Cruise Report
C-259
SEA Semester: Marine Biodiversity & Conservation

Scientific Data Collected Aboard
SSV *Corwith Cramer*

San Juan, PR, USA – St. George's, Bermuda –
New York, NY, USA
20 April 2015 – 23 May 2015

Sea Education Association
Woods Hole, Massachusetts

This document should be cited as:

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To obtain unpublished data, contact the Chief Scientist or SEA data archivist:

Data Archivist
Sea Education Association
PO Box 6
Woods Hole, MA 02543
Phone: 508-540-3954
Fax: 508-457-4673
E-mail: data-archives@sea.edu
Web: www.sea.edu

Table of Contents

SEA Semester: Marine Biodiversity and Conservation Program Participants
SSV *Corwith Cramer*, Cruise C-259

Faculty (Shore and Sea)

Jason Quilter	Captain
Amy Siuda	Chief Scientist & Program Director
Tiffany Smythe	Ocean Policy
Laura Cooney	Teaching Assistant

Faculty (Shore)

Linda Amaral-Zettler (MBL)	Oceanography
Annette Govindarajan (WHOI)	Oceanography
Erik Zettler	Oceanography

Staff

Allison Taylor	Chief Mate	Matt Hirsch	1st Asst. Scientist
Ashley Meyer	Second Mate	Laura Cooney	2nd Asst. Scientist
Cassie Sleeper	Third Mate	Brittany Mauer	3rd Asst. Scientist
Ted Flemming	Engineer	Willie Scheurich	Asst. Engineer – Leg 2
Lauren Heinen	Steward		

Visitors

Robbie Smith	Visiting Scientist (BAMZ) – Leg 1
Robert Barlow	UARV Observer (Archimedes Aerospace) – Leg 1

Students

Amalia Alberini	University Pierre et Marie Curie
William Botta	University of Rhode Island
Anthony Daley	University of New Hampshire
Mareike Duffing Romero	Humboldt State University
Fredrik Eriksson	Dartmouth College
Hannah Freyer	Colorado College
Lena Goss	Whitman College
M. Caroline Graham	Grinnell College
Grayson Huston	University of California, Berkeley
Sabrina Hutchinson	Hawaii Pacific University
Margaret Keefe	Mount Holyoke College
Helena McMonagle	Wellesley College
Elizabeth Olson	Northeastern University
Ryan Plantz	Ripon College
Olivia Robson	University of Connecticut
Katarina Rolf	Carleton College
Callie Schultz	Mount Holyoke College
Sarah Stratton	Oberlin College
Elizabeth Tonkin	Colby College
Joseph Townsend	University of North Carolina, Chapel Hill

Introduction

This cruise report provides a summary of scientific activities aboard the SSV *Corwith Cramer* during cruise C-259 (20 April – 23 May 2015). The over 1600 nm, five-week cruise served as the scientific data collection portion of the *Sea Semester: Marine Biodiversity & Conservation* program with Sea Education Association (SEA). Extensive oceanographic sampling was conducted for both student research projects (Table 1) and the ongoing SEA research program. Students measured biodiversity and examined physical, chemical, biological, and environmental oceanographic characteristics in accordance with their written proposals and presented their results in a final poster session and papers (available upon request from SEA).

The brief summary of data contained in this report is not intended to represent final data interpretation and should not be excerpted or cited without written permission from SEA.

Amy NS Siuda, PhD
Chief Scientists, C-252

Table 1. Student research projects, C-259.

Title	Student Investigators
Initial Microbial Colonizers of Microplastics in the Sargasso Sea	Amalia Alberini, Lena Goss, Caroline Graham, Helena McMonagle
Investigating Dispersion Dynamics of the Caribbean Spiny Lobster *Panulirus agrus* phyllosoma	William Botta, Joseph Townsend, Ryan Plantz
Community and Population Level Biodiversity in the Sargasso Sea: A Study Investigating Biodiversity of *Sargassum*-Associated Mobile Fauna	Anthony Daley, Grayson Huston, Margaret Keefe, Callie Schultz
Eel Biodiversity and Population Connectivity in the Sargasso Sea	Mareike Duffing Romero, Olivia Robson, Katarina Rolf, Sarah Stratton
Distribution and Population Connectivity of Hydroids in the Sargasso Sea	Fredrik Eriksson, Hannah Freyer, Sabrina Hutchinson
A genetic and Morphological Analysis of Atlantic *Sargassum*	Elizabeth Olson and Elizabeth Tonkin

Data Description

This section provides a record of data collected aboard the SSV *Corwith Cramer* cruise C-259 (US State Department Cruise: F2014-092) from San Juan, PR to New York, NY, USA (Figure 1).

