CRUISE REPORT

HUDSON 2013013

Minas Basin

June 4 − 16, 2013

1. CRUISE NARRATIVE

a. Area Designation:	Minas Basin
b. Expedition Designation:	HUD2013013 or 18HU03013 (ISDM format)
c. Chief Scientist:	Dr. Edward Horne Habitat Ecology Section Coastal Ecosystem Science Division Department of Fisheries and Oceans Bedford Institute of Oceanography PO Box 1006 Dartmouth, NS, Canada B2Y 2A4 Edward.Horne@dfo-mpo.gc.ca Brent Law Habitat Ecology Section Coastal Ecosystem Science Division Department of Fisheries and Oceans Bedford Institute of Oceanography PO Box 1006 Dartmouth, NS, Canada B2Y 2A4 Brent.Law@dfo-mpo.gc.ca
d. Ship:	CCGS Hudson (call sign - CGDG) Oceanographic research vessel
e. Ports of Call:	June 4, 2013 Depart BIO Dartmouth, NS, Jun 16, 2013 Return BIO, Dartmouth, NS, Can.
f. Cruise Dates:	June 4-16, 2013

2. Scientific Program

2.1 Objectives

The goal of the mission was to collect water column and seabed data from the Upper Bay of Fundy. More specifically, to make measurements of the hydrodynamics and sediment dynamics in the Minas Basin area in support of the advancement of tidal power and to document baseline conditions. Measurements collected from this research will be used to parameterize and validate coupled hydrodynamic and sediment models and to increase the predictive capacity of models in forecasting possible future environmental impacts of tidal power development and expansion.

Our proposed research has five basic objectives:

- to collect observations of water column properties such as current velocities, suspended sediment concentration, particle size and settling velocity and surface reflectance.
- to collect seabed samples for grain size in the Minas Basin
- to quantify erodibility of seabed sediments through coring and the use of a Gust microcosm erosion chamber
- to parameterize the water column and seabed measurements for use in a coupled sediment hydrodynamic FVCOM model to predict change to the ecosystem as a result of tidal power expansion
- to provide advice on possible change in sediment dynamics and hydrodynamics in the Upper Bay of Fundy as a result of tidal power expansion

2.2 Scientific Work-Plan

i) Collect observations of water column properties

a) A bottom mounted tripod was placed in the southern bite of Minas Basin. The station, A5 (45 14.3094 N, 64 15.4545 W) was chosen because there have been several current meter records from this location as part of the hydrodynamic model development for the area. The tripod was instrumented with a downward looking Nortek Aquadopp current meter capable of measuring waves at 1m above the bottom. A Digital Floc Camera (DFC) and Sequoia Laser In-Situ Size and Scattering Transmissometer (LISST 100x) were used to measure particle size. A digital Video Camera (DVC) was used to measure size versus settling velocity of particles in suspension, a conductivity, temperature and depth (CTD) sensor, an optical backscatterance sensor (OBS) to collect time series of suspended sediment concentration and a McLane water transfer system capable of collecting filters in-situ to determine suspended mass.

b) Two bottom mounted upward looking RDI Acoustic Doppler Current Profilers (ADCP's) were placed at two separate locations in Minas Basin to accurately measure ocean currents. The first was located at the A5 Tripod location listed (45 14.3697 N, 64 15.4818 W) and the second near the middle of Minas Basin (45

19.0682 N, 64 01.2519 W). Both ADCP's were deployed for the duration of the 8 days Hudson cruise.

c) Tidal cycle observations of water column properties were under taken at night, over 9, anchor stations at 5 different locations which started at 7pm and were completed by 8am the next morning. Nutrients, chlorophyll (CHLA), dissolved oxygen (DO), salinity, suspended particulate matter (SPM) and carbon dioxide (CO2) samples were collected from Niskin bottles attached to a CTD rosette from set depths. Depths were near bottom (within 1-2 m), 15, 5 and 1 meter below the surface. The CTD was deployed approximately every hour over the 13 hour sampling period. A Digital Floc Camera (DFC), Laser In-Situ Size Scattering Transmisometer (LISST) and Benthic Organic Bottom sampler (BOB) were also deployed as often as possible depending on the tidal current to obtain particle size and SPM. Those instruments were difficult to deploy in current velocities greater than 4 knots and were therefore sometimes not deployed at peak ebb and flood currents.

d) Surface reflectance measurements were made using a light meter buoy deployed and retrieved from Hudson. The surface reflectance measurements will be used to validate the remote sensing satellites for suspended sediment, chlorophyll, and dissolved organic matter

ii) Collect seabed samples for grain size

Bottom sediments were collected and will be analyzed for grain size in the laboratory. Seabed samples were collected using an Ekman and Van-Veen grabs from the small boat in the inshore areas (water depths < 15 meters) which includes the tidal flats and channels. Offshore bottom sediment samples were collected from Hudson using both the Video Grab and Slo-Corer. In addition to providing bottom sediment samples the Video Grab collected still and video images of the seabed to allow a broader interpretation of study sites. A baseline map of grain-size from Minas Basin and Cobequid Bay will be produced. These data will be important to determine bottom roughness, a parameter used in hydrodynamic models and will help explore relationships between fish feeding areas and bottom type. The sampling scheme was to occupy many of the same sample stations that B.F. Long et al. from NRCan did in the late 1970's to determine grain size and habitat change.

iii) Quantify erodibility of seabed sediments

Erodibility measurements of the seabed were made using the Slo-Corer and a Gust microcosm erosion chamber. The Slo-Corer uses a hydraulic damping mechanism to collect corers with undisturbed sediment water interface. The Gust chamber fits directly on top of a Slo-Core and introduces a user defined homogeneous bottom shear stress across the sediment surface. Samples of the eroded material from the cores are used to calculate erosion rates, mass eroded and critical erosion shear stress (tau C), a parameter needed to operationalize sediment transport models.

iv) Coupled Hydrodynamic-Sediment transport model

A Finite Volume Coastal Ocean Model (FVCOM) will be coupled to the sediment transport module fully parameterized based on the data collected in this study. The model will be validated using the set of baseline data collected during this study and data collected during previous current meter deployments in the area. The model will then be used to forecast future conditions of the hydrodynamics and sediment dynamics based on a pilot scale turbine farm consisting of 5 turbines and a large farm scale operation consisting of up to 200 turbines.

v) Collaborations

Collaborations, included groups from Dalhousie University (Dr. Paul Hill and Dr. Alex Hay) Acadia University (Dr. Anna Redden) and Queens University (Dr. Ryan Mulligan).

The Dalhousie University group studied ice melt rates by deploying large neutrally buoyant sediment laden ice blocks (~350lbs) and by tracking and documenting the melting process and sediment plume.

The Acadia University group collected grab samples from the Video Grab for benthic analysis and collected samples from night time vertical net tows to determine phytoplankton and zooplankton assemblages and abundance.

The Queens University group was interested in ADCP data collected from the moorings to help validate their Delft3D hydrodynamic and sediment model that they have running for the area.

Several students from each of the above listed universities participated in the mission and provided technical support while gaining at sea experience.

3. *List of Participants*

Table. List of Participants with program leads in Bold

Name	Affiliation	Responsibility
Edward Horne	BIO Edward.Horne@dfo-mpo.gc.ca	Senior Scientist, Science Program Coordination/ Logistics
Brent Law	BIO Brent.law@dfo-mpo.gc.ca	Co-Lead Scientist Small vessel operations / Coordination / Logistics
Gary Bugden	BIO	Emeritus Physical Scientist Small Vessel Operations
Anna Redden	Acadia	Biological Sampling
Jay Barthelotte	BIO	Mooring Specialist / Technical Operations
Richard Cheel	Dalhousie University	Ice Project Lead
Kelly Bentham	BIO	Video Grab / Camera Operations
Shawn Roach	BIO	Senior Tech
Robert Benjamin	BIO	Data Management Lead
Kirk Phalen	BIO	Electronics Tech
Pierre Clement	BIO	Night Data Management / CTD Operations
Yongsheng Wu	BIO	Winchroom Sampling
Vanessa Zions	BIO	Core collection and GUST Lead
Rachel Cox	Dalhousie University	GUST Tech
David Allen	Dalhousie University	Ice Tech
Laura DeGelleke	Dalhouise University	Ice Tech
Freya Keyser	Acadia University	Benthic Sample Processing
Kaycee Morison	Acadia University	Benthic Sample Processing
Casey O'Laughlin	BIO	Winchroom Sampling
Adam Drozdowski	BIO	Winchroom Sampling / CTD Lead
Alex Hurley	Queens University	Winchroom Sampling
Logan Ashall	Dalhousie University	Winchroom Sampling
Jing Tao	Dalhousie University	Water Sample Filtering
Diksha Bista	Dalhousie University	Water Sample Filtering

