CRUISE REPORT FOR THE HUDSON MISSION HUD 2009-048

Leg 1: Sept 26-Oct 3, Leg 2 : Oct 5-Oct 10, Leg 3 : Oct 10-Oct 19

Scientific staff
Dave Fifield, EC (Legs 1, 2, 3)
Jeff Anning, ERD, BIO (Legs 3)
Chris L'Esperence, OSD, BIO (Leg 2, 3)
Jay Barthelotte, OSD, BIO (Leg 1)
Rick Boyce, OSD,BIO (Legs 1, 2, 3)
Feizhou Chen, Dal (Leg 3)
Jeff Pugh, POL, UK (Leg 1)
Edward Horne, ERD, BIO (Legs 1, 2, 3)
Randy King, OSD, BIO (Leg 2)
MiguelAngel Morales Maqueda, Univ. Liverpool, UK (Leg 1)
Tim Perry, ERD, BIO (Legs 1, 2, 3)
Murray Scotney, OSD, BIO (Leg 1)
Darlene Brownell, OSD, DFO (Leg 1)
Rick Nelson, ERD, BIO (LEG 1)
Jeffrey Spry, ERD, BIO (Legs 2, 3)
George States, OSD, BIO (Leg 2)
Eric Oliver, Dal (Leg 1)
Carol Anstey, ERD, BIO (Leg 1)
Shan Shiliang, Dal (Leg 1)
Erica Head, ERD, BIO (Legs 2,3)
Mark Ringette, ERD, BIO (Legs 2,3)
Darlene Mossman , OSD,BIO (Legs 2,3)
Adam Hartling TOS, BIO (Legs 2,3)
Cindy Dasilva, Laval (Legs 2,3)
Emmanuelle Medrinal Laval (Legs 2,3)
Chris L'Esperence, OSD, BIO (Legs 2,3)

Objectives

The main objectives of the mission were:

- to obtain synoptic fall observations of the hydrography and the distributions of nutrients, phytoplankton, zooplankton and bacteria along three sections on the Scotian Shelf and one in Cabot Strait, i.e. to carry out the fall Atlantic Zone Monitoring Programme (AZMP).
- to retrieve moorings and deploy moorings along the extension of the Halifax Section and to take hydrographic profiles and collect water samples at mooring stations. This part of the programme is 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 and at stations along a transect across the NE Channel
- to measure the underwater light field (1-2 times per day) and measure levels of CDOM (coloured dissolved organic material)
- to monitor temperature, salinity and *in vivo* phytoplankton fluorescence continuously in the near surface (using a flow-through system)
- to examine the vertical distribution of mesozooplankton at depths of up to 1000 m beyond the shelf-break
- to investigate the vertical distribution of macroplankton (e.g. krill) in NE Channel, the shelf basins, the Gully and Cabot Strait
- to sample using the MVP (Moving Vessel Profiler) between stations on the BBL , HL and NE Channel sections
- to record acoustic backscattering along the ship's track
- to deploy/recover moorings at HL2
- to identify and enumerate birds during transit between stations and lines
- to collect and preserve water samples for analysis of carbon dioxide levels and to measure dissolved oxygen and pH at AZMP stations
- to make VLOPC drops at stations of the main monitoring lines
- to collect stage V *Calanus finmarchicus* at their overwintering depths to measure lipid content

Summary of mission accomplishments and problems encountered

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 moorings on the extended Halifax line were successfully recovered and were successfully deployed, and the hydrographic and water sampling were carried out, so that the second major objective was also successfully completed. Additional stations were sampled as required by the additional objectives stated above and all objectives were achieved

During the first leg of the cruise the mooring work in the slope waters of the Halifax Line was done in collaboration with the scientists from the UK "RAPID" programme. Accompanying CTD profiles were collected and water sampling was also carried out along with some biological net sampling. A report of this work is given in Appendix A.

The second leg of the mission was to the western Scotian Shelf and Northeast Channel, and sampling was along the Browns Bank and PS line. There was also sampling along the shelf portion of the Halifax section, for which the stations in the slope waters had been sampled on the first leg. The PS (Peter Smith) Line was run in order to examine the flux of nutrients into and out of the Gulf of Maine via this route (no project report provided). As well as standard AZMP sampling, on these three lines the MVP (Moving Vessel Profiler), fitted with an LOPC (Laser Optical Plankton Counter), was towed between adjacent stations.

The third leg of the mission was to the eastern Scotian Shelf, the Gully and Cabot Strait. In addition to the AZMP sampling along the Cabot Strait and Louisbourg Lines, 4 stations were sampled in the central Gully and Gully mouth.

Throughout the cruise, except in the Marine Protected Are of the Gully, acoustic backscatter signals were collected at two frequencies to determine the vertical distribution and abundance of macrozooplankton (see report by Norman Cochrane below) and when the ship was under way, during the daylight hours, a survey for pelagic birds was carried out from the bridge (see report by Dave Fifield below).

Summary bridge log for the Hudson mission 2009-048

Sdate	time	Event	Staion	start_lat	start_long	Sounding	Wind Dir	Wind spd	Collectors_comments	Net Mesh(u)
26-Sep-09	1753	1	Basin Buoy - NW	44.6969	-63.6404	66	w	15	deploy buoy anchor & High-flyer	
26-Sep-09	1804	2	Basin Buoy - SE	44.6963	-63.6394	66	w	15	deploy buoy anchor & High-flyer	
26-Sep-09	1829	3	Bedford Basin Test	44.6942	-63.6377	70	w	10	CTD 1	
26-Sep-09	2120	4	HL1	44.3988	-63.4484	79	SW	10	RING NET 1 - 1	202
26-Sep-09	2135	5	HL1	44.3969	-63.4464	75	SW	15	RING NET 1 - 2	76
26-Sep-09	2212	6	HL1	44.3956	-63.4477	74	SW	15	CTD 2	
27-Sep-09	57	7	HL2	44.2708	-63.3204	152	SW	20	RING NET 2 - 1	202
27-Sep-09	111	8	HL2	44.2718	-63.321	160	SW	20	RING NET 2 - 2	76
27-Sep-09	140	9	HL2	44.2738	-63.3197	154	WxS	15	CTD 3	
27-Sep-09	451	10	HL3	43.8803	-62.8825	268	W	25	RING NET 3 - 1	202
27-Sep-09	511	11	HL3	43.8822	-62.8812	268	W	20	RING NET 3 - 2	76
27-Sep-09	538	12	HL3	43.8845	-62.8805	269	W	20	CTD 4	
27-Sep-09	1020	13	Carioca buoy	44.2966	-63.254	142	W	20	DEPLOY CARIOCA BUOY	
27-Sep-09	1053	14	Carioca buoy	44.2944	-63.2584	144	W	20	DEPLOY CARIOCA GUARD	
27-Sep-09	1207	15	OTN2	44.2487	-63.1651	161	WxS	20	RECOVER OTN2 BUOY	
27-Sep-09	1252	16	OTN2	44.2492	-63.1668	163	WSW	15	DEPLOYOTN2 BUOY	
27-Sep-09	2225	17	HL6	42.8493	-61.7336	1030	SW	20	MULTINET 1	
28-Sep-09	9	18	HL6	42.8495	-61.7339	1036	SW	25	RING NET 4 - 1	202
28-Sep-09	111	19	HL6	42.8501	-61.7358	1023	SxE	20	CTD 5	
28-Sep-09	433	20	HL6.3	42.7316	-61.6145	1700	SE	20	MULTINET 2	
28-Sep-09	548	21	HL6.3	42.7356	-61.6143	1700	SSE	15	RING NET 5 - 1	202
28-Sep-09	655	22	HL6.3	42.7388	-61.6169	1630	SSE	20	CTD 6	
28-Sep-09	1024	23	RS1	42.851	-61.6346	1108	SE	25	RECOVER RS1 BUOY	
28-Sep-09	1250	24	RS2	42.7425	-61.5806		SE	30	RECOVER RS2 BUOY	
28-Sep-09	1849	25	RS3	42.6568	-61.449		SSW	30	RECOVER RS3 BUOY	
28-Sep-09	2122	26	HL8	42.3633	-61.3404		WxS	15	MULTINET 3	
28-Sep-09	2243	27	HL8	42.3615	-61.3412		SW	15	RING NET 6 - 1	202

28-Sep-09	2347	28	HL8	42.364	-61.3417		SW	15	CTD 7	
29-Sep-09	423	29	HL7	42.533	-61.431	2660	SSW	10	MULTINET 4	
29-Sep-09	545	30	HL7	42.5353	-61.4343		S	10	RING NET 7 - 1	202
29-Sep-09	653	31	HL7	42.5339	-61.434		SxE	10	CTD 8	
29-Sep-09	1105	32	RS4	42.5592	-61.3625		SSE	10	RECOVER RS4 BUOY	
29-Sep-09	1300	33	RS5	42.3944	-61.2757		SSE	15	RECOVER RS5 BUOY	
29-Sep-09	1630	34	RS6	42.1639	-61.0772		SE	10	RECOVER RS6 BUOY	
29-Sep-09	2103	35	HL11	41.7799	-60.9103		S	25	MULTINET 5	
29-Sep-09	2226	36	HL11	41.7789	-60.9218		SxW	25	RING NET 8 - 1	202
29-Sep-09	2330	37	HL11	41.7813	-60.9303		SxW	25	CTD 9	
30-Sep-09	529	38	HL12	41.409	-60.6831		S	15	RING NET 9 - 1	202
30-Sep-09	646	39	HL12	41.4205	-60.6873		NW	10	MULTINET 6	
30-Sep-09	807	40	HL12	41.4105	-60.6772		NNW	17	CTD 10	
30-Sep-09	1847	41	RS6	42.1636	-61.0705		E	15	DEPLOY RS6 MOORING (#1747)	
30-Sep-09	2322	42	HL10	42.0302	-61.0649		ExS	10	MULTINET 7	
01-Oct-09	41	43	HL10	42.0299	-61.0633		ExN	10	RING NET 10 - 1	202
01-Oct-09	144	44	HL10	42.0295	-61.0635		ExS	10	CTD 11	
01-Oct-09	657	45	HL9	42.1989	-61.1679		SSE	10	MULTINET 8	
01-Oct-09	823	46	HL9	42.1997	-61.1685		S	10	RING NET 11 - 1	202
01-Oct-09	932	47	HL9	42.2008	-61.1664		SxW	10	CTD 12	
01-Oct-09	1356	48	RS5	42.3923	-61.2743		NW	15	CTD 13	
01-Oct-09	1724	49	RS5	42.3766	-61.276		WNW	10	DEPLOY RS5 MOORING	
01-Oct-09	2028	50	RS4	42.5562	-61.3688		NW	15	DEPLOY RS4 MOORING (#1745)	
01-Oct-09	2239	51	HL6.7	42.6183	-61.5168		WNW	20	MULTINET 9	
02-Oct-09	14	52	HL6.7	42.6154	-61.5208		WNW	20	RING NET 12 - 1	202
02-Oct-09	130	53	HL6.7	42.6156	-61.523		WxN	20	CTD 14	
02-Oct-09	556	54	HL5.5	42.9084	-61.908	668	NW	10	RING NET 13 - 1	202
02-Oct-09	640	55	HL5.5	42.9062	-61.9082	680	WNW	10	CTD 15	
02-Oct-09	1017	56	RS3	42.6586	-61.4573		NxE	5	DEPLOY RS3 MOORING	
02-Oct-09	1225	57	RS2	42.7403	-61.5745			LIGHT	DEPLOY RS2 MOORING	
02-Oct-09	1401	58	RS1	42.8537	-61.6324		W	10	DEPLOY RS1 MOORING	
03-Oct-09	1401	59	OTN3	44.1329	-63.0331			LIGHT	RECOVER OTN3 BUOY	
03-Oct-09	1452	60	OTN3	44.134	-63.033			LIGHT	DEPLOY OTN3 BUOY	

03-Oct-09	1725	61	OTN1	44.352	-63.3061			LIG HT	RECOVER OTN1 BUOY	
03-Oct-09	1736	62	OTN1	44.3521	-63.3048			LIG HT	DEPLOY OTN1 BUOY	
03-Oct-09	2015	63	Basin Buoy - SE	44.6966	-63.6393		SSW	10	RECOVER SE MOORING & BUOY	
03-Oct-09	2039	64	Basin Buoy - NW	44.6976	-63.6404		SSW	10	RECOVER NW MOORING & BUOY	
05-Oct-09	1520	65	HL1	44.4021	-63.4528	95		LIG HT	MVP TOW 1 (TO HL2)	
05-Oct-09	1639	66	HL2	44.2696	-63.3209	151	SW	5	CTD 16	
05-Oct-09	1720	67	HL2	44.25	-63.3143		W	20	MVP TOW 2 (TO HL3)	
05-Oct-09	2016	68	HL3	43.875	-62.8742	262	WSW	15	BIONESS TOW 1	
05-Oct-09	2132	69	HL3	43.8781	-62.8823	273	WSW	20	RING NET 14 - 1	202
05-Oct-09	2142	70	HL3	43.8784	-62.8819	269	WSW	20	RING NET 14 - 2	202
05-Oct-09	2209	71	HL3	43.8793	-62.8797	269	WSW	20	CTD 17	
05-Oct-09	2324	72	HL3	43.881	-62.8803	269	W	20	MVP TOW 3 (TO HL4)	
06-Oct-09	214	73	HL4	43.4791	-62.449	87	WxS	20	RING NET 15 - 1	202
06-Oct-09	226	74	HL4	43.4785	-62.4473	85	WxS	20	RING NET 15 - 2	35
06-Oct-09	241	75	HL4	43.4779	-62.4433	83	WxS	20	RING NET 15 - 3	202
06-Oct-09	256	76	HL4	43.4769	-62.4379	83	W	20	CTD 18	
06-Oct-09	346	77	HL4	43.4775	-62.4422	83	W	20	CTD 19	
06-Oct-09	423	78	HL4	43.4744	-62.4235	81	WxN	20	MVP TOW 4 (TO HL5)	
06-Oct-09	659	79	HL5	43.1705	-62.1538	103	W	20	RING NET 16 - 1	202
06-Oct-09	710	80	HL5	43.1701	-62.1513	103	W	20	RING NET 16 - 2	202
06-Oct-09	725	81	HL5	43.1711	-62.15	103	W	20	CTD 20	
06-Oct-09	752	82	HL5	43.1692	-62.1425	103	W	20	MVP TOW 5 (TO HL6)	
06-Oct-09	1027	83	HL6	42.8497	-61.7334	1033	WNW	25	CTD 21	
06-Oct-09	1233	84	HL5.5	42.9075	-61.9126	674	WxN	25	CTD 22	
06-Oct-09	1358	85	HL5.5	42.9045	-61.897	725	WxN	30	RING NET 17 - 1	35
06-Oct-09	2333	86	RL5	42.6215	-64.0834	923	WxN	25	CTD 23	
07-Oct-09	55	87	RL5	42.633	-64.076	890	WxN	25	MULTINET 10	
07-Oct-09	204	88	RL5	42.638	-64.0755	863	WxN	20	MULTINET 11	

07-Oct-09	330	89	RL5	42.6469	-64.0634	861	W	15	RING NET 18 - 1	35
07-Oct-09	556	90	RL6	42.321	-63.8705	1835	WSW	15	CTD 24	
07-Oct-09	734	91	RL6	42.3374	-63.8593	1835	WSW	15	MULTINET 12	
07-Oct-09	1548	92	BBL7	41.871	-65.3506		S	25	RING NET 19 - 1	202
07-Oct-09	1654	93	BBL7	41.8871	-65.3587		S	20	CTD 25	
07-Oct-09	1845	94	BBL7	41.9044	-65.3552		S	25	MULTINET 13	
07-Oct-09	2008	95	BBL7	41.9329	-65.331		WSW	35	MULTINET 14	
07-Oct-09	2212	96	BBL7	41.8641	-65.3336		WSW	35	MVP TOW 6 (TO BBL6)	
07-Oct-09	2359	97	BBL6	41.9991	-65.5146		W	30	MULTINET 15	
08-Oct-09	135	98	BBL6	42.0026	-65.5118		W	30	CTD 26	
08-Oct-09	335	99	BBL6	42.0192	-65.5016	923	W	35	RING NET 20 - 1	202
08-Oct-09	422	100	BBL6	42.0274	-65.5014		WxN	40	RING NET 20 - 2	35
08-Oct-09	509	101	BBL6	42.0363	-65.4815		WNW	40	MVP TOW 7 (TO BBL5)	
08-Oct-09	715	102	BBL5	42.1256	-65.4942		WNW	40	CTD 27	
08-Oct-09	1338	103	PS10	41.9958	-66.1255	94	NW	35	CTD 28	
08-Oct-09	1509	104	PS9	42.0573	-66.0985	86	NW	35	CTD 29	
08-Oct-09	1715	105	PS8	42.1232	-66.0433		NW	35	RING NET 21 - 1	202
08-Oct-09	1738	106	PS8	42.1251	-66.0375	211	NNW	35	CTD 30	
08-Oct-09	1943	107	PS7	42.1631	-65.9669	224	NNW	25	CTD 31	
08-Oct-09	2125	108	PS6	42.2001	-65.9391		NWxN	25	CTD 32	
08-Oct-09	2236	109	PS6	42.1842	-65.9126	232	NW	30	RING NET 22 - 1	202
08-Oct-09	2336	110	PS5	42.2294	-65.9022	223	NNW	30	CTD 33	
09-Oct-09	59	111	PS4	42.2702	-65.873		N	25	CTD 34	
09-Oct-09	207	112	PS4	42.267	-65.872	230	NNW	20	RING NET 23 - 1	202
09-Oct-09	312	113	PS3	42.302	-65.8514	217	NNW	20	CTD 35	
09-Oct-09	432	114	PS2	42.3438	-65.8103	202	NNW	20	CTD 36	
09-Oct-09	549	115	PS1	42.4252	-65.7392	97	NW	20	CTD 37	
09-Oct-09	632	116	PS1	42.4295	-65.7142	95	NNW	20	RING NET 24 - 1	202
09-Oct-09	745	117	BBL4	42.4451	-65.4787	103	NNW	20	RING NET 25 - 1	202
09-Oct-09	751	118	BBL4	42.444	-65.476	103	NNW	20	RING NET 25 - 2	35
09-Oct-09	759	119	BBL4	42.441	-65.4718	103	NxW	20	RING NET 25 - 3	202

