# Mission Report for the Maritimes Region Atlantic Zone Monitoring Program 2026 Spring Survey (JC290)

Lindsay Beazley, Diana Cardoso, Christopher Gordon, Carina Gjerdrum

Ocean and Ecosystem Sciences Division
Fisheries and Oceans Canada
Bedford Institute of Oceanography
P.O. Box 1006
Dartmouth, Nova Scotia, Canada
B2Y 4A2

2026

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Lindsay Beazley[1], Diana Cardoso[1], Christopher Gordon[1], Carina Gjerdrum[2]

[1]Ocean and Ecosystem Sciences Division
Fisheries and Oceans Canada
Bedford Institute of Oceanography
P.O. Box 1006
Dartmouth, Nova Scotia, Canada
B2Y 4A2

[2]Canadian Wildlife Service
Environment and Climate Change Canada
45 Alderney Drive
Dartmouth, Nova Scotia Canada
B2Y 2N6

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## ABSTRACT

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Fisheries and Oceans Canada's (DFO) Maritimes Region Atlantic Zone Monitoring Program 2026 spring survey was conducted on the Royal Research Ship James Cook from April 22 to May 4, 2026. A total of 12 scientific staff from across different federal departments and academic or oceanographic institutions participated in the mission. Oceanographic sampling was conducted across a network of fixed monitoring stations using a CTD-Rosette to obtain vertical profiles and discrete water samples, vertical ring net tows for zooplankton sample collection, and underway flow-through measurements and samples. Two Argo floats were deployed in support of the International Argo Program. In collaboration with the Woods Hole Oceanographic Institution, an Imaging FlowCytobot was used to collect high-resolution images of phytoplankton from surface waters sampled while underway. All planned mission objectives were achieved, and available ship time permitted additional sampling of the Northeast Channel and Laurentian Channel Mouth hydrographic transects. In total, 132 gear operations were conducted at 61 unique stations. This report summarizes the mission objectives and achievements, gear operations, data collected, and operational considerations. Seabird observations and vertical profiles of temperature, salinity, and dissolved oxygen from occupied stations are also presented.

# RÉSUMÉ

Beazley, L., Cardoso, C., Gordon, C., Gjerdrum, C. 2026. Mission Report for the Maritimes Region Atlantic Zone Monitoring Program 2026 Spring Survey (JC290). Can. Tech. Rep. Hydrogr. Ocean Sci. 426: vii + 91 p. https://doi.org/10.60825/69nt-xp58

Le relevé printanier du Programme de Monitorage de la Zone Atlantique, mené par la région des Maritimes de Pêches et Océans Canada, s'est déroulé à bord du navire de recherche RRS James Cook du 22 avril au 4 mai 2026. Au total, 12 membres du personnel scientifique, issus de divers ministères fédéraux et d'établissements universitaires ou océanographiques, ont pris part à cette mission. Des échantillonnages océanographiques ont été effectués sur un réseau prédéterminé de stations à l'aide d'une rosette équipée d'une sonde CTD (pour obtenir des profils verticaux et des échantillons d'eau à des profondeurs discrètes), de filets à plancton verticaux (pour la collecte du zooplancton), ainsi que par le biais de mesures et d'échantillonnages en continu durant la navigation. Deux sondes Argo ont été déployées dans le cadre du programme international Argo. En collaboration avec l'institut océanographique de Woods Hole, un instrument de type «Imaging FlowCytobot» a été utilisé pour capturer des images à haute résolution du phytoplancton présent dans les eaux de surface échantillonnées le long du trajet. Tous les objectifs de la mission ont été atteints et le temps de navire disponible a permis de réaliser des échantillonnages supplémentaires le long des transects hydrographiques du chenal Nord-Est et à l'embouchure du chenal Laurentien. Au total, 132 opérations de déploiement d'instruments ou d'équipements ont été réalisées à 61 stations distinctes. Le présent rapport résume les objectifs et les réalisations de la mission, les opérations effectuées, les données recueillies ainsi que les aspects opérationnels. Il présente également des observations d'oiseaux marins, de même que des profils verticaux de température, de salinité et d'oxygène dissous mesurés aux stations occupées.

# 1. Mission Overview

## 1.1 Background

In the spring of 2026, the Royal Research Ship (RRS) *James Cook*, operated by the National Oceanography Centre (NOC) based in Southampton, UK, was used to deliver the Fisheries and Oceans Canada (DFO) Maritimes Region Atlantic Zone Monitoring Program (AZMP) spring survey. The survey, identified as JC290 (where 'JC' represents the *James Cook* ), took place from April 22 to May 4, 2026, with embarkation and disembarkation occurring at the Bedford Institute of Oceanography (BIO) in Dartmouth, Nova Scotia (NS). This report provides an overview of the JC290 mission, achievements and impacts, and a summary of operations and data collected.

First launched in 2006, the RRS *James Cook* is a British RRS operated by the Natural Environment Research Council (NERC) to support multidisciplinary oceanographic missions led by both UK scientists and the international community. With a length of 89.2 m and breadth of 18.6 m, the RRS *James Cook* is outfitted with stern 'A' and mid-ship 'P' overboarding frames and a number of wet and dry laboratory spaces located on its upper working deck. The vessel's home port is the National Oceanography Centre in Southampton, UK. The RRS *James Cook* was previously used by DFO to deliver the Maritimes Region fall AZMP missions in 2022 and 2025.

## 1.2 Objectives

The AZMP was initiated in 1998 with the aim to detect, track, and predict changes in the state and productivity of waters within the Canadian Exclusive Economic Zone of the northwest Atlantic Ocean. The AZMP's sampling strategy in the Maritimes Region is based on high-frequency (weekly, biweekly, monthly) data collection, hydrographic data collection on the winter and summer Ecosystem Trawl Surveys, and dedicated oceanographic surveys conducted each spring and fall. These activities fall within the traditional and unceded territory of the Mi'kmaq, the original stewards of these waters.

Scientific activities conducted on the JC290 mission in support of the AZMP included 1) CTD- Rosette deployments for the collection of vertical profile data using electronic sensors and discrete water samples for nutrient, salinity, dissolved oxygen, pH, chlorophyll *a* determination, and phytoplankton monitoring; 2) vertical ring net tows for the collection of data on zooplankton abundance and biomass; and 3) the collection of continuous surface measurements and water samples along the mission track using a flow-through system.

In addition to the survey's primary objective, data and samples were also collected in support of a number of ancillary research programs and initiatives led by both DFO and its external partners. This included participation by a wildlife observer to collect seabird observations in support of the Environment and Climate Change Canada (ECCC) Canadian Wildlife Service's (CWS) Eastern Canada Seabirds at Sea (ECSAS) program (Gjerdrum et al. 2012), and the passive collection of high-resolution images of phytoplankton from surface waters sampled along the mission track using an Imaging Flow Cytobot (IFCB), as part of a collaborative agreement between DFO and the Woods Hole Oceanographic Institution to improve understanding of the distribution of harmful

algalbloom species and the processes impacting ocean health. Dalhousie University personnel also took part in the mission to collect data and samples in support of graduate student projects led by the laboratories of Drs. Carly Buchwald, Julie LaRoche, and Erin Bertrand. The focus of this research was on evaluating nitrate stable isotope signatures and variability in the nutrient supply of the Scotian Shelf (Buchwald); understanding phytoplankton growth, phytoplankton-bacterial interactions, and the role of cobalamin and other B vitamins in phytoplankton community composition and productivity (Bertrand); and characterizing the microbial communities of the Scotian Shelf through the collection of eDNA samples (LaRoche). Additionally, water samples were collected from select stations in support of a trial experiment led by Drs. Sue Budge (Dalhousie University) and Emmanuel Devred (DFO) to measure the production of essential fatty acids by phytoplankton. This research is considered complementary to the monitoring conducted by the AZMP, and aids in the understanding of the biogeochemical processes of the Scotian Shelf.

Below is a list of all primary and secondary objectives, along with those supporting external partnerships, that were established during the planning phase of the JC290 mission. A total of 10 scientific objectives supporting two federal government departments (DFO, ECCC) and two research and academic institutions (Woods Hole Oceanographic Institution, Dalhousie University) were identified. Several unplanned activities and objectives were also achieved during the mission, and are described in the Mission Achievements section below.

### 1.2.1 Primary

1. Obtain spring observations on physical, chemical, and lower trophic-level biological oceanographic conditions at fixed sampling stations along core Atlantic Zone Monitoring Program sections within the Maritimes Region and underway data and samples at specified locations, including carbonate chemistry samples (Contact: Lindsay.Beazley@dfo-mpo.gc.ca).

### 1.2.2 Secondary

2. Deploy ARGO floats in support of the International Argo Float Program (Contact: Blair.Greenan@dfo-mpo.gc.ca).
3. Carry out hydrographic, chemical and biological sampling at stations in The Gully in support of Marine Protected Area (MPA) monitoring (Contact: Lindsay.Beazley@dfo-mpo.gc.ca).
4. Carry out hydrographic, chemical and biological sampling at stations in the St. Anns Bank MPA as a continued monitoring effort in support of Marine Protected Area (MPA) monitoring (Contact: Lindsay.Beazley@dfo-mpo.gc.ca). St. Anns Bank is located in Unama'ki, one of the seven districts of Mi'kma'ki, the unceded ancestral territory of the Mi'kmaq.

### 1.2.3 External to DFO

5. Collect seabird and other wildlife observations as part of ECCC Canadian Wildlife Service Eastern Canada Seabirds at Sea (Contact: Carina.Gjerdrum@canada.ca).

6. Collect high-resolution imagery of phytoplankton species while underway using an Imaging Flow Cytobot (IFCB), and data on the presence and quantity of biological toxins (specifically domoic acid) produced by harmful algal bloom species using an Environmental Sample Processor (ESP) in collaboration with the Woods Hole Oceanographic Institution (Contacts: dmcgillicuddy@whoi.edu & Emmanuel.Devred@dfo-mpo.gc.ca).

7. Collect water samples for the Bertrand lab at Dalhousie University to evaluate microbial protein and metabolites from the Scotian Shelf to better understand phytoplankton growth, phytoplankton bacterial interactions, and the role of cobalamin and other B vitamins in phytoplankton community composition and productivity (Contact: Erin.Bertrand@dal.ca).

8. Collect water samples for the LaRoche lab at Dalhousie University from strategic locations and depths to support microbial community analyses via metabarcoding and metagenomics (Contact: Julie.LaRoche@dal.ca).

9. Collect water samples for the Buchwald lab at Dalhousie University from strategic locations and depths to extend the Scotian Shelf nitrate isotope time series to identify nitrogen sources and cycling pathways, and to assess how nutrient supply, circulation, and biogeochemical processes vary over time. Full-depth nitrate isotope samples will be collected across the Scotian Shelf to evaluate interannual variability and detect potential climate-driven changes in regional nutrient dynamics (Contact: cbuchwald@dal.ca).

10. Collect water samples for the Budge lab and conduct a trial experiment to measure production of essential fatty acids by natural phytoplankton communities (Contacts: Emmanuel.Devred@dfo-mpo.gc.ca & budges@dal.ca).

## 1.3 Mission Participants

A list of scientific personnel who participated in the mission is provided in Appendix A. In total, 12 scientific personnel participated in the mission, including DFO and ECCC staff, and four students from Dalhousie University.

## 2. Achievements & Impacts

All planned objectives were fully achieved upon completion of the JC290 mission. The primary objective of occupying the AZMP's core stations on the Browns Bank, Halifax, Louisbourg, and Cabot Strait lines was achieved, with successful CTD-Rosette and ring net deployments at each station. All secondary objectives were also met, along with externally-led objectives in support of ECCC and Dalhousie University.

IFCB and ESP communications and data transfer via the external satellite internet system (Starlink) set up on the Met tower was intermittent for the majority of the JC290 mission. For the IFCB, this only affected the transfer of images to the system's associated dashboard while the mission was ongoing. However, since the ESP relies on external commands to take a sample, the poor communications meant that samples could only be collected once communications improved starting on April 25.

Progress towards mission objectives was evaluated routinely throughout the survey. As the mission remained ahead of schedule, additional scientific activities were undertaken in support of other DFO initiatives. This included occupation of all 10 hydrographic stations along the previously discontinued Northeast Channel Line, which extends between Georges Bank and Browns Bank. The Maritimes Region AZMP sampled this transect routinely since 2009 due to its value in measuring water mass fluxes into and out of the Gulf of Maine, and their associated biogeochemical properties. This transect now also contributes oceanographic observations in support of DFO's Fundian Channel-Browns Bank Area of Interest.

Time also permitted partial sampling of the Laurentian Channel Mouth (LCM) Line during the JC290 mission. Stations LCM_01 through LCM_08 were occupied, with CTD-Rosette and ring net deployments conducted at each station. The LCM hydrographic transect is important for monitoring changes in water-mass transport from the Tail of the Grand Banks into the Gulf of St. Lawrence, as well as outflow from the Gulf, and provides valuable data for regional oceanographic modelling efforts. Stations LCM_09 and LCM_10 were not occupied due to both time constraints and the requirement to transit across the national boundary of St. Pierre et Miquelon.

Due to a family emergency, a crew member had to be disembarked in Halifax part-way through the mission. This was planned for when the vessel returned to the start of the Halifax Line, to minimize impact to the program. A boat transfer was arranged for the crew member near the Halifax pilot station at the mouth of the harbour. This activity resulted in the loss of 1 hour and 50 minutes to the program, which was considered negligible.

The third and final occupation of high-frequency station Halifax-2 (HL_02) while en route back to Halifax Harbour was cancelled due to a Nor'easter that impacted the region, resulting in wind speeds of up to 40 knots and a building sea state.

# 3. Summary of Operations & Data Collected

Figure 1 provides an overview of the stations occupied during the 2026 spring AZMP mission (JC290). A detailed log of all gear operations conducted during the mission is provided in Appendix B. A total of 132 gear operations (events) were conducted at 61 unique stations. The order of operations was influenced by use of the provisional 'cruisePlanning' R package (Layton, C. cruisePlanning: Oceanographic Cruise Planning, Version 0.1.0). This package generates a full mission itinerary based on station locations, operational time, and the between-station transit speed used. The package was developed as a tool to help chief scientists evaluate and select mission scenarios that result in maximum use of the allocated vessel time. Mission scenarios were routinely updated and re-generated throughout the mission and were used to make decisions on the order of stations and their activities. A conservative transit speed of 9 knots was used for planning between-station transits, although this was often exceeded.

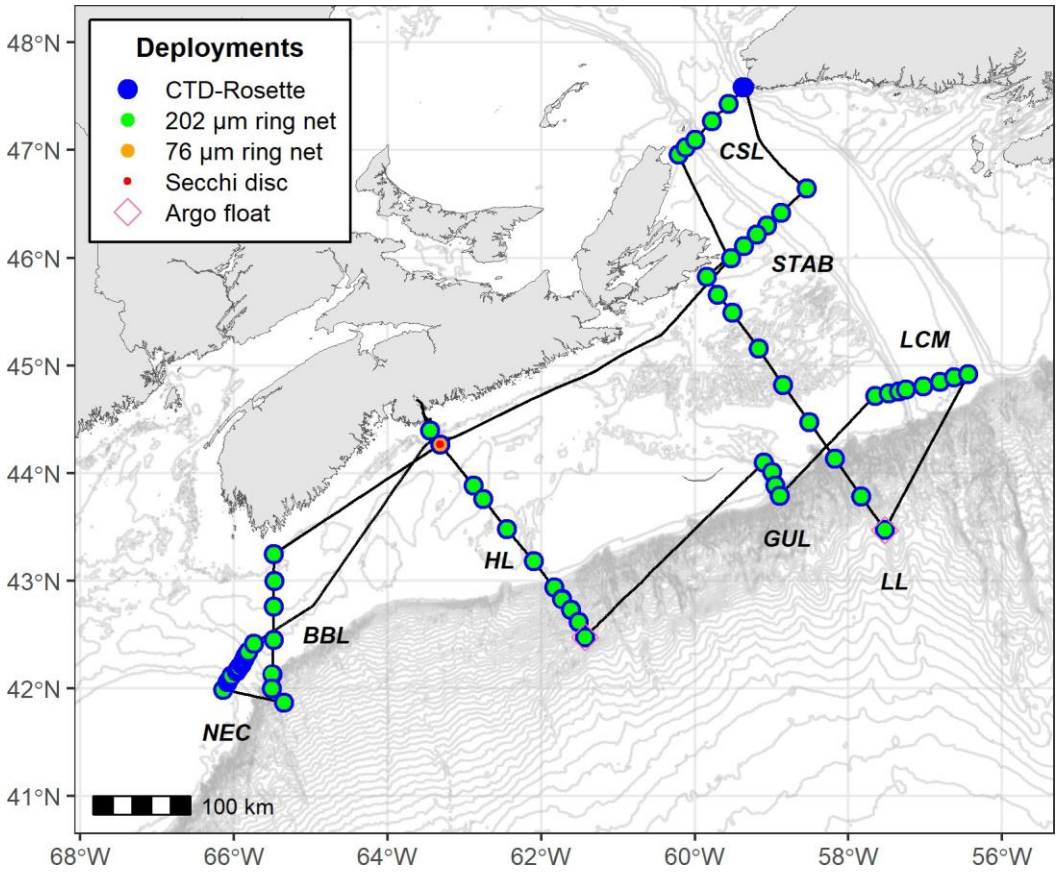



Figure 1. Stations and gear deployments conducted during the 2026 spring AZMP mission (JC290). Multiple operations at single stations may not be fully reflected in the map due to overlapping labels. AZMP sections are labelled in bold italic font, where NEC = Northeast Channel, BBL = Browns Bank Line, HL = Halifax Line, GUL = The Gully, LL = Louisbourg Line, LCM = Laurentian Channel Mouth, STAB = St. Anns Bank, and CSL = Cabot Strait Line.

## 3.1 CTD-Rosette Operations

### 3.1.1 CTD-Rosette Configuration

A SeaBird Electronics (SBE) 24, 10-L bottle CTD-Rosette system provided by NOC was used for the duration of the JC290 mission. The CTD was configured in a custom stainless steel rosette frame with a wing referred to as the vane, which is designed to minimize spinning during deployment and recovery. Table 1 shows a list of installed sensors on the CTD package along with their model numbers, date of last calibration, and owner. The CTD package included dual SeaBird Electronics (SBE) temperature, conductivity, and dissolved oxygen sensors, and a single Satlantic photosynthetically active radiation (PAR) sensor, and a Valeport altimeter. The secondary pump, temperature, conductivity, and oxygen sensors were mounted on the vane, and appeared to provide cleaner data than their corresponding primary sensors. Seapoint chlorophyll *a* and CDOM fluorometers, and a pH sensor (rated to 1200 m) were provided by DFO for use during the mission. The Seapoint sensors were mounted horizontally on the vane. A surface PAR sensor (Satlantic) was also used during the mission but was not integrated with the deck unit. These data are part of the ship's MET package.

**3.1.1.1 Deep SUNA Nitrate Sensor** A SBE Deep SUNA (Submersible Ultraviolet Nitrate Analyzer) nitrate sensor (Figure 2) was used to collect vertical profiles of nitrate and other optical parameters during the mission. The SUNA was mounted horizontally on the CTD vane and was removed for casts conducted at stations deeper than 2000 m. The sensor was integrated with the SBE 911plus CTD system to provide real-time nitrate measurements during each cast. A voltage channel had to be freed in order to integrate the SUNA sensor directly into the CTD. A decision was made not to install a transmissometer on the CTD for the mission.

Following each deployment, the complete optical dataset from the SUNA was manually downloaded using associated UCI software. The light to dark ratio was adjusted throughout the mission from 5:1, 2:1, and ultimately 1:1 to facilitate data download between stations (although see the Operational Considerations and Issues of Note section for further discussion on the sensor sampling rate).

### 3.1.2 CTD-Rosette Deployments

The CTD-Rosette was deployed from the vessel's parallelogram (P) frame, which was extended prior to extension of the hydroboom and docked after recovery of the CTD-Rosette. The main CTD cable was used for the entirety of the mission, which allowed for the hydroboom to drop the CTD-Rosette directly into the CTD hangar. The vessel's backup electromechanical cable, the 'Deep Tow', was not terminated.

SBE Seasave acquisition software was operated using a shipboard acquisition computer and a SBE 11 deck unit situated in the Main Laboratory. Communication between the CTD computer operator and the winch operator was done via radio for the first 30 m after its launch, and for the final 30 m prior to its recovery. Once the CTD-Rosette was deployed, the CTD computer operator instructed the winch operator to lower the package to 10 m depth for a 3-minute soak period, which served to trigger the pumps to turn on and allowed the sensors to acclimate. After the soak period,

the CTD-Rosette was raised to the surface, and then sent on its downcast to approximately 5 m from bottom. During periods of inclement weather or high swell, the CTD package was lowered to within 7 to 10 m from the seabed. The CTD deck unit was powered off just prior to its recovery on deck. Once on deck, the CTD-Rosette was secured in its docking station inside the ship's hangar.

A total of 67 CTD casts (including aborted casts) were conducted during the JC290 mission. Vertical profiles of temperature, salinity, and dissolved oxygen at each station are shown in Appendix C. Several casts (Events 015, 023, 070, 092, and 117) were aborted due to either the sensor caps being left on or issues with the SUNA sensor data logging. In all cases, the issue was remedied and the CTD-Rosette redeployed. The CTD-Rosette worked very well throughout the mission, although several bottle misfires occurred earlier in the mission. Bottles that consistently misfired were either removed from the carousel or re-positioned elsewhere. No CTD sensors were changed during the mission.

### 3.1.3 CTD Data Post-Processing

Once a CTD cast was completed, the raw CTD files (.hex, .hdr, .bl, and .xmlcon) were manually copied from the CTD acquisition computer to the ship's science network where they could be accessed from any networked computer on the vessel. From here, they were copied onto BIO's post-processing computer, where the CTD Data Acquisition and Processing System (CTDDAP, version 6.3), an in-house wrapper application to facilitate downloading and processing of CTD data from various SBE instruments, was used to post-process the .hex files from each cast. This allowed for the creation of ODF (Ocean Data Format) files, BIO's in-house CTD file format, and other files necessary for DFO's archival procedures. The CTD data in each ODF file was binned into 0.5 dbar bins.

Table 1. List of sensors included on the CTD system used during the 2026 spring AZMP mission on board the RRS *James Cook* (JC290). Model number and date of last calibration is shown. NOC = National Oceanography Centre. Blank entries indicate 'not applicable'.

| Sensor | Model | Output Units | Output Variable Name | Serial No. | Calibration Date | Owner |
|---|---|---|---|---|---|---|
| Primary CTD deck unit | SBE 11plus | NA | NA | 11P-24680-0589 | NA | NOC |
| CTD underwater unit | SBE 9plus | | | 09P-77801-1182 | NA | NOC |
| 24-way carousel | SBE 32 | | | 346 | NA | NOC |
| Digiquartz pressure sensor | Paroscientific | [dbar] | prDM | 129735 | 9/17/2024 | NOC |
| Primary temperature | SBE 3P | [C] | t090C | 5660 | 11/26/2024 | NOC |
| Primary conductivity | SBE 4C | [S/m] | c0S/m | 3567 | 12/3/2024 | NOC |
| Primary dissolved oxygen | SBE 43 | [ml/L] | sbeox0 | 4570 | 12/7/2024 | NOC |
| Secondary temperature | SBE 3P | [C] | t191C | 4814 | 8/2/2025 | NOC |
| Secondary conductivity | SBE 4C | [S/m] | c1S/m | 3054 | 1/30/2025 | NOC |
| Secondary dissolved oxygen | SBE 43 | [ml/L] | sbeox1 | 4571 | 12/5/2024 | NOC |
| pH | SBE 18 | NA | ph | 1258 | 9/10/2025 | DFO |
| Chlorophyll fluorometer | Seapoint Fluorometer SCF | | flSP | 3668 | 1/28/2026 | DFO |
| CDOM fluorometer | Seapoint Fluorometer SUVF | [micro g/L] | flSPuv0 | 6225 | 1/28/2026 | DFO |

| | | | | | | |
|---|---|---|---|---|---|---|
| PAR/Log | Satlantic | [micromoles photons/m2/s] | par | 1043 | 10/2/2025 | DFO |
| Nitrate | Deep SUNA | [mg/L] | Upoly0 | NTR-2382 | 1/28/2026 | DFO |

Table 1. *(continued)*

| Sensor | Model | Output Units | Output Variable Name | Serial No. | Calibration Date | Owner |
|---|---|---|---|---|---|---|
| Altimeter | Valeport VA500 | [m] | altM | 96099 | 12/6/2025 | NOC |



Figure 2. Custom CTD-Rosette vane showcasing the SeaBird Electronics SUNA nitrate sensor (top) used during the 2026 spring AZMP mission on the RRS *James Cook* (JC290).

### 3.1.4 Water Sampling

Water samples were collected using 24, 10-L bottles installed on the rosette. The number of water samples collected from each station depended on station depth and other characteristics, and is relatively consistent between missions. Standard AZMP depths (surface, 10, 20, 30, 40, 50, 60, 80, 100 m, and bottom) are consistently sampled at stations 100 m or less, while deeper bottles are typically collected at 500 m intervals (e.g., 1500, 2000 m). Water samples were collected, processed and analyzed according to the following protocols:

- Nutrients (nitrate ($NO_2$ + $NO_3$), nitrite, phosphate, silicate, ammonium; $\mu$g/L): Mitchell et al. (2002); Becker et al. (2020)
- Chlorophyll *a* ($\mu$g/L): Mitchell et al. (2002); Holm-Hansen et al. (1965)
- Dissolved oxygen (ml/L): Mitchell et al. (2002); Langdon (2010)
- Salinity (PSU): Mitchell et al. (2002); Kawano (2010)
- Total inorganic carbon, total alkalinity ($\mu$mol $kg^{-1}$): Dickson et al. (2007)
- Partial pressure of carbon dioxide ($pCO_2$; $\mu$atm): Dickson et al. (2007)
- Particulate organic carbon and nitrogen ($\mu$g/L): Devred et al. (2026)
- Coloured-dissolved organic matter (CDOM) absorption ($m^{-1}$): Mannino et al. (2019)
- High-performance liquid chromatography (HPLC; $\mu$g/L): Head and Harris (1992)
- Phytoplankton absorption ($m^{-1}$): Hoepffner and Sathyendranath (1992) & Hoepffner and Sathyendranath (1993)
- Flow cytometry (cells/L): Li and Dickie (2001)

During the two occupations of the AZMP high-frequency station HL_02 on the Halifax Line, integrated phytoplankton samples were collected by collating 50 mL of water from each of the 10 bottle depths sampled, and preserving the sample using 8 mL of 2% acid Lugol's preservative (Mitchell et al. 2002).

The achieved water sampling by station, depth, and oceanographic parameter is summarized in Appendix D. Sample management included the assignment of unique 6-digit 'sticky IDs' to each Niskin bottle and sample vial. These IDs allow for unique identification of samples across the entire Maritimes Region AZMP time series. The ID range used for samples collected from the CTD-Rosette was 523015 to 524074 across all 132 events.

Bottle samples collected for salinity determination were analyzed at sea using a NOC-owned Guildline Autosal 8410A Salinometer set up in the Electronics Workshop inside the Main Laboratory. The associated Guildline software was used for analysis. Dissolved oxygen samples were analyzed at sea after being stored in the fridge for at least one hour using a modified Winkler technique with automated electrical endpoint system. Chlorophyll *a* samples were also analyzed at sea using a Turner Designs Trilogy benchtop fluorometer after being stored for at least 24 hours in a -20°C

freezer. This represented the first use of the Trilogy fluorometers for chlorophyll determination by the Maritimes AZMP. Samples collected for all other parameters were either stored at room temperature, refrigerated, or frozen for subsequent analysis ashore. No eDNA samples were collected on this mission.

### 3.1.5 Data Accessibility

Upon completion of this mission, the CTD data undergo various quality control checks to correct metadata errors and/or erroneous CTD values (e.g., data spikes), and the primary and secondary conductivity and oxygen sensor data will be calibrated using bottle measurements following SeaBird's 'Computing Temperature & Conductivity Slope & Offset Correction Coefficients from Lab Calibration and Salinity Bottle Samples' Application Note No. 31 (Scientific 2024a) and 'SBE 43 Dissolved Oxygen Sensor Calibration and Data Corrections' Application Note No. 64-2 (Scientific 2024b); also described in Beazley et al. (2024)). These final calibrated files are available in .ODF format by request to DFO.BIODataServices-BIOServicesdeDonnees.MPO@dfo-mpo.gc.ca, or can be downloaded directly in netCDF or other common formats from the Canadian Integrated Ocean Observing System (CIOOS) ERDDAP.

All bottle measurements with the exception of absorption, CDOM, or flow cytometry metrics can be extracted from DFO's national repository for discrete bottle and plankton data, BioChem, or can be made available by request to DFO.BIODataServices-BIOServicesdeDonnees.MPO@dfo-mpo.gc.ca. Absorption, CDOM, and flow cytometry results are archived in a data server managed at BIO by the Ocean Data Information Section (ODIS).

## 3.2 Vertical Ring Net Tows

At each station, a conical ring net with an opening of 0.75 m rigged with 202 µm mesh (filtering ratio of 1:5) was towed vertically from near-bottom (or to a maximum of 1000 m) to the surface to collect samples used by the AZMP to describe changes in mesozooplankton abundance and biomass across the Scotian Shelf. Ring net operations were conducted using the ship's starboard aft pedestal crane and a NOC-supplied Lebus winch secured to the aft deck. The diameter of the wire was 0.322" (~8 mm) and required crossbows compatible with a thicker-gauge wire. A ship's weight was shackled to the termination of this wire and was designed to keep the net straight in the water column during operation, especially in areas with stronger currents.