4. Cruise Summary

Overall

i) CCGS Hudson

Three Hundred and twelve deployments from a combination of Moorings, Video Grab, Slo-Corer, CTD rosette, Camera/LISST 100x package, BOB and vertical plankton net tows. Locations included 1 test CTD with rosette and 1 test DFC/LISST package in the Bedford Basin prior to departure. Two CTD's with rosette at the Atlantic Zonal Monitoring Program (AZMP), Halifax Line, Station 2 (outgoing and incoming). There were also 2 vertical net tows at Station 2 following AZMP protocols both outgoing and on return. The remaining Video Grabs and Slo-Cores were completed during the day and CTD Rosette casts, BOB, Camera/LISST and vertical net tows were completed while the ship was at anchor at night, all in the Minas Basin area. The exact breakdown of deployments were as follows: 3 Moorings, 101 Video Grabs, 15 Slo-cores, 70 CTD's, 42 BOB, 44 DFC/LISST 100x, 20 net tows, 12 ice-block, 5 optics buoy.

ii) Small Vessel Packcat

One hundred and eight deployments with a combination of Ekman and VanVeen grabs, Pole Cores, and mini Slo-Cores in the Minas Basin area. The breakdown of the deployments was as follows: 90 grab samples and 18 mini Slo-cores from both the mini Slo-corer and pole-corer.

Day by Day Summary (all times in GMT)

Day 1 (June 4th)

All scientific staff was on board CCGS Hudson prior to 11:00. Before departing for gear testing in the Bedford an orientation walk through, a life boat drill and fire drill was performed. Hudson left the dock at BIO around 16:00 with a CTD and DFC/LISST test in the deepest part of the Bedford Basin between 17:00 and 18:30. CCGS steamed out of Halifax Harbour on route to the Minas Basin area at 19:00. Hudson stopped on station at AZMP Halifax line, Station 2 (44 16.058N, 63 10.124W) at 22:50 and performed a CTD and two vertical net tows.

Day 2 (June 5th)

Most of the day was spent steaming to the Minas Basin. Preparation of moorings and other gear for deployment continued. Hudson arrived at Anchor Station 5 (ANC5, 45 11.3450N 65 04.9412W) at 23:30. Sampling started using CTD rosette, BOB, DFC/LISST and net tows.

Day 3 (June 6th)

ANC5 sampling was stopped at 07:00.

Hudson sailed through the Minas Passage and into Minas Basin to begin the deployment of the three moorings in the southern bite. The first bottom mounted ADCP mooring was deployed at 45 14.3697N and 64 15.4818W.

The Tripod was deployed next at 45 14.3094N and 64. 4544W.

The optics buoy was released at 12:40 at the same location as the tripod deployment.

Hudson then sailed to outer Minas Basin (45 19.0682N, 64 01.2513W) to deploy the third bottom mounted ADCP SUBS package.

At 14:00 the small vessel Packcat was deployed. During the day until 20:00, Packcatcollected 20 grab samples and 4 mini cores using the pole-corer.

From approximately 14:30 to 20:30 Hudson occupied 10 stations with Video grab to obtain bottom grab samples, video and still images of the bottom.

At 21:00 the optics buoy was retrieved.

At 22:10 Hudson was at anchor at station ANC3 (45 15.328N, 64 15.903W). At anchor CTD's, DFC/LISST, BOB and net tows were performed at regular intervals.

Day 4 (June 7th)

ANC3 nightly sampling was completed at 08:30.

At 10:30 the first set of three sediment laden ice blocks were deployed (45 20.698N, 64 24.276W).

The optics buoy was deployed at 10:55.

From 11:00 to 20:00, 12 Video Grabs were performed.

The Packcat was deployed at 12:00 and from 13:00 to 20:00, 12 Grab samples and 5 mini slo-cores were collected.

The optics buoy was recovered at 22:15

At 22:00 Hudson was at anchor to begin nightly anchor station sampling at ANC1 (45 19.7073N, 64 12.7987W).

Day 5 (June 8th)

ANC1 sampling was completed at 08:30.

Video grab sampling occupied most of the day on Hudson from 10:00 to 20:30, 14 Video Grab stations were occupied throughout Minas Basin.

Hudson was back on anchor at station ANC3 (45 14.7023N, 64 15.7008W) at 21:30.

Day 6 (June 9th)

ANC3 sampling completed at 08:30.

At 10:45 the Video grab was deployed at the FORCE site (45 21.7899N, 64 25.9444W) and 4 grabs were attempted over the area, which included video and still imagery.

At 12:10 the optics buoy was deployed.

The Dalhousie University group deployed the second set of three ice blocks (45 20.7570N, 64 24.8765W).

The Packcat was deployed from Hudson at 13:00 and between 14:00 and 20:00, 9 mini slo-cores and 9 grabs were collected.

Video grab was deployed from 16:00 to 20:00 at 6 different stations

Hudson went to anchor at 22:00 to start sampling at station ANC4 (45 20.4153N, 63 47.7033W).

Day 7 (June 10th)

ANC4 sampling completed at 08:25.

Video Grab sampling commenced at 09:30 and ran until 19:30. A total of 17 stations were occupied.

Packcat was deployed from 13:00 to 20:00 and occupied 13 grab stations.

Hudson went to anchor at 20:30 and sampling at ANC2 (45 19.0675N, 64 00.7807W) started at 21:27.

Day 8 (June 11th)

ANC2 was completed at 08:40.

At 09:44 the optics buoy was deployed.

At 10:10 the 3rd set of sediment laden ice blocks were deployed at tracked.

The Packcat was deployed at 11:00. A total of 36 grabs were collected over the day until Packcat was retrieved by Hudson at 20:30.

Video grab was deployed between 11:30 and 19:00. A series of 13 stations were occupied which included the FORCE site between 13:25 and 14:00.

The optics buoy was retrieved at 20:15

Hudson went to anchor at Station ANC4 (45 20.5253N 63 47.2893W) at 21:40.

Day 9 (June 12th)

Anchor Station ANC4 was completed at 08:30.

Between 12:00 and 14:00, 8 Slo-cores were attempted.

From 15:30 to 17:30, 5 Video Grab Stations were occupied.

From 18:50 to 20:30, 6 more Slo-cores were attempted.

Hudson went to anchor at 21:15 at station ANC1 (45 19.6930N, 64 12.9248W).

Day 10 (June 13th)

Sampling at ANC1 was completed at 08:05.

At 10:00 the last set of three ice blocks, set 4, were deployed at ANC1 (45 19.6930N, 64 12.9248W)

A slo-core was also attempted at ANC4 at 10:15.

The optics buoy was deployed at 12:20.

At 12:45 the recovery of the Tripod occurred.

The mooring near the tripod site was brought on deck at 13:40.

The optics buoy was recovered at 13:50.

Hudson picked up the subs package mooring in outer Minas Basin at 16:15.

3 Video grab stations were occupied between 16:50 and 20:30.

Hudson went to anchor at station SC4 (45 14.6603N, 64 47.9611W) at 21:40.

Day 11 (June 14th)

Anchor station sampling at SC4 was completed at 08:30.

Optics buoy was deployed at 09:05.

17 Video grab stations were occupied between 11:00 and 19:00.

The optics buoy was retrieved at 19:30.

All sampling completed at 20:00. Hudson set sail for BIO.

20:30, BBQ for all on after deck of Hudson.

Day 12 (June 15th)

Steam to BIO.

Day 13 (June 16th)

08:00 to 09:30, AZMP sampling at Halifax line, Station 2 (CTD and net tows).

12:30, arrive at BIO,

At Sea Data Management

(From P. Clement, R. Benjamin)

The mission involved a variety of sampling protocols that were essentially divided into day /night shifts aboard the Hudson and small boat collections. The small boat (PakCat and FRC positions and deployment information was captured by the collectors and incorporated into the general mission database.

