

MRV *Scotia*

Survey 1822S

REPORT

10-20 December 2022

Loading: Aberdeen, 06 December 2022

Unloading: Aberdeen, 20 December 2022

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

Personnel

B Rabe (SIC)

H Smith

A Gallego

M Geldart

M Bargus

R Parpucis

P Stainer

M Rennie

P Diaz

(No Co-SIC but two SITs)

Out-turn days per project: 11 days: ST05b

Gear

Sea-Bird CTD/Carousel (SBE25+), water filtering equipment, chemistry sampling equipment, zooplankton nets, weeHolocam

Objectives

1. Perform Stonehaven sampling (including CTD, bongo, phytoplankton sample, secci disc) at beginning/end of cruise (Table 6). **Achieved**
2. Test the SBE25+ and CTD carousel (main CTD crane) at GoldenEye (details of which instrument/crane TBC). **SBE25+ and CTD crane were tested at Stonehaven and GoldenEye site skipped.**
3. Perform routine hydrographic sampling at stations along the long term monitoring JONSIS section in the northern North Sea (Table 1, Priority 1). **Achieved**

4. Perform routine hydrographic sampling at stations along the long term monitoring Faroe-Shetland Channel section: Nolso-Flugga (Table 2, Priority 1). **Achieved**
5. Perform routine hydrographic sampling at stations along the long term monitoring Faroe-Shetland Channel section Fair Isle-Munken (Table 3, Priority 1). **Achieved**
6. Carry out the Loch Ewe CTD transect and collect water and zooplankton samples (Table 4, Priority 1) (plus additional stations on Loch Ewe Grid, Table 7). **Achieved**
7. Deploy the weeHolocam at all Loch Ewe transect stations (plus a deep deployment test). **Achieved**
8. Take salinity, nutrient, chlorophyll, dissolved oxygen, TADIC samples along all standard lines, full sampling strategy. **Achieved**
9. Run the thermosalinograph (TSG) throughout the survey. TSG will be cleaned prior to sailing. **Achieved**
10. Run the VMADCP on all the standard sections. **Achieved**
11. Provide the Met Office with CTD data similar to previous cruises. **Achieved**
12. Recover NOC's ocean glider near the JONSIS line if timing/weather permits (TBC). **Glider recovered by NOC the previous week.**

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. Perform hydrographic sampling along the Stonehaven AlterEco section in the northern North Sea (Table 5, Priority 2). **Partly achieved**

Narrative

1822S Daily log

09/12

Scientific staff joined *Scotia* in the late evening and made sure that all scientific gear was set up and tied-down.

10/12

Scotia sailed at 0500, everyone completed the muster drill and we arrived at Stonehaven at 0700. The first station was completed but no data was saved on the SBE25+ instrument so we had to repeat the station. We tried to trouble shoot but could not find an obvious fault and suspect there were issues with the plunger (to turn instrument on/off) on the SBE25+. We completed the second Stonehaven cast including two bongo net deployment, secci disk deployment and additional water samples for phytoplankton analysis. The CTD winch was very jerky at this point. We then started steaming towards the Goldeneye station to arrive by 1800 but at 1500 we had to turn around for a medical emergency and to medivac a crew member off (helicopter operations were unsuccessful and a lifeboat collected the crew member in Peterhead Bay), eventually leaving Peterhead at 1900. We started steaming towards the east end of Jonsis (skipping GoldenEye), set to arrive at the start of the line by the next day.

11/12

We arrived at the east end of Jonsis at 0930. We took the pH sensor off the SBE25+ and gave

the TSG a clean before starting the Jonsis line. Before the first cast, we ran the CTD wire in/out a few times without collecting data to help with the jerkiness, which seemed to improve at the end of this test. We then started sampling on Jonsis, with the wire/winch still being jerky but improving over time. We continued to work throughout the day and finished Jonsis at 2100. We then started steaming to the eastern end of FIM, after reassessing the weather forecast at 1900.

