# Cruise Report

# C-199

Scientific Data Collected Aboard
SSV *Corwith Cramer*

Christiansted, St. Croix, USVI – St. George's, Bermuda –
Sable Island – Lunenburg, NS – Woods Hole, MA

7 May – 14 June 2005

Sea Education Association
Woods Hole, Massachusetts

To obtain unpublished data, contact the SEA data archivist:

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**Table of Contents**

## **Ship's Company**

SSV *Corwith Cramer*, Cruise C-199

Nautical Staff

| | |
|---|---|
| Sean Bercaw | Captain |
| Chris Havard | Chief Mate |
| Rob Hancock | Second Mate |
| Steve Kirk | Third Mate |
| Jonathan Cedar | Engineer |
| Laura Morrisey | Steward |
| George Smith | Assistant Steward |

Scientific Staff

| | |
|---|---|
| Amy Smith | Chief Scientist |
| Jen Barone | First Assistant Scientist |
| Katie Krause | Second Assistant Scientist |
| Matt Lambert | Third Assistant Scientist |

Students

| | |
|---|---|
| Rika Anderson | Carleton College |
| Katherine Bosman-Clark | Northland College |
| Jessica Chen | University of California, San Diego |
| Brittany Clark | Wellesley College |
| Kathryn Dunn | Roger Williams University |
| Holly Elwell | University of Vermont |
| Erica Foley | Pennsylvania State University |
| Emily Frost | University of California, Santa Barbara |
| Kevin Garaventa | Oregon State University |
| Leslie Noel Goemaat | Carleton College |
| Ross Mitchell | Carleton College |
| Rebekah Newcum | Perdue University |
| Nicholas Patton | University of California, Los Angeles |
| Kelsey Pickard | Colorado College |
| Jessica Postlethwaite | Carleton College |
| Jessica Raymond | University of California, San Diego |
| Michael Schrimpf | Lawrence University |
| Erin Soucy | College of the Atlantic |
| Phoebe Van Vleet | College of the Atlantic |
| Angela Wood | Oberlin College |

Visitors

| | |
|---|---|
| John Bullard | Sea Education Association |
| Nanci McGuinn | Sea Education Association |

## Introduction

This cruise report provides a summary of scientific activities aboard the SSV *Corwith Cramer* during cruise C-199 (7 May 05 - 14 June 05). The 3150 nautical mile cruise served as the second half of a 12-week, semester program with Sea Education Association (SEA), during which extensive oceanographic sampling was conducted for both student research projects (Table 1) and the ongoing SEA research program. Students examined physical, chemical, geological, biological, and environmental oceanographic characteristics in accordance with their written proposals and presented their results in final poster sessions and papers (available upon request from SEA). The brief summary of data collected and results of student research projects contained in this report are not intended to represent final data interpretation and should not be excerpted or cited without written permission from SEA.

Smooth sailing on light winds from St. Croix to Bermuda facilitated the fast-paced beginning of the academic program (Table 2); students literally "learned the ropes" and became familiar with laboratory and deployment procedures. Fortunately, much of this knowledge was imparted during the first leg of the voyage, because steady swells accompanied us from Bermuda on north.

One of the most memorable parts of C-199 was our visit to Sable Island. Gerry Forbes, Environment Canada meteorology station chief and 20-year island resident, met us at the beach. Inevitably, the fog rolled in during our 3 hour visit ashore, but something seemed right about being among the seals and horses on Sable in the fog. After leaving Sable Island we headed farther east to The Gully, a submarine canyon protected by the Canadian government for its delicate ecology. During our first carousel deployment, we were greeted by two of the elusive bottlenose whales that make their home in The Gully. In all, we collected physical, chemical and biological data from 3 carousel and 2 net deployments for the Canadian Division of Fisheries and Oceans. It was truly rewarding for all aboard to provide data for continued assessment of this unique area.

An experienced and outstanding staff coupled with a group of enthusiastic, inquisitive and hard-working students made C-199 a great success. Thank you.

Amy N. Smith
Chief Scientist, C-199

Table 1. Student research projects, C-199.

| Title | Student Investigator(s) |
|---|---|
| Bacterial Abundance, Dissolved Oxygen, and Nutrient Concentrations with Depth along a South-North Transect in the Atlantic Ocean. | Rika Anderson<br>Michael Schrimpf |
| An Analysis of Pelagic Tar and Plastic Pollution along a south to north Transect of the Sargasso Sea. | Kae Bosman-Clark<br>Phoebe Van Vleet |
| Pigmentation and Size of Copepods in relation to Diel Vertical Migration in the Sargasso Sea. | Jessica Chen |
| Effects of Salinity and Temperature on Size and Distribution of Myctophidae Species in the Atlantic. | Brittany Clark |
| Diel Vertical Migration and Zooplankton Biomass in Relation to 1% Light Levels Along a South to North Transect in the Western North Atlantic. | Kathryn Dunn<br>Emily Frost |
| Nitrogen, Phosphorus, Chlorophyll-*a*, and Bacteria Concentrations as Indicators of Pollution: Christiansted, St. Croix; St. Georges, Bermuda; Lunenburg, Nova Scotia and the Surrounding Waters. | Holly Elwell<br>Erica Foley<br>Kelsey Pickard |
| The present distribution and recent temporal changes of Eighteen Degree Water and Sea Surface Salinity along a South to North transect in the Sargasso Sea in May, 2005. | Kevin Garaventa |
| Determination of Velocity, Direction, and Volume Transport of Geostrophic Flow along a S-N transect of the North-Atlantic Ocean via the Geostrophic Equation. | Leslie Noel Goemaat |
| Hydrodynamic erosion and mass wasting of carbonate marine sediments: an analysis of the sediment transport and morphology of Plantagenet Bank, Bermuda. | Ross Mitchell<br>Nicholas Patton<br>Jessica Raymond |
| Variables of Distribution of the *Halobates micans* in the North Atlantic Ocean. | Rebekah Newcum |
| The relationship between photosynthetic efficiency, biomass of phytoplankton and the 1% light level along a south-north transect of the North Atlantic Ocean. | Jessica Postlethwaite |
| Prey Preferences of Myctophid Fishes along a S-N Transect in the Northwest Atlantic. | Erin Soucy |
| Leptocephali distribution in the Sargasso Sea. | Angela Wood |

Table 2. Oceanographic lectures and activities.

| Date | Topic | Speaker(s) |
|---|---|---|
| 10 May | Project Introductions | Students |
| 11 May | Practical Water Chemistry | J. Barone |
| 12 May | Marine Birds along our Cruise Track | A. Smith & M. Schrimpf |
| 13 May | Tucker Trawl Demonstration | Assistant Scientists |
| 14 May | Extra Extra: study session | |
| 16 May | Sound in the Ocean | J. Barone |
| 18 May | Extra Extra: study session | |
| 19 May | Feedback Mechanisms<br>Bermuda Geology | M. Lambert<br>A. Smith |
| 24 May | Data Discussion I | Assistant Scientists |
| 25 May | Creature Features | Students |
| 26 May | Lab Practical Examination | Students |
| 28 May | Extra Extra: study session | |
| 31 May | Creature Features | Students |
| 4 June | Extra Extra: study session | Students |
| 5 June | Data Discussion II | Assistant Scientists |
| 6 June | Tides | M. Lambert |
| 7 June | Research Poster Session | Students |
| 8 June | Extra Extra: final paper work | Students |
| 9 June | Gulf of Maine: Geology and Circulation | A. Smith |
| 10 June | Marine Protected Areas: Stellwagen Bank | K. Krause |
| 12 June | Results: GOM Sampling Mission | Students |

## Data Description

This section provides a record of data collected aboard the SSV *Corwith Cramer* cruise C-199 (US State Department Cruise: 2005-001). For the first part of the cruise, from St. Croix, USVI to Sable Island and Lunenburg, NS, the vessel tracked practically due north through the Sargasso Sea and across the Gulf Stream. From Lunenburg, we headed back south and west to our final destination in Woods Hole, MA (Figure 1).

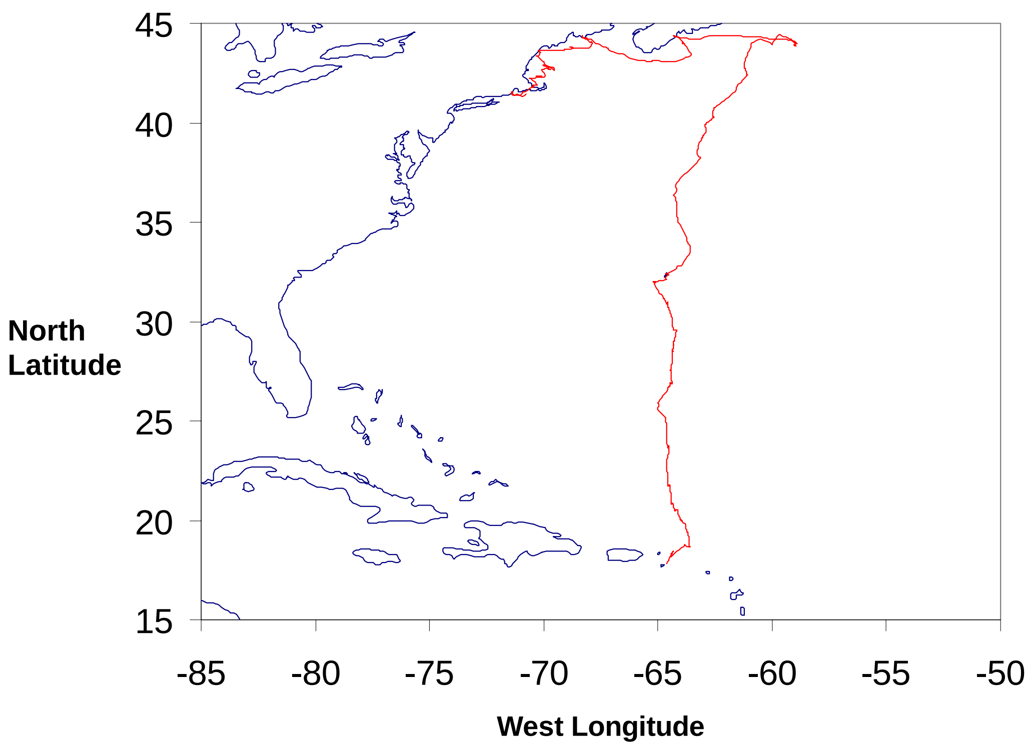


Figure 1. Hourly positions along the C-199 cruise track.

During the six-week voyage, we sampled at 83 discrete oceanographic sampling stations (Figure 2, Table 3). A total of 56 surface sampling stations were limited to the harbors of our departure port and the two subsequent port stops (Table 4). Additionally, we continuously sampled water depth and sub-bottom profiles (CHIRP system), upper ocean currents (ADCP), and sea surface temperature, salinity and *in vivo* fluorescence (seawater flow-through system). Summaries of sea surface chemical and biological properties can be found in Tables 4 and 5, while a summary of chemical and biological properties at depth is found in Table 6. Lengthy CTD, CHIRP, ADCP and flow-through data are not presented here. All unpublished data can be made available by arrangement with the SEA data archivist (contact information, p. 2).

Figure 2. Locations of oceanographic sampling stations: physical and chemical sampling (A), biological sampling (B), geological sampling (C).

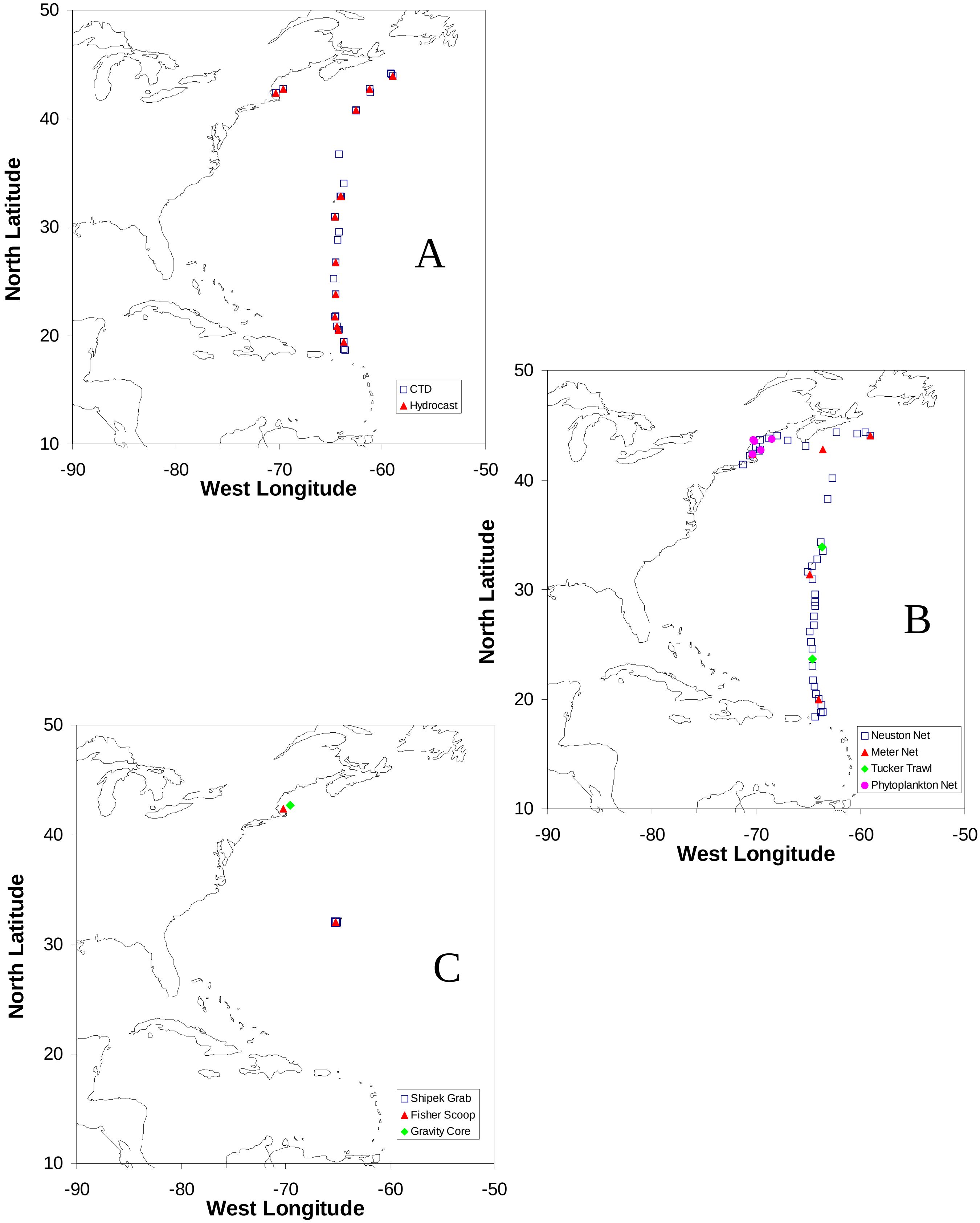

Table 3. Oceanographic sampling stations.