All serially available navigation data including GPS, Gyro, Trackpoint, sounding, wave height, etc. were captured and archived using NavNet. A trackpoint USBL system was used to more accurately position the Videograb.

The vessel kept a Bridge log of activities and recorded the type time and data of anything that went over the side. Both hardcopy and digital logbooks were used to track activities done on the Hudson during each the day and night shifts.

Each deployment was identified as a Consecutive Operation Number (CON) and the small boats tracked their own while the Hudson sampling was coordinated through the Bridge and verified using the Bridge log.

The digital logbook (CAROL) was setup in the forward lab and the winch room and used to track operation types, deployment, on bottom, off bottom and on deck times. All times were GMT. The program is connected to the ship's NavNet navigation system using the virtual serial port app.

An Access 2010 database for mission management was used to process the Carol files to integrate the corrected location information and generate reports.

A data manager was responsible for each the day and night shifts and processed all the logbook information at the end of each shift. The Trackpoint data for corrected 'fish' position was cleaned using Robert Benjamin's NavProcessing program.

All the data were backed-up and a shared drive created for the mission lead on an internal DFO shared server. The CTD data were processed using CTDDap and forwarded to ISDM for incorporation into the Climate database.

Dalhousie University (Narrative)

(From R. Cheel, L. DeGellke)

During the Hudson2013-013 cruise, researchers from Dalhousie University deployed twelve sediment-laden ice blocks in Minas Basin to assess melt rates and observe drift. This work is part of a larger project aiming to survey the occurrence of sediment-laden and occasionally negatively buoyant ice blocks forming in tidal river estuaries of the upper Bay of Fundy. Melt rate and transport are of concern for assessing risk of collision with bottom-mounted tidal turbines.

The sediment-laden ice blocks were rectangular and approximately 1 x 0.4 x 0.25 m in size. The ice blocks were free of air bubbles and each contained enough Bay of Fundy mud to make the ice blocks slightly more dense than seawater. On average, each ice block weighed 135-140 kg and contained about 27 kg of dried mud. The ice blocks were contained within netting just below the surface and instrumented with GPS loggers, PT sensors (above and below), and an HD video camera.

The sediment-laden ice blocks were deployed in sets of three on June 7, 9, 11, and 13. The location and timing within the tidal cycle of each deployment was varied. On June 7 and 9, the ice blocks were deployed in the Minas Passage near or immediately after low water. On June 11 the ice blocks were deployed in Cobequid Bay on the ebb, and on June 13 the blocks were deployed in the middle of the basin on the flood.

During the deployments, the FRC was used to monitor each ice block drifter. A frame instrumented with another HD video camera and scaling lasers was lowered next to each ice block periodically during the melt. Melt rate will be estimated based on recorded changes in ice block size.

It was found that the ice blocks melted in approximately 1 to 1.5 hours. Similar ice blocks melted in a laboratory setting in approximately 6-8 hours, which corresponded extremely well with model results where free-convection was the only ablation mechanism considered. This indicates ablation mechanisms other than free-convection have a considerable effect and laboratory and model results represent an upper-limit on melt rate.

Acadia University (Narrative)

(From A. Redden)

Dr Anna Redden (marine ecologist) and two of her MSc students (Kaycee Morrison and Freya Keyser) from Acadia University contributed to the video-grab surveys in Minas Basin / Minas Passage / Minas Channel. The main focus of our work was a survey of the macrofauna associated with grabs at 21 slow core (SC-series) stations. Records were taken of the sediment volume in each grab. Of the total volume collected, up to 10 L was sieved on deck (1 cm, 1 mm, 0.5 cm) and the 2 smallest fractions stored in 4% formalin for later examination and ID of infauna at Acadia University. Visible, large macrofauna (seastars, polychaetes, sponges, anemones, etc.) were recorded and subsamples stored separately in formalin or ethanol. The data on fauna and sediment grain size will be coupled with information gleaned from the videos of the bottom and sediment characteristics from the sediment samples taken from all grabs (SC and G series). Collectively, the data will be used to create a habitat map that is of relevance to the lobster fishery in the region (LFA 35). Habitat characteristics will help inform the current lobster movement and migration project (tracking via acoustic tags) underway in the Minas Basin and the FORCE site in Minas Passage (MSc project, Kaycee Morrison, Acadia University). Bottom video surveys conducted at the high flow sites in Minas Passage (FORCE stations) were informative of the hard rock conditions in this difficult to sample location (i.e. attempts to collect grab samples were not successful).

In addition, vertical hauls of zooplankton (>200 micron) were collected during low and high tide periods while moored during the night at various stations in Minas Basin. These samples were fixed in 3% formalin and are stored at Acadia University. The samples will be analyzed (enumerated, ID, density determined based on flow meter data) and compared to CTD data for examination of the effects of the tidal regime on the distribution of zooplankton in Minas Basin. Also collected was one phytoplankton sample in Minas Channel (250 ml, fixed with Lugols) for later examination of phytoplankton taxa and relative abundance

Appendix A.

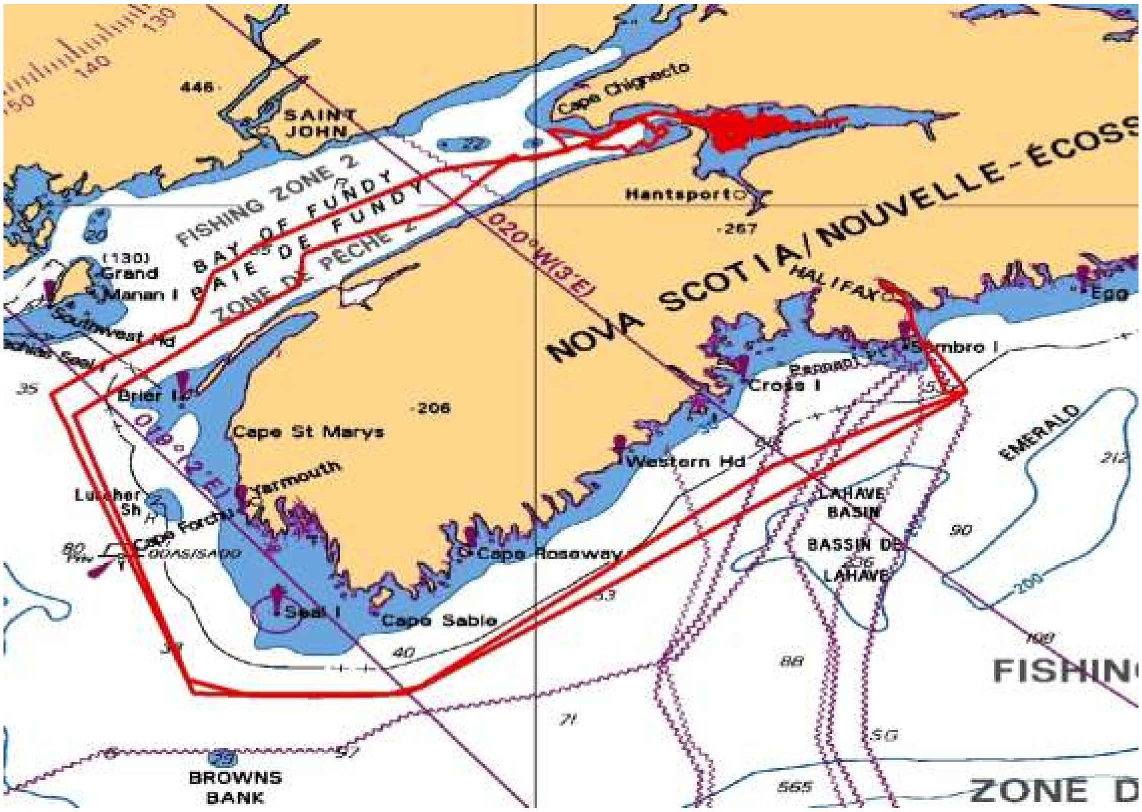

Figure 1. A plot of the cruise track of CCGS Hudson over the 13 day Cruise 2013-013 to the Minas Basin area in support of tidal power development.

Table 1. A list of all Video Grab Stations occupied from Hudson during cruise 2013-013. A successful bottom sediment sample in the grab is denoted with a Y.