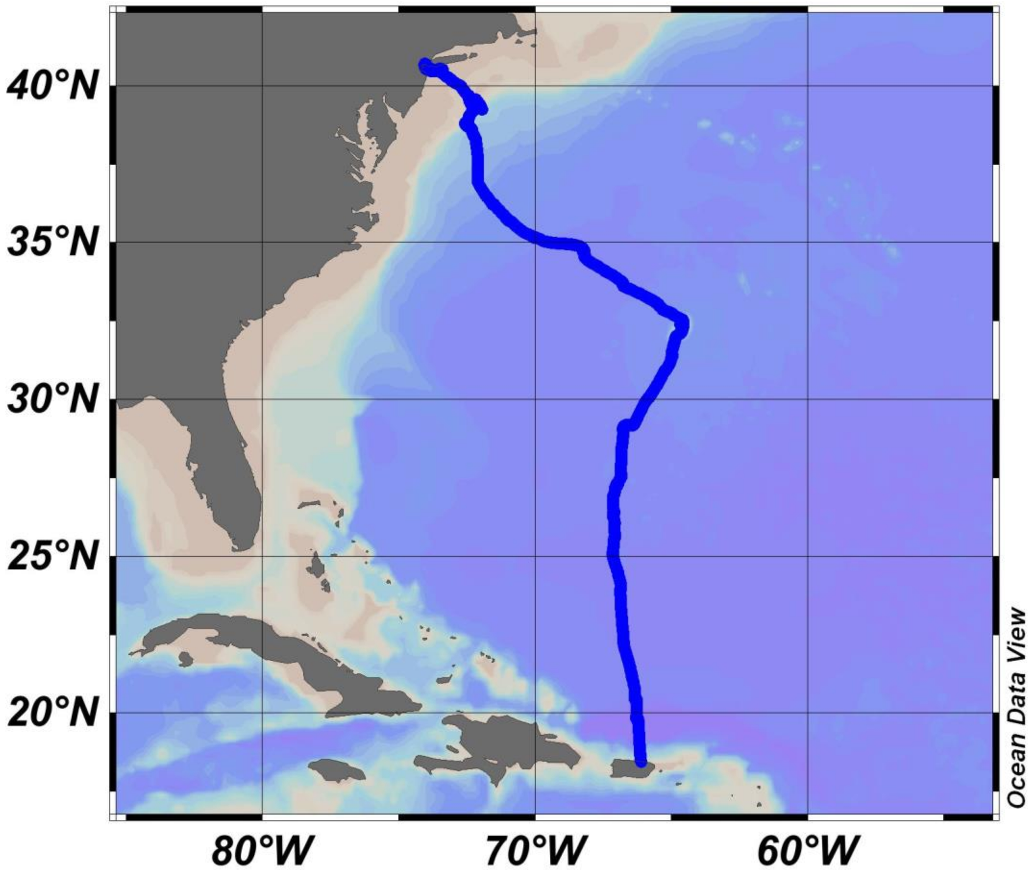

Figure 1. Hourly positions along the C-259 cruise track.

During the 5-week voyage, we sampled at 35 discrete oceanographic stations (Table 2), each with an associated surface sample for chlorophyll *a* and total inorganic phosphate (Table 3). Additionally, we continuously sampled water depth and sub-bottom profiles (CHIRP system), upper ocean currents (ADCP, Figure 2), and sea surface temperature, salinity, CDOM fluorescence, in-vivo chlorophyll fluorescence, and transmittance (seawater flow-through system, Figure 3 – temperature, salinity). Discrete CTD measurements of vertical temperature and salinity profiles were also collected from the top 500 m. Additional instrumentation on the CTDs allowed for profiling fluorescence. Detailed summaries of net tow data are included in Tables 4-5. Lengthy CTD, CHIRP, ADCP and flow-through data are not fully presented here. All unpublished data can be made available by arrangement with the SEA data archivist (contact information, p. 2).

Table 2. Oceanographic sampling stations. X indicates use of sampling equipment at a particular station. (NT = Neuston Tow, MN = Meter Net, 2MN = 2-M Net, DN = Dip Net, PN = Phytoplankton concentrate, CTD = CTD, TDR = depth and temperature recorder attached to subsurface net, Argo = Argo Float Deployment, SS = Surface Station #.