Standard operating procedures for ring nets involved deploying the ring net system at a speed of 30 m/min to 10 m from the seabed (or to a maximum of 1000 m) based on total water column depth, and then slowly continue paying out wire on the winch until either the tension reading on the display decreased or the wire visibly slacked, indicating the weight hit the bottom. At stations where it was not apparent whether the net hit the seabed, the operating procedure was to continue to pay out cable until the weight visibly hit the seabed, or until another 5 m was paid out. The ring net was recovered at a rate of 50 m/min without slowing or stopping until the top of the net was out of the water, to prevent loss of its catch. The angle of the wire was visibly assessed during ascent, and typically ranged between 5 and 10°. This information was recorded in the electronic logging system (ELOG) used during the mission. During periods of inclement weather conditions, the bridge requested that the net be stopped at 20 m depth during its descent, to allow the bridge to assess the drift direction of the net and to re-position the vessel accordingly.

Ring nets were equipped with a KC Denmark flow meter, which was used to record the start and end flow for each cast. Upon recovery, the net was gently rinsed using seawater from a hose, and the contents of the cod end were preserved in 4% buffered formaldehyde (10% formalin). At station HL_02, a second net system was deployed with a smaller mesh size (76 µm, 0.5 m ring opening) to capture small and early-stage copepods. These samples were also preserved in formalin and will be used for future analysis.

A total of 61 ring net operations were conducted at 57 unique stations (see Table B.1), including a total of two 76 µm net deployments at station HL_02. An additional tow was conducted at station STAB_04 in support of a potential stable isotope project led by Dalhousie University. No ring net operations were aborted.

### 3.2.1 Data Accessibility

The wet biomass of large (> 10 mm) and small (< 10 mm) zooplankton (separate and combined), the dry weight of small zooplankton, and abundances of large zooplankton taxa and a sub- sample of small zooplankton taxa will be uploaded and available in BioChem upon completion of the analysis of samples in the laboratory, and can also be provided upon request to DFO.BIODataServices-BIOServicesdeDonnees.MPO@dfo-mpo.gc.ca.

### 3.3 Argo Floats

During JC290, two Argo floats were deployed from the *RRS James Cook* in support of the international Argo program (Wong et al. 2020). Both floats were NKE PROVOR float models, owned by Dalhousie University. The floats record temperature, conductivity, and depth as well as all 6 biogeochemical Argo (BGC-Argo) parameters: dissolved oxygen, chlorophyll fluorescence, particle backscattering, pH, irradiance, and nitrate concentration. The first float was deployed at station HL_07 after completion of CTD and ring net operations (Figure 3 and Table 2), while the second float was deployed at station LL_09, also following CTD and ring net operations.

Both floats were deployed by ship technicians and crew using the aft port-side pedestal crane and a slip line (Figure 4) while the ship was underway doing 1-2 knots. The floats will remain active in the water for approximately 5 years, collecting vertical profiles from the surface to 2000 m every 10 days. The first profile recorded by each float is shown in Figure 5. While these floats also measured chlorophyll, backscatter, and nitrate, these parameters are not yet accepted into the main Argo data system (RBR Tridente for chlorophyll and backscatter, TriOS Opus for nitrate) and so for simplicity are not shown below. Radiometry (irradiance) was also recorded but is not shown in the figure.

#### 3.3.1 Data Accessibility

Floats in the Argo Canada program send their data via Iridium to the Marine Environmental Data Section (MEDS) where it undergoes various real-time quality control tests (Wong et al. (2025), Schmechtig et al. (2023)) and is sent on to the global data assembly centres (GDACs). Argo data is available in near real-time and can be accessed directly in netCDF format at the GDAC via ftp, https, or s3 data services, or by using a variety of software tools or web services such as ERDDAP and Thredds. See https://www.argodatamgt.org/DataAccess.html for further details.

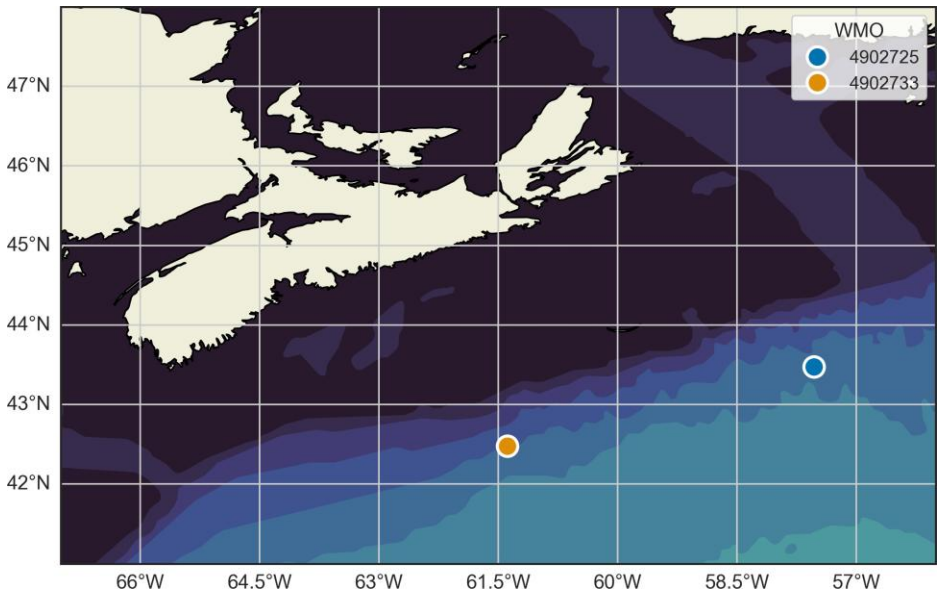



Figure 3. Deployment locations of two Argo floats during the 2026 spring AZMP mission (JC290).

Table 2. Metadata associated with the deployment of two Argo floats during the spring AZMP JC290 survey. The WMO and serial numbers (S/N) of each float are provided, along with the date and time of deployment (UTC), event (Ev.), station, and latitude and longitude (in decimal degrees; DD).

| IMEI | S/N | WMO | Date | Ev. | Station | Deployment Time (UTC) | Lat. (DD) | Lon. (DD) |
|---|---|---|---|---|---|---|---|---|
| 30012506-3318200 | P5389B-25CA003 | 4902733 | 4/27/2026 | 61 | HL_07 | 05:15:26 | 42.4758 | -61.3820 |
| 30012506-3217730 | P5389B-25CA007 | 4902725 | 4/29/2026 | 89 | LL_09 | 23:07:57 | 43.4717 | -57.5277 |



Figure 4. Deployment of an Argo float by NOC crew using the aft port-side pedestal crane and a slip line on the 2026 spring AZMP mission (JC290).

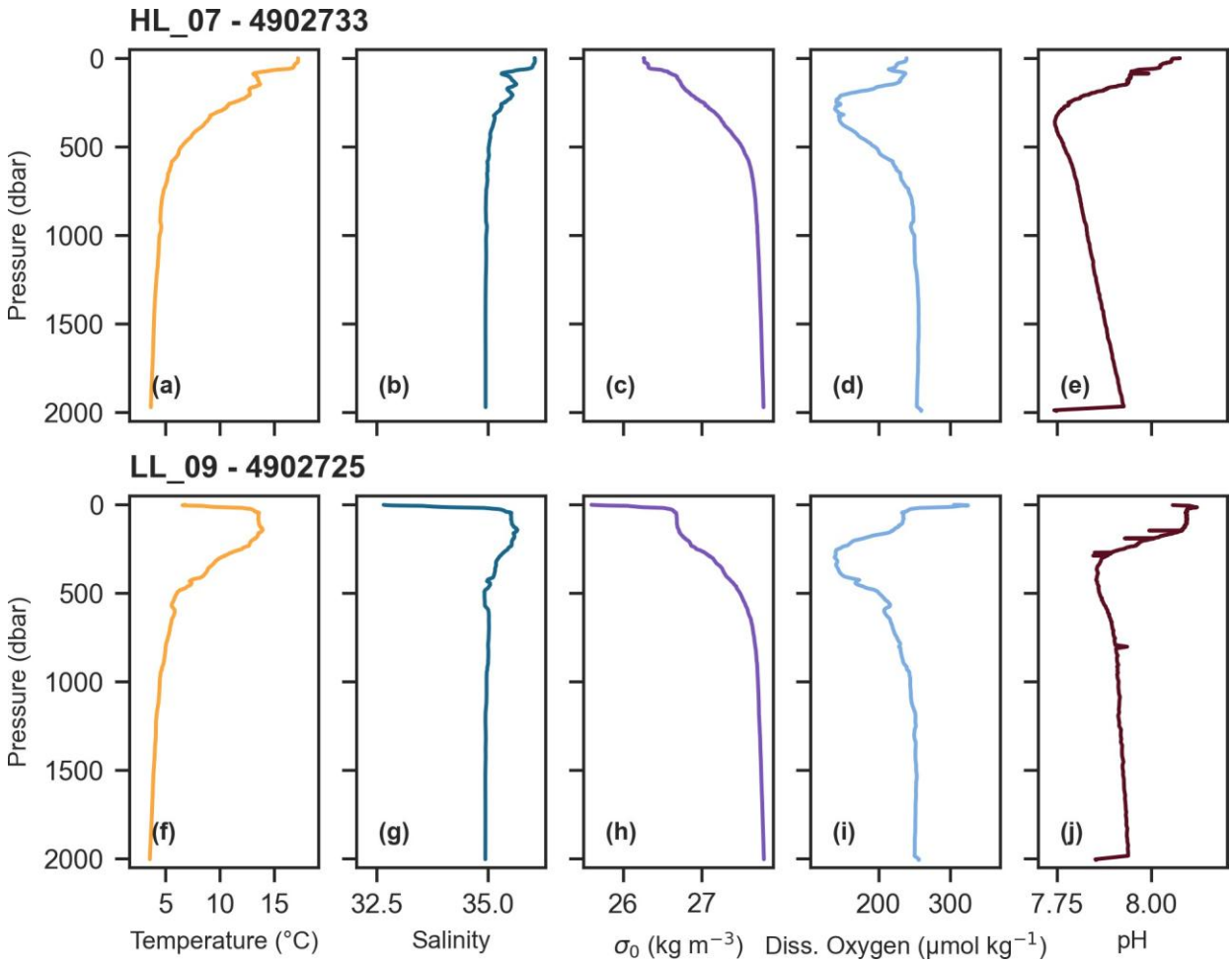



Figure 5. Temperature (a, f), salinity (b, g), potential density (c, h), dissolved oxygen (d, i), and pH (e, j). Argo floats deployed at HL_07 (4902733, upper row) and LL_09 (4902725, lower row).

## 3.4 Flow-Through Systems

### 3.4.1 TSG system

As final vessel demobilization was scheduled to occur in St. John's, NL, the BIO portable underway system was not installed for the JC290 mission. This decision was made to minimize the amount of scientific equipment requiring offload in St. John's and subsequent transport back to BIO. Instead, surface flow-through measurements were collected using the vessel's shipboard thermosalinograph (TSG) system. The RRS *James Cook* shipboard TSG consisted of a SBE 45 TSG, WetLab CStar transmissometer, WetLabs fluorometer, and SBE 38 intake temperature sensors. This flow-through system was connected to the vessel's uncontaminated science seawater dispersed throughout the vessel via an impeller pump. The seawater intake for this pump was located near the bow of the vessel at 6 m below the sea surface. Intake temperature was recorded using SBE 38 temperature sensors located at both the intake and on the ship's drop keel at 5.5 - 5.7 m depth. TSG measurements were stopped during port calls and once when cleaning the system on April 30.

A General Oceanics Model 8060 $pCO_2$ measuring system installed in the Chemistry Laboratory on the vessel was used to collect observations of surface carbon dioxide along the mission track. This system is calibrated using several gas standards at different concentrations, and also includes an Aanderaa optode dissolved oxygen sensor that records measurements of dissolved oxygen concentration at the same interval as the $pCO_2$ measurements (i.e., at 3-minute intervals). Standards for the $pCO_2$ system were run once daily.

**3.4.1.1 Daily underway system sampling** Chlorophyll *a*, salinity, and CDOM samples were collected daily from the outflow of the vessel's TSG system throughout the mission (see Table 3). Samples were collected at approximately 12:00 each day, starting on the day of departure (April 22) and ending on the day prior to arrival (May 3). A daily dissolved oxygen sample was collected from the outflow of the Aanderaa optode sensor installed in the ship's General Oceanics Model 8060 $pCO_2$ system. Surface samples of $pCO_2$, total alkalinity and total inorganic carbon were not collected for the purpose of calibration on this mission as the General Oceanics $pCO_2$ is calibrated using gas standards.

Daily underway samples were assigned a unique sample ID for each day, which was recorded in the ELOG metadata logger. The sample ID range for daily underway samples was 523003 to 523014 (Table 3).

**3.4.1.2 Data management and sensor validation** A script was developed using R statistical software to collate the daily TSG and flow rate data with its corresponding positional data, at a temporal resolution of approximately one second. Maps were created to visualize spatial patterns and help validate the sensor outputs (Figure 6).

Daily salinity and chlorophyll bottle measurements were plotted against the flow-through sensor data throughout the mission (see Figures 7 and 8) to validate the sensor outputs. Sensor and bottle salinity measurements were strongly linearly related ($R^2 = 0.9981$). However, sensor measurements

exhibited an average positive salinity bias of 1.2494 relative to the bottle measurements (mean ± SD = 1.2494 ± 0.0509), indicating a systematic positive bias. The ordinary least squares relationship was y = 0.9898x + 1.5745, where x represents bottle salinity and y represents sensor salinity. The slope was close to unity, suggesting that the discrepancy was primarily attributable to an additive offset rather than a scale-dependent bias.

In contrast, sensor-derived and bottle-measured chlorophyll *a* concentrations exhibited a weak positive relationship ($R^2$ = 0.2661; Figure 8). Sensor measurements were generally lower than corresponding bottle measurements, with a mean sensor–mean bottle difference of -2.1843 ± 2.2169 $\mu$g/L (mean ± SD). The substantial variability among paired differences, together with the departure of the fitted regression from the 1:1 relationship, indicates that the discrepancy was not attributable to a simple constant offset. Sensor chlorophyll *a* also appeared to increasingly underestimate bottle-measured concentrations at higher chlorophyll levels.

### 3.4.2 Imaging Flow Cytobot

As part of a collaborative agreement with the Woods Hole Center for Oceans and Human Health (WHCOHH) headquartered at the Woods Hole Oceanographic Institution (WHOI), an IFCB was installed in the Deck Laboratory for the duration of the mission. This system is designed to draw small seawater samples from its environment (or in this case, from the ship's science seawater system) every 23 minutes using a syringe pump, which then pushes a thin stream of the sampled water across a microscope objective. Cells and other particles are detected by an in-line laser immediately upstream of the objective. Detections trigger a precisely-timed flash lamp that illuminates the cell or particle as it passes in front of the microscope objective. Images of cells are captured by a charged-coupled device (CCD) camera and stored in data files that are associated with each seawater sample. Raw data includes gray-scale images of each particle and associated measurements of laser scatter and fluorescence. This system requires a minimum flow rate of approximately 2 L/min, and the total volume sampled is 15 mL per hour.

An Environmental Sample Processor (ESP) was also installed in the Deck Laboratory and was connected to the science seawater. The ESP is an autonomous, *in situ* instrument used for the collection and analysis of subsurface water samples. The system collects discrete water samples, concentrates microorganisms or particles, and applies molecular or antibody-based assays on board the instrument to detect target organisms, genes, or biological products. In this application, the ESP provided a means of monitoring for the presence of domoic acid-producing algal species or associated toxin signals over the course of the mission, supporting early detection and characterization of harmful algal bloom conditions.

The images collected by the IFCB are transmitted to a Harmful Algal Bloom Observing Network (HABON) Imaging Flow Cytobot dashboard in near real-time using Starlink satellite internet. However, Starlink worked only intermittently during the JC290 mission. Nonetheless, the IFCB still took samples at the normal rate, which were uploaded to the dashboard at a later date. As sampling by the ESP requires manual programming from shore, the intermittent connectivity resulted in fewer samples collected.

### 3.4.3 Data Accessibility

The underway sensor data and daily water sample measurements were archived at BIO in the ODIS data server and are available by request to DFO.BIODataServices-BIOServicesdeDonnees.MPO@dfo-mpo.gc.ca. The images collected by the IFCB are accessible via the mission's HABON-IFCB dashboard.

Table 3. Metadata associated with the collection of water samples from the underway system during the 2026 spring AZMP mission (JC290). Date, time (UTC), latitude and longitude (in decimal degrees) of the ship's position were recorded at the time of sample collection. Temperature (°C), salinity, and flow rate are from the vessel's TSG. 'X' and 'XX' indicate single and duplicate sampling, respectively. Empty cells for Chl and CDOM indicate where samples were collected but subsequently lost or broken.

| | | | | | | | Bottle Samples | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Date/Time [UTC] | Lat. [DD] | Lon. [DD] | Sample ID | Sensor T [degC] | Sensor Sal. | TSG Flow Rate [L/min] | Chl | Salts | O2 | CDOM |
| 2026-04-22 19:50:00 | 43.9440 | -64.0108 | 523003 | 2.92 | 32.47 | 1.63 | XX | X | X | X |
| 2026-04-23 15:25:00 | 42.2274 | -65.4952 | 523004 | 4.54 | 32.72 | 1.71 | XX | X | X | X |
| 2026-04-24 16:48:00 | 42.2818 | -65.8591 | 523005 | 5.68 | 33.31 | 1.63 | XX | X | X | X |
| 2026-04-25 16:05:00 | 44.4880 | -63.4866 | 523006 | 3.80 | 31.95 | 1.46 | | X | X | X |
| 2026-04-26 16:15:00 | 42.7757 | -61.6666 | 523007 | 12.22 | 36.22 | 1.57 | XX | X | X | |
| 2026-04-27 15:03:00 | 43.6503 | -59.7556 | 523008 | 3.71 | 33.39 | 1.63 | XX | X | X | X |
| 2026-04-28 14:55:00 | 44.5714 | -57.8554 | 523009 | 3.35 | 33.20 | 1.48 | XX | X | X | X |
| 2026-04-29 15:45:00 | 43.8759 | -57.2270 | 523010 | 6.11 | 34.25 | 1.50 | XX | X | X | |
| 2026-04-30 15:07:00 | 44.6982 | -58.7316 | 523011 | 3.43 | 33.17 | 1.65 | XX | X | X | X |
| 2026-05-01 16:30:00 | 47.0688 | -60.0447 | 523012 | 1.54 | 32.45 | 1.54 | XX | X | X | X |
| 2026-05-02 15:34:00 | 46.5502 | -58.6878 | 523013 | 1.78 | 32.57 | 1.48 | | X | X | X |
| 2026-05-03 15:15:00 | 44.7195 | -62.0171 | 523014 | 3.04 | 32.39 | 1.52 | XX | X | X | X |

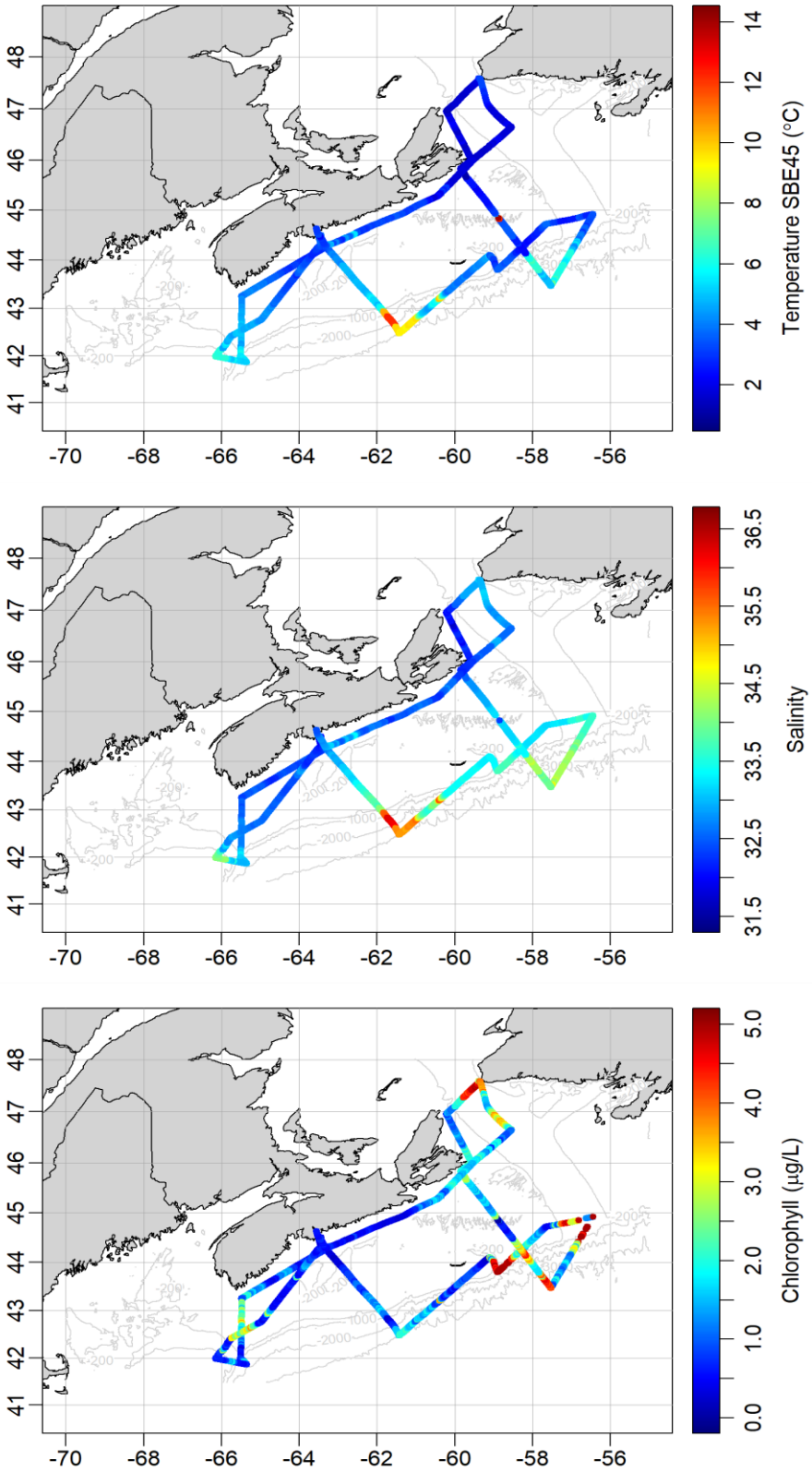



Figure 6. Surface temperature (˚C; top), salinity (middle), and chlorophyll fluorescence ($\mu$g/L; bottom) measured along the mission track during the 2026 spring AZMP mission (JC290). X and y axes are longitude and latitude, respectively, in degrees.

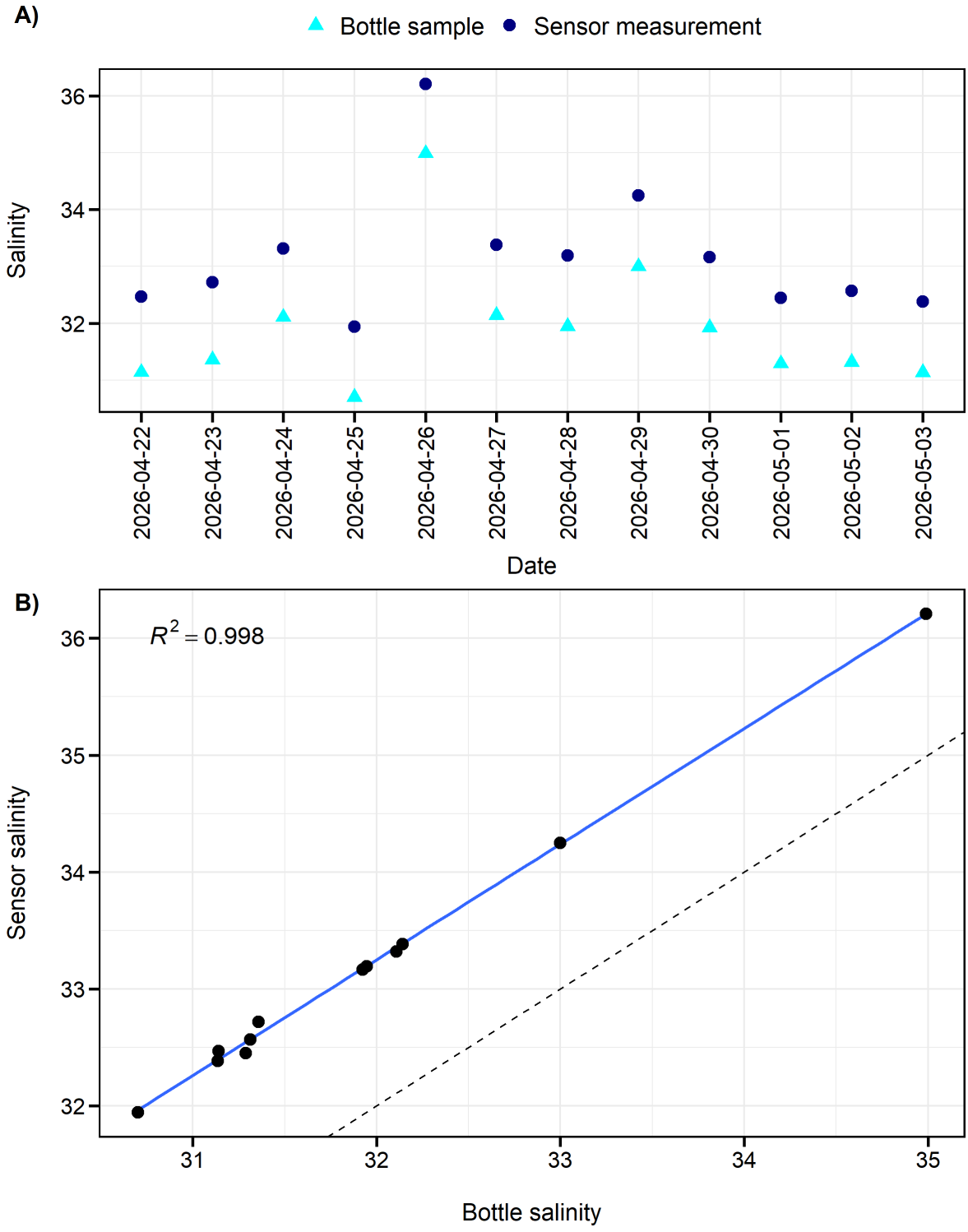



Figure 7. A) Comparison between salinity bottle samples and sensor measurements collected using the RRS *James Cook* flow-through system during the 2026 spring AZMP survey (JC290). B) Relationship between bottle-measured salinity and corresponding flow-through sensor salinity measurements collected during the mission. The solid line represents the ordinary least squares regression and the dashed line represents the 1:1 relationship. The coefficient of determination ($R^2$) is shown.

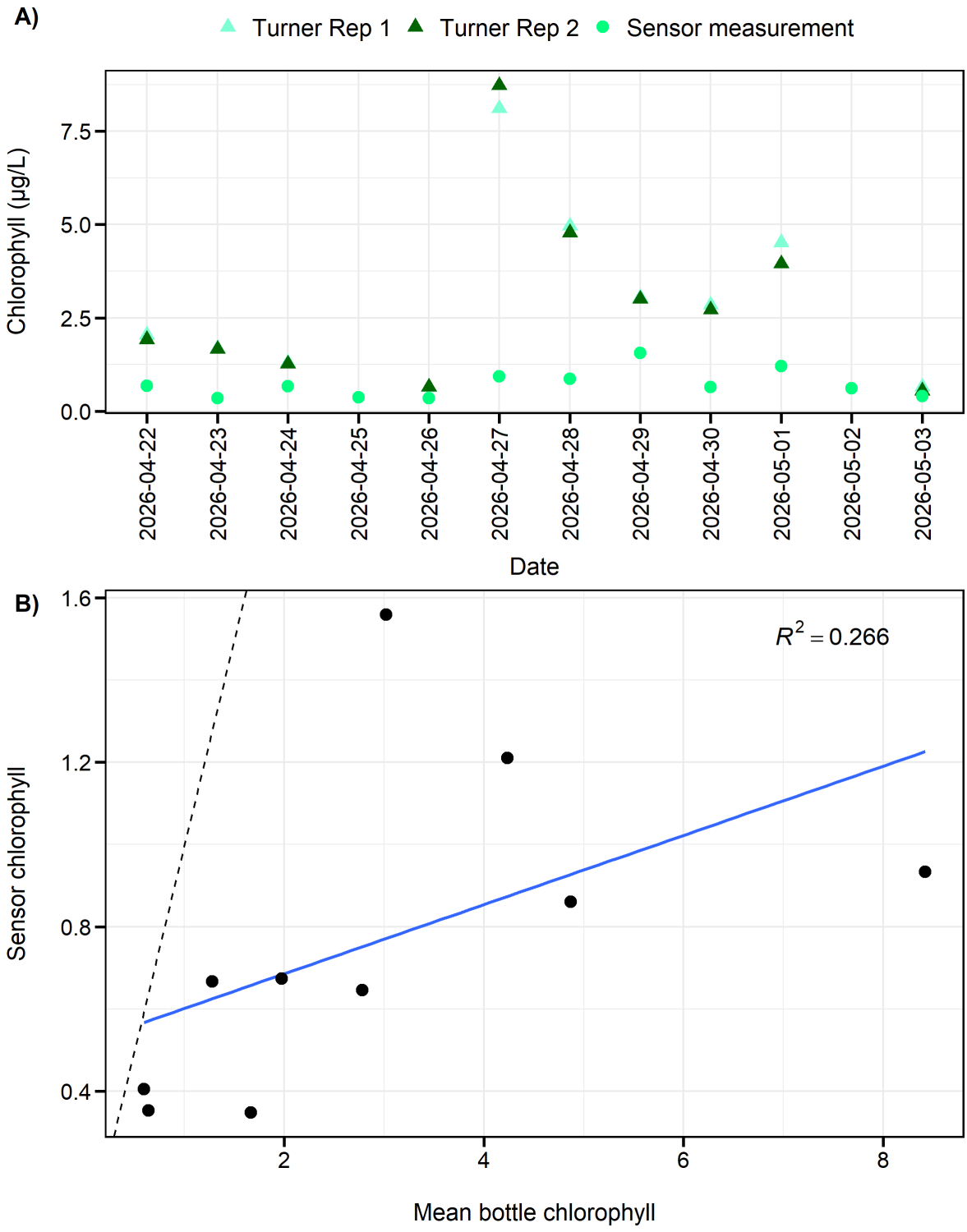



Figure 8. A) Comparison between chlorophyll bottle samples and sensor measurements collected using the RRS *James Cook* flow-through system during the 2026 spring AZMP survey (JC290). B) Relationship between bottle-measured chlorophyll *a* and corresponding flow-through sensor chlorophyll *a* measurements collected during the mission. The solid line represents the ordinary least squares regression and the dashed line represents the 1:1 relationship. The coefficient of determination ($R^2$) is shown.

