CRUISE REPORT FOR THE HUDSON MISSION HUD 2013-004

Leg 1: Apr 4-Apr 12, Leg 2: Apr 13-Apr 26

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Objectives

The main objectives of the mission were:

- to obtain synoptic spring observations of the hydrography and the distributions of nutrients, phytoplankton and zooplankton along three sections on the Scotian Shelf and one in Cabot Strait, i.e. to carry out the Atlantic Zone Monitoring Programme (AZMP).
- to retrieve and deploy moorings along a portion of the Halifax Line in the slope waters of the central Scotian Shelf and to take hydrographic profiles and collect water samples at mooring stations. This part of the programme was in collaboration with members of the UK RAPID-WAVE (West Atlantic Variability Experiment) programme.

Additional objectives were:

- to carry out hydrographic, chemical and biological sampling at stations in the Gully and Roseway Basin, on the Halifax Line Extension (to HL10), and at stations along transects across the NE Channel and St Anns Bank
- to collect nutrients and hydrography across the Northeast Channel as part of NERACOOS Cooperative Agreement
- to investigate the vertical distribution of macroplankton (e.g. krill) in NE Channel, the shelf basins, the Gully and Cabot Strait
- to deploy/recover moorings at inner shelf stations of the Halifax Section (OTN moorings)

- to deploy bottom mounted ADCP/microcat mooring and thermistor chain on St. Anns Bank
- to identify and enumerate birds during transit between stations and lines
- to collect and preserve water samples for analysis of carbon dioxide concentration
- to retrieve three 'whale listening' moorings in the Gully region
- to obtain some moving vessel profiler (MVP) transects during transits

Summary of mission accomplishments

All of the stations of the main AZMP lines were sampled, so that the first major objective, the core AZMP sampling, was successfully completed. All of the RAPID moorings on extended Halifax Section were recovered and deployed. The hydrographic and water sampling associated with the mooring programme were carried out, so that the second major objective was largely successfully completed. Additional stations were sampled as required by the additional objectives stated above and all objectives were achieved.

Cruise Narrative

On April 4th, the CCGS HUDSON left BIO at 10:30 LT (13:30 UTC). After fire and boat drills, testing of the CTD, BIONESS and MVP were conducted in Bedford Basin before heading to the OTN mooring sites. Recovery of OTN1 was started at 17:00 LT and of OTN2 at 18:18 LT. It was decided that it was too late to try and recovery OTN3. We decided to turn that mooring on our return for Leg 1. OTN2 and OTN1 moorings were deployed before heading to HL2. Work started at that site at 22:00. At the end of that station, the MVP was deployed until 05:30 the next morning, near HL5. MVP profiles were made every 10 minutes during this period.

We commenced recovery of moorings at RS1 to RS5 at 08:20 on April 5th. Then, a CTD and net sample were taken at HL6.7 and we prepared to sample at HL7 before the weather became bad (40 kt winds with gusts to 50 kts). That station was abandoned and we proceeded slowly to RS5 hoping that the weather would improve. It did very slightly.

On April 6th at 09:50, we managed to conduct a microcat calibration of the recovered instruments as well as fixed the wraps on the drum. Heavy rolls with slow spooling of the wire probably resulted in the CTD profile being not worthwhile for analysis. Then, we headed to HL10 for a standard CTD station and microcat calibration but the weather became worse. At 17:00, we decided to abandon going to HL10 and headed to HL8 instead.

We did the HL8 CTD and net station as well as microcat calibrations on April 7th. We recovered RS6 and RS6A. While transiting from RS6 to RS6A, communications were established with the old RS6 release and the command to release the anchor was sent. However, the release did not move from the bottom.

On April 8th, at HL7, there were problems with the CTD block; it was believed that a bearing was going. The backup blocks were tried but there were issues with the wire-out data from them.

A CTD cast with microcat calibration was done using the CTD pressure and the LSR/altimeter as guides. The aborted cast (Event #30) and subsequent test of the CTD wire were not logged into the bridge log books. The new RS5 mooring site, east of the unrecovered previous mooring, was surveyed with the Knudson echosounder. RS5 mooring was deployed, followed by moorings at RS4 and RS3. The reassembled CTD block was repaired and stations at HL6.3 and HL6 were completed.

Moorings at RS1 and RS2 were deployed on April 9th. These deployments were followed by a CTD station (with oxygen samples) at HL10. Then, we headed to do the Gully work. On April 10th, the AMAR moorings at ShoHald, GulSho and MidGul were recovered. CTD and net stations were conducted at SG23, GulD4, GulD3 and SG28. BIONESS sampling was also done at GulD3. Sampling was finished in the Gully at 06:00 on April 11th. We proceeded to HL5 and did the stations from HL5 to HL2, including BIONESS sampling at HL3.

On April 12th, the mooring at OTN3 was recovered and another one deployed there. Then, sampling was done at HL1 before heading to BIO for science party change and off load of mooring equipment. We arrived at the dock at 1300 LT.

For the second leg, we depart BIO at 1400 LT on April 13th. After fire and boat drill in the basin, we headed for RL1 to do CTD, net and BIONESS sampling. CTD and net sampling at BBL1, BBL2, BC/CJ and BBL3 followed this sampling. It was noticed that the primary oxygen was acting strangely. Examination of the configuration file and replacing the primary sensor (Event #85) still did resolve the problem. It appears that the original configuration file was incorrect for the oxygen systems and the primary (secondary) oxygen system was plumbed on the secondary (primary) T/C pair. Additionally, updated calibration coefficients for one of the oxygen sensors were obtained. As the PS line was started, it was observed that the oxygen sensor and salinity on the secondary sensor suite were showing oscillations compared to the primary sensors for the upper 20 m of the casts, indication of possible signs of flow problem through the plumbing. During test casts of the CTD, the bridge, during a watch change, recorded a virtual deployment of the CTD (Event #87). While conducting the PS line, the pump was replaced before Event #93. From PS2 to Ps10, even stations were occupied and both a CTD and net cast were conducted. On April 15th, the odd number PS stations were sampled only with the CTD. After the PS line, BBL4 was occupied. After this station, the pump on the secondary suite of sensor was raised to remove some of the bend in the tubing between the sensors and air bleed. That fix did not work. In the end, the air bleed was replaced (hard to get cleaning wire through hole in air bleed) and the secondary sensor suite behaved properly. On Event #109, there was great agreement between the primary and secondary sensors. The BBL line was completed and headed to RL6. RL6 and RL were completed on April 16th and we steamed to St. Anns Bank for the deployment of the moorings. During the transit, all of the CTD stations were reprocessed with the appropriate calibration and configuration files (Table 1).

Stations	Primary O2 sensor	Secondary O2 sensor	Configuration File
Before Event #85	430133	430042	HUD2013004.con
Events #85-#88	430133	431588	HUD2013004B.con
Event #89 onwards	430042	431588	HUD2013004C.con

Table 1: List of O2 sensors used and the CTD configuration file for the different events.

We arrived at the St. Anns Bank mooring site at 06:00 on April 17th. Winds were 35 kts, gusting to 45 kts. It was decided to postpone the deployment until the next day and head to CSL6. CTD and net casts were made at CSL6 to CSL1; the BIONESS normally done at CSL4 was dropped due to winds and sea state.

After completing CSL1 and CSL2 on April 18th, we headed to St. Anns Bank to deploy the high-flyer/thermistor chain and bottom ADCP/microcat. After completion of these moorings, we proceeded to Sydney to drop off Jay Barthelotte by FRC and return to sample along the St. Anns Bank line. At STAB5, BIONESS, CTD and net sampling were done. Sampling was completed between STAB4 and STAB1, with STAB3 starting on April 19th. The Louisbourg line was started. At LL2, it appeared that the primary sensor suite air bleed was plugged. The air bleed was replaced and a test cast (Event #149) was done at LL3. The CTD appeared to be working and LL3 was sampled. From this point on, the two sets of T/C/O2 sensors worked well. Post-processing of the CTD data prior to LL3 should edited to account for the problems with the plumbing (see Table 2 for details). The Louisborg line was occupied out to LL6 and we proceeded to the Banquereau Bank station and sample

On April 20th, sampling across the mouth of the Laurentian Channel (stations BP5, BP4 and BP1) was undertaken before sampling along the St. Pierre Bank line (EH and SPB stations). Stations SPB10 and SPB10A were occupied on April 21st and sampling along the Southeast St. Pierre Bank was started. After completing this line, we transit to LL9 and finished the remaining stations on that line on April 23rd.