Station	Date	Time	Latitude (N)	Longitude (W)	General Locale	NT	MN	2MN	DN	CTD	TDR	SS
C259-001	22-Apr-15	1147	18°38.9'	66°08.7'	N. of Puerto Rico	X				X		001
C259-002	23-Apr-15	0014	19°48.9'	66°13.5'	Puerto Rico Trench	X	X	X			X	002
C259-003	23-Apr-15	1100	20°25.9'	66°17.3'	S. Sargasso Sea	X			18X	X		003
C259-004	24-Apr-15	0009	21°10.4'	66°27.2'	S. Sargasso Sea	X	X	X			X	004
C259-005	24-Apr-15	1033	22°07.1'	66°44.3'	S. Sargasso Sea	X			6X	X		005
C259-006	25-Apr-15	0015	22°55.0'	66°48.6'	S. Sargasso Sea	X	X	X			X	006
C259-007	25-Apr-15	1117	23°27.5'	66°50.7'	S. Sargasso Sea	X			4X	X		007
C259-008	25-Apr-15	2359	24°25.3'	66°56.9'	S. Sargasso Sea	X	X	X			X	008
C259-009	26-Apr-15	1040	25°00.3'	67°08.7'	S. Sargasso Sea	X			10X	X		009
C259-010	27-Apr-15	0016	25°51.5'	67°05.0'	S. Sargasso Sea	X	X	X			X	010
C259-011	27-Apr-15	1041	26°16.6'	67°07.7'	S. Sargasso Sea	X			5X	X		011
C259-012	28-Apr-15	0029	26°57.5'	67°06.0'	S. Sargasso Sea	X	X	X			X	012
C259-013	28-Apr-15	1036	27°14.7'	66°59.5'	S. Sargasso Sea	X			10X	X		013
C259-014	29-Apr-15	0018	27°42.4'	66°51.1'	S. Sargasso Sea	X	X	X			X	014
C259-015	29-Apr-15	1045	28°17.7'	66°49.8'	N. Sargasso Sea	X			5X	X		015
C259-016	30-Apr-15	1105	29°09.8'	66°28.2'	N. Sargasso Sea				5X			
C259-017	2-May-15	0240	30°54.6'	65°12.9'	N. Sargasso Sea	X	X	X			X	016
C259-018	2-May-15	1036	31°22.7'	64°57.4'	N. Sargasso Sea	X			10X	X		017
C259-019	11-May-15	0012	32°41.8'	64°56.7'	N. Sargasso Sea	X	X	X			X	018
C259-020	11-May-15	1036	32°55.1'	65°20.1'	N. Sargasso Sea	X			15X	X		019
C259-021	12-May-15	0018	33°11.4'	65°47.0'	N. Sargasso Sea	X	X	X			X	020
C259-022	12-May-15	0940	33°36.3'	66°45.2'	N. Sargasso Sea	X				X		021
C259-023	13-May-15	0011	34°04.7'	67°24.9'	N. Sargasso Sea	X	X	X			X	022
C259-024	13-May-15	1036	34°32.5'	68°10.9'	N. Sargasso Sea					X		

Table 2 continued.

Station	Date	Time	Latitude (N)	Longitude (W)	General Locale	NT	MN	2MN	DN	CTD	TDR	SS
C259-025	14-May-15	1033	35°10.2'	70°01.7'	N. Sargasso Sea	X			3X	X		023
C259-026	15-May-15	0013	35°41.8'	70°56.8'	N. Sargasso Sea	X	X	X				024
C259-027	15-May-15	1030	36°13.4'	71°32.5'	N. Sargasso Sea	X				X	X	025
C259-028	15-May-15	2354	37°28.4'	72°05.9'	Gulf Stream	X						026
C259-029	16-May-15	1032	38°23.3'	72°14.8'	Temperate North Atlantic	X				X		027
C259-030	17-May-15	0010	38°47.4'	72°34.3'	Temperate North Atlantic	X						028
C259-031	17-May-15	1039	38°58.0'	72°25.0'	Temperate North Atlantic	X				X		029
C259-032	18-May-15	1212	39°15.0'	71°57.6'	Hudson Canyon	X		X				030
C259-033	18-May-15	1030	39°33.4'	72°09.7'	Temperate North Atlantic	X					X	031
C259-034	18-May-15	1235	39°30.2'	72°17.1'	Temperate North Atlantic	X	X					032
C259-035	18-May-15	1737	39°27.7'	72°21.2'	Temperate North Atlantic	X						033

Table 3. Surface station data (SS-XXX). Blank = no data.