| Station | Date | Local Time | Log (nm) | Latitude (N) | Longitude (W) | Depth (m) | General Locale |
|---|---|---|---|---|---|---|---|
| **CTD** | | | | | | | |
| C199-002-CTD | 9-May-05 | 1400 | 106.4 | 18°43.1' | 63°44.3' | 1435 | W Anagada Passage |
| C199-004-CTD | 9-May-05 | 2052 | 122.3 | 18°40.6' | 63°36.4' | 1499 | NW of Sombrero Island |
| C199-006A-CTD | 10-May-05 | 0831 | 166.5 | 19°23.0' | 63°42.1' | 1461 | N of Anagada Passage |
| C199-006B-CTD | 10-May-05 | 1102 | 166.5 | 19°23.8' | 63°43.9' | 246 | N of Anagada Passage |
| C199-010A-CTD | 11-May-05 | 0827 | 257.6 | 20°32.6' | 64°09.2' | 1505 | S Sargasso Sea |
| C199-010B-CTD | 11-May-05 | 1152 | 257.6 | 20°30.0' | 64°13.5' | 240 | S Sargasso Sea |
| C199-012-CTD | 11-May-05 | 1753 | 285.8 | 20°50.9' | 64°21.9' | 1357 | S Sargasso Sea |
| C199-014A-CTD | 12-May-05 | 0830 | 355.0 | 21°46.3' | 64°29.7' | 1631 | S Sargasso Sea |
| C199-014B-CTD | 12-May-05 | 1108 | 355.0 | 21°44.1' | 64°31.9' | 377 | S Sargasso Sea |
| C199-017A-CTD | 13-May-05 | 0811 | 485.7 | 23°45.8' | 64°31.4' | 1667 | STCZ |
| C199-017B-CTD | 13-May-05 | 1111 | 485.7 | 23°45.8' | 64°31.4' | 245 | STCZ |
| C199-020-CTD | 14-May-05 | 0821 | 576.7 | 25°14.2' | 64°43.2' | 1489 | STCZ |
| C199-023A-CTD | 15-May-05 | 0827 | 690.0 | 26°44.4' | 64°31.4' | 1483 | STCZ |
| C199-023B-CTD | 15-May-05 | 1059 | 690.0 | 26°44.8' | 64°29.0' | 300 | STCZ |
| C199-027-CTD | 16-May-05 | 2018 | 828.2 | 28°47.9' | 64°19.2' | 1702 | STCZ |
| C199-029-CTD | 17-May-05 | 0834 | 887.5 | 29°34.1' | 64°11.7' | 1648 | N Sargasso Sea |
| C199-031A-CTD | 18-May-05 | 0816 | 984.4 | 30°57.6' | 64°35.0' | 251 | N Sargasso Sea |
| C199-031B-CTD | 18-May-05 | 0849 | 984.4 | 30°57.4' | 64°35.2' | 1495 | N Sargasso Sea |
| C199-050A-CTD | 23-May-05 | 1350 | 1187.0 | 32°48.0' | 64°03.3' | 1652 | N Sargasso Sea |
| C199-050B-CTD | 23-May-05 | 1713 | 1187.0 | 32°48.2' | 63°58.7' | 285 | N Sargasso Sea |
| C199-053-CTD | 24-May-05 | 0835 | 1253.5 | 34°00.8' | 63°42.9' | 1243 | N Sargasso Sea |
| C199-055-CTD | 25-May-05 | 0839 | 1409.3 | 36°40.8' | 64°10.2' | 629 | Gulf Stream |
| C199-058A-CTD | 27-May-05 | 0817 | 1647.7 | 40°44.2' | 62°32.5' | 1347 | Slope Waters |
| C199-058B-CTD | 27-May-05 | 1121 | 1647.7 | 40°46.4' | 62°29.9' | 248 | Slope Waters |
| C199-059-CTD | 28-May-05 | 0829 | 1771.8 | 42°23.7' | 61°07.1' | 1922 | Slope Waters |
| C199-060-CTD | 28-May-05 | 1507 | 1793.9 | 42°43.7' | 61°10.4' | 1150 | Slope Waters |
| C199-062-CTD | 30-May-05 | 0653 | 2022.3 | 43°53.9' | 58°57.7' | 603 | The Gully |
| C199-064-CTD | 30-May-05 | 1221 | 2040.2 | 44°05.3' | 59°05.0' | 493 | The Gully |
| C199-065-CTD | 30-May-05 | 1418 | 2047.7 | 44°11.4' | 59°11.1' | 146 | The Gully |
| C199-077-CTD | 10-Jun-05 | 1218 | 2820.3 | 42°44.1' | 69°33.5' | 218 | Wilkinson Basin |
| C199-080-CTD | 11-Jun-05 | 1031 | 2927.3 | 42°20.7' | 70°18.4' | 26 | Stellwagen Bank |
| **Hydrocast** | | | | | | | |
| C199-006B-HC | 10-May-05 | 1102 | 166.5 | 19°23.8' | 63°43.9' | 246 | N of Anegada Passage |
| C199-010B-HC | 11-May-05 | 1152 | 257.6 | 20°30.0' | 64°13.5' | 240 | S Sargasso Sea |
| C199-012-HC | 11-May-05 | 1753 | 285.8 | 20°50.9' | 64°21.9' | 1357 | S Sargasso Sea |
| C199-014B-HC | 12-May-05 | 1108 | 355.0 | 21°44.1' | 64°31.9' | 377 | S Sargasso Sea |
| C199-017A-HC | 13-May-05 | 0811 | 485.7 | 23°45.8' | 64°31.4' | 1667 | STCZ |
| C199-017B-HC | 13-May-05 | 1111 | 485.7 | 23°45.8' | 64°31.4' | 245 | STCZ |
| C199-023B-HC | 15-May-05 | 1059 | 690.0 | 26°44.8' | 64°29.0' | 300 | STCZ |
| C199-031A-HC | 18-May-05 | 0816 | 984.4 | 30°57.6' | 64°35.0' | 251 | N Sargasso Sea |
| C199-050A-HC | 23-May-05 | 1350 | 1187.0 | 32°48.0' | 64°03.3' | 1652 | N Sargasso Sea |
| C199-050B-HC | 23-May-05 | 1713 | 1187.0 | 32°48.2' | 63°58.7' | 285 | N Sargasso Sea |
| C199-058B-HC | 27-May-05 | 1121 | 1647.7 | 40°46.4' | 62°29.9' | 248 | Slope Waters |
| C199-060-HC | 28-May-05 | 1507 | 1793.9 | 42°43.7' | 61°10.4' | 1150 | Slope Waters |

Table 3 continued.

| Station | Date | Local Time | Log (nm) | Latitude (N) | Longitude (W) | Depth (m) | General Locale |
|---|---|---|---|---|---|---|---|
| **Hydrocast cont.** | | | | | | | |
| C199-062-HC | 30-May-05 | 0653 | 2022.3 | 43°53.9' | 58°57.7' | 603 | The Gully |
| C199-077-HC | 10-Jun-05 | 1218 | 2818.2 | 42°44.1' | 69°33.5' | 218 | Wilkinson Basin |
| C199-080-HC | 11-Jun-05 | 1031 | 2927.3 | 42°20.7' | 70°18.4' | 26 | Stellwagen Bank |
| | | | | | | | |
| **Neuston Net** | | | | | | | |
| C199-001-NT | 9-May-05 | 0029 | 39.0 | 18°25.0' | 64°20.9' | 0 | 4 nm off Virgin Gorda |
| C199-003-NT | 9-May-05 | 1802 | 107.0 | 18°45.3' | 63°49.5' | 0 | E of Anegada Passage |
| C199-005-NT | 10-May-05 | 0023 | 134.3 | 18°50.6' | 63°37.4' | 0 | 12 nm NW of Sombrero |
| C199-007-NT | 10-May-05 | 1249 | 173.3 | 19°29.8' | 63°45.4' | 0 | N of Anegada Passage |
| C199-009-NT | 11-May-05 | 0004 | 218.6 | 20°01.7' | 63°59.8' | 0 | N of Peurto Rico Trench |
| C199-011-NT | 11-May-05 | 1242 | 257.5 | 20°29.0' | 64°14.5' | 0 | S Sargasso Sea |
| C199-013-NT | 12-May-05 | 0050 | 310.5 | 21°08.9' | 64°25.1' | 0 | S Sargasso Sea |
| C199-015-NT | 12-May-05 | 1147 | 355.2 | 21°43.4' | 64°32.5' | 0 | S Sargasso Sea |
| C199-016-NT | 13-May-05 | 0011 | 438.2 | 23°02.6' | 64°36.6' | 0 | S Sargasso Sea |
| C199-019-NT | 14-May-05 | 0017 | 549.4 | 24°37.1' | 64°37.1' | 0 | STCZ |
| C199-021-NT | 14-May-05 | 1023 | 577.0 | 25°13.5' | 64°44.2' | 0 | STCZ |
| C199-022-NT | 15-May-05 | 0010 | 654.0 | 26°09.2' | 64°50.2' | 0 | STCZ |
| C199-024-NT | 15-May-05 | 1134 | 690.1 | 26°44.6' | 64°28.3' | 0 | STCZ |
| C199-025-NT | 16-May-05 | 0016 | 738.9 | 27°32.2' | 64°26.6' | 0 | STCZ |
| C199-026-NT | 16-May-05 | 1245 | 802.2 | 28°31.4' | 64°20.6' | 0 | STCZ |
| C199-028-NT | 17-May-05 | 0015 | 837.4 | 28°51.4' | 64°20.2' | 0 | STCZ |
| C199-030-NT | 17-May-05 | 1345 | 887.5 | 29°34.3' | 64°18.2' | 0 | N Sargasso Sea |
| C199-032-NT | 18-May-05 | 1052 | 984.5 | 30°55.9' | 64°35.7' | 0 | N Sargasso Sea |
| C199-034-NT | 19-May-05 | 0001 | 1043.8 | 31°37.0' | 65°01.9' | 0 | N Sargasso Sea |
| C199-048-NT | 20-May-05 | 0024 | 1117.9 | 32°07.7' | 64°37.8' | 0 | N Sargasso Sea |
| C199-049-NT | 23-May-05 | 1209 | 1186.6 | 32°46.6' | 64°06.3' | 0 | N Sargasso Sea |
| C199-051-NT | 24-May-05 | 0009 | 1230.5 | 33°31.0' | 63°35.8' | 0 | N Sargasso Sea |
| C199-054-NT | 24-May-05 | 1247 | 1268.7 | 34°19.1' | 63°46.6' | 0 | N Sargasso Sea |
| C199-056-NT | 26-May-05 | 0015 | 1514.3 | 38°18.1' | 63°07.8' | 0 | Gulf Stream |
| C199-057-NT | 27-May-05 | 0004 | 1607.5 | 40°09.3' | 62°38.9' | 0 | Gulf Stream |
| C199-061-NT | 30-May-05 | 0002 | 1973.4 | 44°20.7' | 59°29.5' | 0 | 25 nm NW of The Gully |
| C199-063-NT | 30-May-05 | 1017 | 2034.1 | 44°02.0' | 59°02.0' | 0 | The Gully |
| C199-066-NT | 30-May-05 | 2359 | 2097.7 | 44°15.1' | 60°16.8' | 0 | 10 nm N of Sable Island |
| C199-067-NT | 31-May-05 | 1211 | 2187.1 | 44°22.8' | 62°16.5' | 0 | Scotian Shelf |
| C199-068-NT | 5-Jun-05 | 1249 | 2440.8 | 43°05.9' | 65°16.5' | 0 | Scotian Shelf |
| C199-069-NT | 6-Jun-05 | 0005 | 2518.2 | 43°36.6' | 66°59.7' | 0 | Scotian Shelf |
| C199-070-NT | 8-Jun-05 | 0005 | 2615.3 | 44°02.7' | 67°55.9' | 0 | ESE of Mount Desert I. |
| C199-072-NT | 8-Jun-05 | 1153 | 2660.1 | 43°46.6' | 68°43.6' | 0 | 5 nm E of Matinicus Rk. |
| C199-073-NT | 9-Jun-05 | 0000 | 2720.4 | 43°38.5' | 69°38.0' | 0 | SW of Monhegan I. |
| C199-076-NT | 10-Jun-05 | 0023 | 2785.2 | 43°02.8' | 70°00.4' | 0 | Gulf of Maine |
| C199-078-NT | 10-Jun-05 | 1659 | no data | 42°48.0' | 69°36.3' | 0 | Wilkinson Basin |
| C199-079-NT | 11-Jun-05 | 0024 | 2861.0 | 42°40.3' | 69°40.7' | 0 | Wilkinson Basin |
| C199-081-NT | 11-Jun-05 | 1354 | 2932.5 | 42°20.5' | 70°18.3' | 0 | Stellwagen Bank |
| C199-082-NT | 12-Jun-05 | 0013 | 2971.3 | 42°14.4' | 70°33.7' | 0 | 9 nm E of Scituate |
| C199-083-NT | 14-Jun-05 | 0119 | 3124.8 | 41°24.1' | 71°14.0' | 0 | 4 nm SW Sakonnet Pt. |

Table 3 continued.