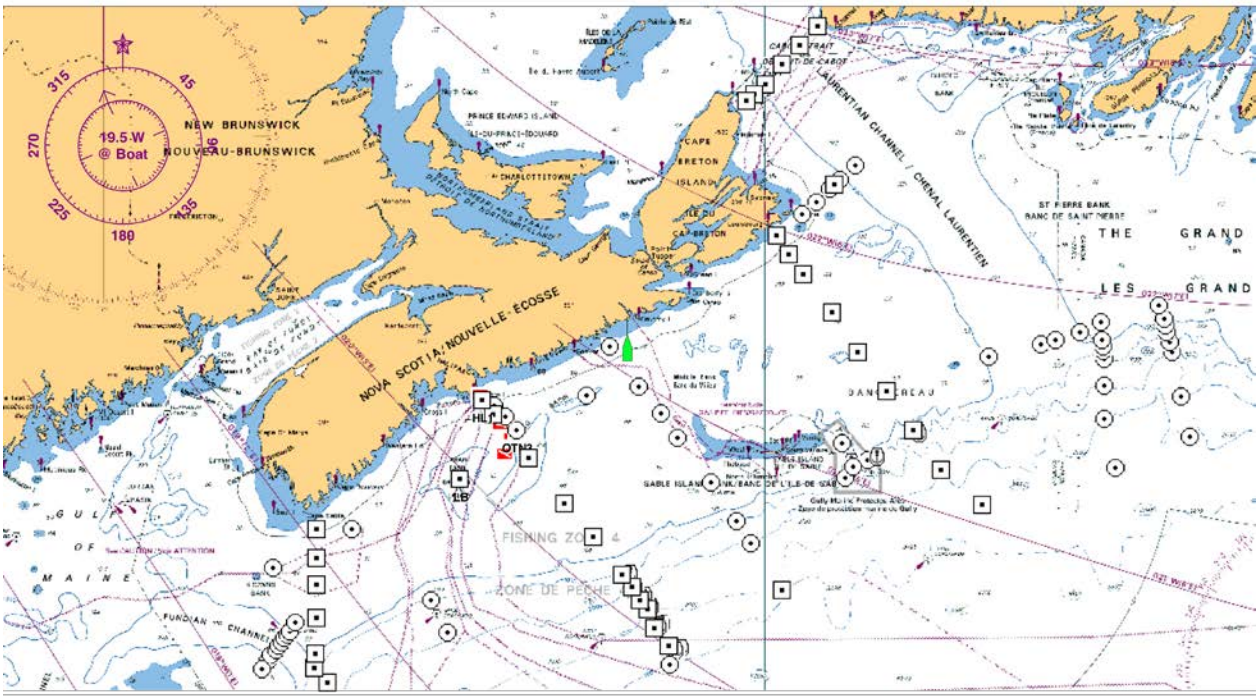
While heading to the end of the Sable Island Bank line, weather worsened and the cruise track changed to a southerly direction. It appears that I gave the bridge an incorrect position and we occupied a station south of SIB8. On April 24th, we completed the SIB line. We proceeded to Little Emerald Basin but it was too rough to do a BIONESS tow. We headed to Emerald Basin and reoccupied HL3 on April 25th. Then, we did a station in LaHave Basin, including a BIONESS tow. We proceeded along the Ocean Tracking Halifax Line and conducted CTD casts at the locations of the benthic pods. HL2 was occupied and we waited until daylight to do the last OTN station which was near the shore.

We arrived at the BIO dock at 11:00 LT on April 26th.

Event	Station	Questionable Data	Where	Event	Station	Questionable Data	Where
11	HL2	secondary T/C; primary O2	<~60 dbars	88	Test	secondary T/C; primary O2	All
19	HL6.7	secondary T/C; primary O2	<~80 dbars	91	PS2	secondary T/C; primary O2	<~90 dbars
20	RS6	secondary T/C; primary O2	<~40 dbars	93	PS4	secondary T/C; primary O2	<~10 dbars
22	HL8	secondary T/C; primary O2	<~60 dbars	95	PS6	secondary T/C; primary O2	<~10 dbars
28	HL9	secondary T/C; primary O2	<~60 dbars	97	PS8	secondary T/C; primary O2	<~20 dbars
31	HL7	secondary T/C; primary O2	<~40 dbars	99	PS10	secondary T/C; primary O2	<~20 dbars
39	HL6.3	secondary T/C; primary O2	<~30 dbars	100	PS9	secondary T/C; primary O2	<~20 dbars
41	HL6	secondary T/C; primary O2	<~60 dbars	101	PS7	secondary T/C; primary O2	<~30 dbars
46	HL10	secondary T/C; primary O2	<~40 dbars	102	PS5	secondary T/C; primary O2	<~20 dbars
50	SG23	secondary T/C; primary O2	<~50 dbars	103	PS3	secondary T/C; primary O2	<~20 dbars
53	GulD4	secondary T/C; primary O2	<~60 dbars	105	BBL4	secondary T/C; primary O2	<~20 dbars
55	GulD3	secondary T/C; primary O2	<~65 dbars	107	BBL5	secondary T/C; primary O2	<~60 dbars
58	SG28	secondary T/C; primary O2	<~60 dbars	123	CSL4	primary T/C; secondary O2	<~80 dbars
61	HL5	secondary T/C; primary O2	<~60 dbars	125	CSL3	primary T/C; secondary O2	<~100 dbars
63	HL4	secondary T/C; primary O2	<~60 dbars	127	CSL2	primary T/C; secondary O2	<~40 dbars
65	HL3	secondary T/C; primary O2	<~60 dbars	129	CSL1	primary T/C; secondary O2	<~30 dbars
68	HL2	secondary T/C; primary O2	<~100 dbars	135	STAB5	primary T/C; secondary O2	<~40 dbars
72	HL1	secondary T/C; primary O2	<~50 dbars	137	STAB4	primary T/C; secondary O2	<~40 dbars
75	RL1	secondary T/C; primary O2	<~60 dbars	139	STAB3	primary T/C; secondary O2	<~30 dbars
77	BBL1	secondary T/C; primary O2	<~30 dbars	141	STAB2	primary T/C; secondary O2	<~40 dbars
80	BBL2	secondary T/C; primary O2	<~60 dbars	143	STAB1	primary T/C; secondary O2	<~40 dbars
83	BC/CJ	secondary T/C; primary O2	<~60 dbars	145	LL1	primary T/C; secondary O2	<~60 dbars
85	BBL3	secondary T/C; primary O2	<~30 dbars	147	LL2	primary T/C; secondary O2	<~80 dbars
86	PS1 Test	secondary T/C; primary O2	<~60 dbars				

Table 2. List of sensor pairs that have questionable data due to a problem with the air bleed on the sensor plumbing.

In addition to the AZMP sampling, samples were collected along main AMZP lines (the Halifax, Browns Bank, Cabot Strait and Louisbourg Lines), by post-graduate students from Dalhousie University to measure carbon dioxide concentrations. When the ship was under way, during the daylight hours on Leg 2, surveys for pelagic birds were carried out from the bridge.



Locations of stations occupied.

Summary bridge log for the Hudson mission 2013-004

Sdate	stime	Event	Station_name	Lat(deg)	Lat(min)	Lon(deg)	Lon(min)	Sounding	Collectors_comments
04-Apr-13	1824	1	**BBASIN**	44	41.6259	63	38.4024	73.6	BEDFORD BASIN TEST CTD 1
	1901	2	**BBASIN**	44	41.6125	63	38.3757	73	BEDFORD BASIN TEST CTD 2
	1936	3	**BBASIN**	44	42.0175	63	38.6628	58	Bioness test tow
	1949	4	**BBASIN**	44	41.6393	63	38.3455	73	MVP test tow
	2336	5	**OTN1**	44	20.9529	63	19.1739	123	MOORING RECOVERY OTN1
05-Apr-13	0041	6	**OTN2**	44	14.9830	63	10.0757	117	MOORING RECOVERY OTN2
	0117	7	**OTN2**	44	15.0199	63	10.0100	172	MOORING DEPLOY OTN2
	0257	8	**OTN1**	44	20.9188	63	18.2177	128	MOORING DEPLOY OTN1
	0407	9	**HL2**	44	16.0166	63	19.0312	156	RING NET 1-1
	0422	10	**HL2**	44	16.1469	63	18.9668	156	RING NET 1-2
	0444	11	**HL2**	44	16.3146	63	18.9878	146	CTD 3
	0525	12	**HL2**	44	15.9713	63	17.7445	150	MVP TOW 1
	1206	13	**RS1**	42	51.2455	61	38.2273	1087	MOORING RECOVERY RS1
	1403	14	**RS2**	42	44.4116	61	34.6978	1661	MOORING RECOVERY RS2
	1552	15	**RS3**	42	39.4025	61	27.5877	2260	MOORING RECOVERY RS3
	1740	16	**RS4**	42	33.4057	61	22.5092	2690	MOORING RECOVERY RS4
	1947	17	**RS5**	42	23.3882	61	16.8020	3360	MOORING RECOVERY RS5
	2125	18	**HL6.7**	42	37.0428	61	30.9271	2300	RING NET 2-1
	2238	19	**HL6.7**	42	37.0504	61	31.7472	2300	CTD 4
06-Apr-13	1245	20	**RS6**	41	56.3924	60	42.5191	3500	CTD 5 - Ucat calibration
07-Apr-13	0327	21	**HL8**	42	21.8734	61	20.5606	3443	RING NET 3-1
	0433	22	**HL8**	42	22.0251	61	19.8884	3443	CTD 6
	1110	23	**RS6**	42	10.8658	61	0.2669	3756	MOORING RECOVERY
	1557	24	**RS6A**	42	12.3700	61	9.0301	3790	MOORING RECOVERY
	1710	25	**RS6**	42	11.6466	61	2.3482	3733	RELEASE TEST
	1921	26	**RS6**	42	10.9325	61	0.1442	3766	MOORING DEPLOYED
	2155	27	**HL9**	42	11.9483	61	9.9614	3700	RING NET 4-1
	2300	28	**HL9**	42	11.9907	61	9.9520	3700	CTD 7
08-Apr-13	0329	29	**HL7**	42	31.9821	61	26.1039	2700	RING NET 5-1
		30							EVENT NUMBER NOT USED
	0731	31	**HL7**	42	32.0778	61	26.0314	2700	CTD 8
	1032	32	**RS5**	42	23.5800	61	12.5900	3426	RELEASE TEST
	1443	33	**RS5**	42	23.8434	61	13.0935	3426	MOORING DEPLOYED
	1728	34	**RS4**	42	32.4675	61	22.5100	2690	RELEASE TEST
	1817	35	**RS4**	42	33.4035	61	22.3344	2708	MOORING DEPLOYED
	2024	36	**RS3**	42	38.4457	61	27.1845	2263	RELEASE TEST
	2151	37	**RS3**	42	39.3874	61	27.3883	2263	MOORING DEPLOYED
09-Apr-13	0008	38	**HL6.3**	42	44.0090	61	37.1694	1650	RING NET 6-1
	0203	39	**HL6.3**	42	44.1062	61	37.4098	1650	CTD 9
	0412	40	**HL6**	42	50.9853	61	44.0906	1025	RING NET 7-1
	0511	41	**HL6**	42	50.9576	61	43.5774	1032	CTD 10
	0958	42	**RS1**	42	50.7475	61	38.9327	1092	RELEASE TEST
	1113	43	**RS1**	42	61.1377	61	38.9764	1092	MOORING DEPLOYED
	1308	44	**RS2**	42	44.5726	61	34.7382	1119	RELEASE TEST
	1353	45	**RS2**	42	44.3041	61	34.3233	1684	MOORING DEPLOYED