Con #	Station	Operation	Date	Lat	Lon	Grab Y or N	Depth
25	SC-21	Video Grab	06-Jun-13	45.3177	-63.9980	Y	28.2
26	SC-20	Video Grab	06-Jun-13	45.2905	-64.0414	Y	22.1
27	G-367	Video Grab	06-Jun-13	45.3117	-64.0475	Y	28.4
28	G-164	Video Grab	06-Jun-13	45.3125	-64.0718	N	30.2
29	G-349	Video Grab	06-Jun-13	45.3126	-64.0887	N	22.9
30	G-154	Video Grab	06-Jun-13	45.3113	-64.0978	Y	20.5
31	G-377	Video Grab	06-Jun-13	45.3119	-64.1233	N	17.8
32	G-377	Video Grab	06-Jun-13	45.3118	-64.1293	N	17.8
33	G-377	Video Grab	06-Jun-13	45.3127	-64.1323	N	18.7
62	SC-10	Video Grab	07-Jun-13	45.2979	-64.2658	Y	39.6
63	SC-10	Video Grab	07-Jun-13	45.2983	-64.2664	N	41.4
64	G-371	Video Grab	07-Jun-13	45.2913	-64.2744	N	33.6
65	G-385	Video Grab	07-Jun-13	45.3098	-64.3266	N	47.1
66	G-385	Video Grab	07-Jun-13	45.3090	-64.3246	N	48.5
67	G-391	Video Grab	07-Jun-13	45.3273	-64.3795	Y	67.2
68	G-392	Video Grab	07-Jun-13	45.3281	-64.4070	N	37.1
69	SC-11	Video Grab	07-Jun-13	45.2554	-64.2678	N	26.7
70	SC-11	Video Grab	07-Jun-13	45.2549	-64.2676	Y	25.6
71	G-56	Video Grab	07-Jun-13	45.2563	-64.2750	N	22.6
72	G-56	Video Grab	07-Jun-13	45.2586	-64.2777	Y	22.1
73	G-49	Video Grab	07-Jun-13	45.2560	-64.3000	Y	18.1
99	SC-18	Video Grab	08-Jun-13	45.3108	-64.1104	Y	17.8
100	G-377	Video Grab	08-Jun-13	45.3113	-64.1195	N	19.1
101	G-366	Video Grab	08-Jun-13	45.3216	-64.1276	Y	25.6
102	G-363	Video Grab	08-Jun-13	45.3319	-64.1257	Y	18.6
103	G-364	Video Grab	08-Jun-13	45.3323	-64.0989	Y	19.9
105	SC-15	Video Grab	08-Jun-13	45.3038	-64.1821	Y	30
106	G-133	Video Grab	08-Jun-13	45.2938	-64.1472	Y	24.4
107	G-144	Video Grab	08-Jun-13	45.2939	-64.1219	Y	23.8
108	G-153	Video Grab	08-Jun-13	45.2931	-64.0953	Y	22.6
109	SC-9	Video Grab	08-Jun-13	45.3411	-64.2686	Y	50.8
110	G-390	Video Grab	08-Jun-13	45.3111	-64.2769	N	41.4
111	G-396	Video Grab	08-Jun-13	45.3128	-64.3003	N	51.6
112	G-397	Video Grab	08-Jun-13	45.2930	-64.3014	Y	36.2
138	F-5	Video Grab	09-Jun-13	45.3633	-64.4331	N	9.4
139	F-5	Video Grab	09-Jun-13	45.3621	-64.4313	N	28.6

140	F-6	Video Grab	09-Jun-13	45.3660	-64.4348	N	50
141	F-6	Video Grab	09-Jun-13	45.3660	-64.4348	N	51
146	SC-8	Video Grab	09-Jun-13	45.3423	-64.3373	N	84
147	G-352	Video Grab	09-Jun-13	45.3457	-64.3272	Y	107.8
148	G-351	Video Grab	09-Jun-13	45.3632	-64.3020	N	17.3
149	G-383	Video Grab	09-Jun-13	45.3641	-64.2776	Y	25.3
150	G-382	Video Grab	09-Jun-13	45.3643	-64.2519	Y	26.8
151	G-381	Video Grab	09-Jun-13	45.3652	-64.2254	Y	24.8
152	G-105	Video Grab	09-Jun-13	45.3645	-64.2000	Y	23.5
153	SC-16	Video Grab	09-Jun-13	45.3514	-64.1857	Y	32.3
154	G-104	Video Grab	09-Jun-13	45.3468	-64.2005	N	25.5
155	G-90	Video Grab	09-Jun-13	45.3466	-64.2270	Y	39.1
173	SC-25	Video Grab	10-Jun-13	45.3398	-63.7945	y	16.5
174	SC-24	Video Grab	10-Jun-13	45.3299	-63.8487	N	16.4
175	SC-24	Video Grab	10-Jun-13	45.3298	-63.8495	Y	19.3
176	SC-23	Video Grab	10-Jun-13	45.3145	-63.9206	Y	4.2
177	G-134	Video Grab	10-Jun-13	45.3116	-64.1477	Y	17.8
178	G-117	Video Grab	10-Jun-13	45.2753	-64.1726	Y	16.9
179	G-118	Video Grab	10-Jun-13	45.2938	-64.1720	Y	20.6
180	G-375	Video Grab	10-Jun-13	45.3111	-64.1736	Y	21.7
181	G-365	Video Grab	10-Jun-13	45.3296	-64.1725	Y	29.4
182	G-103	Video Grab	10-Jun-13	45.3119	-64.1966	Y	36
183	G-102	Video Grab	10-Jun-13	45.2930	-64.1976	Y	32
184	G-101	Video Grab	10-Jun-13	45.2749	-64.1985	Y	27.8
185	G-100	Video Grab	10-Jun-13	45.2568	-64.1984	Y	22.8
186	SC-13	Video Grab	10-Jun-13	45.2283	-64.1834	Y	14.7
187	SC-14	Video Grab	10-Jun-13	45.2590	-64.1875	Y	23.9
188	SC-17	Video Grab	10-Jun-13	45.3588	-64.1141	Y	18.8
215	SC-19	Video Grab	11-Jun-13	45.2672	-64.1175	Y	11.8
216	F-2	Video Grab	11-Jun-13	45.3606	-64.4413	N	95.3
217	F-7	Video Grab	11-Jun-13	45.3672	-64.4380	N	44.1
218	G-384	Video Grab	11-Jun-13	45.3262	-64.3235	N	60.3
219	G-89	Video Grab	11-Jun-13	45.3296	-64.2224	Y	37.8
220	G-410	Video Grab	11-Jun-13	45.3275	-64.2508	Y	24.9
221	G-88	Video Grab	11-Jun-13	45.3109	-64.2253	Y	25.6
222	G-87	Video Grab	11-Jun-13	45.2926	-64.2246	N	31.3
223	G-86	Video Grab	11-Jun-13	45.2755	-64.2246	Y	30.8
224	G-85	Video Grab	11-Jun-13	45.2561	-64.2252	Y	37
225	SC-12	Video Grab	11-Jun-13	45.2121	-64.2669	Y	17.5
226	G-48	Video Grab	11-Jun-13	45.2386	-64.3005	Y	20.2
255	G-71	Video Grab	12-Jun-13	45.2380	-64.2494	Y	15.4
256	G-55	Video Grab	12-Jun-13	45.2383	-64.2746	Y	7.3
257	G-1002	Video Grab	12-Jun-13	45.2718	-64.2860	Y	29.7

258	G-1003	Video Grab	12-Jun-13	45.2784	-64.2465	Y	28.1
259	G-1005	Video Grab	12-Jun-13	45.2610	-64.2394	Y	23.6
293	SC-22	Video Grab	13-Jun-13	45.3503	-64.0421	Y	11.5
294	G-358	Video Grab	13-Jun-13	45.3425	-64.6073	Y	48.6
295	SC-4	Video Grab	13-Jun-13	45.2463	-64.7936	Y	49
314	SC-5	Video Grab	14-Jun-13	45.2327	-64.6613	Y	41.4
315	G-3	Video Grab	14-Jun-13	45.2156	-64.6308	Y	31.7
316	G-5	Video Grab	14-Jun-13	45.2336	-64.6047	Y	41.6
317	G-6	Video Grab	14-Jun-13	45.2520	-64.5797	Y	36
318	G-7	Video Grab	14-Jun-13	45.2347	-64.5540	Y	27.3
319	G-8	Video Grab	14-Jun-13	45.2537	-64.5291	Y	28
320	SC-7	Video Grab	14-Jun-13	45.2697	-64.5233	Y	28.4
321	G-10	Video Grab	14-Jun-13	45.2714	-64.5061	Y	26.1
322	G-12	Video Grab	14-Jun-13	45.2902	-64.4822	Y	23.5
323	G-11	Video Grab	14-Jun-13	45.3091	-64.5033	Y	24
324	G-9	Video Grab	14-Jun-13	45.2902	-64.5323	Y	25.9
325	G-360	Video Grab	14-Jun-13	45.3069	-64.5559	Y	18.4
326	G-359	Video Grab	14-Jun-13	45.3232	-64.5808	Y	80.5
327	G-4	Video Grab	14-Jun-13	45.3244	-64.6327	Y	55
328	G-355	Video Grab	14-Jun-13	45.3233	-64.6854	N	35.1
329	SC-6	Video Grab	14-Jun-13	45.3078	-64.6780	N	50.5
330	SC-2	Video Grab	14-Jun-13	45.2946	-64.9440	Y	48.2

Table 2. A list of all bottom sediment grab samples collected from the small vessel Packcat which was deployed from Hudson during cruise 2013-013.