| Station | Date | Local Time | Log (nm) | Latitude (N) | Longitude (W) | Depth (m) | General Locale |
|---|---|---|---|---|---|---|---|
| **Meter Net** | | | | | | | |
| C199-008-MN | 10-May-05 | 2129 | 212.8 | 19°59.8' | 63°58.0' | 150 | S Sargasso Sea |
| C199-033-MN | 18-May-05 | 2037 | 1023.3 | 31°22.4' | 64°52.0' | 250 | N Sargasso Sea |
| C199-063-MN | 30-May-05 | 1000 | 2033.8 | 44°02.4' | 59°01.9' | 150 | The Gully |
| C199-078-MN | 10-Jun-05 | 1648 | no data | 42°47.7' | 63°35.4' | 75 | Wilkinson Basin |
| C199-081-MN | 10-Jun-05 | 1354 | 2932.5 | 42°20.5' | 70°18.3' | 10 | Stellwagen Bank |
| **Tucker Trawl** | | | | | | | |
| C199-018-TT #1 | 13-May-05 | 1330 | 487.8 | 23°40.7' | 64°34.5' | 0-500 | STCZ |
| C199-018-TT #2 | 13-May-05 | 1404 | 488.7 | 23°40.7' | 64°34.5' | 500 | STCZ |
| C199-018-TT #3 | 13-May-05 | 1428 | 489.3 | 23°40.7' | 64°34.5' | 500-0 | STCZ |
| C199-052-TT #1 | 24-May-04 | 0629 | 1247.6 | 33°55.0' | 63°38.5' | 0-300 | N Sargasso Sea |
| C199-052-TT #2 | 24-May-04 | 0700 | 1250.7 | 33°56.7' | 63°39.8' | 300-0 | N Sargasso Sea |
| **Phytoplankton Net** | | | | | | | |
| C199-071-PN | 8-Jun-05 | 0930 | no data | 43°45.2' | 68°27.0' | 0 | 20 nm off Matinicus Rk. |
| C199-074-PN | 9-Jun-05 | 0806 | 2743.5 | 43°39.4' | 70°14.8' | 0 | Portland, ME |
| C199-075-PN | 9-Jun-05 | 1441 | 2747.6 | 43°31.5' | 70°07.8' | 0 | Outside Portland, ME |
| C199-077-PN | 10-Jun-05 | 1141 | 2818.2 | 42°43.6' | 69°33.4' | 0 | Wilkinson Basin |
| C199-080-PN | 11-Jun-05 | 1036 | 2927.3 | 42°20.7' | 70°18.4' | 0 | Stellwagen Bank |
| **Shipek Grab** | | | | | | | |
| C199-035-SG | 19-May-05 | 0354 | no data | 31°56.1' | 65°10.3' | 70 | Plantagenet Bank |
| C199-036-SG | 19-May-05 | 0414 | no data | 31°56.2' | 65°10.0' | 297 | Plantagenet Bank |
| C199-037-SG | 19-May-05 | 0525 | no data | 31°57.9' | 65°12.7' | 94 | Plantagenet Bank |
| C199-038-SG | 19-May-05 | 0647 | no data | 31°59.1' | 65°12.0' | 89 | Plantagenet Bank |
| C199-039-SG | 19-May-05 | 0703 | no data | 31°59.0' | 65°11.7' | 91 | Plantagenet Bank |
| C199-040-SG | 19-May-05 | 0732 | no data | 31°58.9' | 65°10.4' | 82 | Plantagenet Bank |
| C199-041-SG | 19-May-05 | 0807 | no data | 32°00.6' | 65°09.5' | 84 | Plantagenet Bank |
| C199-042-SG | 19-May-05 | 0817 | no data | 32°00.6' | 65°09.4' | 84 | Plantagenet Bank |
| C199-043-SG | 19-May-05 | 0846 | no data | 32°00.5' | 65°09.4' | 200 | Plantagenet Bank |
| C199-044-SG | 19-May-05 | 0858 | no data | 32°00.4' | 65°08.1' | 93 | Plantagenet Bank |
| C199-045-SG | 19-May-05 | 1021 | no data | 32°00.5' | 65°08.2' | 173 | Plantagenet Bank |
| **Fisher Scoop** | | | | | | | |
| C199-046-FS | 19-May-05 | 1716 | 1079.7 | 31°59.8' | 65°10.4' | 55 | Plantagent Bank |
| C199-047-FS | 19-May-05 | 1724 | 1079.7 | 31°59.8' | 65°11.0' | 54 | Plantagent Bank |
| C199-080-FS | 11-Jun-05 | 1031 | 2927.3 | 42°20.7' | 70°13.4' | 29 | Stellwagen Bank |
| **Gravity Core** | | | | | | | |
| C199-077-GC | 10-Jun-05 | 0924 | 2818.2 | 42°41.3' | 69°33.9' | 247 | Wilkinson Basin |

Table 4. Surface sampling station data in three harbors: Christiansted, St. Croix (8 May 05), St. George's, Bermuda (20 May 05), and Lunenburg, Nova Scotia (1 June 05).

| **Station** | **Date** | **Local Time** | **Latitude (N)** | **Longitude (W)** | **Temp. (˚C)** | **Salinity (ppt)** | **$PO_4$ (μM)** | **NO3 (μM)** | **Chl *a* (μg/L)** |
|---|---|---|---|---|---|---|---|---|---|
| SS-001 | 8-May-05 | 0659 | 17°44.994' | 64°41.778' | 28.8 | 36.6 | 0.160 | 0.157 | 0.087 |
| SS-002 | 8-May-05 | 0705 | 17°45.222' | 64°42.236' | 28.4 | 36.2 | 0.072 | 0.232 | 0.061 |
| SS-003 | 8-May-05 | 0711 | 17°45.189' | 64°42.491' | 28.3 | 36.2 | 0.145 | 0.235 | 0.066 |
| SS-004 | 8-May-05 | 0715 | 17°45.300' | 64°42.945' | 28.4 | 36.2 | 0.160 | 0.282 | 0.077 |
| SS-005 | 8-May-05 | 0721 | 17°45.479' | 64°43.295' | 28.4 | 36.2 | 0.057 | 0.303 | 0.059 |
| SS-006 | 8-May-05 | 0730 | 17°44.860' | 64°42.513' | 28.6 | 36.6 | 0.106 | 0.141 | 0.056 |
| SS-007 | 8-May-05 | 0739 | 17°44.900' | 64°42.25' | 28.5 | 36.4 | 0.135 | 0.246 | 0.068 |
| SS-008 | 8-May-05 | 0900 | 17°45.586' | 64°41.730' | 28.4 | 36.3 | 0.223 | 0.339 | 0.058 |
| SS-009 | 8-May-05 | 0909 | 17°46.598' | 64°42.175' | 28.4 | 36.2 | 0.131 | 0.132 | 0.063 |
| SS-010 | 8-May-05 | 1550 | 17°50.2' | 64°38.5' | 28.6 | 36.2 | 0.174 | 0.096 | 0.026 |
| SS-011 | 20-May-05 | 0505 | 32°22.9' | 64°38.1' | 22.0 | 37.2 | 0.463 | 0.487 | 0.033 |
| SS-012 | 20-May-05 | 0530 | 32°22.8' | 64°38.5' | 22.0 | 37.2 | 0.443 | 0.469 | 0.071 |
| SS-013 | 20-May-05 | 0618 | 32°22.8' | 64°39.5' | 22.0 | 37.2 | 0.392 | 0.440 | 0.035 |
| SS-014 | 20-May-05 | 0827 | 32°22.8' | 64°40.447' | 22.9 | 37.2 | 0.514 | 0.264 | 0.211 |
| SS-015 | 20-May-05 | 0831 | 32°22.722' | 64°40.544' | 22.9 | 37.2 | 0.437 | 0.287 | 0.149 |
| SS-016 | 20-May-05 | 0834 | 32°22.699' | 64°40.90' | 22.7 | 37.2 | 0.386 | 0.187 | 0.195 |
| SS-017 | 20-May-05 | 0838 | 32°22.4' | 64°39.733' | 22.8 | 37.2 | 0.450 | 0.246 | 0.092 |
| SS-018 | 20-May-05 | 0843 | 32°22.489' | 64°40.121' | 22.9 | 37.2 | 0.450 | 0.166 | 0.071 |
| SS-019 | 20-May-05 | 0848 | 32°22.286' | 64°40.264' | 23.2 | 37.1 | 0.392 | 0.337 | 0.110 |
| SS-020 | 20-May-05 | 0855 | 32°22.339' | 64°40.679' | 22.9 | 37.2 | 0.386 | 0.219 | 0.074 |
| SS-021 | 20-May-05 | 0858 | 32°22.479' | 64°41.236' | 22.9 | 37.2 | 0.418 | 0.178 | 0.103 |
| SS-022 | 20-May-05 | 0908 | 32°22.493' | 64°40.979' | 23.0 | 37.2 | 0.386 | 0.082 | 0.295 |
| SS-023 | 20-May-05 | 0905 | 32°22.563' | 64°40.577' | 22.9 | 37.2 | 0.501 | 0.185 | 0.062 |
| SS-024 | 20-May-05 | 1449 | 32°22.4' | 64°40.447' | 23.7 | 37.2 | 0.348 | 0.622 | 0.138 |
| SS-025 | 20-May-05 | 1500 | 32°22.722' | 64°40.344' | 23.4 | 37.2 | 0.456 | 0.228 | 0.224 |
| SS-026 | 20-May-05 | 1503 | 32°22.699' | 64°40.90' | 23.4 | 37.2 | 0.341 | 0.164 | 0.093 |
| SS-027 | 20-May-05 | 1510 | 32°22.4' | 64°39.733' | 23.3 | 37.2 | 0.418 | 0.353 | 0.042 |
| SS-028 | 20-May-05 | 1523 | 32°22.489' | 64°40.121' | 24.2 | 37.3 | 0.411 | 0.239 | 0.112 |
| SS-029 | 20-May-05 | 1534 | 32°22.286' | 64°40.264' | 23.3 | 37.1 | 0.450 | 0.096 | 0.172 |
| SS-030 | 20-May-05 | 1539 | 32°22.339' | 64°40.679' | 23.5 | 37.1 | 0.411 | 0.157 | 0.185 |
| SS-031 | 20-May-05 | 1545 | 32°22.479' | 64°41.236' | 23.6 | 37.1 | 0.443 | 0.355 | 0.063 |
| SS-032 | 20-May-05 | 1552 | 32°22.493' | 64°40.979' | 23.4 | 37.1 | 0.328 | 0.091 | 0.065 |
| SS-033 | 20-May-05 | 1558 | 32°22.563' | 64°40.577' | 23.4 | 37.2 | 0.316 | 0.178 | 0.093 |
| SS-034 | 1-Jun-05 | 1421 | 44°19.763' | 64°14.799' | 13.5 | 25.9 | 0.936 | 0.153 | 1.083 |
| SS-035 | 1-Jun-05 | 1440 | 44°21.140' | 64°16.778' | 13.8 | 25.9 | 0.776 | 0.192 | 0.340 |
| SS-036 | 1-Jun-05 | 1443 | 44°21.356' | 64°17.373' | 13.1 | 25.9 | 0.769 | 0.233 | 0.437 |
| SS-037 | 1-Jun-05 | 1659 | 44°22.571' | 64°18.975' | 17.9 | 23.1 | 2.227 | 3.247 | 2.280 |
| SS-038 | 1-Jun-05 | 1705 | 44°22.518' | 64°18.706' | 16.9 | 23.6 | 0.870 | 0.898 | 1.030 |
| SS-039 | 1-Jun-05 | 1712 | 44°22.434' | 64°18.236' | 15.5 | 24.2 | 1.044 | 0.285 | 1.417 |
| SS-040 | 1-Jun-05 | 1716 | 44°22.98' | 64°17.925' | 12.9 | 25.8 | 0.673 | 0.016 | 0.619 |
| SS-041 | 1-Jun-05 | 1723 | 44°21.791' | 64°17.942' | 12.5 | 25.8 | 0.693 | 0.000 | 0.610 |
| SS-042 | 1-Jun-05 | 1733 | 44°21.693' | 64°18.636' | 12.9 | 26.0 | 0.603 | 0.108 | 0.582 |
| SS-043 | 1-Jun-05 | 1742 | 44°21.875' | 64°19.49' | 16.5 | 24.0 | 0.693 | 0.067 | 0.642 |
| SS-044 | 1-Jun-05 | 1753 | 44°22.39' | 64°18.388' | 14.0 | 25.2 | 0.705 | 0.036 | 1.254 |

Table 4 continued.

| Station | Date | Local Time | Latitude (N) | Longitude (W) | Temp. (˚C) | Salinity (ppt) | $PO_4$ (μM) | NO3 (μM) | Chl *a* (μg/L) |
|---|---|---|---|---|---|---|---|---|---|
| SS-045 | 1-Jun-05 | 1758 | 44°22.226' | 64°18.373' | 13.3 | 25.4 | 0.705 | 0.000 | 0.484 |
| SS-046 | 1-Jun-05 | 1807 | 44°22.221' | 64°18.808' | 13.2 | 25.4 | 0.686 | 0.079 | 1.916 |
| SS-047 | 1-Jun-05 | 2319 | 44°22.500' | 64°18.781' | 14.2 | 24.7 | 0.673 | 0.514 | 0.521 |
| SS-048 | 1-Jun-05 | 2321 | 44°22.497' | 64°18.679' | 13.8 | 24.8 | 0.948 | 0.581 | 0.614 |
| SS-049 | 1-Jun-05 | 2329 | 44°22.420' | 64°18.213' | 14.1 | 24.9 | 0.987 | 0.353 | 0.423 |
| SS-050 | 1-Jun-05 | 2333 | 44°22.79' | 64°17.931' | 14.5 | 24.6 | 0.820 | 0.521 | 0.567 |
| SS-051 | 1-Jun-05 | 2340 | 44°21.791' | 64°17.942' | 13.8 | 25.1 | 0.757 | 0.016 | 1.235 |
| SS-052 | 2-Jun-05 | 0001 | 44°21.690' | 64°18.665' | 12.2 | 25.7 | 0.629 | 0.141 | 0.230 |
| SS-053 | 2-Jun-05 | 0009 | 44°21.847' | 64°19.66' | 10.5 | 26.4 | 0.737 | 0.024 | 0.399 |
| SS-054 | 2-Jun-05 | 0019 | 44°22.39' | 64°18.374' | 13.2 | 25.1 | 0.565 | 0.019 | 0.257 |
| SS-055 | 2-Jun-05 | 0023 | 44°22.237' | 64°18.274' | 13.2 | 25.2 | 0.597 | 0.048 | 1.319 |
| SS-056 | 2-Jun-05 | 0035 | 44°22.253' | 64°18.808' | 13.8 | 14.8 | 0.571 | 0.158 | 1.567 |