12/12

We arrived at the start of FIM at 0545 and sampled throughout the day. Battery changes of the AFM and SBE25+ led to some slight delays but saved time with regard to data downloads. The tap in the water sampling lab had stopped working and the engineers replaced it. The wind picked up during the day, making staying on station more difficult, but manageable. Work continued throughout the day and night with some bow thruster issues.

13/12

FIM got completed at 1130 with all stations successfully sampled. We then made our way towards Loch Ewe, 192 nm away, making good time, heading with the weather at about 12.5 knots. Loch Ewe provided a good option to shelter from bad weather and potentially pick up a new crew member the following day.

14/12

We started the Loch Ewe transect from offshore just after 0400. CTD, bongo net and weeHoloCam deployments were performed at each station, with windy conditions at times. We finished by 1400 and did three extra CTD dips on our LE grid, further inside the loch. *Scotia* then steamed to Ullapool to pick up a new crew member to then start steaming towards the west end of NOL.

15/12

The whole day was spent steaming towards the Faroese side of the NOL line in bumpy conditions. The time was used to catch up on paperwork, SIC Pathway discussions or sleep (where possible). We arrived at NOL at midnight.

16/12

We started the NOL line at NOL-11A at midnight and immediately had to repeat the first station because one Niskin bottle had not fired. An issue with the nodger got fixed by the night watch but everything else worked fine throughout the day. Data downloads were completely during battery changes to save time. The weeHoloCam got deployed on NOL-5 for a test in deep water and performed well.

17/12

We continued our work on NOL throughout the night, including some work on the nodger and the Niskin bottles. The pipes on the CTD crane came loose but the engineers fixed the issue in between stations. We finished NOL successfully by 1330 and started making our way to the eastern end of the AlterEco line, 257 nm away.

18/12

After steaming throughout the night we started sampling on AlterEco at 1130.

The SIC attended the ship's safety meeting at 1300. Sampling continued until it had to get called off by 2215 because of the weather conditions (the bow thruster tripped too many times). The decision was made to steam to Stonehaven (as the highest priority station) and reassess conditions in the morning. An error in our processing was discovered, reading in the first 10 m during the soak instead of skipping that data hence our data submission to the MetOffice had wrong data in it (followed up by email) and plots show wrong values in top 15 m.

19/12

At 0800 the conditions were just about good enough to start sampling at the innermost Stonehaven station and then at Stonehaven 2 including bongo, phyto samples and additional water samples. We managed three more AlterEco stations before it was time to head back towards Aberdeen. We were moored up at 2215.

20/12

Unloading started around 0900 and everything was put away at the lab by 1330.

Throughout the survey the TSG was running and we collected calibration samples (salinity and chlorophyll). The VMAPCP was running on all of our main sampling lines.

In total we steamed 1840 nm during this trip.

Scientific Procedures

Deployment of hydrographic equipment was carried out with the CTD crane whilst the vessel was on station. Plankton bongo-net samples were taken using the plankton crane and wire. WeeHoloCam deployments were using plankton crane and wire for the Loch Ewe deployments and Hydro 3 for the deep test (due to wire width/length).

Two container laboratories were used (one for water filtering and one dry container for communications with sampling equipment). Chlorophyll samples were stored frozen in the freezer in the Fish House and unanalysed nutrient samples were stored in a cleaned, fish-free freezer down below. The thermos-salinograph was run throughout the survey.

Normal contacts were maintained with the laboratory.

Sampling

Overall, 73 hydrographic stations were completed. 350 nutrient samples were collected (one per sampled depth), as well as 173 chlorophyll (one per sampled depth) (including 24 for TSG calibration), 127 oxygen samples (triplicates per sampled depth, duplicates at Stonehaven and Loch Ewe), 220 TA/DICs (duplicates at each depth) and 117 salinity calibration samples (duplicates at each sampled depth) (including 24 for TSG calibration). 13 integrated water column bongo net samples for zooplankton were collected and two phyto plankton samples. The weeHoloCam collected 168 minutes of images from ten dips.