	1908	46	**HL10**	42	1.7831	61	3.7973	3980	CTD 11
10-Apr-13	1117	47	**SHOHALD MOORING**	44	5.4878	58	4.2820	1651	AMAR MOORING RECOVERY
	1439	48	**GULSHO MOORING**	43	52.9923	58	35.8611	1580	AMAR MOORING RECOVERY
	1740	49	**MIDGUL MOORING**	43	51.1172	58	55.3241	1894	AMAR MOORING RECOVERY
	1853	50	**SG23**	43	51.5612	58	43.8945	1080	CTD 12
	2019	51	**SG23**	43	51.6322	58	43.9739	1080	RING NET 8-1
	2218	52	**GULD4**	43	47.4889	58	54.1055	1950	RING NET 9-1
	2324	53	**GULD4**	43	47.7638	58	54.5469	1950	CTD 13
11-Apr-13	0245	54	**GULD3**	44	0.0111	59	1.1642	449	RING NET 10-1
	0309	55	**GULD3**	44	0.0066	59	1.1600	435	CTD 14
	0356	56	**GULD3**	44	1.3755	59	0.6717	600	BIONESS TOW 1
	0637	57	**SG28**	43	42.5727	58	59.9275	825	RING NET 11-1
	0732	58	**SG28**	43	42.5170	58	59.9549	825	CTD 15
	0922	59	**SG28**	43	39.6102	59	17.6671		MVP TOW 2
	2000	60	**HL5**	43	10.9267	62	5.9248	102	RING NET 12-1, 12-2
	2022	61	**HL5**	43	10.9491	62	6.0121	102	CTD 16
	2242	62	**HL4**	43	28.8150	62	27.0677	87	RING NET 13-1, 13-2
	2305	63	**HL4**	43	29.0098	62	26.7602	87	CTD 17
12-Apr-13	0151	64	**HL3**	43	53.0488	62	52.0000	270	RING NET 14-1, 14-2
	0215	65	**HL3**	43	53.0500	62	52.6597	270	CTD 18
	0255	66	**HL3**	43	53.4097	62	52.9971	274	BIONESS TOW 2
	0602	67	**HL2**	44	16.0062	63	19.1151	157	RING NET 15-1, 15-2
	0623	68	**HL2**	44	15.9568	63	18.9622	157	CTD 19
	0955	69	**OTN3**	44	8.0524	63	1.9072	174	MOORING RECOVERY
	1048	70	**OTN3**	44	8.0634	63	1.0637	174	MOORING DEPLOYED
	1307	71	**HL1**	44	23.9692	63	27.0105	88	RING NET 16-1, 16-2
	1323	72	**HL1**	44	23.9686	63	27.0224	87	CTD 20
14-Apr-13	0249	73	**RL1**	43	16.4381	65	0.4340	170	BIONESS TOW 3
	0400	74	**RL1**	43	15.0768	65	2.5229	168	RING NET 17-1
	0422	75	**RL1**	43	15.0966	65	2.7652	161	CTD 21
	0634	76	**BBL1**	43	15.0000	65	28.7001	63	RING NET 18-1
	0654	77	**BBL1**	43	15.0032	65	28.6102	61	CTD 22
	0836	78	**BBL2**	42	59.9951	65	28.6849	116	RING NET 19-1
	0850	79	**BBL2**	42	59.8904	65	28.5008	111	RING NET 19-2
	0907	80	**BBL2**	42	58.7442	65	28.2244	113	CTD 23
	1151	81	**BC/CJ**	42	54.5888	66	0.5192	150	RING NET 20-1
	1204	82	**BC/CJ**	42	54.5475	66	0.5964	150	RING NET 20-2
	1220	83	**BC/CJ**	42	54.5107	66	0.6365	163	CTD 24
	1515	84	**BBL3**	42	45.6001	65	29.1174	105	RING NET 21-1
	1531	85	**BBL3**	42	45.6177	65	29.3942	106	CTD 25
	1836	86	**PS1**	42	25.0910	64	44.6141	100	CTD TEST CAST
		87							NUMBER INCREMENTED BUT NOT USED
	2018	88	**PS1**	42	25.0949	65	44.5956	100	CTD TEST CAST
	2030	89	**PS1**	42	25.0491	65	44.5883	100	CTD 26
	2117	90	**PS1**	42	24.9421	65	44.5503	101	RING NET 22-1
	2200	91	**PS2**	42	20.1706	65	48.4456	201	CTD 27
	2314	92	**PS4**	42	16.2995	65	52.1511	228	RING NET 23-1

	2334	93	**PS4**	42	16.0085	65	52.2195	228	CTD 28
15-Apr-13	0053	94	**PS6**	42	12.0578	65	56.2256	228	RING NET 24-1
	0114	95	**PS6**	42	11.9458	65	56.2907	228	CTD 29
	0231	96	**PS8**	42	7.0621	66	2.3091	209	RING NET 25-1
	0251	97	**PS8**	42	7.0390	66	2.5395	207	CTD 30
	0412	98	**PS10**	41	59.3959	66	8.4251	94	RING NET 26-1
	0430	99	**PS10**	41	59.5092	66	8.3228	94	CTD 31
	0536	100	**PS9**	42	3.6952	66	4.8966	98	CTD 32
	0643	101	**PS7**	42	9.7290	66	58.1052	226	CTD 33
	0748	102	**PS5**	42	13.8874	65	54.1483	237	CTD 34
	0855	103	**PS3**	42	17.8774	65	50.3392	215	CTD 35
	1108	104	**BBL4**	42	274.8157	65	29.1325	102	RING NET 27-1
	1123	105	**BBL4**	42	26.2829	65	29.2847	103	CTD 36
	1313	106	**BBL5**	42	7.9647	65	30.0521	187	RING NET 28-1
	1334	107	**BBL5**	42	7.0195	65	30.2876	157	CTD 37
	1448	108	**BBL6**	42	0.1782	65	30.2949	800	RING NET 29-1
	1555	109	**BBL6**	42	0.3812	65	31.9180	885	CTD 38
	1804	110	**BBL7**	41	52.0360	65	21.0248	1880	RING NET 30-1
	1909	111	**BBL7**	41	52.4432	65	21.3481	1850	CTD 39
	0213	112	**RL6**	42	19.6760	63	52.3642	2000	RING NET 31-1
	0318	113	**RL6**	42	19.2766	63	53.2452	2000	RING NET 31-2
	0334	114	**RL6**	42	19.9960	63	53.5481	1790	CTD 40
	0639	115	**RL5**	42	36.9604	63	5.9707	935	RING NET 32-1
	0740	116	**RL5**	42	36.8336	63	5.0115	943	CTD 41
17-Apr-13	1610	117	**CSL6**	47	35.0556	59	20.5131	244	RING NET 33-1
	1640	118	**CSL6**	47	35.3386	59	20.5604	244	CTD 42
	1858	119	**CSL5**	47	26.1879	59	33.5445	440	RING NET 34-1
	1933	120	**CSL5**	47	26.5979	59	33.0272	469	CTD 43
	2150	121	**CSL4**	47	16.3694	59	47.9981	474	RING NET 35-1
	2229	122	**CSL4**	47	16.5364	59	47.8967	485	RING NET 35-2
	2255	123	**CSL4**	47	16.6632	59	46.7918	479	CTD 44
18-Apr-13	0116	124	**CSL3**	47	6.1244	59	59.2869	382	RING NET 36-1
	0146	125	**CSL3**	47	6.2086	59	58.6895	342	CTD 45
	0402	126	**CSL2**	47	1.4098	60	7.8575	180	RING NET 37-1
	0422	127	**CSL2**	47	1.2818	60	6.4714	180	CTD 46
	0532	128	**CSL1**	46	57.5070	60	13.1429	82	RING NET 38-1
	0605	129	**CSL1**	46	57.4109	60	13.9971	82	CTD 47
	1151	130	**STAB-ADCP**	46	15.3291	59	68.6090	117	STAB LINE MOORING DEPLOYED
	1231	131	**STAB-ADCP**	46	15.1847	59	8.4982	112	T-CHAIN MOORING #1845 DEPLOYED
	2155	132	**STAB5**	46	23.7014	58	51.5418	370	BIONESS TOW 4
	2323	133	**STAB5**	46	24.9502	58	52.8913	374	RING NET 39-1
	2348	134	**STAB5**	46	24.7927	58	52.8139	374	RING NET 39-2
19-Apr-13	0004	135	**STAB5**	46	24.6018	58	52.5777	374	CTD 48
	0130	136	**STAB4**	46	17.9425	59	3.8638	160	RING NET 40-1
	0147	137	**STAB4**	46	17.8709	59	3.9693	159	CTD 49
	0304	138	**STAB3**	46	13.9949	59	11.5857	92	RING NET 41-1
	0320	139	**STAB3**	46	12.9498	59	11.5565	94	CTD 50
	0434	140	**STAB2**	46	6.5576	59	21.7818	68	RING NET 42-1