Table 5. Neuston net tow data.

| Station | Tow Length (m) | Temp. (˚C) | Salinity (ppt) | Zoop. Biomass (ml) | Zoop. Density (ml/m$^2$) | Plastic Pellets (#) | Plastic Pieces (#) | Tar Pieces (#) |
|---|---|---|---|---|---|---|---|---|
| C199-001-NT | 1482 | 28.3 | 36.2 | 18.0 | 0.0121 | 0 | 0 | 0 |
| C199-003-NT | 2037 | 28.6 | 35.8 | 7.0 | 0.0034 | 0 | 1 | 0 |
| C199-005-NT | 1296 | 27.7 | 36.3 | 7.0 | 0.0054 | 16 | 1 | 0 |
| C199-007-NT | 1852 | 28.4 | 36.2 | 3.0 | 0.0016 | 1 | 22 | 0 |
| C199-009-NT | 1111 | 27.5 | 36.8 | 4.5 | 0.0040 | 1 | 6 | 0 |
| C199-011-NT | 1852 | 26.5 | 36.7 | 4.0 | 0.0021 | 0 | 24 | 0 |
| C199-013-NT | 1389 | 26.8 | 36.6 | 5.0 | 0.0036 | 0 | 11 | 0 |
| C199-015-NT | 1481 | 26.7 | 36.5 | 3.0 | 0.0020 | 0 | 50 | 1 |
| C199-016-NT | 1111 | 25.5 | 36.8 | 3.8 | 0.0028 | 0 | 12 | 1 |
| C199-019-NT | 1852 | 25.1 | 37.0 | 7.0 | 0.0038 | 0 | 25 | 0 |
| C199-021-NT | 1852 | 25.0 | 37.0 | 2.0 | 0.0011 | 2 | 102 | 0 |
| C199-022-NT | 1852 | 25.9 | 36.7 | 1.0 | 0.0005 | 0 | 7 | 1 |
| C199-024-NT | 1852 | 26.0 | 36.9 | 1.0 | 0.0005 | 0 | 48 | 0 |
| C199-025-NT | 1852 | 24.7 | 37.4 | 7.0 | 0.0038 | 0 | 29 | 5 |
| C199-026-NT | 1667 | 24.5 | 36.9 | 2.0 | 0.0010 | 2 | 75 | 4 |
| C199-028-NT | 1852 | 24.4 | 37.0 | 5.0 | 0.0027 | 0 | 15 | 0 |
| C199-030-NT | 1852 | 22.8 | 36.9 | 6.0 | 0.0032 | 0 | 122 | 10 |
| C199-032-NT | 1852 | 22.0 | 36.9 | 39.5 | 0.0213 | 2 | 198 | 0 |
| C199-034-NT | 2037 | 22.5 | 36.9 | 32.0 | 0.0157 | 0 | 53 | 0 |
| C199-047-NT | 2222 | 21.8 | 36.9 | 10.0 | 0.0045 | 0 | 22 | 0 |
| C199-049-NT | 1852 | 21.4 | 36.8 | 8.0 | 0.0043 | 13 | 1 | 0 |
| C199-051-NT | 1852 | 21.0 | 36.8 | 19.0 | 0.0100 | 0 | 12 | 0 |
| C199-054-NT | 1852 | 20.5 | 36.6 | 8.5 | 0.0046 | 0 | 21 | 0 |
| C199-056-NT | 2037 | 23.3 | 36.4 | 6.0 | 0.0029 | 0 | 4 | 0 |
| C199-057-NT | 1852 | 19.5 | 35.7 | 15.0 | 0.0081 | 0 | 2 | 1 |
| C199-061-NT | 1111 | 4.9 | 32.7 | 12.0 | 0.0108 | 0 | 1 | 0 |
| C199-063-NT | 1667 | 4.7 | 32.3 | <1.0 | 0.0006 | 1 | 246 | 27 |
| C199-066-NT | 1482 | 6.3 | 32.5 | 50.0 | 0.0337 | 0 | 3 | 0 |
| C199-067-NT | 1852 | 9.5 | 32.9 | 16.0 | 0.0086 | 0 | 43 | 4 |
| C199-068-NT | 1667 | 6.5 | 31.1 | <1.0 | 0.0006 | 1 | 90 | 0 |
| C199-069-NT | 1667 | 5.7 | 31.2 | 36.0 | 0.0216 | 0 | 0 | 0 |
| C199-070-NT | 1667 | 6.5 | 32.3 | 15.0 | 0.0090 | 0 | 1 | 0 |
| C199-072-NT | 1277 | 10.0 | 31.8 | 20.0 | 0.0160 | 4 | 19 | 0 |
| C199-073-NT | 1852 | 11.9 | 29.4 | 23.0 | 0.0124 | 1 | 15 | 0 |
| C199-076-NT | 1667 | 13.2 | 30.4 | 24.0 | 0.0140 | 0 | 8 | 0 |
| C199-078-NT | 1852 | 11.1 | 31.8 | 3.5 | 0.0019 | 0 | 4 | 0 |
| C199-079-NT | 1667 | 11.1 | 32.6 | 98.0 | 0.0588 | 0 | 5 | 0 |
| C199-081-NT | 1111 | 15.3 | 31.2 | 44.0 | 0.0400 | 0 | 0 | 0 |
| C199-082-NT | 1296 | 16.6 | 28.7 | 94.0 | 0.0725 | 0 | 14 | 0 |
| C199-083-NT | 1996 | 30.7 | 15.1 | 133.0 | 0.0660 | 0 | 1 | 0 |

Table 6. Hydrocast bottle data.

| **Station** | **Bottle** | **Depth (m)** | **$O_2$ * (ml/L)** | **$PO_4$ * (μM)** | **Chl *a* * (μg/L)** | **$NO_3$ * (μM)** |
|---|---|---|---|---|---|---|
| C199-006B-HC | 13 | 0.0 | | 0.082 | 0.035 | 0.187 |
| C199-006B-HC | 12 | 29.2 | | | 0.021 | |
| C199-006B-HC | 11 | 60.3 | | | 0.048 | 0.091 |
| C199-006B-HC | 10 | 89.6 | | | 0.147 | |
| C199-006B-HC | 9 | 94.2 | | 0.101 | 0.114 | 0.123 |
| C199-006B-HC | 8 | 99.6 | | | 0.037 | |
| C199-006B-HC | 7 | 104.3 | | 0.126 | 0.045 | 0.116 |
| C199-006B-HC | 6 | 109.6 | | | 0.058 | |
| C199-006B-HC | 5 | 115 | | 0.087 | 0.056 | 0.103 |
| C199-006B-HC | 4 | 119 | | | 0.065 | |
| C199-006B-HC | 3 | 124.9 | | 0.091 | 0.054 | 0.162 |
| C199-006B-HC | 2 | 153.7 | | | 0.022 | |
| C199-006B-HC | 1 | 184.8 | | 0.145 | 0.009 | 2.373 |
| C199-010B-HC | 13 | 0.0 | | 0.209 | 0.012 | 0.139 |
| C199-010B-HC | 12 | 29.5 | | | 0.011 | |
| C199-010B-HC | 11 | 60.3 | | 0.424 | 0.019 | 0.153 |
| C199-010B-HC | 10 | 64.1 | | | 0.031 | |
| C199-010B-HC | 9 | 69.5 | | 0.165 | 0.030 | 0.173 |
| C199-010B-HC | 8 | 75.7 | | | 0.008 | |
| C199-010B-HC | 6 | 89.1 | | | 0.062 | |
| C199-010B-HC | 5 | 109.6 | | 0.101 | 0.043 | 0.194 |
| C199-010B-HC | 4 | 129.3 | | | 0.108 | |
| C199-010B-HC | 3 | 149.5 | | 0.111 | 0.069 | 0.239 |
| C199-010B-HC | 2 | 168.8 | | | 0.101 | |
| C199-010B-HC | 1 | 199.0 | | 0.165 | 0.010 | 1.963 |
| C199-012-HC | 13 | 0.0 | 4.38 | 0.282 | | 0.294 |
| C199-012-HC | 12 | 50 | 4.71 | 0.292 | | 0.175 |
| C199-012-HC | 11 | 100 | 4.50 | 0.170 | | 0.121 |
| C199-012-HC | 10 | 124 | 4.52 | 0.238 | | 0.144 |
| C199-012-HC | 9 | 149 | 4.32 | 0.253 | | 0.522 |
| C199-012-HC | 8 | 175.0 | 4.61 | 0.121 | | 0.487 |
| C199-012-HC | 7 | 199 | 3.99 | 0.072 | | 1.929 |
| C199-012-HC | 6 | 249 | 4.31 | 0.243 | | 3.218 |
| C199-012-HC | 5 | 299 | 4.59 | 0.433 | | 7.136 |
| C199-012-HC | 4 | 497 | 3.54 | 1.137 | | 17.020 |
| C199-012-HC | 3 | 696 | 3.08 | 1.864 | | 26.449 |
| C199-012-HC | 2 | 894 | 3.12 | 2.109 | | 27.543 |
| C199-012-HC | 1 | 1091 | 3.88 | 1.884 | | 28.360 |
| C199-014B-HC | 13 | 0.0 | | 0.033 | 0.025 | 0.130 |
| C199-014B-HC | 12 | 30.0 | | | 0.043 | |
| C199-014B-HC | 11 | 60.0 | | 0.047 | 0.040 | 0.114 |
| C199-014B-HC | 10 | 74.0 | | | 0.059 | |
| C199-014B-HC | 9 | 80.0 | | 0.091 | 0.062 | 0.084 |
| C199-014B-HC | 8 | 85.0 | | | 0.085 | |
| C199-014B-HC | 7 | 89.0 | | 0.170 | 0.085 | 0.128 |

* blank spaces indicate no data collected

Table 6 continued.

| Station | Bottle | Depth (m) | $O_2$ * (ml/L) | $PO_4$ * (μM) | Chl *a* * (μg/L) | $NO_3$ * (μM) |
|---|---|---|---|---|---|---|
| C199-014B-HC | 6 | 94.0 | | | 0.121 | |
| C199-014B-HC | 5 | 99.0 | | 0.033 | 0.115 | 0.155 |
| C199-014B-HC | 4 | 124.0 | | | 0.114 | |
| C199-014B-HC | 3 | 148.0 | | 0.047 | 0.023 | 0.307 |
| C199-014B-HC | 2 | 169.0 | | | 0.040 | |
| C199-014B-HC | 1 | 200.0 | | 0.106 | 0.014 | 0.667 |
| C199-017A-HC | 13 | 0.0 | 4.67 | | | 0.417 |
| C199-017A-HC | 12 | 51.1 | 4.91 | 0.047 | | 0.096 |
| C199-017A-HC | 11 | 99.4 | 4.58 | 0.062 | | 0.412 |
| C199-017A-HC | 10 | 124.7 | 4.41 | 0.131 | | 1.742 |
| C199-017A-HC | 9 | 149.9 | 4.52 | 0.126 | | 2.838 |
| C199-017A-HC | 8 | 173.7 | 4.42 | 0.145 | | 3.312 |
| C199-017A-HC | 7 | 197.9 | 4.37 | 0.116 | | 4.250 |
| C199-017A-HC | 6 | 249.1 | 4.37 | 0.253 | | 5.683 |
| C199-017A-HC | 5 | 297.5 | 4.27 | 0.341 | | 7.637 |
| C199-017A-HC | 4 | 496.8 | 3.95 | 0.697 | | 13.854 |
| C199-017A-HC | 3 | 694.8 | 3.34 | 1.400 | | 22.988 |
| C199-017A-HC | 2 | 892.8 | 3.64 | 1.698 | | 25.265 |
| C199-017A-HC | 1 | 1091.3 | 4.62 | 1.659 | | 22.168 |
| C199-017B-HC | 13 | 0.0 | | 0.038 | 0.020 | 0.417 |
| C199-017B-HC | 12 | 30.0 | | | 0.011 | |
| C199-017B-HC | 11 | 60.0 | | 0.033 | 0.026 | 0.091 |
| C199-017B-HC | 10 | 92.0 | | | 0.095 | |
| C199-017B-HC | 9 | 94.0 | | 0.038 | 0.180 | 0.162 |
| C199-017B-HC | 8 | 100.0 | | | 0.212 | |
| C199-017B-HC | 7 | 101.0 | | 0.018 | 0.116 | 0.649 |
| C199-017B-HC | 6 | 101.0 | | | 0.063 | |
| C199-017B-HC | 5 | 101.0 | | 0.106 | 0.039 | 1.897 |
| C199-017B-HC | 4 | 101.0 | | | 0.051 | |
| C199-017B-HC | 2 | 154.0 | | | 0.020 | |
| C199-017B-HC | 1 | 184.0 | | 0.150 | 0.002 | 3.387 |
| C199-023B-HC | 13 | 0.0 | | 0.013 | 0.008 | 0.075 |
| C199-023B-HC | 12 | 53.8 | | | 0.014 | |
| C199-023B-HC | 11 | 59.7 | | 0.121 | 0.014 | 0.082 |
| C199-023B-HC | 10 | 78.9 | | | 0.032 | |
| C199-023B-HC | 9 | 84.7 | | 0.008 | 0.034 | |
| C199-023B-HC | 8 | 88.9 | | | 0.048 | |
| C199-023B-HC | 7 | 94.3 | | 0.052 | 0.062 | 0.096 |
| C199-023B-HC | 6 | 99.6 | | | 0.043 | |
| C199-023B-HC | 5 | 109.9 | | 0.047 | 0.050 | 0.091 |
| C199-023B-HC | 4 | 118.6 | | | 0.072 | |
| C199-023B-HC | 3 | 129.8 | | 0.038 | 0.048 | 0.526 |
| C199-023B-HC | 2 | 159.3 | | | 0.019 | |
| C199-023B-HC | 1 | 188.5 | | 0.023 | 0.011 | 1.521 |
| C199-031A-HC | 13 | 0.0 | | 0.277 | 0.011 | 0.109 |

* blank spaces indicate no data collected

Table 6 continued.