09-Oct-09	816	120	BBL4	42.436	-65.4639	103	NNW	20	CTD 38	
09-Oct-09	1020	121	BBL5	42.1296	-65.5009	205	NNW	20	RING NET 26 - 1	202
09-Oct-09	1048	122	BBL5	42.1207	-65.5018	233	NNW	15	MVP TOW 8 (TO BBL3)	
09-Oct-09	1648	123	C2	43.0349	-65.7732	126		LIG HT	RECOVER MOORING #1720	
09-Oct-09	1738	124	C2	43.0441	-65.7676	128		LIG HT	DEPLOY REFURBISHED #1720	
09-Oct-09	1821	125	C2	43.0342	-65.7645	128	SW	10	DEPLOY GUARD BUOY @ 1720	
09-Oct-09	1911	126	BC2	42.9679	-65.7348	160	SW	10	BIONESS TOW 2	
09-Oct-09	2145	127	BBL3	42.7603	-65.4756	102	SSW	10	RING NET 27 - 1	202
09-Oct-09	2153	128	BBL3	42.7596	-65.4721	101	SSW	10	RING NET 27 - 2	35
09-Oct-09	2200	129	BBL3	42.759	-65.469	101	SSW	10	RING NET 27 - 3	202
09-Oct-09	2219	130	BBL3	42.7573	-65.4627	102	SW	10	CTD 39	
10-Oct-09	36	131	BBL2	42.9996	-65.4787	114	S	10	CTD 40	
10-Oct-09	124	132	BBL2	43.0007	-65.4781	116	S	15	RING NET 28 - 1	202
10-Oct-09	304	133	BBL1	43.2508	-65.4948	56	SSW	15	CTD 41	
10-Oct-09	409	134	BBL1	43.254	-65.4832	65	SxW	15	RING NET 29 - 1	35
10-Oct-09	415	135	BBL1	43.2546	-65.4867	60	SxW	15	RING NET 29 - 2	202
10-Oct-09	612	136	RL1	43.2497	-65.0608	165	S	15	CTD 42	
10-Oct-09	729	137	RL1	43.2738	-65.0248	167	SSE	20	RING NET 30 - 1	202
10-Oct-09	737	138	RL1	43.2744	-65.0264	166	SSE	20	RING NET 30 - 2	202
10-Oct-09	751	139	RL1	43.2765	-65.0292	166	SSE	20	RING NET 30 - 3	202
10-Oct-09	2053	140	HL2	44.2718	-63.323	190	WxN	30	RING NET 31 - 1	202
10-Oct-09	2103	141	HL2	44.2705	-63.3215	171	WxN	30	RING NET 31 - 2	35
11-Oct-09	1223	142	LL2	45.6599	-59.7011	148	WxN	25	RING NET 32 - 1	202
11-Oct-09	2248	143	CSL6	47.5769	-59.3443	256	WxN	25	RING	35

NET 33 - 1

11-Oct-09	2253	144	CSL6	47.576	-59.3436	256	WxN	25	RING NET 33 - 2	202
11-Oct-09	2321	145	CSL6	47.5749	-59.3391	273	WxN	25	CTD 43	
12-Oct-09	125	146	CSL5	47.4278	-59.6297	486	WSW	25	RING NET 34 - 1	202
12-Oct-09	205	147	CSL5	47.4298	-59.56	480	WxS	40	CTD 44	
12-Oct-09	406	148	CSL4	47.2654	-59.7769	470	WNW	30	RING NET 35 - 1	202
12-Oct-09	415	149	CSL4	47.2647	-59.7754	470	WxN	30	RING NET 35 - 2	35
12-Oct-09	422	150	CSL4	47.2643	-59.7709	470	WxN	30	RING NET 35 - 3	202
12-Oct-09	457	151	CSL4	47.2631	-59.775	470	WNW	30	CTD 45	
12-Oct-09	713	152	CSL3	47.0991	-59.9859	341	W	25	RING NET 36 - 1	202
12-Oct-09	735	153	CSL3	47.0982	-59.9804	345	W	20	RING NET 36 - 2	202
12-Oct-09	748	154	CSL3	47.0973	-59.979	347	NW	20	RING NET 36 - 3	202
12-Oct-09	818	155	CSL3	47.0965	-59.9747	350	WNW	30	CTD 46	
12-Oct-09	1018	156	CSL2	47.0137	-60.1112	178	WNW	40	RING NET 37 - 1	202
12-Oct-09	1035	157	CSL2	47.0064	-60.0992	180	WNW	40	RING NET 37 - 2	35
12-Oct-09	1048	158	CSL2	47.0021	-60.0901	180	WNW	45	CTD 47	
12-Oct-09	1247	159	CSL1	46.9586	-60.2145	80	WNW	35	RING NET 38 - 1	202
12-Oct-09	1305	160	CSL1	46.9463	-60.2057	78	WNW	35	CTD 48	
12-Oct-09	1910	161	LL1	45.8308	-59.8505	92	WNW	25	RING NET 39 - 1	202
12-Oct-09	1921	162	LL1	45.8183	-59.8504	90	WNW	25	RING NET 39 - 2	
12-Oct-09	1933	163	LL1	45.8321	-59.8463	89	WxN	30	CTD 49	
12-Oct-09	2036	164	LL1	45.8304	-59.8498	91	WNW	25	VLOPC 1	
13-Oct-09	114	165	LL2	45.6598	-59.7044	141	WNW	20	RING NET 40 - 1	35
13-Oct-09	119	166	LL2	45.6597	-59.7039	138	WNW	20	RING NET 40 - 2	202
13-Oct-09	143	167	LL2	45.6598	-59.7043	140	WxN	20	CTD 50	
13-Oct-09	227	168	LL2	45.6617	-59.7049	143	WxS	20	VLOPC 2	

13-Oct-09	347	169	LL3	45.49	-59.5182	146	W	25	RING NET 41 - 1	202
13-Oct-09	406	170	LL3	45.4906	-59.5146	148	WNW	20	CTD 51	
13-Oct-09	443	171	LL3	45.4908	-59.5122	146	WNW	25	VLOPC 3	
13-Oct-09	659	172	LL4	45.16	-59.1797	105	NW	20	RING NET 42 - 1	35
13-Oct-09	704	173	LL4	45.16	-59.179	103	NW	20	RING NET 42 - 2	202
13-Oct-09	720	174	LL4	45.16	-59.1788	106	NW	15	CTD 52	
13-Oct-09	759	175	LL4	45.1597	-59.1784	105	WxN	20	VLOPC 4	
13-Oct-09	1013	176	LL5	44.8188	-58.852	224	SW	15	RING NET 43 - 1	202
13-Oct-09	1038	177	LL5	44.819	-58.8503	229	W	20	CTD 53	
13-Oct-09	1107	178	LL5	44.8216	-58.8475	197	W	15	VLOPC 5	
13-Oct-09	1332	179	LL6	44.4798	-58.5121	66	WxN	15	RING NET 44 - 1	202
13-Oct-09	1340	180	LL6	44.4797	-58.5107	66	WxN	15	RING NET 44 - 2	35
13-Oct-09	1353	181	LL6	44.4801	-58.5116	66	W	20	CTD 54	
13-Oct-09	1416	182	LL6	44.4821	-58.5164	68	W	15	VLOPC 6	
13-Oct-09	1428	183	LL6	44.4836	-58.5192	68	WxN	20	LIGHT METER 1	
13-Oct-09	1710	184	LL7	44.1296	-58.1786	687	WSW	5	CTD 55	
13-Oct-09	1807	185	LL7	44.1309	-58.1762	749	WSW	10	VLOPC 7	
13-Oct-09	1844	186	LL7	44.1303	-58.181	656	SW	10	MULTINET 16	
13-Oct-09	1942	187	LL7	44.1368	-58.1771	819	NW	10	RING NET 45 - 1	202
13-Oct-09	2021	188	LL7	44.1381	-58.1684	980	NW	15	RING NET 45 - 2	35
13-Oct-09	2246	189	LL8	43.7799	-57.8295		N	15	MULTINET 17	
14-Oct-09	12	190	LL8	43.7795	-57.8296		NNE	10	RING NET 46 - 1	202
14-Oct-09	124	191	LL8	43.7786	-57.8286		NE	20	CTD 56	
14-Oct-09	340	192	LL8	43.7592	-57.8324		E	30	VLOPC 8	
14-Oct-09	628	193	LL9	43.4712	-57.5303	3600	E	30	MULTINET 18	
14-Oct-09	803	194	LL9	43.4793	-57.5315	3626	SxE	20	CTD 57	
15-Oct-09	232	195	BANC-B4	44.7777	-57.2515	400	NW	25	RING NET 47 - 1	202
15-Oct-09	323	196	BANC-B4	44.7741	-57.2511		NW	20	CTD 58	
16-Oct-09	112	197	GWA2	44.2309	-59.5588	220	W	15	RING NET 48 - 1	202
16-Oct-09	204	198	GWA2	44.2283	-59.547	217	NW	15	CTD 59	
16-Oct-09	609	199	SG28	43.7097	-59.0098	866		LIG HT	RING NET 49 -	202

									1	
16-Oct-09	705	200	SG28	43.7101	-59.01	856	NE	10	CTD 60	
16-Oct-09	1020	201	GULD3	43.9599	-59.0151	670	ExSS	20	BIONESS 3	
16-Oct-09	1239	202	GULD3	44.0197	-59.0389	496	ExN	25	CTD 61	
16-Oct-09	1349	203	GULD3	44.0178	-59.051	370	ExN	35	RING NET 50 - 1	202
17-Oct-09	1016	204	SIB8	43.1236	-60.1617	1930	N	20	CTD 62	
17-Oct-09	1254	205	SIB8	43.1221	-60.1577	1930	N	20	MULTINET 19	
17-Oct-09	1651	206	SIB10	42.7138	-59.738	3939	NE	20	CTD 63	
17-Oct-09	2044	207	SIB10	42.7008	-59.69	3939	NE	20	MULTINET 20	
18-Oct-09	301	208	SIB7	43.3192	-60.3418	1000	NE	20	MULTINET 21	
18-Oct-09	403	209	SIB7	43.3209	-60.3423	1000	NE	15	CTD 64	
18-Oct-09	535	210	SIB7	43.3211	-60.3399	500	NE	20	MULTINET 22	
18-Oct-09	741	211	SIB6.7	43.3967	-60.4095	506	NE	15	RING NET 51 - 1	202
18-Oct-09	824	212	SIB6.7	43.3972	-60.41	506	NE	15	CTD 65	
18-Oct-09	1020	213	SIB6.5	43.4454	-60.4506	141	NE	15	RING NET 52 - 1	202
18-Oct-09	1044	214	SIB6.5	43.4442	-60.4545	143	NE	20	CTD 66	
18-Oct-09	1102	215	SIB6.5	43.4435	-60.4554	60	NE	20	VLOPC 9	
18-Oct-09	1248	216	SIB6	43.6769	-60.6478	59	E	20	CTD 67	
18-Oct-09	1310	217	SIB6	43.6756	-60.6543	60	E	15	VLOPC 10	
18-Oct-09	1334	218	SIB6	43.6715	-60.661	58	E	15	RING NET 53 - 1	202
18-Oct-09	1620	219	SIB4	44.0602	-61.0594	57	ENE	20	RING NET 54 - 1	202
18-Oct-09	1634	220	SIB4	44.0595	-61.0605	56	ENE	20	CTD 68	
18-Oct-09	1654	221	SIB4	44.0579	-61.063	58	ENE	20	VLOPC 11	
18-Oct-09	1826	222	SIB3	44.278	-61.2626	102	ExN	25	CTD 69	
18-Oct-09	1927	223	SIB3	44.2785	-61.2642	104	ExN	25	VLOPC 12	
18-Oct-09	1943	224	SIB3	44.2784	-61.2654	104	ExN	30	RING NET 55 -1	202
18-Oct-09	2127	225	SIB2	44.5156	-61.5415		ExN	30	RING NET 56 -1	202
18-Oct-09	2148	226	SIB2	44.5156	-61.5448		E	35	CTD 70	
18-Oct-09	2217	227	SIB2	44.5144	-61.554		E	30	VLOPC 13	
19-Oct-09	35	228	SIB1	44.8633	-61.8866	65	ExN	30	RING NET 57 -1	202
19-Oct-09	45	229	SIB1	44.8609	-61.8916	72	ExN	40	RING NET 57 -2	202
19-Oct-09	103	230	SIB1	44.8574	-61.9004	75	ExN	35	CTD 71	
19-Oct-09	123	231	SIB1	44.8544	-61.9133	90	ExN	35	VLOPC 14	
19-Oct-09	640	232	HL2	44.267	-63.3234	161	ExS	30	RING NET 58 -1	202

19-Oct-09	702	233 HL2	44.2613	-63.3301	162 E	20 CTD 72
19-Oct-09	739	234 HL2	44.2487	-63.3409	145 NE	30 VLOPC

Routine AZMP sampling procedures

1. CTD profiles: CTD profiles were collected at all stations. As well as recording temperature, depth and salinity, the CTD was also equipped with an *in situ* fluorometer to examine the vertical distribution of phytoplankton, an oxygen sensor (during leg 1 only), and with Niskin bottles. Water samples were collected at all or selected depths at all AZMP stations and stations in Roseway Basin, the Gully and in the slope waters off the Central Scotian Shelf along the SS-B line. These were used to determine: dissolved oxygen, extracted chlorophyll, nutrients, bacterial biomass and algal taxonomy. Winkler oxygen titrations and salinity determinations were carried out for the water samples collected at all depths below 250 m at stations of the SS-B line and at selected depths at other stations. pH measurements were made at all depths and samples were collected for the determination of dissolved CO2. POC, PON and HPLC pigment samples and samples for determination of absorption spectra were also taken at the surface. (Total number of profiles taken = 65)
2. VLOPC drops: VLOPC (Vertical Laser Optical Plankton Counter) profiles to the bottom or 300 m were taken to examine the vertical distribution of plankton "particles" on the HL, LL and CSL lines. (Total stations sampled = 27)
3. Vertical net tows: At the AZMP stations, a 200 μm mesh ring net was towed vertically to collect mesozooplankton. Tows were to the bottom, or 1000 m. Vertical ring net tows using a 76 μm mesh were taken on the Halifax Line. (Total number of vertical net tow stations = 41)
4. BIONESS tows: 1 in the Gully, 2 in Emerald Basin, 2 in Roseway Basin, 2 at HL2, 2 in Cabot Strait, 1 in the NE Channel and one in the chaneel to the north of Browns Bank. (Total stations sampled =11)
5. MULTI-NET tows: 6 off the western Scotian Shelf, 4 off the central Scotian Shelf, 2 in the Gully region, 3 off the eastern Scotian Shelf. (Total stations sampled = 15)

Carbon dioxide biogeochemistry preliminary report for the October 2009 Scotian Shelf cruise

Oceanic acidification from anthropogenic CO_2 has become significant and has been a focus recently. The Scotian Shelf is controlled by the North Atlantic Current, the Labrador Current, and the outflow of the Gulf of St. Lawrence. Therefore, a long-term trend in CO_2 in the Scotian Shelf may reflect the magnitude of global warming and oceanic acidification on a larger spatial scale. During this two-week cruise, we collected water samples from the Scotian Shelf for inorganic carbon biogeochemistry research. More specifically, dissolved inorganic carbon (DIC) and alkalinity (Alk) were measured.

Altogether, four transects were sampled. They are HL, BBL, CL, and LL. This includes 5 stations on the HL line, 7 stations on the BBL line, 6 stations for the CL line and 6 stations for the LL line. Between 6-15 samples were collected at each station.

For summary, around 240 water samples were collected for subsequent DIC/Alk analysis done at Dalhousie.

In addition to these discrete bottle samples, underway measurements of both atmospheric and surface ocean pCO_2 were also taken consistently throughout the 2 week period. The air measurements were made using a sensor placed on the top deck of the ship, while the water measurements used a constant flow system which pumped water onboard from approximately 3 meters depth.

Cindy Dasilva
Emmanuelle Medrinal

Université Laval (Québec)
Laboratoire Connie Lovejoy

Cruise Report Hudson 5 october – 19 october 2009

At each of the stations we sampled, we collected 6L seawater at 4 different depths (Surface, chlorophyll maximum, minimum or maximum oxygen and bottom). Samples at all depths were collected for DNA analyses, RNA analyses, chlorophyll *a* small fraction, and for bacteria and eukaryote microscope slides stained with DAPI. Samples were collected for fluorescence in situ hybridization (FISH) analyses and microbial cell counts and identification at the surface and chlorophyll maximum depths. At chlorophyll maximum depth, samples were collected for HPLC analyses.

A phytoplankton net tow was also done at each of these stations (1 catching basket for 37.5 µm phyto-plankton net). Samples were and preserved in two different reagents for cell counts and identification: a buffered preservative solution and a lugol iodine solution. Samples from the net tows were also collected for DNA analyses by filtering onto a 0,2 µm pore-sized filter. Once the filter was dark brown, it was conserved in 95% ethanol.