Con #	Station	Operation	Date	Lat	Lon	Depth
P1	Kg6	Ekman Grab	06-Jun-13	45.1536	-64.3709	4.3
P2	Kg12	Ekman Grab	06-Jun-13	45.1541	-64.3695	4.1
P3	Kg19	Ekman Grab	06-Jun-13	45.1536	-64.3658	5.3
P4	Kg13	Ekman Grab	06-Jun-13	45.1528	-64.3686	5.4
P5	Kg7	Ekman Grab	06-Jun-13	45.1518	-64.3706	5
P6	Kg1	Ekman Grab	06-Jun-13	45.1518	-64.3739	4.2
P7	Kg2	Ekman Grab	06-Jun-13	45.1502	-64.3735	5.6
P8	Kg8	Ekman Grab	06-Jun-13	45.1497	-64.3705	6.2
P9	Kg14	Ekman Grab	06-Jun-13	45.1509	-64.3677	6.6
P10	Kg20	Ekman Grab	06-Jun-13	45.1518	-64.3648	5.8
P11	Kg24	Ekman Grab	06-Jun-13	45.1546	-64.3618	4.6
P12	Kg28	Ekman Grab	06-Jun-13	45.1553	-64.3597	5.3
P13	Kg29	Ekman Grab	06-Jun-13	45.1532	-64.3554	8.5
P14	Kg25	Ekman Grab	06-Jun-13	45.1524	-64.3610	6.2
P19	Kg3	Ekman Grab	06-Jun-13	45.1484	-64.3724	2.7
P20	Kg4	Ekman Grab	06-Jun-13	45.1470	-64.3727	4.9
P21	Kg5	Ekman Grab	06-Jun-13	45.1457	-64.3719	1.9
P22	Kg11	Ekman Grab	06-Jun-13	45.1450	-64.3693	5.3
P23	Kg10	Ekman Grab	06-Jun-13	45.1465	-64.3691	1.7
P24	Kg17	Ekman Grab	06-Jun-13	45.1456	-64.3645	3.1
P25	Kg18	Ekman Grab	06-Jun-13	45.1452	-64.3640	3.8
P26	Kg27	Ekman Grab	06-Jun-13	45.1484	-64.3587	3.3
P27	G129	Ekman Grab	07-Jun-13	45.0331	-64.1431	8.5
P28	G137	Ekman Grab	07-Jun-13	45.0326	-64.1309	8
P29	G138	Ekman Grab	07-Jun-13	45.0418	-64.1304	6.7
P30	G139	Ekman Grab	07-Jun-13	45.0508	-64.1304	8.1
P31	G130	Ekman Grab	07-Jun-13	45.0425	-64.1427	7.8
P32	G122(a)	Ekman Grab	07-Jun-13	45.0523	-64.1514	13.1
P33	G122(b)	Ekman Grab	07-Jun-13	45.0514	-64.1413	11.8
P34	G131	Ekman Grab	07-Jun-13	45.0599	-64.1434	8.1
P35	G123	Ekman Grab	07-Jun-13	45.0597	-64.1556	11.9
P36	G112	Ekman Grab	07-Jun-13	45.0599	-64.1661	9.8
P37	G113	Ekman Grab	07-Jun-13	45.0693	-64.1686	17.1
P38	G124	Ekman Grab	07-Jun-13	45.0688	-64.1561	8.9
P52	Kg22	Ekman Grab	09-Jun-13	45.1478	-64.3617	9.1
P53	Kg23	Ekman Grab	09-Jun-13	45.1463	-64.3602	11.1
P55	Kg21	Ekman Grab	09-Jun-13	45.1498	-64.3636	8.2
P56	Kg15	Ekman Grab	09-Jun-13	45.1487	-64.3663	7.8
P57	KG9	Ekman Grab	09-Jun-13	45.1479	-64.3701	7.7

P58	G111	Ekman Grab	09-Jun-13	45.3923	-64.1893	8.8
P59	G441	Ekman Grab	09-Jun-13	45.4020	-64.1242	3
P60	G440	Ekman Grab	09-Jun-13	45.4022	-64.1009	3.8
P61	G160	Ekman Grab	09-Jun-13	45.3932	-64.0878	7.1
P64	G31	Van-Veen Grab	10-Jun-13	45.2304	-64.3396	15.5
P65	G23	Van-Veen Grab	10-Jun-13	45.2193	-64.3501	11.3
P66	G17	Van-Veen Grab	10-Jun-13	45.2109	-64.3624	6.2
P67	G13	Van-Veen Grab	10-Jun-13	45.2012	-64.3740	3.8
P68	G22	Van-Veen Grab	10-Jun-13	45.2016	-64.3497	8.7
P69	G30	Van-Veen Grab	10-Jun-13	45.2110	-64.3370	11.6
P70	G53	Van-Veen Grab	10-Jun-13	45.2016	-64.3246	15.2
P71	G46	Van-Veen Grab	10-Jun-13	45.2024	-64.2981	17.3
P72	G52	Van-Veen Grab	10-Jun-13	45.2027	-64.2733	17.3
P73	G69	Van-Veen Grab	10-Jun-13	45.2025	-64.2482	15.3
P74	G82	Van-Veen Grab	10-Jun-13	45.2027	-64.2227	16.6
P75	G841	Van-Veen Grab	11-Jun-13	45.2393	-64.2224	14.2
P76	G839	Van-Veen Grab	11-Jun-13	45.2207	-64.2223	10.3
P77	G96	Van-Veen Grab	11-Jun-13	45.1938	-64.2091	6.8
P78	G95	Van-Veen Grab	11-Jun-13	45.1761	-64.2085	10.9
P79	G432	Van-Veen Grab	11-Jun-13	45.1583	-64.2085	14.5
P80	G81	Van-Veen Grab	11-Jun-13	45.1304	-64.2208	6
P81	G80	Van-Veen Grab	11-Jun-13	45.1223	-64.2201	9.9
P82	G73	Van-Veen Grab	11-Jun-13	45.1217	-64.2330	4.6
P83	G74	Van-Veen Grab	11-Jun-13	45.1299	-64.2345	10.4
P84	G75	Van-Veen Grab	11-Jun-13	45.1398	-64.2333	10.1
P85	G433	Van-Veen Grab	11-Jun-13	45.1463	-64.2348	11
P86	G66	Van-Veen Grab	11-Jun-13	45.1490	-64.2469	5.8
P87	G60	Van-Veen Grab	11-Jun-13	45.1487	-64.2586	2.5
P88	G61	Van-Veen Grab	11-Jun-13	45.1574	-64.2592	5.4
P89	G436	Van-Veen Grab	11-Jun-13	45.1662	-64.2718	6.7
P90	G50	Van-Veen Grab	11-Jun-13	45.1660	-64.2853	6.6
P91	G44	Van-Veen Grab	11-Jun-13	45.1659	-64.2983	8.9
P92	G34	Van-Veen Grab	11-Jun-13	45.1655	-64.3243	12
P93	G20	Van-Veen Grab	11-Jun-13	45.1653	-64.3483	4.6
P94	G313	Van-Veen Grab	11-Jun-13	45.3347	-63.5100	10.8
P95	G311	Van-Veen Grab	11-Jun-13	45.3433	-63.5230	7.4
P96	G304	Van-Veen Grab	11-Jun-13	45.3433	-63.5480	7.3
P97	G294	Van-Veen Grab	11-Jun-13	45.3433	-63.5741	9.6
P98	G281	Van-Veen Grab	11-Jun-13	45.3429	-63.5999	10.2
P99	G270	Van-Veen Grab	11-Jun-13	45.3427	-63.6261	13.2
P100	G260	Van-Veen Grab	11-Jun-13	45.3426	-63.6513	14.3
P101	G253	Van-Veen Grab	11-Jun-13	45.3431	-63.6760	13.1
P102	G249	Van-Veen Grab	11-Jun-13	45.3426	-63.7026	22.4