| Station | Bottle | Depth (m) | $O_2$ * (ml/L) | $PO_4$ * (μM) | Chl *a* * (μg/L) | $NO_3$ * (μM) |
|---|---|---|---|---|---|---|
| C199-031A-HC | 12 | 29.6 | | | 0.006 | |
| C199-031A-HC | 11 | 60.2 | | 0.322 | 0.021 | 0.050 |
| C199-031A-HC | 10 | 75.3 | | | 0.047 | |
| C199-031A-HC | 9 | 79.5 | | 0.239 | 0.084 | 0.150 |
| C199-031A-HC | 8 | 84.5 | | | 0.054 | |
| C199-031A-HC | 7 | 89.8 | | 0.226 | 0.166 | 0.667 |
| C199-031A-HC | 6 | 94.1 | | 0.194 | 0.149 | 0.745 |
| C199-031A-HC | 4 | 119.2 | | | 0.040 | |
| C199-031A-HC | 3 | 149.2 | | 0.277 | 0.004 | 1.674 |
| C199-031A-HC | 2 | 169.1 | | 0.162 | 0.075 | 0.082 |
| C199-050A-HC | 13 | 0.0 | 5.09 | 0.303 | | |
| C199-050A-HC | 12 | 49.0 | 5.29 | 0.328 | | 0.026 |
| C199-050A-HC | 11 | 100.0 | 4.98 | 0.348 | | 1.393 |
| C199-050A-HC | 10 | 124.0 | 4.89 | 0.379 | | 2.003 |
| C199-050A-HC | 9 | 149.0 | 5.00 | 0.437 | | 2.481 |
| C199-050A-HC | 8 | 173.0 | 4.77 | 0.411 | | 3.053 |
| C199-050A-HC | 7 | 199.0 | 4.92 | 0.392 | | 2.875 |
| C199-050A-HC | 6 | 249.0 | 4.78 | 0.750 | | 3.502 |
| C199-050A-HC | 5 | 298.0 | 4.71 | 0.482 | | 3.106 |
| C199-050A-HC | 4 | 497.0 | 4.15 | 0.820 | | 9.976 |
| C199-050A-HC | 3 | 695.0 | 3.88 | 1.715 | | 19.296 |
| C199-050B-HC | 13 | 0.0 | | | 0.006 | 0.216 |
| C199-050B-HC | 12 | 30.0 | | | 0.009 | |
| C199-050B-HC | 11 | 59.0 | | 0.367 | 0.111 | 0.283 |
| C199-050B-HC | 10 | 65.0 | | | 0.145 | |
| C199-050B-HC | 9 | 69.0 | | 0.348 | 0.062 | 0.879 |
| C199-050B-HC | 8 | 75.0 | | | 0.119 | |
| C199-050B-HC | 7 | 80.0 | | 0.322 | 0.042 | 1.136 |
| C199-050B-HC | 6 | 85.0 | | | 0.045 | |
| C199-050B-HC | 4 | 99.0 | | | 0.034 | |
| C199-050B-HC | 3 | 124.0 | | 0.475 | 0.022 | 1.883 |
| C199-050B-HC | 2 | 155.0 | | | 0.014 | |
| C199-050B-HC | 1 | 184.0 | | 0.552 | 0.001 | 3.994 |
| C199-058B-HC | 13 | 0.0 | | 0.699 | 0.773 | 1.345 |
| C199-058B-HC | 12 | 5.0 | | | 0.467 | |
| C199-058B-HC | 11 | 10.0 | | 0.910 | 0.439 | 6.348 |
| C199-058B-HC | 10 | 14.0 | | | 0.957 | |
| C199-058B-HC | 9 | 21.0 | | 0.546 | 0.771 | 1.035 |
| C199-058B-HC | 8 | 25.0 | | | 0.234 | |
| C199-058B-HC | 7 | 29.0 | | 0.584 | 0.201 | 1.448 |
| C199-058B-HC | 6 | 35.0 | | | 0.315 | |
| C199-058B-HC | 5 | 39.0 | | 0.654 | 0.341 | 1.314 |
| C199-058B-HC | 4 | 48.0 | | | 0.075 | |
| C199-058B-HC | 3 | 60.0 | | 0.757 | 0.041 | 5.054 |
| C199-058B-HC | 2 | 79.0 | | | 0.020 | |
| C199-058B-HC | 1 | 101.0 | | 1.051 | 0.015 | 11.009 |

* blank spaces indicate no data collected

Table 6 continued.

| **Station** | **Bottle** | **Depth (m)** | **$O_2$ * (ml/L)** | **$PO_4$ * (μM)** | **Chl *a* * (μg/L)** | **$NO_3$ * (μM)** |
|---|---|---|---|---|---|---|
| C199-060-HC | 13 | 0.0 | 6.99 | 1.319 | | 0.518 |
| C199-060-HC | 12 | 25.0 | 6.81 | 0.942 | | 0.091 |
| C199-060-HC | 11 | 50.0 | 6.54 | 1.070 | | 2.901 |
| C199-060-HC | 10 | 75.0 | 5.39 | 1.549 | | 18.047 |
| C199-060-HC | 9 | 99.0 | 4.67 | 1.945 | | 17.591 |
| C199-060-HC | 8 | 149.0 | 4.44 | 2.271 | | 21.650 |
| C199-060-HC | 7 | 199.0 | 4.18 | 2.380 | | 23.812 |
| C199-060-HC | 6 | 299.0 | 4.40 | 2.444 | | 24.341 |
| C199-060-HC | 4 | 497.0 | 5.59 | 2.144 | | 21.554 |
| C199-060-HC | 3 | 596.0 | 5.13 | 2.220 | | 20.761 |
| C199-060-HC | 2 | 794.0 | 6.29 | 2.086 | | 19.440 |
| C199-060-HC | 1 | 993.0 | 6.38 | 2.009 | | 21.746 |
| C199-062-HC | 13 | 0 | 7.32 | 1.089 | 0.481 | 0.127 |
| C199-062-HC | 12 | 25 | 7.40 | 0.131 | 0.344 | 0.269 |
| C199-062-HC | 11 | 50 | 6.55 | 1.115 | 0.086 | 2.140 |
| C199-062-HC | 10 | 75 | 5.62 | 1.319 | 0.066 | 5.652 |
| C199-062-HC | 9 | 100 | 6.32 | 1.696 | 0.022 | 11.705 |
| C199-062-HC | 8 | 149 | 4.65 | 2.099 | 0.009 | 17.158 |
| C199-062-HC | 7 | 199 | 4.57 | 2.348 | 0.004 | 19.344 |
| C199-062-HC | 6 | 249 | 4.32 | 2.412 | 0.003 | 21.314 |
| C199-062-HC | 4 | 349 | 4.99 | 2.355 | 0.004 | 20.377 |
| C199-062-HC | 3 | 398 | 5.46 | 2.303 | 0.006 | 18.840 |
| C199-062-HC | 2 | 448 | 7.08 | 0.916 | 0.533 | 0.007 |
| C199-077B-HC | 13 | 0.0 | 6.72 | | 0.554 | |
| C199-077B-HC | 12 | 10.0 | 7.38 | | 0.453 | |
| C199-077B-HC | 11 | 20.0 | 7.20 | | 0.363 | |
| C199-077B-HC | 10 | 40.0 | 6.93 | | 0.055 | |
| C199-077B-HC | 9 | 60.0 | 6.78 | | 0.015 | |
| C199-077B-HC | 8 | 80.0 | 6.53 | | 0.010 | |
| C199-077B-HC | 7 | 100.0 | 6.41 | | 0.014 | |
| C199-077B-HC | 6 | 120.0 | 6.08 | | 0.018 | |
| C199-077B-HC | 4 | 159.0 | 5.52 | | 0.011 | |
| C199-077B-HC | 3 | 179.0 | 5.18 | | 0.008 | |
| C199-077B-HC | 2 | 199.0 | 5.20 | | 0.008 | |
| C199-077B-HC | 1 | 208.0 | 5.12 | | 0.010 | |
| C199-080-HC | 13 | 0.0 | 6.85 | | 0.611 | |
| C199-080-HC | 12 | 2.0 | 7.02 | | 0.235 | |
| C199-080-HC | 11 | 5.0 | 7.03 | | 0.628 | |
| C199-080-HC | 10 | 6.0 | 7.66 | | 1.521 | |
| C199-080-HC | 9 | 8.0 | 7.87 | | 3.532 | |
| C199-080-HC | 8 | 10.0 | 7.68 | | 4.092 | |
| C199-080-HC | 7 | 10.0 | 7.61 | | 4.456 | |
| C199-080-HC | 6 | 12.0 | 7.18 | | 2.613 | |
| C199-080-HC | 4 | 16.0 | 6.81 | | 0.463 | |
| C199-080-HC | 3 | 18.0 | 6.75 | | 0.270 | |
| C199-080-HC | 2 | 20.0 | 2.37 | | 0.536 | |

* blank spaces indicate no data collected

## Scientific Results: Student Abstracts

Bacterial Abundance, Dissolved Oxygen, and Nutrient Concentrations with Depth along a South-North Transect in the Atlantic Ocean.

Rika Anderson and Michael Schrimpf

Within the marine ecosystem, bacteria function as both heterotrophic decomposers and autotrophic producers. Water between 0 and 2000 m along a South-North transect of the Atlantic Ocean was analyzed for dissolved oxygen, nitrate and phosphate concentrations. DAPI stained bacteria from these samples were counted to determine the correlation between these variables and bacterial abundance. Bacterial abundance was directly correlated with dissolved oxygen concentrations and inversely correlated with nitrate concentrations with depth. These results indicate that the majority of the bacteria sampled along this cruise track were autotrophic, although a secondary peak in bacterial abundance detected in deeper waters may have been heterotrophic. Bacteria in the water column are therefore separated into at least two different and isolated communities.

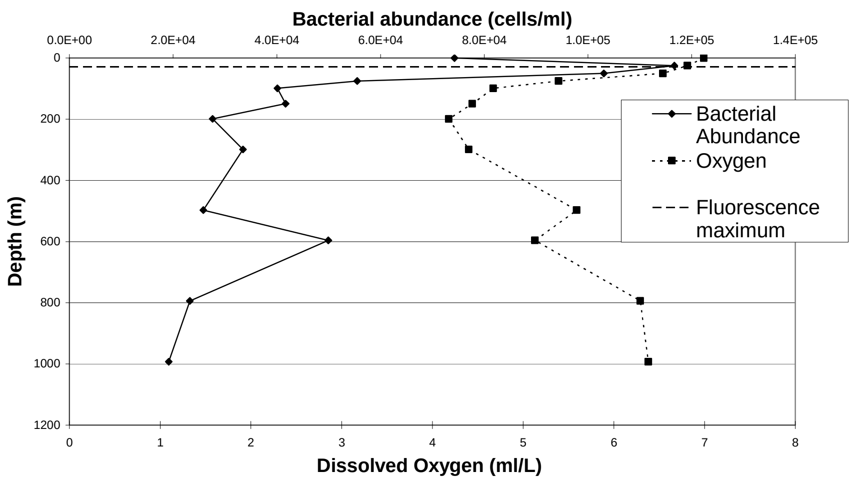


Figure 3. Bacterial abundance and dissolved oxygen concentrations at station C199-060-HC in slope waters off the coast of Nova Scotia.

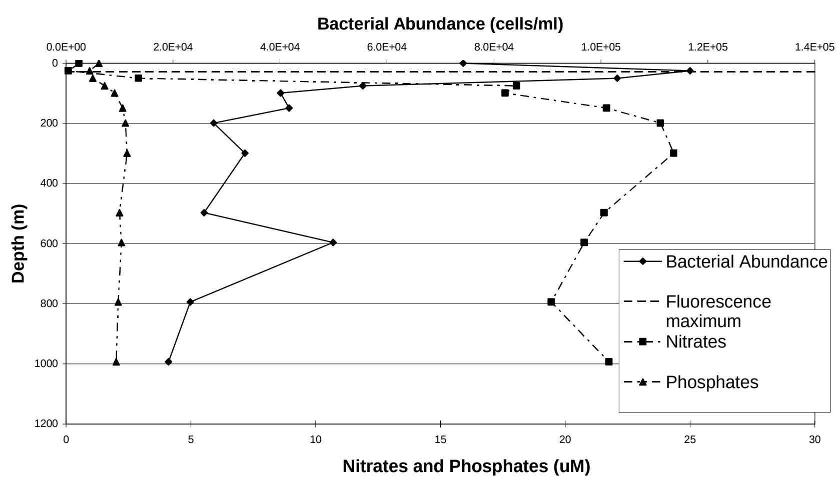


Figure 4. Bacteria, nitrate and phosphate concentrations at station C199-060-HC.

An Analysis of Pelagic Tar and Plastic Pollution along a south to north Transect of the Sargasso Sea.

Kae Bosman-Clark and Phoebe VanVleet

Due to the increased awareness about the abundance and possible repercussions of plastic and tar pollution in our oceans, legislative actions have been taken to decrease the amount going in. For our onboard research we anticipated finding a decrease in the amount of pollution, while expecting to see relative concentrations of these pollutants due to ocean circulation patterns.

In collecting pieces of plastic and tar in bi-daily neuston tows following a south to north transect of the Atlantic Ocean, we found less tar and more plastic than anticipated. Using past SEA data for similar cruise tracks as a reference point, we found an 80% decrease in the tar density as compared to data for 1995. This indicates the positive impact of recent legislation for cleaner oil transportation practices. Plastics were found to be decreasing in comparison to recent years, but still part of a larger rise. Both appear to be the most abundant around the Sub-Tropical Convergence Zone, or STCZ, suggesting that ocean circulation patterns concentrate not only the ocean water, but physical pollutants as well.