The samples collected for chlorophyll *a*, HPLC, DNA and RNA analyses were size fractionated.
Only the small fraction was collected for chlorophyll *a* analyses. Samples were filtered through a 3 µm pore-seized filter before being filtered through GF/F 25mm filter. Chlorophyll *a* total was collected by BIO.
Total fraction of HPLC pigments were collected by filtration through GF/F 25mm. Samples for the small fraction were filtered through a 3 µm pore-seized filter before being filtered through GF/F 25mm filter.
Samples for DNA and RNA, were first filtered through a 50 µm mesh, then through a 3 µm 47mm pore-sized polycarbonate filter and finally through a 0.2 µm pore size Sterivex unit for RNA and DNA.

Stations sampled: See below.

Stations	Cast	Date start	n° Niskin bottles used	Depth (m)
HL2	# 66	5 october 2009	359954, 359955	Btm 150
			359960, 359961	50
			359964, 359965, 359966	30
			359971, 359972	Surface
HL4	# 77	5 october 2009	359994, 359995	Btm 80
			359996, 359996	55
			359998, 359999, 360000	40
			360001, 360002	Surface
HL5.A	# 84	6 october 2009	360028, 360029	Btm 540
			360031, 360032	250
			360038, 360039, 360040	40
			360045, 360046	Surface
RL5	# 86	6 october 2009	360049, 360050	Btm 1000
			360054, 360055	220
			360061, 360062, 360063	40
			360069, 360070	Surface

Stations	Cast	Date start	n° Niskin bottles used	Depth (m)
BBL6	# 98	8 october 2009	360102, 360103	Btm 1000
			360107, 360108	160
			360115, 360116, 360117	20
			360122, 360123	Surface
BBL4	# 120	9 october 2009	360259, 360260	Btm 90
			360266, 360267	35
			360273, 360274	5
			360277	Surface
BBL3	# 130	9 october 2009	360278, 360279	Btm 100
			360285, 360286	35
			360288, 360289, 360290	20
			360295, 360296	Surface
BBL1	# 133	10 october 2009	360307, 360308	Btm 60
			360311, 360312	30
			360315, 360316, 360317	18
			360321, 360322	Surface
CSL6	# 145	11 october 2009	360334, 360335	Btm 240
			360339, 360340	100
			360348, 360349, 360350	10
			360352, 360353	Surface
CSL4	# 151	12 october 2009	360370, 360371	Btm 460
			360378, 360379	60
			360382, 360383, 360384	40
			360389, 360390	Surface
CSL2	# 158	12 october 2009	360407, 360308	Btm 160
			360412, 360413	80
			360417, 360418, 360419	35
			360424, 360425	Surface
LL1	# 163	12 october 2009	360436, 360437	Btm 80
			360441, 360442	40
			360445, 360446, 360447	20
			360451, 360452	Surface
LL2	# 167	13 october 2009	360453, 360454	Btm 130
			360458, 360459	60
			360463, 360464, 360465	30

			360469, 360470	Surface
LL4	# 174	13 october 2009	360484, 360485	Btm 100
			360489, 360490	50
			360494, 360495, 360496	20
			360499, 360500	Surface

Stations	**Cast**	**Date start**	**n° Niskin bottles used**	**Depth (m)**
LL7	# 184	13 october 2009	360523, 360524	Btm 700
			360527, 360528	250
			360535, 360536, 360437	25
			360542, 360543	Surface
LL9	# 194	14 october 2009	360560, 360561	Btm 3700
			360567, 360568	200
			360575, 360576	30
			360580, 360581	Surface

Multi-frequency Acoustics HUDSON 2009-048

Objective:
Primarily, to acquire 12 & 200 kHz acoustic backscatter data on standard AZMP cruise tracks to allow quantification of water column macrozooplankton and the delineation of associated pelagic fish distributions to facilitate this process. There also exists particular interest in the distribution of mesopelagic fish in and around the Gully MPA in regard to the broader functioning of the Gully ecosystem.

Equipment:
Two DataSonics DFT-210 scientific echosounders were used in conjunction with a ram-mounted EDO 323B transducer (12 kHz) and a FURUNO 200-B transducer (200 kHz) deployed through HUDSON's GP lab stand-pipe. Echosounder demodulated outputs were digitized to 12-bit resolution and logged to PC hard drive together with time and navigation header information. The installation was configured to run in autonomous mode.

Procedure:
Acoustic data for files 2 – 8 (see Table below) were sampled at matched ping and logging rates of 1 ping/10 s and digitized at 5 kHz/channel over an acquisition interval of 818 ms. This yielded a total penetration depth of about 610 m. Files 9 to 23 were acquired at a sounder ping rate of 1 ping/2 s to provide closely spaced, real-time bathymetric data in support of Moving Vessel Profiler (MVP) operations. The ping data were decimated by a factor of 5 before recording, resulting in a standard recorded ping rate of 1 ping/ 10 s. A noise sample (File 1) was collected with the vessel alongside at BIO at a 1 ping/s rate using standard echosounder settings but with no emitted transmit signal. This enables quantification of the sounder receiver noise contribution.

Results:
Raw data files were generally of good quality. Some "wrap around" bottom artifacts were occasionally observed in very deep water when the sounder rate of 1 ping/2 s was being utilized. Occasional interference from other shipboard sounders was also encountered. Several data gaps occurred when the sounder was shut down to prevent interference with other acoustic operations and not reactivated for a considerable length of time. Occasionally the sounders were shut down and restarted in a non-standard way that produced not-immediately-obvious time gaps in the acoustic recordings e.g. files 11, 12, 18, and 22. The location of the time gaps are noted in the Table below.

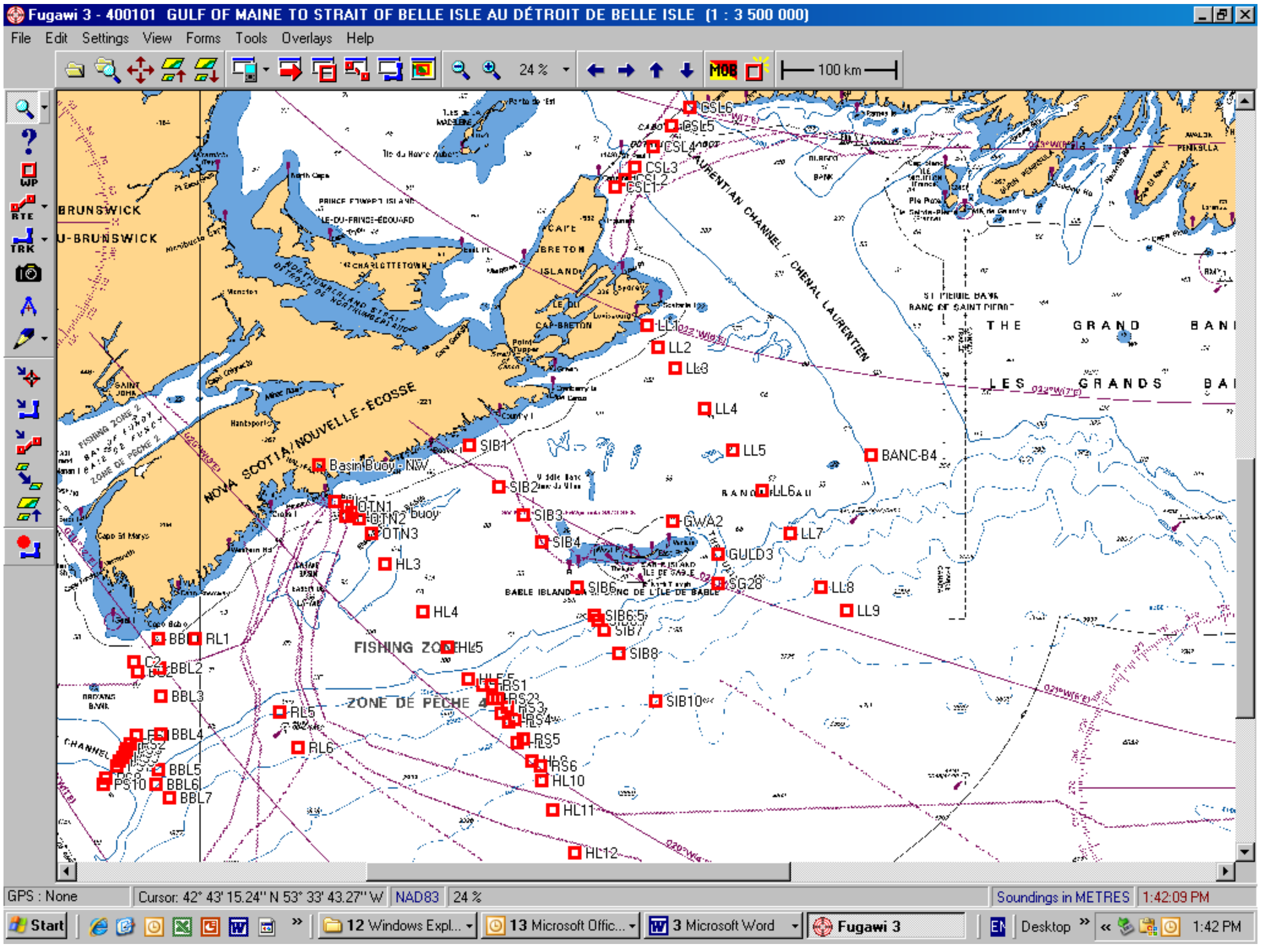
Table. Data collected on HUDSON 2009-048.

FILE #	TIME (ADT)	LOCATION
1	14:54 Sept. 25 – 14:59 Sept. 25	44 40.90 N 63 36.82 W
		Noise Sample alongside at BIO
2	15:18 Sept. 25 – 15:18 Sept. 26	To: 44 41.60 N 63 38.24 W
		BIO to Bedford Basin
3	15:18 Sept. 26 – 15:18 Sept. 27	To: 43 24.16 N 62 17.69 W
		Bedford Basin – HL3 to north of HL2 – south of HL4
4	15:18 Sept. 27 – 15:18 Sept. 28	To: 42 39.64 N 61 27.32 W
		South of HL4, south to between HL6 & HL7
5	15:18 Sept. 28 – 15:18 Sept. 29	To: 42 09.93 N 61 05.00 W
		North of HL7, south to between HL7 and HL8
6	15:18 Sept. 29 – 15:18 Sept. 30	To: 42 09.93 N 61 05.00 W
		Between HL7 & HL8 to SSE south of HL8 and return
7	15:18 Sept. 30 – 15:18 Oct. 01	To: 42 23.14 N 61 15.96 W
		Between HL7 & HL8
8	15:18 Oct. 01 – 15:18 Oct. 02	To: 42 56.36 N 60 51.59 W

		South of HL7 north to vicinity of HL6 then sail to east toward SIB7
9	07:37 Oct. 05 – 07:37 Oct. 06	From: 44 40.91 N 63 36.82 W To: 42 50.96 N 61 43.93 W
		BIO – Bedford Basin – then south on Halifax Line to HL6
10	07:37 Oct. 06 – 07:37 Oct. 07	To: 42 14.50 N 64 10.91 W
		HL6 west to Roseway Line 5 (RL5), south to RL6, then turn to west
11	07:37 Oct. 07 – 07:47 Oct. 08	To: 42 05.43 N 65 39.10 W
	Time break starts after p. 7659	West of RL6 to Browns Bank Line 7 (BBL7), then north to BBL5
12	07:47 Oct. 08 – 08:00 Oct. 09	To: 42 08.87 N 65 30.09 W
	Time break starts after p. 2260	BBL5 – BBL4 – loop to west across Fundian Ch. – to just W of BBL5
13	08:00 Oct. 09 – 13:05 Oct. 09	To: 43 02.00 N 65 46.03 W
		BBL5 north to BBL3 then to northwest
14	15:43 Oct. 09 – 15:43 Oct. 10	From: 43 00.76 N 65 44.10 W To: 44 37.91 N 63 33.24 W
		NW of BBL3 – BBL3 – BBL1 – RL1 – Dartmouth
15	15:43 Oct. 10 – 15:43 Oct. 11	To: 46 46.05 N 59 25.38 W
		Dartmouth – HL2 – LL2 – into Laurentian Ch. toward east end CSL
16	15:43 Oct. 11 – 15:43 Oct. 12	To: 45 51.91 N 59 48.41 W
		Laurentian Channel to CSL6, west to CSL1, then to just east of LL1
17	15:43 Oct. 12 – 15:43 Oct. 13	To: 44 07.81 N 58 10.86 W
		Just east of LL1 – LL1, then jog to east and back to LL2 – LL7
18	15:43 Oct. 13 – 20:55 Oct. 14	To: 44 53.35 N 57 20.25 W
	Time break starts after p. 1435	LL7 to LL9, then NNE along eastern side of Laurentian Ch. mouth
19	20:55 Oct. 14 – 20:55 Oct. 15	To: 44 13.94 N 59 33.31 W
		Near mouth Laurentian Ch. NE to just E. of LL1 then south to GULD1
20	20:55 Oct. 15 – 20:55 Oct. 16	To: 43 37.24 N 59 54.86 W
		GULD1 – cross mouth to GULD4 – GULD3 – cross mouth & to W
21	20:55 Oct. 16 – 20:55 Oct. 17	To: 42 52.90 N 59 53.67 W
		S of Sable Island – vicinity of SIB7 to near SIB8, then toward SIB7
22	20:55 Oct. 17 – 02:19 Oct. 19	To: 44 23.73 N 63 01.15 W
	Time break starts after p. 1613	Between SIB7 & SIB8 to SIB1, then SW to just east of HL2
23	02:19 Oct. 19 – 11:50 Oct. 19	To: 44 38.25 N 63 32.40 W
		Just east of HL2 – HL2 – BIO

File names: HA0948xx.dat
Data format: Header + 2 ch x 4090 pts/ch @ 5 kHz/ch (special)

Norman Cochrane
DFO/Ocean Physics Section/OSD/BIO



Fugawi 3 - 400101 GULF OF MAINE TO STRAIT OF BELLE ISLE AU DÉTROIT DE BELLE ISLE (1 : 3 500 000)
File Edit Settings View Forms Tools Overlays Help
24 %
100 km
NEW BRUNSWICK
NOUVEAU-BRUNSWICK
PRINCE EDWARD ISLAND
ÎLE-DU-PRINCE-ÉDOUARD
CAPE BRETON ISLAND
NOVA SCOTIA / NOUVELLE-ÉCOSSE
LAURENTIAN CHANNEL / CHENAL LAURENTIEN
THE GRAND BANK
LES GRANDS BANCS
FISHING ZONE 4
ZONE DE PÊCHE 4
CSL6
CSL5
CSL4
CSL3
CSL2
CSL1
LL1
LL2
LL3
LL4
LL5
LL6
LL7
LL8
LL9
BANC-B4
SIB1
SIB2
SIB3
SIB4
SIB6
SIB6.5
SIB7
SIB8
SIB10
GWA2
GULD3
SG28
Basin Buoy - NW
OTN1
OTN2
OTN3
HL3
HL4
HL5
HL10
HL11
HL12
RL1
RL5
RL6
BBL2
BBL3
BBL4
BBL5
BBL6
BBL7
RS1
RS2
RS3
RS4
RS5
RS6
GPS : None
Cursor: 42° 43' 15.24" N 53° 33' 43.27" W
NAD83
24 %
Soundings in METRES
1:42:09 PM
Start
12 Windows Expl...
13 Microsoft Offic...
3 Microsoft Word
Fugawi 3
Desktop
1:42 PM