	0448	141	**STAB2**	46	6.5877	59	21.6472	68	CTD 51
	0600	142	**STAB1**	46	0.0045	59	31.9582	63	RING NET 43-1
	0614	143	**STAB1**	46	0.0705	59	31.8588	60	CTD 52
	0803	144	**LL1**	45	49.5846	59	50.9248	95	RING NET 44-1
	0817	145	**LL1**	45	49.6759	59	50.8121	95	CTD 53
	1014	146	**LL2**	45	39.5225	59	42.0444	121	RING NET 45-1
	1030	147	**LL2**	45	39.5275	59	42.1140	138	CTD 54
	1207	148	**LL3**	45	29.4772	59	31.0379	142	RING NET 46-1
	1224	149	**LL3**	45	29.5065	59	31.1749	140	CTD 55 TEST
	1231	150	**LL3**	45	29.5266	59	31.1953	139	CTD 56
	1505	151	**LL4**	45	9.4951	59	10.4806	106	RING NET 47-1
	1519	152	**LL4**	45	9.5662	59	10.5679	106	CTD 57
	1753	153	**LL5**	44	49.0200	58	51.0472	246	RING NET 48-1
	1814	154	**LL5**	44	49.0594	58	51.1217	245	CTD 58
	2106	155	**LL6**	44	28.4858	58	30.4854	67	RING NET 49-1
	2119	156	**LL6**	44	28.5901	58	30.4536	67	CTD 59
20-Apr-13	0149	157	**BANCB4**	44	46.6881	57	15.0007	406	RING NET 50-1
	0222	158	**BANCB4**	44	46.6901	57	15.3714	400	CTD 60
	0501	159	**BP5**	44	53.4738	56	38.9967	414	RING NET 51-1
	0534	160	**BP5**	44	53.8643	56	38.4283	415	CTD 61
	0700	161	**BP4**	44	55.2218	56	26.5166	395	RING NET 52-1
	0730	162	**BP4**	44	55.4112	56	26.7264	380	CTD 62
	0914	163	**BP1**	44	58.8208	56	8.4091	229	RING NET 53-1
	0945	164	**BP1**	44	58.0406	56	8.4449	229	RING NET 53-2
	1006	165	**BP1**	44	58.0972	56	8.5664	229	CTD 63
	1130	166	**EH1**	45	2.9811	55	52.7215	89	RING NET 54-1
	1144	167	**EH1**	45	2.9942	55	52.7927	89	CTD 64
	1306	168	**EH2**	44	54.1987	55	52.2725	186	RING NET 55-1
	1325	169	**EH2**	44	54.2467	55	52.2938	186	CTD 65
	1505	170	**EH3**	44	52.7444	55	52.2650	351	RING NET 56-1
	1532	171	**EH3**	44	52.9066	55	52.9407	313	CTD 66
	1650	172	**EH4**	44	49.2660	55	51.1935	820	RING NET 57-1
	1740	173	**EH4**	44	49.6507	55	51.6432	800	CTD 67
	1912	174	**SPB8**	44	45.5289	55	50.5693	1056	RING NET 58-1
	2014	175	**SPB8**	44	45.8983	55	50.8425	1050	CTD 68
	2246	176	**SPB9**	44	31.7053	55	49.5913	2075	RING NET 59-1
	2343	177	**SPB9**	44	32.0490	55	49.3264	2075	RING NET 59-2
	2359	178	**SPB9**	44	32.0994	55	49.2333	2075	CTD 69
21-Apr-13	0332	179	**SPB10**	44	14.3131	55	49.7749	2976	RING NET 60-1
	0438	180	**SPB10**	44	14.5049	55	49.6436	2870	CTD 70
	0909	181	**SPB10A**	43	47.9427	55	42.0511	3500	RING NET 61-1
	1016	182	**SPB10A**	43	47.9046	55	42.5821	3500	CTD 71
	1626	183	**SESPB_9**	43	48.0005	55	43.6258	3200	RING NET 62-1
	1726	184	**SESPB_9**	44	4.8547	54	46.8873	3200	CTD 72
	2130	185	**SESPB_8**	44	25.9377	54	53.6007	2195	RING NET 63-1
	2238	186	**SESPB_8**	44	25.9667	54	53.4986	2195	CTD 73
22-Apr-13	0223	187	**SESPB_7**	44	48.7693	55	0.5115	1950	RING NET 64-1
	0330	188	**SESPB_7**	44	48.7635	55	0.3083	1950	CTD 74
	0552	189	**SESPB_6.5**	44	53.9765	55	2.5492	1117	RING NET 65-1

	0657	190	**SESPB_6.5**	44	54.0212	55	2.8449	1117	CTD 75
	0902	191	**SESPB_6**	44	59.2367	55	4.2422	1000	RING NET 66-1
	0959	192	**SESPB_6**	44	59.1420	55	4.3436	970	CTD 76
	1147	193	**SESPB_5.5**	45	2.8021	55	5.2999	750	RING NET 67-1
	1239	194	**SESPB_5.5**	45	2.6214	55	5.2925	750	CTD 77
	1454	195	**SESPB_5**	45	6.5931	55	6.5614	167	RING NET 68-1
	1513	196	**SESPB_5**	45	6.6254	55	6.6636	167	CTD 78
	1625	197	**SESPB_4.5**	45	13.0380	55	9.9815	180	RING NET 69-1
	1642	198	**SESPB_4.5**	45	13.0652	55	9.9491	173	CTD 79
23-Apr-13	0439	199	**LL9**	43	28.3328	57	31.6292	3658	RING NET 70-1
	0541	200	**LL9**	43	28.3930	57	31.6182	3658	RING NET 70-2
	0556	201	**LL9**	43	28.3992	57	31.6233	3658	CTD 80
	1016	202	**LL8**	43	46.8877	57	49.6450	2800	RING NET 71-1
	1119	203	**LL8**	43	46.2371	57	50.6098	2800	CTD 81
	1536	204	**LL7**	44	7.8808	58	10.5801	720	RING NET 72-1
	1623	205	**LL7**	44	7.5071	58	10.9518	701	CTD 82
24-Apr-13	0337	206	**SIB9**	42	41.9849	59	46.7299	3700	RING NET 73-1
	0441	207	**SIB9**	42	41.9562	59	46.8045	3700	RING NET 73-2
	0543	208	**SIB9**	42	41.9542	59	46.8533	3700	CTD 83
	0941	209	**SIB8**	43	7.3109	60	9.5092	1850	RING NET 74-1
	1041	210	**SIB8**	43	7.4114	60	10.3761	1850	CTD 84
	1310	211	**SIB7**	43	19.2117	60	19.8132	1250	RING NET 75-1
	1402	212	**SIB7**	43	19.2787	60	19.1148	1281	CTD 85
	1703	213	**SIB6**	43	40.3873	60	39.0392	60	RING NET 76-1
	1716	214	**SIB6**	43	40.3767	60	39.2872	60	CTD 86
	1941	215	**SIB4**	44	3.5914	61	3.5474	59	RING NET 77-1
	1952	216	**SIB4**	44	3.6538	61	3.6979	59	CTD 87
	2122	217	**SIB3**	44	16.7843	61	15.6191	107	RING NET 78-1
	2138	218	**SIB3**	44	16.8220	61	15.6886	107	CTD 88
	2319	219	**SIB2**	44	31.2099	61	32.4003	158	RING NET 79-1
	2336	220	**SIB2**	44	31.2249	61	32.4980	158	CTD 89
25-Apr-13	0210	221	**SIB1**	44	51.5947	61	53.3229	75	RING NET 80-1
	0224	222	**SIB1**	44	51.6540	61	53.3471	75	CTD 90
	0600	223	**LE**	44	25.8313	62	11.0516	225	RING NET 81-1
	0622	224	**LE**	44	25.8678	62	11.3508	225	CTD 91
	1109	225	**HL3**	44	53.0682	62	53.0645	275	RING NET 82-1
	1103	226	**HL3**	43	53.0737	62	53.0733	270	CTD 92
	1529	227	**LB**	43	41.9432	63	44.0444	240	RING NET 83-1
	1550	228	**LB**	43	42.0319	63	44.4185	240	CTD 93
	1653	229	**LB**	43	42.2925	63	44.3299	240	BIONESS TOW 5
	2001	230	**OTN97**	43	54.8380	63	11.3776	130	CTD 94
	2121	231	**OTN69**	44	5.3155	63	6.0913	163	CTD 95
	2238	232	**OTN48**	44	10.6906	63	13.8234	176	CTD 96
26-Apr-13	0003	233	**HL2**	44	16.0097	63	19.0119	157	RING NET 84-1
	0018	234	**HL2**	44	16.0926	63	19.0221	157	RING NET 84-2
	0028	235	**HL2**	44	16.1060	63	19.9993	157	CTD 97
	0145	236	**OTN28**	44	19.0108	63	21.0359	120	CTD 98
	1016	237	**OTN8**	44	26.2669	63	29.2419	67	CTD 99

APPENDIX A: RAPID-WAVE MOORINGS (MORALES MAQUEDA/PUGH)

A separate report describing the recovery and deployment of the RAPID-WAVE moorings on the Scotian Slope-Rise has been prepared.

APPENDIX B: Zooplankton (Ringuette/Spry)

Sampling

Spring AZMP cruise goal for the zooplankton group is to describe the state of the mesozooplankton community of the Scotian shelf during the late winter season and into the spring bloom period. Plankton collections using fine mesh nets are made to estimate the abundance and biomass of the zooplankton community.

Overall we sampled ca. 80 different stations resulting into 103 successful fishing activities (See table B1 for details). We used an array of sampling gear allowing us to efficiently sample organisms of different size spectra. In order to estimate the mesozooplankton community abundance and biomass, a conical ring net of 202μm meshsize with an aperture of 75 cm in diameter (filtering ratio 1:5) equipped with a KC Denmark flowmeter was towed vertically from the bottom to the surface at each station (or from a maximum depth of 1000m – AZMP standard). The content of the cod end was preserved in 4% buffered formaldehyde. An extra cast was performed at certain stations in order to provide fresh live material (see section "Other activities").