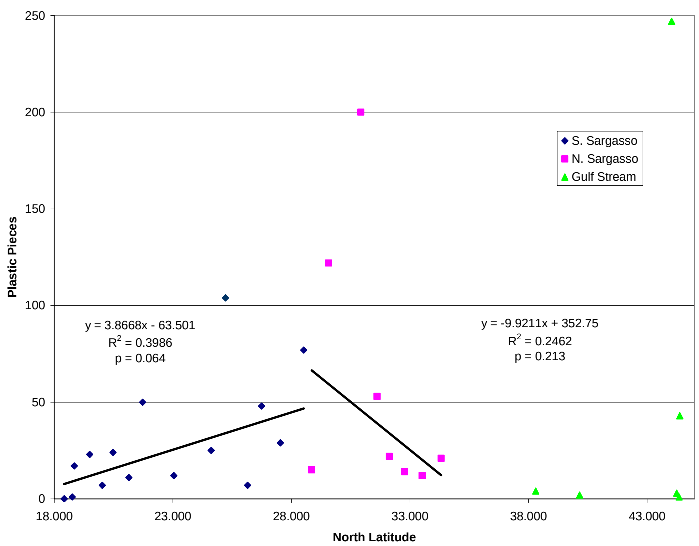


Figure 5. Number of plastic pieces found along C199 cruise track, including regression analyses for N and S Sargasso Sea regions.

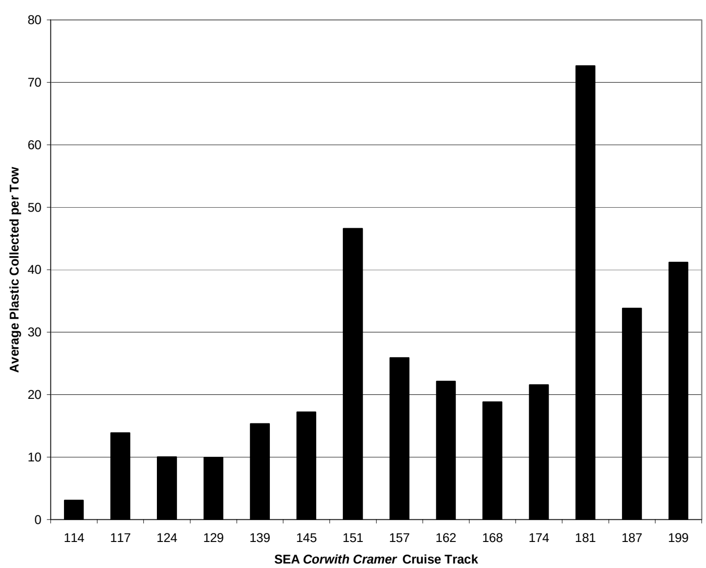


Figure 6. Average number of plastic pieces collected per neuston tow during past SEA cruises in the Sargasso Sea.

Pigmentation and Size of Copepods in relation to Diel Vertical Migration in the Sargasso Sea.

Jessica Chen

Many studies have documented the diel vertical migration of copepods in various waters, but not extensively in the Sargasso Sea. The purpose of this experiment is to determine the DVM trends and investigate the effect of size on the relation between color and DVM in the Sargasso Sea and the Gully. Samples were gathered in 20 neuston net tows (at midnight and noon) in the Sargasso Sea. As expected, clear and orange copepods mainly displayed nocturnal DVM for most of the Sargasso Sea. Possible explanations for this behavior include avoidance of predators for the orange pigmented copepods and photodamage avoiding for the clear copepods. However, some reverse DVM was observed in clear copepods in the Southern Sargasso Sea and in orange copepods in the Northern Sargasso Sea and in the Gully. These migration deviations from the normal DVM may be due to different copepod species displaying different behavior and adaptations. Contrary to the hypothesis, blue copepods were found in significant numbers during the day, indicating the occurrence of reverse DVM. This trend could be due to the fact their blue pigments camouflage well in the deep blue Sargasso Sea and protect them from photodamage while feeding in relatively less competitive waters. Additionally, as expected, size was not found to have any relation to DVM, let alone effect the relation between pigmentation and DVM. Further studies on color and DVM relations are strongly suggested to include species identification with color.

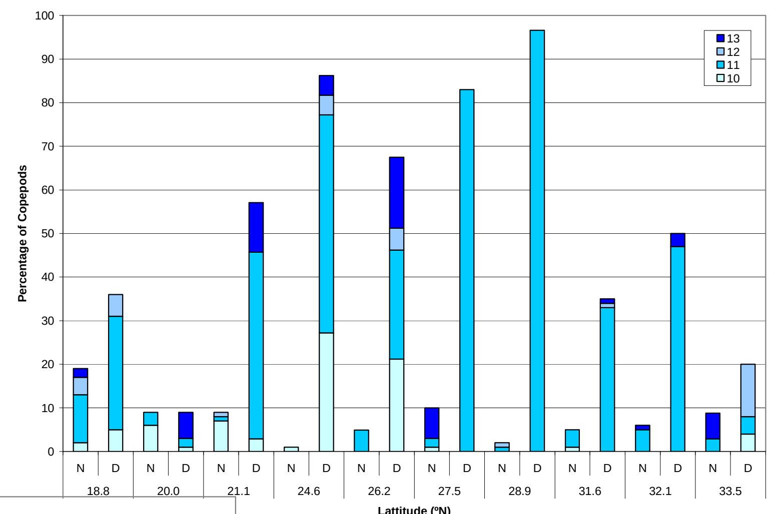


Figure 7. Percentage of blue shade copepods found in night and day neuston tows.

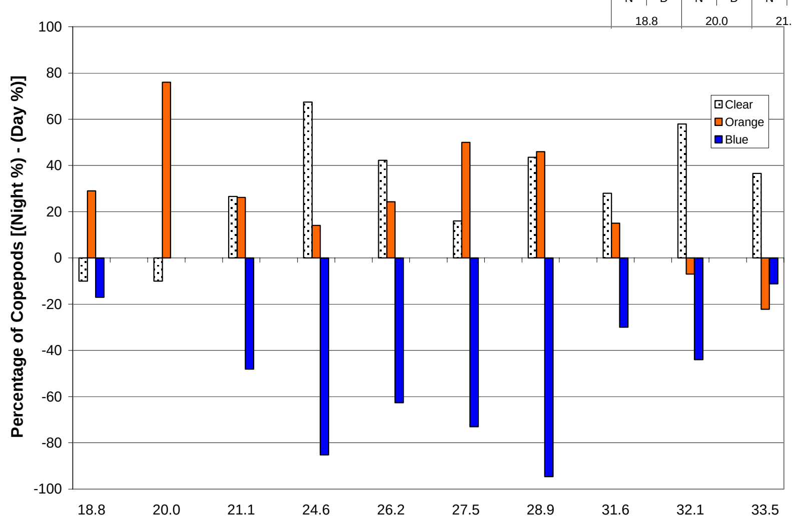


Figure 8. Difference between the percentage of copepods during the day and night graphed against latitude.

# Effects of Salinity and Temperature on Size and Distribution of Myctophidae Species in the Atlantic.

Brittany Clark

Myctophids are the most abundant mesopelagic fish, yet not much is known about their ideal habitat. Temperature and salinity are important environmental factors that could inhibit or encourage their growth. To look at the relationship between the Myctophids, temperature, and salinity, nets were deployed between the latitudes of 18° 25.0'N and 40° 9.3'N in the North Atlantic gyre and eight species of Myctophids were caught. Myctophids showed greater species diversity at higher latitudes. There was also a negative correlation between temperature and Myctophid length. This may indicate that Myctophids are healthier in colder waters. *C. nigroocellates* was unusual in that it was the only species to have a stronger correlation to salinity than temperature. Salinity may have more of an effect on the survival of other species as well, but it was hard to determine given the limited number of Myctophids in each species caught.

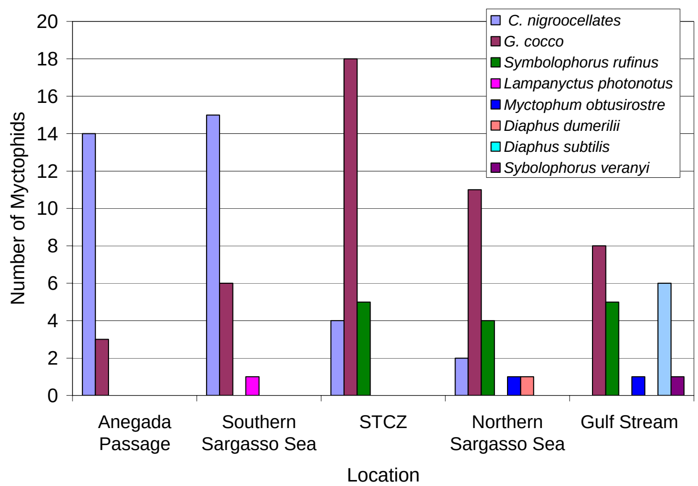


Figure 9. Species distribution of Myctophids caught along C-199 cruise track. Species are divided into the number found in various locations along the cruise track using either a neuston net or meter net tow.

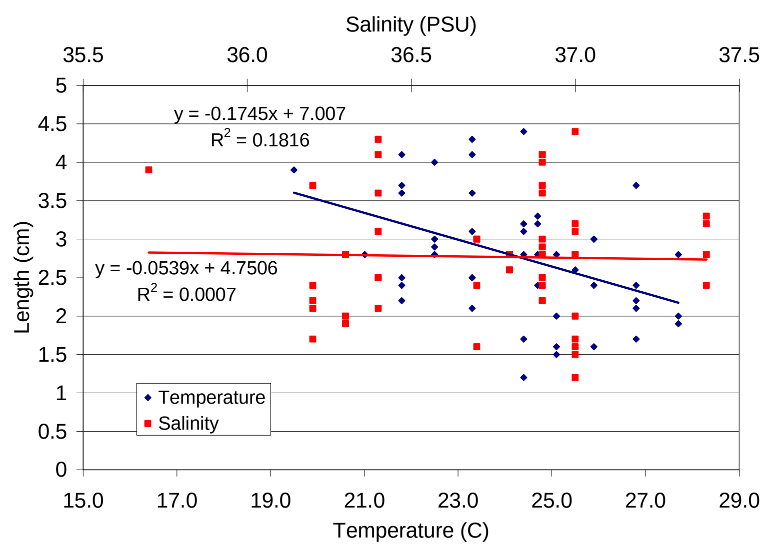


Figure 10. Comparison of the length of each netted *Gonichthys cocco* against the temperature and salinity in which they were found.

Diel Vertical Migration and Zooplankton Biomass in Relation to 1% Light Levels Along a South to North Transect in the Western North Atlantic.

Katie Dunn and Emily Frost

Diel Vertical Migration (DVM) of zooplankton is a well-documented phenomenon across many taxa. Plankton migrate from a certain depth below surface, the deep scattering layer, during the day to surface waters at nightfall. This study looks at the occurrence of DVM along a south to north track in the Atlantic and the relationship of the deep scattering layer to the depth of the 1% light level. We hypothesized that DVM would be found along the track and that the depth of the deep scattering layer would be directly related to the depth of the 1% light level, and would be found slightly below it.

ADCP data, biomass collected from neuston tows and secchi disk depths were used in order to test our hypotheses. ADCP data and day and night neuston biomass densities support the DVM of zooplankton. A pattern could be seen in the echo amplitude return from the ADCP, showing that migration was occurring at night and a deep scattering layer at a consistent depth was visible. The night biomass densities throughout the cruise track were higher than that of the day tows. There was a positive correlation between the depth of the 1% light level and the depth of the deep scattering layer. Although directly related, the two depths were not as close to one another as previously expected.

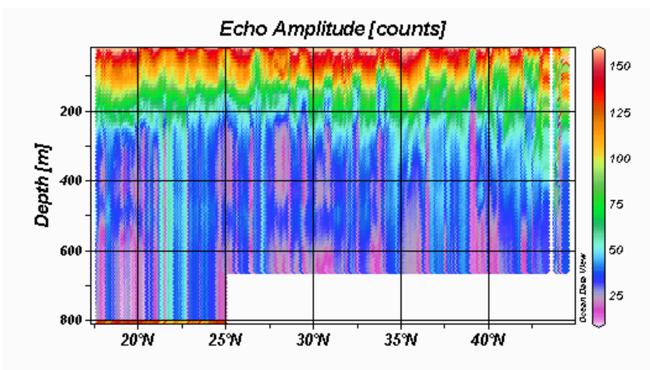


Figure 11. Echo amplitude along entire cruise track. The deep scattering layer is the blue band which is visible at around 500m for most of the cruise track.

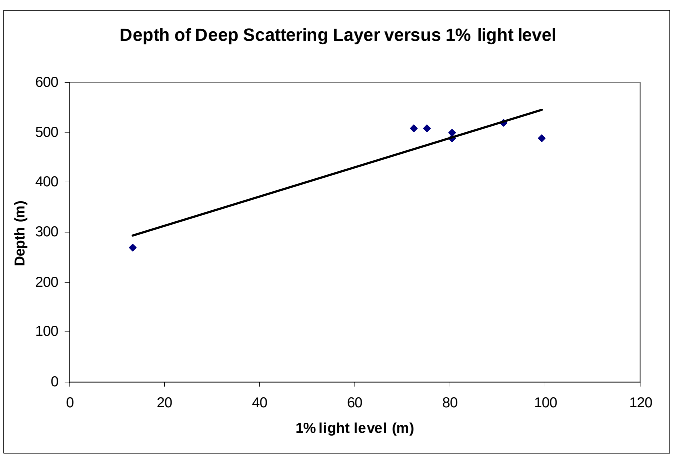


Figure 12. Relationship between depth of the deep scattering layer and depth of 1% light level. The depths of the 1% light level and the deep scattering layer have a positive correlation with $R^2$=0.8568 and p = 0.000574.

Nitrogen, Phosphorus, Chlorophyll-*a*, and Bacteria Concentrations as Indicators of Pollution: Christiansted, St. Croix; St. Georges, Bermuda; Lunenburg, Nova Scotia and the Surrounding Waters.

Holly Elwell, Erica Foley, and Kelsey Pickard

The economy and culture of St. Croix, Bermuda, and Nova Scotia depend heavily on the health of surrounding marine environments. This study determined the nutrient levels and organic content of the water to assess anthropogenic input and relative productivity of the waters. Surface waters were tested in each harbor for nitrates, phosphates, chlorophyll-*a*, and bacteria. Results between flood and ebb tide and in and out side of the harbors were statistically analyzed. Lunenburg harbor had the highest level of nutrients, reflecting the productivity of northern, temperate waters. Its levels also reflected the high level of anthropogenic activity and steep topography of the harbor. The nutrient levels in St. George's harbor were statistically different from those found outside of the harbor and had the lowest level of general and coliform bacteria. It is hypothetical that these differences were found because it is a closed-mouthed harbor which is more protected from all of the sewage outfalls which are outside of the harbor. Christiansted harbor had nutrient levels reflecting point source pollution and a high level of flushing due to the coral reef located just outside. Although there were not statistically significant relationships between flood and ebb tide or in the case of Lunenburg and Christiansted, in and outside of the harbor, there are trends suggesting known anthropogenic activity is altering the composition of the harbor waters. To further determine the affects of these activities more sites should be tested within the harbor, as well as outside. Differentiation between point and non-point pollution as well as testing for dissolved oxygen would also help solidify these trends.

