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MRV *Scotia*

Survey 1821S

PROGRAMME

10-20 December 2021

Loading: Aberdeen, 06 December 2021

Unloading: Aberdeen, 20 December 2021

In setting the survey programme and specific objectives, etc the Scientist-in-Charge needs to be aware of the restrictions on working hours and the need to build in adequate rest days and rest breaks as set out in Marine Scotland's Working Time Policy (Notice 34/03). In addition, the Scientist-in-Charge must formally review the risk assessments for the survey with staff on-board before work is commenced.

In the interest of efficient data management it is now mandatory to return the survey report, to I Gibb and the Survey Summary Report (old ROSCOP form) to M Geldart, within four weeks of a survey ending. In the case of the Survey Summary Report a nil return is required, if appropriate

Out-turn days per project: 11 days: ST05b

Gear

Sea-Bird CTD/Carousel (SBE9, SBE9 (BAS), SBE25), water filtering equipment, chemistry sampling equipment, zooplankton nets, weeHolocam, glider recovery kit

Objectives

1. Test the SBE911 and CTD carousel (main CTD crane) at GoldenEye.
2. Perform routine hydrographic sampling at stations along the long term monitoring JONSIS section in the northern North Sea (Table 1, Priority 1).
3. Perform routine hydrographic sampling at stations along the long term monitoring Faroe-Shetland Channel section: Nolso-Flugga (Table 2, Priority 1).
4. Perform routine hydrographic sampling at stations along the long term monitoring Faroe-Shetland Channel section Fair Isle-Munken (Table 3, Priority 1).
5. Carry out the Loch Ewe CTD transect and collect water and zooplankton samples (Table 4, Priority 1).
6. Deploy the weeHolocam at all Loch Ewe stations.
7. Take salinity, nutrient, chlorophyll, dissolved oxygen, TADIC samples along all standard lines, full sampling strategy.
8. Run the thermosalinograph (TSG) throughout the survey. TSG will be cleaned prior to sailing.

9. Run the VMADCP on all the standard sections.
10. Carry out oil degrading bacteria work: water filtration on selected NOL/FIM stations.
11. Provide the Met Office with CTD data similar to 1421S.
12. Recover HECLA Faroes Glider if required and if time allows (potentially at NW corner of Shelf 3 line).

Extra work listed below will be performed if time allows, Priority 2 tasks are not listed in order of importance and the sequence will be determined depending on time/location/weather:

13. Set up SBE25 with CDOM fluorometer for the chemists for Survey 0122S.
14. Perform hydrographic sampling along the Stonehaven AlterEco section in the northern North Sea (Table 5, Priority 2).
15. Perform a Stonehaven CTD cast at beginning/end of cruise (depending on the Stonehaven sampling schedule).
16. Perform hydrographic sampling along the Shelf 1 section (Priority 2).
17. Perform hydrographic sampling along the Shelf 2 section (Priority 2).
18. Perform hydrographic sampling along the Shelf 3 section (Priority 2).
19. Perform hydrographic sampling along the Shelf 4 section (Priority 2).
20. Conduct CTD/VMADCP survey in Yell Sound (Priority 2).
21. If weather/time permits repeat the JONSIS line at the end of the survey and extend to 001° 30' E (if we have Norwegian clearance) (Priority 2).
22. Perform hydrographic sampling along the East Coast section (in the Northern North Sea) (Priority 2).
23. Perform hydrographic sampling along the Fedje/Shetland section between Shetland and Norway (in the Northern North Sea) (Priority 2).
24. If conditions in the Faroe-Shetland Channel don't allow further work in the Faroe-Shetland Channel, conduct VMADCP/CTD work in the Moray Firth (details to be determined) (Priority 3).
25. If weather/time permits, perform a CTD/VMADCP survey on part of the Jonsis line (around 59° 17' N, 001° 15' W) (Priority 3).
26. If sheltering in a suitable location around Shetland or Orkney due to bad weather conduct VMADP/CTD surveys (details to be determined). (Priority 3).

General Procedure

After departing Aberdeen and completing appropriate drills, *Scotia* will make passage to GoldenEye (target sampling position will be 58° 0.3' N 0° 21.96' W) for a test dip (unless we need to perform a Stonehaven CTD dip first). On completion, *Scotia* will head to the eastern

end of the JONSIS section to carry out sampling with the CTD and carousel water sampler (Table 1, Figure 1).

