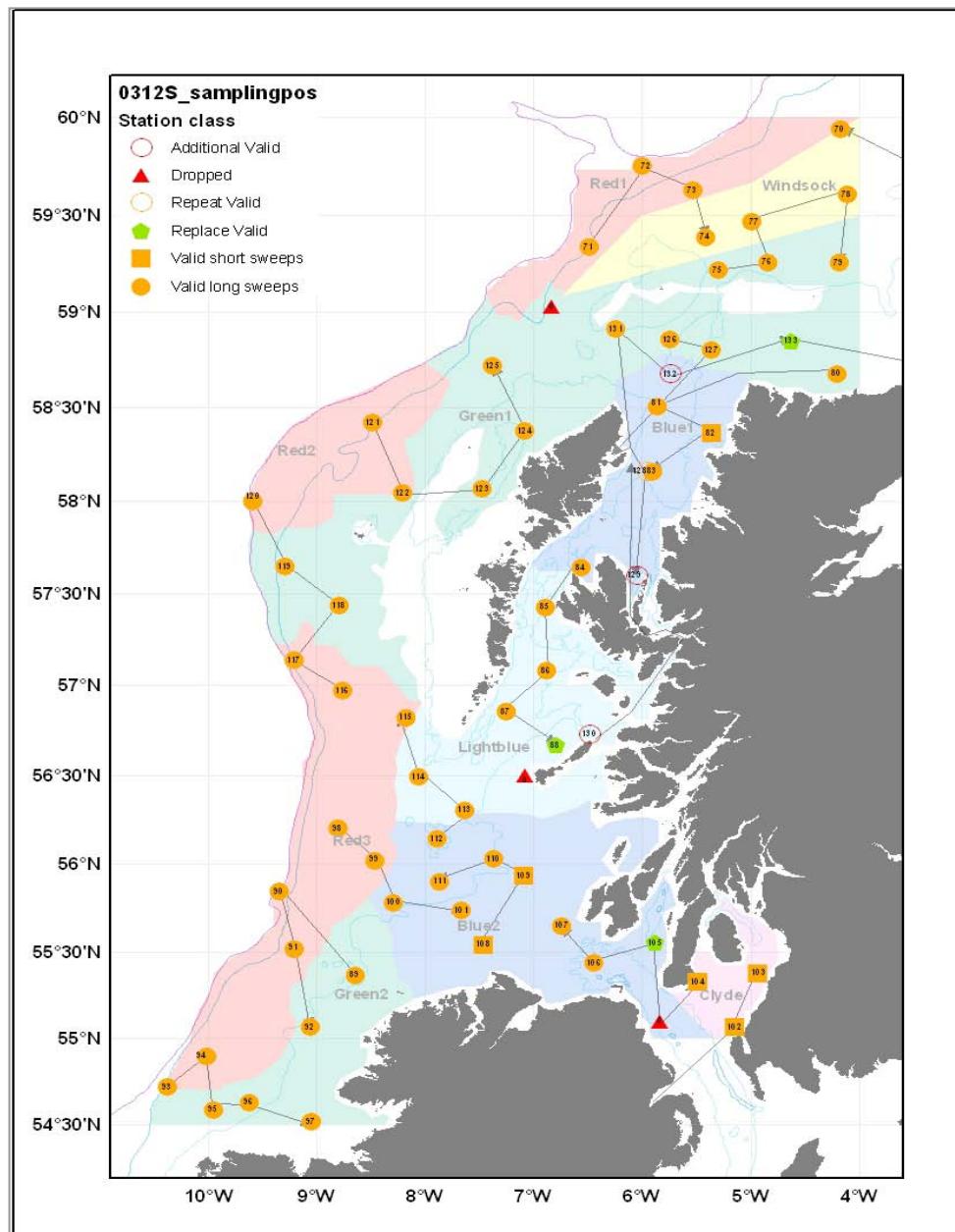
New CPUE indices for ICES Subarea Via (nos caught/10 hrs) derived from the new survey strata and weighted according to area of each stratum for cod, haddock, whiting and saithe.

<b>Species</b>	<b>Age.0</b>	<b>Age.1</b>	<b>Age.2</b>	<b>Age.3</b>	<b>Age.4</b>	<b>Age.5</b>	<b>Age.6</b>	<b>Age.7</b>	<b>Age.8</b>	<b>Age.9</b>	<b>Year</b>
Cod	NA	12.13	25.30	23.51	4.26	4.03	2.53	4.84	0.69	0.00	2012
Haddock	NA	130.31	170.59	3897.78	112.07	91.06	74.95	409.73	8.45	12.43	2012
Whiting	NA	3251.28	312.66	861.59	85.90	15.54	5.90	7.41	2.58	0.00	2012
Saithe	NA	0.00	0.33	40.27	17.62	1.22	1.06	0.75	0.62	0.25	2012