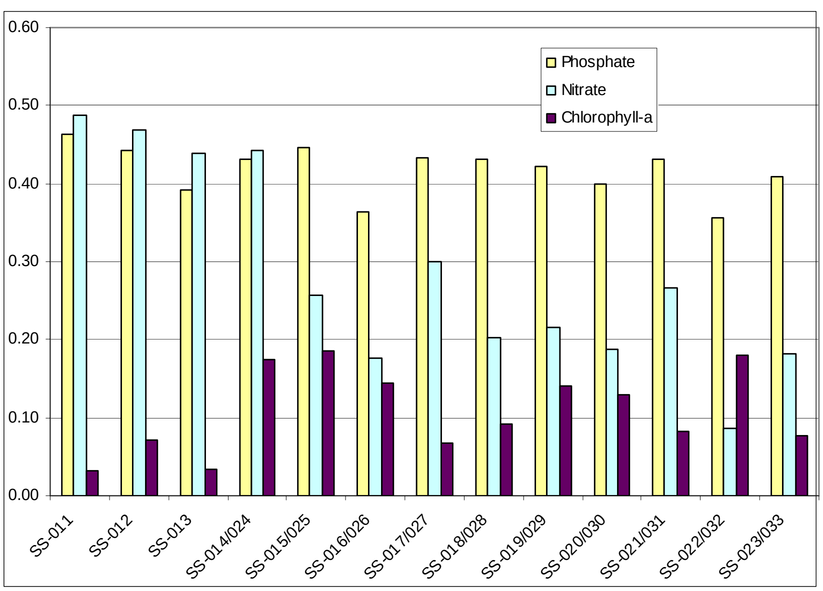


Figure 13. Phosphate, Nitrate, and chlorophyll-*a* levels for St. George's harbor. Surface stations 011 – 013 are located 3 nm, 1 nm, and 0.5 nm outside of the harbor, respectively. All other surface stations are located inside the harbor.

The present distribution and recent temporal changes of Eighteen Degree Water and Sea Surface Salinity along a South to North transect in the Sargasso Sea in May, 2005.

Kevin Garaventa

The salinity of the Sargasso Sea was examined by monitoring surface salinity and 18°C water distribution. This study shows that the surface salinity has considerably risen in the past two years and the salinity of 18° water has considerably fallen in the past two years. The salinity is vital to the processes of the oceans and the climate circulation.

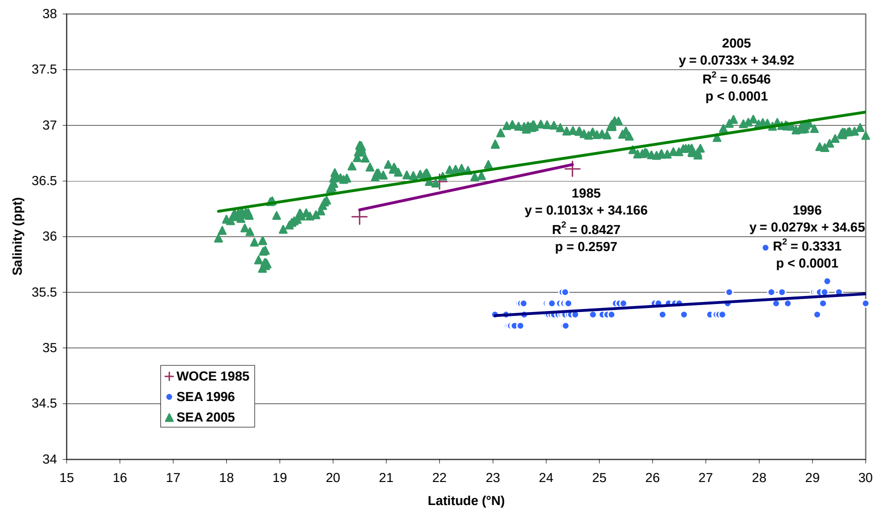


Figure 14. Surface salinities collected in the southern Sargasso Sea (15º-30ºN) in May of 1985, 1996, and 2005. The trend of surface salinity in 2005 showed a significant increase since 1996 ($p < 0.0001$).

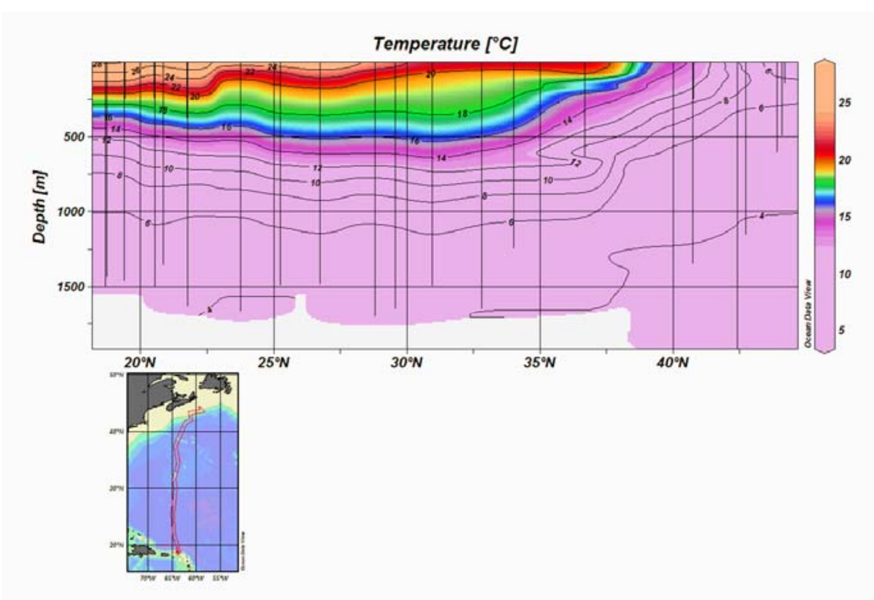


Figure 15. Observed temperature of ocean water in the Sargasso sea between 17ºN and 45ºN in May, 2005. Temperature is marked with contour lines. The 18º water is marked with green. There were 24 CTDs cast over the entire cruise track, ranging from 18ºN to 44ºN.

Determination of Velocity, Direction, and Volume Transport of Geostrophic Flow along a S-N transect of the North-Atlantic Ocean via the Geostrophic Equation.

Leslie Noel Goemaat

Geostrophic flow calculations provide evidence of major currents of the North Atlantic Gyre that result from dynamic height differentials and can produce an identifiable peak in dynamic height corresponding to the Sub-Tropical Convergence Zone. It was expected that geostrophic flow calculations along a S-N transect of the Western North Atlantic Ocean would identify the Northern Equatorial Current, the Gulf Stream and the location of the STCZ. Velocity and direction of geostrophic flow, as well as dynamic height, was determined using data from 15 deep CTD casts along a South-North transect of the Western North Atlantic Ocean and was compared with data gathered instantaneously by the Acoustic Doppler Current Profiler. Geostrophic flow was determined to be consistently eastward in the Northern Sargasso Sea, of variable direction and velocity in the Southern Sargasso Sea, and Northward out of the Anegada Passage. The STCZ was identified at approximately 27.7˚ north. Eastward flow calculated in the Northern Sargasso Sea may result from the dominating presence of the Gulf Stream while the Southern Sargasso Sea is less affected by swift boundary currents allowing for stronger localized currents. ADCP data revealed currents of larger magnitude in similar directions to those calculated by the geostrophic equation, which are likely a result of wind-driven currents measured in addition to geostrophic flow by the ADCP.

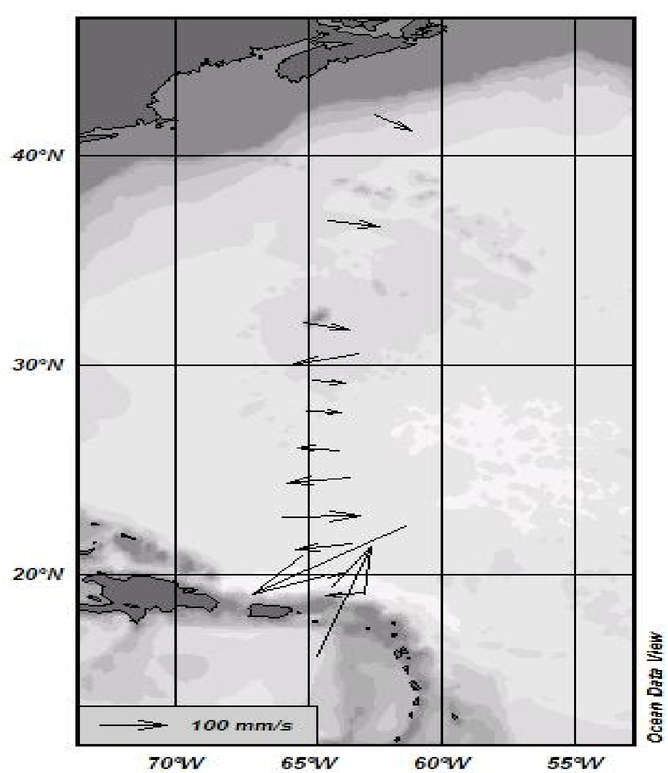


Figure 16. Vectors indicate the magnitude and direction of averaged geostrophic flow in the first 100 m of the water column as calculated between each pair of adjacent CTD stations. Notably, surface flow is moving out of the Caribbean through the Anegada Passage. Analysis to greater depths reveals that surface waters of the Anegada passage flow into the North Atlantic and deep currents flow South through the Anegada Passage and back into the Caribbean.

Hydrodynamic erosion and mass wasting of carbonate marine sediments: an analysis of the sediment transport and morphology of Plantagenet Bank, Bermuda.

Ross Mitchell, Nicholas Patton and Jessica Raymond

Plantagenet Bank, located 14 miles southwest of the Bermuda mainland, is a carbonate platform on top of a volcanic edifice. Sediment transport defined by hydrodynamic energy (currents) and mass wasting (slumping) was examined to determine the present morphology of the bank. Shipek grabs from various depths correlate with ADCP current vectors and CHIRP profiles to identify the agent of sediment transport on the morphology of the bank. Influences of both hydrodynamic energy and mass wasting were found. CHIRP profiles indicate erosional bedforms near the top of the bank and the presence of mass wasting at depth seen in hyperbolic traces, suggesting the current morphology of the bank is a combined product of hydrodynamic erosion and antecedent topography from depositional slumping. Unusually opaque returns on slumping slopes are attributed to strong, deep currents, explained as a positive feedback mechanism relating ADCP data and morphology.

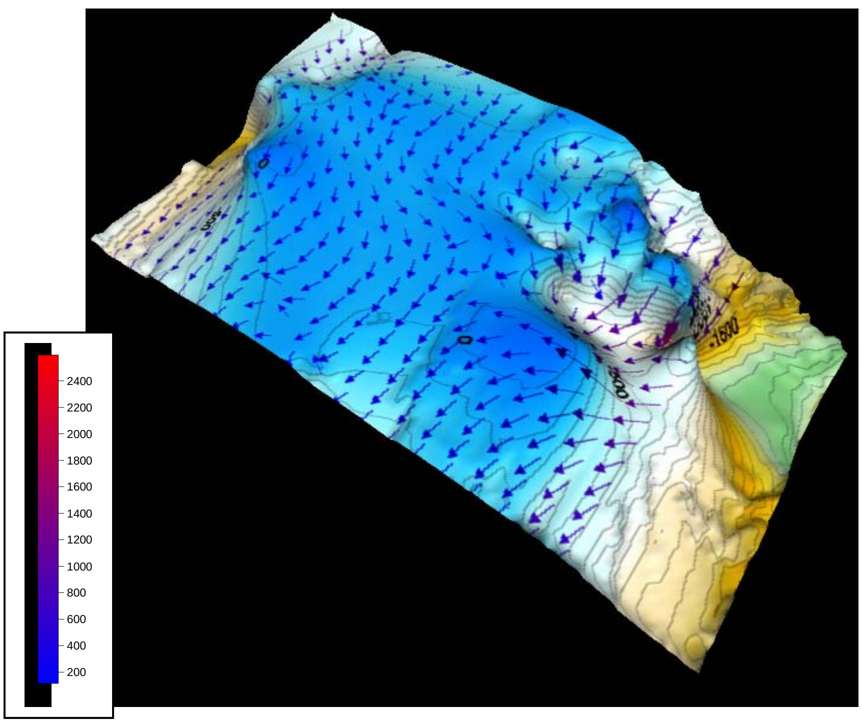


Figure 17. 2D current vector map imposed upon surface and contour maps. Arrow colors indicate magnitude in mm/sec. Surface map colors indicate bathymetry. Contour interval = 100m

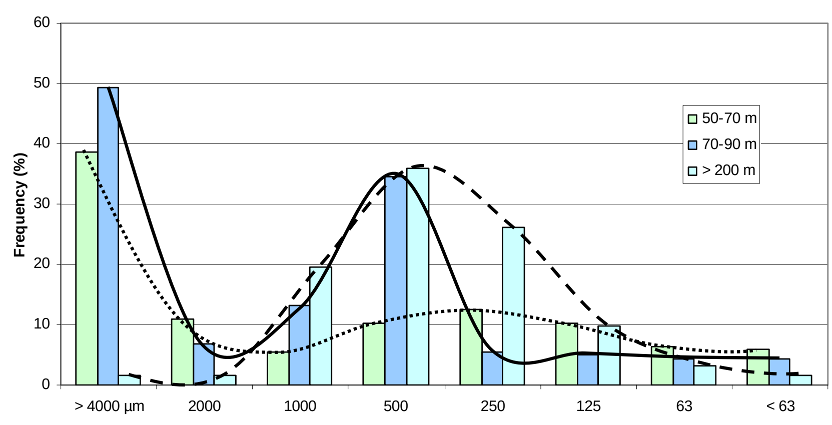


Figure 18. The frequency distributions of grain size for each depth range. As expected frequency curves for 50-70m and 70-90 m are positively skewed and >200m is not skewed. Solid and dashed black lines are the frequency curves for each depth range, imposed for ease of comparison between depth ranges.