Water sampling depths and ID numbers for CTD profiles

CTD	EVENT	STN	ID_TAG	DEPTH	CTD	EVENT	STN	ID_TAG	DEPTH
1	3	**BBASIN**	**999999**	NO BOTTLES	36	114	**PS2**	**360236**	192
2	6	**HL1**	**359751**	74	36	114	**PS2**	**360237**	175
2	6	**HL1**	**359752**	59	36	114	**PS2**	**360238**	150
2	6	**HL1**	**359753**	50	36	114	**PS2**	**360239**	125
2	6	**HL1**	**359754**	40	36	114	**PS2**	**360240**	100
2	6	**HL1**	**359755**	30	36	114	**PS2**	**360241**	75
2	6	**HL1**	**359756**	20	36	114	**PS2**	**360242**	61
2	6	**HL1**	**359757**	10	36	114	**PS2**	**360243**	50
2	6	**HL1**	**359758**	2	36	114	**PS2**	**360244**	41
3	9	**HL2**	**359759**	162	36	114	**PS2**	**360245**	29
3	9	**HL2**	**359760**	99	36	114	**PS2**	**360246**	20
3	9	**HL2**	**359761**	81	36	114	**PS2**	**360247**	10
3	9	**HL2**	**359762**	60	36	114	**PS2**	**360248**	3
3	9	**HL2**	**359763**	50	37	115	**PS1**	**360249**	91
3	9	**HL2**	**359764**	40	37	115	**PS1**	**360250**	76
3	9	**HL2**	**359765**	31	37	115	**PS1**	**360251**	61
3	9	**HL2**	**359766**	20	37	115	**PS1**	**360252**	51
3	9	**HL2**	**359767**	10	37	115	**PS1**	**360253**	41
3	9	**HL2**	**359768**	2	37	115	**PS1**	**360254**	31
4	12	**HL3**	**359769**	255	37	115	**PS1**	**360255**	20
4	12	**HL3**	**359770**	201	37	115	**PS1**	**360256**	11
4	12	**HL3**	**359771**	100	37	115	**PS1**	**360257**	3
4	12	**HL3**	**359772**	80	37	115	**PS1**	**360258**	3
4	12	**HL3**	**359773**	60	38	120	**BBL4**	**360259**	93
4	12	**HL3**	**359774**	50	38	120	**BBL4**	**360260**	94
4	12	**HL3**	**359775**	40	38	120	**BBL4**	**360261**	94
4	12	**HL3**	**359776**	30	38	120	**BBL4**	**360262**	79
4	12	**HL3**	**359777**	20	38	120	**BBL4**	**360263**	61
4	12	**HL3**	**359778**	10	38	120	**BBL4**	**360264**	50
4	12	**HL3**	**359779**	3	38	120	**BBL4**	**360265**	40
5	19	**HL6**	**359780**	1000	38	120	**BBL4**	**360266**	35
5	19	**HL6**	**359781**	750	38	120	**BBL4**	**360267**	35
5	19	**HL6**	**359782**	500	38	120	**BBL4**	**360268**	31
5	19	**HL6**	**359783**	251	38	120	**BBL4**	**360269**	20
5	19	**HL6**	**359784**	100	38	120	**BBL4**	**360270**	20
5	19	**HL6**	**359785**	80	38	120	**BBL4**	**360271**	21
5	19	**HL6**	**359786**	60	38	120	**BBL4**	**360272**	11
5	19	**HL6**	**359787**	50	38	120	**BBL4**	**360273**	6
5	19	**HL6**	**359788**	40	38	120	**BBL4**	**360274**	6
5	19	**HL6**	**359789**	31	38	120	**BBL4**	**360275**	6
5	19	**HL6**	**359790**	21	38	120	**BBL4**	**360276**	2
5	19	**HL6**	**359791**	11	38	120	**BBL4**	**360277**	2
5	19	**HL6**	**359792**	2	39	130	**BBL3**	**360278**	93
6	22	**HL6.3**	**359793**	1646	39	130	**BBL3**	**360279**	93
6	22	**HL6.3**	**359794**	1501	39	130	**BBL3**	**360280**	94
6	22	**HL6.3**	**359795**	1000	39	130	**BBL3**	**360281**	81
6	22	**HL6.3**	**359796**	751	39	130	**BBL3**	**360282**	60

6	22	**HL6.3**	**359797**	501	39	130	**BBL3**	**360283**	51
6	22	**HL6.3**	**359798**	251	39	130	**BBL3**	**360284**	41
6	22	**HL6.3**	**359799**	100	39	130	**BBL3**	**360285**	34
6	22	**HL6.3**	**359800**	80	39	130	**BBL3**	**360286**	34
6	22	**HL6.3**	**359801**	60	39	130	**BBL3**	**360287**	30
6	22	**HL6.3**	**359802**	50	39	130	**BBL3**	**360288**	21
6	22	**HL6.3**	**359803**	40	39	130	**BBL3**	**360289**	21
6	22	**HL6.3**	**359804**	31	39	130	**BBL3**	**360290**	21
6	22	**HL6.3**	**359805**	20	39	130	**BBL3**	**360291**	21
6	22	**HL6.3**	**359806**	10	39	130	**BBL3**	**360292**	10
6	22	**HL6.3**	**359807**	3	39	130	**BBL3**	**360293**	2
7	28	**HL8**	**359808**	3404	39	130	**BBL3**	**360294**	2
7	28	**HL8**	**359809**	3150	39	130	**BBL3**	**360295**	3
7	28	**HL8**	**359810**	2600	39	130	**BBL3**	**360296**	3
7	28	**HL8**	**359811**	2001	40	131	**BBL2**	**360297**	105
7	28	**HL8**	**359812**	1400	40	131	**BBL2**	**360298**	80
7	28	**HL8**	**359813**	801	40	131	**BBL2**	**360299**	60
7	28	**HL8**	**359814**	501	40	131	**BBL2**	**360300**	51
7	28	**HL8**	**359815**	250	40	131	**BBL2**	**360301**	40
7	28	**HL8**	**359816**	100	40	131	**BBL2**	**360302**	30
7	28	**HL8**	**359817**	81	40	131	**BBL2**	**360303**	20
7	28	**HL8**	**359818**	61	40	131	**BBL2**	**360304**	10
7	28	**HL8**	**359819**	50	40	131	**BBL2**	**360305**	3
7	28	**HL8**	**359820**	41	40	131	**BBL2**	**360306**	3
7	28	**HL8**	**359821**	31	41	133	**BBL1**	**360307**	47
7	28	**HL8**	**359822**	20	41	133	**BBL1**	**360308**	45
7	28	**HL8**	**359823**	10	41	133	**BBL1**	**360309**	46
7	28	**HL8**	**359824**	2	41	133	**BBL1**	**360310**	40
8	31	**HL7**	**359825**	2709	41	133	**BBL1**	**360311**	30
8	31	**HL7**	**359826**	1501	41	133	**BBL1**	**360312**	29
8	31	**HL7**	**359827**	1000	41	133	**BBL1**	**360313**	29
8	31	**HL7**	**359828**	751	41	133	**BBL1**	**360314**	21
8	31	**HL7**	**359829**	501	41	133	**BBL1**	**360315**	19
8	31	**HL7**	**359830**	250	41	133	**BBL1**	**360316**	18
8	31	**HL7**	**359831**	103	41	133	**BBL1**	**360317**	19
8	31	**HL7**	**359832**	80	41	133	**BBL1**	**360318**	10
8	31	**HL7**	**359833**	61	41	133	**BBL1**	**360319**	3
8	31	**HL7**	**359834**	51	41	133	**BBL1**	**360320**	3
8	31	**HL7**	**359835**	41	41	133	**BBL1**	**360321**	3
8	31	**HL7**	**359836**	29	41	133	**BBL1**	**360322**	3
8	31	**HL7**	**359837**	20	42	136	**RL1**	**360323**	156
8	31	**HL7**	**359838**	10	42	136	**RL1**	**360324**	101
8	31	**HL7**	**359839**	4	42	136	**RL1**	**360325**	80
9	37	**HL11**	**359840**	4460	42	136	**RL1**	**360326**	61
9	37	**HL11**	**359841**	4193	42	136	**RL1**	**360327**	50
9	37	**HL11**	**359842**	3850	42	136	**RL1**	**360328**	40
9	37	**HL11**	**359843**	3601	42	136	**RL1**	**360329**	30
9	37	**HL11**	**359844**	3451	42	136	**RL1**	**360330**	20
9	37	**HL11**	**359845**	3300	42	136	**RL1**	**360331**	10
9	37	**HL11**	**359846**	3151	42	136	**RL1**	**360332**	3
9	37	**HL11**	**359847**	2601	42	136	**RL1**	**360333**	3
9	37	**HL11**	**359848**	2000	43	145	**CSL6**	**360334**	355
9	37	**HL11**	**359849**	1400	43	145	**CSL6**	**360335**	354
9	37	**HL11**	**359850**	799	43	145	**CSL6**	**360336**	354
9	37	**HL11**	**359851**	500	43	145	**CSL6**	**360337**	199

9	37	**HL11**	**359852**	250	43	145	**CSL6**	**360338**	149
9	37	**HL11**	**359853**	100	43	145	**CSL6**	**360339**	99
9	37	**HL11**	**359854**	80	43	145	**CSL6**	**360340**	100
9	37	**HL11**	**359855**	60	43	145	**CSL6**	**360341**	99
9	37	**HL11**	**359856**	50	43	145	**CSL6**	**360342**	80
9	37	**HL11**	**359857**	40	43	145	**CSL6**	**360343**	59
9	37	**HL11**	**359858**	30	43	145	**CSL6**	**360344**	550
9	37	**HL11**	**359859**	20	43	145	**CSL6**	**360345**	40
9	37	**HL11**	**359860**	11	43	145	**CSL6**	**360346**	30
9	37	**HL11**	**359861**	2	43	145	**CSL6**	**360347**	20
10	40	**HL12**	**359862**	4528	43	145	**CSL6**	**360348**	10
10	40	**HL12**	**359863**	4192	43	145	**CSL6**	**360349**	10
10	40	**HL12**	**359864**	3851	43	145	**CSL6**	**360350**	10
10	40	**HL12**	**359865**	3600	43	145	**CSL6**	**360351**	10
10	40	**HL12**	**359866**	3451	43	145	**CSL6**	**360352**	2
10	40	**HL12**	**359867**	3302	43	145	**CSL6**	**360353**	3
10	40	**HL12**	**359868**	3150	43	145	**CSL6**	**360354**	3
10	40	**HL12**	**359869**	2598	43	145	**CSL6**	**360355**	3
10	40	**HL12**	**359870**	2002	44	147	**CSL5**	**360356**	464
10	40	**HL12**	**359871**	1400	44	147	**CSL5**	**360357**	300
10	40	**HL12**	**359872**	799	44	147	**CSL5**	**360358**	200
10	40	**HL12**	**359873**	500	44	147	**CSL5**	**360359**	150
10	40	**HL12**	**359874**	250	44	147	**CSL5**	**360360**	99
10	40	**HL12**	**359875**	101	44	147	**CSL5**	**360361**	81
10	40	**HL12**	**359876**	82	44	147	**CSL5**	**360362**	61
10	40	**HL12**	**359877**	61	44	147	**CSL5**	**360363**	50
10	40	**HL12**	**359878**	51	44	147	**CSL5**	**360364**	40
10	40	**HL12**	**359879**	40	44	147	**CSL5**	**360365**	30
10	40	**HL12**	**359880**	31	44	147	**CSL5**	**360366**	20
10	40	**HL12**	**359881**	21	44	147	**CSL5**	**360367**	10
10	40	**HL12**	**359882**	10	44	147	**CSL5**	**360368**	3
10	40	**HL12**	**359883**	3	44	147	**CSL5**	**360369**	3
11	44	**HL10**	**359884**	3919	45	151	**CSL4**	**360370**	457
11	44	**HL10**	**359885**	3850	45	151	**CSL4**	**360371**	456
11	44	**HL10**	**359886**	3601	45	151	**CSL4**	**360372**	457
11	44	**HL10**	**359887**	3450	45	151	**CSL4**	**360373**	300
11	44	**HL10**	**359888**	3301	45	151	**CSL4**	**360374**	201
11	44	**HL10**	**359889**	3151	45	151	**CSL4**	**360375**	150
11	44	**HL10**	**359890**	2601	45	151	**CSL4**	**360376**	100
11	44	**HL10**	**359891**	2000	45	151	**CSL4**	**360377**	81
11	44	**HL10**	**359892**	1400	45	151	**CSL4**	**360378**	61
11	44	**HL10**	**359893**	800	45	151	**CSL4**	**360379**	60
11	44	**HL10**	**359894**	500	45	151	**CSL4**	**360380**	61
11	44	**HL10**	**359895**	250	45	151	**CSL4**	**360381**	49
11	44	**HL10**	**359896**	101	45	151	**CSL4**	**360382**	41
11	44	**HL10**	**359897**	81	45	151	**CSL4**	**360383**	40
11	44	**HL10**	**359898**	61	45	151	**CSL4**	**360384**	40
11	44	**HL10**	**359899**	50	45	151	**CSL4**	**360385**	40
11	44	**HL10**	**359900**	41	45	151	**CSL4**	**360386**	29
11	44	**HL10**	**359901**	31	45	151	**CSL4**	**360387**	20
11	44	**HL10**	**359902**	21	45	151	**CSL4**	**360388**	10
11	44	**HL10**	**359903**	10	45	151	**CSL4**	**360389**	3
11	44	**HL10**	**359904**	3	45	151	**CSL4**	**360390**	3
12	47	**HL9**	**359905**	3753	45	151	**CSL4**	**360391**	3
12	47	**HL9**	**359906**	3603	45	151	**CSL4**	**360392**	3

12	47	**HL9**	**359907**	3448	46	155	**CSL3**	**360393**	335
12	47	**HL9**	**359908**	3296	46	155	**CSL3**	**360394**	200
12	47	**HL9**	**359909**	3142	46	155	**CSL3**	**360395**	150
12	47	**HL9**	**359910**	2591	46	155	**CSL3**	**360396**	100
12	47	**HL9**	**359911**	1994	46	155	**CSL3**	**360397**	80
12	47	**HL9**	**359912**	1386	46	155	**CSL3**	**360398**	61
12	47	**HL9**	**359913**	1195	46	155	**CSL3**	**360399**	50
12	47	**HL9**	**359914**	1005	46	155	**CSL3**	**360400**	39
12	47	**HL9**	**359915**	800	46	155	**CSL3**	**360401**	29
12	47	**HL9**	**359916**	496	46	155	**CSL3**	**360402**	20
12	47	**HL9**	**359917**	249	46	155	**CSL3**	**360403**	10
12	47	**HL9**	**359918**	99	46	155	**CSL3**	**360404**	2
12	47	**HL9**	**359919**	80	46	155	**CSL3**	**360405**	3
12	47	**HL9**	**359920**	60	47	158	**CSL2**	**360406**	157
12	47	**HL9**	**359921**	51	47	158	**CSL2**	**360407**	157
12	47	**HL9**	**359922**	40	47	158	**CSL2**	**360408**	157
12	47	**HL9**	**359923**	31	47	158	**CSL2**	**360409**	154
12	47	**HL9**	**359924**	21	47	158	**CSL2**	**360410**	99
12	47	**HL9**	**359925**	10	47	158	**CSL2**	**360411**	82
12	47	**HL9**	**359926**	4	47	158	**CSL2**	**360412**	82
13	48	**R55**	**25**	3304	47	158	**CSL2**	**360413**	82
13	48	**R55**	**26**	2698	47	158	**CSL2**	**360414**	60
13	48	**R55**	**27**	2197	47	158	**CSL2**	**360415**	50
13	48	**R55**	**28**	1608	47	158	**CSL2**	**360416**	42
13	48	**R55**	**29**	1015	47	158	**CSL2**	**360417**	35
14	53	**HL6.7**	**359927**	2318	47	158	**CSL2**	**360418**	35
14	53	**HL6.7**	**359928**	2000	47	158	**CSL2**	**360419**	35
14	53	**HL6.7**	**359929**	1501	47	158	**CSL2**	**360420**	30
14	53	**HL6.7**	**359930**	1000	47	158	**CSL2**	**360421**	20
14	53	**HL6.7**	**359931**	800	47	158	**CSL2**	**360422**	11
14	53	**HL6.7**	**359932**	500	47	158	**CSL2**	**360423**	2
14	53	**HL6.7**	**359933**	250	47	158	**CSL2**	**360424**	2
14	53	**HL6.7**	**359934**	101	47	158	**CSL2**	**360425**	2
14	53	**HL6.7**	**359935**	80	48	160	**CSL1**	**360426**	71
14	53	**HL6.7**	**359936**	61	48	160	**CSL1**	**360427**	60
14	53	**HL6.7**	**359937**	50	48	160	**CSL1**	**360428**	51
14	53	**HL6.7**	**359938**	41	48	160	**CSL1**	**360429**	40
14	53	**HL6.7**	**359939**	31	48	160	**CSL1**	**360430**	30
14	53	**HL6.7**	**359940**	20	48	160	**CSL1**	**360431**	20
14	53	**HL6.7**	**359941**	10	48	160	**CSL1**	**360432**	10
14	53	**HL6.7**	**359942**	2	48	160	**CSL1**	**360433**	3
15	55	**HL5.5**	**359943**	680	48	160	**CSL1**	**360434**	3
15	55	**HL5.5**	**359944**	251	49	163	**LL1**	**360435**	84
15	55	**HL5.5**	**359945**	100	49	163	**LL1**	**360436**	84
15	55	**HL5.5**	**359946**	80	49	163	**LL1**	**360437**	84
15	55	**HL5.5**	**359947**	60	49	163	**LL1**	**360438**	61
15	55	**HL5.5**	**359948**	50	49	163	**LL1**	**360439**	51
15	55	**HL5.5**	**359949**	40	49	163	**LL1**	**360440**	41
15	55	**HL5.5**	**359950**	30	49	163	**LL1**	**360441**	41
15	55	**HL5.5**	**359951**	21	49	163	**LL1**	**360442**	41
15	55	**HL5.5**	**359952**	10	49	163	**LL1**	**360443**	30
15	55	**HL5.5**	**359953**	2	49	163	**LL1**	**360444**	21
16	66	**HL2**	**359954**	161	49	163	**LL1**	**360445**	21
16	66	**HL2**	**359955**	161	49	163	**LL1**	**360446**	21
16	66	**HL2**	**359956**	161	49	163	**LL1**	**360447**	21