**Table 2**

<b>Number of biological samples (maturity and age material, *maturity only):</b>			
<i>Species</i>	Age	<i>Species</i>	Age
<i>Gadus morhua</i>	238	<i>Dipturus intermedia</i>	41*
<i>Melanogrammus aeglefinus</i>	1208	<i>Dipturus flossada</i>	2*
<i>Merlangius merlangius</i>	1094	<i>Raja naevus</i>	68*
<i>Pollachius virens</i>	161	<i>Raja clavata</i>	76*
<i>Merluccius merluccius</i>	454*	<i>Molva molva</i>	32*
<i>Lepidorhombus whiffagonis</i>	164	<i>Raja montagui</i>	173*
<i>Clupea harengus</i>	763	<i>Mustelus mustelus</i>	4*
<i>Scomber scombrus</i>	409	<i>Mustelus asterias</i>	11*
<i>Lepidorhombus boscii</i>	1*	<i>Scophthalmus rhombus</i>	2*
<i>Trisopterus esmarkii</i>	307	<i>Conger conger</i>	6*
<i>Sprattus sprattus</i>	302	<i>Leucoraja fullonica</i>	1*
<i>Raja brachyura</i>	6*	<i>Rostroraja alba</i>	1*
<i>Psetta maxima</i>	4*	<i>Pollachius pollachius</i>	5*
<i>Lophius piscatorius</i>	28*	<i>Lophius budegassa</i>	*10
<i>Brosme brosme</i>	1*		

**Figure 1:** 0312S survey strata, survey track and trawl numbers.



**Figure 2-3:** 0312S Gulf 7 deployments and total numbers of mackerel eggs present (Figure 2) and numbers of Stage 1 mackerel eggs present (Figure 3). 100, 200 and 500 m isobaths are also provided for reference.

Figure 2

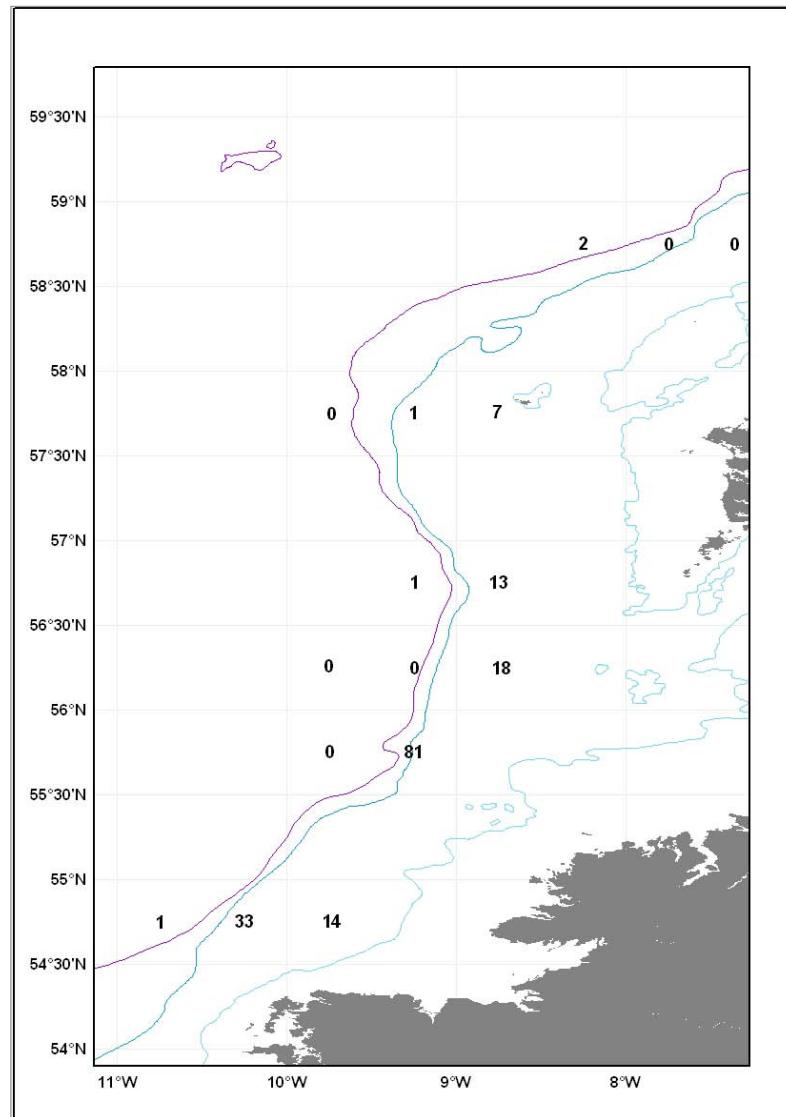


Figure 3