The vessel will then either proceed to the Faroe-Shetland Channel or Loch Ewe, weather dependent. We will commence hydrographic sampling along the Nolso Flugga survey line (Table 2, Figure 1) in the FSC. On completion of the Nolso Flugga line, the vessel will proceed to conduct hydrographic sampling on the Fair Isle-Munken survey line (Table 3, Figure 1). On completion of the Fair Isle Munken line, the vessel will proceed to Loch Ewe and commence CTD, biological sampling and weeHoloCam deployments along the transect (Table 4, Figure 1).

Once the Priority 1 work is completed (or if time allows during Priority 1 work) and if time allows, *Scotia* will carry out additional work (listed among the survey objectives as Priority 2 and 3, Figure 3). This extra work will include extra hydrographic lines on the shelf and/or the North Sea and additional CTD/VMADCP transects/locations. In case we are sheltering in a suitable location around Shetland, Orkney or the Moray Firth we will run the VMADCP and perform CTD sampling along specified lines (to be determined).

Scientific Procedures

It is expected that deployments of hydrographic equipment will be carried out with the CTD crane whilst the vessel is on station. Plankton bongo-net samples will be taken using the plankton crane and wire. weeHoloCam deployments will be using the plankton crane and wire

Three container laboratories will be required (one for the chemists, one for water filtering and a dry container for communications with sampling equipment). Chlorophyll samples will be stored frozen in the freezer in the Fish House and nutrient samples will be stored in a **clean, fish-free** freezer down below.

The thermosalinograph will be run throughout the survey.

(NOTE: The position of the CTD sampling station in the Goldeneye oil field may be adjusted for any exclusion zones and oil infrastructure).

(NOTE: The survey will potentially take *Scotia* into the Foinaven Development Area. This is now standard practice, and normal on-site communications will be established with the Foinaven co-ordinating officer).

(NOTE: Hydrographic stations at NOL and FIM have been amended to avoid entering Faroese territorial waters).

Normal contacts will be maintained with the laboratory.

Submitted:
H Smith/B. Rabe
29 November 2021

Approved:
I Gibb
03 December 2021

Figure 1: Map of main monitoring lines (Jonsis, NOL, FIM, AlterEco and Loch Ewe)