16	66	**HL2**	**359957**	101	49	163	**LL1**	**360448**	10
16	66	**HL2**	**359958**	76	49	163	**LL1**	**360449**	2
16	66	**HL2**	**359959**	50	49	163	**LL1**	**360450**	2
16	66	**HL2**	**359960**	50	49	163	**LL1**	**360451**	2
16	66	**HL2**	**359961**	50	49	163	**LL1**	**360452**	2
16	66	**HL2**	**359962**	40	50	167	**LL2**	**360453**	133
16	66	**HL2**	**359963**	30	50	167	**LL2**	**360454**	133
16	66	**HL2**	**359964**	30	50	167	**LL2**	**360455**	133
16	66	**HL2**	**359965**	30	50	167	**LL2**	**360456**	100
16	66	**HL2**	**359966**	30	50	167	**LL2**	**360457**	80
16	66	**HL2**	**359967**	20	50	167	**LL2**	**360458**	60
16	66	**HL2**	**359968**	10	50	167	**LL2**	**360459**	60
16	66	**HL2**	**359969**	5	50	167	**LL2**	**360460**	59
16	66	**HL2**	**359970**	2	50	167	**LL2**	**360461**	50
16	66	**HL2**	**359971**	2	50	167	**LL2**	**360462**	39
16	66	**HL2**	**359972**	2	50	167	**LL2**	**360463**	30
17	71	**HL3**	**359973**	260	50	167	**LL2**	**360464**	30
17	71	**HL3**	**359974**	201	50	167	**LL2**	**360465**	30
17	71	**HL3**	**359975**	99	50	167	**LL2**	**360466**	30
17	71	**HL3**	**359976**	81	50	167	**LL2**	**360467**	21
17	71	**HL3**	**359977**	60	50	167	**LL2**	**360468**	10
17	71	**HL3**	**359978**	50	50	167	**LL2**	**360469**	3
17	71	**HL3**	**359979**	41	50	167	**LL2**	**360470**	3
17	71	**HL3**	**359980**	30	50	167	**LL2**	**360471**	3
17	71	**HL3**	**359981**	20	50	167	**LL2**	**360472**	3
17	71	**HL3**	**359982**	11	51	170	**LL3**	**360473**	140
17	71	**HL3**	**359983**	3	51	170	**LL3**	**360474**	100
17	71	**HL3**	**359984**	3	51	170	**LL3**	**360475**	79
18	76	**HL4**	**359985**	76	51	170	**LL3**	**360476**	61
18	76	**HL4**	**359986**	59	51	170	**LL3**	**360477**	51
18	76	**HL4**	**359987**	51	51	170	**LL3**	**360478**	41
18	76	**HL4**	**359988**	40	51	170	**LL3**	**360479**	31
18	76	**HL4**	**359989**	30	51	170	**LL3**	**360480**	20
18	76	**HL4**	**359990**	20	51	170	**LL3**	**360481**	9
18	76	**HL4**	**359991**	10	51	170	**LL3**	**360482**	3
18	76	**HL4**	**359992**	2	51	170	**LL3**	**360483**	3
18	76	**HL4**	**359993**	2	52	174	**LL4**	**360484**	98
19	77	**HL4**	**359994**	74	52	174	**LL4**	**360485**	99
19	77	**HL4**	**359995**	74	52	174	**LL4**	**360486**	99
19	77	**HL4**	**359996**	54	52	174	**LL4**	**360487**	79
19	77	**HL4**	**359997**	54	52	174	**LL4**	**360488**	61
19	77	**HL4**	**359998**	41	52	174	**LL4**	**360489**	50
19	77	**HL4**	**359999**	40	52	174	**LL4**	**360490**	50
19	77	**HL4**	**360000**	41	52	174	**LL4**	**360491**	49
19	77	**HL4**	**360001**	2	52	174	**LL4**	**360492**	40
19	77	**HL4**	**360002**	2	52	174	**LL4**	**360493**	31
20	81	**HL5**	**360003**	96	52	174	**LL4**	**360494**	21
20	81	**HL5**	**360004**	80	52	174	**LL4**	**360495**	20
20	81	**HL5**	**360005**	60	52	174	**LL4**	**360496**	20
20	81	**HL5**	**360006**	50	52	174	**LL4**	**360497**	20
20	81	**HL5**	**360007**	40	52	174	**LL4**	**360498**	10
20	81	**HL5**	**360008**	30	52	174	**LL4**	**360499**	2
20	81	**HL5**	**360009**	22	52	174	**LL4**	**360500**	3
20	81	**HL5**	**360010**	10	52	174	**LL4**	**360501**	3
20	81	**HL5**	**360011**	2	52	174	**LL4**	**360502**	2

20	81	**HL5**	**360012**	2	53	177	**LL5**	**360503**	217
21	83	**HL6**	**360013**	1030	53	177	**LL5**	**360504**	100
21	83	**HL6**	**360014**	757	53	177	**LL5**	**360505**	80
21	83	**HL6**	**360015**	5003	53	177	**LL5**	**360506**	60
21	83	**HL6**	**360016**	253	53	177	**LL5**	**360507**	51
21	83	**HL6**	**360017**	103	53	177	**LL5**	**360508**	40
21	83	**HL6**	**360018**	83	53	177	**LL5**	**360509**	30
21	83	**HL6**	**360019**	63	53	177	**LL5**	**360510**	21
21	83	**HL6**	**360020**	53	53	177	**LL5**	**360511**	11
21	83	**HL6**	**360021**	42	53	177	**LL5**	**360512**	3
21	83	**HL6**	**360022**	33	53	177	**LL5**	**360513**	3
21	83	**HL6**	**360023**	22	54	181	**LL6**	**360514**	61
21	83	**HL6**	**360024**	13	54	181	**LL6**	**360515**	50
21	83	**HL6**	**360025**	2	54	181	**LL6**	**360516**	41
21	83	**HL6**	**360026**	2	54	181	**LL6**	**360517**	31
22	84	**HL5.5**	**360027**	665	54	181	**LL6**	**360518**	19
22	84	**HL5.5**	**360028**	665	54	181	**LL6**	**360519**	10
22	84	**HL5.5**	**360029**	665	54	181	**LL6**	**360520**	4
22	84	**HL5.5**	**360030**	255	54	181	**LL6**	**360521**	4
22	84	**HL5.5**	**360031**	255	55	184	**LL7**	**360522**	743
22	84	**HL5.5**	**360032**	255	55	184	**LL7**	**360523**	743
22	84	**HL5.5**	**360033**	102	55	184	**LL7**	**360524**	743
22	84	**HL5.5**	**360034**	84	55	184	**LL7**	**360525**	500
22	84	**HL5.5**	**360035**	62	55	184	**LL7**	**360526**	250
22	84	**HL5.5**	**360036**	54	55	184	**LL7**	**360527**	250
22	84	**HL5.5**	**360037**	43	55	184	**LL7**	**360528**	250
22	84	**HL5.5**	**360038**	43	55	184	**LL7**	**360529**	100
22	84	**HL5.5**	**360039**	43	55	184	**LL7**	**360530**	79
22	84	**HL5.5**	**360040**	43	55	184	**LL7**	**360531**	61
22	84	**HL5.5**	**360041**	33	55	184	**LL7**	**360532**	51
22	84	**HL5.5**	**360042**	24	55	184	**LL7**	**360533**	41
22	84	**HL5.5**	**360043**	12	55	184	**LL7**	**360534**	30
22	84	**HL5.5**	**360044**	3	55	184	**LL7**	**360535**	26
22	84	**HL5.5**	**360045**	3	55	184	**LL7**	**360536**	26
22	84	**HL5.5**	**360046**	3	55	184	**LL7**	**360537**	26
22	84	**HL5.5**	**360047**	3	55	184	**LL7**	**360538**	20
23	86	**RL5**	**360048**	899	55	184	**LL7**	**360539**	10
23	86	**RL5**	**360049**	900	55	184	**LL7**	**360540**	3
23	86	**RL5**	**360050**	901	55	184	**LL7**	**360541**	3
23	86	**RL5**	**360051**	751	55	184	**LL7**	**360542**	3
23	86	**RL5**	**360052**	501	55	184	**LL7**	**360543**	3
23	86	**RL5**	**360053**	250	56	191	**LL8**	**360544**	2932
23	86	**RL5**	**360054**	221	56	191	**LL8**	**360545**	2001
23	86	**RL5**	**360055**	221	56	191	**LL8**	**360546**	1500
23	86	**RL5**	**360056**	99	56	191	**LL8**	**360547**	1001
23	86	**RL5**	**360057**	82	56	191	**LL8**	**360548**	500
23	86	**RL5**	**360058**	60	56	191	**LL8**	**360549**	250
23	86	**RL5**	**360059**	51	56	191	**LL8**	**360550**	100
23	86	**RL5**	**360060**	40	56	191	**LL8**	**360551**	80
23	86	**RL5**	**360061**	41	56	191	**LL8**	**360552**	61
23	86	**RL5**	**360062**	40	56	191	**LL8**	**360553**	50
23	86	**RL5**	**360063**	42	56	191	**LL8**	**360554**	40
23	86	**RL5**	**360064**	31	56	191	**LL8**	**360555**	30
23	86	**RL5**	**360065**	20	56	191	**LL8**	**360556**	20
23	86	**RL5**	**360066**	10	56	191	**LL8**	**360557**	10

23	86	**RL5**	**360067**	3	56	191	**LL8**	**360558**	3
23	86	**RL5**	**360068**	3	56	191	**LL8**	**360559**	3
23	86	**RL5**	**360069**	3	57	194	**LL9**	**360560**	3760
23	86	**RL5**	**360070**	3	57	194	**LL9**	**360561**	3760
24	90	**RL6**	**360071**	1888	57	194	**LL9**	**360562**	3760
24	90	**RL6**	**360072**	1503	57	194	**LL9**	**360563**	2001
24	90	**RL6**	**360073**	1001	57	194	**LL9**	**360564**	1500
24	90	**RL6**	**360074**	500	57	194	**LL9**	**360565**	1002
24	90	**RL6**	**360075**	250	57	194	**LL9**	**360566**	499
24	90	**RL6**	**360076**	100	57	194	**LL9**	**360567**	197
24	90	**RL6**	**360077**	81	57	194	**LL9**	**360568**	197
24	90	**RL6**	**360078**	60	57	194	**LL9**	**360569**	197
24	90	**RL6**	**360079**	50	57	194	**LL9**	**360570**	99
24	90	**RL6**	**360080**	40	57	194	**LL9**	**360571**	81
24	90	**RL6**	**360081**	31	57	194	**LL9**	**360572**	60
24	90	**RL6**	**360082**	20	57	194	**LL9**	**360573**	50
24	90	**RL6**	**360083**	10	57	194	**LL9**	**360574**	40
24	90	**RL6**	**360084**	3	57	194	**LL9**	**360575**	30
24	90	**RL6**	**360085**	3	57	194	**LL9**	**360576**	30
25	93	**BBL7**	**360086**	1807	57	194	**LL9**	**360577**	30
25	93	**BBL7**	**360087**	1500	57	194	**LL9**	**360578**	20
25	93	**BBL7**	**360088**	752	57	194	**LL9**	**360579**	9
25	93	**BBL7**	**360089**	500	57	194	**LL9**	**360580**	4
25	93	**BBL7**	**360090**	251	57	194	**LL9**	**360581**	4
25	93	**BBL7**	**360091**	99	57	194	**LL9**	**360582**	4
25	93	**BBL7**	**360092**	81	57	194	**LL9**	**360583**	4
25	93	**BBL7**	**360093**	60	58	196	**BANC-B4**	**360584**	387
25	93	**BBL7**	**360094**	50	58	196	**BANC-B4**	**360585**	249
25	93	**BBL7**	**360095**	40	58	196	**BANC-B4**	**360586**	98
25	93	**BBL7**	**360096**	30	58	196	**BANC-B4**	**360587**	80
25	93	**BBL7**	**360097**	21	58	196	**BANC-B4**	**360588**	61
25	93	**BBL7**	**360098**	11	58	196	**BANC-B4**	**360589**	51
25	93	**BBL7**	**360099**	3	58	196	**BANC-B4**	**360590**	41
25	93	**BBL7**	**360100**	3	58	196	**BANC-B4**	**360591**	29
26	98	**BBL6**	**360101**	1007	58	196	**BANC-B4**	**360592**	20
26	98	**BBL6**	**360102**	1007	58	196	**BANC-B4**	**360593**	10
26	98	**BBL6**	**360103**	1007	58	196	**BANC-B4**	**360594**	3
26	98	**BBL6**	**360104**	750	58	196	**BANC-B4**	**360595**	4
26	98	**BBL6**	**360105**	499	59	198	**GWA2**	**360596**	208
26	98	**BBL6**	**360106**	252	59	198	**GWA2**	**360597**	208
26	98	**BBL6**	**360107**	160	59	198	**GWA2**	**360598**	102
26	98	**BBL6**	**360108**	161	59	198	**GWA2**	**360599**	82
26	98	**BBL6**	**360109**	100	59	198	**GWA2**	**360600**	62
26	98	**BBL6**	**360110**	79	59	198	**GWA2**	**360601**	50
26	98	**BBL6**	**360111**	60	59	198	**GWA2**	**360602**	40
26	98	**BBL6**	**360112**	51	59	198	**GWA2**	**360603**	30
26	98	**BBL6**	**360113**	41	59	198	**GWA2**	**360604**	20
26	98	**BBL6**	**360114**	31	59	198	**GWA2**	**360605**	10
26	98	**BBL6**	**360115**	21	59	198	**GWA2**	**360606**	3
26	98	**BBL6**	**360116**	20	59	198	**GWA2**	**360607**	3
26	98	**BBL6**	**360117**	19	60	200	**SG28**	**360608**	844
26	98	**BBL6**	**360118**	20	60	200	**SG28**	**360609**	750
26	98	**BBL6**	**360119**	10	60	200	**SG28**	**360610**	500
26	98	**BBL6**	**360120**	2	60	200	**SG28**	**360611**	250
26	98	**BBL6**	**360121**	3	60	200	**SG28**	**360612**	100

26	98	**BBL6**	**360122**	3	60	200	**SG28**	**360613**	80
26	98	**BBL6**	**360123**	2	60	200	**SG28**	**360614**	60
27	102	**BBL5**	**360124**	225	60	200	**SG28**	**360615**	50
27	102	**BBL5**	**360125**	151	60	200	**SG28**	**360616**	40
27	102	**BBL5**	**360126**	102	60	200	**SG28**	**360617**	30
27	102	**BBL5**	**360127**	80	60	200	**SG28**	**360618**	20
27	102	**BBL5**	**360128**	59	60	200	**SG28**	**360619**	10
27	102	**BBL5**	**360129**	49	60	200	**SG28**	**360620**	3
27	102	**BBL5**	**360130**	40	60	200	**SG28**	**360621**	3
27	102	**BBL5**	**360131**	30	61	202	**GULD3**	**360622**	466
27	102	**BBL5**	**360132**	19	61	202	**GULD3**	**360623**	245
27	102	**BBL5**	**360133**	10	61	202	**GULD3**	**360624**	99
27	102	**BBL5**	**360134**	4	61	202	**GULD3**	**360625**	80
27	102	**BBL5**	**360135**	4	61	202	**GULD3**	**360626**	660
28	103	**PS10**	**360136**	85	61	202	**GULD3**	**360627**	51
28	103	**PS10**	**360137**	74	61	202	**GULD3**	**360628**	41
28	103	**PS10**	**360138**	59	61	202	**GULD3**	**360629**	30
28	103	**PS10**	**360139**	51	61	202	**GULD3**	**360630**	20
28	103	**PS10**	**360140**	41	61	202	**GULD3**	**360631**	10
28	103	**PS10**	**360141**	29	61	202	**GULD3**	**360632**	3
28	103	**PS10**	**360142**	21	61	202	**GULD3**	**360633**	3
28	103	**PS10**	**360143**	10	62	204	**SIB8**	**360634**	1877
28	103	**PS10**	**360144**	5	62	204	**SIB8**	**360635**	1397
28	103	**PS10**	**360145**	5	62	204	**SIB8**	**360636**	795
29	104	**PS9**	**360146**	87	62	204	**SIB8**	**360637**	500
29	104	**PS9**	**360147**	76	62	204	**SIB8**	**360638**	250
29	104	**PS9**	**360148**	60	62	204	**SIB8**	**360639**	102
29	104	**PS9**	**360149**	49	62	204	**SIB8**	**360640**	80
29	104	**PS9**	**360150**	41	62	204	**SIB8**	**360641**	60
29	104	**PS9**	**360151**	29	62	204	**SIB8**	**360642**	52
29	104	**PS9**	**360152**	21	62	204	**SIB8**	**360643**	40
29	104	**PS9**	**360153**	11	62	204	**SIB8**	**360644**	31
29	104	**PS9**	**360154**	4	62	204	**SIB8**	**360645**	20
30	106	**PS8**	**360155**	198	62	204	**SIB8**	**360646**	11
30	106	**PS8**	**360156**	176	62	204	**SIB8**	**360647**	4
30	106	**PS8**	**360157**	150	62	204	**SIB8**	**360648**	4
30	106	**PS8**	**360158**	126	63	206	**SIB10**	**360649**	3929
30	106	**PS8**	**360159**	102	63	206	**SIB10**	**360650**	3897
30	106	**PS8**	**360160**	75	63	206	**SIB10**	**360651**	3795
30	106	**PS8**	**360161**	61	63	206	**SIB10**	**360652**	3700
30	106	**PS8**	**360162**	51	63	206	**SIB10**	**360653**	3598
30	106	**PS8**	**360163**	42	63	206	**SIB10**	**360654**	3449
30	106	**PS8**	**360164**	30	63	206	**SIB10**	**360655**	3300
30	106	**PS8**	**360165**	20	63	206	**SIB10**	**360656**	3150
30	106	**PS8**	**360166**	11	63	206	**SIB10**	**360657**	2603
30	106	**PS8**	**360167**	2	63	206	**SIB10**	**360658**	2000
30	106	**PS8**	**360168**	2	63	206	**SIB10**	**360659**	1399
31	107	**PS7**	**360169**	213	63	206	**SIB10**	**360660**	800
31	107	**PS7**	**360170**	175	63	206	**SIB10**	**360661**	500
31	107	**PS7**	**360171**	151	63	206	**SIB10**	**360662**	251
31	107	**PS7**	**360172**	127	63	206	**SIB10**	**360663**	102
31	107	**PS7**	**360173**	101	63	206	**SIB10**	**360664**	82
31	107	**PS7**	**360174**	75	63	206	**SIB10**	**360665**	60
31	107	**PS7**	**360175**	61	63	206	**SIB10**	**360666**	50
31	107	**PS7**	**360176**	50	63	206	**SIB10**	**360667**	42