Submitted: B Rabe, 21 December 2022

Approved:

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

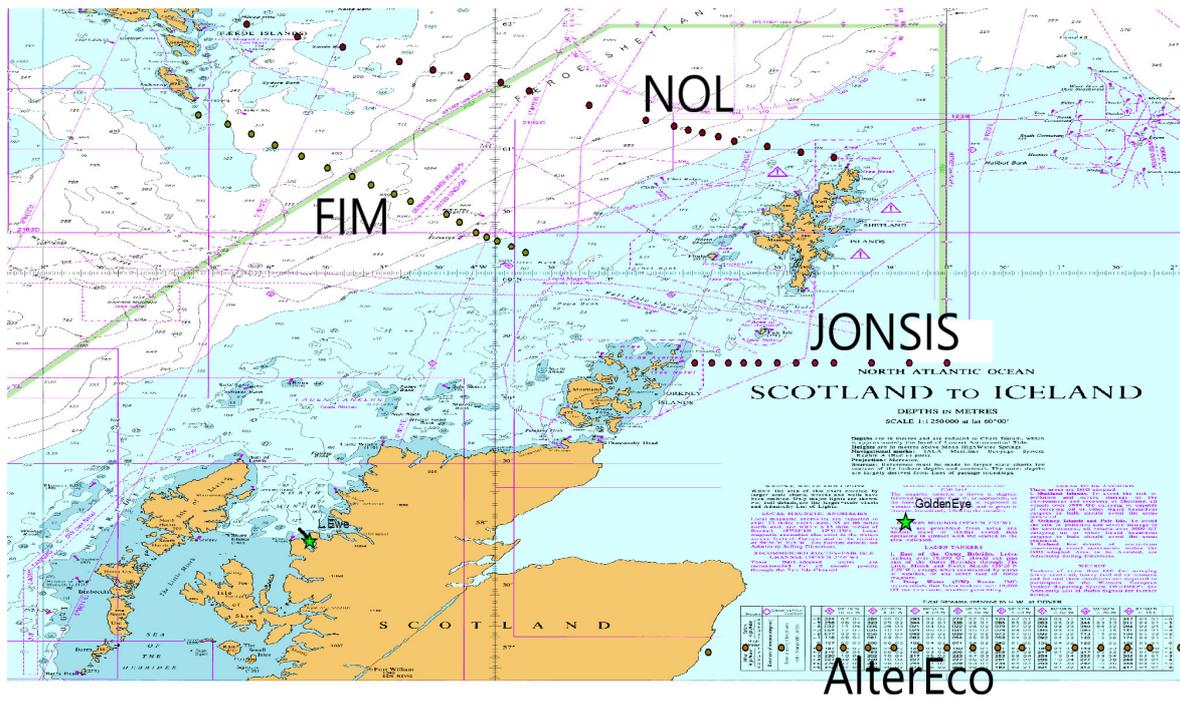


Table 1: Jonsis

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 FULL SAMPLING**

CODES	#	Name	Latitude	Longitude	Depth	Spacing
N, CH, DS, S	01	NOL-01	60° 56.00' N	01° 00.00' W	110 m	
N, CH	02	SEFN1	60° 58.70' N	01° 17.70' W	125 m	9.00 nm
N, CH, S	03	SEFN2	61° 01.40' N	01° 35.40' W	155 m	8.99 nm
N, T, O, CH	04	NOL-02	61° 04.00' N	01° 53.00' W	270 m	8.91 nm
N, CH, DS, S	05	SEFN3	61° 06.00' N	02° 01.50' W	440 m	4.57 nm
N, CH	06	NOL-03	61° 08.00' N	02° 10.00' W	550 m	4.57 nm
N, CH, S	07	SEFN4	61° 09.30' N	02° 17.50' W	630 m	3.85 nm
N, CH	08	NOL-3a	61° 11.00' N	02° 25.00' W	730 m	3.98 nm
N, T, O, CH, DS, S	09	NOL-04	61° 14.00' N	02° 40.00' W	1080 m	7.82 nm
N, CH	10	NOL-05	61° 21.00' N	03° 10.00' W	1370 m	16.03 nm
N, T, O, CH, S	11	NOL-06	61° 28.00' N	03° 42.00' W	1235 m	16.84 nm
CTD only	12	FARN2	61° 32.00' N	03° 57.00' W	1200 m	8.18 nm
N, CH, DS	13	NOL-07	61° 35.00' N	04° 15.00' W	990 m	9.08 nm
CTD only	14	FARN1	61° 38.00' N	04° 33.00' W	530 m	9.07 nm
N, T, O, CH, S	15	NOL-08	61° 42.00' N	04° 51.00' W	235 m	9.44 nm
N, CH	16	NOL-09	61° 49.00' N	05° 21.00' W	180 m	15.84 nm
N, CH, DS, S	17	NOL-10	61° 54.00' N	05° 45.00' W	290 m	12.37 nm
N, T, O, CH	18	NOL-11 (NOL-11A)	62° 00.00' N (61° 56.50' N)	06° 12.00' W (05° 57.00' W)	125 m (159 m)	14.04 nm (7.0 nm)
	Totals				10245 m	162.60 nm