A 74μm conical ring net, 30 cm in diameter also with a 1:5 filtering ratio was towed vertically as well but only at on-shelf Halifax Line stations. This serves the same purpose of quantifying the community but targets a smaller fraction of the mesozooplankton community i.e. smaller developmental stages, eggs and nauplii. Contents of the cod end were again preserved in 4% buffered formaldehyde.

As the phytoplankton algal bloom period was well underway across much of the sampling area (Scotian Shelf/Slope); many of the ring net zooplankton samples contain large amounts of contaminating cells and so may prove difficult to obtain good biomass measurement.

The Bioness towed vehicle targets larger and faster swimming organisms like krill (Euphausiidae). Plankton nets (up to 10 are carried) are of 243u meshsize with an opening of .25m square. The net frame, which is towed at 3 knots speed typically, is sent to the bottom and brought back to the surface closing nets on its way back, making a long oblique tow and taking samples at discrete strata. Contents of the cod ends were preserved in 4% buffered formaldehyde.

Others activities

Egg production methodology

Recent experiments with the copepod *Calanus finmarchicus* indicates higher egg production rates (EPr) when we count and remove the egg every 6 hours instead of the standard method which consists of incubation experiments wherein the eggs are only counted at the end of the 24 hour period. Cannibalism of the eggs by the female is one of the hypotheses that could explain such observations. In order to test this hypothesis we compared the EPr from our regular 90mm Petri dishes with a smaller type of Petri dish (60mm) with a small sieve inserted that prevented cannibalism. For the experiment: 4 treatments were applied; 1) Large Petri dish with the egg removed every 6 hours, 2) incubation with Large Petri dish for the regular 24 hours, 3) Small Petri dish without the sieve for 24 hours and 4) Small Petri dish with the sieve for 24 hours, thus enabling a calibration of the different method and dishes. During this cruise 5 full experiments were performed. Prosome length of all the individuals was measured. A subset of 5 individuals per treatment was preserved for dry weight measurement and CHN analysis.

Bar-coding samples for Dr. Ann Bucklin (Univesity of Connecticutt)

Mesozooplankton samples were taken at 3 locations (Brown Banks, Cabot Strait & Sable Island Line) and preserved in 95% EtOH (ethanol) for genetic bar-coding purposes. More samples from the St. Lawrence Gulf and the Labrador Sea in the upcoming HUD2013-008 cruise will be taken before the shipment to UConn.

Remarks/comments:

No equipment problems were experienced during the mission. Some 750 m of mechanical ‘hydro’ wire was removed late, in the mission, from the hydrographic winch in the Hudson winchroom, as it was deemed to be less reliable in its rusted state and displayed many small snags - evidence of broken strands. A piece was kept for break-test purposes.

Table B1. Mesozooplankton sampling during AZMP fall cruise (HUD2013-004)

Date	Station	Lat (deg, min)	Lon (deg, min)	Z (m)	Ring nets 202µm	74µm	Xtra*	Bioness
05-Apr	HL2	44°15.986	-63°19.047	158	X	X		
	HL6.7	42°37.042	-61°30.938	2100	X			
07-Apr	HL8	42°21.872	-61°20.550	2600	X			
	HL9	42°11.926	-61°09.961	3780	X			
08-Apr	HL7	42°31.993	-61°26.146	2650	X			
	HL6.3	42°44.025	-61°37.189	1700	X			
09-Apr	HL6	42°51.983	-61°44.089	1020	X			
10-Apr	S923	43°51.629	-58°43.975	1048	X			
	GULD 4	43°47.493	-58°54.112	1950	X			
11-Apr	GULD 3	44°00.035	-59°01.174	425	X			X
	S928	43°42.506	-58°59.879	840	X			
	HL5	43°10.949	-62°06.015	102	X	X		
	HL4	43°28.817	-62°27.062	88	X	X		
	HL3	43°53.052	-62°52.845	265	X	X		X
12-Apr	HL2	44°16.005	-63°19.110	156	X	X		
	HL1	44°23.967	-63°27.010	88	X	X		
14-Apr	RL1	43°15.068	-65°02.601	118	X			X
	BBL 1	43°15.000	-65°28.700	63	X			
	BB L2	42°59.883	-65°28.597	116	X		X	
	BC/CJ	42°54.5896	-66°00.522	150	X		X	
	BBL3	42°45.602	-65°29.125	114	X			
	PS1	42°24.883	-65°44.552	100	X			
	PS4	42°16.174	-65°52.160	228	X			
	PS6	42°11.984	-65°56.227	228	X			
	PS8	42°07.078	-66°02.442	209	X			
15-Apr	PS10	41°59.436	-66°08.431	94	X			
	BBL4	42°26.817	-65°29.136	102	X			
	BBL5	42°07.981	-65°30.170	190	X			
	BBL6	42°00.068	-65°30.908	996	X			
	BBL7	41°52.071	-65°21.025	1829	X			
	RL6`	42°19.517	-63°52.816	1821	X			
	RL5	42°36.939	-64°05.963	935	X			
17-Apr	CSL6	47°35.057	-59°20.510	265	X			
	CSL5	47°26.215	-59°33.50	475	X			
	CSL4	47°16.442	-59°46.934	474	X		X	
	CSL3	47°06.174	-59°59.035	382	X			
18-Apr	CSL2	47°01.343	-60°06.649	180	X			
	CSL1	46°57.450	-60°13.111	82	X			
	StAB5	46°24.851	-58°52.863	370	X		X	X
	StAB4	46°17.897	-59°03.864	157	X			
19-Apr	StAB3	46°12.989	-59°11.538	92	X			
	StAB2	46°06.565	-59°21.754	68	X			
	StAB1	46°00.057	-59°31.940	64	X			
	LL1	45°49.611	-59°50.899	92	X			
	LL2	45°39.526	-59°42.044	140	X			

Tables B1. Mesozooplancton sampling during AZMP fall cruise (HUD2013-004) (Continued)

Date	Station	Lat (deg, min)	Lon (deg, min)	Z (m)	Ring nets 202μm	74μm	Xtra*	Bioness
19-Apr	LL3	45°29.479	-59°31.039	145	X			
	LL4	45°09.475	-59°10.447	105	X			
	LL5	44°49.043	-58°51.073	240	X			
	LL6	44°28.513	-58°30.489	66	X			
	Banq4	44°46.6630	-57°15.078	399	X			
20-Apr	BP5	44°53.731	-56°38.207	411	X			
	BP4	44°55.293	-56°26.604	391	X			
	BP1	44°59.044	-56°08.441	455	X			
	EH1	45°02.984	-55°52.719	88	X			
	EH2	44°55.212	-55°52.283	180	X			
	EH3	44°52.758	-55°52.510	335	X			
	EH4	44°49.274	-55°51.195	820	X			
	SPB8	44°45.831	-55°50.768	1080	X			
	SPB9	44°31.842	-55°49.456	2103	X		X	
21-Apr	SPB10	44°14.340	-55°49.618	2976	X			
	SPB10A	43°47.969	-55°42.090	3700	X			
	SESPB9	44°04.505	-54°46.867	3200	X			
	SESPB8	44°25.996	-54°53.590	2195	X			
	SESPB7	44°48.768	-55°00.430	1963	X			
22-Apr	SESPB6.5	44°54.004	-55°02.745	1117	X			
	SESPB6	44°59.232	-55°04.238	1000	X			
	SESPB5.5	45°02.799	-55°05.305	810	X			
	SESPB5	45°06.596	-55°06.614	180	X			
	SESPB4.5	45°13.038	-55°09.981	180	X			
23-Apr	LL9	43°28.358	-57°31.645	3658	X		X	
	LL8	43°46.881	-57°50.067	2800	X			
	LL7	44°07.698	-58°10.762	680	X			
24-Apr	SIB9	42°41.975	-59°46.785	3400	X		X	
	SIB8	43°07.313	-60°09.514	2000	X			
	SIB7	43°19.212	-60°19.809	1025	X			
	SIB6	43°40.394	-60°39.044	60	X			
	SIB4	44°03.596	-61°03.649	60	X			
	SIB3	44°16.803	-61°15.655	107	X			
	SIB2	44°31.226	-61°32.428	127	X			
	SIB1	44°51.611	-61°53.341	75	X			
25-Apr	LE	44°25.842	-62°11.197	225	X			
	HL3	43°53.060	-62°53.051	275	X			
	LB	43°41.946	-63°44.045	240	X			X
	HL2	44°16.035	-63°19.017	157	X	X		

APPENDIX C: Seabird Observations (Wong)

Spring AZMP Seabird Survey Cruise report: April 13 - 26, 2013
Dartmouth, N.S. to Dartmouth, N.S.
Observer: Sarah Wong
snpwong@dal.ca

General overview

Seabird and marine mammal observations were made from the bridge of the CCGS Hudson during the second leg of the Spring AZMP cruise, April 13 – 26, 2013. Seabird surveys followed the standardized protocol for pelagic seabird surveys from moving platforms and stationary platforms for the Eastern Canada Seabirds at Sea program (ECSAS). The survey included Roseway and Emerald Basins, Browns Bank, Cabot Strait, St Anns Bank, Misaine Bank, Banquereau Bank, St Pierre Bank, Sable Island Bank and waters in between. Surveys were conducted between oceanographic stations when the vessel was steaming faster than 4 knots and during transits. Thick fog prevented surveys for nearly all of April 20 and most of April 25. A total of 952 five-minute transects were completed, resulting in nearly 80 hours of observations and a total of 1,842 km surveyed.

Seabird sightings

During the Spring AZMP a total of 2,401sea birds from 5 different families were counted in transect (this does not include birds outside of the 300m wide transect, birds following the ship or birds in flight that were not captured during the instantaneous snapshots)(Table C1). Dovekies were the most common seabird sighted, followed by Thick-billed murres, Northern fulmars, Herring gulls and Black-legged kittiwakes. Dovekies were sighted in large numbers along the slope of the Gully Marine Protected Area and were also common on the slope of St Pierre Bank, on the edge of Sable Island Bank and on Browns Bank (Figure C1). Thick-billed murres were common on Browns Bank, Misaine Bank, Banquereau Bank and Sable Island Bank (Figure C2). Atlantic puffins, razorbills and common murres, though sighted in small numbers, were most common on Sable Island Bank and Browns Bank (Figure C3). Black-legged kittiwakes were only sighted in the northeastern part of the cruise and were most abundant on Misaine Bank, St Pierre Bank, northern Cabot Strait and on the slope of Banquereau Bank (Figure C4). Northern fulmars were most abundant in Cabot Strait and St Anns Bank (Figure C5). Herring gulls were seen throughout the survey, especially on the slope off Banquereau and St Pierre Bank (Figure C6). Northern gannets were found on the shelf and most abundant on St Anns Bank (Figure C7). Other species returning to Atlantic waters for breeding or feeding that were sighted included: sooty shearwaters (Figure C5), Wilson's storm-petrels (Figure C8), and Leach's storm-petrels (Figure C8). No greater shearwaters were sighted.

Marine mammal and shark sightings

A total of 80 marine mammals were sighted during the Spring AZMP survey (Table C2), consisting mainly of dolphins (white-beaked, Atlantic white-sided, common) and one group of Long-finned pilot whales. Of note, a group of 5 Sowerby's beaked whales were sighted near Shortland Canyon on April 23 at 17:18 UTC (44.0964, -58.2129). Four basking sharks were sighted on April 15 within nearly 30 minutes of each other in the deep water along the slope as we approached the Roseway Line from Browns Bank. The basking shark sighting locations are as follows: 1) 41.9969, -64.9345 at 22:02 UTC, 2) 42.0142, -64.8794 at 22:13 UTC, 3) 42.0242, -64.8474 at 22:21 UTC and 4) 42.044, -64.7934 at 22:35 UTC.

Tables

Table C1: List of seabird species observed during the seabird survey on the Spring AZMP 2013 cruise April 13 - 26, 2013. Total numbers include only those birds considered "in" transect. They do not include birds following the ship, birds outside 300m and flying birds not captured during the "snapshot". Additional species sighted that were not considered "in transect" include: white-winged scoters (*Melanitta deglandi*).

Family	Species	Latin Name	Number Observed	Total Percentage (%)
Alcidae	Dovekie	*Alle alle*	1373	57.2
	Thick-billed murre	*Uria lomvia*	289	12.0
	Unknown murre	*Uria* sp.	110	4.6
	Murre or Razorbill	*Uria* or *Alca*	79	3.3
	Atlantic puffin	*Fratercula arctica*	17	0.7
	Common murre	*Uria aalge*	17	0.7
	Razorbill	*Alca torda*	11	0.5
Laridae	Herring gull	*Larus argentatus*	113	4.7
	Black-legged kittiwake	*Rissa tridactyla*	83	3.5
	Great black-backed gull	*Larus marinus*	21	0.9
	Glaucous gull	*Larus hyperboreus*	8	0.3
	Pomarine Jaeger	*Stercorarius pomarinus*	7	0.3
	Arctic Tern	*Sterna paradisaea*	1	< 0.1
	Iceland Gull	*Larus glaucoides*	1	< 0.1
	Parasitic Jaeger	*Stercorarius parasiticus*	1	< 0.1
	Unknown Jaeger	*Stercorarius* sp.	1	< 0.1
Phalacrocoracidae	Great Cormorant	*Phalacrocorax carbo*	1	< 0.1
Procellariidae	Northern Fulmar	*Fulmarus glacialis*	116	4.8
	Unknown Storm-Petrel	*Oceanodroma* or *Oceanites*	47	2.0
	Wilson Storm-Petrel	*Oceanites oceanicus*	24	1.0
	Sooty Shearwater	*Puffinus griseus*	19	0.8
	Leach's Storm-Petrel	*Oceanodroma leucorha*	12	0.5
Sulidae	Northern Gannet	*Morus bassanus*	50	2.1

Table C2: List of marine mammals and large fish recorded during the seabird survey on Spring AZMP 2013 cruise, April 13 - 26, 2013.

Species	Latin Name	Number observed
Long-finned pilot whale	*Globicephala melas*	22
Short-beaked Common dolphin	*Delphinus delphis*	12
Unknown dolphin		9
Atlantic white-sided dolphin	*Lagenorhynchus acutus*	8
White-beaked dolphin	*Lagenorhynchus albirostris*	8
Grey seal	*Halichoerus grypus*	6
Sowerby's beaked whale	*Mesoplodon bidens*	5
Unknown Baleen whale	*Balaenoptera* sp.	3
Finback whale	*Balaenoptera physalus*	2
Harbour seal	*Phoca vitulina*	2
Unknown seal		2
Harbour porpoise	*Phocoena phocoena*	1
Basking shark	*Cetorhinus maximus*	4

Figures

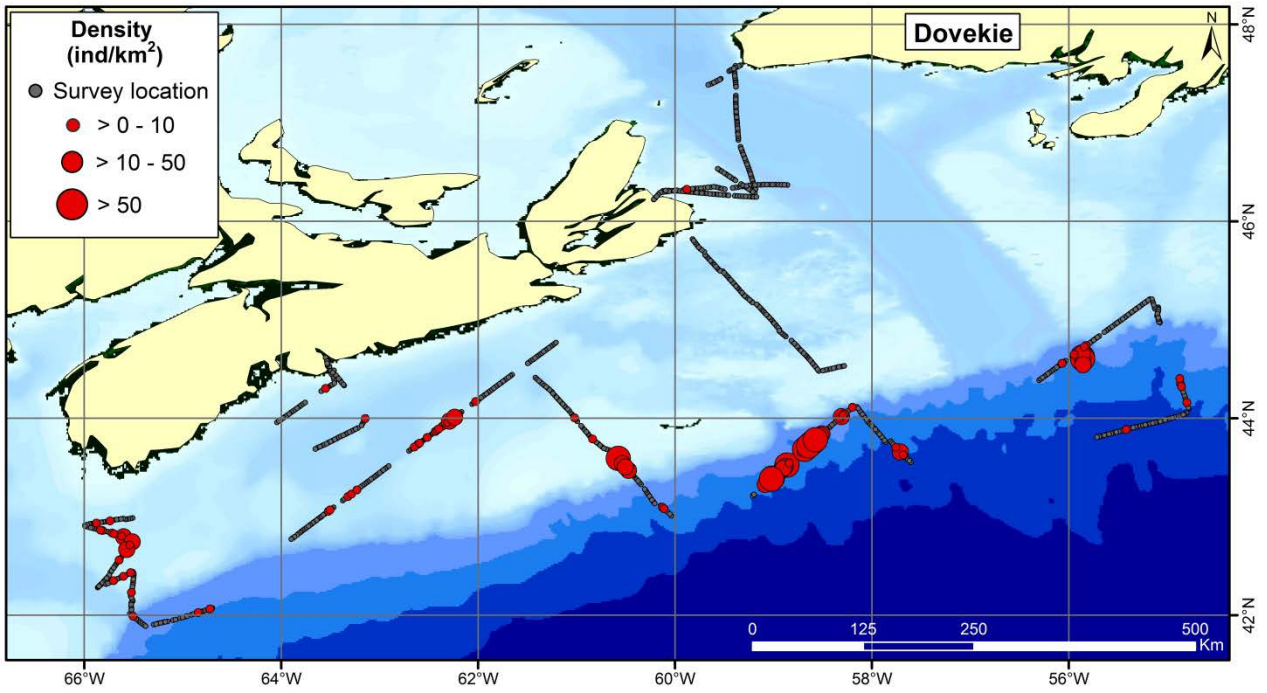


Figure C1: Density of Dovekies sighted during the seabird survey on the spring AZMP cruise, April 13 – 26, 2013.

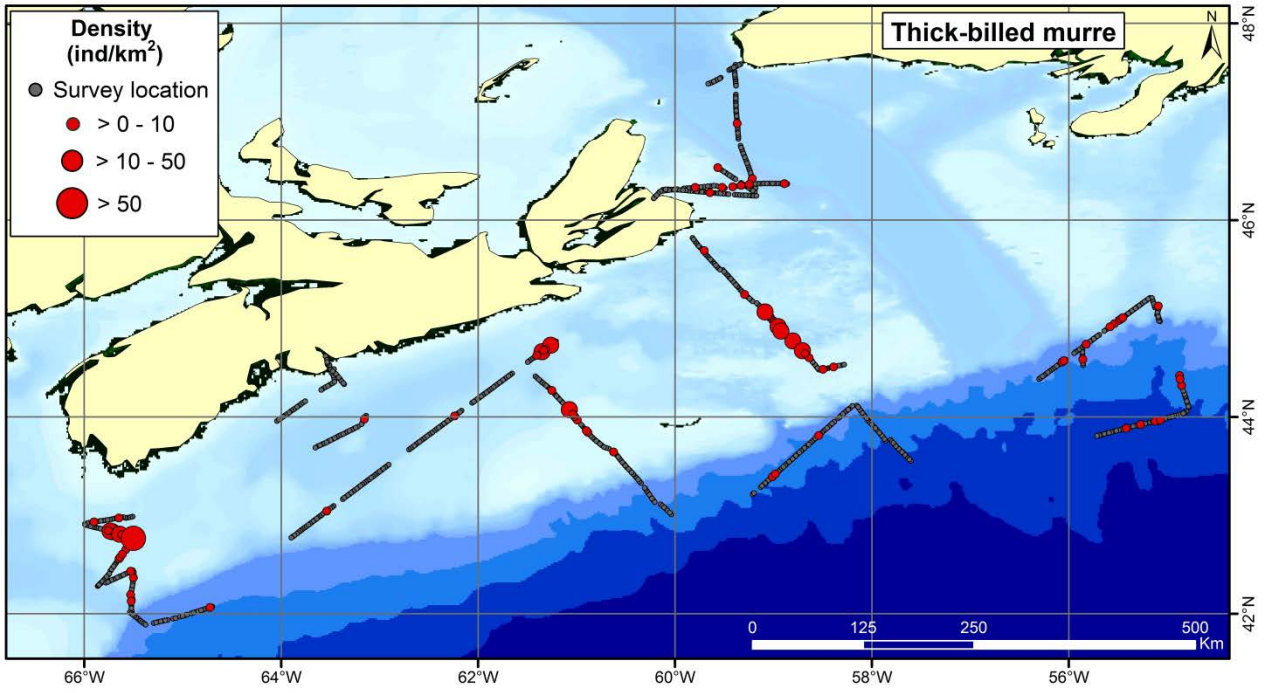


Figure C2: Density of Thick-billed murres (TBMU) sighted during the seabird survey on the spring AZMP cruise, April 13 – 26, 2013.

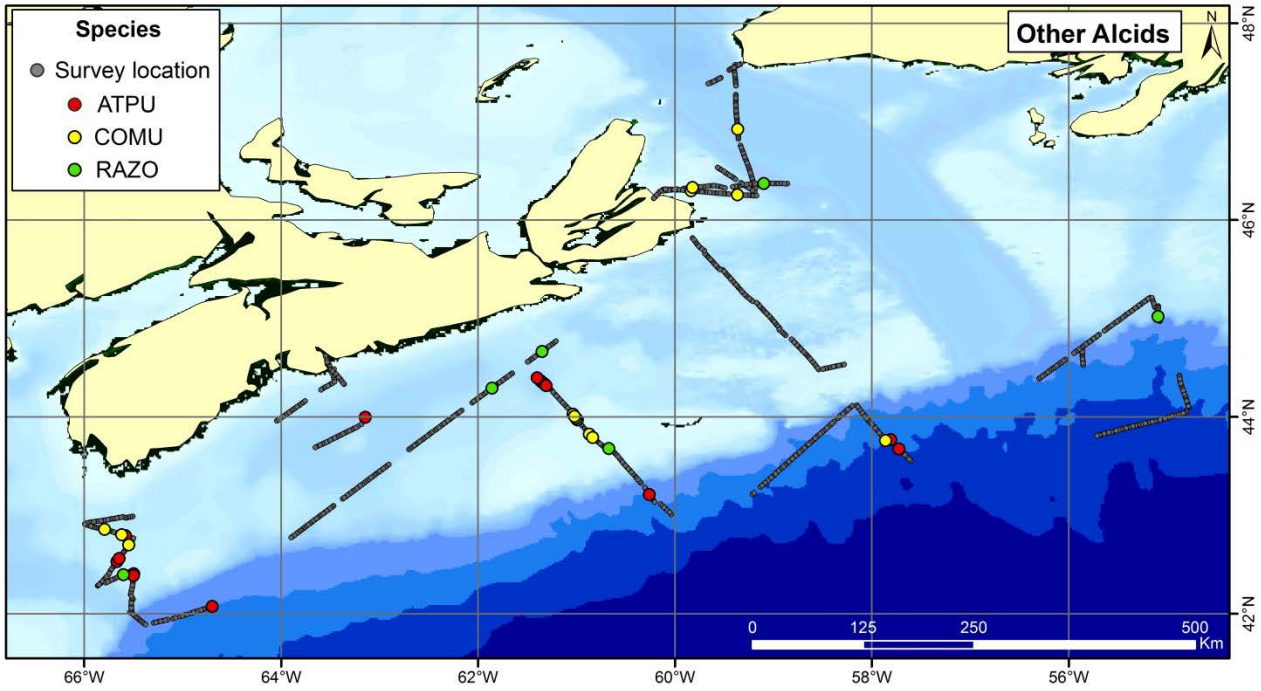


Figure C3: Location of other alcid sightings during the seabird survey on the spring AZMP cruise, April 13 – 26, 2013. ATPU = Atlantic puffin, COMU = Common murre, RAZO = Razorbill. Densities for these species were less than 10 individuals/km^2.

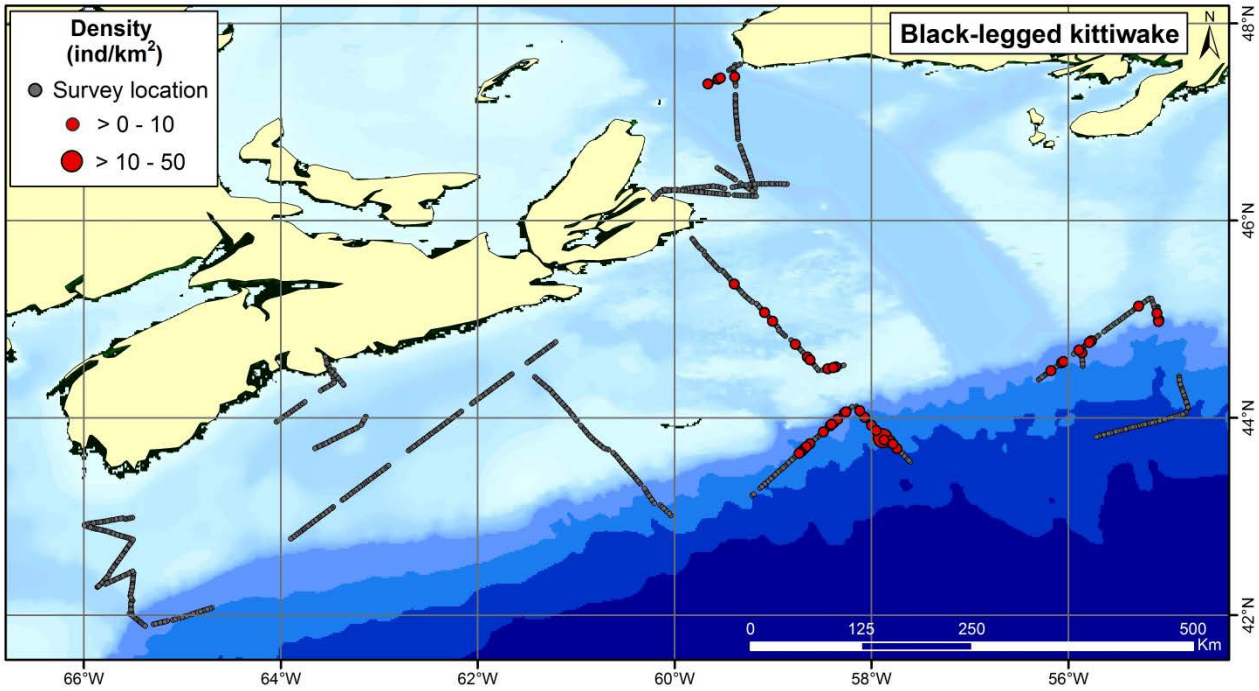


Figure C4: Density of Black-legged kittiwakes (BLKI) sighted during the seabird survey on the spring AZMP cruise, April 13 – 26, 2013.

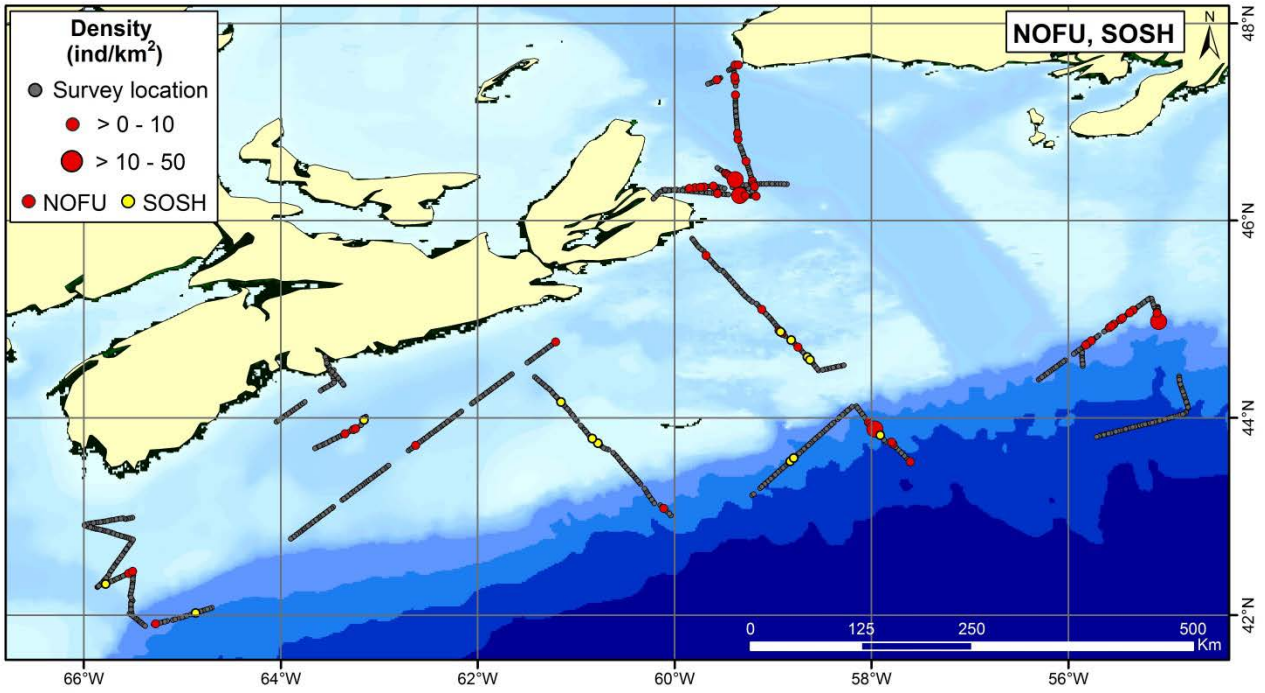


Figure C5: Density of Northern fulmars (NOFU) and Sooty shearwaters (SOSH) sighted during the seabird survey on the spring AZMP cruise, April 13 – 26, 2013.