Variables of Distribution of the *Halobates micans* in the North Atlantic Ocean.

Rebekah Newcum

*Halobates micans* are the only water striders in the world that live on the open ocean from 40°N to 40°S. They are found in the neuston layer where ocean surface elements contribute to their distribution by increasing their range and rate of individual encounters. The objective of this study was to observe the factors that affect *Halobates micans* distribution in the Atlantic Ocean from 18 °N to 44°N. I compared life stage and their sex with temperature, salinity, cloud cover, and Beaufort force,
Neuston tows were towed every 12 hours in the vicinity of longitude 64°W. Individuals were observed for sex and age and compared with the other variables. There were no significant relationships between cloud cover and Beaufort force compared with the total amount of individuals, sex, or age. I found that the total number of individuals showed a positive relationship with water temperature and a negative relationship with salinity and latitude. Females and adults also showed the same but males and nymphs had no significant relationship with salinity, cloud cover, or Beaufort force.

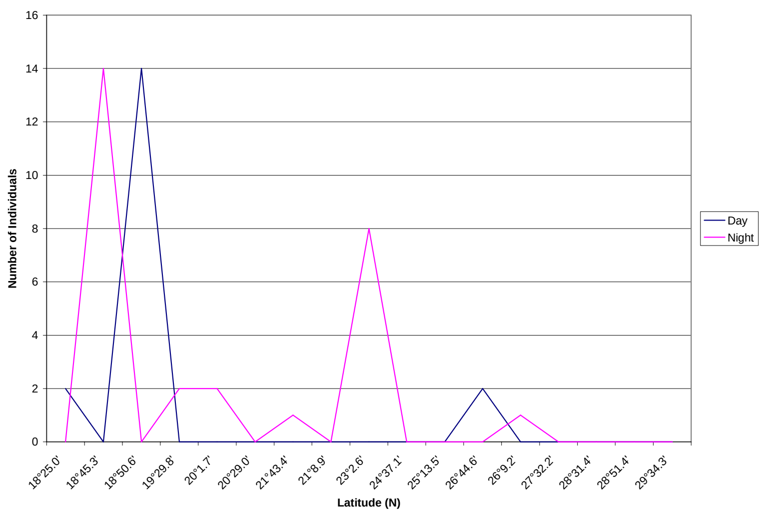


Figure 19. Line graph showing relationship of total number of individuals found in the day and night tows compared to latitude. 61% of the total amount of *H. micans* were caught during the night tows. 39% of *H. micans* were caught during the day tows.

## The relationship between photosynthetic efficiency, biomass of phytoplankton and the 1% light level along a south-north transect of the North Atlantic Ocean.

Jessica Postlethwaite

Phytoplankton are the primary producers of our oceans whose distribution throughout the water column is strongly related to the amount of light and nutrients present, revealing a relationship to climatic and environmental changes. This study was conducted in order to test the hypothesis that the depth of the 1% light level would also be the depth of maximum photosynthetic efficiency and phytoplankton biomass. To examine these relationships, eight hydrocasts were deployed along a south-north transect running from St. Croix, U.S.V.I to Lunenburg, Nova Scotia. Each hydrocast was deployed to 200 meters with half of the samples concentrated around the 1% light level and the others spread across the remaining area above and below the depth of 1% light. The depth of 1% light was calculated based on Secci depths determined with a Secci disc. All samples were tested for chlorophyll *a* concentration (which served as a proxy for biomass) using a 0.45 micron filter. In order to determine photosynthetic efficiency, each sample was tested for minimum and maximum fluorescence using a fluorometer and DCMU, an herbicide that halts photosynthesis to produce maximum fluorescence. From the data, it was possible to reject the hypothesis since the depth of 1% light level did not appear to be the depth of maximum biomass and photosynthetic efficiency. However, several significant relationships were found. First, the depths of 1% light were positively correlated with the depths of maximum biomass and photosynthetic efficiency. Secondly, phytoplankton biomass maximum values were found predominately at the same depths as the maximum photosynthetic efficiency. The maximum phytoplankton biomass was most likely found at the same depth as the photosynthetic efficiency maximum because this depth would be the most advantageous for converting light energy into chemical energy via photosynthesis. Most of the maximum phytoplankton biomass and photosynthetic efficiency values were found below the depth of the 1% light level, which was possibly due to the placement of the maximum nutrient depths. The nutricline showed the presence of maximum nitrates and phosphates 50-75 meters below the 1% light level. It has not been concluded definitively that the 1% light level depth would not also be the depth of maximum biomass and photosynthetic efficiency. The close proximity of the maximum biomass and photosynthetic efficiency to the 1% light level throughout the transect is a strong indication that the location of phytoplankton in the water column does follow a trend. Future studies, with more data points, would help determine accurately whether the difference between the depth of 1% light and maximum phytoplankton biomass and photosynthetic efficiency is significant.

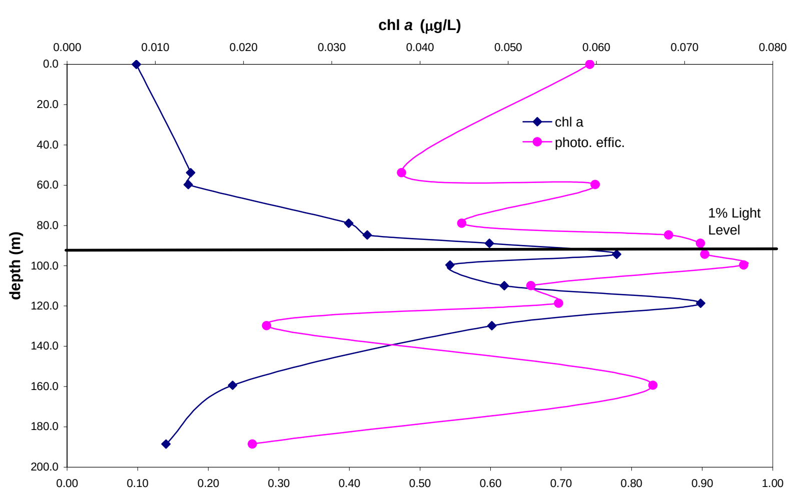


Figure 20. Chlorophyll *a* concentration and photosynthetic efficiency with depth in the sub-tropical convergence zone (STCZ) at position 26˚ 44.8' N X 64˚ 29.0' W (station 023B). The depth of the 1% light level is depicted by the b road line at 91.3 meters.

Prey Preferences of Myctophid Fishes along a S-N Transect in the Northwest Atlantic.

Erin M. Soucy

Myctophids are a commonly found mesopelagic fish that follow a pattern of vertical migration. Prey selectivity of myctophids is still under debate among researchers. This study was conducted to examine whether the Myctophids found along a south – north transect in the northwestern Atlantic feed selectively by species. Myctophids were collected during midnight neuston tows and were identified and later dissected and the stomach contents analyzed. The data found does not appear to indicate selective feeding by species although some species eat a wider range of prey than others. This would indicate that there is not enough competition for prey that the myctophids have developed selective feeding habits. Additional research with a larger sample size and possibly a focus on only a few species of fish may give more clearly defined results.

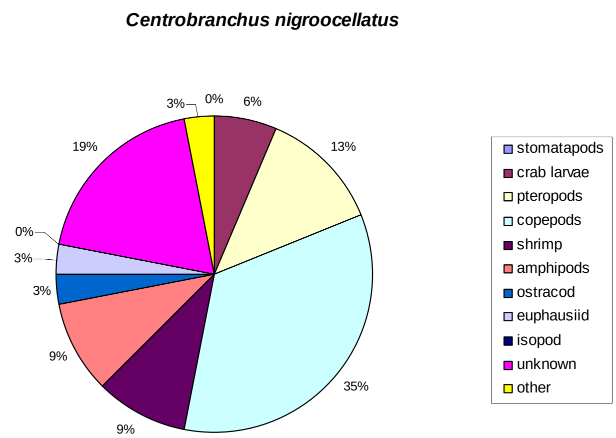


Figure 21. Gut content of *Centrobranchus nigrocellatus*.

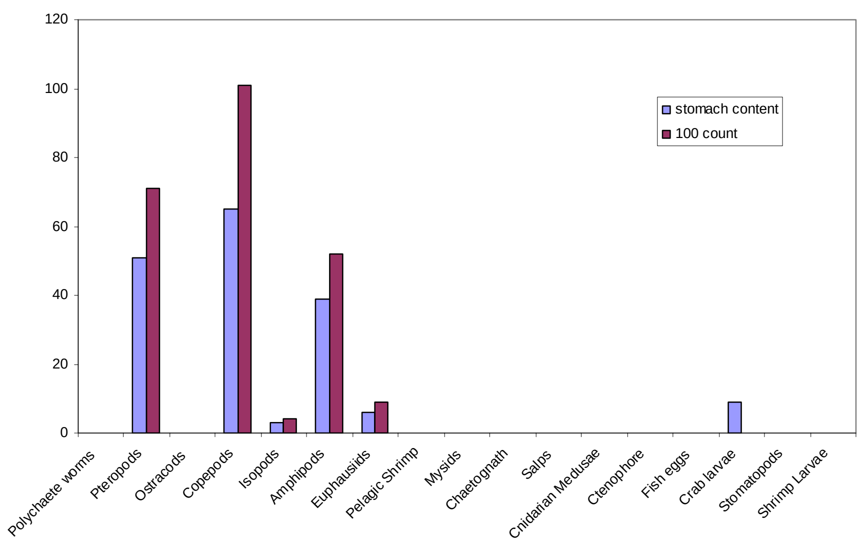


Figure 22. Gut content compared to 100 count content for *G. cocco.*

Leptocephali distribution in the Sargasso Sea.

Angela S. Wood

*Anguilla anguilla* and *Anguilla rostrata* spawn in Spring, in association with the STCZ. Therefore, a large concentration of small *Anguilla* leptocephali was expected at or just south of the STCZ. However, despite sampling along a South-North transect that crossed the STCZ between May 13th and 17th, neuston net, meter net, and tucker trawl tows yielded no *Anguilla* leptocephali. Instead, a large abundance of *Ariosoma balearicum* (*A. balearicum*) was found, which is not surprising, as previous studies have found it to be common in the western North Atlantic. Specimens of *Serrimoveridae*, *Ophichthus*, and *Anarchias similis* were also collected. Small sample sizes and the limited number of tows that yielded specimens resulted in no conclusive statistical analysis of leptocephali length. The lack of *Anguilla* leptocephali, and the composition of the tows, however, led to the idea that spawning is patchy, and not uniform within the spawning area and time period.

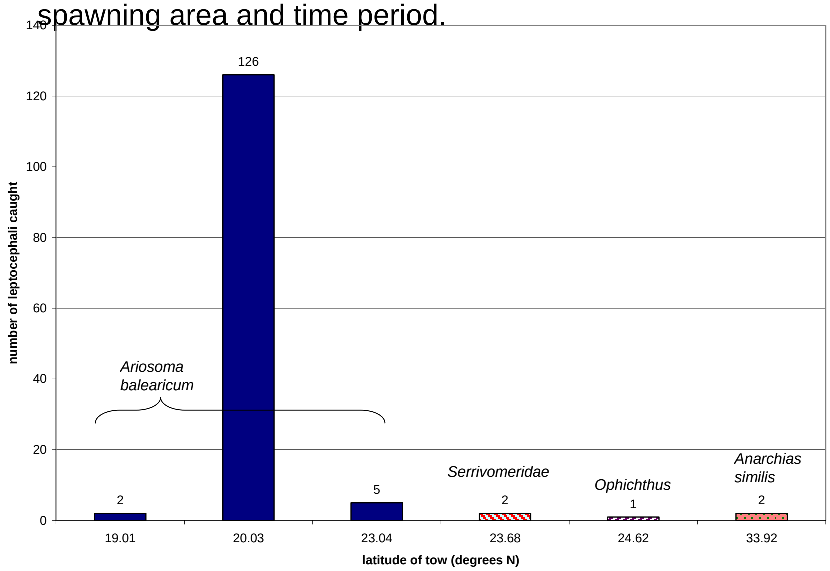


Figure 23. 133 of the 139 leptocephali were *Ariosoma balearicum*. 126 of these were collected in one tow (C199-009-NT). Two *Serrivomeridae*, one *Ophichthus* sp., and two *Anarchias similes* were also found. Leptocephali within each tow were of the same species, and the three tows that yielded the same species (*Ariosoma balearicum*) were geographically near each other.

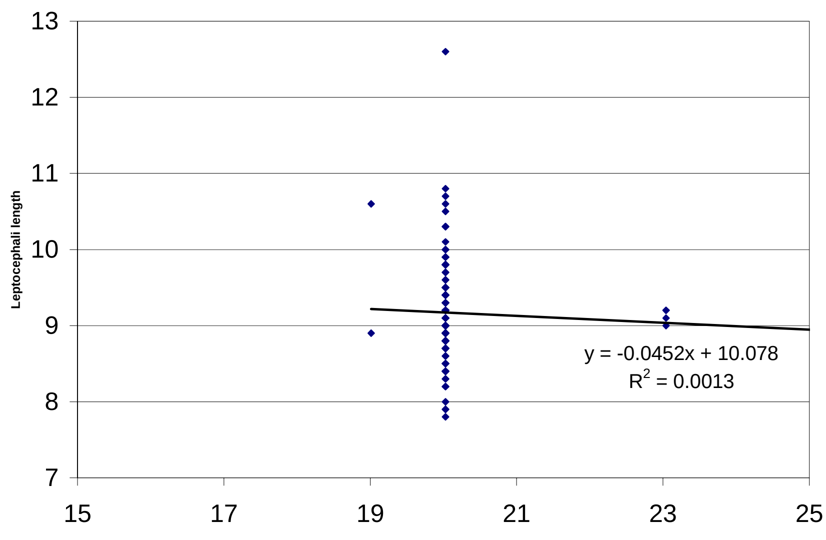


Figure 24. Statistical analysis of *A. balearicum* leptocephali by length and latitude did not support a correlation between the two. The small sample size and large length distribution of the one high-yield tow contributed to the insignificant p-value.