P103	G241	Van-Veen Grab	11-Jun-13	45.3149	-63.7383	7.2
P104	G241	Van-Veen Grab	11-Jun-13	45.3149	-63.7383	7.2
P105	G242	Van-Veen Grab	11-Jun-13	45.3336	-63.7415	14.5
P106	G243	Van-Veen Grab	11-Jun-13	45.3516	-63.7439	26.3
P107	G240	Van-Veen Grab	11-Jun-13	45.3789	-63.7559	13.2
P108	G414	Van-Veen Grab	11-Jun-13	45.3960	-63.7552	7.6
P109	G414(2)	Van-Veen Grab	11-Jun-13	45.3960	-63.7560	7.1
P110	G218	Van-Veen Grab	11-Jun-13	45.3773	-63.8569	8.4

Table 3. A list of all core station occupied during cruise 2013-013. Slo-cores were collected from the Hudson and mini Slo-cores and Pole-cores were collected from the small vessel Packcat. A successful collection of a core is denoted with a Y.

Con #	Station #	Operation	Date	Lat	Lon	Core (Y or N)	Depth
246	G103	Slo-Core	12-Jun-13	45.3111	-64.2005	N	17.8
247	G103	Slo-Core	12-Jun-13	45.3109	-64.1999	N	17.7
248	G103	Slo-Core	12-Jun-13	45.3113	-64.1999	N	17.6
249	G100	Slo-Core	12-Jun-13	45.2574	-64.1978	N	12.2
250	G100	Slo-Core	12-Jun-13	45.2596	-64.1951	Y	13.2
251	G100	Slo-Core	12-Jun-13	45.2599	-64.1985	N	13.3
252	sc14	Slo-Core	12-Jun-13	45.2586	-64.1875	N	13
253	sc14	Slo-Core	12-Jun-13	45.2588	-64.1870	N	13.2
254	sc14	Slo-Core	12-Jun-13	45.2600	-64.1863	N	14.3
260	sc12	Slo-Core	12-Jun-13	45.2398	-64.2769	N	20.6
261	sc12	Slo-Core	12-Jun-13	45.2398	-64.2769	N	20.6
262	g49	Slo-Core	12-Jun-13	45.2556	-64.2998	Y	25.3
263	g49	Slo-Core	12-Jun-13	45.2555	-64.3009	N	25.4
264	g49	Slo-Core	12-Jun-13	45.2553	-64.2992	Y	24.5
287	anc1	Slo-Core	13-Jun-13	45.3288	-64.2150	N	35.6
P15	MC1(1)	Pole Core	07-Jun-13	45.1534	-64.3697	Y	2.4
P16	MC1(2)	Pole Core	07-Jun-13	45.1536	-64.3696	Y	1.7
P17	MC1(3)	Pole Core	07-Jun-13	45.1535	-64.3693	Y	1.5
P18	MC1(4)	Pole Core	07-Jun-13	45.1535	-64.3692	Y	1.2
P39	MC4(1)	Mini Slo-Core	07-Jun-13	45.1498	-64.3626	Y	4.6
P40	MC-4(2)	Mini Slo-Core	07-Jun-13	45.1497	-64.3635	Y	3.2
P41	MC5(1)	Mini Slo-Core	07-Jun-13	45.1470	-64.3644	Y	1.3
P42	MC7(1)	Mini Slo-Core	07-Jun-13	45.1463	-64.3630	Y	2.5
P43	MC7(2)	Mini Slo-Core	07-Jun-13	45.1463	-64.3630	Y	2.1
P44	MC3(1)	Mini Slo-Core	09-Jun-13	45.1492	-64.3674	Y	3.3
P45	MC3(2)	Mini Slo-Core	09-Jun-13	45.1492	-64.3674	Y	3.9
P46	MC3(3)	Mini Slo-Core	09-Jun-13	45.1492	-64.3674	Y	4.2
P47	MC2(1)	Mini Slo-Core	09-Jun-13	45.1522	-64.3667	Y	4.6
P48	MC2(2)	Mini Slo-Core	09-Jun-13	45.1522	-64.3667	Y	4.8
P49	MC2(3)	Mini Slo-Core	09-Jun-13	45.1522	-64.3668	Y	5.2
P50	MC6(1)	Mini Slo-Core	09-Jun-13	45.1469	-64.3608	Y	9.8
P51	MC6(2)	Mini Slo-Core	09-Jun-13	45.1469	-64.3607	Y	10.1
P54	MC6(3)	Mini Slo-Core	09-Jun-13	45.1467	-64.3605	Y	10.5

Table 4. A list of all anchor stations occupied which include the AZMP Halifax Line Station 2 sampling. The operation and sampling times are also presented.

Con #	Station	Operation	Date	Lat	Lon	Depth	Hr (GMT)	Min
1	Bed Basin	CTD	04-Jun-13	44.6934	-63.6407		17	29
2	Bed Basin	Camera/LISST	04-Jun-13	44.6934	-63.6401		18	8
3	Stn 2	Camera/Lisst	04-Jun-13	44.2679	-63.3183	147	22	57
4	Stn 2	Net Tow 200	04-Jun-13	44.2679	-63.3179	145	23	15
6	Stn 2	CTD	05-Jun-13	44.2679	-63.3179		0	1
8	ANC 5	Net Tow 200	06-Jun-13	45.1891	-65.0721	70	0	8
9	ANC 5	Camera/LISST	06-Jun-13	45.1892	-65.0740	72	0	25
10	ANC 5	BOB	06-Jun-13	45.1887	-65.0765	73	0	52
11	ANC 5	CTD	06-Jun-13	45.1885	-65.0756	72	1	40
12	ANC 5	Camera/LISST	06-Jun-13	45.1882	-65.0772	74	2	34
13	ANC 5	BOB	06-Jun-13	45.1880	-65.0779	74	2	48
14	ANC 5	CTD	06-Jun-13	45.1876	-65.0788	72	3	44
15	ANC 5	Camera/LISST	06-Jun-13	45.1880	-65.0788	71	4	44
16	ANC 5	BOB	06-Jun-13	45.1883	-65.0783	70	5	1
17	ANC 5	CTD	06-Jun-13	45.1847	-65.0841	68	5	20
18	ANC 5	Camera/Lisst	06-Jun-13	45.1898	-65.0817	65	6	0
19	ANC 5	BOB	06-Jun-13	45.1891	-65.0884	64	6	15
20	ANC 5	CTD	06-Jun-13	45.1861	-65.0970	53	6	38
35	ANC 3	Net Tow 200	06-Jun-13	45.2556	-64.2650	19	22	18
36	ANC 3	BOB	06-Jun-13	45.2555	-64.2651	19.5	22	34
37	ANC 3	Camera/LISST	06-Jun-13	45.2554	-64.2652	20.1	22	52
38	ANC 3	CTD	06-Jun-13	45.2553	-64.2653	20.7	23	10
39	ANC 3	Camera/LISST	06-Jun-13	45.2552	-64.2654	22.7	23	52
40	ANC 3	BOB	07-Jun-13	45.2552	-64.2657	23.4	0	4
41	ANC 3	CTD	07-Jun-13	45.2551	-64.2658	24.4	0	24
42	ANC 3	Camera/LISST	07-Jun-13	45.2551	-64.2660	26.6	1	10
43	ANC 3	BOB	07-Jun-13	45.2550	-64.2665	27.3	1	21
43	ANC 3	BOB	07-Jun-13	45.2550	-64.2665	27.3	1	21
44	ANC 3	CTD	07-Jun-13	45.2551	-64.2665	27.9	1	38
45	ANC 3	Camera/LISST	07-Jun-13	45.2551	-64.2663	29.2	2	25
46	ANC 3	BOB	07-Jun-13	45.2552	-64.2664	29.5	2	35
47	ANC 3	Net Tow 200	07-Jun-13	45.2554	-64.2664	29.8	2	49
48	ANC 3	CTD	07-Jun-13	45.2554	-64.2664	30.1	3	6
49	ANC 3	Camera/LISST	07-Jun-13	45.2560	-64.2670	30.1	4	7
50	ANC 3	BOB	07-Jun-13	45.2560	-64.2671	30	4	17
51	ANC 3	CTD	07-Jun-13	45.2560	-64.2673	29.7	4	33