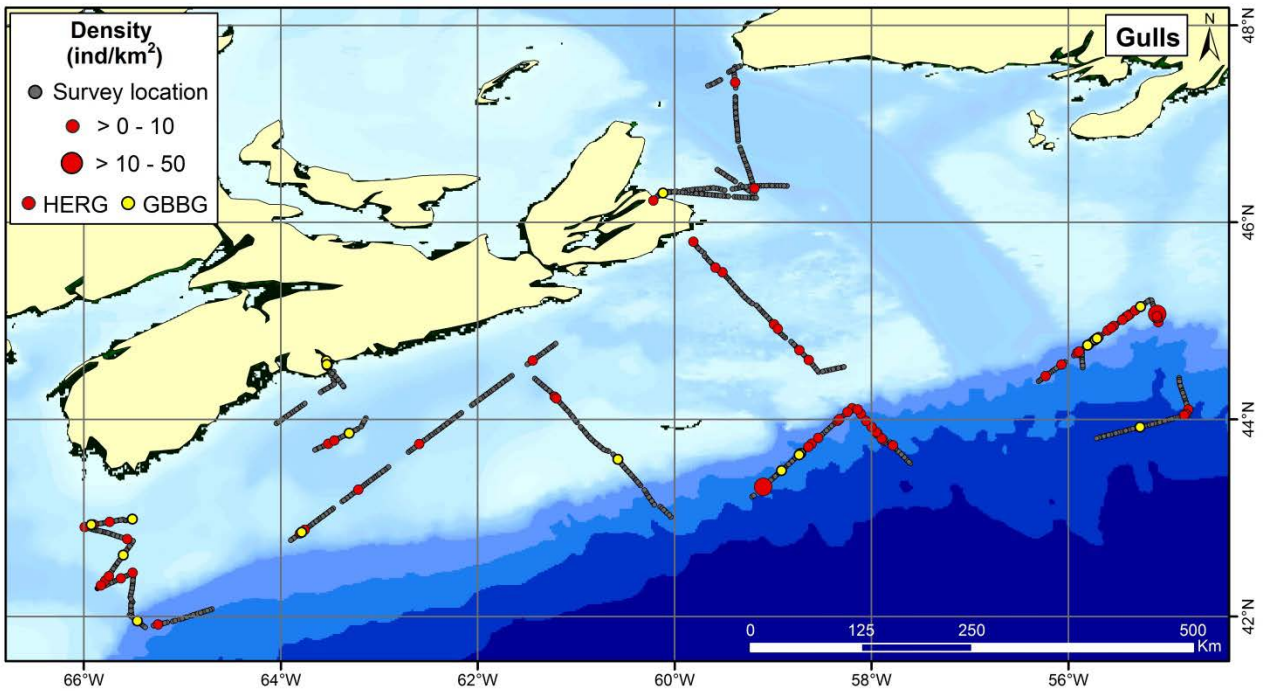


Figure C6: Density of Herring gulls (HERG) and Great black-backed gulls (GBBG) sighted during the seabird survey on the spring AZMP cruise, April 13 – 26, 2013.

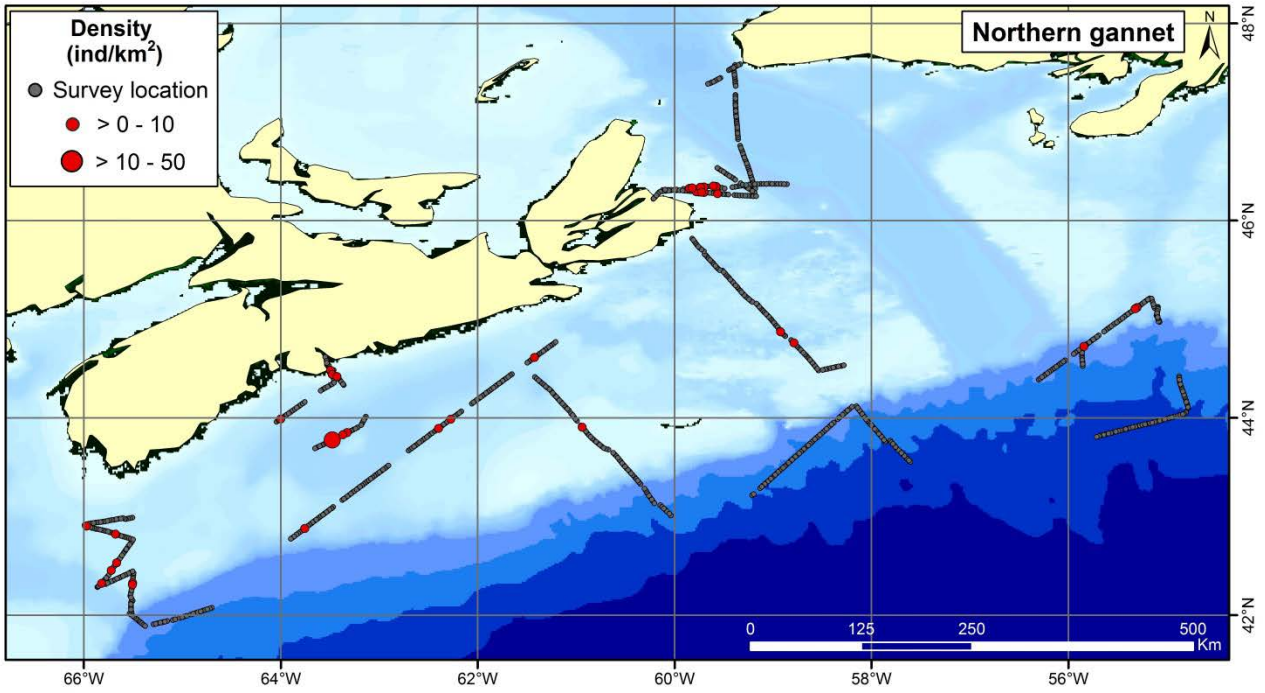


Figure C7: Density of Northern gannets sighted during the seabird survey on the spring AZMP cruise, April 13 – 26, 2013.

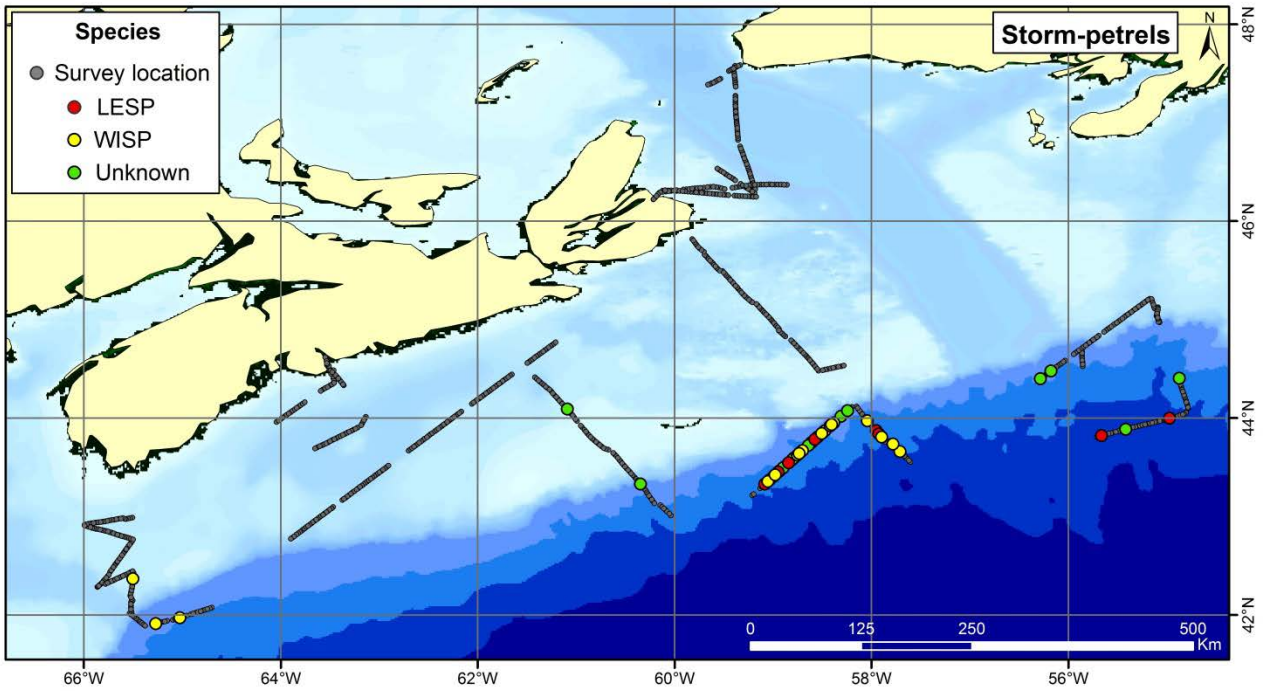


Figure C8: Location of storm-petrels sighted during the seabird survey on the spring AZMP cruise, April 13 – 26, 2013. LESP = Leach's storm-petrel, WISP = Wilson's storm-petrel, Unknown = WISP or LESP. Densities for these species were less than 10 individuals/km^2.