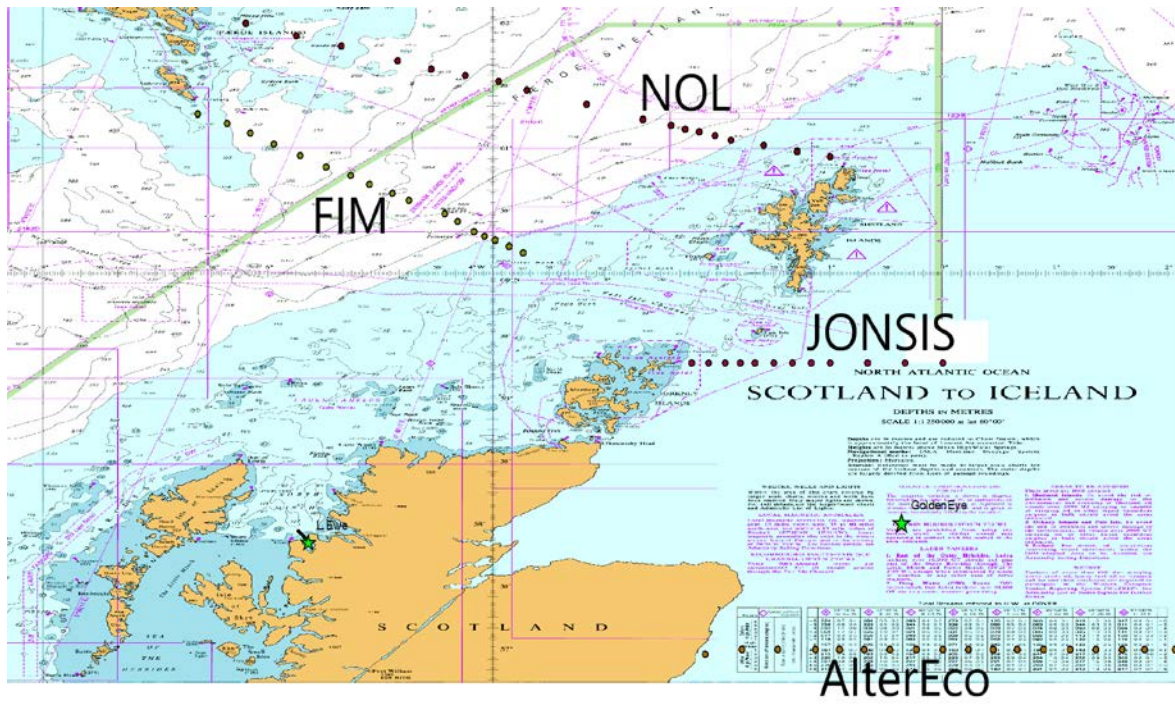


Table 1: Jonsis

CODES	#	Name	Latitude	Longitude	Depth	Spacing
	01	JO 1	59° 17.00' N	02° 14.00' W	75 m	
	02	JO 1A	59° 17.00' N	02° 5.00' W	90 m	4.59 nm
	03	JO 2	59° 17.00' N	01° 56.00' W	100 m	4.59 nm
	04	JO 3	59° 17.00' N	01° 48.00' W	80 m	4.08 nm
	05	JO 4	59° 17.00' N	01° 40.00' W	90 m	4.08 nm
	06	JO 5	59° 17.00' N	01° 30.00' W	95 m	5.10 nm
	07	JO 6	59° 17.00' N	01° 20.00' W	110 m	5.10 nm
	08	JO 6A	59° 17.00' N	01° 10.00' W	120 m	5.10 nm
	09	JO 7	59° 17.00' N	01° 0.00' W	125 m	5.10 nm
	10	JO 8	59° 17.00' N	00° 40.00' W	120 m	10.20 nm
	11	JO 9	59° 17.00' N	00° 20.00' W	140 m	10.20 nm
	12	JO10	59° 17.00' N	00° 0.00' W	135 m	10.20 nm
	Totals				1180 m	68.36 nm

Priority Stations are JO-01, JO-03 and JO-06a, JO-10

**Table 2: NOL line
Nolso-Flugga –**

CODE	#	Name	Latitude	Longitude	Depth	Spacing
	01	NOL-01	60° 56.00' N	01° 00.00' W	110 m	
	02	SEFN1	60° 58.70' N	01° 17.70' W	125 m	9.00 nm
	03	SEFN2	61° 01.40' N	01° 35.40' W	155 m	8.99 nm
	04	NOL-02	61° 04.00' N	01° 53.00' W	270 m	8.91 nm
	05	SEFN3	61° 06.00' N	02° 01.50' W	440 m	4.57 nm
	06	NOL-03	61° 08.00' N	02° 10.00' W	550 m	4.57 nm
	07	SEFN4	61° 09.30' N	02° 17.50' W	630 m	3.85 nm
	08	NOL-3a	61° 11.00' N	02° 25.00' W	730 m	3.98 nm
	09	NOL-04	61° 14.00' N	02° 40.00' W	1080 m	7.82 nm
	10	NOL-05	61° 21.00' N	03° 10.00' W	1370 m	16.03 nm
	11	NOL-06	61° 28.00' N	03° 42.00' W	1235 m	16.84 nm
	12	FARN2	61° 32.00' N	03° 57.00' W	1200 m	8.18 nm
	13	NOL-07	61° 35.00' N	04° 15.00' W	990 m	9.08 nm
	14	FARN1	61° 38.00' N	04° 33.00' W	530 m	9.07 nm
	15	NOL-08	61° 42.00' N	04° 51.00' W	235 m	9.44 nm
	16	NOL-09	61° 49.00' N	05° 21.00' W	180 m	15.84 nm
	17	NOL-10	61° 54.00' N	05° 45.00' W	290 m	12.37 nm
	18	NOL-11	62° 00.00' N	06° 12.00' W	125 m	14.04 nm
	Totals				8250 m	162.60 nm

If stations need to be missed they should be dropped in this order
 [Priority 4: FARN1, FARN2], [Priority 3: SEFN1, SEFN2, SEFN3, SEFN4]
 [Priority 2, NOL-3a, NOL-05, NOL-07, NOL-10]

**Table 3: FIM
Fair Isle - Munken**

(Amended for presence of Foinaven oil platform)