Station	Date	Time	Temp. (C)	Salinity (PSU)	Fluor. (chla)	PO4 (μM)
SS-001	22-Apr-15	1147	27.0	36.24	497.7	0.000
SS-002	23-Apr-15	0043	26.8	36.21	513.2	0.220
SS-003	23-Apr-15	1215	27.1	36.21	495.2	0.064
SS-004	24-Apr-15	0021	27.1	36.29	510.5	0.079
SS-005	24-Apr-15	1145	27.2	36.40	485.8	0.098
SS-006	25-Apr-15	0040	26.8	36.52	497.5	0.084
SS-007	25-Apr-15	1124	26.8	36.10	486.9	0.084
SS-008	26-Apr-15	0022	26.7	36.75	502.3	0.118
SS-009	26-Apr-15	1130	26.5	36.58	501.4	0.161
SS-010	27-Apr-15	0033	26.1	36.64	526.2	0.079
SS-011	27-Apr-15	1050	26.0	36.65	522.3	0.050
SS-012	28-Apr-15	0050	25.3	36.74	539.5	0.064
SS-013	28-Apr-15	1130	25.0	36.70	489.3	0.098
SS-014	29-Apr-15	0033	23.9	36.78	491.2	0.050
SS-015	29-Apr-15	1146	23.9	36.80	504.2	0.064
SS-016	2-May-15	0037	22.5	36.75	507.6	0.123
SS-017	2-May-15	1125	21.7	36.70	488.8	0.021
SS-018	11-May-15	0028	22.7	36.71	482.4	0.066
SS-019	11-May-15	1240	23.0	36.71	459.4	0.163
SS-020	12-May-15	0033	23.3	36.74	491.2	0.066
SS-021	12-May-15	1400	22.3	36.47	509.0	0.100
SS-022	13-May-15	0030	22.2	36.64	555.9	0.071
SS-023	14-May-15	1135	21.3	36.62	609.4	0.086
SS-024	15-May-15	0036	21.3	36.62	582.1	0.066
SS-025	15-May-15	1135	22.5	36.61	536.3	0.062
SS-026	16-May-15	0018	25.1	36.32	680.7	0.066
SS-027	16-May-15	1132	21.2	36.16	630.9	0.086
SS-028	17-May-15	0022	17.3	35.13	1263.3	0.167
SS-029	17-May-15	1220	15.7	34.36	1123.4	0.182
SS-030	18-May-15	0035	16.8	34.50	1271.0	0.196
SS-031	18-May-15	1100	13.9	33.33	1064.5	0.269
SS-032	18-May-15	1300	13.6	33.29	932.0	0.240
SS-033	18-May-15	1733	14.2	33.32	1288.5	0.244

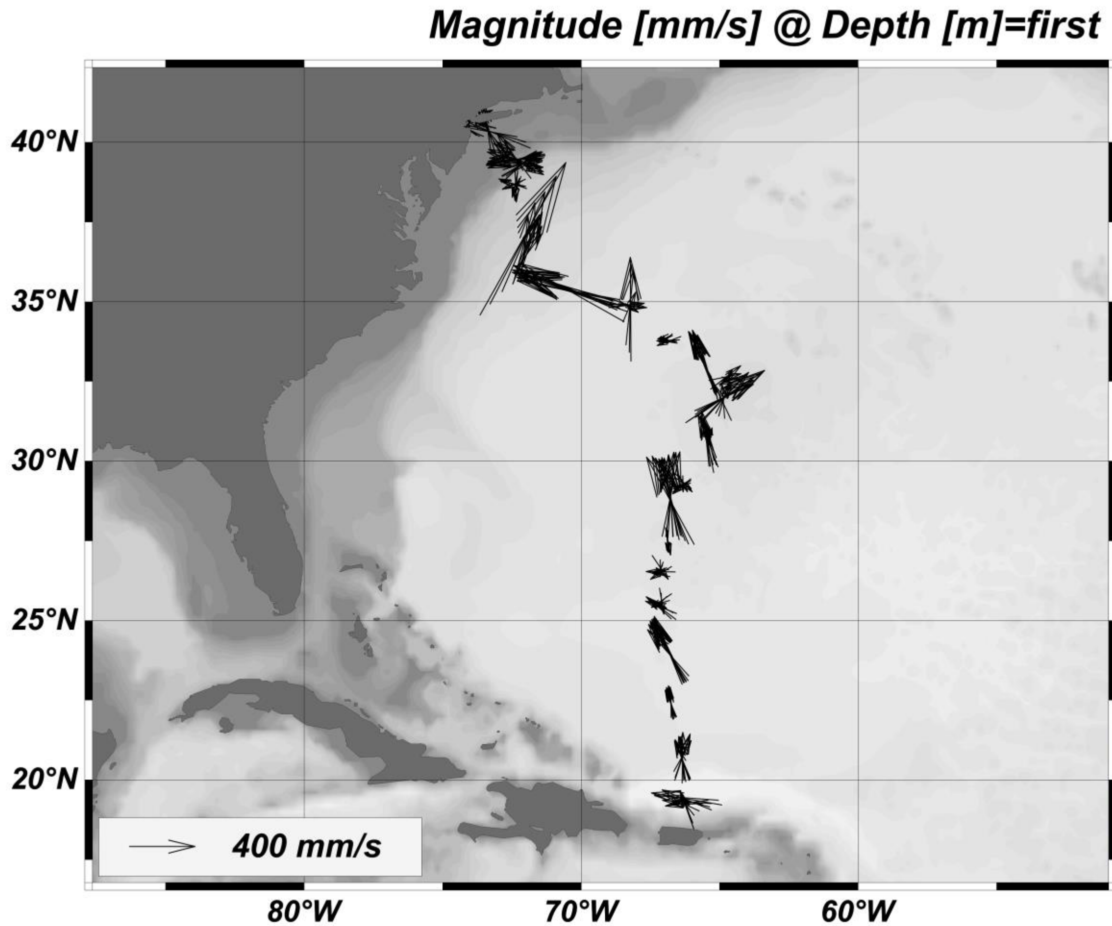

Figure 2. Surface current direction and velocity measured with the ADCP from 2000 to 0000 daily.