31	107	**PS7**	**360177**	38	63	206	**SIB10**	**360668**	31
31	107	**PS7**	**360178**	30	63	206	**SIB10**	**360669**	21
31	107	**PS7**	**360179**	21	63	206	**SIB10**	**360670**	11
31	107	**PS7**	**360180**	10	63	206	**SIB10**	**360671**	3
31	107	**PS7**	**360181**	4	63	206	**SIB10**	**360672**	3
32	108	**PS6**	**360182**	215	64	209	**SIB7**	**360673**	1471
32	108	**PS6**	**360183**	174	64	209	**SIB7**	**360674**	1401
32	108	**PS6**	**360184**	150	64	209	**SIB7**	**360675**	799
32	108	**PS6**	**360185**	124	64	209	**SIB7**	**360676**	501
32	108	**PS6**	**360186**	102	64	209	**SIB7**	**360677**	249
32	108	**PS6**	**360187**	76	64	209	**SIB7**	**360678**	100
32	108	**PS6**	**360188**	61	64	209	**SIB7**	**360679**	80
32	108	**PS6**	**360189**	51	64	209	**SIB7**	**360680**	60
32	108	**PS6**	**360190**	41	64	209	**SIB7**	**360681**	50
32	108	**PS6**	**360191**	31	64	209	**SIB7**	**360682**	40
32	108	**PS6**	**360192**	20	64	209	**SIB7**	**360683**	30
32	108	**PS6**	**360193**	11	64	209	**SIB7**	**360684**	21
32	108	**PS6**	**360194**	3	64	209	**SIB7**	**360685**	10
32	108	**PS6**	**360195**	3	64	209	**SIB7**	**360686**	2
33	110	**PS5**	**360196**	226	64	209	**SIB7**	**360687**	2
33	110	**PS5**	**360197**	175	65	212	**SIB6.7**	**360688**	504
33	110	**PS5**	**360198**	152	65	212	**SIB6.7**	**360689**	504
33	110	**PS5**	**360199**	125	65	212	**SIB6.7**	**360690**	249
33	110	**PS5**	**360200**	100	65	212	**SIB6.7**	**360691**	100
33	110	**PS5**	**360201**	75	65	212	**SIB6.7**	**360692**	80
33	110	**PS5**	**360202**	61	65	212	**SIB6.7**	**360693**	61
33	110	**PS5**	**360203**	50	65	212	**SIB6.7**	**360694**	50
33	110	**PS5**	**360204**	41	65	212	**SIB6.7**	**360695**	40
33	110	**PS5**	**360205**	29	65	212	**SIB6.7**	**360696**	31
33	110	**PS5**	**360206**	20	65	212	**SIB6.7**	**360697**	21
33	110	**PS5**	**360207**	10	65	212	**SIB6.7**	**360698**	11
33	110	**PS5**	**360208**	3	65	212	**SIB6.7**	**360699**	3
34	111	**PS4**	**360209**	216	65	212	**SIB6.7**	**360700**	3
34	111	**PS4**	**360210**	175	66	214	**SIB6.5**	**360701**	139
34	111	**PS4**	**360211**	150	66	214	**SIB6.5**	**360702**	101
34	111	**PS4**	**360212**	125	66	214	**SIB6.5**	**360703**	80
34	111	**PS4**	**360213**	99	66	214	**SIB6.5**	**360704**	61
34	111	**PS4**	**360214**	76	66	214	**SIB6.5**	**360705**	50
34	111	**PS4**	**360215**	60	66	214	**SIB6.5**	**360706**	40
34	111	**PS4**	**360216**	50	66	214	**SIB6.5**	**360707**	31
34	111	**PS4**	**360217**	41	66	214	**SIB6.5**	**360708**	20
34	111	**PS4**	**360218**	30	66	214	**SIB6.5**	**360709**	10
34	111	**PS4**	**360219**	19	66	214	**SIB6.5**	**360710**	4
34	111	**PS4**	**360220**	10	66	214	**SIB6.5**	**360711**	4
34	111	**PS4**	**360221**	3	67	216	**SIB6**	**360712**	56
34	111	**PS4**	**360222**	3	67	216	**SIB6**	**360713**	50
35	113	**PS3**	**360223**	213	67	216	**SIB6**	**360714**	41
35	113	**PS3**	**360224**	175	67	216	**SIB6**	**360715**	30
35	113	**PS3**	**360225**	151	67	216	**SIB6**	**360716**	21
35	113	**PS3**	**360226**	126	67	216	**SIB6**	**360717**	10
35	113	**PS3**	**360227**	100	67	216	**SIB6**	**360718**	2
35	113	**PS3**	**360228**	75	67	216	**SIB6**	**360719**	2
35	113	**PS3**	**360229**	59	68	220	**SIB4**	**360720**	51
35	113	**PS3**	**360230**	50	68	220	**SIB4**	**360721**	50
35	113	**PS3**	**360231**	40	68	220	**SIB4**	**360722**	40

35	113	**PS3**	**360232**	31
35	113	**PS3**	**360233**	19
35	113	**PS3**	**360234**	11
35	113	**PS3**	**360235**	2

68	220	**SIB4**	**360723**	31
68	220	**SIB4**	**360724**	20
68	220	**SIB4**	**360725**	10
68	220	**SIB4**	**360726**	2
68	220	**SIB4**	**360727**	2
69	222	**SIB3**	**360728**	97
69	222	**SIB3**	**360729**	80
69	222	**SIB3**	**360730**	60
69	222	**SIB3**	**360731**	51
69	222	**SIB3**	**360732**	40
69	222	**SIB3**	**360733**	30
69	222	**SIB3**	**360734**	20
69	222	**SIB3**	**360735**	11
69	222	**SIB3**	**360736**	4
69	222	**SIB3**	**360737**	4
70	226	**SIB2**	**360738**	144
70	226	**SIB2**	**360739**	100
70	226	**SIB2**	**360740**	81
70	226	**SIB2**	**360741**	61
70	226	**SIB2**	**360742**	51
70	226	**SIB2**	**360743**	40
70	226	**SIB2**	**360744**	30
70	226	**SIB2**	**360745**	20
70	226	**SIB2**	**360746**	11
70	226	**SIB2**	**360747**	2
70	226	**SIB2**	**360748**	2
71	230	**SIB1**	**360749**	62
71	230	**SIB1**	**360750**	51
71	230	**SIB1**	**360751**	41
71	230	**SIB1**	**360752**	30
71	230	**SIB1**	**360753**	20
71	230	**SIB1**	**360754**	10
71	230	**SIB1**	**360755**	3
71	230	**SIB1**	**360756**	4
72	233	**HL2**	**360757**	142
72	233	**HL2**	**360758**	100
72	233	**HL2**	**360759**	77
72	233	**HL2**	**360760**	61
72	233	**HL2**	**360761**	50
72	233	**HL2**	**360762**	40
72	233	**HL2**	**360763**	31
72	233	**HL2**	**360764**	19
72	233	**HL2**	**360765**	11
72	233	**HL2**	**360766**	3
72	233	**HL2**	**360767**	3

APPENDIX A

CCGS HUDSON FALL CRUISE 2009, HUD0948
REPORT ON THE RECOVERY AND DEPLOYMENT OF RAPID-WAVE MOORINGS IN THE SCOTIAN SLOPE-RISE
26 SEPTEMBER-3 OCTOBER 2009

MIGUEL ÁNGEL MORALES MAQUEDA AND JEFFREY PUGH
PROUDMAN OCEANOGRAPHIC LABORATORY

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INTRODUCTION

This cruise is the fifth RAPID-WAVE cruise in the area of the Scotian Slope/Rise. WAVE, which stands for West Atlantic Variability Experiment, is a NERC funded project to study the variability of the Meridional Overturning Circulation in the Northwest Atlantic. The four previous cruises took place in 2004, 2006, 2007 and 2008.

In August 2004, 6 lander Bottom Pressure Recorder (BPR) moorings and 5 MicroCAT moorings were deployed in a line across the shelf break south of St. John's, New Foundland. This line was designated Line A (see report of RRS Charles Darwin cruise CD160). A second line, called line B, was deployed east of Halifax, Nova Scotia. Lines A and B were almost identically instrumented. Additionally, Dr John Loder, from the Bedford Institute of Oceanography (BIO) in Dartmouth, Nova Scotia, deployed two MicroCAT/RCM near bottom moorings in line B.

Recovery of these two lines in July-August 2006 was full of difficulties, with losses of 8 MicroCAT moorings and 6 lander BPRs (see report of RRS Discovery cruise D308). Because of the lack of a sufficient number of replacement instruments, line A was abandoned. In line B, 4 lander BPRs and 2 MicroCAT/BPR moorings were redeployed during D308.

To try to prevent further mooring losses in subsequent cruises, an agreement was reached with BIO in early 2007 to return to the Halifax line in 2007 and turn the MicroCAT/BPR moorings around, as we all as to check on some of the lander BPRs. To that effect, a cruise took place in September/October 2007. The cruise was a complete success (see report of CCGS Hudson Fall Cruise HUD07045).

In 2008, RAPID-WAVE contributed to the first leg of the CCGS Hudson BIO Fall Cruise 2008 (HUD08037) with the two-fold objective of recovering the old RAPID-WAVE line B in its entirety[1] and deploying a new array of 6 BPR/ADCP/CTD moorings along the BIO Halifax line, located southwest of the old line B. The new mooring array was christened RAPID-SCOTIA (RS) array. Both cruise objectives were attained (see report of CCGS Hudson cruise HUD0837).

The 2009 RAPID-WAVE cruise onboard CCGS Hudson aimed at recovering and redeploying the RS array first deployed in 2008. The ship sailed at 8:30 local time on the 26th September and returned to port on the 3rd October at 19:30. All moorings were recovered by 30 September 2009. All instruments were in good state, except for a flooded ADCP. Three other ADCPs run out of power between three and two months before the recovery. All data was downloaded and examined to detect potential instrument problems or malfunctions and deemed to be generally of good quality. Deployments took place between 30-09-2009 and 02-10-2009. All were successful.

1 All gear in this line was to be returned to the National Marine Facilities in Southampton, except for 9 SBE MicroCATs and 2 Casabel beacons that had been acquired with RAPID-WAVE funding.

RS ARRAY RECOVERY

Recovery work was carried out throughout 28-09-2009 and 29-09-2009. The entire line was recovered without incidents. The following three tables summarise relevant information for all recoveries.

MOORINGS RECOVERED

SITE	LATITUDE (N)	LONGITUDE (W)	DATE & TIME ONBOARD	DEPTH (m)	MOORING TYPE
RS1	42 50.9592	61 37.8552	28-09-2009, 10:36 Z	1116 (cor.)	Short
RS2	42 44.2637	61 34.6121	28-09-2009, 12:50 Z	1703 (cor.)	Short
RS3	42 39.4975	61 27.7026	28-09-2009, 19:07 Z	2286 (cor.)	Short
RS4	42 33.3551	61 22.1421	29-09-2009, 11:00 Z	2773 (cor.)	Short
RS5	42 23.5656	61 16.5677	29-09-2009, 13:00 Z	3407 (cor.)	Short
RS6	42 09.8114	61 04.2213	29-09-2009, 17:45 Z	3892 (cor.)	Long

Notes. Positions were calculated during the previous cruise HUD08037 using M-Cal triangulations (see SEANAV's website http://www.seanav.com/). Echosounder depths were corrected using Carter tables.

EQUIPMENT RECOVERED

	RS1	RS2	RS3	RS4	RS5	RS6
Casabel Iridium beacon	12948990	12154420	12949990	2155420	2152420	2153420
Aanderaa Seaguard[1]		33				
Aanderaa RCM8[1]		No				1039
Aanderaa RCM11[1]		595				
Aanderaa Seaguard[1]		20				
SBE37 MicroCAT	6437					6433
SBE37 MicroCAT		6434				6435
SBE37 MicroCAT			6436			4617
SBE37 MicroCAT				6468		6432
SBE37 MicroCAT					1696	1785
SBE37 MicroCAT						6467
WHADCP	11432	10942	11433	11089	11431	10941
Benthos 965-A acoustic release	809 9.5 kHx D/E	807 11.5 kHz D	40083 9 kHz H/ E	44302 13.5 kHz D	40081 8.5 kHz E	40080
RBR BPR DR-1050	14581					14580
SBE53 BPR	50	49	48	47	46	45
POL RAPID LANDER						TRL04 DQ93161

1. These current meters are BIO's and not part of the RAPID-WAVE project.

SUMMARY OF INSTRUMENT SET-UP

Instrument	Site	Sampling interval	Averaging interval	Number of bins/ bin size (m)	Time of first record (Z)	Time of last record (Z)

		(seconds)	(seconds)			
SBE37-SM 1785	RS6	600		-	01 Oct 2008, 23:00:01	30 Sep 2009, 20:10:04
SBE37-SM 1696	RS5	600		-	01 Oct 2008, 23:00:01	29 Sep 2009, 18:30:01
SBE37-SM 4617	RS6	600		-	01 Oct 2008, 23:00:01	30 Sep 2009, 17:20:01
SBE37-SM 6432	RS6	600		-	01 Oct 2008, 23:00:01	30 Sep 2009, 14:20:01
SBE37-SM 6433	RS6	600		-	01 Oct 2008, 23:00:01	30 Sep 2009, 08:50:01
SBE37-SM 6434	RS2	600		-	01 Oct 2008, 23:00:01	29 Sep 2009, 11:50:01
SBE37-SM 6435	RS6	600		-	01 Oct 2008, 23:00:01	29 Sep 2009, 22:30:01
SBE37-SM 6436	RS3	600		-	01 Oct 2008, 23:00:01	29 Sep 2009, 09:00:01
SBE37-SM 6437	RS1	600		-	01 Oct 2008, 23:00:01	28 Sep 2009, 23:00:01
SBE37-SM 6467	RS6	600		-	01 Oct 2008, 23:00:01	30 Sep 2009, 11:30:01
SBE37-SM 6468	RS4	600		-	01 Oct 2008, 23:00:01	29 Sep 2009, 20:00:01
WHADP Sentinel 10941	RS6	3600		30/4	01 Oct 2008, 23:00.00	12 Jul 2009, 18:00:00
WHADP Sentinel 10942	RS2	3600		30/4	01 Oct 2008, 23:00.00	30 Jun 2009, 01:00:00
WHADP Sentinel 11089	RS4	3600		30/4	01 Oct 2008, 23:00:00	09 Aug 2009, 19:00:00
WHADP Sentinel 11431	RS5	3600		30/4	01 Oct 2008, 23:00:00	-
WHADP Sentinel 11432	RS1	3600		30/4	01 Oct 2008, 23:00:00	28 Sep 2009, 14:00:00
WHADP Sentinel 11433	RS3	3600		30/4	01 Oct 2008, 23:00:00	28 Sep 2009, 18:00:00
SBE53 45	RS6	1200	300[1]	-	27 Sep 2008, 17:20:00	29 Sep 2009, 21:40:00
SBE53 46	RS5	1200	300[1]	-	27 Sep 2008, 17:20:00	29 Sep 2009, 22:20:00
SBE53 47	RS4	1200	300[1]	-	27 Sep 2008, 17:20:00	29 Sep 2009, 21:40:00
SBE53 48	RS3	1200	300[1]	-	27 Sep 2008, 17:20:00	28 Sep 2009, 22:40:00
SBE53 49	RS2	1200	300[1]	-	27 Sep 2008, 17:20:00	28 Sep 2009, 23:20:00
SBE53 50	RS1	1200	300[1]	-	27 Sep 2008, 17:20:00	28 Sep 2009, 22:40:00
RBR DR-1050 14580	RS6	20		-	27 Sep 2008, 19:30:00	29 Sep 2009, 22:13:20
RBR DR-1050 14581	RS1	20		-	27 Sep 2008, 19:30:00	28 Sep 2009, 23:37:40
TRL04	RS6	900	900	-	27 Sep 2008, 20:15:00	29 Sep 2009, 23:00:00

1. Sensor warming up period was set to 300 seconds too. The time stamp for SBE53 samples correspond to the beginning of each 300- second averaging interval.

Notes on recovered instruments

1. Bottom pressure recorders

SBE53s. All SBE53s performed very well. Pressure ranges in all 6 sites were approximately 2 decibars. All instruments, except the one at RS3 exhibit a slightly upward trend of less than 0.1 decibar per year. The SBE53 at RS3 shows a more complicated low frequency signal, including two episodes in which the pressure seems to have undergone a jump (see Figure 1). It seems unlikely that these jumps are caused by the mooring hoping uphill from its original position since no such discontinuities are apparent in the pressure time series derived from the CTD microcat mounted on the same mooring.

Of these six BPRs units 50, 49, 48 and 45 were slightly bashed against the ship's side during recovery and will be sent back to the manufacturer for recalibration. Upon recovery of mooring RS6 it was discovered that the top four buoyancy spheres had imploded, ripping the hard hats. There is no clear evidence of when such implosion occurred.