CODE	#	Name	Latitude	Longitude	Depth	Spacing
	01	FIM-01	60° 10.00' N	03° 44.00' W	150 m	
	02	SEFF1	60° 13.00' N	03° 51.50' W	170 m	4.74 nm
	03	FIM-02	60° 16.00' N	03° 59.00' W	200 m	4.84 nm
	04	SEFF2	60° 18.00' N	04° 04.50' W	330 m	3.36 nm
	* 05	<i>FIM-03</i>	<i>60° 20.00' N</i>	<i>04° 10.00' W</i>	<i>390 m</i>	<i>3.03 nm</i>
	06	FIM-04	60° 25.00' N	04° 19.00' W	655 m	6.88 nm
	07	FIM-05	60° 29.00' N	04° 26.00' W	995 m	5.45 nm
	08	FIM-06	60° 35.00' N	04° 45.00' W	1090 m	11.15 nm
	09	FIM-6a	60° 38.00' N	04° 54.00' W	1030 m	5.33 nm
	10	FIM-07	60° 43.00' N	05° 06.00' W	915 m	7.70 nm
	11	FIM-08	60° 47.00' N	05° 16.00' W	830 m	6.34 nm
	12	FIM-09	60° 51.00' N	05° 29.00' W	600 m	7.36 nm
	13	FARF3	60° 56.70' N	05° 42.80' W	333 m	8.90 nm
	14	FIM-10	61° 02.00' N	05° 57.00' W	280 m	8.68 nm
	15	FARF2	61° 07.20' N	06° 09.40' W	250 m	7.95 nm
	16	FIM-11	61° 12.00' N	06° 22.00' W	240 m	7.67 nm
	17	FARF1	61° 16.40' N	06° 37.70' W	100 m	8.80 nm
	Totals				8,558 m	108.18 nm

If stations need to be missed they should be dropped in this order
 [Priority 4: FARF1, FARF2, FARF3], [Priority 3: SEFF1, SEFF2]
 [Priority 2, FIM-04, FIM-06a, FIM-07]

Table 4: Loch Ewe line

stn	lat		lon		
0	57	50.982	5	39.010	W
1	57	52.104	5	39.674	W
2	57	53.061	5	40.245	W
3	57	53.977	5	41.118	W
4	57	54.893	5	41.992	W
5	57	55.810	5	42.865	W
6	57	56.726	5	43.739	W
7	57	57.642	5	44.612	W
8	57	58.559	5	45.486	W

Table 5: AlterEco Line

#	Name	Latitude	Longitude	Depth [m]	Spacing
01	AlterEco1	57° 00.00' N	02° 04.00' E	92	
02	AlterEco2	57° 00.00' N	01° 48.00' E	94	8.72 nm
03	AlterEco3	57° 00.00' N	01° 36.00' E	99	6.54 nm
04	AlterEco4	57° 00.00' N	01° 22.00' E	104	7.63 nm
05	AlterEco5	57° 00.00' N	01° 08.00' E	85	7.63 nm
06	AlterEco6	57° 00.00' N	00° 54.00' E	102	7.61 nm
07	AlterEco7	57° 00.00' N	00° 40.00' E	92	7.61 nm
08	AlterEco8	57° 00.00' N	00° 27.00' E	89	7.09 nm
09	AlterEco9	57° 00.00' N	00° 14.00' E	84	7.09 nm
10	AlterEco10	57° 00.00' N	00° 00.00' E	83	7.61 nm
11	AlterEco11	57° 00.00' N	00° 14.00' W	79	7.61 nm
12	AlterEco12	57° 00.00' N	00° 28.00' W	82	7.63 nm
13	AlterEco13	57° 00.00' N	00° 42.00' W	68	7.63 nm
14	AlterEco14	57° 00.00' N	00° 55.00' W	75	7.07 nm
15	AlterEco15	57° 00.00' N	01° 08.00' W	67	7.07 nm
16	AlterEco16	57° 00.00' N	01° 28.00' W	68	10.91 nm
17	AlterEco17	57° 00.00' N	01° 47.00' W	98	10.56 nm
18	<i>AlterEco18</i>	<i>56° 57.80' N</i>	<i>02° 06.80' W</i>	<i>47</i>	<i>10.78 nm</i>
Totals				1508 m	136.83 nm

Figure 3: Map of some of the extra hydrographic lines (details to be provided at a later stage when necessary)