## 3.5 Shipboard Science Systems

### 3.5.1 Vessel-Mounted Acoustic Doppler Current Profiler (VMADCP)

Ocean currents were continuously measured throughout the JC290 mission using a dual vessel-mounted Acoustic Doppler Current Profiler (ADCP) system consisting of 75 kHz and 150 kHz Ocean Surveyor ADCPs. The 75 kHz ADCP can reach to 600-800 m in good weather in its deep-profiling mode, while the 150 kHz has a maximum range of ~400 m depth. In bad weather, low scattering conditions, or some speed/heading/sea state conditions that entrain bubbles under the transducer, the range decreases. Data acquisition and the requisite ancillary navigation streams occur via the VMDAS manufacturers software. An Ocean Surveyor is capable of running in either broadband mode (higher resolution at the expense of penetration) or narrow-band mode (slightly deeper profiling but lower resolution). It is also capable of interleaving these pings. Data were processed and available for viewing in real time via the Teledyne RDI VmDas software.

The ADCP system was configured by Ship Scientific Systems (SSS) technician Joshua Pedder and DFO data manager Diana Cardoso according to the settings described in Table 4 below. The alignment angle (EA) of the 75 kHz system was -6.62°, while the 150 kHz was 0.60°. Both ADCPs were run continuously for the entire mission with the exception of stops in ports, while operating in The Gully MPA, when they were removed from k-Sync, and to turn on/off bottom tracking. When the EM710 multibeam was stopped April 25, the ADCPs were taken off k-sync to give higher resolution data. After this, the minimum ping time changed from OS75=4s, OS150=2.1s to OS150=1.1s, OS75=1.8s. Bottom tracking was turned on at the end of the mission, on May 3. Normally, one beam of the 75 kHz ADCP is obstructed when the vessel's second drop keel is lowered. However, the second drop keel was not lowered at any point during this mission.

A detailed digital log for the ADCP systems was maintained by the SSS technician, and collected data were archived at the Bedford Institute of Oceanography via the BIO Data Services group.

Table 4. Configuration settings for the 75 and 150 kHz VMADCP units on the RRS *James Cook* for the 2026 spring AZMP mission (JC290).

| ADCP | Start Day (UTC) | End Day (UTC) | Ping | No. Bins | Bin Size (m) | Blank Distance (m) |
|---|---|---|---|---|---|---|
| 75 kHz | 2026-05-04 07:08:00 | 2026-04-22 12:39:42 | Narrow band | 50 | 16 | 8 |
| 150 kHz | 2026-05-04 07:08:00 | 2026-04-22 12:39:42 | Narrow band | 50 | 4 | 4 |

### 3.5.2 Echosounders and Multibeam

The RRS *James Cook* is equipped with a Kongsberg EA640 single-beam echosounder with 10 and 12 kHz transducers that was used for depth estimation during CTD and ring net operations. The vessel's other echosounders - a Kongsberg SBP27 sub-bottom profiler with frequency outputs that

range from 3.5 to 10 kHz and a Kongsberg EK80, were not turned on for the duration of the mission. Of the ship's two multibeam systems (Kongsberg EM710 and EM122), the EM710 was initially turned on at the start of the mission to enhance the precision of depth measurements during CTD and net operations. However, this unit was turned off on April 25 after noting interference with the ADCP data collection.

### 3.5.3 SurfMet

The Surface Meteorological (SurfMet) system of the RRS *James Cook* was used to measure, process, and display weather and sea-state data at the ship's location. It incorporates various sensors on the meteorological mast (i.e., Met Tower) and from the vessel's flow-through system. The Met component consisted of an air temperature and humidity probe, ambient light sensors (PAR, TIR), a barometer, and anemometer. The shipboard flow-through system, described in the Flow-Through Systems section above, is also considered part of SurfMet package.

SurfMet data were accessible in real-time through the vessel's National Marine Facilities display system. A detailed digital log for the flow-through system was maintained by the SSS and was archived along with the collected data at the Bedford Institute of Oceanography via the BIO Data Services group. The SurfMet system was run throughout the mission, excepting during short periods where the system was cleaned and while alongside.

### 3.5.4 Availability of Shipboard Data

All shipboard environmental and navigational data collected during the JC290 mission were archived at BIO in the Ocean Data Information Section (ODIS) data server and are available by request to DFO.BIODataServices-BIOServicesdeDonnees.MPO@dfo-mpo.gc.ca.

# 4. Data Management Summary

Digital data collected during the JC290 mission were from a combination of DFO, NOC, and WHOI instrumentation. All digital data collected were backed up at least daily on the ship's network and on an external hard drive. At the end of the mission, all data and scanned logs were sent to the BIO Data Services group in ODIS for upload and archival into their protected server. Data collected by the IFCB and ESP are stored at WHOI and are available by request.

## 4.1 Digital and Paper Logs

ELOG, an electronic logbook system for collecting event metadata, was used to log the date, time, ship's position, and sounding associated with certain logistical aspects of each gear deployment (e.g., deployed, on bottom, and recovered). This electronic logbook was accessible on the ship's network and mobile devices. In addition, an ELOG observations log was used to record detailed notes and observations on shipboard instrumentation and other systems and an underway logbook within ELOG was used to record the samples collected, date, time and position. The ELOG configuration, deployment and backup was managed using Git locally, and was pushed to GitHub upon return (https://github.com/dfo-mar-odis/azmp_elog/tree/2026_Spring_AZMP_JC290). The recording of metadata in ELOG facilitates the upload of discrete and plankton data to the BioChem national repository.

ELOG was run from a Windows 10 laptop in the Main Laboratory near the CTD computer. A second laptop was placed in the Deck Laboratory for the ring net operator. The GPS and sounder data for ELOG from the ship's network were read using Python scripts called from the ELOG config file. Tablets were used to access ELOG on deck. The bridge staff of the RRS *James Cook* also kept a digital log for all gear deployments.

Digital 'filtration logs' (in .csv format) were used by laboratory staff for logging details associated with the processing of collected water samples. These filtration logs were generated prior to the start of the mission using the R statistical software from an Excel file containing the planned sampling for each station (known as the water budget). At the end of the mission, a summary of filter volumes and other metadata was generated for use in subsequent laboratory analysis at BIO. A laptop was placed in the Main Laboratory for management of the digital filtration logs.

A digital log was also maintained in Excel to record details associated with each SUNA sensor deployment, including the SUNA data file name and size, as well as the corresponding station and event information. This provided a reliable means of tracking and verifying the station and event associated with each data file/deployment.

Paper logsheets were also kept for a number of gear deployments to provide redundancy in case of failure of ELOG. These included CTD 'deck' sheets, ring net logs, and a paper logsheet to note daily sampling from the flow-through system.

## 4.2 DFO At-sea Reporting Template (DART)

The in-house DFO At-sea Reporting Template (DART) was used to compile and reformat all discrete data collected and analyzed at sea (dissolved oxygen, chlorophyll, and salinity). DART provides a means to verify the accuracy of collected metadata and data, and facilitates subsequent processing and archiving. This process involved loading the ELOG files and the CTD bottle (.btl) files, which contain the sensor data associated with each Niskin bottle fire. DART was also used to produce reports of the linked bottle and sensor measurements to facilitate the quality control of both sensor and bottle measurements while at sea. Upon return, DART was used to load discrete and ring net data to the DFO national database BioChem.

## 4.3 Data Submission to Global Telecommunications Systems

The World Meteorological Organization Global Telecommunications Systems (GTS) disseminates meteorological and oceanographic data for the primary purpose of supporting weather forecasting. However, the data are also available for modelers to assimilate into their climate forecasting. DFO's pathway to providing data on the GTS is via Environment and Climate Change Canada.

The AZMP submits CTD data to GTS via MEDS (Marine Environmental Data Section, Ocean Sciences Division, DFO) at regular intervals throughout each mission to MEDS-SDMM.XNCR@dfo-mpo.gc.ca. The data must be sent within 30 days of collection. The files submitted are a customized .txt file called an IGOSS file, which is generated using the in-house CTD post-processing software CTDDAP.

# 5 Seabird Observations

## 5.1 Background

The east coast of Canada supports millions of breeding marine birds as well as migrants from the southern hemisphere and the eastern North Atlantic. In 2005, the Canadian Wildlife Service (CWS) of Environment Canada initiated the Eastern Canada Seabirds at Sea (ECSAS) program with the goal of identifying and minimizing the impacts of human activities on birds in the marine environment (Gjerdrum et al. 2012). Since that time, a scientifically rigorous protocol for collecting data at sea and a sophisticated geodatabase have been developed, relationships with various industries and DFO to support offshore seabird observers have been established, and over 300,000 km of ocean track have been surveyed by CWS-trained observers. These data are now being used to quantify seabird abundance and distribution at sea and to identify and mitigate any threats. In addition, data are collected on marine mammals, sea turtles, sharks, and other marine organisms when they are encountered.

## 5.2 Methods

Seabird surveys were conducted from the port side of the bridge of the RRS *James Cook* during the Scotian Shelf AZMP from April 22 through to May 4, 2026. Surveys were conducted while the ship was moving at speeds greater than 4 knots, looking forward and scanning a 90°arc to the port side of the ship. All birds observed on the water within a 300 m-wide transect were recorded, and we used the snapshot approach for flying birds (intermittent sampling based on the speed of the ship) to avoid overestimating abundance of birds flying in and out of transect. Distance sampling methods were incorporated to address the variation in bird detectability. Marine mammal and other marine wildlife observations were also recorded, although surveys were not specifically designed to detect marine mammals. Details of the methods used can be found in the CWS standardized protocol for pelagic seabird surveys from moving platforms (Gjerdrum et al. 2012).

## 5.3 Results

A total of 1188.7 km of ocean was surveyed over 12 days. A total of 2817 marine birds were observed from 6 families (Table 5). Bird densities averaged 8.9 birds/km$^2$ (ranging from 0 – 1187.2 birds/km$^2$). The highest densities of birds (> 150 birds/km$^2$) were observed at the northern and eastern edges of Banquereau Bank, and at the outlet of the Laurentian Channel in slope waters (Figure 9).

Sightings from the family Alcidae were the most abundant (65% of the observations), most of which were Dovekie and Murre (Table 5). Neither of these species breed in the area but do spend a significant amount of time here during the non-breeding season (i.e., September through early May). Laridae were also common (17% of the observations), with Black-legged Kittiwake, Herring and Great Black-backed Gulls observed throughout the survey area. Just nine marine mammals were observed during the surveys: seven pilot whales (*Globicephala melas*) and two humpbacks

(*Megaptera novaeangliae*).

## 5.4 The Gully and St. Ann's Bank MPAs

Surveys took place in the Gully MPA on 27-28 April (Figure 9) where a total of 33 marine birds were observed (Table 6). Surveys in St. Ann's Bank MPA took place on May 2 where just 5 marine birds were sighted, all Northern Fulmar. No marine mammals were observed in either of the MPAs. Wildlife density and the likelihood of detection can vary considerably with survey timing and environmental conditions. The relatively low number of sightings in both MPAs during this survey likely reflects the limited daytime survey effort within the MPAs, as the vessel spent most of its time there at night, when wildlife surveys were not conducted.

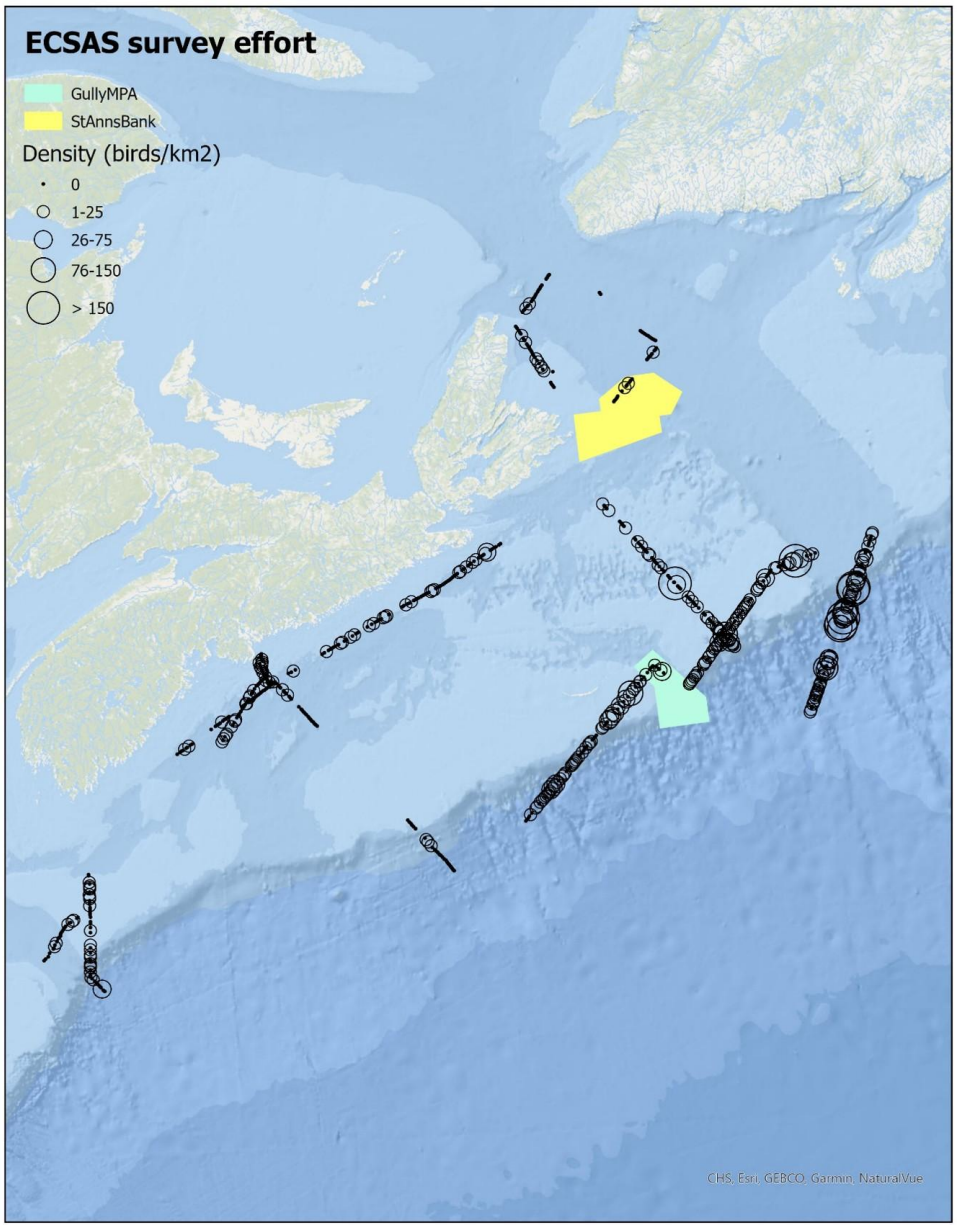



Figure 9. Density of birds (all species combined) observed during surveys on the 2026 spring AZMP mission from April 22 to May 4, 2026. The Gully and St. Anns Bank Marine Protected Areas are represented by the green and yellow polygons, respectively.

Table 5. List of total number (No.) of observed during surveys completed on the JC290 mission.

| Family | Common Name | Latin | Total Count |
|---|---|---|---|
| ***Marine birds*** | | | |
| Procellariidae | Northern Fulmar | *Fulmarus glacialis* | 283 |
| Procellariidae | Sooty Shearwater | *Ardenna grisea* | 90 |
| Hydrobatidae | Leach's Storm-Petrel | *Hydrobates leucorhous* | 55 |
| Hydrobatidae | Wilson's Storm Petrel | *Oceanites oceanicus* | 9 |
| Sulidae | Northern Gannet | *Morus bassanus* | 53 |
| Scolopacidae | Red-necked Phalarope | *Phalaropus lobatus* | 3 |
| Laridae | Pomarine Jaeger | *Sterocorarius pomarinus* | 9 |
| Laridae | Parasitic Jaeger | *Stercorarius parasiticus* | 2 |
| Laridae | Long-tailed Jaeger | *Stercorarius longicaudus* | 1 |
| Laridae | Black-legged Kittiwake | *Rissa tridactyla* | 15 |
| Laridae | Herring Gull | *Larus argentatus* | 57 |
| Laridae | Great Black-backed Gull | *Larus marinus* | 19 |
| Laridae | Lesser Black-backed Gull | *Larus fuscus* | 4 |
| Laridae | Ring-billed Gull | *Larus delawarensis* | 19 |
| Laridae | Iceland Gull | *Larus glaucoides* | 3 |
| Laridae | Glaucous Gull | *Larus hyperboreus* | 6 |
| Laridae | Unidentified Gulls | *Larus* | 355 |
| Alcidae | Dovekie | *Alle alle* | 1231 |
| Alcidae | Common Murre | *Uria aalge* | 83 |
| Alcidae | Thick-billed Murre | *Uria lomvia* | 63 |
| Alcidae | Unidentified Murres | *Uria* | 345 |
| Alcidae | Atlantic Puffin | *Fratercula arctica* | 8 |
| Alcidae | Razorbill | *Alca torda* | 4 |
| Alcidae | Unidentified Auks | *Alcidae* | 100 |
| **Total** | | | **2817** |

Table 6. List of total number (No.) of marine bird species observed during surveys within The Gully Marine Protected Area on April 27-28, 2026 during the JC290 mission.

| Common Name | Latin | Total Count |
|---|---|---|
| Unidentified Murres | *Uria* | 16 |
| Unidentified Auks | *Alcidae* | 11 |
| Northern Gannet | *Morus bassanus* | 3 |
| Northern Fulmar | *Fulmarus glacialis* | 2 |
| Ring-billed Gull | *Larus delawarensis* | 1 |
| **Total** | | **33** |

# 6 Operational Considerations and Issues of Note

This section contains a brief summary of the various operational considerations or issues encountered with science equipment and/or data and sample post-processing during the JC290 mission. This information should help to guide both CTD and laboratory post-processing procedures, and future interpretation of the data collected on the mission.

## 6.1 Yarmouth and Portsmouth Lines

Due to internal pressures on available ship-time funding, sampling of the 'Yarmouth' and 'Portsmouth' hydrographic transects located in the Gulf of Maine was discontinued in 2026, starting with the JC290 survey. Sampling of these transects during AZMP surveys began starting in the fall of 2016 as part of a collaborative agreement between DFO and the Northeastern Regional Association of Coastal Ocean Observing Systems (NERACOOS). This collaboration aimed to monitor changes in the flux and properties of water masses across the Scotian Shelf and into the Gulf of Maine, including temperature, salinity, carbon, alkalinity, oxygen, and nutrient concentrations, and to assess how these changes may be influenced by natural processes and human activities. Routine sampling of the AZMP hydrographic transects across the Northeast Channel and the mouth of the Laurentian Channel, a secondary priority of these surveys, was also discontinued in 2026. However, these transects will be prioritized for sampling during future surveys when time permits.

## 6.2 CTD Operations

1. The plug was inadvertently left on the conductivity sensor during the CTD-Rosette deployment at station LCM_01 (Event 070). Evaluation of the data collected during the soak period indicated an issue with the salinity measurements, and the cast was subsequently aborted. The CTD-Rosette was recovered, the plug removed, and the system redeployed successfully. A similar issue occurred at station LL_07 (Event 092), where the pH buffer bottle had been left on the pH sensor. In this instance, the CTD-Rosette was recovered, the bottle removed, and the system redeployed successfully.

2. Upon recovery of the CTD-Rosette at station CSL_06 (Event 117), it was discovered that the vents were left open on all Niskin bottles. Given that this is a core station, a decision was made to redeploy the CTD-Rosette to ensure no impacts to the water measurements would be incurred.

3. There were both logistical and data quality issues with the SUNA nitrate sensor during the JC290 mission. The initial sampling rate of 5:1 light-to-dark counts used on stations HL_02 (Event 001), and BBL_01 through BBL_03 (Events 005 through 009) resulted in large files that could not be downloaded in time before the sensor's next deployment. Prior to deployment at BBL_04 (Event 011), the sampling rate was changed to 1:1, resulting in smaller files that could be downloaded between stations. At BBL_05 (Event 013), the CTD-Rosette deployment was aborted after the SUNA began reporting a continuous nitrate value of -24 and a voltage of zero. Suspecting an issue with the sensor's physical configuration on the

CTD-Rosette, the system was recovered and inspected, and the SUNA sensor removed. A bench test was conducted by connecting the sensor to an external power source and computer running the associated UCI software, and the sensor's voltage properties were examined. The sensor passed the bench test. The sea battery used to power the SUNA during deployment was subsequently tested and measured 12.3 V, indicating that it was near full charge. The cable connecting the sea battery to the SUNA was also tested and confirmed to be conductive. CTD technicians suspected that water ingress into the sensor may have contributed to its malfunction and elected to remove it from the CTD-Rosette for stations BBL_05 through BBL_07. The sensor was subsequently reinstalled for deployments in the Northeast Channel, where station depths were shallower. Consequently, no SUNA nitrate data were collected at BBL_05 (Event 013), BBL_06 (Event 015), or BBL_07 (Event 017). Several sampling rates were evaluated during the remainder of the mission, with a 2:1 light-to-dark ratio ultimately adopted for the majority of subsequent deployments. However, the SUNA continued to exhibit intermittent erroneous readings of -24. The source of these errors remains under investigation. Nitrate data from the SUNA contained within the .ODF CTD files and .QAT files (reported as the Upoly0 field) from all stations should therefore be interpreted with caution.

## 6.3 Ring Net Operations

1. The flow meters installed on both the 202 and 76 µm ring nets were not functional for their first deployment at station HL_02 (Events 002 and 003, respectively). Both flow meters were replaced and operational for their subsequent deployments.

2. A small amount of the contents of the ring net sample collected at station STAB_06 (Event 121) was lost after the vessel rolled and the jar was tipped over. The results of this sample should therefore be taken with caution.

## 6.4 Laboratory

1. Several days into the mission, it was discovered that the TIC/TA samples were being preserved using only 50 $\mu$L of mercuric chloride instead of the required 100 $\mu$L. Upon discovery, the affected samples, which were collected on stations HL_02 (Event 001), and BBL_01 through BBL_06 (Events 005 to 015), were opened and an additional 50 $\mu$L of mercuric chloride was added to ensure adequate preservation.

2. A tote containing water samples in glass vials for CDOM determination fell out of a fridge after the vessel rolled significantly in a storm, resulting in the loss of samples. A total of 16 CDOM samples were lost, most coming from stations sampled on the eastern Scotian Shelf and Cabot Strait (see Table 7).

3. In 2026 the Maritimes Region AZMP migrated over to new Turner Designs Trilogy benchtop fluorometers for the measurement of chlorophyll concentration from water samples. These units write raw fluorescence units measured from each sample directly into Microsoft Excel. During the reading of samples collected on station STAB_05 (Event 122), a connection issue

occurred between the benchtop fluorometer and Excel, resulting in the loss of chlorophyll measurements from this station.

4. Replicate dissolved oxygen measurements showed greater variability than expected during the mission. Inspection of the Metrohm Dosimat revealed that several connectors in the sodium thiosulfate dispensing system were loose, resulting in the introduction of more air bubbles than usual during titration. After the connectors were tightened, agreement among replicate oxygen measurements improved.

## 6.5 Other

1. During the second occupation of high-frequency station HL_02, the Secchi disc was lost after its bridle broke during recovery. Secchi depth was recorded prior to the bridle breaking.

2. IFCB and ESP communications and data transfer via the external satellite internet system (Starlink) set up on the Met tower were intermittent for the majority of the JC290 mission. For the IFCB, this only affected the transfer of images to the system's associated dashboard while the mission was ongoing. However, since the ESP relies on external commands to take a sample, the poor communications meant that samples could only be collected once communications improved starting on April 25.

Table 7. Metadata associated with the coloured dissolved organic matter (CDOM) samples lost during the JC290 mission.

| Sample ID | Station | Nominal Depth (m) |
|---|---|---|
| 523007 | Underway | Surface |
| 523010 | Underway | Surface |
| 523106 | BBL_05 | 30 |
| 523317 | NEC_01 | 1 |
| 523543 | GUL_01 | 1 |
| 523631 | LCM_03 | 1 |
| 523650 | LCM_04 | 1 |
| 523662 | LCM_05 | 30 |
| 523696 | LCM_07 | 30 |
| 523771 | LL_07 | 30 |
| 523777 | LL_07 | 1 |
| 523788 | LL_06 | 1 |
| 523877 | CSL_01 | 30 |
| 523883 | CSL_01 | 1 |
| 523939 | CSL_04 | 1 |
| 524024 | STAB_05 | 1 |

# 7 Acknowledgements

We would like to thank all science staff of the JC290 mission for their dedication and hard work to make the mission a success. We also thank Commanding Officer John Leask, as well as the officers, crew, and marine technicians of the RRS *James Cook* for their dedication and support during the mission.

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# APPENDIX A Participants

A total of 12 scientific personnel participated in the JC290 mission (Table A.1), including seven staff from DFO, one seabird observer from Environment and Climate Change Canada's Canadian Wildlife Service, and two student samplers representing the laboratories of Drs. Carly Buchwald, Julie LaRoche, and Erin Bertrand at Dalhousie University in Halifax, Nova Scotia. Two additional students from Dalhousie University volunteered to assist with DFO data collection and sampling activities. The chief scientist was Lindsay Beazley (DFO), with Peter Thamer (DFO) as night shift captain.

Science staff were organized into 12-hour shifts to support continuous operations. Most staff supporting AZMP activities were organized into 06:00-18:00 or 18:00-06:00 shifts, while wildlife observing took place typically from 07:00-19:00.

A total of 14 ship's crew and six National Marine Facility (NMF) technicians supported vessel and scientific operations. The lead marine technician was Paul Henderson (24:00 - 12:00). Commanding Officer John Leask served as captain of the RRS *James Cook*.

Table A.1. Science personnel of the 2026 spring AZMP mission (JC290). Role and shift schedule are also shown. Affiliations are as follows: DFO = Fisheries and Oceans Canada, ECCC = Environment and Climate Change Canada, and DAL = Dalhousie University.

| Role | Affiliation | Shift | Participant |
|---|---|---|---|
| Chief Scientist/ Ring net operator | DFO | 06:00-18:00 | Lindsay Beazley |
| Ring net operator | DFO | 18:00-06:00 | Rebecca Milne |
| CTD data acquisition | DFO | 06:00-18:00 | Lisa Baxter |
| CTD data acquisition | DFO | 18:00-06:00 | Meng Ji |
| Lab filtration | DFO | 06:00-18:00 | Tim Perry |
| Lab filtration | DFO | 18:00-06:00 | Peter Thamer |
| Lab support/CDOM filtration | DAL | 06:00-18:00 | Hana Hourston |
| Lab support/CDOM filtration | DAL | 18:00-06:00 | Stella Seifried |
| Data manager | DFO | 06:00-18:00 | Diana Cardoso |
| Water sampling/filtration | DAL | 06:00-18:00 | Katie Halloran |
| Water sampling/filtration | DAL | 18:00-06:00 | Sofia Dragoti |
| Seabird observer | ECCC | 07:00-19:00 | Jacob Comeau-Ouellette |

# APPENDIX B Detailed Gear Operations Conducted during the JC290 Mission

This appendix provides a detailed log of all gear deployments and recoveries conducted during the JC290 mission. Operations are listed sequentially by event number and include the station identifier, gear type, deployment position, date, mean water depth from the 12 kHz echosounder, duration of activity, and associated operational comments. These records were generated from the shipboard electronic log (ELOG) system and provide a complete operational record of sampling activities conducted during the mission.