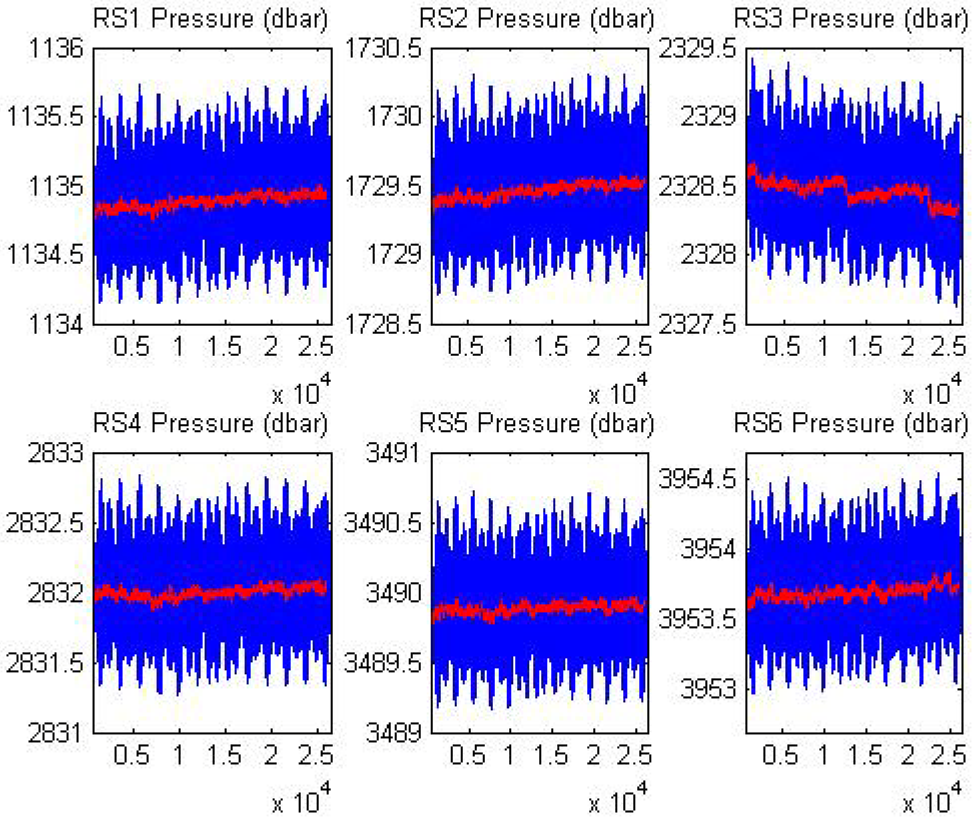


Figure 1: Time series of bottom pressure at sites RS1 to RS6 from October 2008 to October 2009. Blue: raw data. Red: moving averaged data with a 25-hour averaging window. The x-axis is sample number (the sampling frequency was 20 minutes).

POL landers. The POL Rapid lander at RS6, TRL04, had a linear trend two to three times larger than that of the SBE53 located at the same site (Figure 2).

RBR DR-1050. The two RBR BPRs have a strong decaying trend of 0.1 to 0.5 decibars during the first 3 months or so of the deployment. In addition, the RBR at site RS6 went through a period of jerky changes in pressure between 22 December 2008 and 7 January 2009 (This is anomalous behaviour is not apparent in Figure 2).

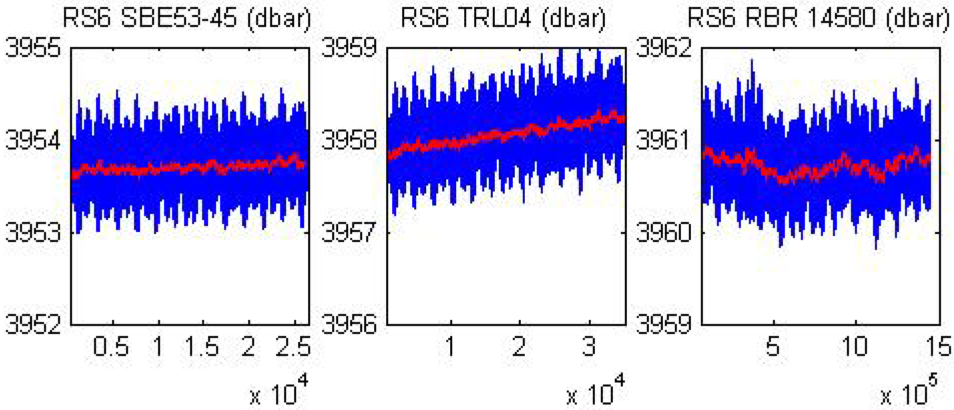


Figure 2: Time series of bottom pressures recorded at site RS6 from October 2008 to October 2009. Blue: raw data. Red: moving averaged data with a 25-hour averaging window. The x-axis is sample number (the sampling frequency for SBE53-45was 20 minutes, for TRL04 was 15 minutes and for RBR 14580 was 20 seconds).

2. RDI Workhorse ADCPs

The ADCP at RS5 flooded immediately after deployment and so no data was recovered. Since this was a new instrument, it is expected that the manufacturer will replace it at no additional cost to the project. All other instruments provided fairly good data, although the ADCPs at RS6, Rs4 and RS2 run out of batteries before recovery. All these batteries came from the same batch and so the BIO technicians suspect a manufacturing problem. The manufacturer has been contacted for clarifications.

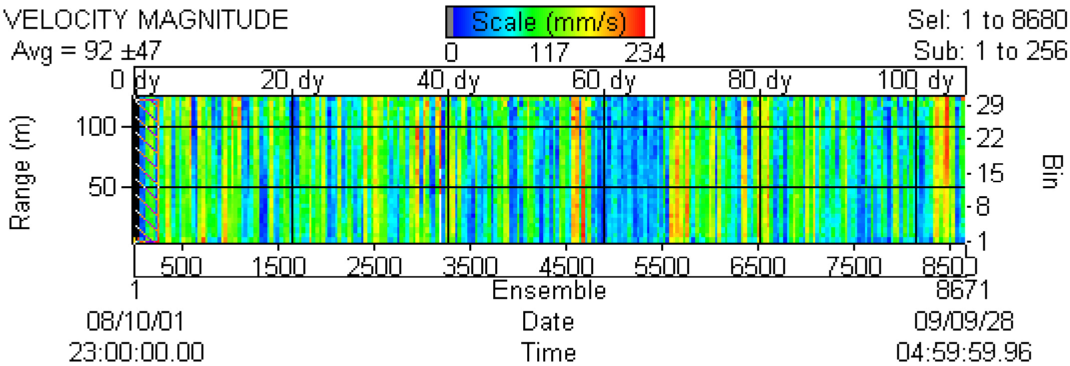
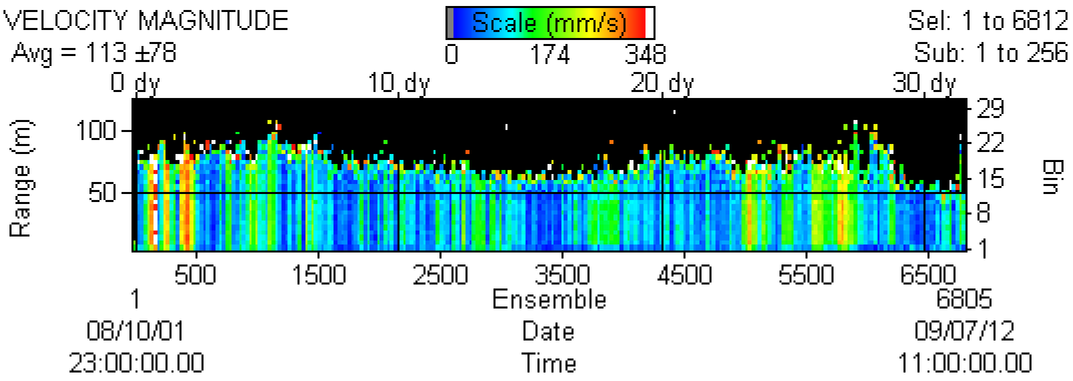


Figure 3: Near bottom ocean current speed at RS1.



In all sites, the measured velocities are fairly uniform in the vertical. At RS6, few good velocities were obtained in the range 75-100 m above the ADCP, presumably because of a reduced amount of scatterers at those depths. However, it might be possible to exploit the vertical uniformity of the currents to extrapolate velocity values into those bins.

3. SBE37 Microcats

The mooring microcat data was summarily examined soon after recovery. All data seemed of acceptable quality. The SBE37 data from site RS3 did not show any evidence of jumps in pressure (Figure 5), suggesting that the pressure discontinuities measured by the SBE53 sensor at the same site are not real.

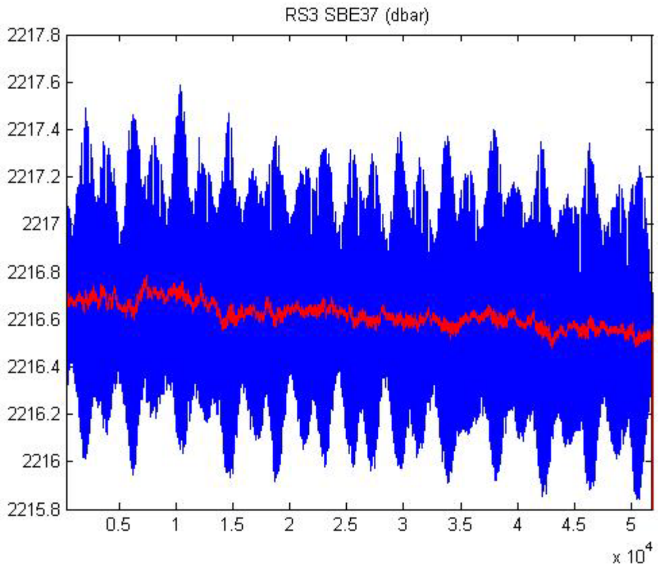


Figure 5: Pressure time series from SBE37 microcat at RS3. The x axis is sample number (the sampling interval was 10 minutes).

A calibration cast was done on 01 October 2009. All 11 microcats recovered from line RS were clamped to the CTD rosette and submerged to 3300 m. As the rosette was being brought up to the surface, five 10-minute stops were made to allow the microcats to record at reasonably constant and uniform conditions. Following the recommendations of Shane Elipot (POL), the microcat sampling rate was set to 15 seconds for this calibration dip, thus affording about 40 samples per rosette stop. The nominal sampling depths were: 3300 m, 2700 m, 2200 m, 1600 m and 1000 m.

4. CTD data

CTD casts were made adjacent to all six RS mooring sites. BIO are currently performing quality control and calibration of these data.

RS ARRAY REDEPLOYMENT

The redeployment of the RAPID-WATCH-WAVE line took place between 30-09-2009 and 02-10-2009 without any incidents. After the redeployment work was completed, there was some time left to attempt recovery of an acoustic release and dragging wire that was lost in the Fall Cruise 2008 near the old RAPID-WAVE site B1. The release responded to pinging and was accurately positioned using M-Cal. We carried out two recovery trials on the 2nd October 2009 but, unfortunately, they were unsuccessful. While at B1, we pinged to an unrecovered RAPID-WAVE lander BPR. The instrument is still there but it is unlikely that we will be able to retrieve it in 2010.

The table below and Figure 6 summarise these deployments.

MOORINGS DEPLOYED

SITE	LATITUDE (N)	LONGITUDE (W)	DATE & TIME AT BOTTOM	DEPTH (m)	MOORING TYPE
RS1	42 51.2223	61 37.9196	02-10-2009, 14:30 Z	1082 (cor.)	Short
RS2	42 44.4343	61 34.4546	02-10-2009, 12:48 Z	1669 (cor.)	Short
RS3	42 39.5690	61 27.4136	02-10-2009, 10:54 Z	2266 (cor.)	Short
RS4	42 33.4088	61 22.1512	01-10-2009, 21:01 Z	2749 (cor.)	Short
RS5	42 23.4680	61 16.6267	01-10-2008, 18:18 Z	3391 (cor.)	Short
RS6	42 09.9145	61 04.6658	30-09-2009, 19:25 Z	3836 (cor.)	Long

Note. Positions were calculated from M-Cal triangulations (see SEANAV's website http://www.seanav.com/). All times record the moment when the mooring anchor hit bottom (except for RS6, for which the bridge position for anchor on water is given). Depths are corrected using Carter tables.

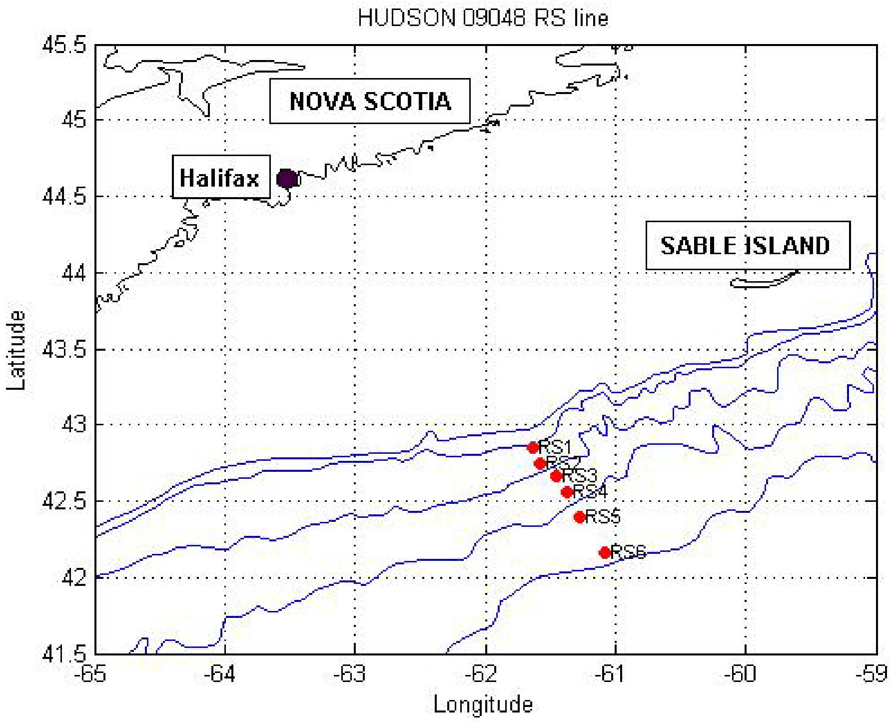


Figure 6: Location of moorings deployed in 2009. The blue lines correspond to the bathymetric contours: 500 m, 1000 m, 2000 m, 3000 m and 4000 m.

The following table includes the serial number of all the instruments, beacons and releases deployed in the line. Mooring schematics can be found in the Appendix.

EQUIPMENT DEPLOYED

	RS1	RS2	RS3	RS4	RS5	RS6
Casabel Iridium beacon	300034012204210					300034012204150
Iridium Sable beacon		300034012484560	300034012482560	300034012298970	300034012483560	
Aanderaa RCM11[1]						563
SBE37 MicroCAT	2165					4614
SBE37 MicroCAT		3680				3709
SBE37 MicroCAT			3681			3710
SBE37 MicroCAT				3675		3682
SBE37 MicroCAT					3676	3713
SBE37 MicroCAT						3714
WHADCP	11432	11433	13153	13152	12491	12455
Benthos 965-A acoustic release	47461 Rx 12.0 kHz E/F Tx 10.0 kHz	47463 Rx 13.5 kHz B/G Tx 10.0 kHz	47459 Rx 11.0 kHz A/B Tx 10 kHz	47462 Rx 13.0 kHz G/D Tx 10.0 kHz	40081 Rx 11.5 kHz D Tx 10.0 kHz	47464 Rx 14.0 kHz F/A Tx 10.0 kHz
RBR BPR DR-1050	14581					14580
SBE53 BPR	24	52	51	47	46	25
POL RAPID LANDER						TRL04 DQ93161

1. This current meter is BIO's and not part of the RAPID-WAVE project.

SUMMARY OF INSTRUMENT SET-UP

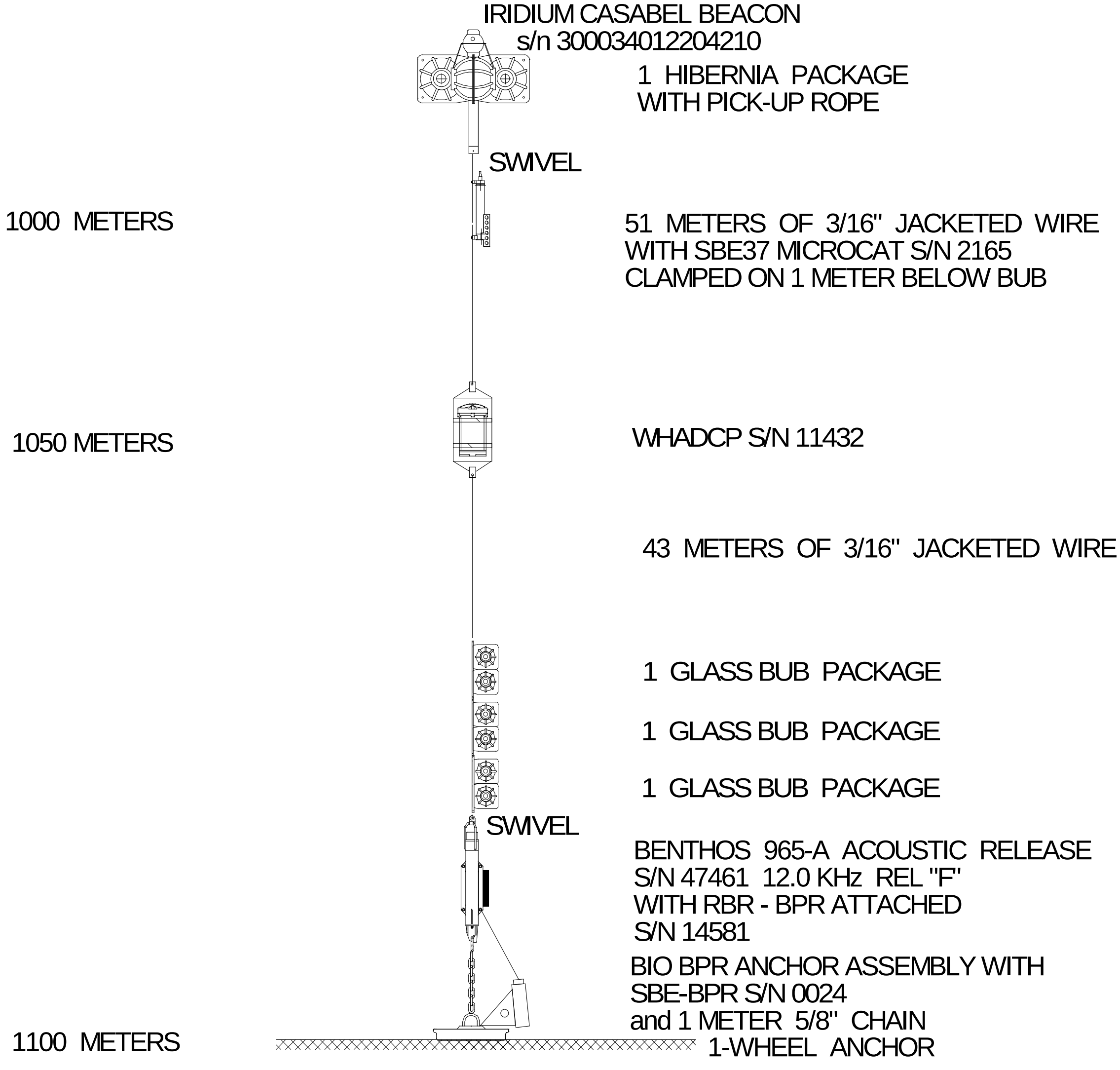
Instrument	Site	Sampling interval (seconds)	Averaging interval (seconds)	Number of bins/ bin size (m)	Time of first record (Z)	Time of last record (Z)
SBE37-SM 2165	RS1	600		-	To be found from BIO	
SBE37-SM 3675	RS4	600		-	To be found from BIO	
SBE37-SM 3676	RS5	600		-	To be found from BIO	
SBE37-SM 3680	RS2	600		-	To be found from BIO	
SBE37-SM 3681	RS3	600		-	To be found from BIO	