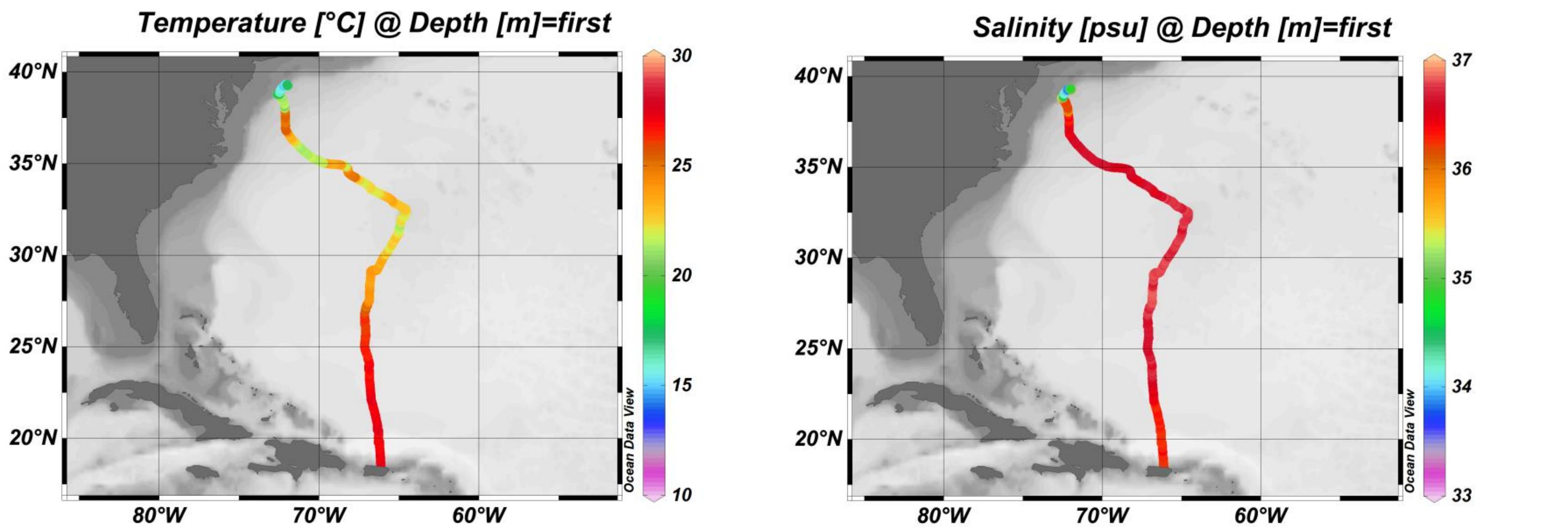

Figure 3. Surface temperature (left) and salinity (right) measurements from the continuous flow-through data logger.

Table 4. Neuston net tow data. 333 μm mesh. Blank indicates no data collected.

Station	Tow Dist. (m)	Zoo. Density (mL/m^2)	Phyllo-soma (#)	Lepto-cephali (#)	Myctophid (#)	Halobates (#)	*Sargassum* (g)	Plastic pellets (#)	Plastic pieces (#)
C259-001-NT	2149.3	0.0003	0	0	0	0	58.0	0	0
C259-002-NT	1462.9	0.0064	0	0	0	0	344.5	0	0
C259-003-NT	1435.4	0.0488	0	0	0	0	502.1	0	0
C259-004-NT	1512.2	0.0238	3	4	5	0	194.0	0	36
C259-005-NT	2274.6	0.0167	0	0	0	1	39.9	0	7
C259-006-NT	1340.4	0.0112	6	38	1	11	14.0	0	0
C259-007-NT	1434.7	0.0027	0	0	0	2	20.0	0	24
C259-008-NT	1914.0	0.0408	0	47	0	0	338.0	0	85
C259-009-NT	1704.3	0.0141	0	0	0	0	1731.0	0	15
C259-010-NT	1477.5	0.0037	2	6	1	1	0.7	0	0
C259-011-NT	1736.5	0.0049	0	0	0	0	40.0	0	10
C259-012-NT	1666.1	0.0114	3	0	1	1	169.0	0	15
C259-013-NT	1174.8	0.0438	0	0	0	1	1105.0	0	43
C259-014-NT	1160.9	0.0052	0	1	3	1	174.0	0	130
C259-015-NT	2430.9	0.0029	0	0	0	0	198.0	0	142
C259-017-NT	1232.2	0.0041	0	0	0	0	29.0	0	10
C259-018-NT	1862.9	0.0021	0	0	0	0	11.0	0	45
C259-019-NT	1039.5	0.0063	0	0	1	1	14.0	0	236
C259-020-NT	1749.2	0.0049	0	0	0	0	2.0	0	247
C259-021-NT	1323.8	0.0178	1	0	1	0	19.0	0	12
C259-022-NT	1634.6	0.0037	0	0	0	0	2.3	0	47
C259-023-NT	1279.8	0.0172	0	0	1	0	0.0	0	7
C259-025-NT	1151.3	0.0391	0	0	0	0	0.3	0	229
C259-026-NT	1252.1	0.0256	0	1	5	0	0.0	0	0
C259-027-NT	1320.1	0.0061	0	0	0	0	0.0	0	30
C259-028-NT	3546.9	0.0039	8	0	11	0	4.0	0	0
C259-029-NT	1662.9	0.0313	0	0	0	0	58.0	0	0

Table 4 continued.