Table B.1. Operations conducted at each station during the 2026 spring AZMP mission (JC290), ordered sequentially by Event number. Event coordinates (in decimal degrees - DD; Start Latitude (Lat.); Start Longitude (Lon.)) reflect the ship's position at the time of deployment, as recorded using the ELOG meta-data logger. Mean depth (m) is calculated as the average water depth recorded by the ship's echosounder at the time each action was recorded for each station. Comments are associated with the 'action' on which they were entered for each event: Aborted (failed event), Deployed (gear deployment), Bottom (gear at the bottom), and Recovered (gear recovery). Note that multiple comments/actions can be present for a single event.

| Event | Station | Gear | Start Lat. (DD) | Start Lon. (DD) | Date | Mean Depth (m) | Duration | Comments |
|---|---|---|---|---|---|---|---|---|
| 1 | HL_02 | CTD-Rosette | 44.2667 | -63.3167 | 4/22/2026 | 146 | 00:52:39 | |
| 2 | HL_02 | 202 µm net | 44.2659 | -63.3177 | 4/22/2026 | 146 | 00:08:21 | |
| 3 | HL_02 | 76 µm net | 44.2652 | -63.3187 | 4/22/2026 | 146 | 00:10:29 | Recovered: flowmeter problematic |
| 4 | HL_02 | Secchi Disc | 44.2653 | -63.3187 | 4/22/2026 | 145 | 00:00:29 | |
| 5 | BBL_01 | CTD-Rosette | 43.2500 | -65.4855 | 4/23/2026 | 79 | 00:33:36 | Recovered: Bottles 9, 10 and 12 did not fire (523045, 523046, 523048). Salinity and oxy taken from surface bottle instead of 10 m. |
| 6 | BBL_01 | 202 µm net | 43.2499 | -65.4862 | 4/23/2026 | 66 | 00:14:15 | |
| 7 | BBL_02 | CTD-Rosette | 42.9999 | -65.4799 | 4/23/2026 | 119 | 00:40:49 | |
| 8 | BBL_02 | 202 µm net | 42.9999 | -65.4799 | 4/23/2026 | 119 | 00:09:48 | |
| 9 | BBL_03 | CTD-Rosette | 42.7587 | -65.4830 | 4/23/2026 | 105 | 00:32:34 | Recovered: NOC tech suggested 2m for surface bottles with sea state; bottle 12 did not close (20m; 523072) |
| 10 | BBL_03 | 202 µm net | 42.7586 | -65.4806 | 4/23/2026 | 104 | 00:10:05 | |
| 11 | BBL_04 | CTD-Rosette | 42.4506 | -65.4834 | 4/23/2026 | 104 | 00:29:16 | |
| 12 | BBL_04 | 202 µm net | 42.4506 | -65.4837 | 4/23/2026 | 104 | 00:09:43 | |
| 13 | BBL_05 | CTD-Rosette | 42.1333 | -65.5046 | 4/23/2026 | 186 | 00:44:46 | |
| 14 | BBL_05 | 202 µm net | 42.1351 | -65.5065 | 4/23/2026 | 169 | 00:20:02 | |

Table B.1. *(continued)*

| Event | Station | Gear | Start Lat. (DD) | Start Lon. (DD) | Date | Mean Depth (m) | Duration | Comments |
|---|---|---|---|---|---|---|---|---|
| 15 | BBL_06 | CTD-Rosette | 41.9995 | -65.5100 | 4/23/2026 | 1092 | 00:11:55 | Aborted: SUNA values consistent at -24; battery voltage shows as 0 |
| 16 | BBL_06 | CTD-Rosette | 41.9995 | -65.5100 | 4/23/2026 | 1091 | 01:18:58 | |
| 17 | BBL_06 | 202 µm net | 41.9995 | -65.5100 | 4/23/2026 | 1090 | 00:54:09 | |
| 18 | BBL_07 | CTD-Rosette | 41.8667 | -65.3498 | 4/23/2026 | 1886 | 01:53:57 | Deployed: No SUNA or pH due to depth |
| 19 | BBL_07 | 202 µm net | 41.8663 | -65.3498 | 4/24/2026 | 1885 | 00:53:04 | |
| 20 | NEC_10 | CTD-Rosette | 41.9902 | -66.1451 | 4/24/2026 | 95 | 00:38:52 | |
| 21 | NEC_10 | 202 µm net | 41.9909 | -66.1468 | 4/24/2026 | 94 | 00:13:43 | |
| 22 | NEC_09 | CTD-Rosette | 42.0617 | -66.0832 | 4/24/2026 | 98 | 00:33:23 | |
| 23 | NEC_08 | CTD-Rosette | 42.1183 | -66.0374 | 4/24/2026 | 209 | 00:12:20 | Aborted: SUNA values consistent at -25 |
| 24 | NEC_08 | CTD-Rosette | 42.1183 | -66.0374 | 4/24/2026 | 209 | 00:46:00 | Deployed: SUNA not working. Leaving it on for second cast. Bottom: submitted late at 125m, 2026-04-24 \| 090152.0016 \| 42 07.09728 N \| 66 02.24551 W changed to actual Recovered: Bottle 3 dripping at bottom |
| 25 | NEC_08 | 202 µm net | 42.1183 | -66.0374 | 4/24/2026 | 209 | 00:14:15 | |
| 26 | NEC_07 | CTD-Rosette | 42.1588 | -65.9664 | 4/24/2026 | 227 | 00:42:04 | Deployed: SUNA was removed |
| 27 | NEC_06 | CTD-Rosette | 42.1956 | -65.9380 | 4/24/2026 | 229 | 00:45:05 | Bottom: Changed seapoint sensor 3867; file name now JC290_1182_NMEA_B.XMLCON |
| 28 | NEC_06 | 202 µm net | 42.1979 | -65.9368 | 4/24/2026 | 229 | 00:19:14 | Recovered: strong currents. very challenging to keep wire straight |

Table B.1. *(continued)*

| Event | Station | Gear | Start Lat. (DD) | Start Lon. (DD) | Date | Mean Depth (m) | Duration | Comments |
|---|---|---|---|---|---|---|---|---|
| 29 | NEC_05 | CTD-Rosette | 42.2290 | -65.9033 | 4/24/2026 | 239 | 00:46:27 | |
| 30 | NEC_04 | CTD-Rosette | 42.2716 | -65.8698 | 4/24/2026 | 230 | 00:46:03 | Deployed: SUNA back on package |
| 31 | NEC_04 | 202 µm net | 42.2716 | -65.8719 | 4/24/2026 | 229 | 00:17:02 | Bottom: good station keeping |
| 32 | NEC_03 | CTD-Rosette | 42.3006 | -65.8497 | 4/24/2026 | 217 | 00:44:15 | |
| 33 | NEC_02 | CTD-Rosette | 42.3370 | -65.8146 | 4/24/2026 | 206 | 00:40:47 | |
| 34 | NEC_02 | 202 µm net | 42.3409 | -65.8158 | 4/24/2026 | 206 | 00:16:50 | |
| 35 | NEC_01 | CTD-Rosette | 42.4178 | -65.7441 | 4/24/2026 | 102 | 00:27:00 | |
| 36 | NEC_01 | 202 µm net | 42.4183 | -65.7432 | 4/24/2026 | 102 | 00:07:49 | |
| 37 | HL_01 | CTD-Rosette | 44.3992 | -63.4504 | 4/25/2026 | 86 | 00:24:32 | |
| 38 | HL_01 | 202 µm net | 44.3992 | -63.4504 | 4/25/2026 | 85 | 00:06:36 | |
| 39 | HL_02 | CTD-Rosette | 44.2666 | -63.3172 | 4/25/2026 | 160 | 00:35:54 | |
| 40 | HL_02 | 202 µm net | 44.2666 | -63.3186 | 4/25/2026 | 159 | 00:10:52 | |
| 41 | HL_02 | 76 µm net | 44.2668 | -63.3186 | 4/25/2026 | 160 | 00:09:25 | |
| 42 | HL_02 | Secchi Disc | 44.2668 | -63.3186 | 4/25/2026 | 160 | 00:00:23 | Recovered: Lost the secchi disk and weight during recovery. |
| 43 | HL_03 | CTD-Rosette | 43.8832 | -62.8832 | 4/25/2026 | 270 | 00:45:27 | Bottom: SUNA not working. Stuck at -24. Not redeploying. |
| 44 | HL_03 | 202 µm net | 43.8832 | -62.8832 | 4/25/2026 | 270 | 00:15:38 | |
| 45 | HL_03.3 | CTD-Rosette | 43.7627 | -62.7532 | 4/26/2026 | 210 | 00:43:46 | Deployed: SUNA on. Appears to be working. |
| 46 | HL_03.3 | 202 µm net | 43.7627 | -62.7533 | 4/26/2026 | 211 | 00:12:21 | |
| 47 | HL_04 | CTD-Rosette | 43.4788 | -62.4517 | 4/26/2026 | 88 | 00:33:00 | Bottom: SUNA not working values consistent at -24 |
| 48 | HL_04 | 202 µm net | 43.4788 | -62.4517 | 4/26/2026 | 88 | 00:07:02 | Recovered: ring scraped hull on recovery |
| 49 | HL_05 | CTD-Rosette | 43.1823 | -62.0983 | 4/26/2026 | 103 | 00:32:54 | |

Table B.1. *(continued)*

| Event | Station | Gear | Start Lat. (DD) | Start Lon. (DD) | Date | Mean Depth (m) | Duration | Comments |
|---|---|---|---|---|---|---|---|---|
| 50 | HL_05 | 202 µm net | 43.1825 | -62.0983 | 4/26/2026 | 103 | 00:07:01 | |
| 51 | HL_05.5 | CTD-Rosette | 42.9393 | -61.8335 | 4/26/2026 | 460 | 00:57:31 | |
| 52 | HL_05.5 | 202 µm net | 42.9393 | -61.8335 | 4/26/2026 | 460 | 00:27:25 | |
| 53 | HL_06 | CTD-Rosette | 42.8309 | -61.7334 | 4/26/2026 | 1109 | 01:22:57 | |
| 54 | HL_06 | 202 µm net | 42.8297 | -61.7334 | 4/26/2026 | 1109 | 00:55:49 | |
| 55 | HL_06.3 | CTD-Rosette | 42.7331 | -61.6171 | 4/26/2026 | 1682 | 01:44:15 | |
| 56 | HL_06.3 | 202 µm net | 42.7331 | -61.6177 | 4/26/2026 | 1684 | 00:53:20 | |
| 57 | HL_06.7 | CTD-Rosette | 42.6191 | -61.5168 | 4/26/2026 | 2312 | 02:11:40 | |
| 58 | HL_06.7 | 202 µm net | 42.6191 | -61.5168 | 4/26/2026 | 2312 | 00:53:56 | |
| 59 | HL_07 | CTD-Rosette | 42.4755 | -61.4319 | 4/27/2026 | 2764 | 02:31:17 | |
| 60 | HL_07 | 202 µm net | 42.4755 | -61.4319 | 4/27/2026 | 2764 | 00:53:12 | |
| 61 | HL_07 | Argo float | 42.4755 | -61.4320 | 4/27/2026 | 2763 | 00:15:47 | |
| 62 | GUL_01 | CTD-Rosette | 44.0978 | -59.1062 | 4/27/2026 | 637 | 01:04:03 | Deployed: Sounding in SeaSave/ELOG was initially incorrect but has since been corrected |
| 63 | GUL_01 | 202 µm net | 44.0978 | -59.1062 | 4/27/2026 | 698 | 00:36:51 | |
| 64 | GUL_02 | CTD-Rosette | 44.0100 | -59.0000 | 4/27/2026 | 1218 | 01:18:20 | Deployed: SUNA not working values consistent at -24 |
| 65 | GUL_02 | 202 µm net | 44.0100 | -59.0000 | 4/27/2026 | 1227 | 00:53:00 | |
| 66 | GUL_03 | CTD-Rosette | 43.8885 | -58.9543 | 4/28/2026 | 1761 | 01:56:01 | |
| 67 | GUL_03 | 202 µm net | 43.8885 | -58.9537 | 4/28/2026 | 1707 | 00:53:29 | |
| 68 | GUL_04 | CTD-Rosette | 43.7900 | -58.9000 | 4/28/2026 | 2044 | 02:03:47 | Deployed: No SUNA or pH due to depth |
| 69 | GUL_04 | 202 µm net | 43.7900 | -58.9000 | 4/28/2026 | 2043 | 00:57:09 | |
| 70 | LCM_01 | CTD-Rosette | 44.7196 | -57.6549 | 4/28/2026 | 35 | 00:05:52 | Aborted: Aborted cast; caps were still on salinity sensors |
| 71 | LCM_01 | CTD-Rosette | 44.7196 | -57.6549 | 4/28/2026 | 35 | 00:16:10 | |

Table B.1. *(continued)*

| Event | Station | Gear | Start Lat. (DD) | Start Lon. (DD) | Date | Mean Depth (m) | Duration | Comments |
|---|---|---|---|---|---|---|---|---|
| 72 | LCM_01 | 202 µm net | 44.7196 | -57.6549 | 4/28/2026 | 35 | 00:03:05 | |
| 73 | LCM_02 | CTD-Rosette | 44.7448 | -57.4746 | 4/28/2026 | 58 | 00:23:06 | |
| 74 | LCM_02 | 202 µm net | 44.7448 | -57.4746 | 4/28/2026 | 58 | 00:04:28 | |
| 75 | LCM_03 | CTD-Rosette | 44.7623 | -57.3486 | 4/28/2026 | 77 | 00:27:05 | |
| 76 | LCM_03 | 202 µm net | 44.7623 | -57.3486 | 4/28/2026 | 77 | 00:05:33 | |
| 77 | LCM_04 | CTD-Rosette | 44.7799 | -57.2501 | 4/28/2026 | 407 | 00:50:14 | |
| 78 | LCM_04 | 202 µm net | 44.7799 | -57.2499 | 4/28/2026 | 408 | 00:22:09 | |
| 79 | LCM_05 | CTD-Rosette | 44.8092 | -57.0278 | 4/28/2026 | 433 | 00:48:11 | |
| 80 | NEC_05 | 202 µm net | 44.8092 | -57.0278 | 4/29/2026 | 434 | 00:25:58 | |
| 81 | LCM_06 | CTD-Rosette | 44.8475 | -56.8083 | 4/29/2026 | 429 | 00:53:48 | |
| 82 | LCM_06 | 202 µm net | 44.8475 | -56.8083 | 4/29/2026 | 431 | 00:27:14 | |
| 83 | LCM_07 | CTD-Rosette | 44.8900 | -56.6303 | 4/29/2026 | 416 | 01:00:07 | |
| 84 | LCM_07 | 202 µm net | 44.8900 | -56.6303 | 4/29/2026 | 416 | 00:25:05 | |
| 85 | LCM_08 | CTD-Rosette | 44.9200 | -56.4398 | 4/29/2026 | 397 | 00:43:41 | Deployed: changed sample ID from 523703, 523714 Bottom: changed sample ID from 523703, 523714 Recovered: changed sample ID from 523703, 523714 |
| 86 | LCM_08 | 202 µm net | 44.9200 | -56.4398 | 4/29/2026 | 397 | 00:22:53 | |
| 87 | LL_09 | CTD-Rosette | 43.4734 | -57.5269 | 4/29/2026 | 3723 | 02:52:39 | |
| 88 | LL_09 | 202 µm net | 43.4734 | -57.5269 | 4/29/2026 | 3713 | 00:50:53 | |
| 89 | LL_09 | Argo float | 43.4717 | -57.5277 | 4/29/2026 | 3725 | 00:16:02 | |
| 90 | LL_08 | CTD-Rosette | 43.7824 | -57.8350 | 4/30/2026 | 2885 | 02:30:29 | |
| 91 | LL_08 | 202 µm net | 43.7824 | -57.8350 | 4/30/2026 | 2882 | 00:52:47 | |
| 92 | LL_07 | CTD-Rosette | 44.1333 | -58.1752 | 4/30/2026 | 776 | 00:04:43 | Aborted: Caps on pH sensors were still on so aborted |
| 93 | LL_07 | CTD-Rosette | 44.1333 | -58.1752 | 4/30/2026 | 745 | 01:03:23 | |

Table B.1. *(continued)*

| Event | Station | Gear | Start Lat. (DD) | Start Lon. (DD) | Date | Mean Depth (m) | Duration | Comments |
|---|---|---|---|---|---|---|---|---|
| 94 | LL_07 | 202 µm net | 44.1333 | -58.1754 | 4/30/2026 | 744 | 00:38:27 | |
| 95 | LL_06 | CTD-Rosette | 44.4756 | -58.5085 | 4/30/2026 | 68 | 00:28:52 | Deployed: new winch driver; slower descent speed than usual |
| 96 | LL_06 | 202 µm net | 44.4756 | -58.5085 | 4/30/2026 | 68 | 00:05:04 | |
| 97 | LL_05 | CTD-Rosette | 44.8167 | -58.8504 | 4/30/2026 | 246 | 00:36:46 | Recovered: Surface was 3m wire due to swell |
| 98 | LL_05 | 202 µm net | 44.8167 | -58.8504 | 4/30/2026 | 246 | 00:14:14 | |
| 99 | LL_04 | CTD-Rosette | 45.1581 | -59.1750 | 4/30/2026 | 107 | 00:35:07 | |
| 100 | LL_04 | 202 µm net | 45.1581 | -59.1750 | 4/30/2026 | 106 | 00:06:45 | |
| 101 | LL_03 | CTD-Rosette | 45.4929 | -59.5163 | 4/30/2026 | 139 | 00:33:15 | |
| 102 | LL_03 | 202 µm net | 45.4929 | -59.5162 | 4/30/2026 | 138 | 00:08:38 | |
| 103 | LL_02 | CTD-Rosette | 45.6576 | -59.7014 | 5/1/2026 | 155 | 00:34:58 | |
| 104 | LL_02 | 202 µm net | 45.6576 | -59.7014 | 5/1/2026 | 146 | 00:08:44 | |
| 105 | LL_01 | CTD-Rosette | 45.8250 | -59.8501 | 5/1/2026 | 95 | 00:37:06 | |
| 106 | LL_01 | 202 µm net | 45.8250 | -59.8501 | 5/1/2026 | 95 | 00:06:05 | Recovered: weight kissed bottom |
| 107 | CSL_01 | CTD-Rosette | 46.9584 | -60.2162 | 5/1/2026 | 86 | 00:32:43 | |
| 108 | CSL_01 | 202 µm net | 46.9583 | -60.2162 | 5/1/2026 | 83 | 00:06:18 | Recovered: strong currents |
| 109 | CSL_02 | CTD-Rosette | 47.0236 | -60.1180 | 5/1/2026 | 189 | 00:39:52 | |
| 110 | CSL_02 | 202 µm net | 47.0236 | -60.1181 | 5/1/2026 | 189 | 00:11:19 | Recovered: wire angle zero until top 50 m. then 10 degrees |
| 111 | CSL_03 | CTD-Rosette | 47.0999 | -59.9928 | 5/1/2026 | 336 | 00:45:55 | |
| 112 | CSL_03 | 202 µm net | 47.0999 | -59.9928 | 5/1/2026 | 335 | 00:18:30 | |
| 113 | CSL_04 | CTD-Rosette | 47.2713 | -59.7840 | 5/1/2026 | 473 | 00:53:37 | |
| 114 | CSL_04 | 202 µm net | 47.2717 | -59.7833 | 5/1/2026 | 480 | 00:26:36 | |
| 115 | CSL_05 | CTD-Rosette | 47.4322 | -59.5603 | 5/1/2026 | 482 | 01:00:23 | |
| 116 | CSL_05 | 202 µm net | 47.4326 | -59.5597 | 5/2/2026 | 483 | 00:25:18 | |

Table B.1. *(continued)*

| Event | Station | Gear | Start Lat. (DD) | Start Lon. (DD) | Date | Mean Depth (m) | Duration | Comments |
|---|---|---|---|---|---|---|---|---|
| 117 | CSL_06 | CTD-Rosette | 47.5831 | -59.3813 | 5/2/2026 | 281 | 00:52:15 | Deployed: 1km/0.5nm away from actual station Recovered: too many empty niskins to use - CTD recast , NO BOTTLE DATA Collected! |
| 118 | CSL_06 | 202 µm net | 47.5851 | -59.3624 | 5/2/2026 | 279 | 00:16:32 | Deployed: 1km away from station |
| 119 | CSL_06 | CTD-Rosette | 47.5833 | -59.3654 | 5/2/2026 | 281 | 00:48:44 | Deployed: Redeployment at CSL06 as Niskin bottles leaked on first cast event 117 and 1km/0.5nm away from actual station due to strong currents Bottom: 7m from bottom due to ship drift Recovered: 5m due to currents |
| 120 | STAB_06 | CTD-Rosette | 46.6454 | -58.5462 | 5/2/2026 | 422 | 00:47:58 | |
| 121 | STAB_06 | 202 µm net | 46.6454 | -58.5462 | 5/2/2026 | 422 | 00:23:48 | Recovered: lost small amount of net contents after ship rolled. |
| 122 | STAB_05 | CTD-Rosette | 46.4168 | -58.8832 | 5/2/2026 | 376 | 00:48:18 | |
| 123 | STAB_05 | 202 µm net | 46.4168 | -58.8831 | 5/2/2026 | 375 | 00:21:37 | |
| 124 | STAB_04 | CTD-Rosette | 46.3000 | -59.0646 | 5/2/2026 | 158 | 00:36:42 | |
| 125 | STAB_04 | 202 µm net | 46.3001 | -59.0646 | 5/2/2026 | 162 | 00:08:44 | |
| 126 | STAB_04 | 202 µm net | 46.3001 | -59.0646 | 5/2/2026 | 161 | 00:08:22 | Recovered: Tow for Dalhousie isotope/vitamin work |
| 127 | STAB_03 | CTD-Rosette | 46.2166 | -59.1952 | 5/2/2026 | 94 | 00:29:45 | |
| 128 | STAB_03 | 202 µm net | 46.2166 | -59.1952 | 5/2/2026 | 95 | 00:05:40 | |

Table B.1. *(continued)*

| Event | Station | Gear | Start Lat. (DD) | Start Lon. (DD) | Date | Mean Depth (m) | Duration | Comments |
|---|---|---|---|---|---|---|---|---|
| 129 | STAB_02 | CTD-Rosette | 46.1088 | -59.3642 | 5/2/2026 | 69 | 00:24:24 | |
| 130 | STAB_02 | 202 µm net | 46.1088 | -59.3642 | 5/3/2026 | 69 | 00:04:44 | |
| 131 | STAB_01 | CTD-Rosette | 46.0001 | -59.5319 | 5/3/2026 | 58 | 00:22:42 | |
| 132 | STAB_01 | 202 µm net | 46.0001 | -59.5319 | 5/3/2026 | 59 | 00:04:15 | |

# APPENDIX C Vertical Profiles of Temperature, Salinity, Dissolved Oxygen

This appendix illustrates the vertical downcast profiles of temperature, salinity, and dissolved oxygen for each station sampled during the JC290 mission. Profile plots are organized by hydrographic section (e.g., Halifax Line: HL). These plots were generated routinely throughout the mission and compared against the corresponding bottle salinity and dissolved oxygen measurements obtained via Winkler titrations as a tool to A) evaluate any discrepancies between the dual sensors, B) evaluate which of the dual sensors more closely reflected the corresponding bottle measurements generated at sea, a task which helps guide the final sensor calibration process, and C) evaluate the laboratory measurements for visual outliers. Outliers in the bottle data were identified based on their divergence from replicate samples, when collected, or whether they fell far from the CTD profile data, and were assigned quality control flags according to the quality control flag schema applied to data submitted in DFO's National Repository, BioChem (Devine et al. 2014).

For the majority of the casts conducted during the mission there was excellent congruence between both the primary and secondary dissolved oxygen and conductivity sensors, and between the sensor and bottle data (data not shown). Although data from the primary and secondary oxygen sensors were comparable, the secondary sensor was closer to the corresponding Winkler titration values than the primary.

Although bottle chlorophyll *a* measurements are not used to calibrate the sensor data, they were routinely compared against the chlorophyll fluorometer sensor data throughout the mission to evaluate the reliability of the sensor, and to ensure that all bottle sample IDs for parameters measured at sea were accounted for. The discrepancy between the sensor data and bottle measurements was higher, especially at the depth of the chlorophyll *a* maximum, where the sensors underestimated chlorophyll concentration relative to the bottle measurements. Consequently, outliers were assigned to bottle measurements based only on their deviation from replicate bottle values, and not the sensor data.

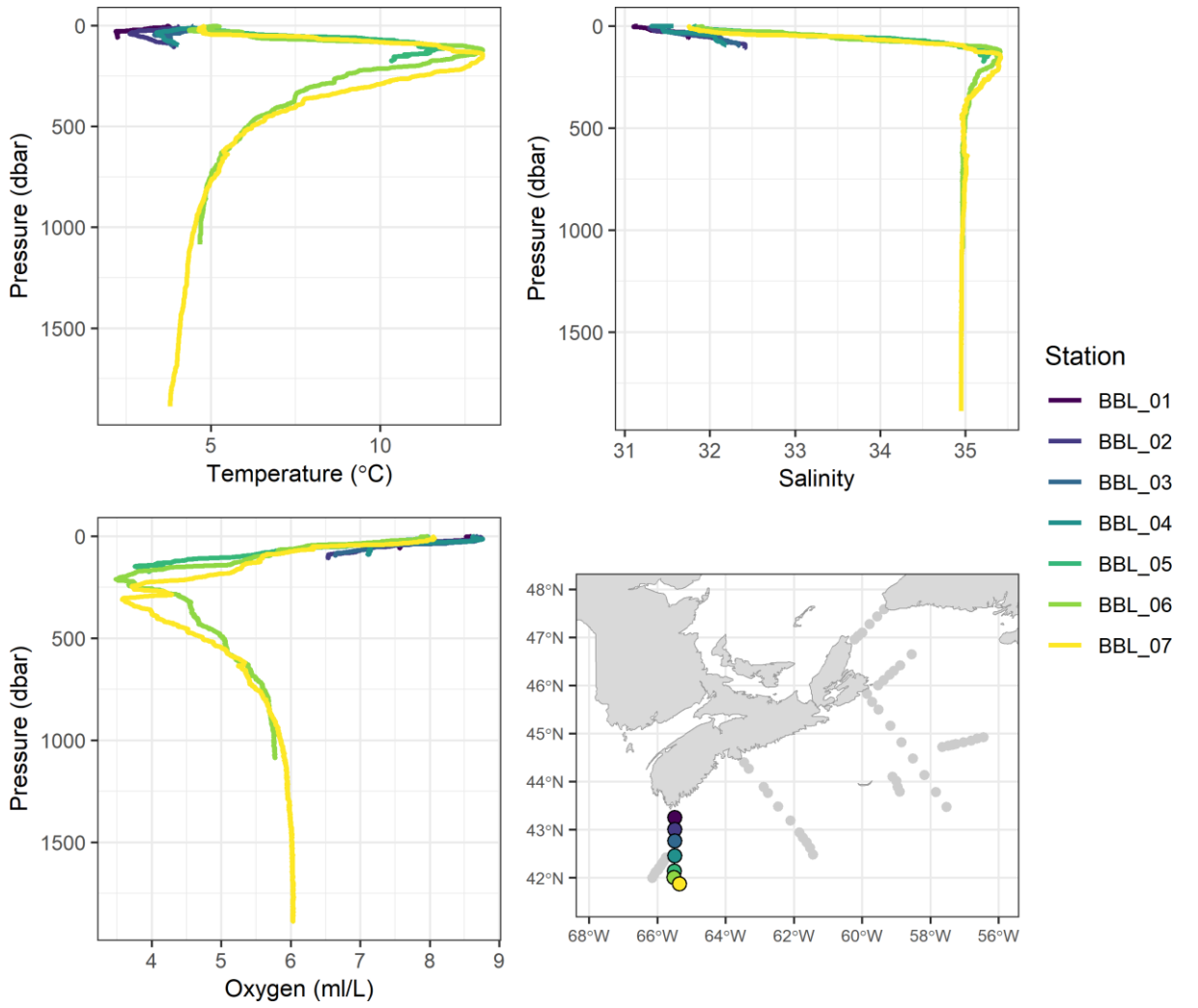



Figure C.1. Vertical profiles of temperature (top left), salinity (top right), and dissolved oxygen (bottom left) from stations sampled on the Browns Bank Line (BBL; bottom right) during the 2026 spring AZMP mission (JC290).