52	ANC 3	Camera/LISST	07-Jun-13					
53	ANC 3	Camera/LISST	07-Jun-13	45.2562	-64.2672	27.8	5	22
53	ANC 3	Camera/LISST	07-Jun-13	45.2562	-64.2672	27.7	5	22
54	ANC 3	BOB	07-Jun-13	45.2564	-64.2672	27.3	5	33
55	ANC 3	CTD	07-Jun-13	45.2565	-64.2672	26.6	5	49
56	ANC 3	Camera/LISST	07-Jun-13	45.2566	-64.2674	24.6	6	29
57	ANC 3	BOB	07-Jun-13	45.2566	-64.2674	24.2	6	39
58	ANC 3	CTD	07-Jun-13	45.2566	-64.2674	23.5	6	54
59	ANC 3	Camera/LISST	07-Jun-13	45.2566	-64.2673	20.9	7	56
60	ANC 3	BOB	07-Jun-13	45.2566	-64.2673	20.6	8	4
61	ANC 3	CTD	07-Jun-13	45.2566	-64.2673	20.1	8	19
79	ANC 1	Net tow 200	07-Jun-13	45.3284	-64.2134	28.6	22	3
80	ANC 1	LISST	07-Jun-13	45.3285	-64.2133	28.9	22	15
81	ANC 1	BOB	07-Jun-13	45.3286	-64.2132	29.2	22	23
82	ANC 1	CTD	07-Jun-13	45.3286	-64.2130	29.6	22	44
83	ANC 1	Camera/LISST	07-Jun-13	45.3282	-64.2114	31	23	39
84	ANC 1	BOB	07-Jun-13	45.3279	-64.2110	29.6	23	49
85	ANC 1	CTD	08-Jun-13	45.3275	-64.2102	28.9	0	8
86	ANC 1	Camera/LISST	08-Jun-13					
87	ANC 1	BOB	08-Jun-13					
88	ANC 1	CTD	08-Jun-13	45.3282	-64.2085	37.2	1	30
89	ANC 1	Camera/LISST	08-Jun-13					
90	ANC 1	CTD	08-Jun-13	45.3282	-64.2086	41.1	3	31
91	ANC 1	Camera/LISST	08-Jun-13	45.3282	-64.2091	40.8	4	30
92	ANC 1	BOB	08-Jun-13	45.3281	-64.2096	40.3	4	41
93	ANC 1	CTD	08-Jun-13	45.3282	-64.2108	40.7	4	58
94	ANC 1	Net Tow 200	08-Jun-13	45.3282	-64.2110	39.8	5	32
95	ANC 1	Camera/LISST	08-Jun-13	45.3282	-64.2112	39.2	5	45
96	ANC 1	BOB	08-Jun-13	45.3282	-64.2115	38.3	5	56
97	ANC 1	CTD	08-Jun-13	45.3282	-64.2130	36.1	6	16
98	ANC 1	CTD	08-Jun-13	45.3280	-64.2135	33.4	7	5
98	ANC 1	CTD	08-Jun-13	45.3280	-64.2135	33.4	7	5
113	ANC 3	Camera/LISST	08-Jun-13	45.2451	-64.2617	15.1	21	21
114	ANC 3	BOB	08-Jun-13	45.2451	-64.2618	15	21	31
115	ANC 3	CTD	08-Jun-13	45.2451	-64.2617	14.6	21	44
116	ANC 3	Camera/LISST	08-Jun-13	45.2447	-64.2605	13.5	22	52
117	ANC 3	BOB	08-Jun-13	45.2446	-64.2605	13.5	23	0
118	ANC 3	Net Tow 200	08-Jun-13	45.2445	-64.2606	13.7	23	14
119	ANC 3	CTD	08-Jun-13	45.2444	-64.2605	13.9	23	27
120	ANC 3	Camera/LISST	09-Jun-13	45.2439	-64.2604	15.5	0	23
121	ANC 3	BOB	09-Jun-13	45.2438	-64.2604	15.9	0	31

122	ANC 3	CTD	09-Jun-13	45.2438	-64.2604	16.6	0	48
123	ANC 3	Camera/LISST	09-Jun-13	45.2437	-64.2607	19.2	1	43
124	ANC 3	BOB	09-Jun-13	45.2437	-64.2606	19.2	1	51
125	ANC 3	CTD	09-Jun-13	45.2436	-64.2606	20.4	2	8
126	ANC 3	Camera/LISST	09-Jun-13	45.2438	-64.2613	23.8	3	26
127	ANC 3	BOB	09-Jun-13	45.2439	-64.2613	23.9	3	35
128	ANC 3	CTD	09-Jun-13	45.2438	-64.2612	24.4	3	52
129	ANC 3	Camera/LISST	09-Jun-13	45.2443	-64.2615	25.3	4	54
130	ANC 3	Net Tow 200	09-Jun-13	45.2444	-64.2614	25.3	5	4
131	ANC 3	BOB	09-Jun-13	45.2446	-64.2615	25.2	5	15
132	ANC 3	CTD	09-Jun-13	45.2445	-64.2618	25.1	5	34
133	ANC 3	Camera/LISST	09-Jun-13	45.2447	-64.2618	23.6	6	27
134	ANC 3	BOB	09-Jun-13	45.2447	-64.2618	23.1	6	37
135	ANC 3	CTD	09-Jun-13	45.2449	-64.2620	22.5	6	53
136	ANC 3	Camera/LISST	09-Jun-13					
137	ANC 3	CTD	09-Jun-13	45.2450	-64.2619	19.6	7	51
156	ANC 4	BOB	09-Jun-13	45.3403	-63.7950	12	23	43
157	ANC 4	Camera/LISST	09-Jun-13	45.3402	-63.7949	12.1	23	53
158	ANC 4	CTD	10-Jun-13	45.3400	-63.7936	12.3	0	8
159	ANC 4	Camera/LISST	10-Jun-13	45.3404	-63.7932	12	0	50
160	ANC 4	Camera/LISST	10-Jun-13	45.3406	-63.7929	11.5	1	2
161	ANC 4	BOB	10-Jun-13	45.3408	-63.7923	11.7	1	11
162	ANC 4	CTD	10-Jun-13	45.3409	-63.7920	12.6	1	29
163	ANC 4	CTD	10-Jun-13	45.3412	-63.7917	14.7	2	16
164	ANC 4	CTD	10-Jun-13	45.3412	-63.7916	17.7	3	18
165	ANC 4	CTD	10-Jun-13	45.3412	-63.7914	21.3	4	40
166	ANC 4	Camera/LISST	10-Jun-13	45.3410	-63.7916	22.1	5	40
167	ANC 4	BOB	10-Jun-13	45.3409	-63.7917	22.1	5	48
168	ANC 4	Net Tow 200	10-Jun-13	45.3408	-63.7917	22.1	6	0
169	ANC 4	CTD	10-Jun-13	45.3406	-63.7921	22.1	6	14
170	ANC 4	Camera/LISST	10-Jun-13	45.3406	-63.7930	21.1	6	59
171	ANC 4	BOB	10-Jun-13	45.3403	-63.7934	22.5	7	7
172	ANC 4	CTD	10-Jun-13	45.3402	-63.7936	22	7	23
190	ANC 2	CTD	10-Jun-13	45.3179	-64.0130	21	21	19
191	ANC 2	CTD	10-Jun-13	45.3180	-64.0130	18.3	22	26
192	ANC 2	Camera/LISST	10-Jun-13	45.3180	-64.0130	16.8	23	18
193	ANC 2	BOB	10-Jun-13	45.3180	-64.0129	16.1	23	27
194	ANC 2	CTD	10-Jun-13	45.3179	-64.0130	16.5	23	42
195	ANC 2	Camera/LISST	11-Jun-13	45.3178	-64.0111	16.8	0	39
196	ANC 2	Net Tow 200	11-Jun-13	45.3179	-64.0111	16.8	0	48
197	ANC 2	BOB	11-Jun-13	45.3179	-64.0111	17	1	0