Station	Tow Dist. (m)	Zoo. Density (mL/m^2)	Phyllo-soma (#)	Lepto-cephali (#)	Myctophid (#)	Halobates (#)	*Sargassum* (g)	Plastic pellets (#)	Plastic pieces (#)
C259-030-NT	1872.1	0.0510	0	0	44	0	0.0	0	1
C259-031-NT	1843.9	0.0543	0	0	0	0	0.0	0	0
C259-032-NT	1345.3	0.7634	0	1	3	0	0.0	0	0
C259-033-NT	1609.0	0.0196	0	0	0	0	0.0	0	0
C259-034-NT	1981.8	0.0050	0	0	0	0	0.0	0	0
C259-035-NT	2224.7	0.0081	0	0	0	0	0.0	0	8

Table 5. Meter Net and 2-Meter Net data.

Station	Mesh Size (μm)	Tow Depth (m)	Tow Volume (m^3)	Phyllo-soma (#)	Lepto-cephali (#)	Myctophid (#)
C259-002-MN	333	5.0	1597.4	8	3	0
C259-002-2MN	1000	31.0	8356.7	40	14	17
C259-004-MN	333	5.0	1153.4	21	3	0
C259-004-2MN	1000	54.0	5140.5	7	11	7
C259-006-MN	333	5.0	1097.0	4	2	0
C259-006-2MN	1000	52.0	3680.3	0	11	2
C259-008-MN	333	5.0	1360.1	12	8	0
C259-008-2MN	1000	43.0	6267.1	4	22	0
C259-010-MN	333	5.0	1274.5	9	0	0
C259-010-2MN	1000	44.0	4360.8	1	3	3
C259-012-MN	333	5.0	1396.7	23	0	0
C259-012-2MN	1000	29.0	6903.4	10	11	0
C259-014-MN	333	5.0	1054.5	0	1	0
C259-014-2MN	1000	69.0	4583.0	2	8	0
C259-017-MN	333	5.0	1093.4	0	0	0
C259-017-2MN	1000	37.0	4954.4	6	7	2
C259-019-MN	333	5.0	909.5	2	2	0
C259-019-2MN	1000	46.0	4286.6	0	14	6
C259-021-MN	333	5.0	1016.3	3	0	1
C259-021-2M	1000	38.0	5066.0	0	11	7
C259-023-MN	333	5.0	1347.3	6	5	0
C259-023-2MN	1000	33.0	6105.8	1	21	14
C259-026-MN	333	5.0	1281.2	3	5	1
C259-026-2MN	1000	40.5	4852.1	0	9	18
C259-032-2MN	1000	286.0	3472.8	0	2	3
C259-034-MN	333	234.0	2387.4	0	1	0

<u>Seabird and Migratory Bird Observations – a study conducted by Visiting Scientist, Dr. Robbie Smith (Bermuda Aquarium, Museum and Zoo)</u>

Observations were made of seabirds and migratory birds on Cruise 259 from Puerto Rico to Bermuda by Dr. Struan Smith of the Bermuda Natural History Museum. The observing periods commenced after dawn each day, typically 06:30- 07:30 and then resumed from 08:00 until noon. Afternoon observation continued from 13:00 until 18:00. The time of observations each day varied considerably due to weather, duties, drills and other research and teaching activities. Students and crew were advised to alert Dr. Smith of any birds they saw and this certainly aided in detecting birds approaching the vessel or at a distance.

59 birds were observed in approximately 14 taxa. Identification was often limited by the distance of a bird from the vessel and a lack of time to detect key identification characteristics of specific birds. The white-tailed tropicbird was the most frequently observed bird species (8) followed b y the storm petrels (14), who were difficult to separate to species. Most surprising was the number of migratory songbirds observed, most of which perched on *Corwith Cramer,* allowing for accurate identifications. The Barn swallows and Rough-wing swallows often spent much time perching, departing and returning to the vessel, but each bird was only counted once. One barn swallow expired on deck and was preserved. The Eastern kingbird observation was made when the bird perched on a lifeline on the quarterdeck and it had a moth in its beak!

The individual bird sighting data will be entered in the ebird database (www.ebird.org), along with records from C252, on the same cruise track in 2014 but slightly earlier in April.