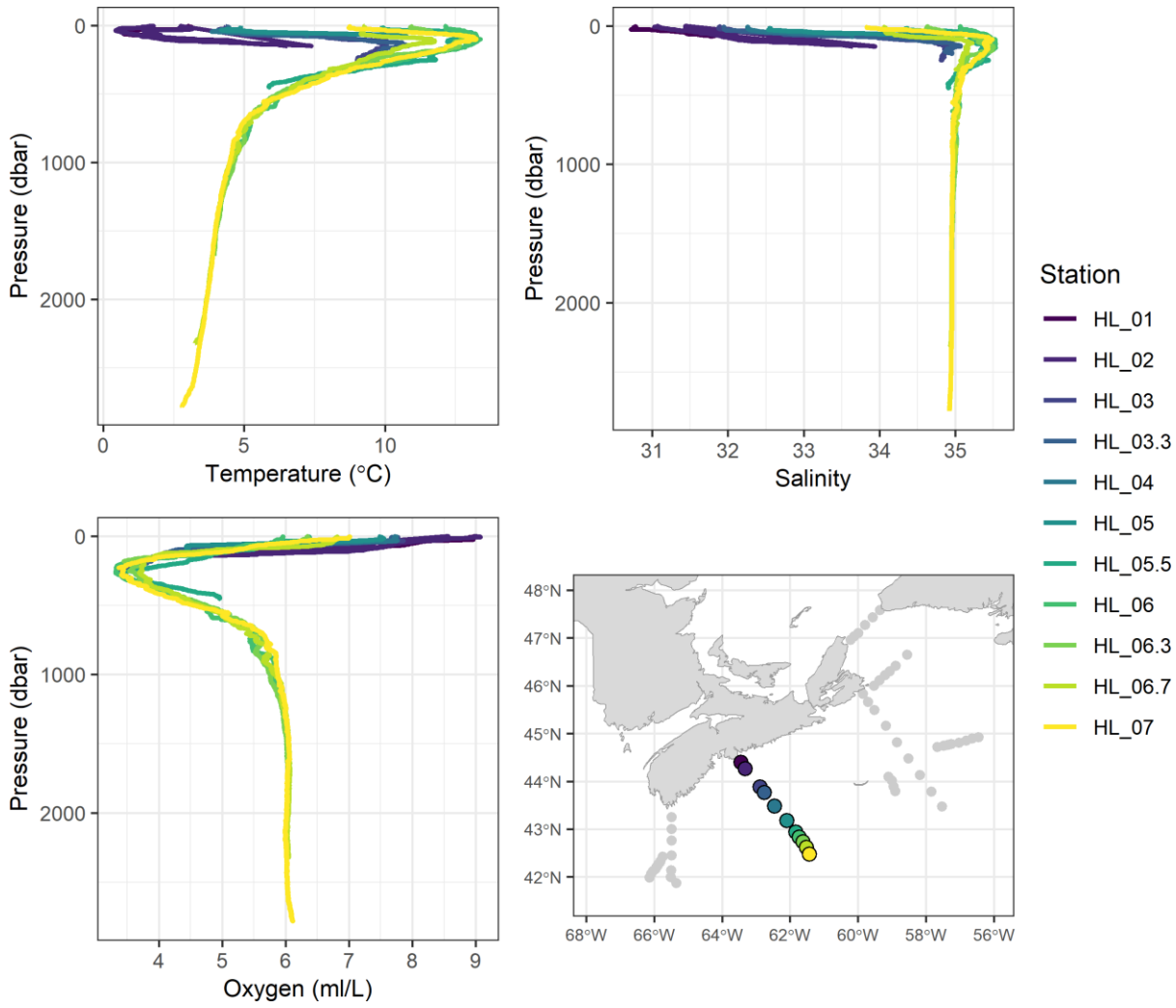



Figure C.2. Vertical profiles of temperature (top left), salinity (top right), and dissolved oxygen (bottom left) from stations sampled on the Halifax Line (HL; bottom right) during the 2026 spring AZMP mission (JC290).

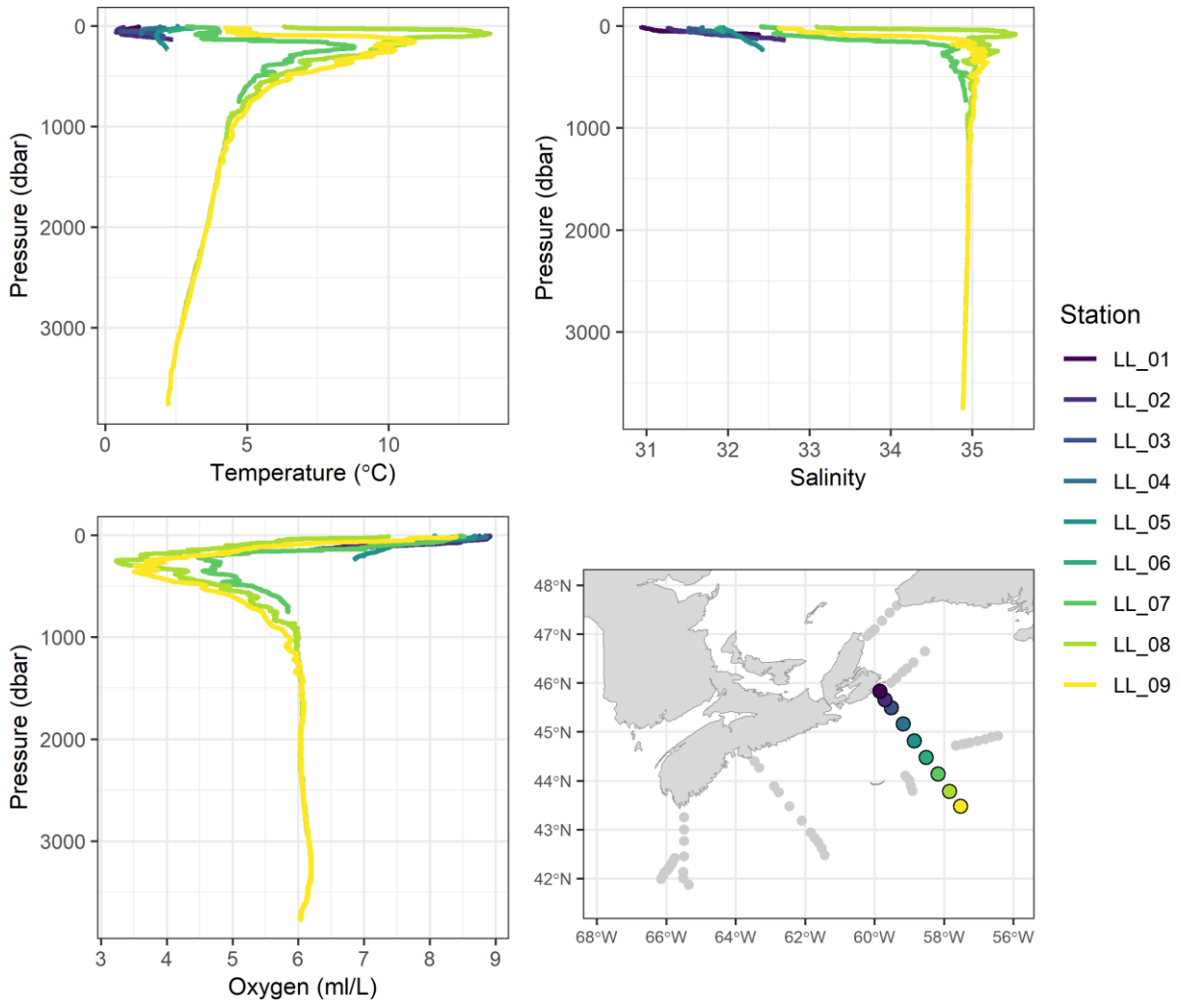



Figure C.3. Vertical profiles of temperature (top left), salinity (top right), and dissolved oxygen (bottom left) from stations sampled on the Louisbourg Line (LL; bottom right) during the 2026 spring AZMP mission (JC290).

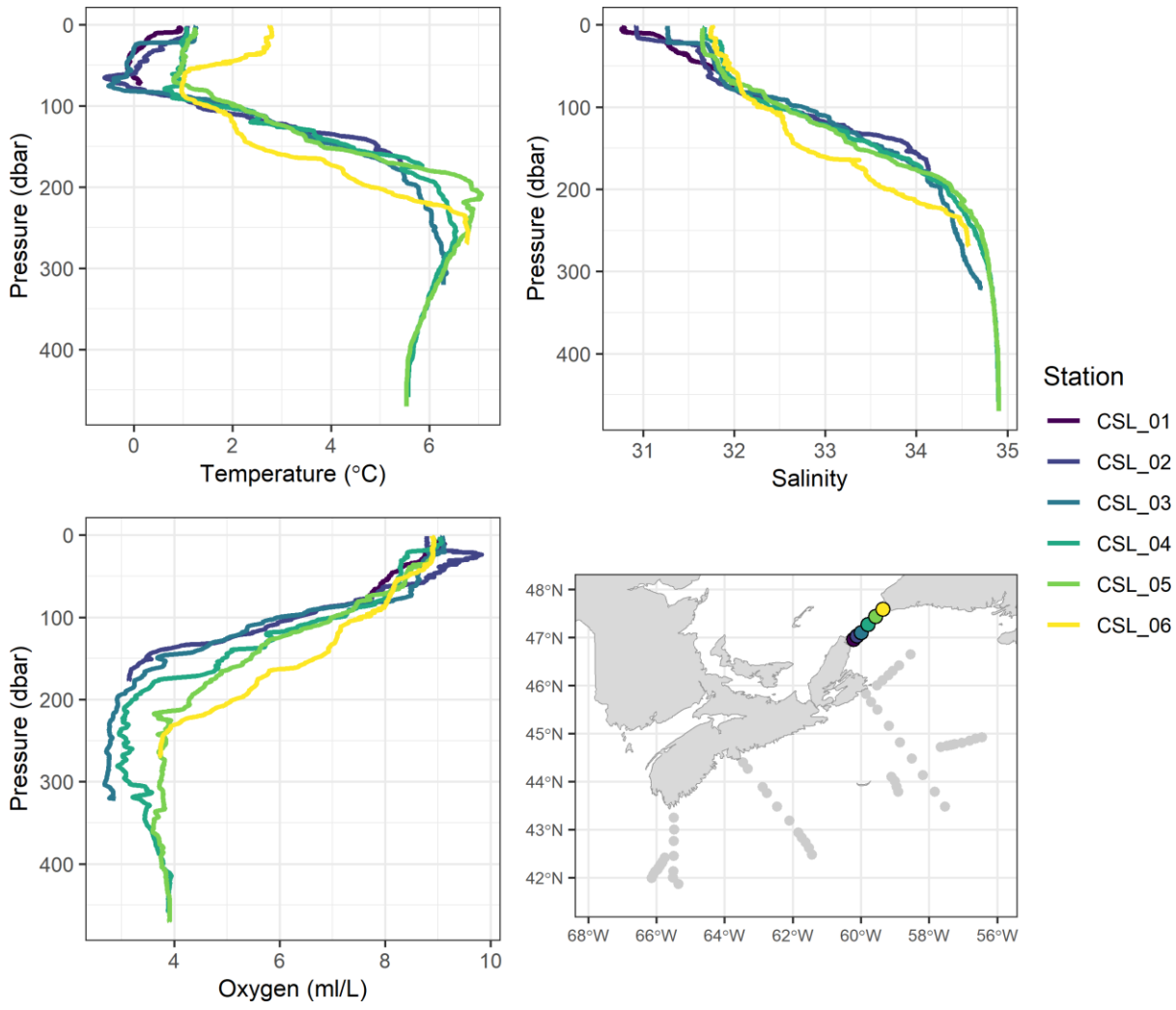



Figure C.4. Vertical profiles of temperature (top left), salinity (top right), and dissolved oxygen (bottom left) from stations sampled on the Cabot Strait Line (CSL; bottom right) during the 2026 spring AZMP mission (JC290). Note that for station CSL_06, only the second cast (Event 119) is shown.

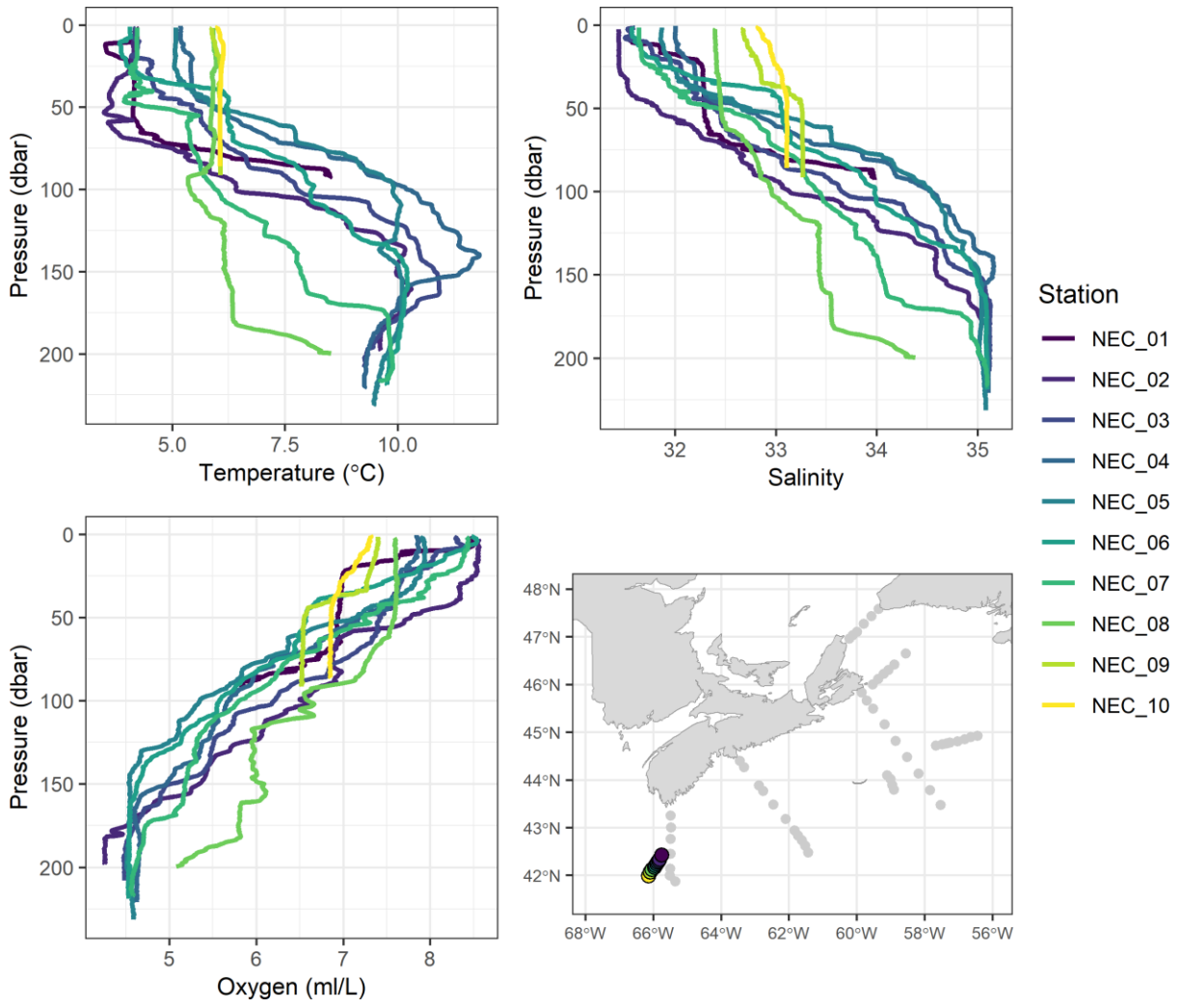



Figure C.5. Vertical profiles of temperature (top left), salinity (top right), and dissolved oxygen (bottom left) from stations sampled in the Northeast Channel (NEC; bottom right) during the 2026 spring AZMP mission (JC290).

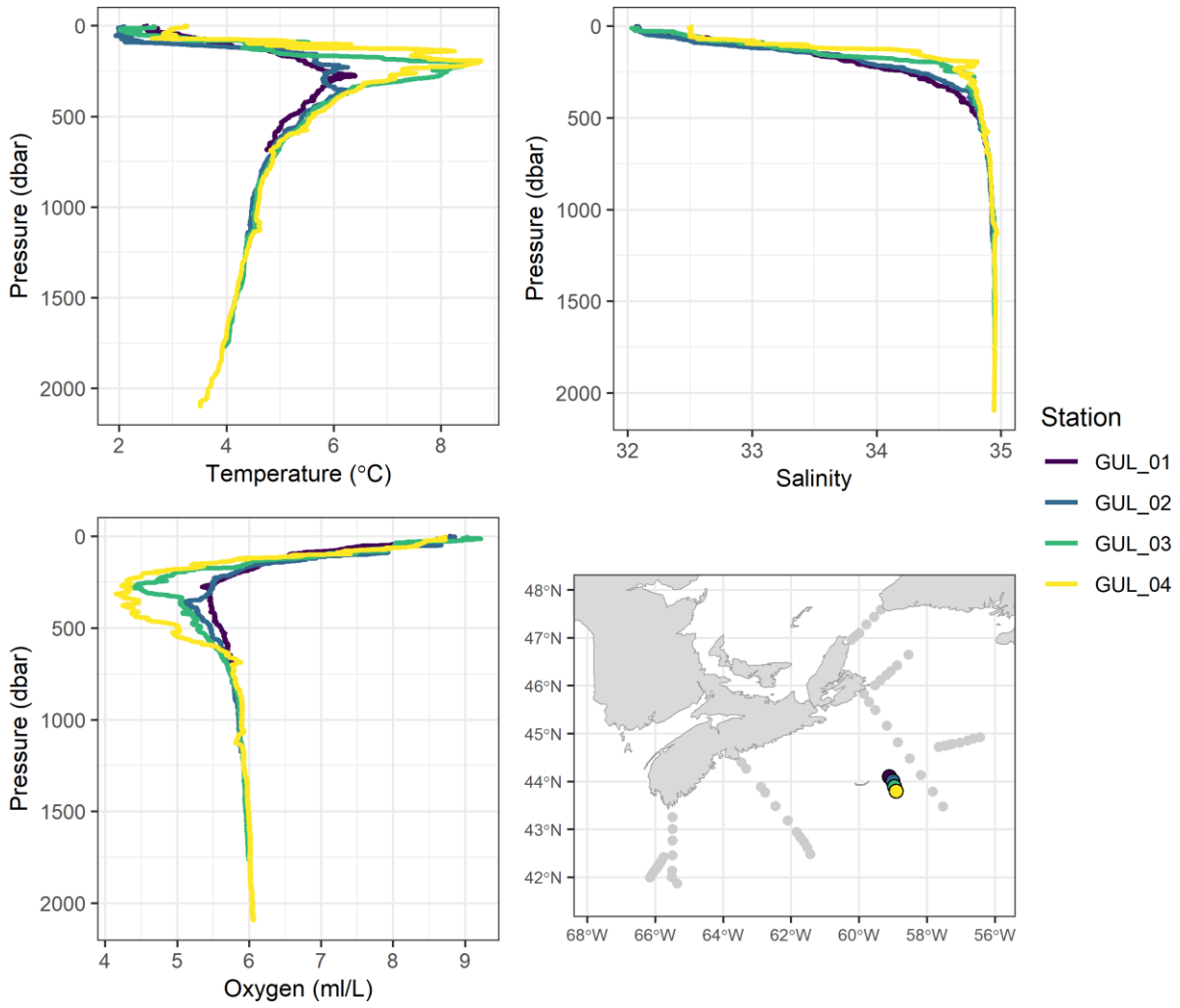



Figure C.6. Vertical profiles of temperature (top left), salinity (top right), and dissolved oxygen (bottom left) from stations sampled in the Gully (GUL; bottom right) during the 2026 spring AZMP mission (JC290).

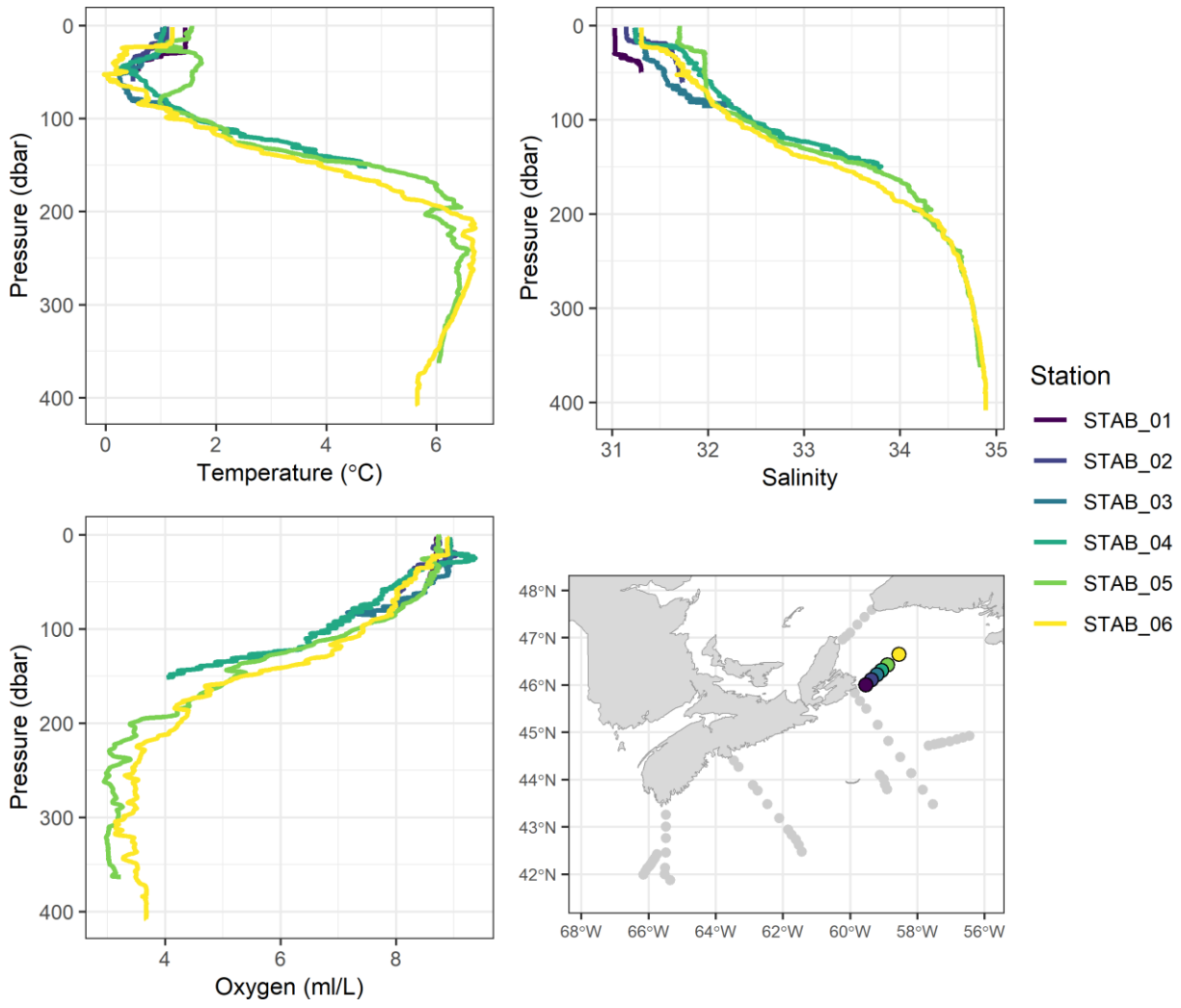



Figure C.7. Vertical profiles of temperature (top left), salinity (top right), and dissolved oxygen (bottom left) from stations sampled on St. Anns Bank (STAB; bottom right) during the 2026 spring AZMP mission (JC290).

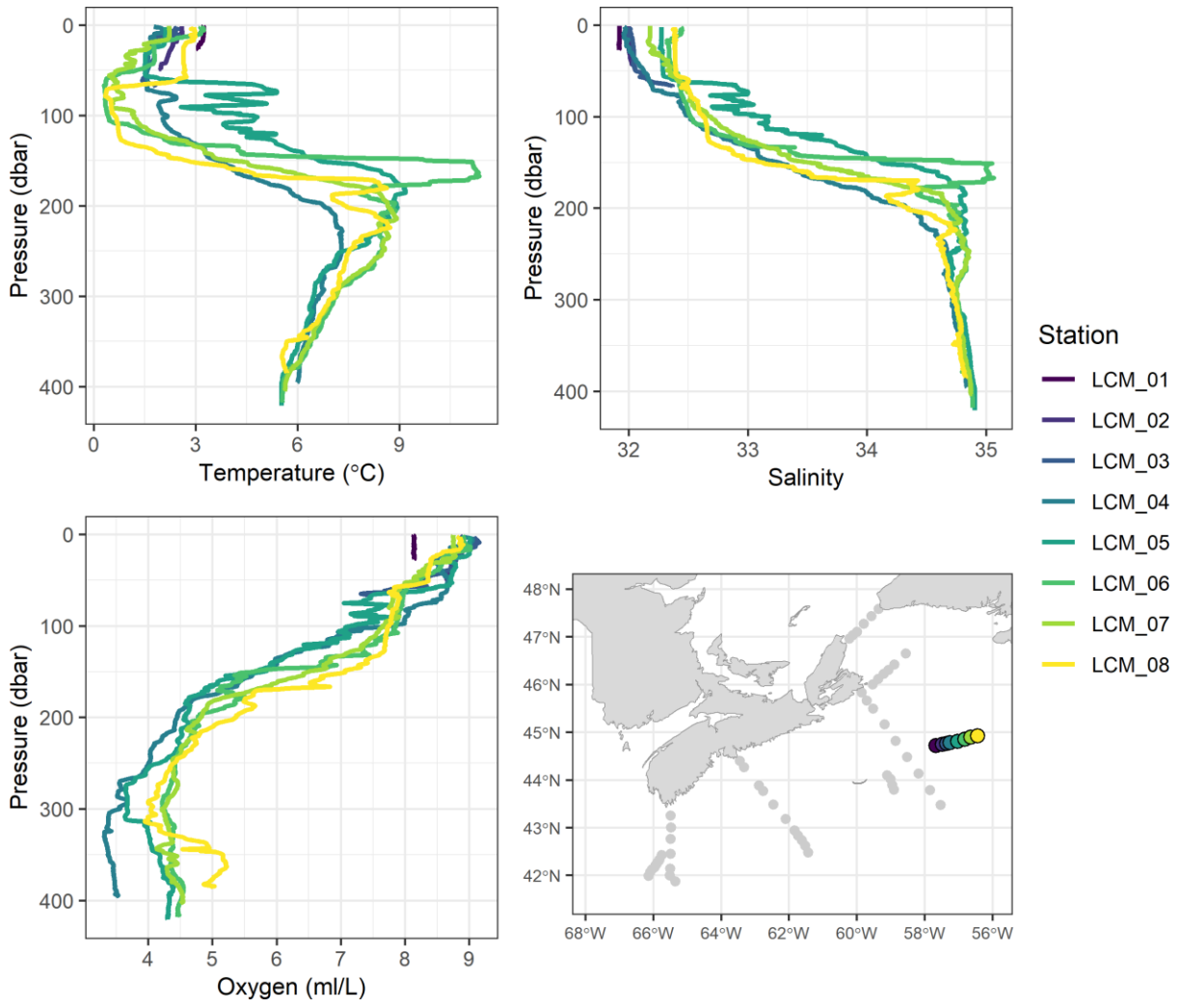



Figure C.8. Vertical profiles of temperature (top left), salinity (top right), and dissolved oxygen (bottom left) from stations sampled in the Laurentian Channel Mouth (LCM; bottom right) during the 2026 spring AZMP mission (JC290).

# APPENDIX D Collected Water Samples by Station

Table D.1 provides an account of the achieved water sampling for each AZMP hydrographic station occupied during the 2026 spring AZMP mission (JC290). Water samples were collected for a suite of physical, chemical, and biological parameters at standard depths throughout the water column. Overall, the planned sampling program was largely achieved, although some modifications were made in response to station depth, operational constraints, and equipment issues (e.g., bottle misfires). Single and replicate samples are indicated in the table, along with comments describing any deviations from the planned sampling scheme. For each station, a second bottle at the surface (1 m) was fired when possible in order to meet the water demands for all parameters.

For some stations, CDOM samples were collected but later lost after the sample bottles were accidentally broken. See the Operational Considerations and Issues of Note section for further information. In other instances, some samples were lost (e.g., nutrients) prior to their analysis, and no data therefore is available.