Table 3: FIM

Fair Isle - Munken - FULL SAMPLING

CODE	#	Name	Latitude	Longitude	Depth	Spacing
S, N, CH, DS	01	FIM-01	60° 10.00' N	03° 44.00' W	150 m	
N, CH	02	SEFF1	60° 13.00' N	03° 51.50' W	170 m	4.74 nm
S, N, T, O, CH	03	FIM-02	60° 16.00' N	03° 59.00' W	200 m	4.84 nm
N, CH	04	SEFF2	60° 18.00' N	04° 04.50' W	330 m	3.36 nm
S, N, CH, DS	<i>* 05</i>	<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>
N, CH	06	FIM-04	60° 25.00' N	04° 19.00' W	655 m	6.88 nm
S, N, CH	07	FIM-05	60° 29.00' N	04° 26.00' W	995 m	5.45 nm
N,T,O,CH	08	FIM-06	60° 35.00' N	04° 45.00' W	1090 m	11.15 nm
S, N, CH, DS	09	FIM-6a	60° 38.00' N	04° 54.00' W	1030 m	5.33 nm
N, CH	10	FIM-07	60° 43.00' N	05° 06.00' W	915 m	7.70 nm
S, N, T, O, CH	11	FIM-08	60° 47.00' N	05° 16.00' W	830 m	6.34 nm
N, CH, DS	12	FIM-09	60° 51.00' N	05° 29.00' W	600 m	7.36 nm
CTD only	13	FARF3	60° 56.70' N	05° 42.80' W	333 m	8.90 nm
S, N, CH	14	FIM-10	61° 02.00' N	05° 57.00' W	280 m	8.68 nm
CTD only	15	FARF2	61° 07.20' N	06° 09.40' W	250 m	7.95 nm
N, T, O, CH, DS	16	FIM-11 (FIM-11A)	61° 12.00' N (61° 11.30' N)	06° 22.00' W (06° 20.00' W)	240 m (242 m)	7.67 nm (7.0 nm)
CTD only	17	FARF1	61° 16.40' N	06° 37.70' W	100 m	8.80 nm
Totals					8,558 m	108.18 nm

* FIM-03 - Use 60 20.25'N 004 09.00'W if above position is occupied.

Table 4: Loch Ewe line

LOCH EWE TRANSECT

Sampling	stn	lat		lon			Depth	distance
N, T, O, Ch, S Bongo Holocam	0	57	50.982	5	39.010	W	46	
CTD Bongo Holocam	1	57	52.104	5	39.674	W	32	1
N, T, O, Ch, S Bongo Holocam	2	57	53.061	5	40.245	W	37	1
CTD Bongo Holocam	3	57	53.977	5	41.118	W	55	1
N, T, O, Ch, S Bongo Holocam	4	57	54.893	5	41.992	W	62	1
CTD Bongo Holocam	5	57	55.810	5	42.865	W	82	1
N, T, O, Ch, S Bongo Holocam	6	57	56.726	5	43.739	W	104	1
CTD Bongo Holocam	7	57	57.642	5	44.612	W	95	1
N, T, O, Ch, S Bongo Holocam	8	57	58.559	5	45.486	W	123	1
							640	8