198	ANC 2	Camera/LISST	11-Jun-13	45.3179	-64.0110	17.6	1	17
199	ANC 2	CTD	11-Jun-13	45.3179	-64.0110	17.9	1	27
200	ANC 2	BOB	11-Jun-13	45.3179	-64.0102	20.3	2	6
201	ANC 2	CTD	11-Jun-13				2	59
202	ANC 2	Camera/LISST	11-Jun-13	45.3178	-64.0099	26.3	4	11
203	ANC 2	BOB	11-Jun-13	45.3178	-64.0099	26.6	4	21
204	ANC 2	CTD	11-Jun-13	45.3177	-64.0100	27.3	4	40
205	ANC 2	Camera/LISST	11-Jun-13	45.3177	-64.0101	28.9	5	45
206	ANC 2	BOB	11-Jun-13	45.3177	-64.0102	28.9	5	54
207	ANC 2	Net Tow 200	11-Jun-13	45.3177	-64.0102	28.9	6	6
208	ANC 2	CTD	11-Jun-13	45.3175	-64.0108	28.8	6	26
209	ANC 2	Camera/LISST	11-Jun-13	45.3178	-64.0117	27.3	7	9
210	ANC 2	BOB	11-Jun-13	45.3177	-64.0120	27.4	7	21
211	ANC 2	CTD	11-Jun-13	45.3177	-64.0122	26.8	7	38
229	ANC 4	CTD	11-Jun-13	45.3421	-63.7881	15.9	21	43
230	ANC 4	CTD	11-Jun-13	45.3421	-63.7881	13.3	22	48
231	ANC 4	CTD	11-Jun-13	45.3421	-63.7881	11.4	23	45
232	ANC 4	Camera/LISST	12-Jun-13	45.3421	-63.7882	10	0	44
233	ANC 4	BOB	12-Jun-13	45.3422	-63.7881	9.9	0	55
234	ANC 4	Net Tow 200	12-Jun-13	45.3422	-63.7881	10	1	9
235	ANC 4	CTD	12-Jun-13	45.3421	-63.7879	10.4	1	27
236	ANC 4	CTD	12-Jun-13	45.3429	-63.7855	12.2	2	44
237	ANC 4	CTD	12-Jun-13	45.3428	-63.7844	15.5	3	50
238	ANC 4	CTD	12-Jun-13	45.3429	-63.7845	18.5	4	54
239	ANC 4	Camera/LISST	12-Jun-13	45.3421	-63.7841	21.9	5	57
240	ANC 4	BOB	12-Jun-13	45.3421	-63.7842	22.2	6	8
241	ANC 4	CTD	12-Jun-13	45.3421	-63.7844	22.4	6	24
242	ANC 4	Net Tow 200	12-Jun-13	45.3421	-63.7864	22.5	7	0
243	ANC 4	Camera/LISST	12-Jun-13	45.3426	-63.7869	21.6	7	10
244	ANC 4	BOB	12-Jun-13	45.3425	-63.7876	22	7	24
245	ANC 4	CTD	12-Jun-13	45.3421	-63.7879	22	7	40
265	ANC 1	Camera/LISST	12-Jun-13	45.3284	-64.2153	36.9	21	17
266	ANC 1	CTD	12-Jun-13	45.3284	-64.2153	36.2	21	32
267	ANC 1	CTD	12-Jun-13	45.3283	-64.2154	32.6	22	52
268	ANC 1	CTD	12-Jun-13	45.3284	-64.2153	30.5	23	56
269	ANC 1	Camera/LISST	13-Jun-13	45.3282	-64.2153	29.2	0	55
270	ANC 1	BOB	13-Jun-13	45.3282	-64.2153	28.9	1	4
271	ANC 1	CTD	13-Jun-13	45.3281	-64.2152	28.3	1	25
272	ANC 1	Camera/LISST	13-Jun-13	45.3276	-64.2148	25.2	2	1
273	ANC 1	Net Tow 200	13-Jun-13	45.3277	-64.2148	25.6	2	10
274	ANC 1	BOB	13-Jun-13	45.3276	-64.2144	25.9	2	22

275	ANC 1	Camera/LISST	13-Jun-13	45.3277	-64.2140	27.3	2	32
276	ANC 1	CTD	13-Jun-13	45.3280	-64.2133	29	2	48
277	ANC 1	CTD	13-Jun-13	45.3284	-64.2110	35.8	4	15
278	ANC 1	CTD	13-Jun-13	45.3285	-64.2110	38.7	5	23
279	ANC 1	CTD	13-Jun-13	45.3284	-64.2111	40.5	6	28
280	ANC 1	Camera/LISST	13-Jun-13	45.3282	-64.2113	40.2	7	20
281	ANC 1	BOB	13-Jun-13	45.3281	-64.2115	39.3	7	30
282	ANC 1	Net Tow 200	13-Jun-13	45.3279	-64.2120	38	7	45
283	ANC 1	CTD	13-Jun-13	45.3277	-64.2124	36.9	8	1
296	ANC 1	CTD	13-Jun-13	45.2443	-64.7993	48.1	21	43
297	SC 4	CTD	13-Jun-13	45.2445	-64.7994	46.1	22	53
298	SC 4	CTD	13-Jun-13	45.2445	-64.7994	44.5	23	57
299	SC 4	Camera/LISST	14-Jun-13	45.2446	-64.7993	43.9	0	45
300	SC 4	BOB	14-Jun-13	45.2445	-64.7993	43.7	0	57
301	SC 4	CTD	14-Jun-13	45.2444	-64.7992	43.4	1	15
302	SC 4	Camera/LISST	14-Jun-13	45.2444	-64.7989	43.3	1	49
303	SC 4	BOB	14-Jun-13	45.2443	-64.7985	43.2	1	59
304	SC 4	Net Tow 200	14-Jun-13			49	2	15
305	SC 4	CTD	14-Jun-13	45.2447	-64.7978	43.8	2	27
306	SC 4	CTD	14-Jun-13	45.2447	-64.7978	44	2	28
307	SC 4	CTD	14-Jun-13				3	56
308	SC 4	CTD	14-Jun-13	45.2452	-64.7948	52.6	6	12
309	SC 4	Camera/LISST	14-Jun-13	45.2451	-64.7951	59	7	38
310	SC 4	BOB	14-Jun-13	45.2450	-64.7952	53.3	7	50
311	SC 4	Net Tow 200	14-Jun-13	45.2451	-64.7951	59	8	2
312	SC 4	CTD	14-Jun-13	45.2447	-64.7962	51.2	8	21
333	Stn 2	Net Tow 200	16-Jun-13	44.2687	-63.3181	151.8	8	55
335	Stn 2	Net Tow 200	16-Jun-13	44.2687	-63.3181	151.8	8	55
336	Stn 2	CTD	16-Jun-13	44.2693	-63.3181	155.2	9	14

Table 5. A list of the sediment laden ice-block deployment sites.

Con	Operation	Date	Lat	Lon	Hr (GMT)	Min	Depth
62 ,63, 64	Ice	07-Jun-13	45.3466	-64.4099	10	32	63.9
143, 144, 145	Ice	09-Jun-13	45.3631	-64.4324	10	44	27.5
212, 213, 214	Ice	11-Jun-13	45.3178	-64.0130	10	7	19.7
284, 285, 286	Ice	13-Jun-13	45.3290	-64.2149	9	59	36.5

Table 6. A total of the number of deployments and list of each instruments used for each of the nightly anchor station occupied and includes the AZMP sampling during Hudson cruise 2013-013.

Date (June 2013)	Station	CTD	BOB	Camera/LISST	Net Tows
4	Bedford Basin	1		1	
4	HFX2	1			2
6	ANC5	4	4	4	1
6-7	ANC3	8	9	8	2
7-8	ANC1	8	4	3	2
8-9	ANC3	8	6	7	2
9-10	ANC4	7	4	5	1
10-11	ANC2	8	6	6	2
11-12	ANC4	9	3	3	2
12-13	ANC1	10	3	5	2
13-14	SC 4	8	3	3	2
16	HFX2	1			2
Totals		**70**	**42**	**44**	**20**