Table D.1. Water samples collected by parameter on each station occupied during the 2026 spring AZMP mission (JC290), where O2 = dissolved oxygen, pCO2 = partial pressure of carbon dioxide, TIC = total inorganic carbon, TA = total alkalinity, NUTS = nutrients, SAL = salinity, CHL = chlorophyll, POC = particulate organic carbon, HPLC = high performance liquid chromatography, ABS = phytoplankton absorption, CDOM = coloured dissolved organic matter absorption, and CYTO = flow cytometry. 'X' represents single samples, while 'XX' represents replicate samples. Niskin bottles without sampling designated were sampled by Dalhousie University except where indicated.

| Station | Event | SAMPLE ID | Niskin # | Nom. Depth (m) | O2 | pCO2 | TIC/ TA | NUTS | SAL | CHL | POC/ PON | HPLC | ABS | CDOM | CYTO | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 523015 | 1 | BTM | XX | X | X | XX | X | | | | | | | |
| | | 523016 | 2 | 100 | | X | X | XX | | XX | | | | | XX | |
| | | 523017 | 3 | 80 | | | | XX | | XX | | | | | XX | |
| | | 523018 | 4 | 80 | | | | | | | | | | | | |
| | | 523019 | 5 | 80 | | | | | | | | | | | | |
| | | 523020 | 6 | 60 | | | | XX | | XX | | | | | XX | |
| | | 523021 | 7 | 50 | | X | X | XX | | XX | | | | | XX | |
| | | 523022 | 8 | 40 | | | | XX | | XX | | | | | XX | |
| | | 523023 | 9 | 40 | | | | | | | | | | | | |
| HL_02 | 001 | 523024 | 10 | 40 | | | | | | | | | | | | |
| | | 523025 | 11 | 30 | | X | X | XX | | XX | | X | X | X | XX | |
| | | 523026 | 12 | 30 | | | | | | | | | | | | |
| | | 523027 | 13 | 20 | | | | XX | | XX | | | | | XX | |
| | | 523028 | 14 | 20 | | | | | | | | | | | | |
| | | 523029 | 15 | 20 | | | | | | | | | | | | |
| | | 523030 | 16 | 10 | X | X | X | XX | X | XX | | | | | XX | |
| | | 523031 | 17 | 1 | | X | X | XX | | XX | XX | X | X | X | XX | |
| | | 523032 | 18 | 1 | | | | | | | | | | | | Extra bottle |
| | | 523033 | 19 | 1 | | | | | | | | | | | | |
| | | 523034 | 20 | 1 | | | | | | | | | | | | |
| | | 523037 | 1 | BTM | X | X | X | XX | X | XX | | | | | XX | |
| | | 523038 | 2 | 50 | | | | XX | | XX | | | | | XX | |
| | | 523039 | 3 | 40 | | | | XX | | XX | | | | | XX | |
| | | 523040 | 4 | 40 | | | | | | | | | | | | |
| | | 523041 | 5 | 40 | | | | | | | | | | | | |
| | | 523042 | 6 | 30 | | X | X | XX | | XX | | X | X | X | XX | |
| | | 523043 | 7 | 30 | | | | | | | | | | | | |
| | | 523044 | 8 | 20 | | | | XX | | XX | | | | | XX | |
| | | 523045 | 9 | 10 | | X | X | XX | | XX | | | | | XX | Misfire |
| | | 523046 | 10 | 1 | | X | X | XX | | XX | XX | X | X | X | XX | Misfire |
| | | 523047 | 11 | 1 | X | X | X | XX | X | | | | | | | Extra bottle |

Table D.1. *(continued)*

| Station | Event | SAMPLE ID | Niskin # | Nom. Depth (m) | O2 | pCO2 | TIC/ TA | NUTS | SAL | CHL | POC/ PON | HPLC | ABS | CDOM | CYTO | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BBL_01 | 005 | | | | | | | | | | | | | | | |
| | | 523048 | 12 | 1 | | | | | | | | | | | | Misfire |
| | | 523049 | 13 | 1 | | | | | | | | | | | | |
| | | 523051 | 1 | BTM | XX | | | XX | X | XX | | | | | | |
| | | 523052 | 2 | 80 | | | | XX | | XX | | | | | | |
| | | 523053 | 3 | 60 | | | | XX | | XX | | | | | | |
| | | 523054 | 4 | 50 | | | | XX | | XX | | | | | | |
| | | 523055 | 5 | 40 | | | | XX | | XX | | | | | | |
| BBL_02 | 007 | 523056 | 6 | 30 | | | | XX | | XX | | | | | | |
| | | 523057 | 7 | 20 | | | | XX | | XX | | | | | | |
| | | 523058 | 8 | 10 | X | | | XX | X | XX | | | | | | |
| | | 523059 | 9 | 1 | | | | XX | | XX | XX | X | | X | X | |
| | | 523060 | 10 | 1 | | | | | | | | | | | | Misfire |
| | | 523061 | 1 | BTM | X | X | X | XX | X | XX | | | | | | |
| | | 523062 | 2 | 80 | | X | X | XX | | XX | | | | | | |
| | | 523063 | 3 | 80 | | | | | | | | | | | | |
| | | 523064 | 4 | 80 | | | | | | | | | | | | |
| | | 523065 | 5 | 60 | | | | XX | | XX | | | | | | |
| | | 523066 | 6 | 50 | | X | X | XX | | XX | | | | | | |
| | | 523067 | 7 | 40 | | | | XX | | XX | | | | | | |
| | | 523068 | 8 | 40 | | | | | | | | | | | | |
| | | 523069 | 9 | 40 | | | | | | | | | | | | |
| | | 523070 | 10 | 30 | | | | XX | | XX | | X | | X | X | |
| | | 523071 | 11 | 30 | | | | | | | | | | | | |
| | | 523072 | 12 | 20 | | | | XX | | XX | | | | | | Bottle misfired. Took 20 m samples from Dal bottle |
| BBL_03 | 009 | | | | | | | | | | | | | | | |
| | | 523073 | 13 | 20 | | | | | | | | | | | | |
| | | 523074 | 14 | 20 | | | | | | | | | | | | |
| | | 523075 | 15 | 10 | XX | X | X | XX | X | XX | | | | | | |
| | | 523076 | 16 | 1 | | X | X | XX | | XX | XX | X | | X | X | |
| | | 523077 | 17 | 1 | | | | | | | | | | | | Extra bottle |
| | | 523078 | 18 | 1 | | | | | | | | | | | | |
| | | 523079 | 19 | 1 | | | | | | | | | | | | |
| | | 523082 | 1 | BTM | XX | | | XX | X | XX | | | | | XX | |

Table D.1. *(continued)*

| Station | Event | SAMPLE ID | Niskin # | Nom. Depth (m) | O2 | pCO2 | TIC/ TA | NUTS | SAL | CHL | POC/ PON | HPLC | ABS | CDOM | CYTO | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 523083 | 2 | 80 | | | | XX | | XX | | | | | XX | |
| | | 523084 | 3 | 80 | | | | | | | | | | | | |
| | | 523085 | 4 | 60 | | | | XX | | XX | | | | | XX | |
| | | 523086 | 5 | 50 | | | | XX | | XX | | | | | XX | |
| | | 523087 | 6 | 40 | | | | XX | | XX | | | | | XX | |
| BBL_04 | 011 | 523088 | 7 | 30 | | | | XX | | XX | | | | | XX | |
| | | 523089 | 8 | 20 | | | | XX | | XX | | | | | XX | |
| | | 523090 | 9 | 10 | X | | | XX | X | XX | | | | | XX | |
| | | 523091 | 10 | 1 | | | | XX | | XX | XX | X | X | X | XX | |
| | | 523092 | 11 | 1 | | | | | | | | | | | | Extra bottle |
| | | 523093 | 12 | 1 | | | | | | | | | | | | |
| | | 523095 | 1 | BTM | X | X | X | XX | X | | | | | | | |
| | | 523096 | 2 | 150 | | | | XX | | | | | | | | |
| | | 523097 | 3 | 100 | | X | X | XX | | XX | | | | | | |
| | | 523098 | 4 | 80 | | | | XX | | XX | | | | | | |
| | | 523099 | 5 | 80 | | | | | | | | | | | | |
| | | 523100 | 6 | 80 | | | | | | | | | | | | |
| | | 523101 | 7 | 60 | | | | XX | | XX | | | | | | |
| | | 523102 | 8 | 50 | | X | X | XX | | XX | | | | | | |
| | | 523103 | 9 | 40 | | | | XX | | XX | | | | | | |
| | | 523104 | 10 | 40 | | | | | | | | | | | | |
| | | 523105 | 11 | 40 | | | | | | | | | | | | |
| BBL_05 | 013 | 523106 | 12 | 30 | | X | X | XX | | XX | | X | X | | | CDOM sample broken. Lost. |
| | | 523107 | 13 | 30 | | | | | | | | | | | | |
| | | 523108 | 14 | 20 | | | | XX | | XX | | | | | | |
| | | 523109 | 15 | 20 | | | | | | | | | | | | |
| | | 523110 | 16 | 20 | | | | | | | | | | | | |
| | | 523111 | 17 | 10 | XX | X | X | XX | X | XX | | | | | | |
| | | 523112 | 18 | 1 | | X | X | XX | | XX | XX | X | X | X | | |
| | | 523113 | 19 | 1 | | | | | | | | | | | | Extra bottle |
| | | 523114 | 20 | 1 | | | | | | | | | | | | |
| | | 523115 | 21 | 1 | | | | | | | | | | | | |
| | | 523117 | 1 | BTM | XX | X | X | XX | X | | | | | | | |
| | | 523118 | 2 | 1000 | | | | XX | | | | | | | | |
| | | 523119 | 3 | 750 | | X | X | XX | | | | | | | | |

Table D.1. *(continued)*

| Station | Event | SAMPLE ID | Niskin # | Nom. Depth (m) | O2 | pCO2 | TIC/ TA | NUTS | SAL | CHL | POC/ PON | HPLC | ABS | CDOM | CYTO | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 523120 | 4 | 500 | | X | X | XX | | | | | | | | |
| | | 523121 | 5 | 250 | X | X | X | XX | X | | | | | | | |
| | | 523122 | 6 | 150 | | | | XX | | | | | | | | |
| | | 523123 | 7 | 100 | | X | X | XX | | XX | | | | | | |
| | | 523124 | 8 | 80 | | | | XX | | XX | | | | | | |
| BBL_06 | 015 | 523125 | 9 | 60 | | | | XX | | XX | | | | | | |
| | | 523126 | 10 | 50 | | X | X | XX | | XX | | | | | | |
| | | 523127 | 11 | 40 | | | | XX | | XX | | | | | | |
| | | 523128 | 12 | 30 | | X | X | XX | | XX | | | | | | |
| | | 523129 | 13 | 20 | | | | XX | | XX | | | | | | |
| | | 523130 | 14 | 10 | X | X | X | XX | X | XX | | | | | | |
| | | 523131 | 15 | 1 | | X | X | XX | | XX | XX | X | | X | X | |
| | | 523132 | 16 | 1 | | | | | | | | | | | | Extra bottle |
| | | 523133 | 17 | 1 | | | | | | | | | | | | |
| | | 523135 | 1 | BTM | X | X | X | XX | X | | | | | | | Re-sampled TIC/TA |
| | | 523136 | 2 | 1500 | X | X | X | XX | X | | | | | | XX | |
| | | 523137 | 3 | 1500 | | | | | | | | | | | | |
| | | 523138 | 4 | 1000 | | X | X | XX | | | | | | | | |
| | | 523139 | 5 | 750 | | X | X | XX | | | | | | | XX | |
| | | 523140 | 6 | 500 | | X | X | XX | | | | | | | | |
| | | 523141 | 7 | 250 | X | X | X | XX | X | | | | | | XX | Re-sampled TIC/TA |
| | | 523142 | 8 | 150 | | | | XX | | | | | | | | |
| | | 523143 | 9 | 100 | | X | X | XX | | XX | | | | | XX | |
| | | 523144 | 10 | 80 | | | | XX | | XX | | | | | XX | Misfire |
| | | 523145 | 11 | 80 | | | | | | | | | | | | |
| | | 523146 | 12 | 80 | | | | | | | | | | | | |
| | | 523147 | 13 | 60 | | | | XX | | XX | | | | | XX | |
| | | 523148 | 14 | 50 | | X | X | XX | | XX | | | | | XX | |
| | | 523149 | 15 | 40 | | | | XX | | XX | | | | | XX | |
| | | 523150 | 16 | 30 | | X | X | XX | | XX | | X | | X | XX | |
| | | 523151 | 17 | 20 | | | | XX | | XX | | | | | XX | |
| | | 523152 | 18 | 20 | | | | | | | | | | | | |
| | | 523153 | 19 | 20 | | | | | | | | | | | | |
| | | 523154 | 20 | 10 | XX | X | X | XX | X | XX | | | | | XX | |

Table D.1. *(continued)*

| Station | Event | SAMPLE ID | Niskin # | Nom. Depth (m) | O2 | pCO2 | TIC/ TA | NUTS | SAL | CHL | POC/ PON | HPLC | ABS | CDOM | CYTO | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 523155 | 21 | 1 | | X | X | XX | | XX | XX | X | X | X | XX | |
| | | 523156 | 22 | 1 | | | | | | | | | | | | Extra bottle |
| | | 523157 | 23 | 1 | | | | | | | | | | | | |
| | | 523158 | 24 | 1 | | | | | | | | | | | | |
| | | 523160 | 1 | BTM | X | | | XX | X | XX | | | | | | |
| | | 523161 | 2 | 75 | | | | XX | | XX | | | | | | |
| | | 523162 | 3 | 75 | | | | | | | | | | | | |
| | | 523163 | 4 | 75 | | | | | | | | | | | | |
| | | 523164 | 5 | 60 | | | | XX | | XX | | | | | | |
| | | 523165 | 6 | 50 | | | | XX | | XX | | | | | | |
| | | 523166 | 7 | 40 | | | | XX | | XX | | | | | | |
| | | 523167 | 8 | 40 | | | | | | | | | | | | |
| NEC_10 | 020 | [illegible] | 9 | 40 | | | | | | | | | | | | |
| | | 523169 | 10 | 30 | | | | XX | | XX | | | | | | |
| | | 523170 | 11 | 20 | | | | XX | | XX | | | | | | |
| | | 523171 | 12 | 20 | | | | | | | | | | | | |
| | | 523172 | 13 | 20 | | | | | | | | | | | | |
| | | 523173 | 14 | 10 | XX | | | XX | X | XX | | | | | | |
| | | 523174 | 15 | 1 | | | | XX | | XX | XX | X | X | X | | |
| | | 523175 | 16 | 1 | | | | | | | | | | | | Extra bottle |
| | | 523176 | 17 | 1 | | | | | | | | | | | | |
| | | 523177 | 18 | 1 | | | | | | | | | | | | |
| | | 523179 | 1 | BTM | XX | X | X | XX | X | | | | | | | |
| | | 523180 | 2 | 75 | | | | XX | | | | | | | | |
| | | 523181 | 3 | 60 | | | | XX | | | | | | | | |
| | | 523182 | 4 | 50 | | X | X | XX | | | | | | | | |
| NEC_09 | 022 | [illegible] | 5 | 40 | | | | XX | | | | | | | | |
| | | 523184 | 6 | 30 | | X | X | XX | | | | | | | | |
| | | 523185 | 7 | 20 | | | | XX | | | | | | | | |
| | | 523186 | 8 | 10 | X | X | X | XX | X | | | | | | | |
| | | 523187 | 9 | 1 | | X | X | XX | | | | | | | | |
| | | 523188 | 10 | 1 | | | | | | | | | | | | Extra bottle |
| | | 523189 | 1 | BTM | X | | | XX | X | | | | | | | |
| | | 523190 | 2 | 175 | | | | XX | | | | | | | | |
| | | 523191 | 3 | 150 | | | | XX | | | | | | | | |

Table D.1. *(continued)*

| Station | Event | SAMPLE ID | Niskin # | Nom. Depth (m) | O2 | pCO2 | TIC/ TA | NUTS | SAL | CHL | POC/ PON | HPLC | ABS | CDOM | CYTO | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 523192 | 4 | 125 | | | | XX | | | | | | | | |
| | | 523193 | 5 | 100 | | | | XX | | XX | | | | | | |
| | | 523194 | 6 | 75 | | | | XX | | XX | | | | | | |
| NEC_08 | 023 | [illegible] | 7 | 60 | | | | XX | | XX | | | | | | |
| | | 523196 | 8 | 50 | | | | XX | | XX | | | | | | |
| | | 523197 | 9 | 40 | | | | XX | | XX | | | | | | |
| | | 523198 | 10 | 30 | | | | XX | | XX | | | | | | |
| | | 523199 | 11 | 20 | | | | XX | | XX | | | | | | |
| | | 523200 | 12 | 10 | XX | | | XX | X | XX | | | | | | |
| | | 523201 | 13 | 1 | | | | XX | | XX | XX | X | X | X | | |
| | | 523202 | 14 | 1 | | | | | | | | | | | | Extra bottle |
| | | 523204 | 1 | BTM | XX | X | X | XX | X | | | | | | | |
| | | 523205 | 2 | 175 | | X | X | XX | | | | | | | | |
| | | 523206 | 3 | 175 | | | | | | | | | | | | |
| | | 523207 | 4 | 150 | | | | XX | | | | | | | | |
| | | 523208 | 5 | 125 | | | | XX | | | | | | | | |
| | | 523209 | 6 | 100 | | X | X | XX | | | | | | | | |
| | | 523210 | 7 | 75 | | | | XX | | | | | | | | |
| NEC_07 | 026 | [illegible] | 8 | 60 | | | | XX | | | | | | | | |
| | | 523212 | 9 | 50 | | X | X | XX | | | | | | | | |
| | | 523213 | 10 | 40 | | | | XX | | | | | | | | |
| | | 523214 | 11 | 30 | | X | X | XX | | | | | | | | |
| | | 523215 | 12 | 20 | | | | XX | | | | | | | | |
| | | 523216 | 13 | 10 | X | X | X | XX | X | | | | | | | |
| | | 523217 | 14 | 1 | | X | X | XX | | | | | | | | |
| | | 523218 | 15 | 1 | | | | | | | | | | | | Extra bottle |
| | | 523219 | 16 | 1 | | | | | | | | | | | | |
| | | 523220 | 1 | BTM | X | | | XX | X | | | | | | | |
| | | 523221 | 2 | 175 | | | | XX | | | | | | | | |
| | | 523222 | 3 | 150 | | | | XX | | | | | | | | |
| | | 523223 | 4 | 125 | | | | XX | | | | | | | | |
| | | 523224 | 5 | 100 | | | | XX | | XX | | | | | | |
| | | 523225 | 6 | 75 | | | | XX | | XX | | | | | | |
| | | 523226 | 7 | 60 | | | | XX | | XX | | | | | | |
| | | 523227 | 8 | 50 | | | | XX | | XX | | | | | | |
| | | 523228 | 9 | 40 | | | | XX | | XX | | | | | | |

Table D.1. *(continued)*

| Station | Event | SAMPLE ID | Niskin # | Nom. Depth (m) | O2 | pCO2 | TIC/ TA | NUTS | SAL | CHL | POC/ PON | HPLC | ABS | CDOM | CYTO | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NEC_06 | 027 | | | | | | | | | | | | | | | |
| | | 523229 | 10 | 30 | | | | XX | | XX | | | | | | |
| | | 523230 | 11 | 20 | | | | XX | | XX | | | | | | |
| | | 523231 | 12 | 10 | XX | | | XX | X | XX | | | | | | |
| | | 523232 | 13 | 1 | | | | XX | | XX | XX | X | X | X | | |
| | | 523233 | 14 | 1 | | | | | | | | | | | | Extra bottle |
| | | 523235 | 1 | BTM | XX | X | X | XX | X | | | | | | | |
| | | 523236 | 2 | 175 | | X | X | XX | | | | | | | | |
| | | 523237 | 3 | 175 | | | | | | | | | | | | |
| | | 523238 | 4 | 175 | | | | | | | | | | | | |
| | | 523239 | 5 | 150 | | | | XX | | | | | | | | |
| | | 523240 | 6 | 125 | | | | XX | | | | | | | | |
| | | 523241 | 7 | 100 | | X | X | XX | | | | | | | | |
| | | 523242 | 8 | 75 | | | | XX | | | | | | | | |
| | | 523243 | 9 | 75 | | | | | | | | | | | | |
| | | 523244 | 10 | 75 | | | | | | | | | | | | |
| NEC_05 | 029 | [illegible] | 11 | 60 | | | | XX | | | | | | | | |
| | | 523246 | 12 | 50 | | X | X | XX | | | | | | | | |
| | | 523247 | 13 | 40 | | | | XX | | | | | | | | |
| | | 523248 | 14 | 30 | | | | XX | | | | | | | | |
| | | 523249 | 15 | 20 | | | | XX | | | | | | | | |
| | | 523250 | 16 | 20 | | | | | | | | | | | | |
| | | 523251 | 17 | 20 | | | | | | | | | | | | |
| | | 523252 | 18 | 10 | X | X | X | XX | X | | | | | | | |
| | | 523253 | 19 | 1 | | X | X | XX | | | | | | | | |
| | | 523254 | 20 | 1 | | | | | | | | | | | | Extra bottle |
| | | 523255 | 21 | 1 | | | | | | | | | | | | |
| | | 523256 | 22 | 1 | | | | | | | | | | | | |
| | | 523257 | 1 | BTM | X | | | XX | X | | | | | | | |
| | | 523258 | 2 | 175 | | | | XX | | | | | | | | |
| | | 523259 | 3 | 150 | | | | XX | | | | | | | | |
| | | 523260 | 4 | 125 | | | | XX | | | | | | | | |
| | | 523261 | 5 | 100 | | | | XX | | XX | | | | | | |
| | | 523262 | 6 | 75 | | | | XX | | XX | | | | | | |
| | | 523263 | 7 | 60 | | | | XX | | XX | | | | | | |
| | | 523264 | 8 | 50 | | | | XX | | XX | | | | | | |
| | | 523265 | 9 | 40 | | | | XX | | XX | | | | | | |

Table D.1. *(continued)*

| Station | Event | SAMPLE ID | Niskin # | Nom. Depth (m) | O2 | pCO2 | TIC/ TA | NUTS | SAL | CHL | POC/ PON | HPLC | ABS | CDOM | CYTO | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NEC_04 | 030 | | | | | | | | | | | | | | | |
| | | 523266 | 10 | 30 | | | | XX | | XX | | | | | | |
| | | 523267 | 11 | 20 | | | | XX | | XX | | | | | | |
| | | 523268 | 12 | 10 | XX | | | XX | X | XX | | | | | | |
| | | 523269 | 13 | 1 | | | | XX | | XX | XX | X | X | X | | |
| | | 523270 | 14 | 1 | | | | | | | | | | | | Extra bottle |
| | | 523272 | 1 | BTM | XX | X | X | XX | X | | | | | | | |
| | | 523273 | 2 | 175 | | | | XX | | | | | | | | |
| | | 523274 | 3 | 175 | | | | | | | | | | | | |
| | | 523275 | 4 | 150 | | | | XX | | | | | | | | |
| | | 523276 | 5 | 125 | | | | XX | | | | | | | | |
| | | 523277 | 6 | 100 | | X | X | XX | | | | | | | | |
| | | 523278 | 7 | 75 | | | | XX | | | | | | | | |
| NEC_03 | 032 | [illegible] | 8 | 60 | | | | XX | | | | | | | | |
| | | 523280 | 9 | 50 | | X | X | XX | | | | | | | | |
| | | 523281 | 10 | 40 | | | | XX | | | | | | | | |
| | | 523282 | 11 | 30 | | X | X | XX | | | | | | | | |
| | | 523283 | 12 | 20 | | | | XX | | | | | | | | |
| | | 523284 | 13 | 10 | X | X | X | XX | X | | | | | | | |
| | | 523285 | 14 | 1 | | X | X | XX | | | | | | | | |
| | | 523286 | 15 | 1 | | | | | | | | | | | | Extra bottle |
| | | 523287 | 16 | 1 | | | | | | | | | | | | |
| | | 523288 | 1 | BTM | X | X | X | XX | X | | | | | | | |
| | | 523289 | 2 | 175 | | | | XX | | | | | | | | |
| | | 523290 | 3 | 150 | | | | XX | | | | | | | | |
| | | 523291 | 4 | 125 | | | | XX | | | | | | | | |
| | | 523292 | 5 | 100 | | X | X | XX | | | | | | | | |
| | | 523293 | 6 | 75 | | | | XX | | | | | | | | |
| NEC_02 | 033 | [illegible] | 7 | 60 | | | | XX | | | | | | | | |
| | | 523295 | 8 | 50 | | X | X | XX | | | | | | | | |
| | | 523296 | 9 | 40 | | | | XX | | | | | | | | |
| | | 523297 | 10 | 30 | | X | X | XX | | | | | | | | |
| | | 523298 | 11 | 20 | | | | XX | | | | | | | | |
| | | 523299 | 12 | 10 | XX | X | X | XX | X | | | | | | | |
| | | 523300 | 13 | 1 | | X | X | XX | | | | | | | | |
| | | 523301 | 14 | 1 | | | | | | | | | | | | Extra bottle |

Table D.1. *(continued)*

| Station | Event | SAMPLE ID | Niskin # | Nom. Depth (m) | O2 | pCO2 | TIC/ TA | NUTS | SAL | CHL | POC/ PON | HPLC | ABS | CDOM | CYTO | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 523303 | 1 | BTM | XX | | | XX | X | XX | | | | | | |
| | | 523304 | 2 | 75 | | | | XX | | XX | | | | | | |
| | | 523305 | 3 | 75 | | | | | | | | | | | | |
| | | 523306 | 4 | 75 | | | | | | | | | | | | |
| | | 523307 | 5 | 60 | | | | XX | | XX | | | | | | |
| | | 523308 | 6 | 50 | | | | XX | | XX | | | | | | |
| | | 523309 | 7 | 40 | | | | XX | | XX | | | | | | |
| | | 523310 | 8 | 40 | | | | | | | | | | | | |
| | | 523311 | 9 | 40 | | | | | | | | | | | | |
| NEC_01 | 035 | 523312 | 10 | 30 | | | | XX | | XX | | | | | | |
| | | 523313 | 11 | 20 | | | | XX | | XX | | | | | | |
| | | 523314 | 12 | 20 | | | | | | | | | | | | |
| | | 523315 | 13 | 20 | | | | | | | | | | | | |
| | | 523316 | 14 | 10 | X | | | XX | X | XX | | | | | | |
| | | 523317 | 15 | 1 | | | | XX | | XX | XX | X | X | | | CDOM broken. Lost. |
| | | 523318 | 16 | 1 | | | | | | | | | | | | Extra bottle |
| | | 523319 | 17 | 1 | | | | | | | | | | | | |
| | | 523320 | 18 | 1 | | | | | | | | | | | | |
| | | 523322 | 1 | BTM | X | X | X | XX | X | XX | | | | | | |
| | | 523323 | 2 | 60 | | | | XX | | XX | | | | | XX | |
| | | 523324 | 3 | 60 | | | | | | | | | | | | |
| | | 523325 | 4 | 60 | | | | | | | | | | | | |
| | | 523326 | 5 | 50 | | X | X | XX | | XX | | | | | XX | |
| | | 523327 | 6 | 40 | | | | XX | | XX | | | | | XX | |
| | | 523328 | 7 | 40 | | | | | | | | | | | | |
| | | 523329 | 8 | 40 | | | | | | | | | | | | |
| HL_01 | 037 | 523330 | 9 | 30 | | X | X | XX | | XX | | | | | XX | |
| | | 523331 | 10 | 20 | | | | XX | | XX | | | | | XX | |
| | | 523332 | 11 | 20 | | | | | | | | | | | | |
| | | 523333 | 12 | 20 | | | | | | | | | | | | |
| | | 523334 | 13 | 10 | XX | X | X | XX | X | XX | | | | | XX | |
| | | 523335 | 14 | 1 | | X | X | XX | | XX | XX | X | X | X | XX | |
| | | 523336 | 15 | 1 | | | | | | | | | | | | Extra bottle |
| | | 523337 | 16 | 1 | | | | | | | | | | | | |
| | | 523338 | 17 | 1 | | | | | | | | | | | | |

Table D.1. *(continued)*

| Station | Event | SAMPLE ID | Niskin # | Nom. Depth (m) | O2 | pCO2 | TIC/ TA | NUTS | SAL | CHL | POC/ PON | HPLC | ABS | CDOM | CYTO | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 523340 | 1 | BTM | XX | X | X | XX | X | | | | | | | Did not get the bottom bottle for the phyto sample before the bottles were empty |
| | | 523341 | 2 | 100 | | X | X | XX | | XX | | | | | XX | |
| | | 523342 | 3 | 80 | | | | XX | | XX | | | | | XX | |
| | | 523343 | 4 | 80 | | | | | | | | | | | | |
| | | 523344 | 5 | 80 | | | | | | | | | | | | |
| | | 523345 | 6 | 60 | | | | XX | | XX | | | | | XX | |
| | | 523346 | 7 | 50 | | X | X | XX | | XX | | | | | XX | |
| | | 523347 | 8 | 40 | | | | XX | | XX | | | | | XX | |
| | | 523348 | 9 | 40 | | | | | | | | | | | | |
| HL_02 | 039 | 523349 | 10 | 40 | | | | | | | | | | | | |
| | | 523350 | 11 | 30 | | X | X | XX | | XX | | X | X | X | XX | |
| | | 523351 | 12 | 30 | | | | | | | | | | | | |
| | | 523352 | 13 | 20 | | | | XX | | XX | | | | | XX | |
| | | 523353 | 14 | 20 | | | | | | | | | | | | |
| | | 523354 | 15 | 20 | | | | | | | | | | | | |
| | | 523355 | 16 | 10 | X | X | X | XX | X | XX | | | | | XX | |
| | | 523356 | 17 | 1 | | X | X | XX | | XX | XX | X | | X | XX | |
| | | 523357 | 18 | 1 | | | | | | | | | | | | Extra bottle |
| | | 523358 | 19 | 1 | | | | | | | | | | | | |
| | | 523359 | 20 | 1 | | | | | | | | | | | | |
| | | 523362 | 1 | BTM | XX | X | X | XX | X | | | | | | | |
| | | 523363 | 2 | 200 | | X | X | XX | | | | | | | | |
| | | 523364 | 3 | 100 | | X | X | XX | | XX | | | | | XX | |
| | | 523365 | 4 | 80 | | | | XX | | XX | | | | | XX | |
| | | 523366 | 5 | 60 | | | | XX | | XX | | | | | XX | |
| | | 523367 | 6 | 50 | | X | X | XX | | XX | | | | | XX | |
| | | 523368 | 7 | 40 | | | | XX | | XX | | | | | XX | |
| | | 523369 | 8 | 30 | | X | X | XX | | XX | | | | | XX | |
| | | 523370 | 9 | 20 | | | | XX | | XX | | | | | XX | |
| | | 523371 | 10 | 10 | X | X | X | XX | X | XX | | | | | XX | |
| | | 523372 | 11 | 1 | | X | X | XX | | XX | XX | X | | X | XX | |

Table D.1. *(continued)*

| Station | Event | SAMPLE ID | Niskin # | Nom. Depth (m) | O2 | pCO2 | TIC/ TA | NUTS | SAL | CHL | POC/ PON | HPLC | ABS | CDOM | CYTO | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| HL_03 | 043 | | | | | | | | | | | | | | | |
| | | 523373 | 12 | 1 | | | | | | | | | | | | Extra bottle |
| | | 523374 | 13 | 1 | | | | | | | | | | | | |
| | | 523376 | 1 | BTM | X | | | XX | X | | | | | | | |
| | | 523377 | 2 | 100 | | | | XX | | XX | | | | | | |
| | | 523378 | 3 | 80 | | | | XX | | XX | | | | | | |
| | | 523379 | 4 | 60 | | | | XX | | XX | | | | | | |
| | | 523380 | 5 | 50 | | | | XX | | XX | | | | | | |
| HL_03.3 | 045 | 523381 | 6 | 40 | | | | XX | | XX | | | | | | |
| | | 523382 | 7 | 30 | | | | XX | | XX | | X | | X | X | |
| | | 523383 | 8 | 20 | | | | XX | | XX | | | | | | |
| | | 523384 | 9 | 10 | XX | | | XX | X | XX | | | | | | |
| | | 523385 | 10 | 1 | | | | XX | | XX | XX | X | | X | X | |
| | | 523386 | 11 | 1 | | | | | | | | | | | | Extra bottle |
| | | 523388 | 1 | BTM | XX | X | X | XX | X | XX | | | | | | |
| | | 523389 | 2 | 60 | | | | XX | | XX | | | | | XX | |
| | | 523390 | 3 | 60 | | | | | | | | | | | | |
| | | 523391 | 4 | 60 | | | | | | | | | | | | |
| | | 523392 | 5 | 50 | | X | X | XX | | XX | | | | | XX | |
| | | 523393 | 6 | 40 | | | | XX | | XX | | | | | XX | |
| | | 523394 | 7 | 40 | | | | | | | | | | | | |
| | | 523395 | 8 | 40 | | | | | | | | | | | | |
| HL_04 | 047 | 523396 | 9 | 30 | | X | X | XX | | XX | | | | | XX | |
| | | 523397 | 10 | 20 | | | | XX | | XX | | | | | XX | |
| | | 523398 | 11 | 20 | | | | | | | | | | | | |
| | | 523399 | 12 | 20 | | | | | | | | | | | | |
| | | 523400 | 13 | 10 | X | X | X | XX | X | XX | | | | | XX | |
| | | 523401 | 14 | 1 | | X | X | XX | | XX | XX | X | | X | X | XX |
| | | 523402 | 15 | 1 | | | | | | | | | | | | Extra bottle |
| | | 523403 | 16 | 1 | | | | | | | | | | | | |
| | | 523404 | 17 | 1 | | | | | | | | | | | | |
| | | 523406 | 1 | BTM | X | X | X | XX | X | XX | | | | | XX | |
| | | 523407 | 2 | 80 | | X | X | XX | | XX | | | | | XX | |
| | | 523408 | 3 | 60 | | | | XX | | XX | | | | | XX | |
| | | 523409 | 4 | 50 | | X | X | XX | | XX | | | | | XX | |
| | | 523410 | 5 | 40 | | | | XX | | XX | | | | | XX | |

Table D.1. *(continued)*

| Station | Event | SAMPLE ID | Niskin # | Nom. Depth (m) | O2 | pCO2 | TIC/ TA | NUTS | SAL | CHL | POC/ PON | HPLC | ABS | CDOM | CYTO | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| HL_05 | 049 | 523411 | 6 | 30 | | | | XX | | XX | | X | X | X | XX | |
| | | 523412 | 7 | 30 | | | | | | | | | | | | |
| | | 523413 | 8 | 20 | | X | X | XX | | XX | | | | | XX | |
| | | 523414 | 9 | 10 | XX | | | XX | X | XX | | | | | XX | |
| | | 523415 | 10 | 1 | | X | X | XX | | XX | XX | X | X | X | XX | Leaky Niskin |
| | | 523416 | 11 | 1 | | | | | | | | | | | | Extra bottle |
| | | 523417 | 12 | 1 | | | | | | | | | | | | |
| | | 523419 | 1 | BTM | XX | X | X | XX | X | | | | | | | |
| | | 523420 | 2 | 250 | X | X | X | XX | X | | | | | | | |
| | | 523421 | 3 | 250 | | | | | | | | | | | | |
| | | 523422 | 4 | 100 | | X | X | XX | | XX | | | | | | |
| | | 523423 | 5 | 100 | | | | | | | | | | | | |
| | | 523424 | 6 | 80 | | | | XX | | XX | | | | | | |
| | | 523425 | 7 | 80 | | | | | | | | | | | | |
| | | 523426 | 8 | 80 | | | | | | | | | | | | |
| | | 523427 | 9 | 60 | | | | XX | | XX | | | | | | |
| | | 523428 | 10 | 60 | | | | | | | | | | | | |
| | | 523429 | 11 | 50 | | X | X | XX | | XX | | | | | | |
| HL_05.5 | 051 | 523430 | 12 | 40 | | | | XX | | XX | | | | | | |
| | | 523431 | 13 | 40 | | | | | | | | | | | | |
| | | 523432 | 14 | 40 | | | | | | | | | | | | |
| | | 523433 | 15 | 30 | | X | X | XX | | XX | | | | | | |
| | | 523434 | 16 | 20 | | | | XX | | XX | | | | | | |
| | | 523435 | 17 | 20 | | | | | | | | | | | | |
| | | 523436 | 18 | 20 | | | | | | | | | | | | |
| | | 523437 | 19 | 10 | X | X | X | XX | X | XX | | | | | | |
| | | 523438 | 20 | 1 | | X | X | XX | | XX | XX | X | | X | X | |
| | | 523439 | 21 | 1 | | | | | | | | | | | | Extra bottle |
| | | 523440 | 22 | 1 | | | | | | | | | | | | |
| | | 523441 | 23 | 1 | | | | | | | | | | | | |
| | | 523443 | 1 | BTM | X | X | X | XX | X | | | | | | | |
| | | 523444 | 2 | 1000 | X | X | X | XX | X | | | | | | | |
| | | 523445 | 3 | 900 | X | | | | X | | | | | | XX | |
| | | 523446 | 4 | 750 | X | X | X | XX | X | | | | | | | |
| | | 523447 | 5 | 500 | X | X | X | XX | X | | | | | | | |

Table D.1. *(continued)*

| | | |
|---|---|---|
| 523448 | 6 | 500 |

Table D.1. *(continued)*

| Station | Event | SAMPLE ID | Niskin # | Nom. Depth (m) | O2 | pCO2 | TIC/ TA | NUTS | SAL | CHL | POC/ PON | HPLC | ABS | CDOM | CYTO | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 523449 | 7 | 250 | X | X | X | XX | X | | | | | | | |
| | | 523450 | 8 | 250 | | | | | | | | | | | | |
| | | 523451 | 9 | 150 | | X | X | XX | | | | | | | | |
| | | 523452 | 10 | 100 | | X | X | XX | | XX | | | | | XX | |
| | | 523453 | 11 | 80 | | | | XX | | XX | | | | | XX | |
| HL_06 | 053 | 523454 | 12 | 80 | | | | | | | | | | | | |
| | | 523455 | 13 | 60 | | | | XX | | XX | | | | | XX | |
| | | 523456 | 14 | 50 | X | X | X | XX | X | XX | | | | | XX | |
| | | 523457 | 15 | 50 | | | | | | | | | | | | |
| | | 523458 | 16 | 50 | | | | | | | | | | | | |
| | | 523459 | 17 | 40 | | | | XX | | XX | | | | | XX | |
| | | 523460 | 18 | 30 | | X | X | XX | | XX | | X | X | X | XX | |
| | | 523461 | 19 | 20 | | | | XX | | XX | | | | | XX | |
| | | 523462 | 20 | 20 | | | | | | | | | | | | |
| | | 523463 | 21 | 10 | XX | X | X | XX | X | XX | | | | | XX | |
| | | 523464 | 22 | 1 | | X | X | XX | | XX | XX | X | X | X | XX | |
| | | 523465 | 23 | 1 | | | | | | | | | | | | |
| | | 523466 | 24 | 1 | | | | | | | | | | | | |
| | | 523468 | 1 | BTM | XX | | | XX | X | | | | | | | |
| | | 523469 | 2 | 1500 | | | | XX | | | | | | | | |
| | | 523470 | 3 | 1000 | X | | | XX | X | | | | | | | Bottle misfired. No samples taken from 1000m |
| | | 523471 | 4 | 750 | | | | XX | | | | | | | | |
| | | 523472 | 5 | 500 | X | | | XX | X | | | | | | | |
| | | 523473 | 6 | 250 | X | | | XX | X | | | | | | | |
| | | 523474 | 7 | 150 | | | | XX | | | | | | | | |
| | | 523475 | 8 | 100 | | | | XX | | XX | | | | | | |
| | | 523476 | 9 | 80 | | | | XX | | XX | | | | | | |
| | | 523477 | 10 | 60 | | | | XX | | XX | | | | | | |
| | | 523478 | 11 | 50 | | | | XX | | XX | | | | | | |
| | | 523479 | 12 | 40 | | | | XX | | XX | | | | | | |
| | | 523480 | 13 | 30 | | | | XX | | XX | | | | | | |
| | | 523481 | 14 | 20 | | | | XX | | XX | | | | | | |
| | | 523482 | 15 | 10 | X | | | XX | X | XX | | | | | | |

Table D.1. *(continued)*

| Station | Event | SAMPLE ID | Niskin # | Nom. Depth (m) | O2 | pCO2 | TIC/ TA | NUTS | SAL | CHL | POC/ PON | HPLC | ABS | CDOM | CYTO | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 523483 | 16 | 1 | | | | XX | | XX | XX | X | X | X | | |
| | | 523484 | 17 | 1 | | | | | | | | | | | | Extra bottle |
| | | 523486 | 1 | BTM | X | | | XX | X | | | | | | | |
| | | 523487 | 2 | 2000 | X | | | XX | X | | | | | | | |
| | | 523488 | 3 | 1750 | X | | | | X | | | | | | | |
| | | 523489 | 4 | 1500 | X | | | XX | X | | | | | | | |
| | | 523490 | 5 | 1250 | X | | | | X | | | | | | | |
| | | 523491 | 6 | 1000 | X | | | XX | X | | | | | | | |
| | | 523492 | 7 | 750 | X | | | XX | X | | | | | | | |
| | | 523493 | 8 | 500 | X | | | XX | X | | | | | | | |
| | | 523494 | 9 | 250 | X | | | XX | X | | | | | | | |
| HL_06.7 | 057 | 523495 | 10 | 150 | | | | XX | | | | | | | | |
| | | 523496 | 11 | 100 | | | | XX | | XX | | | | | | |
| | | 523497 | 12 | 80 | | | | XX | | XX | | | | | | |
| | | 523498 | 13 | 60 | | | | XX | | XX | | | | | | |
| | | 523499 | 14 | 50 | X | | | XX | X | XX | | | | | | |
| | | 523500 | 15 | 40 | | | | XX | | XX | | | | | | |
| | | 523501 | 16 | 30 | | | | XX | | XX | | | | | | |
| | | 523502 | 17 | 20 | | | | XX | | XX | | | | | | |
| | | 523503 | 18 | 10 | XX | | | XX | X | XX | | | | | | |
| | | 523504 | 19 | 1 | | | | XX | | XX | XX | X | | X | X | |
| | | 523505 | 20 | 1 | | | | | | | | | | | | Extra bottle |
| | | 523507 | 1 | BTM | XX | | | XX | X | | | | | | | |
| | | 523508 | 2 | 2000 | X | X | X | XX | X | | | | | | | |
| | | 523509 | 3 | 1750 | X | | | | X | | | | | | | |
| | | 523510 | 4 | 1500 | X | X | X | XX | X | | | | | | | |
| | | 523511 | 5 | 1250 | X | | | | X | | | | | | | |
| | | 523512 | 6 | 1000 | X | X | X | XX | X | | | | | | | |
| | | 523513 | 7 | 750 | X | X | X | XX | X | | | | | | | |
| | | 523514 | 8 | 500 | X | X | X | XX | X | | | | | | XX | |
| | | 523515 | 9 | 250 | X | X | X | XX | X | | | | | | | |
| | | 523516 | 10 | 150 | | X | X | XX | | | | | | | | |
| | | 523517 | 11 | 100 | | X | X | XX | | XX | | | | | XX | |
| | | 523518 | 12 | 80 | | X | X | XX | | XX | | | | | XX | |
| | | 523519 | 13 | 80 | | | | | | | | | | | | |
| | | 523520 | 14 | 60 | | | | XX | | XX | | | | | XX | |

Table D.1. *(continued)*

| Station | Event | SAMPLE ID | Niskin # | Nom. Depth (m) | O2 | pCO2 | TIC/ TA | NUTS | SAL | CHL | POC/ PON | HPLC | ABS | CDOM | CYTO | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| HL_07 | 059 | | | | | | | | | | | | | | | |
| | | 523521 | 15 | 50 | X | X | X | XX | X | XX | | | | | XX | |
| | | 523522 | 16 | 50 | | | | | | | | | | | | |
| | | 523523 | 17 | 40 | | | | XX | | XX | | | | | XX | |
| | | 523524 | 18 | 30 | | X | X | XX | | XX | | X | X | X | XX | |
| | | 523525 | 19 | 20 | | | | XX | | XX | | | | | | |
| | | 523526 | 20 | 20 | | | | | | | | | | | | |
| | | 523527 | 21 | 10 | X | X | X | XX | X | XX | | | | | XX | |
| | | 523528 | 22 | 1 | | X | X | XX | | XX | XX | X | X | X | XX | |
| | | 523529 | 23 | 1 | | | | | | | | | | | | |
| | | 523530 | 24 | 1 | | | | | | | | | | | | |
| | | 523532 | 1 | BTM | X | X | X | XX | X | | | | | | | |
| | | 523533 | 2 | 500 | | | | XX | | | | | | | | |
| | | 523534 | 3 | 500 | | | | | | | | | | | | |
| | | 523535 | 4 | 250 | X | | | XX | X | | | | | | | |
| | | 523536 | 5 | 100 | | | | XX | | XX | | | | | XX | |
| | | 523537 | 6 | 80 | | | | XX | | XX | | | | | XX | |
| GUL_01 | 062 | [illegible] | 7 | 60 | | | | XX | | XX | | | | | XX | |
| | | 523539 | 8 | 50 | | | | XX | | XX | | | | | XX | |
| | | 523540 | 9 | 40 | | | | XX | | XX | | | | | XX | |
| | | 523541 | 10 | 30 | | | | XX | | XX | | | | | XX | |
| | | 523542 | 11 | 10 | XX | | | XX | X | XX | | | | | XX | |
| | | 523543 | 12 | 1 | | | | XX | | XX | XX | X | X | | XX | CDOM broken |
| | | 523544 | 13 | 1 | | | | | | | | | | | | |
| | | 523545 | 14 | 1 | | | | | | | | | | | | Extra bottle |
| | | 523547 | 1 | BTM | XX | X | X | XX | X | | | | | | | |
| | | 523548 | 2 | 750 | | | | XX | | | | | | | | |
| | | 523549 | 3 | 500 | | | | XX | | | | | | | | |
| | | 523550 | 4 | 250 | X | | | XX | X | | | | | | | |
| | | 523551 | 5 | 100 | | | | XX | | XX | | | | | | |
| | | 523552 | 6 | 80 | | | | XX | | XX | | | | | | |
| | | 523553 | 7 | 60 | | | | XX | | XX | | | | | | |
| | | 523554 | 8 | 50 | | | | XX | | XX | | | | | | |
| | | 523555 | 9 | 40 | | | | XX | | XX | | | | | | |
| | | 523556 | 10 | 30 | | | | XX | | XX | | | | | | |
| | | 523557 | 11 | 20 | | | | XX | | XX | | | | | | |
| | | 523558 | 12 | 10 | X | | | XX | X | XX | | | | | | |

Table D.1. *(continued)*

| Station | Event | SAMPLE ID | Niskin # | Nom. Depth (m) | O2 | pCO2 | TIC/ TA | NUTS | SAL | CHL | POC/ PON | HPLC | ABS | CDOM | CYTO | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 523559 | 13 | 1 | | | | XX | | XX | XX | X | X | X | | |
| | | 523560 | 14 | 1 | | | | | | | | | | | | Extra bottle |
| | | 523562 | 1 | BTM | XX | X | X | XX | X | | | | | | | |
| | | 523563 | 2 | 1500 | | X | X | XX | | | | | | | | |
| | | 523564 | 3 | 1500 | | | | | | | | | | | | |
| | | 523565 | 4 | 750 | | | | XX | | | | | | | | |
| | | 523566 | 5 | 500 | | | | XX | | | | | | | | |
| | | 523567 | 6 | 250 | X | | | XX | X | | | | | | | |
| | | 523568 | 7 | 250 | | | | | | | | | | | | |
| | | 523569 | 8 | 100 | | | | XX | | XX | | | | | XX | |
| | | 523570 | 9 | 80 | | | | XX | | XX | | | | | XX | |
| GUL_03 | 066 | 523571 | 10 | 60 | | | | XX | | XX | | | | | XX | |
| | | 523572 | 11 | 50 | | | | XX | | XX | | | | | XX | |
| | | 523573 | 12 | 40 | | | | XX | | XX | | | | | XX | |
| | | 523574 | 13 | 30 | | | | XX | | XX | | | | | XX | |
| | | 523575 | 14 | 20 | | | | XX | | XX | | | | | XX | |
| | | 523576 | 15 | 20 | | | | | | | | | | | | |
| | | 523577 | 16 | 10 | X | | | XX | X | XX | | | | | XX | |
| | | 523578 | 17 | 1 | | | | XX | | XX | XX | X | X | X | XX | |
| | | 523579 | 18 | 1 | | | | | | | | | | | | Extra bottle |
| | | 523580 | 19 | 1 | | | | | | | | | | | | |
| | | 523582 | 1 | BTM | X | X | X | XX | X | | | | | | | |
| | | 523583 | 2 | BTM | | | | | | | | | | | | |
| | | 523584 | 3 | 1500 | | X | X | XX | | | | | | | | |
| | | 523585 | 4 | 1500 | | | | | | | | | | | | |
| | | 523586 | 5 | 750 | | | | XX | | | | | | | | |
| | | 523587 | 6 | 500 | | X | X | XX | | | | | | | | |
| | | 523588 | 7 | 250 | X | | | XX | X | | | | | | | |
| | | 523589 | 8 | 250 | | | | | | | | | | | | |
| | | 523590 | 9 | 100 | | X | X | XX | | XX | | | | | XX | |
| | | 523591 | 10 | 80 | | | | XX | | XX | | | | | XX | |
| | | 523592 | 11 | 60 | | | | XX | | XX | | | | | XX | |
| | | 523593 | 12 | 60 | | | | | | | | | | | | |
| | | 523594 | 13 | 50 | | | | XX | | XX | | | | | XX | |
| | | 523595 | 14 | 40 | | | | XX | | XX | | | | | XX | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 523596 | 15 | 30 | | XX | XX | XX |

Table D.1. *(continued)*

| Station | EVent | SAMPLE ID | Niskin # | Nom. Depth (m) | O2 | pCO2 | TIC/ TA | NUTS | SAL | CHL | POC/ PON | HPLC | ABS | CDOM | CYTO | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 523597 | 16 | 20 | | | | XX | | XX | | | | | XX | |
| | | 523598 | 17 | 20 | | | | | | | | | | | | |
| | | 523599 | 18 | 20 | | | | | | | | | | | | |
| | | 523600 | 19 | 10 | XX | X | X | XX | X | XX | | | | | XX | |
| | | 523601 | 20 | 1 | | X | X | XX | | XX | XX | X | X | X | XX | |
| | | 523602 | 21 | 1 | | | | | | | | | | | | Extra bottle |
| | | 523603 | 22 | 1 | | | | | | | | | | | | |
| | | 523604 | 23 | 1 | | | | | | | | | | | | |
| | | 523606 | 1 | BTM | X | X | X | XX | X | XX | | | | | | |
| | | 523607 | 2 | 20 | | | | XX | | XX | | | | | | |
| | | 523608 | 3 | 20 | | | | | | | | | | | | |
| | | 523609 | 4 | 20 | | | | | | | | | | | | |
| LCM_01 | 070 | 523610 | 5 | 10 | XX | X | X | XX | X | XX | | | | | | |
| | | 523611 | 6 | 1 | | X | X | XX | | XX | XX | X | X | X | | |
| | | 523612 | 7 | 1 | | | | | | | | | | | | Extra bottle |
| | | 523613 | 8 | 1 | | | | | | | | | | | | |
| | | 523614 | 9 | 1 | | | | | | | | | | | | |
| | | 523616 | 1 | BTM | XX | | | XX | X | XX | | | | | | |
| | | 523617 | 2 | 40 | | | | XX | | XX | | | | | | |
| | | 523618 | 3 | 30 | | | | XX | | XX | | | | | | |
| LCM_02 | 073 | 523619 | 4 | 20 | | | | XX | | XX | | | | | | |
| | | 523620 | 5 | 10 | X | | | XX | X | XX | | | | | | |
| | | 523621 | 6 | 1 | | | | XX | | XX | XX | X | X | X | | |
| | | 523622 | 7 | 1 | | | | | | | | | | | | Extra bottle |
| | | 523624 | 1 | BTM | X | X | X | XX | X | XX | | | | | | |
| | | 523625 | 2 | 60 | | | | XX | | XX | | | | | | |
| | | 523626 | 3 | 50 | | | | XX | | XX | | | | | | |
| | | 523627 | 4 | 40 | | | | XX | | XX | | | | | | |
| LCM_03 | 075 | 523628 | 5 | 30 | | | | XX | | XX | | X | X | X | | |
| | | 523629 | 6 | 20 | | | | XX | | XX | | | | | | |
| | | 523630 | 7 | 10 | XX | | | XX | X | XX | | | | | | |
| | | 523631 | 8 | 1 | | X | X | XX | | XX | XX | X | X | | | CDOM broken |
| | | 523632 | 9 | 1 | | | | | | | | | | | | Extra bottle |
| | | 523634 | 1 | BTM | XX | X | X | XX | X | | | | | | | |
| | | 523635 | 2 | 200 | | X | X | XX | | | | | | | | |

Table D.1. *(continued)*

| Station | Event | SAMPLE ID | Niskin # | Nom. Depth (m) | O2 | pCO2 | TIC/ TA | NUTS | SAL | CHL | POC/ PON | HPLC | ABS | CDOM | CYTO | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 523636 | 3 | 100 | | X | X | XX | | XX | | | | | | Leaking Niskin |
| | | 523637 | 4 | 80 | | | | XX | | XX | | | | | | |
| | | 523638 | 5 | 80 | | | | | | | | | | | | |
| | | 523639 | 6 | 80 | | | | | | | | | | | | |
| | | 523640 | 7 | 60 | | | | XX | | XX | | | | | | |
| | | 523641 | 8 | 50 | | X | X | XX | | XX | | | | | | |
| | | 523642 | 9 | 40 | | | | XX | | XX | | | | | | |
| LCM_04 | 077 | 523643 | 10 | 40 | | | | | | | | | | | | |
| | | 523644 | 11 | 40 | | | | | | | | | | | | |
| | | 523645 | 12 | 30 | | | | XX | | XX | | | | | | |
| | | 523646 | 13 | 20 | | | | XX | | XX | | | | | | |
| | | 523647 | 14 | 20 | | | | | | | | | | | | |
| | | 523648 | 15 | 20 | | | | | | | | | | | | |
| | | 523649 | 16 | 10 | X | X | X | XX | X | XX | | | | | | |
| | | 523650 | 17 | 1 | | X | X | XX | | XX | XX | X | X | | | CDOM broken |
| | | 523651 | 18 | 1 | | | | | | | | | | | | Extra bottle |
| | | 523652 | 19 | 1 | | | | | | | | | | | | |
| | | 523653 | 20 | 1 | | | | | | | | | | | | |
| | | 523655 | 1 | BTM | X | X | X | XX | X | | | | | | | |
| | | 523656 | 2 | 200 | | X | X | XX | | | | | | | | |
| | | 523657 | 3 | 100 | | X | X | XX | | XX | | | | | | |
| | | 523658 | 4 | 80 | | | | XX | | XX | | | | | | |
| | | 523659 | 5 | 60 | | | | XX | | XX | | | | | | |
| LCM_05 | 079 | 523660 | 6 | 50 | | X | X | XX | | XX | | | | | | |
| | | 523661 | 7 | 40 | | | | XX | | XX | | | | | | |
| | | 523662 | 8 | 30 | | | | XX | | XX | | X | X | | | CDOM broken |
| | | 523663 | 9 | 20 | | | | XX | | XX | | | | | | |
| | | 523664 | 10 | 10 | XX | X | X | XX | X | XX | | | | | | |
| | | 523665 | 11 | 1 | | X | X | XX | | XX | XX | X | X | X | | |
| | | 523666 | 12 | 1 | | | | | | | | | | | | Extra bottle |
| | | 523668 | 1 | BTM | XX | | | XX | X | | | | | | | |
| | | 523669 | 2 | 200 | | | | XX | | | | | | | | |
| | | 523670 | 3 | 200 | | | | | | | | | | | | |
| | | 523671 | 4 | 200 | | | | | | | | | | | | |
| | | 523672 | 5 | 100 | | | | XX | | XX | | | | | | |
| | | 523673 | 6 | 80 | | | | XX | | XX | | | | | | |

Table D.1. *(continued)*

| Station | Event | SAMPLE ID | Niskin # | Nom. Depth (m) | O2 | pCO2 | TIC/ TA | NUTS | SAL | CHL | POC/ PON | HPLC | ABS | CDOM | CYTO | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 523674 | 7 | 80 | | | | | | | | | | | | |
| | | 523675 | 8 | 80 | | | | | | | | | | | | |
| | | 523676 | 9 | 60 | | | | XX | | XX | | | | | | |
| LCM_06 | 081 | [illegible] | 10 | 50 | | | | XX | | XX | | | | | | |
| | | 523678 | 11 | 40 | | | | XX | | XX | | | | | | |
| | | 523679 | 12 | 30 | | | | XX | | XX | | | | | | |
| | | 523680 | 13 | 20 | | | | XX | | XX | | | | | | |
| | | 523681 | 14 | 20 | | | | | | | | | | | | |
| | | 523682 | 15 | 20 | | | | | | | | | | | | |
| | | 523683 | 16 | 10 | X | | | XX | X | XX | | | | | | |
| | | 523684 | 17 | 1 | | | | XX | | XX | XX | X | | X | X | |
| | | 523685 | 18 | 1 | | | | | | | | | | | | Extra bottle |
| | | 523686 | 19 | 1 | | | | | | | | | | | | |
| | | 523687 | 20 | 1 | | | | | | | | | | | | |
| | | 523689 | 1 | BTM | X | X | X | XX | X | | | | | | | |
| | | 523690 | 2 | 250 | X | X | X | XX | | | | | | | | |
| | | 523691 | 3 | 100 | | X | X | XX | | XX | | | | | | |
| | | 523692 | 4 | 80 | | | | XX | | XX | | | | | | |
| | | 523693 | 5 | 60 | | | | XX | | XX | | | | | | |
| LCM_07 | 083 | [illegible] | 6 | 50 | | | | XX | | XX | | | | | | |
| | | 523695 | 7 | 40 | | | | XX | | XX | | | | | | |
| | | 523696 | 8 | 30 | | | | XX | | XX | | X | | X | | CDOM broken |
| | | 523697 | 9 | 20 | | | | XX | | XX | | | | | | |
| | | 523698 | 10 | 10 | XX | X | X | XX | X | XX | | | | | | |
| | | 523699 | 11 | 1 | | X | X | XX | | XX | XX | X | | X | X | |
| | | 523700 | 12 | 1 | | | | | | | | | | | | Extra bottle |
| | | 523702 | 1 | BTM | XX | | | XX | X | | | | | | | |
| | | 523703 | 2 | 250 | X | | | XX | | | | | | | | |
| | | 523704 | 3 | 100 | | | | XX | | XX | | | | | | |
| | | 523705 | 4 | 80 | | | | XX | | XX | | | | | | |
| | | 523706 | 5 | 60 | | | | XX | | XX | | | | | | |
| | | 523707 | 6 | 50 | | | | XX | | XX | | | | | | |
| | | 523708 | 7 | 40 | | | | XX | | XX | | | | | | |
| | | 523709 | 8 | 30 | | | | XX | | XX | | | | | | |
| | | 523710 | 9 | 20 | | | | XX | | XX | | | | | | |
| | | 523711 | 10 | 10 | X | | | XX | X | XX | | | | | | |