Table 6. Observations of seabirds and migratory birds on the S/V *Corwith Cramer*, C-259, from 21st April to 2nd May, 2015. Birds were observed in dedicated observing periods each day, from dawn to dusk, though not continuously. Casual observations were also recorded. Morning or afternoon periods where no birds were observed are omitted from the table for simplicity

	Date	4/21	4/22	4/23	4/24	4/24	4/25	4/25	4/26	4/26	4/27	4/28	4/29	4/29	4/30	4/30	5/1	5/1	5/2	5/2	
	Time	AM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	
	Hours of observation	0.5	2	1.5	3	2	3	3	3	5	3	1	5	3.5	2.5	3.5	3	4	6	4	
Common name	Species name																				Total
Brown booby	*Sula leucogaster*	1		1																	2
Jaeger sp.			1																		1
Pomerine jaeger	*Stercorarius pomerinus*												2					1		1	4
Whitetailed tropicbird	*Phaethon lepturus*				1		2				1		6						1		11
Greater shearwater	*Puffinus gravis*												2								2
undeterm. shearwaters											1		1				1				3
Leach's Storm petrel	*Oceanodroma leucorhoa*					1					1					1					3
Wilson's Storm petrel	*Oceanites oceanicus*								2				1		1						4
Undeterm. Storm petrels							1						5						1		7
Tern w/black cap							1														1
Semi palmate plover?																1					1
Osprey	*Pandion haliaetus*																1				1
Barn swallow	*Hirundo rustica*							1					1	2		2		1	1		8
Rough-winged swallow	*Stelgidopteryx ruficollis*									4	1										5
Eastern kingbird?	*Tyrannus tyrannus*																1				1
unident. Songbirds					1		2					1				1					5
Total		1	1	1	2	1	6	1	2	4	4	1	18	2	1	5	3	2	3	1	59

ABSTRACTS -

Initial microbial colonizers of microplastics in the Sargasso Sea.

Amalia Alberini, Lena Goss, Caroline Graham, Helena McMonagle

Plastic pollution, the primary source of marine debris, is an increasing environmental concern. This is especially true in the Sargasso Sea, located in the North Atlantic subtropical gyre, where plastics are known to accumulate. Microplastics (<5 mm), a relatively understudied substrate, are commonly found in this area, providing a previously unavailable habitat for microbial communities and successional colonizers. The colonizers of these plastics play a role in the fate and ecological impacts of plastics that may transport invasive species, harmful algae, and potential pathogens. In order to understand how newly deposited microplastics are colonized in the open ocean and the effects they may have on these ecosystems, we performed morphological and genetic analyses of the first colonizers of microplastics, microbes. We studied the microbes that grew on different plastic resins after incubation times of 0.5 and 2 hours at four sample sites spanning different latitudes in the Sargasso Sea. We found differences in colonization across sample sites as well as between plastic resins. Our genetic results revealed a wide variety of biofilm forming genera such as *Marinobacter*, *Halomonas*, *Idiomarina*, *Alteromonas*, and *Pseudoalteromonas.* This study offers the first glimpse of the very early colonizers of newly deposited microplastics in open ocean ecosystems.

Investigating dispersion dynamics of the Caribbean spiny lobster *Panulirus argus* phyllosoma.

William Botta, Joseph Townsend, Ryan Plantz

Panulirus argus, an important fisheries species, has been documented throughout the Caribbean and to the north and south of the Caribbean Sea, and is an important commercial fishery species for many Caribbean states. Because of the r-selected dispersal strategy of *P. argus*, populations throughout the Caribbean have been shown to be highly connected, however, some of these populations contain two major genetic cohorts of *Panulirus argus*. This study expands the area of study of *P. argus* to Bermuda and the Sargasso Sea through collection and analysis of *P. argus* phyllosoma. Phyllosoma were sampled nightly along a sailing transect in the Sargasso Sea from San Juan, Puerto Rico, to St. George, Bermuda, to New York City, USA. Individuals captured in nightly tows were identified, staged, and sized. Additionally, genetic analysis was conducted on select individuals by analyzing single-nucleotide polymorphisms in the mitochondrial hypervariable domain of the control region (HV-CR_{d1}, or HV-MCR_{d1}). The results indicate 1) abundance of phyllosoma, as well as number of unique stages sampled, is negatively correlated with latitude 2) developmental stage and body size are highly correlated, 3) individuals from both genetic lineages are present throughout the Sargasso Sea and Bermuda. The results of this study show the importance of including the Bermudan *Panulirus argus* population as a highly connected population to *P. argus* populations throughout the Caribbean.

Community and population level biodiversity in the Sargasso Sea: A study investigating biodiversity of *Sargassum*-associated mobile fauna.