SBE37-SM 3682	RS6	600		-	To be found from BIO	
SBE37-SM 3709	RS6	600		-	To be found from BIO	
SBE37-SM 3710	RS6	600		-	To be found from BIO	
SBE37-SM 3713	RS6	600		-	To be found from BIO	
SBE37-SM 3714	RS6	600		-	To be found from BIO	
SBE37-SM 4614	RS6	600		-	To be found from BIO	
WHADP Sentinel 12455	RS6	3600		30/4	To be found from BIO	
WHADP Sentinel 12491	RS5	3600		30/4	To be found from BIO	
WHADP Sentinel 11432	RS1	3600		30/4	To be found from BIO	
WHADP Sentinel 11433	RS2	3600		30/4	To be found from BIO	
WHADP Sentinel 13152	RS4	3600		30/4	To be found from BIO	
WHADP Sentinel 13153	RS3	3600		30/4	To be found from BIO	
SBE53 24[1]	RS1	1200	300[2]	-	30 Sep 2009, 23:55:00	
SBE53 25[1]	RS6	1200	300[2]	-	30 Sep 2009, 13:20:00	
SBE53 46	RS5	1200	300[2]	-	30 Sep 2009, 22:15:00	
SBE53 47	RS4	1200	300[2]		30 Sep 2009, 22:15:00	
SBE53 51	RS3	1200	300[2]	-	30 Sep 2009, 22:55:00	
SBE53 52	RS2	1200	300[2]	-	30 Sep 2009 22:55:00	
RBR DR-1050 14580	RS6	20		-	30 Sep 2009, 13:20:00	
RBR DR-1050 14581	RS1	20		-	30 Sep 2009, 23:45:00	
TRL04	RS6	900	900	-	30 Sep 2009, 23:45:00	

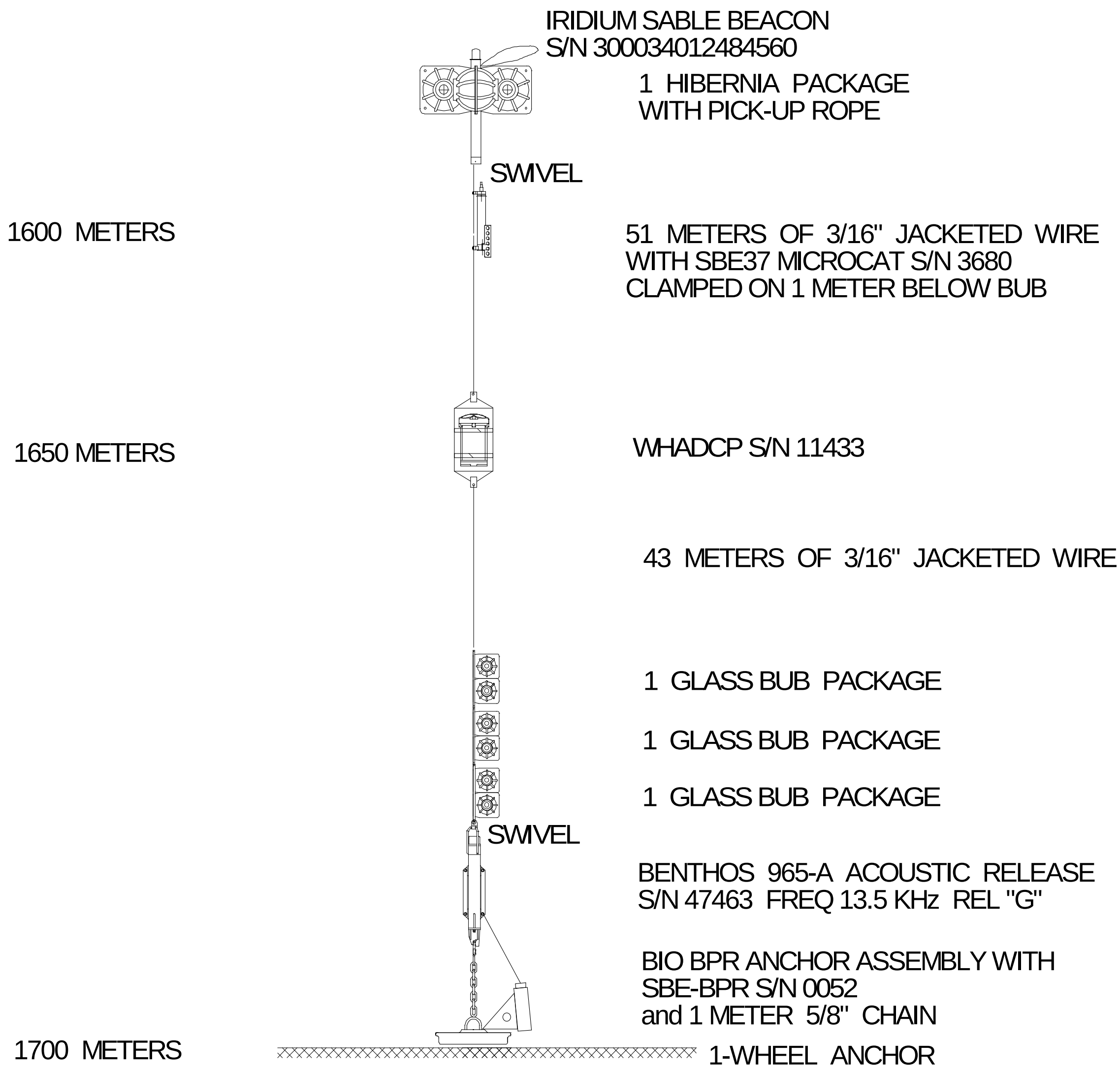
1. Sea Bird provided drift estimates for SBE53s numbers 24 and 25, whose sensors where made using a manufacturing process different from (and, apparently, inferior to) that of the other sensors in the SBE53 series. Their estimated drifts are 0.6 dbar/year and 0.2 decibar/year, respectively. We are grateful to Norge Larson, from Sea Bird, for this information.
2. Sensor warming up period was set to 300 seconds too. The time stamp for SBE53 samples correspond to the beginning of each 300- second averaging interval.

APPENDIX. MOORING DIAGRAMS

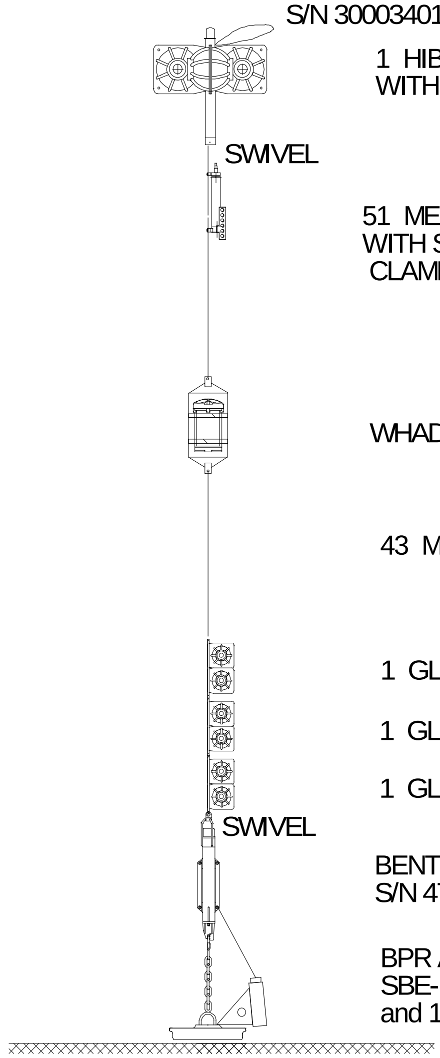
MOORING # 1742 RS1 LODER/POL SCOTIAN SLOPE SEPT 2009



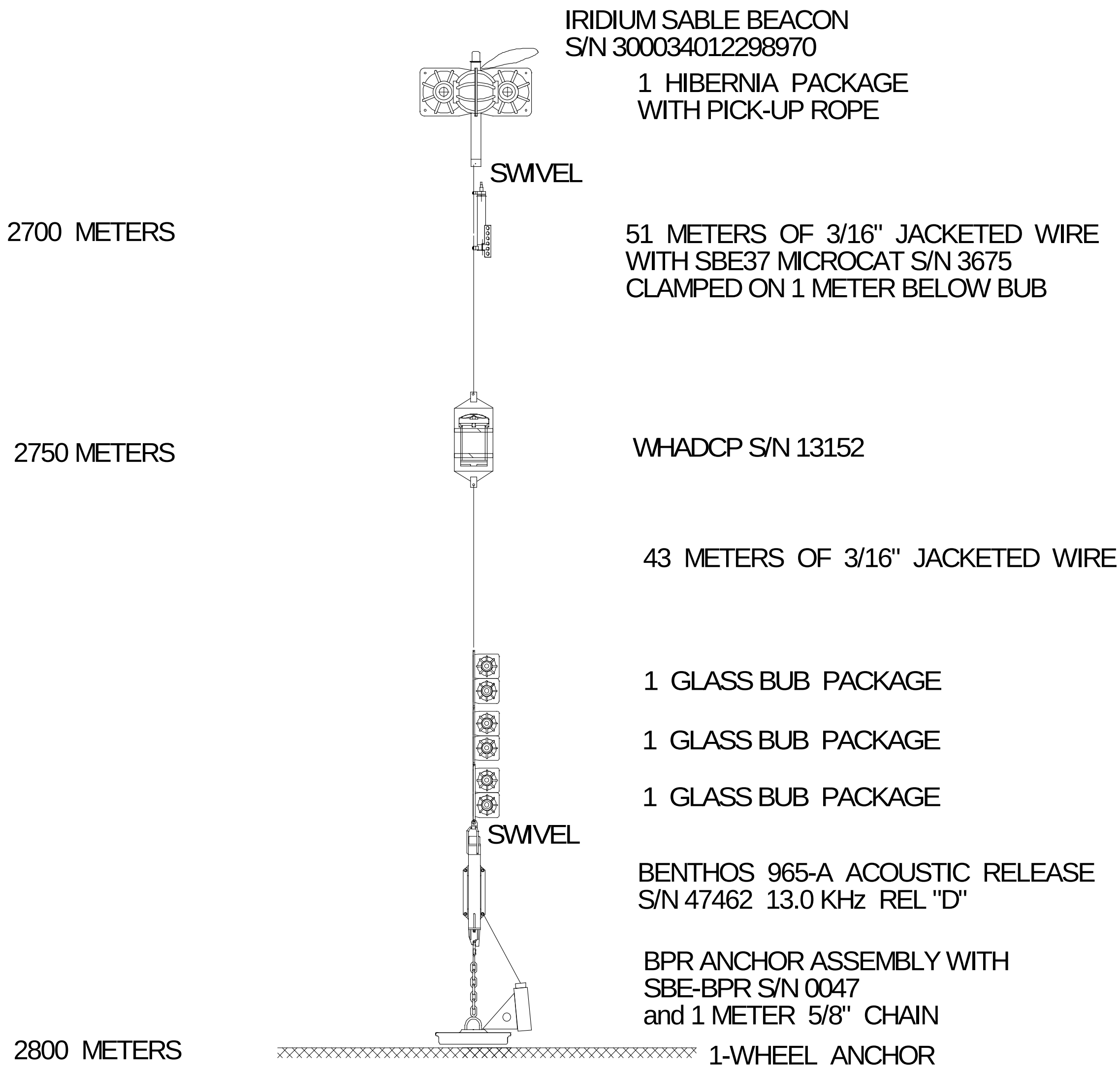
MOORING # 1743 RS2 LODER/POL SCOTIAN SLOPE SEPT 2009



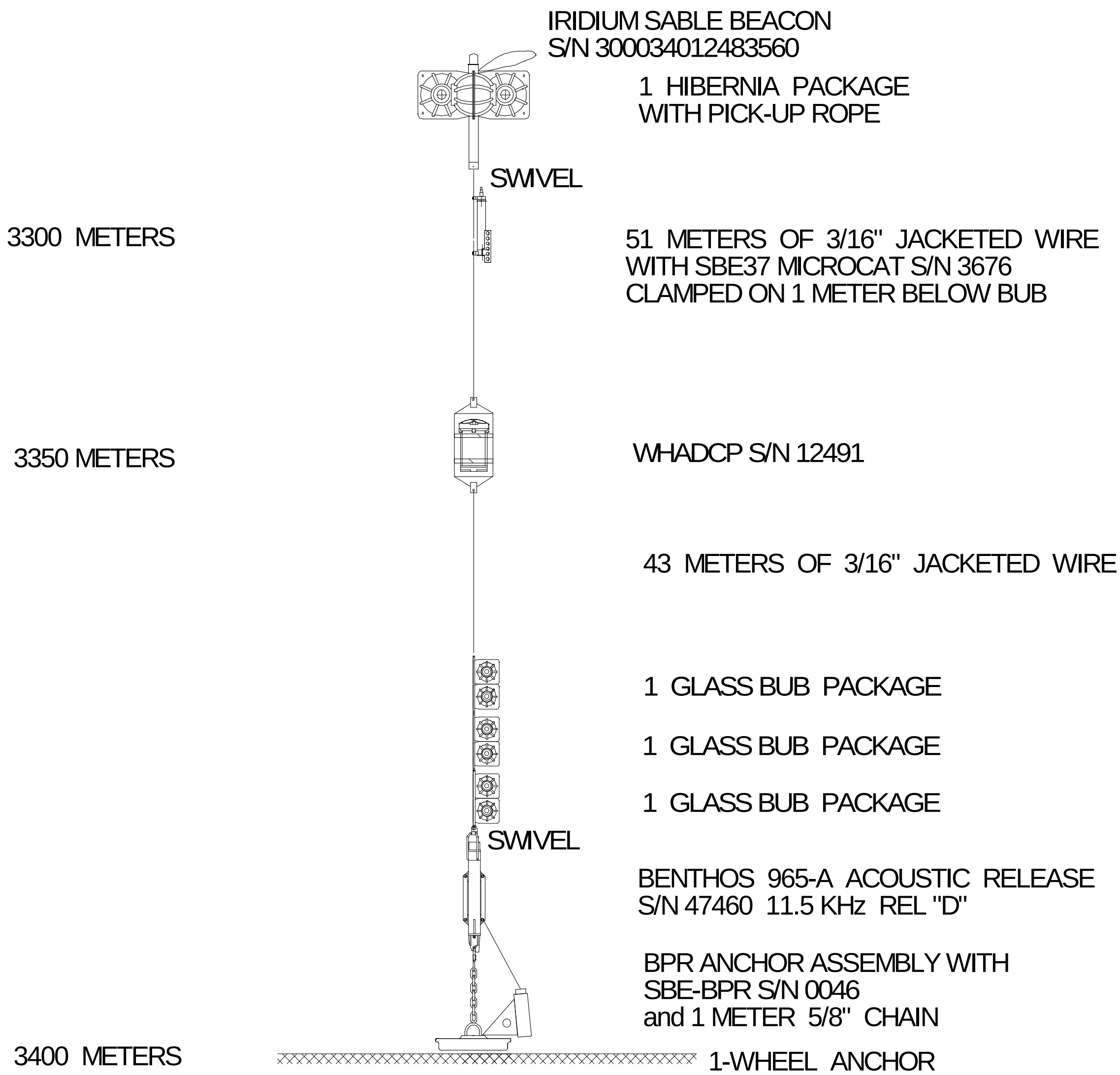
MOORING # 1744 RS3 LODER/POL SCOTIAN SLOPE SEPT 2009



MOORING # 1745 RS4 LODER/POL SCOTIAN SLOPE SEPT 2009



MOORING # 1746 RS5 LODER/POL SCOTIAN SLOPE SEPT 2009



MOORING # 1747 RS6 LODER/POL SCOTIAN SLOPE SEPT 2009