Table D.1. *(continued)*

LCM_08_085

| Station | Event | SAMPLE ID | Niskin # | Nom. Depth (m) | O2 | pCO2 | TIC/ TA | NUTS | SAL | CHL | POC/ PON | HPLC | ABS | CDOM | CYTO | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 523712 | 11 | 1 | | | | XX | | XX | XX | X | X | X | | |
| | | 523713 | 12 | 1 | | | | | | | | | | | | Extra bottle |
| | | 523715 | 1 | BTM | X | X | X | XX | X | | | | | | | |
| | | 523716 | 2 | 3000 | X | X | X | XX | | | | | | | | |
| | | 523717 | 3 | 2000 | | X | X | XX | | | | | | | XX | |
| | | 523718 | 4 | 1500 | | X | X | XX | | | | | | | | |
| | | 523719 | 5 | 1000 | | X | X | XX | | | | | | | | |
| | | 523720 | 6 | 500 | | X | X | XX | | | | | | | | |
| | | 523721 | 7 | 250 | X | X | X | XX | X | | | | | | | |
| | | 523722 | 8 | 250 | | | | | | | | | | | | |
| | | 523723 | 9 | 150 | | | | XX | | | | | | | | |
| | | 523724 | 10 | 100 | | X | X | XX | | XX | | | | | XX | |
| | | 523725 | 11 | 80 | | | | XX | | XX | | | | | XX | |
| LL_09 | 087 | 523726 | 12 | 80 | | | | | | | | | | | | |
| | | 523727 | 13 | 80 | | | | | | | | | | | | |
| | | 523728 | 14 | 60 | | | | XX | | XX | | | | | XX | |
| | | 523729 | 15 | 50 | | X | X | XX | | XX | | | | | XX | |
| | | 523730 | 16 | 40 | | | | XX | | XX | | | | | XX | |
| | | 523731 | 17 | 30 | | X | X | XX | | XX | | X | X | X | XX | |
| | | 523732 | 18 | 20 | | | | XX | | XX | | | | | XX | |
| | | 523733 | 19 | 20 | | | | | | | | | | | | |
| | | 523734 | 20 | 20 | | | | | | | | | | | | |
| | | 523735 | 21 | 10 | XX | X | X | XX | X | XX | | | | | XX | |
| | | 523736 | 22 | 1 | | X | X | XX | | XX | XX | X | X | X | XX | |
| | | 523737 | 23 | 1 | | | | | | | | | | | | |
| | | 523738 | 24 | 1 | | | | | | | | | | | | |
| | | 523740 | 1 | BTM | XX | | | XX | X | | | | | | | |
| | | 523741 | 2 | 2000 | | X | X | XX | X | | | | | | | |
| | | 523742 | 3 | 1500 | | X | X | XX | | | | | | | | |
| | | 523743 | 4 | 1000 | | X | X | XX | | | | | | | | |
| | | 523744 | 5 | 500 | | X | X | XX | | | | | | | | |
| | | 523745 | 6 | 250 | X | X | X | XX | X | | | | | | | |
| | | 523746 | 7 | 150 | | | | XX | | | | | | | | |
| | | 523747 | 8 | 100 | | X | X | XX | | XX | | | | | | |
| | | 523748 | 9 | 80 | | | | XX | | XX | | | | | | |
| | | 523749 | 10 | 60 | | | | XX | | XX | | | | | | |

Table D.1. *(continued)*

| Station | Event | SAMPLE ID | Niskin # | Nom. Depth (m) | O2 | pCO2 | TIC/ TA | NUTS | SAL | CHL | POC/ PON | HPLC | ABS | CDOM | CYTO | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LL_08 | 090 | | | | | | | | | | | | | | | |
| | | 523750 | 11 | 50 | | X | X | XX | | XX | | | | | | |
| | | 523751 | 12 | 40 | | | | XX | | XX | | | | | | |
| | | 523752 | 13 | 30 | | X | X | XX | | XX | | | | | | |
| | | 523753 | 14 | 20 | | | | XX | | XX | | | | | | |
| | | 523754 | 15 | 10 | X | X | X | XX | X | XX | | | | | | |
| | | 523755 | 16 | 1 | | X | X | XX | | XX | XX | X | | X | X | |
| | | 523756 | 17 | 1 | | | | | | | | | | | | Extra bottle |
| | | 523758 | 1 | BTM | X | X | X | XX | X | | | | | | | |
| | | 523759 | 2 | 500 | | X | X | XX | | | | | | | | |
| | | 523760 | 3 | 250 | X | | | XX | X | | | | | | | |
| | | 523761 | 4 | 250 | | | | | | | | | | | | |
| | | 523762 | 5 | 250 | | | | | | | | | | | | |
| | | 523763 | 6 | 150 | | | | XX | | | | | | | | |
| | | 523764 | 7 | 100 | | X | X | XX | | XX | | | | | XX | |
| | | 523765 | 8 | 80 | | | | XX | | XX | | | | | XX | |
| | | 523766 | 9 | 80 | | | | | | | | | | | | |
| | | 523767 | 10 | 80 | | | | | | | | | | | | |
| | | 523768 | 11 | 60 | | | | XX | | XX | | | | | XX | |
| LL_07 | 092 | 523769 | 12 | 50 | | X | X | XX | | XX | | | | | XX | |
| | | 523770 | 13 | 40 | | | | XX | | XX | | | | | XX | |
| | | 523771 | 14 | 30 | | X | X | XX | | XX | | X | X | | XX | CDOM broken |
| | | 523772 | 15 | 30 | | | | | | | | | | | | |
| | | 523773 | 16 | 20 | | | | XX | | XX | | | | | XX | |
| | | 523774 | 17 | 20 | | | | | | | | | | | | |
| | | 523775 | 18 | 20 | | | | | | | | | | | | |
| | | 523776 | 19 | 10 | XX | X | X | XX | X | XX | | | | | XX | |
| | | 523777 | 20 | 1 | | X | X | XX | | XX | XX | X | X | | XX | CDOM broken |
| | | 523778 | 21 | 1 | | | | | | | | | | | | Extra bottle |
| | | 523779 | 22 | 1 | | | | | | | | | | | | |
| | | 523780 | 23 | 1 | | | | | | | | | | | | |
| | | 523782 | 1 | BTM | XX | | | XX | X | XX | | | | | | |
| | | 523783 | 2 | 50 | | | | XX | | XX | | | | | | |
| | | 523784 | 3 | 40 | | | | XX | | XX | | | | | | |
| | | 523785 | 4 | 30 | | | | XX | | XX | | | | | | |

Table D.1. *(continued)*

| | |
|---|---|
| 523786 | 5 |
| | 20 |
| | XX |
| | XX |
| 523787 | 6 |
| | 10 |
| | X |
| | XX |
| | X |
| | XX |

Table D.1. *(continued)*

| Station | Event | SAMPLE ID | Niskin # | Nom. Depth (m) | O2 | pCO2 | TIC/ TA | NUTS | SAL | CHL | POC/ PON | HPLC | ABS | CDOM | CYTO | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LL_06 | 095 | 523788 | 7 | 1 | | | | XX | | XX | XX | X | X | | | CDOM broken |
| | | 523789 | 8 | 1 | | | | | | | | | | | | Extra bottle |
| LL_05 | 097 | 523791 | 1 | BTM | X | X | X | XX | X | XX | | | | | | |
| | | 523792 | 2 | 100 | | X | X | XX | | XX | | | | | | |
| | | 523793 | 3 | 80 | | | | XX | | XX | | | | | | |
| | | 523794 | 4 | 60 | | | | XX | | XX | | | | | | |
| | | 523795 | 5 | 50 | | X | X | XX | | XX | | | | | | |
| | | 523796 | 6 | 40 | | | | XX | | XX | | | | | | |
| | | 523797 | 7 | 30 | | | | XX | | XX | | X | X | X | | |
| | | 523798 | 8 | 30 | | X | X | | | | | | | | | |
| | | 523799 | 9 | 20 | | X | X | XX | | XX | | | | | | |
| | | 523800 | 10 | 10 | XX | X | X | XX | X | XX | | | | | | |
| | | 523801 | 11 | 1 | | X | X | XX | | XX | XX | X | X | X | | |
| | | 523802 | 12 | 1 | | | | | | | | | | | | Extra bottle |
| | | 523803 | 13 | 1 | | | | | | | | | | | | |
| LL_04 | 099 | 523805 | 1 | BTM | XX | X | X | XX | X | | | | | | | |
| | | 523806 | 2 | 80 | | X | X | XX | | XX | | | | | XX | |
| | | 523807 | 3 | 80 | | | | | | | | | | | | |
| | | 523808 | 4 | 80 | | | | | | | | | | | | |
| | | 523809 | 5 | 60 | | | | XX | | XX | | | | | XX | |
| | | 523810 | 6 | 50 | | X | X | XX | | XX | | | | | XX | |
| | | 523811 | 7 | 40 | | | | XX | | XX | | | | | XX | |
| | | 523812 | 8 | 40 | | | | | | | | | | | | |
| | | 523813 | 9 | 40 | | | | | | | | | | | | |
| | | 523814 | 10 | 30 | | X | X | XX | | XX | | | | | XX | |
| | | 523815 | 11 | 20 | | X | X | XX | | XX | | | | | XX | |
| | | 523816 | 12 | 20 | | | | | | | | | | | | |
| | | 523817 | 13 | 20 | | | | | | | | | | | | |
| | | 523818 | 14 | 10 | X | X | X | XX | X | XX | | | | | XX | |
| | | 523819 | 15 | 1 | | X | X | XX | | XX | XX | X | X | X | XX | |
| | | 523820 | 16 | 1 | | | | | | | | | | | | Extra bottle |
| | | 523821 | 17 | 1 | | | | | | | | | | | | |
| | | 523822 | 18 | 1 | | | | | | | | | | | | |
| | | 523824 | 1 | BTM | X | X | X | XX | X | | | | | | | |
| | | 523825 | 2 | 100 | | X | X | XX | | XX | | | | | | |

Table D.1. *(continued)*

| Station | Event | SAMPLE ID | Niskin # | Nom. Depth (m) | O2 | pCO2 | TIC/ TA | NUTS | SAL | CHL | POC/ PON | HPLC | ABS | CDOM | CYTO | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 523826 | 3 | 80 | | | | XX | | XX | | | | | | |
| | | 523827 | 4 | 60 | | | | XX | | XX | | | | | | |
| | | 523828 | 5 | 50 | | X | X | XX | | XX | | | | | | |
| LL_03 | 101 | 523829 | 6 | 40 | | | | XX | | XX | | | | | | |
| | | 523830 | 7 | 30 | | X | X | XX | | XX | | X | X | X | | |
| | | 523831 | 8 | 20 | | X | X | XX | | XX | | | | | | |
| | | 523832 | 9 | 10 | XX | X | X | XX | X | XX | | | | | | |
| | | 523833 | 10 | 1 | | X | X | XX | | XX | XX | X | X | X | | |
| | | 523834 | 11 | 1 | | | | | | | | | | | | Extra bottle |
| | | 523836 | 1 | BTM | XX | X | X | XX | X | | | | | | | |
| | | 523837 | 2 | 100 | | X | X | XX | | XX | | | | | | |
| | | 523838 | 3 | 80 | | | | XX | | XX | | | | | | |
| | | 523839 | 4 | 60 | | | | XX | | XX | | | | | | |
| | | 523840 | 5 | 50 | | X | X | XX | | XX | | | | | | |
| LL_02 | 103 | [illegible] | 6 | 40 | | | | XX | | XX | | | | | | |
| | | 523842 | 7 | 30 | | X | X | XX | | XX | | | | | | |
| | | 523843 | 8 | 20 | | X | X | XX | | XX | | | | | | |
| | | 523844 | 9 | 10 | X | X | X | XX | X | XX | | | | | | |
| | | 523845 | 10 | 1 | | X | X | XX | | XX | XX | X | X | X | | |
| | | 523846 | 11 | 1 | | | | | | | | | | | | Extra bottle |
| | | 523847 | 12 | 1 | | | | | | | | | | | | |
| | | 523849 | 1 | BTM | X | X | X | XX | X | XX | | | | | XX | |
| | | 523850 | 2 | 80 | | | | XX | | XX | | | | | XX | |
| | | 523851 | 3 | 60 | | | | XX | | XX | | | | | XX | |
| | | 523852 | 4 | 60 | | | | | | | | | | | | |
| | | 523853 | 5 | 60 | | | | | | | | | | | | |
| | | 523854 | 6 | 50 | | X | X | XX | | XX | | | | | XX | |
| | | 523855 | 7 | 40 | | | | XX | | XX | | | | | XX | |
| | | 523856 | 8 | 40 | | | | | | | | | | | | |
| | | 523857 | 9 | 40 | | | | | | | | | | | | |
| | | 523858 | 10 | 30 | | X | X | XX | | XX | | X | X | X | XX | |
| | | 523859 | 11 | 30 | | | | | | | | | | | | |
| | | 523860 | 12 | 20 | | X | X | XX | | XX | | | | | XX | |
| | | 523861 | 13 | 20 | | | | | | | | | | | | |
| | | 523862 | 14 | 20 | | | | | | | | | | | | |
| | | 523863 | 15 | 10 | XX | X | X | XX | X | XX | | | | | XX | |

Table D.1. *(continued)*

| Station | Event | SAMPLE ID | Niskin # | Nom. Depth (m) | O2 | pCO2 | TIC/ TA | NUTS | SAL | CHL | POC/ PON | HPLC | ABS | CDOM | CYTO | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 523864 | 16 | 1 | | X | X | XX | | XX | XX | X | X | X | XX | |
| | | 523865 | 17 | 1 | | | | | | | | | | | | Extra bottle |
| | | 523866 | 18 | 1 | | | | | | | | | | | | |
| | | 523867 | 19 | 1 | | | | | | | | | | | | |
| | | 523869 | 1 | BTM | X | X | X | XX | X | XX | | | | | XX | |
| | | 523870 | 2 | 60 | | | | XX | | XX | | | | | XX | |
| | | 523871 | 3 | 60 | | | | | | | | | | | | |
| | | 523872 | 4 | 60 | | | | | | | | | | | | |
| | | 523873 | 5 | 50 | | X | X | XX | | XX | | | | | XX | |
| | | 523874 | 6 | 40 | | | | XX | | XX | | | | | XX | |
| | | 523875 | 7 | 40 | | | | | | | | | | | | |
| | | 523876 | 8 | 40 | | | | | | | | | | | | |
| CSL_01 | 107 | 523877 | 9 | 30 | | X | X | XX | | XX | | X | X | | XX | CDOM broken |
| | | 523878 | 10 | 30 | | | | | | | | | | | | |
| | | 523879 | 11 | 20 | | X | X | XX | | XX | | | | | XX | |
| | | 523880 | 12 | 20 | | | | | | | | | | | | |
| | | 523881 | 13 | 20 | | | | | | | | | | | | |
| | | 523882 | 14 | 10 | XX | X | X | XX | X | XX | | | | | XX | |
| | | 523883 | 15 | 1 | | X | X | XX | | XX | XX | X | X | | XX | CDOM broken |
| | | 523884 | 16 | 1 | | | | | | | | | | | | Extra bottle |
| | | 523885 | 17 | 1 | | | | | | | | | | | | |
| | | 523886 | 18 | 1 | | | | | | | | | | | | |
| | | 523888 | 1 | BTM | XX | X | X | XX | X | | | | | | | |
| | | 523889 | 2 | 150 | | X | X | XX | | | | | | | | |
| | | 523890 | 3 | 100 | | X | X | XX | | XX | | | | | | |
| | | 523891 | 4 | 80 | | | | XX | | XX | | | | | | |
| | | 523892 | 5 | 60 | | | | XX | | XX | | | | | | |
| CSL_02 | 109 | 523893 | 6 | 50 | | X | X | XX | | XX | | | | | | |
| | | 523894 | 7 | 40 | | | | XX | | XX | | | | | | |
| | | 523895 | 8 | 30 | | X | X | XX | | XX | | | | | | |
| | | 523896 | 9 | 20 | | X | X | XX | | XX | | | | | | |
| | | 523897 | 10 | 10 | X | X | X | XX | X | XX | | | | | | |
| | | 523898 | 11 | 1 | | X | X | XX | | XX | XX | X | X | X | | |
| | | 523899 | 12 | 1 | | | | | | | | | | | | Extra bottle |
| | | 523901 | 1 | BTM | X | X | X | XX | X | | | | | | | |

Table D.1. *(continued)*

| Station | Event | SAMPLE ID | Niskin # | Nom. Depth (m) | O2 | pCO2 | TIC/ TA | NUTS | SAL | CHL | POC/ PON | HPLC | ABS | CDOM | CYTO | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 523902 | 2 | 250 | X | X | X | XX | X | | | | | | | |
| | | 523903 | 3 | 200 | | X | X | XX | | | | | | | | |
| | | 523904 | 4 | 150 | | X | X | XX | | | | | | | | |
| | | 523905 | 5 | 100 | | X | X | XX | | XX | | | | | XX | |
| | | 523906 | 6 | 80 | | | | XX | | XX | | | | | XX | |
| | | 523907 | 7 | 60 | | | | XX | | XX | | | | | XX | |
| CSL_03 | 111 | [illegible] | 8 | 50 | | X | X | XX | | XX | | | | | XX | |
| | | 523909 | 9 | 40 | | | | XX | | XX | | | | | XX | |
| | | 523910 | 10 | 30 | | X | X | XX | | XX | | X | X | X | XX | |
| | | 523911 | 11 | 30 | | | | | | | | | | | | |
| | | 523912 | 12 | 20 | | X | X | XX | | XX | | | | | XX | |
| | | 523913 | 13 | 10 | XX | X | X | XX | X | XX | | | | | XX | |
| | | 523914 | 14 | 1 | | X | X | XX | | XX | XX | X | X | X | XX | |
| | | 523915 | 15 | 1 | | | | | | | | | | | | Extra bottle |
| | | 523916 | 16 | 1 | | | | | | | | | | | | |
| | | 523918 | 1 | BTM | XX | X | X | XX | X | | | | | | | |
| | | 523919 | 2 | BTM | | | | | | | | | | | | |
| | | 523920 | 3 | 300 | | X | X | XX | | | | | | | | Misfire |
| | | 523921 | 4 | 300 | | | | | | | | | | | | |
| | | 523922 | 5 | 250 | X | X | X | XX | X | | | | | | | |
| | | 523923 | 6 | 200 | | X | X | XX | | | | | | | | |
| | | 523924 | 7 | 150 | | X | X | XX | | | | | | | | |
| | | 523925 | 8 | 100 | | X | X | XX | | XX | | | | | XX | |
| | | 523926 | 9 | 80 | | | | XX | | XX | | | | | XX | |
| | | 523927 | 10 | 80 | | | | | | | | | | | | |
| | | 523928 | 11 | 80 | | | | | | | | | | | | |
| | | 523929 | 12 | 60 | | | | XX | | XX | | | | | XX | |
| | | 523930 | 13 | 60 | | | | | | | | | | | | |
| | | 523931 | 14 | 60 | | | | | | | | | | | | |
| | | 523932 | 15 | 50 | | X | X | XX | | XX | | | | | XX | |
| | | 523933 | 16 | 40 | | | | XX | | XX | | | | | XX | |
| | | 523934 | 17 | 30 | | X | X | XX | | XX | | | | | XX | |
| | | 523935 | 18 | 20 | | X | X | XX | | XX | | | | | XX | |
| | | 523936 | 19 | 20 | | | | | | | | | | | | |
| | | 523937 | 20 | 20 | | | | | | | | | | | | |
| | | 523938 | 21 | 10 | X | X | X | XX | X | XX | | | | | XX | |

Table D.1. *(continued)*

| Station | Event | SAMPLE ID | Niskin # | Nom. Depth (m) | O2 | pCO2 | TIC/ TA | NUTS | SAL | CHL | POC/ PON | HPLC | ABS | CDOM | CYTO | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 523939 | 22 | 1 | | X | X | XX | | XX | XX | X | X | | XX | CDOM broken |
| | | 523940 | 23 | 1 | | | | | | | | | | | | |
| | | 523941 | 24 | 1 | | | | | | | | | | | | |
| | | 523943 | 1 | BTM | X | X | X | XX | X | | | | | | | |
| | | 523944 | 2 | 300 | | X | X | XX | | | | | | | | |
| | | 523945 | 3 | 250 | X | X | X | XX | X | | | | | | | |
| | | 523946 | 4 | 200 | | X | X | XX | | | | | | | | |
| | | 523947 | 5 | 150 | | X | X | XX | | | | | | | | |
| | | 523948 | 6 | 100 | | X | X | XX | | XX | | | | | | |
| | | 523949 | 7 | 80 | | | | XX | | XX | | | | | | |
| | | 523950 | 8 | 60 | | | | XX | | XX | | | | | | |
| CSL_05 | 115 | 523951 | 9 | 50 | | X | X | XX | | XX | | | | | | |
| | | 523952 | 10 | 40 | | | | XX | | XX | | | | | | |
| | | 523953 | 11 | 30 | | X | X | XX | | XX | | X | X | X | | |
| | | 523954 | 12 | 30 | | | | | | | | | | | | |
| | | 523955 | 13 | 20 | | X | X | XX | | XX | | | | | | |
| | | 523956 | 14 | 10 | XX | X | X | XX | X | XX | | | | | | |
| | | 523957 | 15 | 1 | | X | X | XX | | XX | XX | X | X | X | | |
| | | 523958 | 16 | 1 | | | | | | | | | | | | Extra bottle |
| | | 523959 | 17 | 1 | | | | | | | | | | | | |
| | | 523961 | 1 | BTM | XX | X | X | XX | X | | | | | | | |
| | | 523962 | 2 | 200 | | X | X | XX | | | | | | | | |
| | | 523963 | 3 | 200 | | | | | | | | | | | | |
| | | 523964 | 4 | 200 | | | | | | | | | | | | |
| | | 523965 | 5 | 150 | | X | X | XX | | | | | | | | |
| | | 523966 | 6 | 100 | | X | X | XX | | XX | | | | | XX | |
| | | 523967 | 7 | 80 | | | | XX | | XX | | | | | XX | |
| | | 523968 | 8 | 60 | | | | XX | | XX | | | | | XX | |
| | | 523969 | 9 | 60 | | | | | | | | | | | | |
| | | 523970 | 10 | 60 | | | | | | | | | | | | |
| | | 523971 | 11 | 50 | | X | X | XX | | XX | | | | | XX | |
| | | 523972 | 12 | 40 | | | | XX | | XX | | | | | XX | |
| | | 523973 | 13 | 30 | | X | X | XX | | XX | | | | | XX | |
| | | 523974 | 14 | 20 | | X | X | XX | | XX | | | | | XX | |
| | | 523975 | 15 | 20 | | | | | | | | | | | | |
| | | 523976 | 16 | 20 | | | | | | | | | | | | |

Table D.1. *(continued)*

| Station | Event | SAMPLE ID | Niskin # | Nom. Depth (m) | O2 | pCO2 | TIC/ TA | NUTS | SAL | CHL | POC/ PON | HPLC | ABS | CDOM | CYTO | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 523977 | 17 | 10 | X | X | X | XX | X | XX | | | | | XX | |
| | | 523978 | 18 | 1 | | X | X | XX | | XX | XX | X | X | X | XX | |
| | | 523979 | 19 | 1 | | | | | | | | | | | | Extra bottle |
| | | 523980 | 20 | 1 | | | | | | | | | | | | |
| | | 523981 | 21 | 1 | | | | | | | | | | | | |
| | | 523983 | 1 | BTM | XX | | | XX | X | | | | | | | |
| | | 523984 | 2 | 300 | | | | XX | | | | | | | | |
| | | 523985 | 3 | 300 | | | | | | | | | | | | |
| | | 523986 | 4 | 300 | | | | | | | | | | | | |
| | | 523987 | 5 | 200 | | | | XX | | | | | | | | |
| | | 523988 | 6 | 150 | | | | XX | | | | | | | | |
| | | 523989 | 7 | 100 | | | | XX | | XX | | | | | | |
| | | 523990 | 8 | 80 | | | | XX | | XX | | | | | | |
| | | 523991 | 9 | 80 | | | | | | | | | | | | |
| | | 523992 | 10 | 80 | | | | | | | | | | | | |
| STAB_06 | 120 | 523993 | 11 | 60 | | | | XX | | XX | | | | | | |
| | | 523994 | 12 | 50 | | | | XX | | XX | | | | | | |
| | | 523995 | 13 | 40 | | | | XX | | XX | | | | | | |
| | | 523996 | 14 | 30 | | | | XX | | XX | | | | | | |
| | | 523997 | 15 | 20 | | | | XX | | XX | | | | | | |
| | | 523998 | 16 | 20 | | | | | | | | | | | | |
| | | 523999 | 17 | 20 | | | | | | | | | | | | |
| | | 524000 | 18 | 10 | X | | | XX | X | XX | | | | | | |
| | | 524001 | 19 | 1 | | | | XX | | XX | XX | X | X | X | | |
| | | 524002 | 20 | 1 | | | | | | | | | | | | Extra bottle |
| | | 524003 | 21 | 1 | | | | | | | | | | | | |
| | | 524004 | 22 | 1 | | | | | | | | | | | | |
| | | 524006 | 1 | BTM | X | X | X | XX | X | | | | | | | |
| | | 524007 | 2 | 300 | | | | XX | | | | | | | | |
| | | 524008 | 3 | 300 | | | | | | | | | | | | |
| | | 524009 | 4 | 300 | | | | | | | | | | | | |
| | | 524010 | 5 | 200 | | | | XX | | | | | | | | |
| | | 524011 | 6 | 150 | | | | XX | | | | | | | | |

Table D.1. *(continued)*

| Station | Event | SAMPLE ID | Niskin # | Nom. Depth (m) | O2 | pCO2 | TIC/ TA | NUTS | SAL | CHL | POC/ PON | HPLC | ABS | CDOM | CYTO | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 524012 | 7 | 100 | | X | X | XX | | XX | | | | | | Nutrient samples missing (LB: June 10, 2026) |
| | | 524013 | 8 | 80 | | | | XX | | XX | | | | | | |
| | | 524014 | 9 | 80 | | | | | | | | | | | | |
| | | 524015 | 10 | 80 | | | | | | | | | | | | |
| STAB_05 | 122 | 524016 | 11 | 60 | | | | XX | | XX | | | | | | |
| | | 524017 | 12 | 50 | | | | XX | | XX | | | | | | |
| | | 524018 | 13 | 40 | | | | XX | | XX | | | | | | |
| | | 524019 | 14 | 30 | | | | XX | | XX | | | | | | |
| | | 524020 | 15 | 20 | | | | XX | | XX | | | | | | |
| | | 524021 | 16 | 20 | | | | | | | | | | | | |
| | | 524022 | 17 | 20 | | | | | | | | | | | | |
| | | 524023 | 18 | 10 | XX | | | XX | X | XX | | | | | | |
| | | 524024 | 19 | 1 | | | | XX | | XX | XX | X | X | | | CDOM broken |
| | | 524025 | 20 | 1 | | | | | | | | | | | | Extra bottle |
| | | 524026 | 21 | 1 | | | | | | | | | | | | |
| | | 524027 | 22 | 1 | | | | | | | | | | | | |
| | | 524029 | 1 | BTM | XX | | | XX | X | | | | | | | |
| | | 524030 | 2 | 100 | | | | XX | | XX | | | | | | |
| | | 524031 | 3 | 80 | | | | XX | | XX | | | | | | |
| | | 524032 | 4 | 60 | | | | XX | | XX | | | | | | |
| | | 524033 | 5 | 50 | | | | XX | | XX | | | | | | |
| STAB_04 | 124 | 524034 | 6 | 40 | | | | XX | | XX | | | | | | |
| | | 524035 | 7 | 30 | | | | XX | | XX | | | | | | |
| | | 524036 | 8 | 20 | | | | XX | | XX | | | | | | |
| | | 524037 | 9 | 10 | X | | | XX | X | XX | | | | | | |
| | | 524038 | 10 | 1 | | | | XX | | XX | XX | X | X | X | | |
| | | 524039 | 11 | 1 | | | | | | | | | | | | Extra bottle |
| | | 524042 | 1 | BTM | X | X | X | XX | X | XX | | | | | | |
| | | 524043 | 2 | BTM | | | | | | | | | | | | |
| | | 524044 | 3 | 60 | | | | XX | | XX | | | | | | |
| | | 524045 | 4 | 50 | | | | XX | | XX | | | | | | |
| | | 524046 | 5 | 40 | | | | XX | | XX | | | | | | |

Table D.1. *(continued)*

| | | | | | |
|---|---|---|---|---|---|
| 524047 | 6 | 30 | | XX | XX |

Table D.1. *(continued)*

| Station | Event | SAMPLE ID | Niskin # | Nom. Depth (m) | O2 | pCO2 | TIC/ TA | NUTS | SAL | CHL | POC/ PON | HPLC | ABS | CDOM | CYTO | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| STAB_03 | 127 | 524048 | 7 | 20 | | | | XX | | XX | | | | | | |
| | | 524049 | 8 | 20 | | | | | | | | | | | | |
| | | 524050 | 9 | 10 | XX | | | XX | X | XX | | | | | | |
| | | 524051 | 10 | 1 | | X | X | XX | | XX | XX | X | X | X | | |
| | | 524052 | 11 | 1 | | | | | | | | | | | | |
| | | 524053 | 12 | 1 | | | | | | | | | | | | Extra bottle |
| STAB_02 | 129 | 524055 | 1 | BTM | XX | | | XX | X | XX | | | | | | |
| | | 524056 | 2 | 50 | | | | XX | | XX | | | | | | |
| | | 524057 | 3 | 40 | | | | XX | | XX | | | | | | |
| | | 524058 | 4 | 30 | | | | XX | | XX | | | | | | |
| | | 524059 | 5 | 20 | | | | XX | | XX | | | | | | |
| | | 524060 | 6 | 10 | X | | | XX | X | XX | | | | | | |
| | | 524061 | 7 | 1 | | | | XX | | XX | XX | X | X | X | | |
| | | 524062 | 8 | 1 | | | | | | | | | | | | Extra bottle |
| STAB_01 | 131 | 524064 | 1 | BTM | X | X | X | XX | X | XX | | | | | | |
| | | 524065 | 2 | 40 | | | | XX | | XX | | | | | | |
| | | 524066 | 3 | 40 | | | | | | | | | | | | |
| | | 524067 | 4 | 40 | | | | | | | | | | | | |
| | | 524068 | 5 | 30 | | | | XX | | XX | | | | | | |
| | | 524069 | 6 | 20 | | | | XX | | XX | | | | | | |
| | | 524070 | 7 | 10 | XX | | | XX | X | XX | | | | | | |
| | | 524071 | 8 | 1 | | | | XX | | XX | XX | X | X | X | | |
| | | 524072 | 9 | 1 | | | | | | | | | | | | Extra bottle |
| | | 524073 | 10 | 1 | | | | | | | | | | | | |
| | | 524074 | 11 | 1 | | | | | | | | | | | | |