Anthony Daley, Grayson Huston, Margaret Keefe, Callie Schultz

Pelagic *Sargassum* provides a unique drift macroalgal habitat in the North Atlantic that supports a variety of important species. Using biodiversity as an indicator for ecosystem health, we evaluated the diversity of *Sargassum*-associated mobile fauna communities in the Sargasso Sea using variables such as *Sargassum* species, age, and size. We collected clumps of *Sargassum* through dipnetting during our cruise from San Juan, PR to New York, NY via Bermuda (April-May 2015). We observed two species of *Sargassum*, *S. fluitans III* and *S. natans I,* and *S. natans VIII*, a variant. Each species of *Sargassum* differs morphologically, with *S. fluitans III* and *S. natans VIII* offering greater surface area than *S. natans I*. We observed a significant difference in species' richness on clumps of *S. natans I* and *S. fluitans III* compared to *S. natans VIII.* We found a significant negative relationship between species' abundance and amount of *Sargassum* present. As a narrower lens for diversity in the Sargasso Sea, we used the slender *Sargassum* shrimp to test population connectivity in the Sargasso Sea. Through a comparison between collection sites based on dominant *Sargassum* species, we determined whether frontal dynamics acted as barriers between populations of *Latreutes fucorum*. We found that despite differences in *Sargassum* distribution, there was no significant genetic structure of *L. fucorum* in the Sargasso Sea. Through our analysis of biodiversity of mobile fauna and of *L. fucorum*, we concluded that biodiversity is highly varying and requires continued research to grasp the full picture in the Sargasso Sea.

Eel biodiversity and population connectivity in the Sargasso Sea.

Mareike Duffing Romero, Olivia Robson, Katarina Rolf, Sarah Stratton

Eels play a major ecological role as predators and prey in coastal and marine food webs to help maintain other populations. Several species of eel migrate to the Sargasso Sea to spawn each year, yet little is known about eel biodiversity and abundance in the Sargasso Sea. We aimed to assess the biodiversity and population connectivity of eels by using the bandtooth conger eel, *Ariosoma balearicum,* as an indicator species and examining different environmental parameters. We sampled eel leptocephali every night at three depths along a cruise track from Puerto Rico to New York City. We collected a total of 262 leptocephali covering 12 families and 15 species. Eel biodiversity was significantly greater at 50m depth than at the surface, but was not influenced by environmental parameters such as temperature, salinity, or chlorophyll-a concentration. The distribution of *A. balearcium* changed across geographic regions of the Sargasso Sea, with the highest concentrations in the Tropical Atlantic, and decreasing concentrations farther north. Eel richness and abundance were not affected by geographic region. Based on myomere counts of the 167 *A. balearicum* samples there was no indication of two separate populations in regions of the North and South Sargasso Sea. High myomere count was correlated with increased length of leptocephali. There was significant genetic variation of *A. balearicum* within the South Sargasso Sea, as well as across all geographic sites studied at the molecular level. This research has helped contribute to a better understanding of economically and ecologically important eel species in the Sargasso Sea.

Distribution and population connectivity of hydroids in the Sargasso Sea.

Fredrik Eriksson, Hannah Freyer, Sabrina Hutchinson

In recent years, many nations and conservation organizations have shown interest in protecting the Sargasso Sea, possibly through a network of protected areas. To better understand the ecology of the area, which is needed for designing effective protection areas, hydroids on pelagic *Sargassum natan I, Sargassum natans VIII,* and *S. fluitans III* were studied. Samples were collected and examined by Sea Education Association research students aboard the *SSV Corwith Cramer* on a transect through the Sargasso Sea from Puerto Rico to New York in late spring 2015. Species diversity and population connectivity of the most common hydroid species, *Clytia noliformis,* were studied. A total of seven hydroid genera were represented in these samples, six on *S. natans I,* six on *S. natans VIII,* and four on *S. fluitans III*; Hydroids belonged to: *Clytia*, *Aglaeophenia*, *Obelia*, *Plumularia*, *Dynamena*, *Halopteris*, and *Zanclea*. Following basic morphological identification from aboard the vessel, DNA barcoding was carried out by the DNA sequencing laboratory Operon. The study shows that hydroid community species composition differed between *Sargassum* species and between the south and north Sargasso Sea. Haplotype network analysis showed nine different haplotypes that had little to no population structure or haplotype grouping between the north and south Sargasso Sea. Results suggest that this hydroid species, and potentially many other species crucial to the *Sargassum* ecosystem, can be managed as a single population across the entire Sargasso Sea.

A genetic and morphological analysis of Atlantic *Sargassum.*

Elizabeth Olson and Elizabeth Tonkin

During a five week cruise of the Sargasso Sea, three morphotypes of *Sargassum,* morphologically identified as *Sargassum fluitans III*, *Sargassum natans I*, and *Sargassum natans VIII,* were studied. SEA measured water temperature, phosphate concentration, current strength and direction, and wind speed and direction. None of these factors correlated with the change in the relative masses of the different *Sargassum* types. Satellite data gathered from NOAA shows that the current direction over a broader region does correlate with changes in *Sargassum* distribution, with *S. natans VIII* confined to areas south of the Sargasso Sea and *S. natans I* staying within the north Atlantic gyre. Genetic analysis of the mitochondrial gene cytochrome-oxidase 1 (CO1) revealed very little variation between species. Out of a sequence of 552 nucleotides, only one was found to vary between species. This indicates that a different gene should be found to do a more robust analysis on potential speciation.