Table 5: AlterEco Line

AlterEco Transect

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

Table 6: Stonehaven sampling

Stonehaven CTD stations – 1822S

CODE	#	Name	Latitude	Longitude	Depth [m]	Spacing
N, CH, O, DS, TADIC Bongo, Phyto, Secci	1	Stonehaven 2	56° 57.801' N	02° 06.795' W	47	<i>0.77 nm</i>
CTD only	2	Stonehaven 1	56° 57.801' N	02° 08.157' W	47	

Table 7: Loch Ewe inner CTD grid

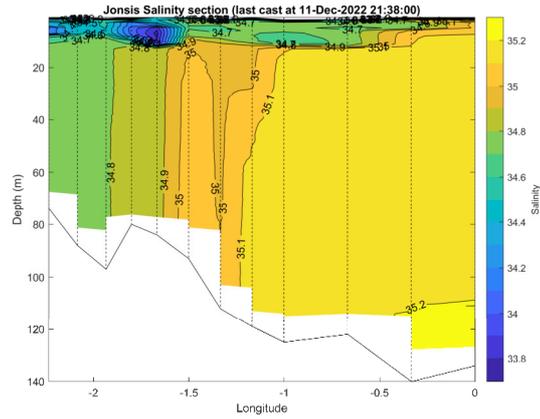
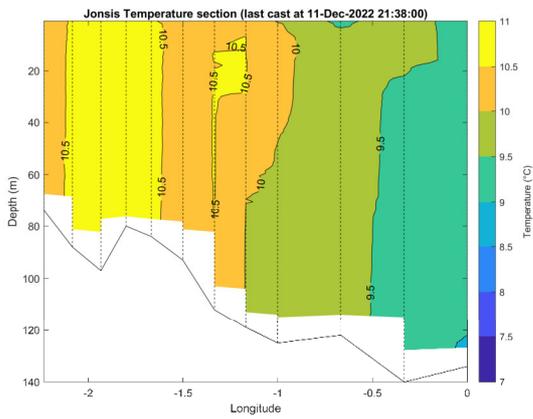
Name	Latitude	Longitude	Depth (m)
LEgrid-07	57 49.76N	005 38.79W	45
LEgrid-09	57 48.56N	005 38.43W	31
LEgrid-10	57 47.78N	005 38.35W	45

Appendix 1: Section plots for long-term monitoring lines

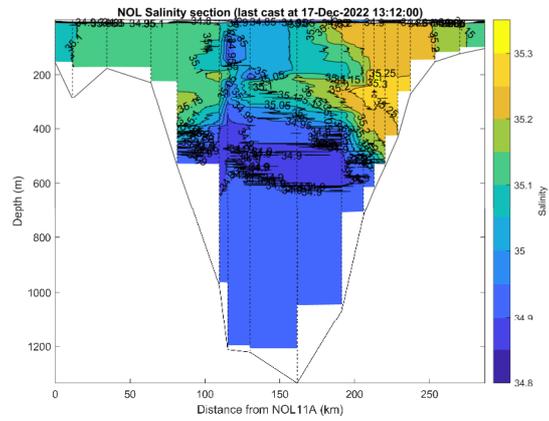
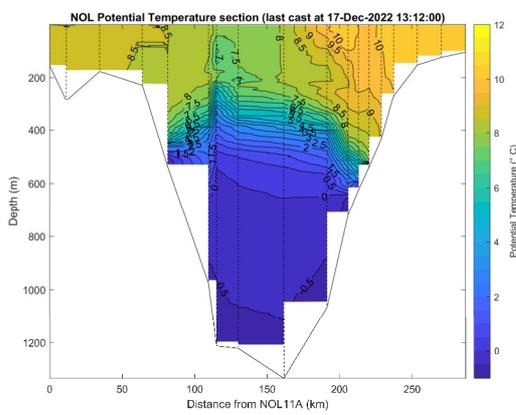
Temperature/Potential temperature (left) and salinity (right) section plots for Jonsis, NOL, FIM and Loch Ewe, plus a TS diagram for Jonsis, NOL and FIM.

NOTE: The top 10 m show false values due to a processing issue.

Jonsis:



NOL:



FIM:

