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### **Summary of the 2017 and 2018 snow crab bottom trawl survey activities in the southern Gulf of St. Lawrence**

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## Foreword

This series documents the scientific basis for the evaluation of aquatic resources and ecosystems in Canada. As such, it addresses the issues of the day in the time frames required and the documents it contains are not intended as definitive statements on the subjects addressed but rather as progress reports on ongoing investigations.

Research documents are produced in the official language in which they are provided to the Secretariat.

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## ABSTRACT

The present document summarizes the details of the 2017 and 2018 snow crab bottom trawl surveys conducted in the southern Gulf of St. Lawrence (sGSL). Details of survey protocols and activities, tow characteristics and information on snow crab catches and by-catch species are included. The primary objective of these surveys is to provide data on abundance and distribution of snow crab and other by-catch species. In-depth analysis results of the survey data are presented in the assessment document. The surveys were conducted from July to September using a chartered commercial fishing vessel, the "*Jean Mathieu*". A total of 355 grids were visited and 353 and 354 grids were successfully sampled in 2017 and 2018, respectively. The total duration of the 2017 survey was 75 days with 42 days at sea while the 2018 survey lasted 60 days with 41 days at sea. Total number of adult male crab catches increased from 4,995 in 2017 to 5,439 in 2018 whereas catches of commercial-male crabs increased from 2,001 to 2,441. For adult females, the total number of crabs slightly decreased from 8,819 in 2017 to 8,802 in 2018. Recorded by-catch during the 2017 and 2018 surveys consisted of 76 and 78 species/groups that comprised of 48 fish and 28 and 30 invertebrates, respectively.

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## INTRODUCTION

The southern Gulf of St. Lawrence (sGSL) snow crab fishery, made up of fishermen from the Maritime Provinces and Quebec, began in the mid-1960s and entered a development phase in the 1970s. From initially modest landings, record catches were landed in the early 1980s (Hébert et al. 2016a). During this period, the status of this snow crab stock was poorly understood and the analysis was mostly based on fishery data. In 1989, the Area 12 fishery was closed prematurely due to a rapid decline in catch rates associated with a high incidence of soft-shelled crabs. Subsequently, new management measures were introduced in 1990.

One such measure was to set the total allowable catch (TAC) based on a trawl survey estimate of commercial biomass. This fishery independent survey uses a modified Nephrops-type trawl, used to fish Norway lobster in Europe, which has a footrope that digs into soft sediment and has a high catchability for snow crab. A 40 mm liner in the cod-end ensures that the wide range of snow crab sizes is caught. This survey is conducted annually and is the main assessment tool for determining the population status and dynamics. It provides indices of future recruitment to the fishery, spawning stock size, natural mortality, molting cycles and relative exploitation rates.

From its inception in 1988, the survey area has been modified and expanded to include most of the sGSL snow crab habitat. In 1988, the survey area only covered the boundaries of the commercial fishery in snow crab fishing area 12. The survey was expanded to include Area 19 in 1990 and Areas 12E and 12F in 1997. In Areas 12, 12E and 12F, the survey was conducted after the fishing season, which usually opened in late April and finished by mid-July. The trawl survey normally starts in early to mid-July and ends in September or October. In Area 19, the survey was conducted between the spring and summer fishing seasons between 1990 and 1992. Since 1993, the snow crab fishery in Area 19 only occurs in the summer and the survey is conducted after the fishery. Further details of these survey design changes are provided by Moriyasu et al. (2008).

Since 2013, the survey has been financed by a collaborative agreement under Section 10 with the snow crab industry of the southern Gulf of St. Lawrence.

The present document summarizes the 2017 and 2018 survey activities of the directed snow crab bottom trawl survey of the southern Gulf of St. Lawrence. The information includes survey protocols, characteristics of each tow, and catches of snow crab and by-catch species.

## SURVEY DESIGN AND PROTOCOL

### STATISTICAL DESIGN

The survey follows a grid sampling design with random assignment of sampling stations within each grid (Moriyasu et al. 1998). The spatial sampling design from 1988 to 2011 used 10 x 10 minute (latitude-longitude) grids overlaying the survey area, with one or more random sampling locations in each grid. The locations of the stations remained generally fixed from year to year, though a major spatial redistribution of stations occurred in 2006. Locations which were deemed too difficult to trawl were reassigned to new random sampling locations within the same grid. Further stations were added in an ad hoc manner to increase the precision of biomass estimates in smaller fishing areas (Areas 19, 12E, 12F and Chaleur Bay) or as the survey expanded.

In 2006, the sampling design was modified in accordance with recommendations from the 2005 Assessment Framework Workshop on the sGSL snow crab (DFO, 2006; Moriyasu et al. 2008). The new design was introduced to increase spatial sampling homogeneity while keeping within

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the 10 x 10 minute spatial grid scheme. The updated survey design was spatially unbiased in the sense that the expected number of stations per 10 x 10 minute grid was proportional to its surface area. This implies that in practice the actual number of stations per grid was either one or two stations, and grids along the survey area margins often had zero stations. Past survey stations were retained as much as possible, but others were redistributed to other grids as prescribed by the sampling method (Moriyasu et al. 2008).

In 2012, the sampling design was again modified following recommendations from the 2011 Snow Crab Assessment Methods Framework Science Review (DFO 2012). The boundaries of the survey area were extended to the 20 and 200 fathom isobaths, which encompass the vast majority of favorable snow crab habitat (i.e. bottom temperatures between -1°C and 3°C) and better represented the sGSL snow crab biological unit. To further improve spatial homogeneity, grids were set to be square rather than rectangular with dimensions defined as a function of the number of total samples, so that each grid included only a single sampling station (DFO 2012). This protocol resulted in an entirely new set of sampling stations. The revised survey sampling design in 2012 is presented in Wade et al. (2014).

For 2013, the number of stations increased from 325 to 355 following recommendations from the snow crab advisory committee to increase the precision of the biomass estimates in smaller fishing zones. The survey area was partitioned into square grids and a new set of sampling stations was generated. Since 2014, the number of sampling stations has remained at 355 and the sampling locations within each grid have been fixed from year to year, with exception to adjustments for untrawlable areas.

## **SURVEY PROTOCOL**

The survey protocol (sampling grid setting, target number of stations, and their locations) was similar for the years 2013 to 2018 (DFO 2012; Hébert et al. 2018). The survey spatial sampling design is based on a survey area partitioned into 355 square grids of 12.7 km x 12.7 km (Figure 1). In each grid identified for sampling, a primary station (P) and three alternate stations (A1 to A3) are defined; the alternate stations are defined in case the primary station cannot be trawled and are randomly chosen prior to the survey. If the trawl net becomes damaged while fishing and the station is considered unsuccessful by the onboard biologist, a tow at the first alternate sampling station (A1) within the same grid is conducted. If the tow is considered unsuccessful at the first alternate station (A1), another tow is conducted at the second alternate station (A2), and up to the third alternate station (A3). If the primary (P) and the three alternate stations (A1 to A3) within a given grid are considered unsuccessful, the grid is abandoned and no further tows are undertaken in this grid. Unsuccessful tows are defined as torn or damaged nets resulting in loss of specimens. Uncompleted tows due to the weather or sea conditions are not considered as unsuccessful and are revisited later.

If a primary station is deemed unsuccessful and one of the alternate stations (A1, A2 or A3) of that grid is successfully trawled, the first successful alternate station is used as the primary station for the following survey year. For an abandoned grid, new primary and alternate stations are generated randomly for the upcoming survey.

In 2016, 35 grids were successful at alternate stations (A1, A2 or A3); therefore, these stations were used as primary stations for the 2017 survey. Additionally, new station positions were generated for one grid that was abandoned in 2016. For grid GP319 in Area 19, an alternate station had been successfully trawled in 2015. However, following a catch of more than 1,000 lobsters at this alternate station, this station was not retained and sampling at the original primary station was conducted in 2016 and 2017.

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In 2017, 31 grids were successful at alternate stations (A1, A2 or A3); therefore, these stations were used as primary stations for the 2018 survey. Additionally, stations for two grids were generated randomly for 2018 to replace the stations for the two grids abandoned in 2017.

Trawling was completed during civil twilight time (civil twilight begins prior to sunrise when the geometric center of the sun reaches 6° below the horizon and ends when the geometric center of the sun reaches 6° below the horizon after sunset). There is enough light from the sun during this period that artificial sources of light is not needed to complete outdoor activities. This usually occurs approximately 30 minutes earlier and later than sunrise and sunset, respectively.

The sampling protocol calls for the survey to be postponed in the event of adverse weather conditions: winds above 20 to 25 knots or sea conditions that may hinder the proper boat maneuverability or trawling operations.

## **TRAWL MENSURATION DATA**

Standard tows were made using a *Nephrops* trawl at a speed of 2 knots with a target duration of five minutes, based on the time the trawl touches the sea floor as determined by the output of the trawl hydro acoustic monitoring system (Moriyasu et al. 2008).

Snow crab catches are standardized by the swept area of the trawl, i.e. the area covered by the trawl between the time it first touches the bottom (touchdown time) and the time when active trawling stops, i.e. the engine throttle is cut and hauling of the net begins. A set of hydro acoustic sensors (eSonar®) provide information about the trawl geometry, including the width of the trawl which is also used to calculate swept area. These sensors allow for real-time monitoring of the performance of each tow and have been in use since 2013. The sensor configuration on the trawl is shown in Figure 2. The width of the trawl is estimated from the wing spread of the trawl, measured using a pair of distance sensors and mounted slightly behind the wing to provide basic protection. A single sensor, mounted on the headline, measures the vertical trawl opening, i.e. the distance from the headline to the sea bottom. Similarly, a sensor mounted at the midpoint of the headline measures the depth of the trawl. These data are recorded at approximately 7-second intervals. Floats are attached to counteract the negative buoyancy of the sensor and to avoid distortion of the headline. Detailed methodology for estimating the swept surface from wing spread observations are provided by Moriyasu et al. (2008).

It was realized about halfway through the 2017 survey that the number of sensor observations being recorded was about half of that observed in 2014 and 2015. Furthermore, the signal strength was found to be weak in 2016 and more so in 2017. The crew promptly had divers clean the transponder and the signal strength then returned to 2014-2015 levels. Due to this issue, the chief scientist's ability to accurately determine the trawl touchdown time was reduced in the affected tows. Although these tows are considered successful,, the touchdown is re-estimated after the survey using Vemco® Minilog depth profile sensors. The determination of the swept area for these tows is estimated by the mean swept area of the 10 nearest tows with valid swept area estimates. The proportion of tows whose swept area was the average of those of surrounding tows increased to 52 for 2017 versus 27 in 2016. In 2018, despite having the sensors cleaned prior to the survey, the number of tows with inadequate door spread and data remained high at 53 tows. Almost one-third (16) of these tows were at depths greater than 250 m where no commercial crabs were caught. By their nature, acoustic data are noisy and thus the rate and quality of valid observations vary by bottom type, depth, and terrain profiles.

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## **Vemco ® Minilog and Star-Oddi® probes**

Environmental variables during trawling were obtained using two types of probes: Vemco ® Minilog depth and temperature probes which have been in use since the mid-1990s and newer Star-Oddi® probes which have been used since 2014. The latter have more precise depth measurements (TD) while the TDT type can also determine the tilt angle of the probe which, when combined with a suitable casing, provides an important net tilting information in determining the trawl touchdown time. The data recorded by these probes is only recovered after the trawl is hauled on deck.

The Vemco® Minilog probe is attached to the headline of the trawl (Figure 2). The depth profile data from this probe, gathered at one second intervals, is currently used to revise trawl touchdown times after the survey. Survey bottom temperatures are also determined from this probe. The favoured use of this probe rather than more modern alternatives is done in order to maintain comparability of analyses among survey years. In the meantime, Star-Oddi probes, which are slated as replacements once Minilog probes are phased out and that appropriate conversions between the two probe types has been performed, provide auxiliary information as to water temperatures, and trawl touchdown times. A Star-Oddi temperature/depth (TD) probe is also placed alongside the Minilog probe on the headline. The Star-Oddi temperature/depth/tilt (TDT) probe is placed within the steel casing and attached directly onto the footrope of the trawl. As with the Minilog probe, sampling rate for Star-Oddi probes was set to one per second. The depth and tilt information from these probes are used to more accurately determine the trawl touchdown times.

## **OTHER ENVIRONMENTAL DATA COLLECTED**

At all visited sampling stations in 2017 in 2018, a vertical profile of the water column was made using a newer model of CTD (SeaBird 19 plus®) as a replacement of older model (SeaBird 19) to obtain information regarding water temperature, conductivity (salinity) and pressure (depth). The water temperatures are also measured with the Star-Oddi® sensors placed on both head and foot rope of the trawl net and with the Vemco® minilog probe placed on the head rope.

## **BIOLOGICAL DATA COLLECTED**

Catches for each successful tow are photographed and used to produce an image map of the sGSL (electronic copy available upon request). Species identifications were made based on taxonomic information in Scott and Scott (1988), Pohle (1990), Squires (1990), and Brunel et al. (1998). Although species identification other than snow crab were recorded since the first year of the survey, the protocol and effort put on other species have not been consistent over the years. In 2006, a more thorough collection of information on the count per species began and since 2010, size measurements of sub-sampled (maximum of 100 individuals per station) fish species from 100 randomly selected stations was conducted. All other catches were sorted by species or group of higher taxa, counted, and returned to the sea.

For every snow crab captured, detailed measurements included carapace width (CW), chela (claw) height (for males larger than 40mm CW only), carapace conditions (1-5: see Hébert et al. 2016a for details), gonad color (for all adolescent females only), egg color (for adult females only), missing legs, and presence/absence of diseases (i.e. chitinoclastic disease “cigarette burn”, bitter crab disease (BCD)) and morphological abnormalities (such as malformation of carapace and appendages).

Onboard measurements obtained from snow crab and other species were identical in 2017 and 2018. Since 2017, a colorimeter (Konica-Minolta CR-400 Chroma Meter) was used to help quantify the assessment of carapace condition by color variations. During the 2018 survey, a

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sub-sample (1,252) of male snow crab larger than 90 mm carapace width and of various carapace conditions were used to examine the feasibility of using a colorimeter onboard. The purpose of adding colorimeter measurements for carapace condition determination is to help validate qualitative shell condition observations that are currently being used.

## **SURVEY RESULTS**

Since 2013, the 3-year trawl survey contract has been issued to the vessel “*Jean-Mathieu*” and the 2018 season was the last year of the contract (Table 1). Historical information of the survey timing and duration are summarized in Figure 3.

The comparison of monthly patterns of the progress of the survey from the last four years (2015 to 2018) is presented in Figure 4. Similar to previous years, the survey began in Areas 12E and 12F and Area 12F was completed at the beginning of the survey. Furthermore, like previous years, Area 19 was completed during the last trip and in 2017 and 2018, this area was completed in September. As much as similar survey schedules are planned every year, the actual itineraries are often modified due to weather conditions, vessel maintenance or equipment damage such as ripped trawl nets.

## **SURVEY ACTIVITIES IN 2017**

### **Personnel and duties**

Capitaine Ghislain Bourgeois took command on “*Jean-Mathieu*” for the 2017 survey and was in charge of net repair. Five other crew members during the 2017 survey included: Tommy Turbide (net repair master, left door setting), Denis Bédard (winch operator, cook, net repairs), Denis Poirier (engineer, CTD casting, net repairs, right door setting), Denis Cormier (net repairs, helper in by-catch species measurements) and a new member for the 2017 survey, Paul-André Arseneau (net repairs, helper in by-catch species measurements).

Five employees (Marcel Hébert, Jean-Francois Landry, Pierre Degrâce, Réjean Vienneau and Murray McWilliams) from DFO Science participated in the 2017 survey; as such, there were always at least two DFO Science employees on board at any given time throughout the survey period.

One DFO Science member was responsible for the operation of the e-Sonar®, CTD data recording, colorimeter measurement (new for 2017), measurement of by-catch and determining the tow quality. The second DFO Science member was responsible for the measurement of crabs.

### **Survey itinerary**

The 2017 survey began on July 10 and ended on September 22, a total of 75 days. The starting date was the same as the 2015 and 2016 surveys while it ended 12 days and 22 days earlier than the 2016 and 2015 surveys, respectively. It took seven trips in 2017 (9 in 2016 and 8 in 2015) to complete the survey with individual trip duration varying from 4 to 11 days. The number of stations sampled per trip varied from 25 (trip 6) to 68 (trip 7) (Table 2a). Additional trip details are presented in Appendix 1. The start of the first and last tows of any given day began after morning civil twilight and before evening twilight time, respectively (Table 3a).

- Trip 1 (Appendix 1a): Departure from Souris (PE) on July 10 and trawling in the Area 12E and F as well as the Magdalen Trough. The vessel docked for net repairs in Magdalen Islands after 6 days of work at sea until the following departure on July 20. A total of 50 stations were successfully trawled.

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- Trip 2 (Appendix 1b): Departure from Souris (PE) on July 20 and trawling in areas which were closed due to the presence of North Atlantic Right Whales and south off of PEI since the Area 12 fishery was still open in other areas. A total of 60 stations were successfully trawled during that trip and the vessel docked in Caraquet (NB). One net was seriously damaged.
  - Trip 3 (Appendix 1c): Departure from Caraquet (NB) on August 1. Trawling was conducted in Chaleurs Bay and off Gaspé. After four days at sea, the vessel docked in Caraquet due to strong winds. A total of 43 stations were successfully trawled during this trip.
  - Trip 4 (Appendix 1d): Departure from Caraquet (NB) on August 8 and sampling mainly in Area 12E and return to the Magdalen Islands due to strong winds on August 13. A total of 44 stations were successfully trawled.
  - Trip 5 (Appendix 1e): Departure from Cheticamp (NS) on August 18 and trawling in Bradelle Bank and off Prince Edward Island. A total of 55 stations were successfully trawled during this trip. The vessel docked in the Magdalen Islands on August 28. Grid GP229 off Prince Edward Island was abandoned after 4 trials.
  - Trip 6 (Appendix 1f): Departure from the Magdalen Islands on September 6 and trawling off of St. George's Bay, the southern part of Magdalen Islands and off Prince Edward Island and a return to Magdalen Islands on September 10 due to strong winds. A total of 27 stations were successfully trawled during this trip. The trip was delayed for several days and shortened due to bad weather and rudder problems. One grid (GP212) west of the Magdalen Islands was abandoned after four unsuccessful trawling attempts.
  - Trip 7 (Appendix 1g): Departure from Magdalen Islands on September 12 and trawling in near Bradelle Bank and in Area 19. The survey was completed on September 22 and 74 successful tows were completed that trip, resulting in a total 353 successfully sampled stations in 2017.

In 2017, serious net damage which required repairs at the wharf occurred 13 times, compared to 24 and 30 times in 2016 and 2015, respectively. A total of 3 out of 7 nets were deemed to be unrepairable during the season, compared to 2 in 2016 and 3 in 2015.

## **SURVEY ACTIVITIES IN 2018**

### **Personnel and duties**

Capitaine Ghislain Bourgeois took command on "Jean-Mathieu" for the 2018 survey and was in charge of net repair. Five other crew members during the 2018 survey included: Tommy Turbide (net repair master, left door setting), Denis Bédard (winch operator, cook, net repairs), Denis Poirier (engineer, CTD casting, net repairs, right door setting), Denis Cormier (net repairs, helper in by-catch species measurements) and Paul-André Arseneau (net repairs, helper in by-catch species measurements).

Four employees from DFO Science (Marcel Hébert and Jean-Francois Landry (by-catch species identification and measurement, tow monitoring and recording), Murray McWilliams (snow crab identification and measurements) and Yves Larocque (data recorder)) participated in the 2018 survey; as such, there were always at least three DFO Science employees on board at any given time throughout the survey period.

### **Survey itinerary**

The 2018 survey began on July 19 and ended on September 16, a total of 60 days. The starting date was nine days later than in 2016 and 2017 but the survey was completed 6 days and 18

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days earlier than the 2017 and 2016 surveys, respectively. It took 5 trips in 2018, compared to 7 trips in 2017 and 9 trips in 2016, to complete the survey with each total trip duration varying from 7 to 10 days with the number of successful stations sampled varying from 58 (trip 1) to 84 (trip 2) (Table 2b). The start of the first and last tows of any given day began after morning civil twilight and before evening twilight time, respectively (Table 3b). Below is a brief summary of each trip. Additional trip details are presented in Appendix 2.

- Trip 1 (Appendix 2a): Departure from Cheticamp (NS) on July 18. Trawling was completed in the Areas 12E and F and the northernmost portion of Area 12. The vessel docked in Magdalen Islands after seven days of work at sea. A total of 58 stations were successfully trawled and two nets were damaged.
- Trip 2 (Appendix 2b): Departure from Magdalen Islands on July 30. Trawling was completed in areas around PEI and moving towards Miscou Island (NB). Station 150 (north of Stanhope, PE) was abandoned after four failed trawling attempts. In 2017, this grid was trawled four times before a successful tow was completed. A total of 84 stations were successfully trawled during this trip and the vessel docked in Caraquet (NB) after 9 days of work at sea. Three nets were seriously damaged.
- Trip 3 (Appendix 2c): Departure from Caraquet (NB) on August 13. Trawling was completed in Chaleurs Bay and south of the Area 12E border. A total of 77 stations were successfully trawled during this trip and the vessel docked in Magdalen Islands after nine days of work at sea. Two nets were seriously damaged during this trip.
- Trip 4 (Appendix 2d): Departure from Magdalen Islands on August 24. Trawling was completed in Bradelle Bank and the Magdalen Trough and in former Area 18/buffer zone. Trawling was delayed for three days (August 29 to 31) due to strong winds. A total of 71 stations were successfully trawled during this trip and the vessel docked in Cheticamp (NS) after seven days working at sea. Two nets were seriously damaged.
- Trip 5 (Appendix 2e): Departure from Cheticamp (NS) on September 7. Trawling was completed south of the Magdalen Trough, Cape Breton corridor and Area 19. A total of 64 stations were successfully trawled during this trip. Trawling was delayed for one day for transmission repairs. The vessel docked in Cheticamp (NS) after nine days working at sea. The 2018 survey was completed on September 16, the earliest finish date since the implementation of 355 stations in 2013. Two nets were seriously damaged during this trip.

In 2018, serious net damage which required repairs at the wharf occurred 11 times, compared to 13 and 24 times in 2017 and 2016, respectively. One of the 7 nets was deemed to be unrepairable during the season, compared to 3 in 2017 and 2 in 2016. Historical information of the survey timing and duration are summarized in Figure 4.

## **CHARACTERISTICS OF TOWS**

A summary of the characteristics of tows for the time series is presented in Tables 4 and 5, and Figure 5.

### **Characteristics of tows in 2017**

The details of each tow (date, fishing area, tow number, position, swept area estimation, depth, temperature, and station type (whether the station is primary or alternate) are summarized in Appendix 3.

In 2017, a total of 402 tows were attempted from which 51 were considered unsuccessful (Table 2a). The breakdown of tows by station type was: 355 tows at the primary station, 32 tows at the



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first alternate (A1) station, 10 tows at the second alternate (A2) station, and 6 tows at the third alternate (A3), and 2 grids were deemed not trawlable (Table 5). The two grids (GP212 and GP229) were abandoned after four trawling attempts: one at the primary station and the others at the three alternate stations. The percentage of unsuccessful tows for 2017 (12.6 %) was lower than previous years. The unsuccessful grids were located around Magdalen Islands and off Prince Edward Island heading towards Miscou Island (Figure 5).

In 2017, a total of 353 stations successfully sampled (Table 5). The distribution of 2017 samples for Areas 12, E, F and 19 was 299, 14, 17 and 23 stations, respectively (Figure 5; Appendix 3). The direction of a given trawl depends on the current and/or wind direction and in some cases the starting or ending points fall in a neighboring grid. In 2017, there were 4 vacant/double grids (GP015, GP017, GP246 and GP316) (Figure 5).

The depth of the trawl stations in 2017 (measured with the vessel's depth sounder) varied from 33 m to 382 m which is constant with recent years of the survey. The 2017 bottom temperatures at each station varied from -0.8 to 6.6°C with an average of 1.3°C (Appendix 3).

The mean swept area over all successful tows in 2017 was 2,874 m<sup>2</sup>, corresponding to an average tow length of 345.4 m and an average wing spread of 8.18 m. These values were similar to those of past years (Table 4).

### **Characteristics of tows in 2018**

The details of each tow (date, fishing area, tow number, position, swept area estimation, depth, temperature, and station type (whether the station is primary or alternate) are summarized in Appendix 4.

In 2018, a total of 395 tows were attempted from which 354 were considered successful and 41 were considered unsuccessful (Table 2b)). The breakdown of tows by station type was: 323 tows were completed at the primary station, 25 tows were completed at the first alternate station, 6 tows were completed at the second alternate station and one grid was abandoned (Table 5). Grid GP150 was abandoned after four trawling attempts; one at the primary station and the others at the three alternate stations. Unsuccessful tows consisted of 32 tows at the primary station, 7 tows at the first alternate station and one tow at the second and third alternate stations. The percentage of unsuccessful tows for 2018 (10.4 %) is lower than previous years. The unsuccessful tows for 2018 were mostly located between the Magdalen Islands and Prince Edward Island, around Miscou Island, the American bank and south of the Laurentian Channel (Figure 5).

In 2018, a total of 355 stations were visited with 354 stations successfully sampled. The distribution of 2018 stations for Areas 12, E, F and 19 was 299, 13, 18 and 24, respectively (Figure 5). The chosen path of a given trawl depends on the current and/or wind direction and in some cases the start or end points may fall in neighboring grids. In 2018, there were three vacant/double grids (Figure 5).

The mean swept area over all successful tows in 2018 was 2,766 m<sup>2</sup>, corresponding to an average tow length of 339.0 m and an average wing spread of 8.16 m. These values were very similar to those of past years (Table 4).

The depth of the trawl stations in 2018 (measured with the vessel's depth sounder) varied from 33 m to 386 m which is consistent with recent years of the survey (Appendix 4). The 2018 bottom temperatures at each station varied from -0.6 to 7.5°C with an average of 1.4°C.

Bottom temperatures in 2018 as measured by the Star-Oddi headline probe is shown in Figure 6. These show the typical stratification pattern of the southern Gulf during the summer and fall

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season, with high coastal temperatures in shallower waters less than 40-meter depth, the cold intermediary layer from 40 to 150-meters and the relatively warmer waters in deeper waters along the edge of the Laurentian Channel. Two observations at the mouth the Cape Breton Trough were warmer in 2018, a full two degrees higher than other observations at similar depths, which were possibly the result of an influx of warmer waters from the southern part of the Laurentian Channel. The accuracy of these observations was independently confirmed by other temperature probes (i.e. Minilog probe on the headline and another Star-Oddi probe on the footrope) on the trawl.

## **SNOW CRAB CATCHES IN 2017**

The details of catches commercial sized ( $\geq 95$  mm carapace width) male snow crab of all carapace conditions, and the residual component of the commercial sized male crab (carapace conditions 3 to 5) in numbers and weight by tow in 2017 are summarized in Appendix 3.

Snow crabs were captured at 321 of 353 stations sampled in 2017 (Figure 7) and the total catch was 31,930 individuals, sex and sizes combined (Table 6). No snow crab were captured in 32 sampled grids in 2017 (Figure 7). The geographic distribution of grids with no snow crab were similar 2013 to 2016, occurring mainly along the Laurentian Channel, south of the Magdalen Islands, northeast of Prince Edward Island and between Miscou Island and western PEI (Figure 7).

## **SNOW CRAB CATCHES IN 2018**

The details of catches commercial sized ( $\geq 95$  mm carapace width) male snow crab of all carapace conditions, and the residual component of the commercial sized male crab (carapace conditions 3 to 5) in numbers and weight by tow in 2018 are summarized in Appendix 4.

Snow crabs were captured at 328 of 354 stations sampled in 2018 (Figure 7) and the total catch was 33,684 individuals, sex and sizes combined (Table 6). No snow crab were captured at 26 grids in 2018. The geographic distribution of grids with no snow crab were similar those of 2013 to 2017, occurring mainly along the Laurentian Channel, south of the Magdalen Islands, around the northeastern tip of Prince Edward Island (Figure 7).

## **SUMMARY OF SNOW CRAB CATCH TRENDS**

The historical trends in the mean number per tow of all male snow crab caught (sizes and maturity confounded) and sampled during the surveys are shown in Table 6 and Figure 8. The mean number per tow of male snow crab has fluctuated throughout the time series with peak and low values in 1999 and in 2009 with 70.2 and 33.7 male snow crabs per tow, respectively. Of all the male snow crab caught in 2018, 70.4% were immature or adolescent, compared with 70.7% in 2017 and 67.2 % in 2016 (Figure 8).

The total number of commercial-sized male snow crab captured was highest in 2004 at 3,321 individuals and was at its lowest level of 900 individuals in 2009 (Table 7). The number of individuals increased in 2018 compared to the previous year from 2001 to 2,441 (Table 7). Since 1997, the peak catch of commercial-sized adult male snow crab per tow was in 2004, at approximately 10 crabs per tow. The mean individual weight of commercial-sized adult male was 555 g in 2017 and 556 g in 2018, lower than the historic average (1997-2016) of 585 g (Table 7). The estimated densities (number per km<sup>2</sup>) of 2,061 crabs per km<sup>2</sup> in 2017 and 2,513 crabs per km<sup>2</sup> in 2018 are higher than the historic average (1997-2016) of 1,827 crabs per km<sup>2</sup>.

The mean number of females per tow has also fluctuated since 1997 (Table 8; Figure 9) with a peak in 1999 of 62.4 females per tow, and a low of 25.5 females per tow in 2006. The mean

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number of females per tow was 41.7 in 2017 and 42.8 in 2018, slightly above the historic average (1997-2017) of 39.1 females per tow (Table 8). The percentage of adolescent females was 12.6% of total females in 2018 compared to 16.2% in 2017 (Figure 9).

## BY-CATCH SPECIES

Collecting data on by-catch species is important to better understand snow crab habitat and monitor changes in their ecosystem. The information on by-catch species during the 2016-2018 surveys are summarized in Appendix 5. Species identifications (Landry et al. 2014; Moriyasu et al. 2015) were established for the snow crab survey in the sGSL based on Scott and Scott (1988), Pohle (1990), Squires (1990), Brunel et al. (1998), Nozères et al. (2010) and using an unpublished species identification guide developed for the Scotian Shelf snow crab survey.

The list contains a total of 87 species/groups comprised of 57 fish and 30 invertebrates. The majority of the invertebrates were not identified to the species level but rather gathered into common name groups. A total of 48 fish species/groups and 27 invertebrate species/groups were recorded during the 2017 survey whereas 48 fish species/groups and 30 invertebrate species/groups were recorded during the 2018 survey, similar to previous years (Appendix 5, Hébert et al. 2016b).

The distribution of the catches of the most common fish (Figures 10 and 12) and invertebrate (Figures 11 and 13) species / groups are shown in Figures 10 and 11 for the 2017 survey and Figures 12 and 13 for the 2018 survey.

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## TABLES

*Table 1. Annual summary of vessel and equipment characteristics during the snow crab survey. Columns are the survey year, survey start month and day, survey end month and day, vessel name, length, horsepower, hull material, trawling method, acoustic sensor type and application of Minilog and Star-Oddi sensors. Note: Catchability comparisons were not performed during transition years (when a change in vessel occurred).*

Year	Start month	Start day	End month	End day	Vessel	Length (feet)	Horsepower	Hull Material	Trawl Method	Acoustic Sensor	Minilog	Star-Oddi
1997	7	9	9	11	Emy Serge D.	64	375	wood	side	Scanmar	yes	no
1998	7	7	9	14	Emy Serge D.	64	375	wood	side	Scanmar	yes	no
1999	7	9	9	10	Den C. Martin	64	402	steel	stern	Netmind	yes	no
2000	8	1	9	21	Den C. Martin	64	402	steel	stern	Netmind	yes	no
2001	8	9	10	2	Den C. Martin	64	402	steel	stern	Netmind	yes	no
2002	7	8	9	19	Den C. Martin	64	402	steel	stern	Netmind	yes	no
2003	7	15	10	7	Marco-Michel	65	660	fiberglass	stern	Netmind	yes	no
2004	7	14	10	1	Marco-Michel	65	660	fiberglass	stern	Netmind	yes	no
2005	7	13	9	20	Marco-Michel	65	660	fiberglass	stern	Netmind	yes	no
2006	8	2	10	18	Marco-Michel	65	660	fiberglass	stern	Netmind	yes	no
2007	7	10	9	22	Marco-Michel	65	660	fiberglass	stern	Netmind	yes	no
2008	7	16	9	25	Marco-Michel	65	660	fiberglass	stern	Netmind	yes	no
2009	7	16	9	27	Marco-Michel	65	660	fiberglass	stern	Netmind	yes	no
2010	7	8	9	14	Marco-Michel	65	660	fiberglass	stern	Netmind	yes	no
2011	7	13	10	4	Marco-Michel	65	660	fiberglass	stern	Netmind	yes	no
2012	7	10	9	23	Marco-Michel	65	660	fiberglass	stern	Netmind/eSonar	yes	no
2013	7	9	10	14	Jean-Mathieu	65	720	steel	stern	eSonar	yes	no
2014	7	9	10	12	Jean-Mathieu	65	720	steel	stern	eSonar	yes	yes
2015	7	9	10	15	Jean-Mathieu	65	720	steel	stern	eSonar	yes	yes
2016	7	10	10	4	Jean-Mathieu	65	720	steel	stern	eSonar	yes	yes
2017	7	10	9	22	Jean-Mathieu	65	720	steel	stern	eSonar	yes	yes
2018	7	19	9	16	Jean-Mathieu	65	720	steel	stern	eSonar	yes	yes

*Table 2a. The 2017 survey performance statistics (duration of each trip, number of days at sea, number of attempted tows, number of successful tows at the primary station and alternate stations, number of unsuccessful tows, number of untrawlable grids and frequency of serious net damage).*

Statistics	Trip number										Total
	1	2	3	4	5	6	7	8	9	10	
Duration (day) of each trip	6	7	4	6	11	7	11	na	na	na	52
Number of days at sea	6	7	4	4	7	4	10	na	na	na	42
Number of attempted tows	57	68	44	48	73	30	82	na	na	na	402
Tows completed at primary station	48	55	42	40	44	25	68	na	na	na	322
Tows completed at 1 <sup>st</sup> alternate station	0	3	1	4	7	2	4	na	na	na	21
Tows completed at 2 <sup>nd</sup> alternate station	2	2	0	0	2	0	0	na	na	na	6
Tows completed at 3 <sup>rd</sup> alternate station	0	0	0	0	1	0	1	na	na	na	2
Number of unsuccessful tows	7	8	1	4	20	3	8	na	na	na	51
Number of untrawlable grids	0	0	0	0	1	1	0	na	na	na	2
Number of tows with serious net damage	1	3	1	3	3	1	1	na	na	na	13

*Table 2b. The 2018 survey performance statistics (duration of each trip, number of days at sea, number of attempted tows, number of successful tows at the primary station and alternate stations, number of unsuccessful tows, number of untrawlable grids and frequency of serious net damage).*

Statistics	Trip number										Total
	1	2	3	4	5	6	7	8	9	10	
Duration (day) of each trip	8	10	9	11	10	na	na	na	na	na	48
Number of days at sea	7	9	9	7	9	na	na	na	na	na	41
Number of attempted tows	63	100	82	74	76	na	na	na	na	na	395
Tows completed at primary station	53	74	71	69	55	na	na	na	na	na	322
Tows completed at 1 <sup>st</sup> alternate station	5	8	6	2	5	na	na	na	na	na	26
Tows completed at 2 <sup>nd</sup> alternate station	0	2	0	0	4	na	na	na	na	na	6
Tows completed at 3 <sup>rd</sup> alternate station	0	0	0	0	0	na	na	na	na	na	0
Number of unsuccessful tows	5	16	5	3	12	na	na	na	na	na	41
Number of untrawlable grids	0	1	0	0	0	na	na	na	na	na	1
Number of tows with serious net damage	2	3	2	2	2	na	na	na	na	na	11

Table 3a. Start and end time of daily fishing operations and corresponding morning (mCtw) (sunrise) and evening (eCtw; sunset) civil twilight times during the 2017 trawl survey. Civil twilight times were for Charlottetown, PE (46° 39' N, 63° 13' W) based on [Sunrise/sunset calculator - National Research Council Canada](#).

Trip number	Date (mm / dd)	Time start first tow	mCtw	Time start last tow	eCtw
1	07/10	08:49	04:52	21:00	21:44
1	07/11	05:20	04:53	18:09	21:43
1	07/12	06:07	04:54	20:14	21:43
1	07/13	05:24	04:55	20:37	21:42
1	07/14	05:32	04:56	18:59	21:41
1	07/15	05:21	04:57	20:11	21:40
2	07/20	05:28	05:03	19:40	21:35
2	07/21	05:33	05:04	20:42	21:34
2	07/22	05:30	05:05	21:02	21:33
2	07/23	12:44	05:07	20:14	21:31
2	07/24	05:32	05:08	19:41	21:30
2	07/25	05:45	05:09	20:30	21:29
2	07/26	05:34	05:10	11:01	21:28
3	08/01	05:45	05:18	20:26	21:19
3	08/02	05:43	05:20	19:24	21:17
3	08/03	05:43	05:21	20:30	21:16
3	08/04	05:57	05:23	20:28	21:14
4	08/09	05:51	05:30	19:31	21:06
4	08/10	05:53	05:31	20:40	21:04
4	08/11	05:50	05:32	20:13	21:03
4	08/12	05:54	05:34	17:11	21:01
5	08/19	06:16	05:44	13:34	20:48
5	08/21	06:08	05:46	19:59	20:44
5	08/22	06:14	05:48	19:33	20:43
5	08/24	06:16	05:51	19:40	20:39
5	08/25	06:19	05:52	20:12	20:37
5	08/26	06:26	05:53	19:47	20:35
5	08/27	06:28	05:55	16:30	20:33
6	09/06	16:08	06:08	17:22	20:13
6	09/08	07:29	06:11	19:39	20:09
6	09/09	06:31	06:12	19:27	20:07
6	09/10	06:41	06:14	13:49	20:05
7	09/13	07:09	06:18	19:26	19:59
7	09/14	06:48	06:19	18:52	19:57
7	09/15	06:47	06:20	15:49	19:55
7	09/16	06:50	06:22	18:47	19:53
7	09/17	06:51	06:23	19:06	19:50
7	09/18	06:51	06:24	18:55	19:48
7	09/19	06:52	06:26	18:26	19:46
7	09/20	06:52	06:27	06:52	19:44
7	09/21	12:36	06:28	18:48	19:42
7	09/22	06:51	06:30	12:11	19:40

Table 3b. Start and end time of daily fishing operations and corresponding morning (mCtw) (sunrise) and evening (eCtw; sunset) civil twilight times during the 2018 trawl survey. Civil twilight times were for Charlottetown, PE (46° 39' N, 63° 13' W) based on [Sunrise/sunset calculator - National Research Council Canada](#).

Trip number	Date (mm / dd)	Time start first tow	mCtw	Time start last tow	eCtw
1	07/19	05:20	05:01	20:14	21:36
1	07/20	05:14	05:03	20:17	21:35
1	07/21	05:15	05:04	19:40	21:34
1	07/22	05:16	05:05	20:37	21:33
1	07/23	05:28	05:06	20:07	21:32
1	07/24	05:25	05:08	20:42	21:30
1	07/25	05:37	05:09	05:37	21:29
2	07/31	05:27	05:17	20:52	21:21
2	08/01	05:37	05:18	20:41	21:19
2	08/02	05:45	05:20	21:38	21:18
2	08/03	05:38	05:21	20:21	21:16
2	08/04	05:45	05:22	20:11	21:15
2	08/05	05:58	05:24	19:56	21:13
2	08/06	05:45	05:25	20:22	21:12
2	08/07	05:57	05:26	20:26	21:10
2	08/08	05:49	05:28	09:54	21:08
3	08/13	15:23	05:35	19:56	21:00
3	08/14	05:56	05:36	19:41	20:58
3	08/15	06:17	05:38	18:07	20:56
3	08/16	05:54	05:39	18:35	20:54
3	08/17	05:55	05:40	19:42	20:52
3	08/18	06:07	05:42	19:25	20:51
3	08/19	05:57	05:43	20:05	20:49
3	08/20	05:55	05:45	20:07	20:47
3	08/21	05:56	05:46	06:50	20:45
4	08/25	06:08	05:52	19:33	20:37
4	08/26	06:10	05:53	18:52	20:35
4	08/27	06:09	05:54	19:27	20:33
4	08/28	06:10	05:56	17:46	19:31
4	09/01	06:10	06:01	18:05	20:23
4	09/02	06:53	06:03	19:37	20:21
4	09/03	06:14	06:04	18:55	20:19
5	09/07	06:37	06:09	18:49	20:11
5	09/08	06:23	06:11	08:45	20:09
5	09/10	06:26	06:13	18:17	20:05
5	09/11	06:35	06:15	13:01	20:03
5	09/12	07:06	06:16	18:47	20:01
5	09/13	06:26	06:18	18:43	19:59
5	09/14	06:27	06:19	19:28	19:57
5	09/15	06:29	06:20	18:22	19:55
5	09/16	06:31	06:21	11:13	19:53



*Table 4. Swept area statistics by survey year from 2010 to 2018. Columns are survey year, the number of tows with sufficient wing spread data used to calculate the statistics, the mean tow distance, the mean and standard deviation of the trawl wing spread, the mean trawl swept area, the acoustic sonar system used and the survey vessel.*

Year	n	Tow distance (m)	Mean wing spread (m)	Standard error wing spread (m)	Mean swept area (m <sup>2</sup> )	Sonar system	Survey vessel
2010	315	-	8.40	1.78	2,736	NetMind	Marco-Michel
2011	289	-	8.45	2.44	2,711	NetMind	Marco-Michel
2012	281	-	8.71	1.61	2,675	NetMind	Marco-Michel
2013	286	352.0	7.93	1.86	2,591	e-Sonar	Jean-Mathieu
2014	335	336.1	7.91	1.47	2,665	e-Sonar	Jean-Mathieu
2015	319	342.6	7.91	1.65	2,712	e-Sonar	Jean-Mathieu
2016	327	355.7	7.77	1.58	2,763	e-Sonar	Jean-Mathieu
2017	301	345.4	8.18	1.57	2,824	e-Sonar	Jean-Mathieu
2018	301	339.0	8.16	1.65	2,766	e-Sonar	Jean-Mathieu

Table 5. Annual summary of tow characteristics during the snow crab survey. Columns are the survey year, the total number of successful tows, the station type (primary stations (P), alternate stations (A1, A2 or A3 (first, second and third alternate stations, respectively)) or abandoned stations (Abd), separated by the type of swept area estimation method, which was either calculated (Cal.) or averaged (Avg.) from neighbouring tows.

Year of survey	Total successful tows	Primary		A1		A2		A3		Abd	Total tows attempted
		Cal.	Avg.	Cal.	Avg.	Cal.	Avg.	Cal.	Avg.		
1997	259	190	51	15	3	0	0	0	0	0	277
1998	261	152	95	9	3	1	1	0	0	0	277
1999	277	127	127	14	6	1	2	0	0	0	303
2000	280	232	30	10	1	6	0	0	0	0	302
2001	292	253	15	13	7	1	2	1	0	0	321
2002	319	285	13	15	4	1	1	0	0	0	342
2003	317	283	10	13	1	6	1	3	0	0	354
2004	333	271	46	4	5	6	0	1	0	0	357
2005	344	290	11	32	3	8	0	0	0	0	395
2006	354	294	34	17	1	8	0	0	0	1	395
2007	355	294	31	13	3	12	1	1	0	0	400
2008	355	284	37	23	0	8	1	2	0	0	402
2009	355	293	39	10	0	11	1	0	0	0	388
2010	354	285	32	23	7	7	0	0	0	1	401
2011	353	274	46	24	3	3	2	1	0	2	401
2012	321	220	50	36	5	7	1	2	0	4	400
2013	352	230	52	45	13	10	1	1	0	3	447
2014	353	295	17	36	0	2	1	2	0	2	409
2015	353	275	28	36	3	9	1	1	0	2	423
2016	354	292	27	27	0	6	0	2	0	1	409
2017	353	275	49	18	3	6	0	2	0	2	402
2018	354	272	50	24	2	5	1	0	0	1	395

Table 6. Snow crab survey annual summary statistics for adolescent (including immature), adult and total male snow crab. Columns are the survey year, the total number of observed adolescent and adult male snow crab, the number of adolescent, adult and total males caught per tow, and the overall density (number) of males in survey catches.

Year	Total number			Crabs per tow			Mean density (number per km <sup>2</sup> )
	Adolescent	Adult	Total	Adolescent	Adult	Total	
1997	10,998	3,127	14,191	42.5	12.1	54.6	24,369
1998	12,299	3,848	16,242	47.1	14.7	61.8	26,629
1999	13,962	5,487	19,548	50.4	19.8	70.2	28,103
2000	13,027	5,248	18,377	46.5	18.7	65.2	23,820
2001	13,050	5,460	18,648	44.7	18.7	63.4	23,532
2002	10,578	5,503	16,210	33.2	17.3	50.5	20,477
2003	11,459	6,297	17,907	36.1	19.9	56.0	19,663
2004	10,420	6,645	17,238	30.0	19.1	49.1	15,474
2005	8,588	4,908	13,614	24.2	13.8	38.0	13,876
2006	7,923	4,362	12,370	22.4	12.3	34.7	12,282
2007	8,277	3,963	12,365	23.3	11.2	34.5	12,624
2008	8,705	3,498	12,299	24.5	9.9	34.4	13,020
2009	9,029	2,950	12,055	25.4	8.3	33.7	11,977
2010	12,512	3,799	16,398	35.3	10.7	46.0	16,843
2011	11,313	5,073	16,470	32.0	14.4	46.4	16,986
2012	10,020	4,775	14,917	31.2	14.9	46.1	17,081
2013	8,274	3,961	12,335	23.5	11.3	34.8	13,383
2014	9,739	4,129	14,002	27.6	11.7	39.3	15,228
2015	11,499	3,755	15,402	32.6	10.6	43.2	16,317
2016	11,431	5,453	16,991	32.3	15.4	47.7	18,167
2017	12,060	4,995	17,186	34.2	14.2	48.4	17,655
2018	12,960	5,439	18,512	36.6	15.4	52.0	19,091

*Table 7. Snow crab survey annual summary statistics for commercial crab (adult males with  $\geq 95$  mm carapace width). Columns are the survey year, the number of crab observed, the mean number per tow, the mean crab weight and the mean density.*

Year	Number of crabs captured	Mean number per tow	Mean weight (g)	Mean density (number per km <sup>2</sup> )
1997	1,335	5.2	600.4	2,258
1998	1,420	5.4	597.3	2,198
1999	1,472	5.3	563.9	2,106
2000	1,346	4.8	587.5	1,756
2001	1,744	6.0	540.0	2,232
2002	1,915	6.0	547.3	2,417
2003	2,682	8.5	561.1	2,957
2004	3,321	9.6	581.2	2,974
2005	2,427	6.8	592.1	2,469
2006	2,302	6.5	617.6	2,192
2007	1,911	5.4	610.6	1,958
2008	1,431	4.0	611.9	1,546
2009	900	2.5	610.5	899
2010	1,057	3.0	606.5	1,093
2011	1,970	5.6	583.5	2,035
2012	2,093	6.5	566.3	2,358
2013	1,886	5.4	596.8	1,994
2014	1,885	5.3	581.0	2,011
2015	1,741	4.9	584.0	1,784
2016	2,896	8.2	573.9	2,998
2017	2,001	5.7	555.7	2,061
2018	2,441	6.9	556.6	2,513

*Table 8. Snow crab survey annual summary statistics for immature, adolescent and adult female snow crab. Columns are the survey year, the total number of observed immature, adolescent, adult and total female snow crab counts, the number of immature, adolescent, adult and total females caught per tow, and the overall density (number per km<sup>2</sup>) of females in survey catches.*

Year	Total catch (number)				Crabs per tow (number)				Mean density (number per km <sup>2</sup> )
	Immature	Adolescent	Adult	Total	Immature	Adolescent	Adult	Total	
1997	4,317	3,166	6,661	14,240	16.7	12.2	25.7	54.6	23,976
1998	4,886	2,290	7,755	14,933	18.7	8.8	29.7	57.2	24,486
1999	2,896	3,268	11,110	17,277	10.5	11.8	40.1	62.4	24,792
2000	1,295	2,668	11,171	15,134	4.6	9.5	39.9	54.1	19,931
2001	823	611	12,537	13,974	2.8	2.1	42.9	47.8	17,823
2002	935	542	10,905	12,387	2.9	1.7	34.2	38.8	15,246
2003	1,907	758	10,709	13,376	6.0	2.4	33.8	42.2	14,534
2004	2,294	1,088	9,583	12,966	6.6	3.1	27.6	37.3	12,129
2005	2,617	1,089	6,645	10,351	7.4	3.1	18.7	29.1	10,611
2006	3,213	1,316	4,491	9,020	9.1	3.7	12.7	25.5	9,062
2007	3,551	1,941	5,066	10,558	10.0	5.5	14.3	29.8	10,716
2008	3,174	1,883	4,975	10,032	8.9	5.3	14.0	28.2	10,649
2009	2,256	2,330	5,118	9,707	6.4	6.6	14.4	27.3	9,680
2010	4,344	1,629	7,845	13,826	12.3	4.6	22.2	39.1	14,081
2011	3,769	1,691	7,866	13,333	10.7	4.8	22.3	37.8	13,796
2012	2,865	2,388	7,486	12,740	8.9	7.4	23.3	39.7	14,688
2013	1,712	1,350	6,221	9,286	4.9	3.8	17.7	26.4	10,062
2014	2,958	998	6,682	10,639	8.4	2.8	18.9	30.1	11,404
2015	3,341	1,482	7,448	12,302	9.5	4.2	21.1	34.8	12,822
2016	3,252	2,241	7,891	13,401	9.2	6.3	22.3	37.8	14,116
2017	3,500	2,391	8,819	14,744	9.9	6.8	25.0	41.7	14,800
2018	4,418	1,921	8,802	15,172	12.5	5.4	24.9	42.8	15,133

## FIGURES

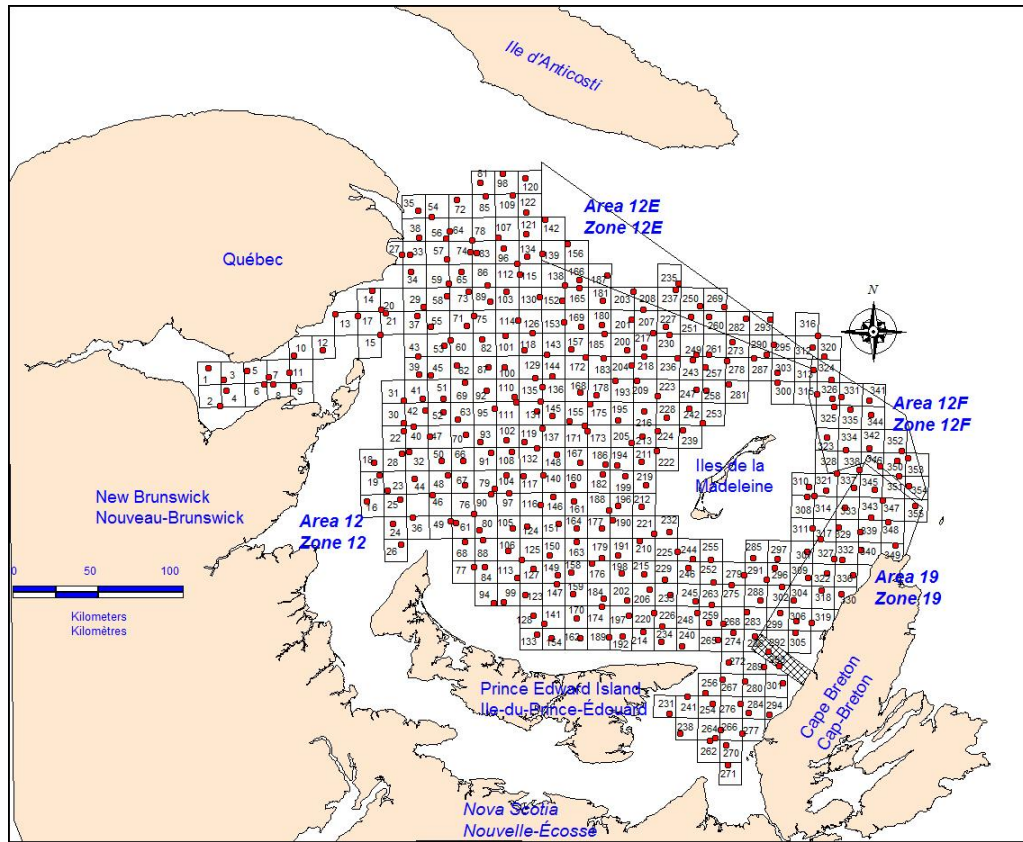


Figure 1. Snow crab trawl survey grid sampling design for the southern Gulf of St. Lawrence deployed since 2013. There are a total of 355 sampling grids defined by squares measuring 12.7 by 12.7 kilometres. Red dots indicate survey stations and numbers are station identifications (ID numbers).

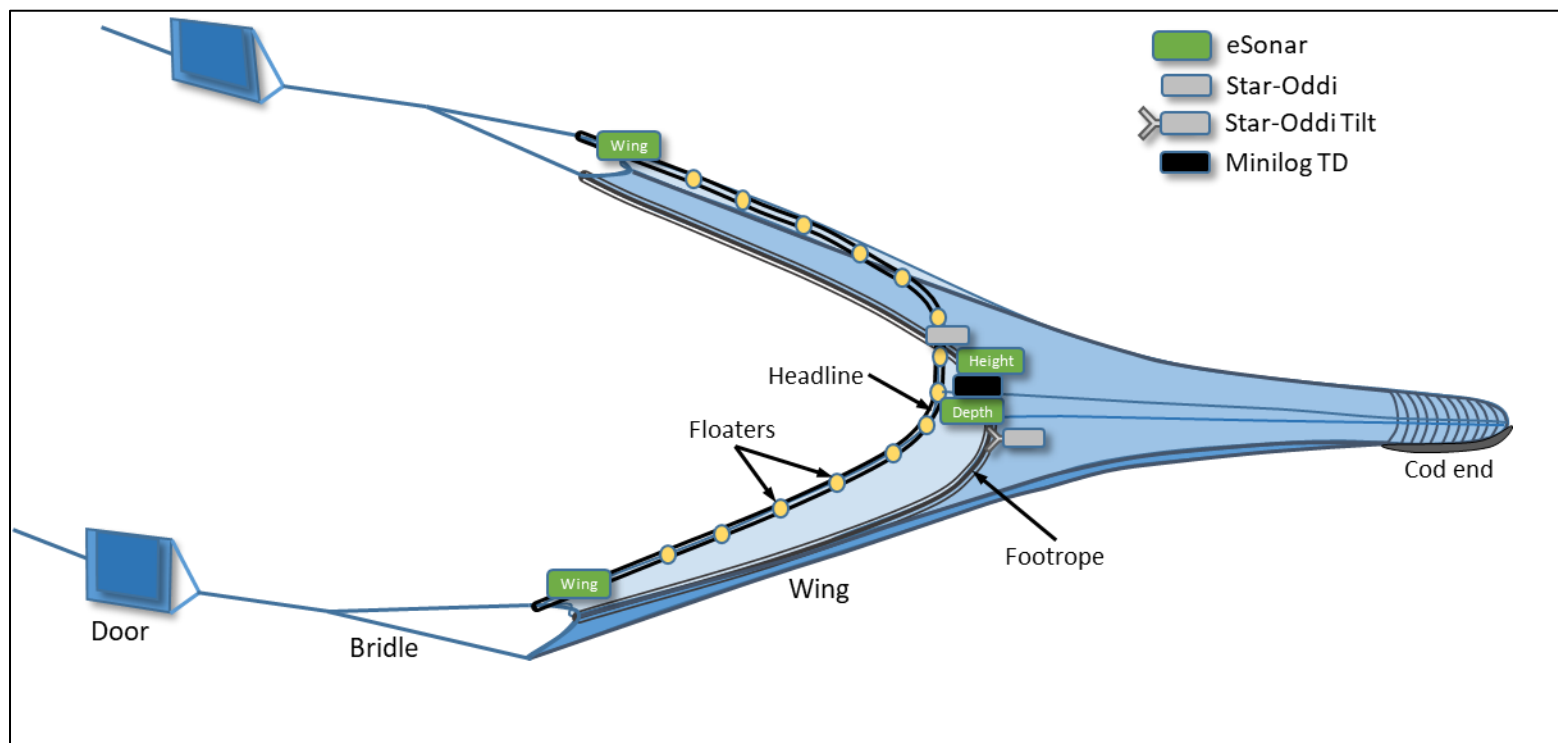
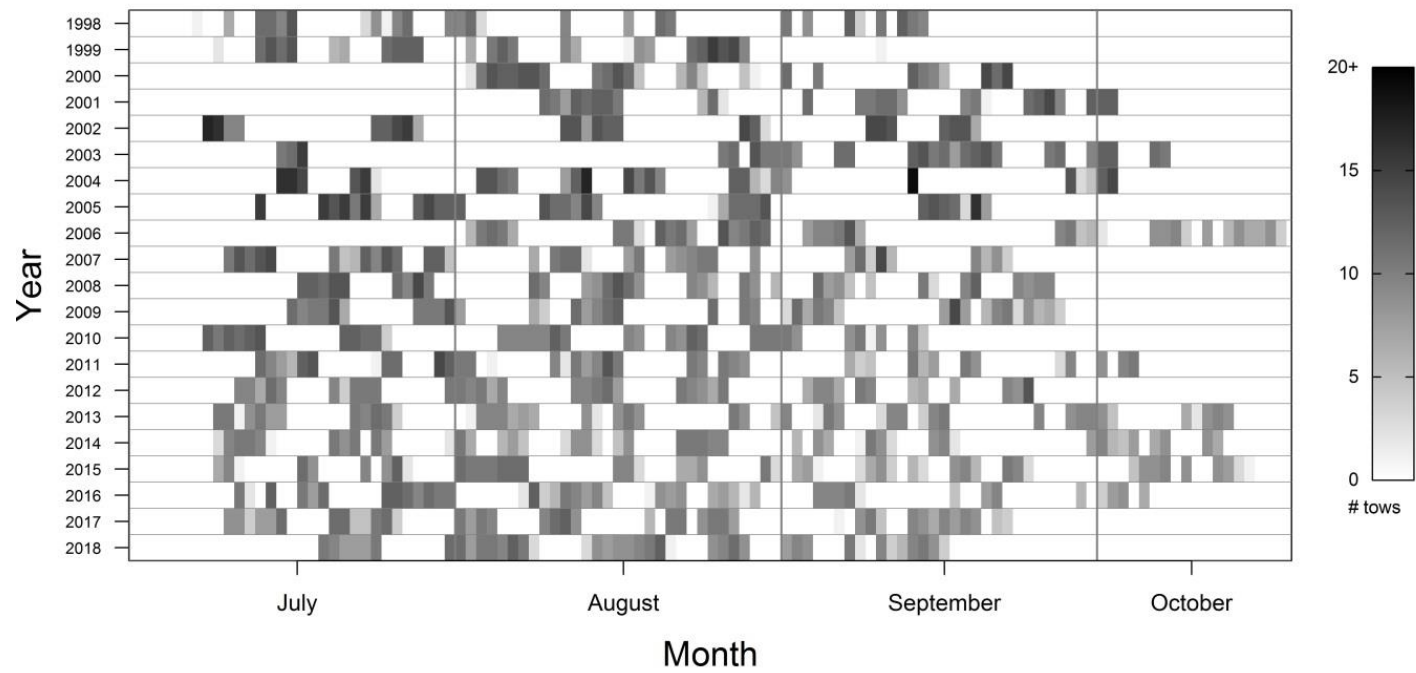


Figure 2. Schematic view of the various sensors deployed on the snow crab bottom trawl survey. eSonar net sensors (a pair of distance/wing sensors and height sensor), Star-Oddi temperature/depth (TD) and temperature/depth/tilt (TDT) sensors, and a Vemco Minilog temperature/depth sensor.



*Figure 3. Timeline of daily snow crab survey activity from 1997 to 2018. Shading showing tow numbers per day varying from white (no tows) to black (21 tows per day).*



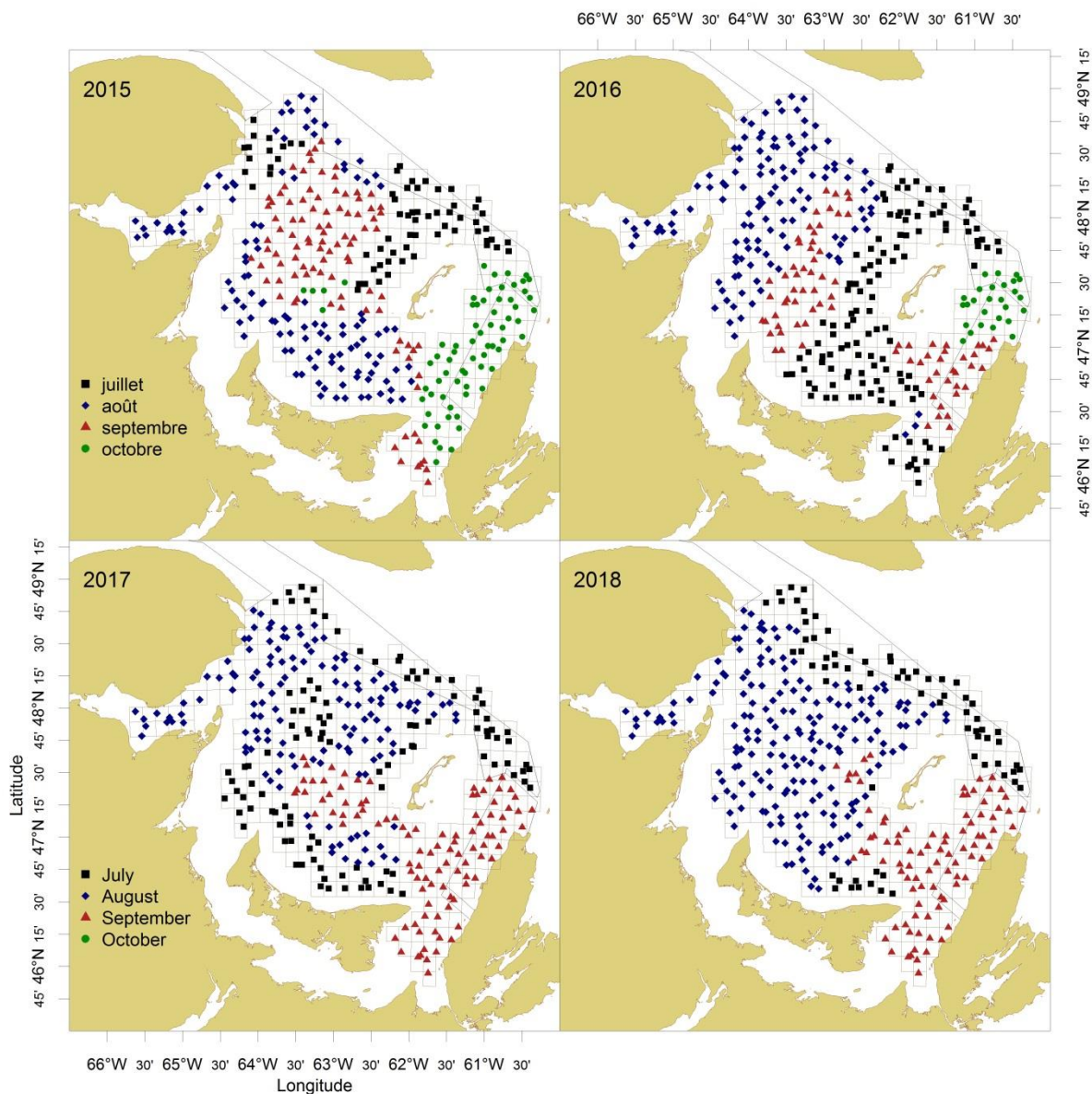


Figure 4. Monthly geographic distributions of the stations sampled by the snow crab survey (2015-2018). The survey typically takes place in the months of July (black squares), August (blue diamonds), September (red triangles), and October (green circles). Snow crab fishing areas are outlined in black; the survey grid in grey.

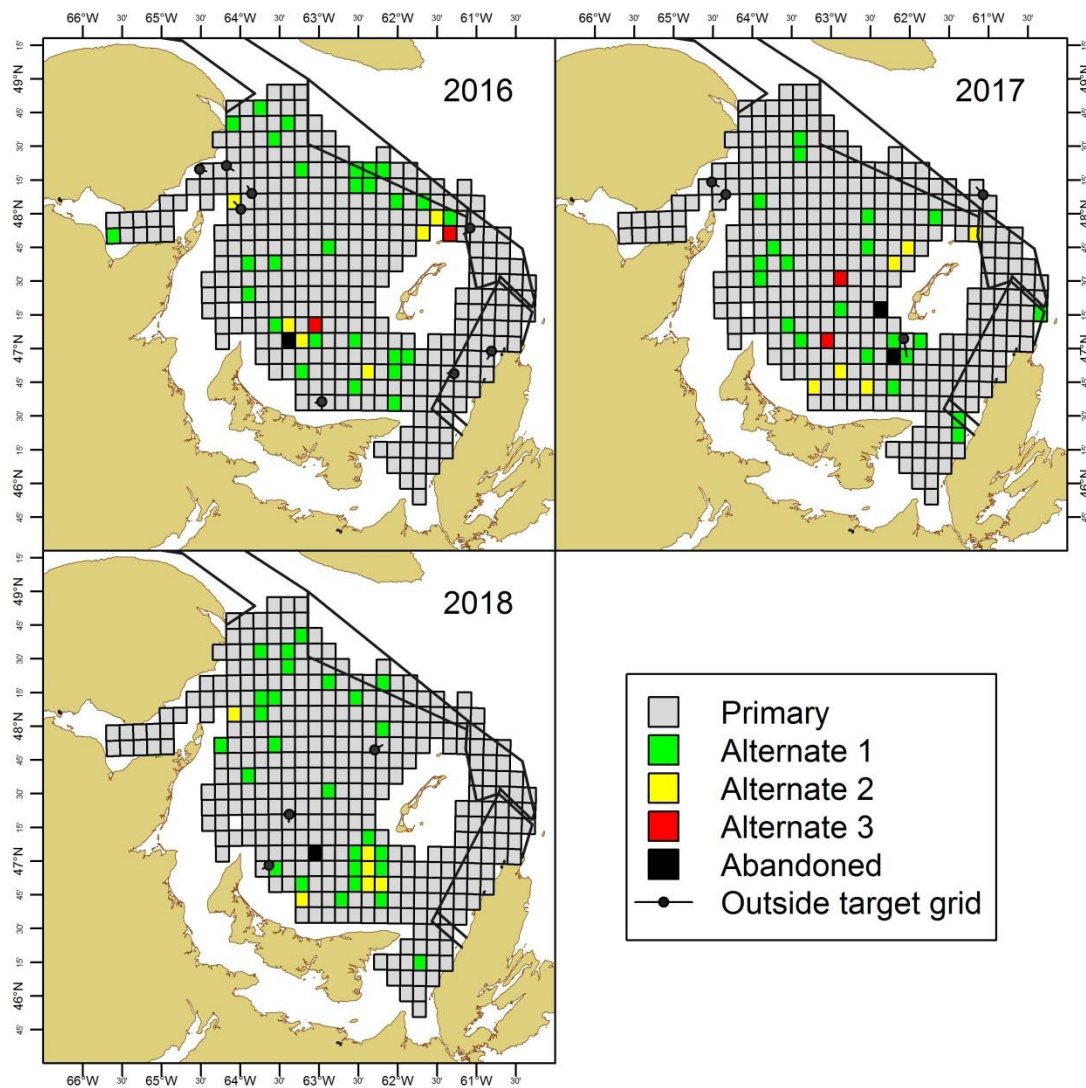


Figure 5. Geographic presentation of trawl tow quality and characteristics showing primary, alternate 1, alternate 2, alternate 3 and abandoned grids together with targeted grids not realized in annual trawl surveys of 2016 to 2018. Snow crab fishing areas are outlined in black.

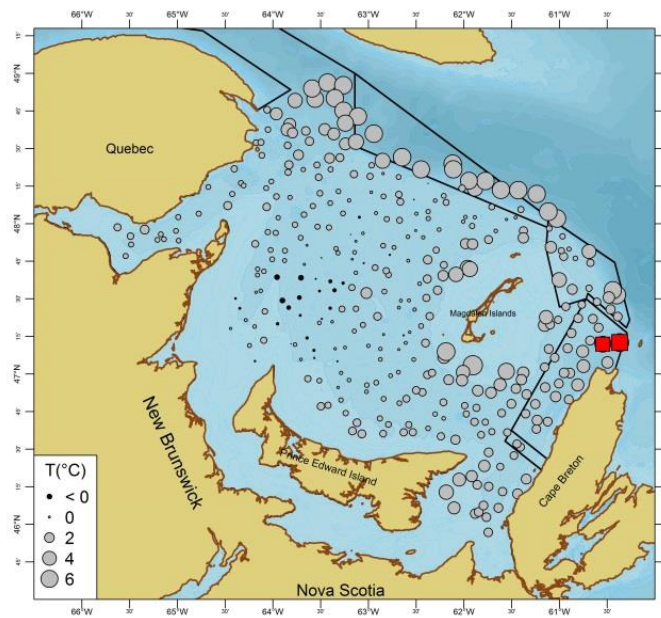
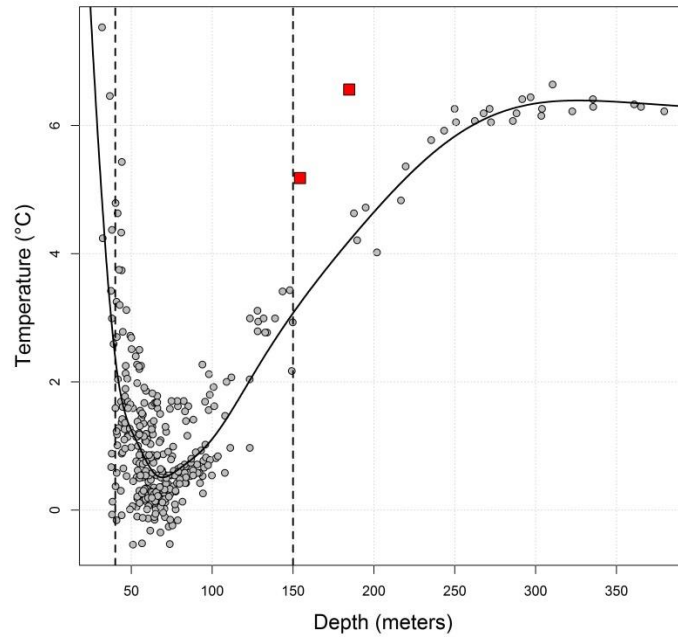


Figure 6. Scatter plot of bottom temperatures versus water depth (top panel) and geographic location of bottom temperatures (bottom panel) as measured by Star-Oddi temperature probes attached to the headline of the trawl during the 2018 bottom trawl survey. Red squares highlight the two relatively warm temperature observations at the mouth of the Cape Breton Troughs. The black line (a) shows the general trends versus water depth. Circle sizes in the map (b) are proportional to the observed temperatures, while small black circles indicate temperatures below while grey circles temperatures above zero °C.



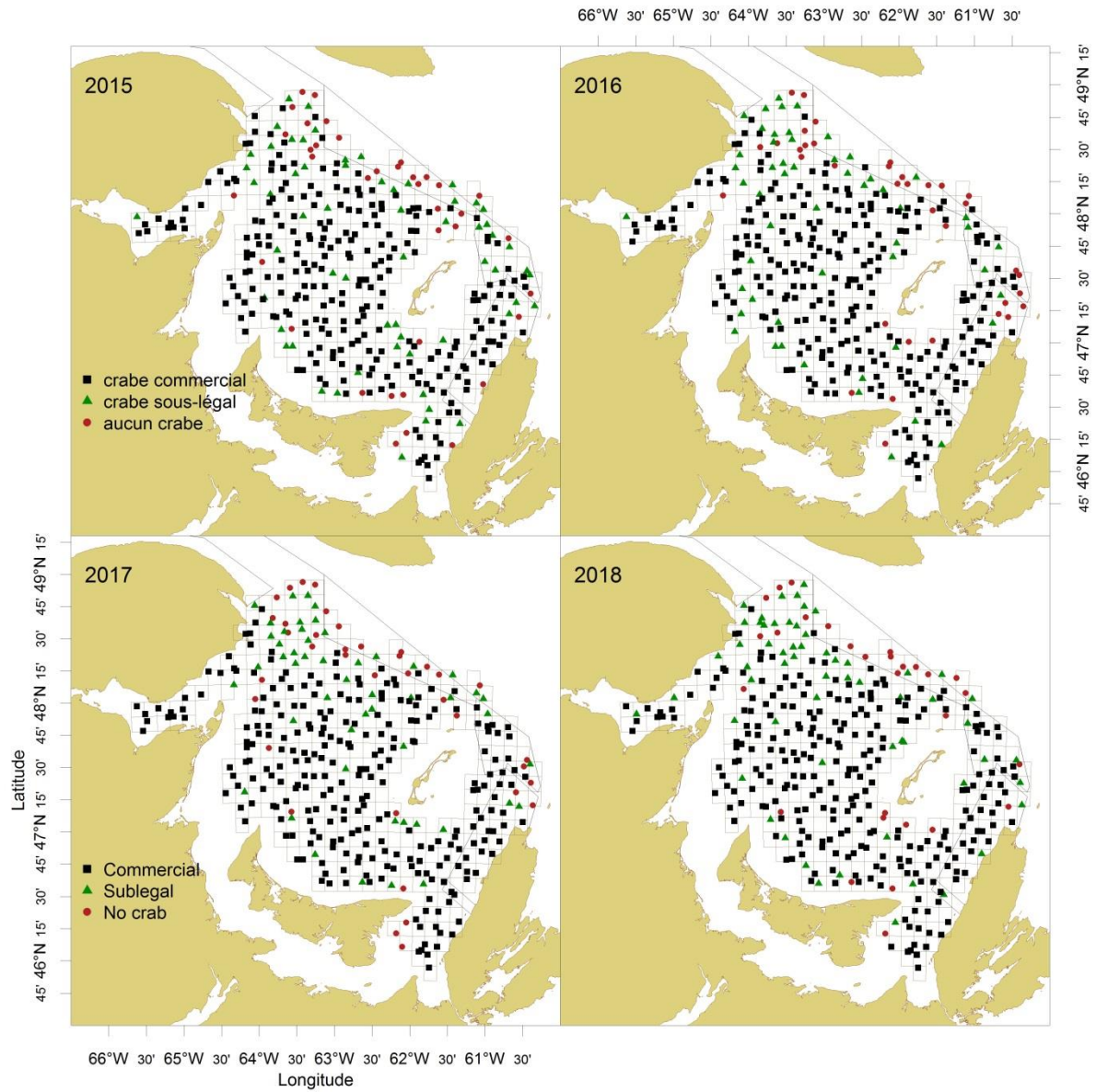


Figure 7. Snow crab survey stations, sampled in 2015-2018, where commercial-sized snow crab (black squares), sublegal snow crab only (green triangles), or no male snow crab (red circles) were captured. Snow crab fishing areas are outlined in black; the survey grid in grey.

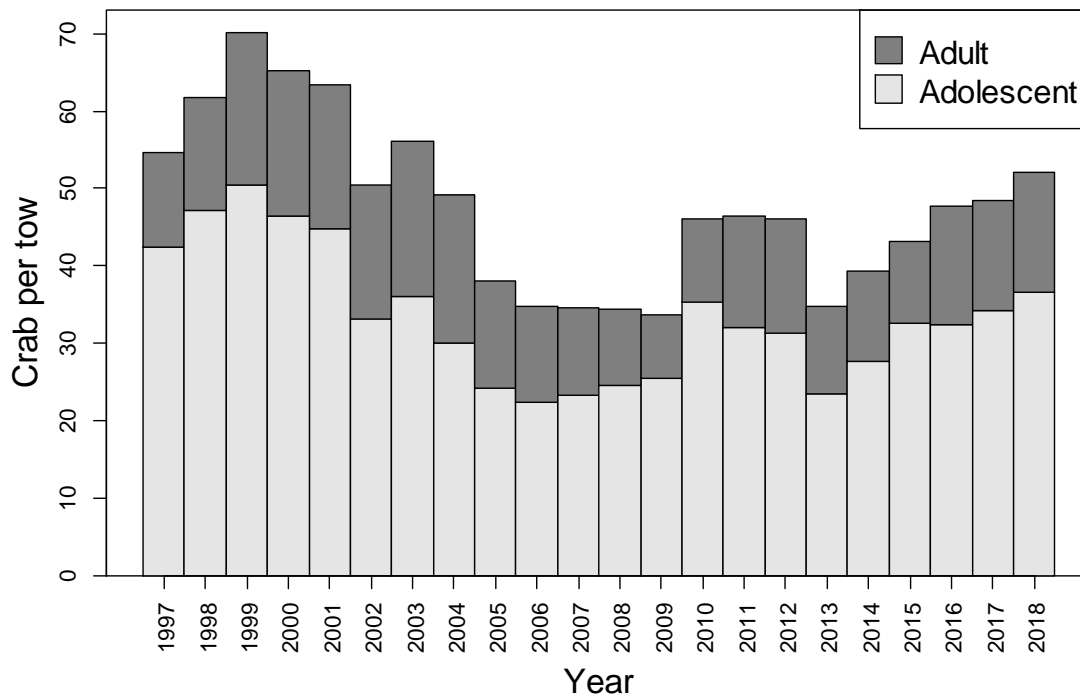


Figure 8. Mean number of male snow crab per tow by maturity stage from snow crab survey data.

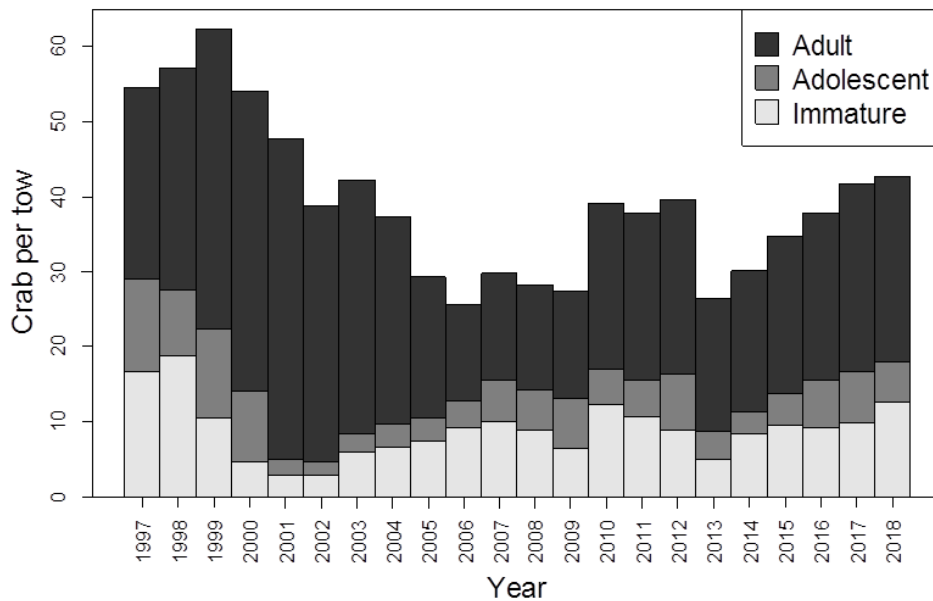


Figure 9. Mean number of female snow crab per tow by maturity stage from snow crab survey data.

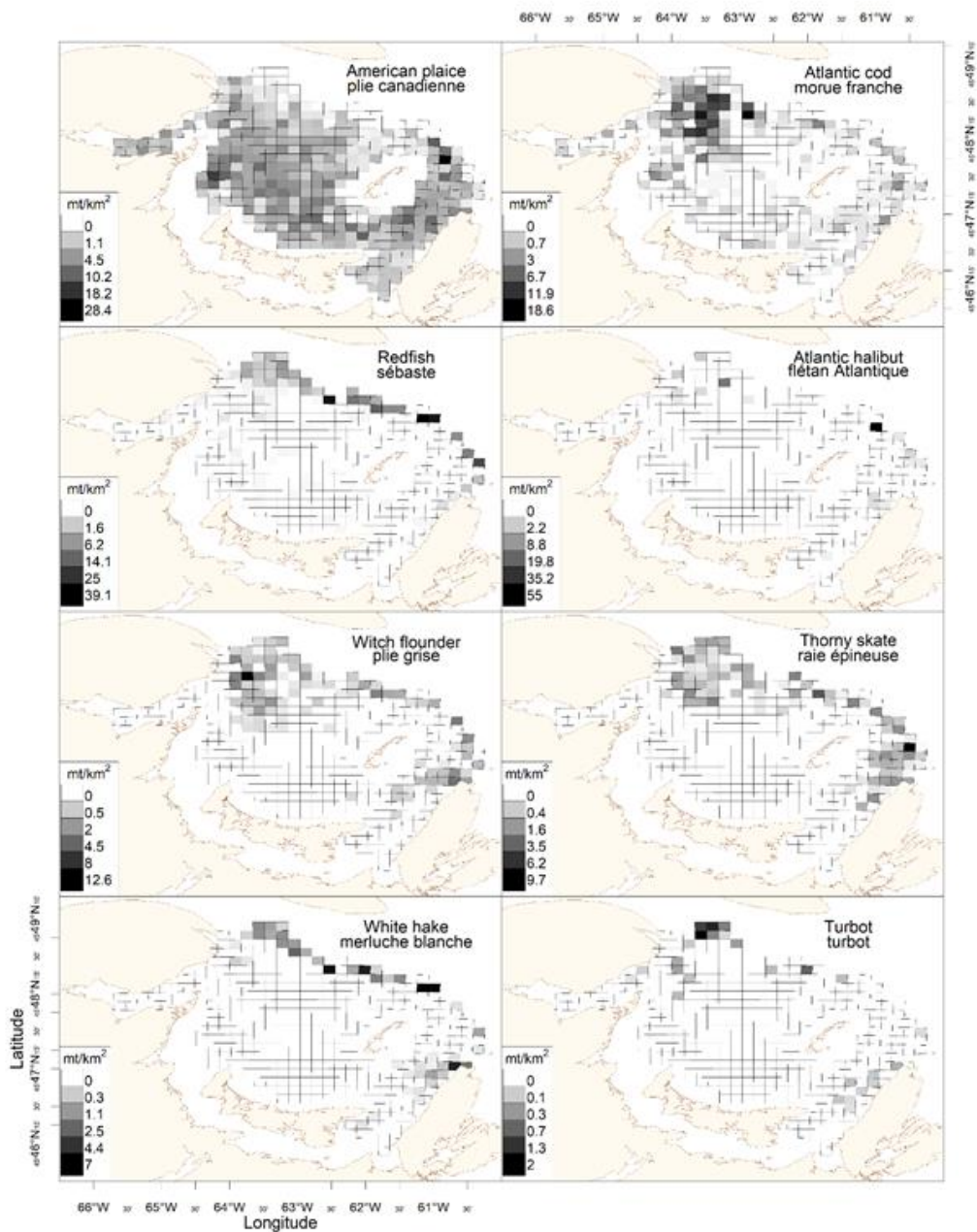


Figure 10. Distribution of the eight most common recorded fish bycatch, by weight (kg), in the 2017 snow crab survey. The snow crab survey grid is displayed in grey and the colour bars have been scaled to the maximum weight (kg) by species captured in the grid.

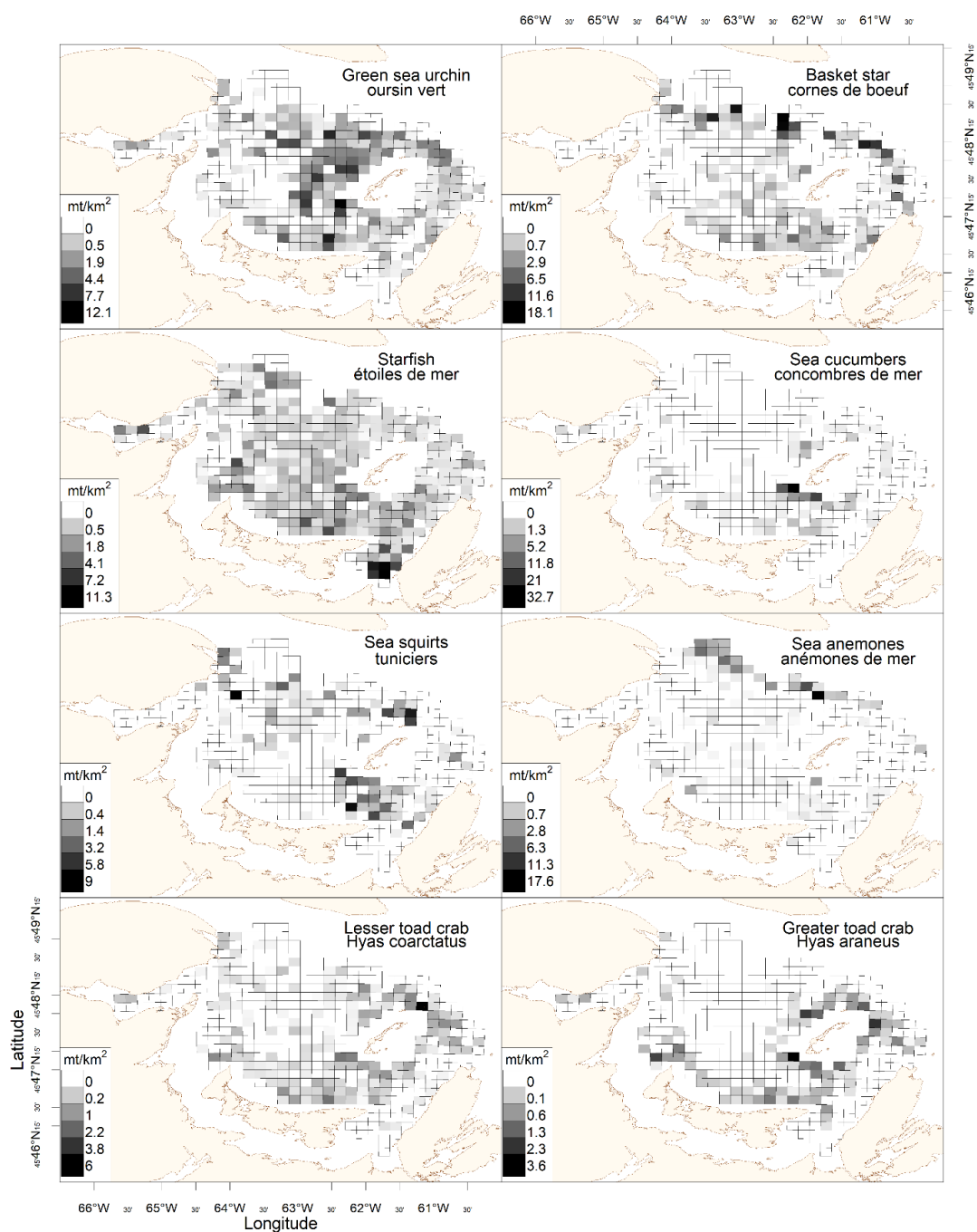


Figure 11. Distribution of the eight most commonly recorded invertebrate bycatch, excluding snow crab, by weight (kg), in the 2017 snow crab survey. The snow crab survey grid is displayed in grey and the colour bars have been scaled to the maximum weight (kg) by species/group captured over all grids.

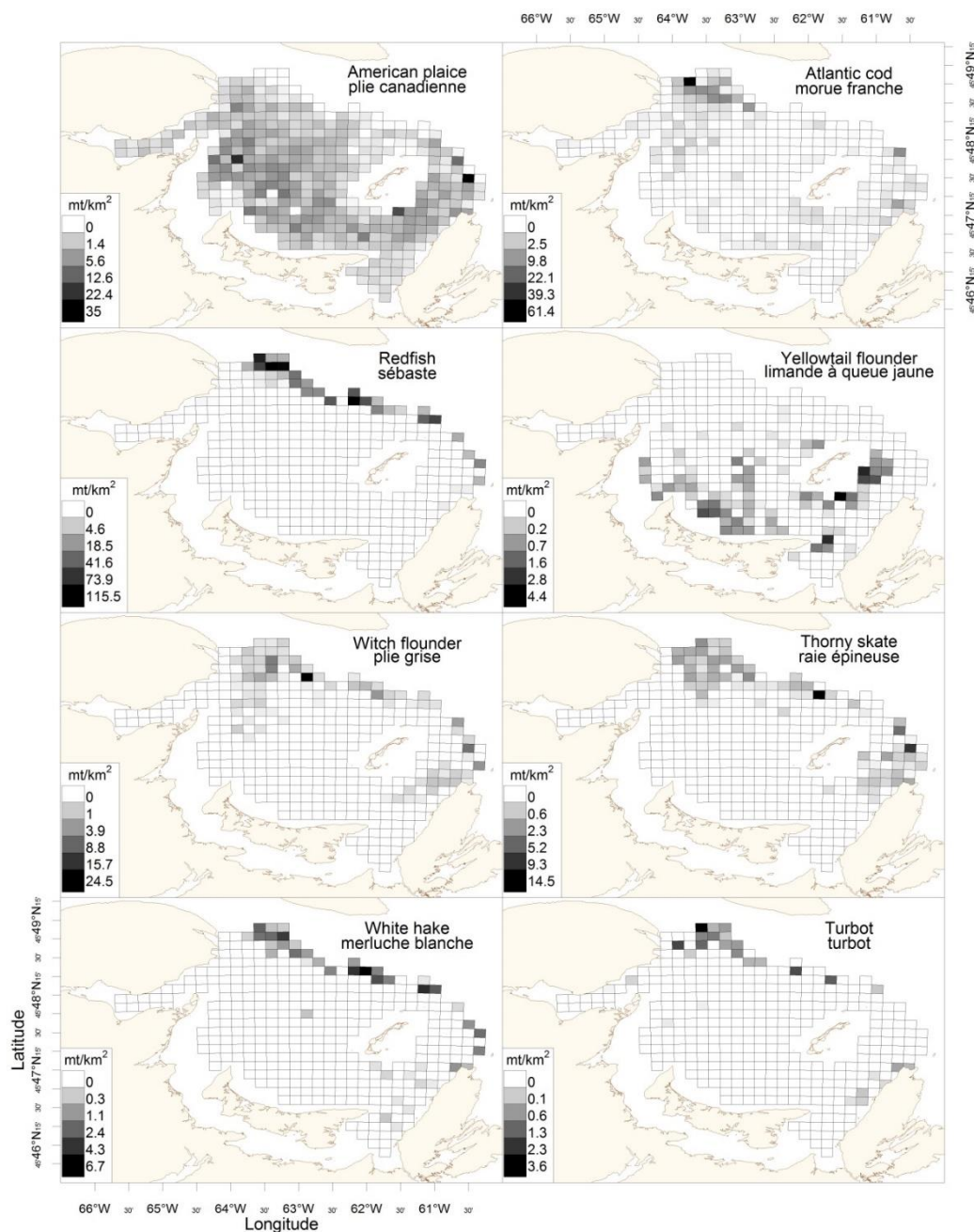


Figure 12. Distribution of the eight most common recorded fish species bycatch, by weight, standardized to the area swept (t per km²), in the 2018 snow crab survey. The distribution of the commercial species of interest, turbot, is also presented. The snow crab survey grid is displayed in grey and the colour bars have been scaled to the maximum standardized weight (t per km²) by species over all grids.



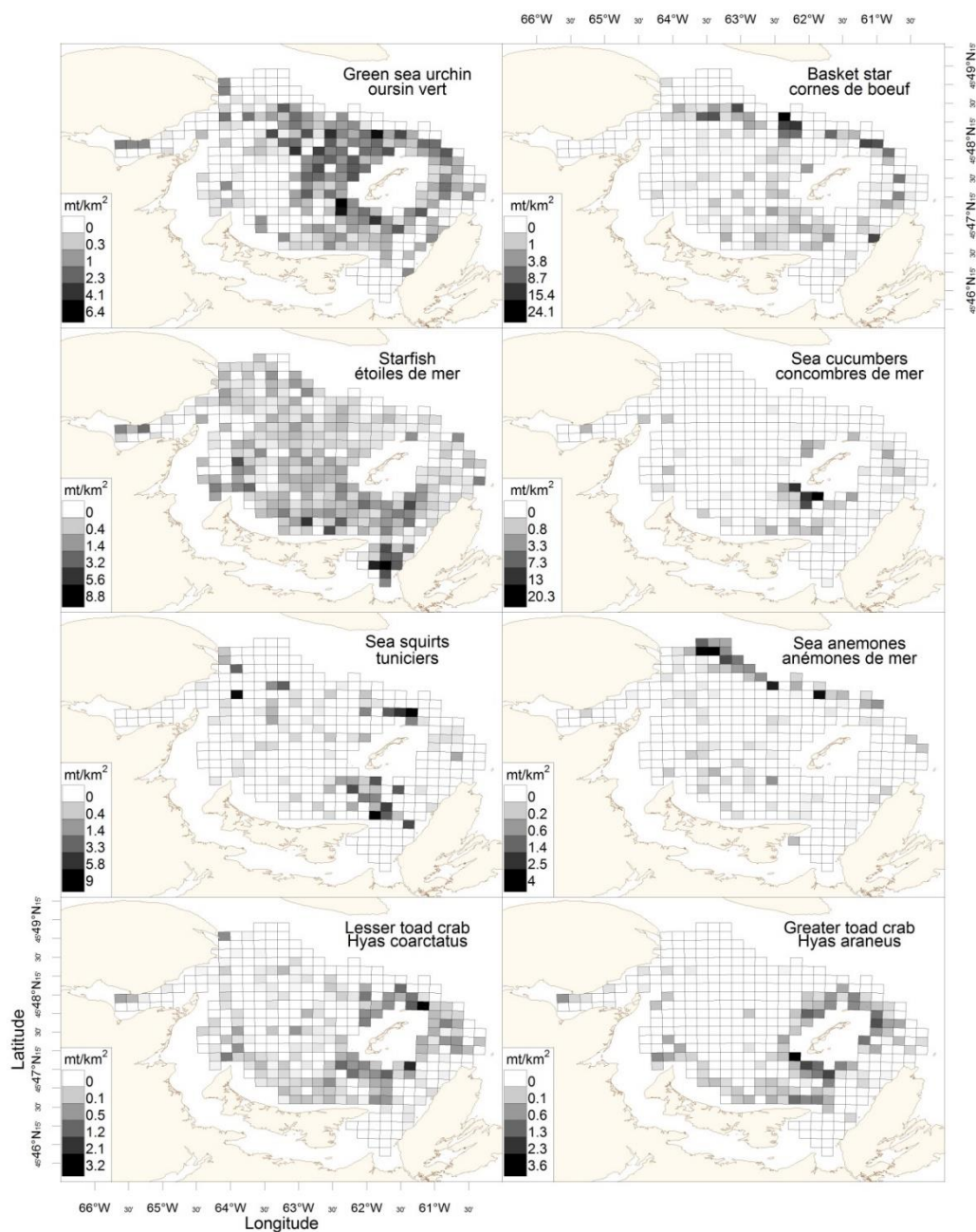


Figure 13. Distribution of the eight most commonly recorded invertebrate species / group bycatch, after snow crab, by weight standardized to the area swept (t per km<sup>2</sup>), in the 2018 snow crab survey. The snow crab survey grid is displayed in grey and the colour bars have been scaled to the maximum standardized weight (t per km<sup>2</sup>) by species/group over all grids.

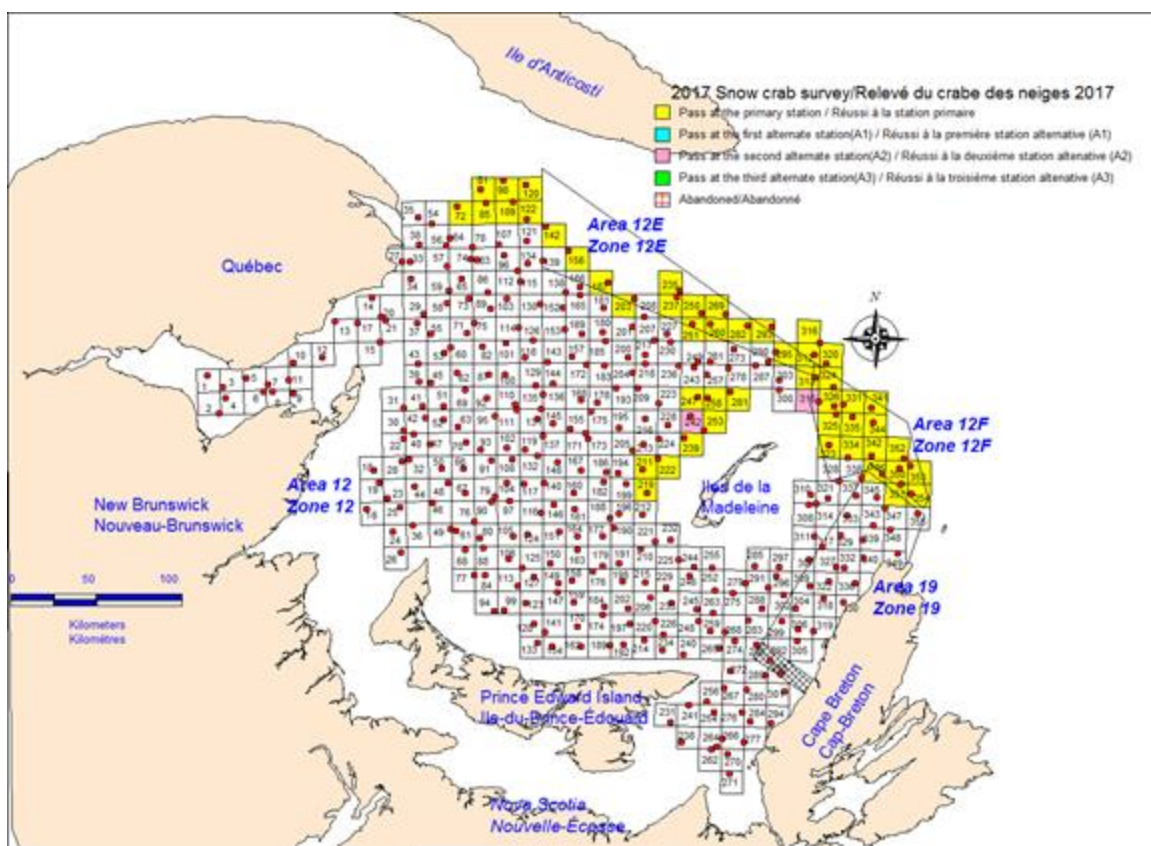
## APPENDICES

Appendix 1. Summary of progression of survey by trip, number of grids sampled, number of tows undertaken, number of successful tows and number of grids abandoned during the 2017 snow crab survey in the southern Gulf of St. Lawrence.

Number of grids sampled	355
Number of tows conducted	403
Number of successful tows	353
Number of grids abandoned	2

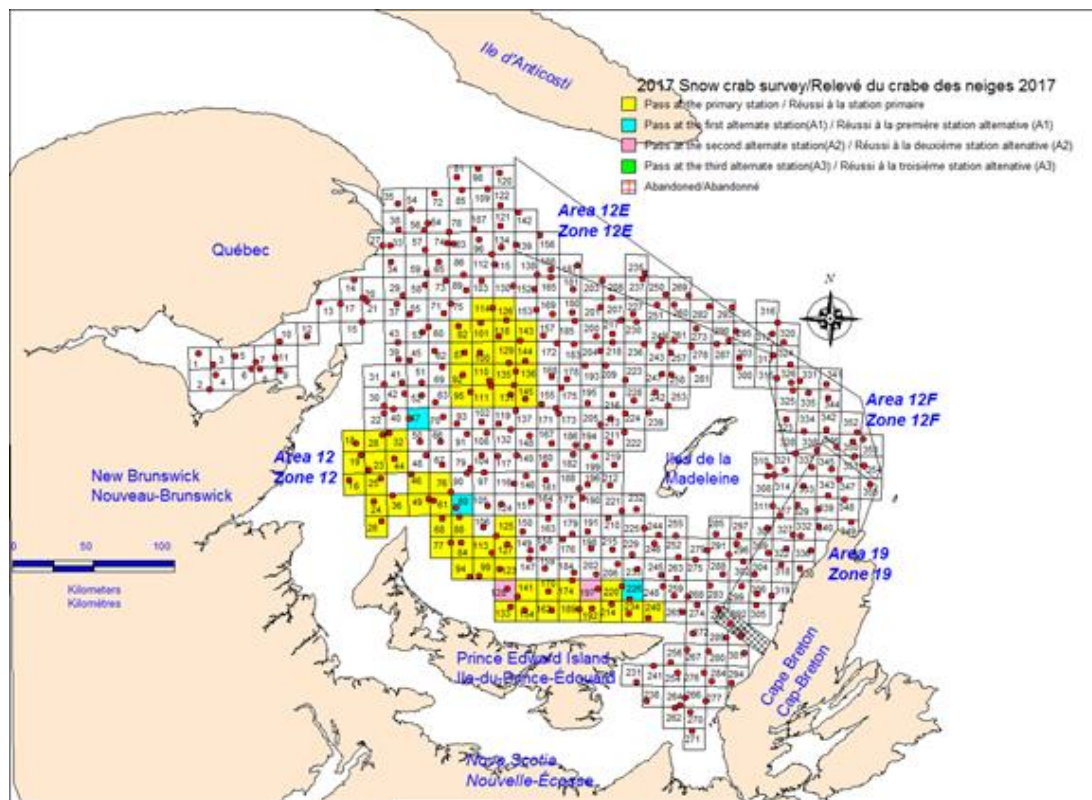
Appendix 1a. Stations visited during trip 1 in 2017. Alter. indicates alternate stations.

Date	Departure	Arrival	Station category					Total	Total successful tows	Number of damaged nets
			Primary	Alter. 1	Alter. 2	Alter. 3	Abandoned			
10-Jul	Souris	At sea	10	0	0	0	0	10	10	0
11-Jul	At sea	At sea	7	0	1	0	0	8	8	0
12-Jul	At sea	At sea	5	0	0	0	0	5	5	0
13-Jul	At sea	At sea	9	0	0	0	0	9	9	0
14-Jul	At sea	At sea	9	0	0	0	0	9	9	0
15-Jul	At sea	At sea	8	0	1	0	0	9	9	1
<b>Total (Trip 1)</b>			<b>48</b>	<b>0</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>50</b>	<b>50</b>	<b>1</b>



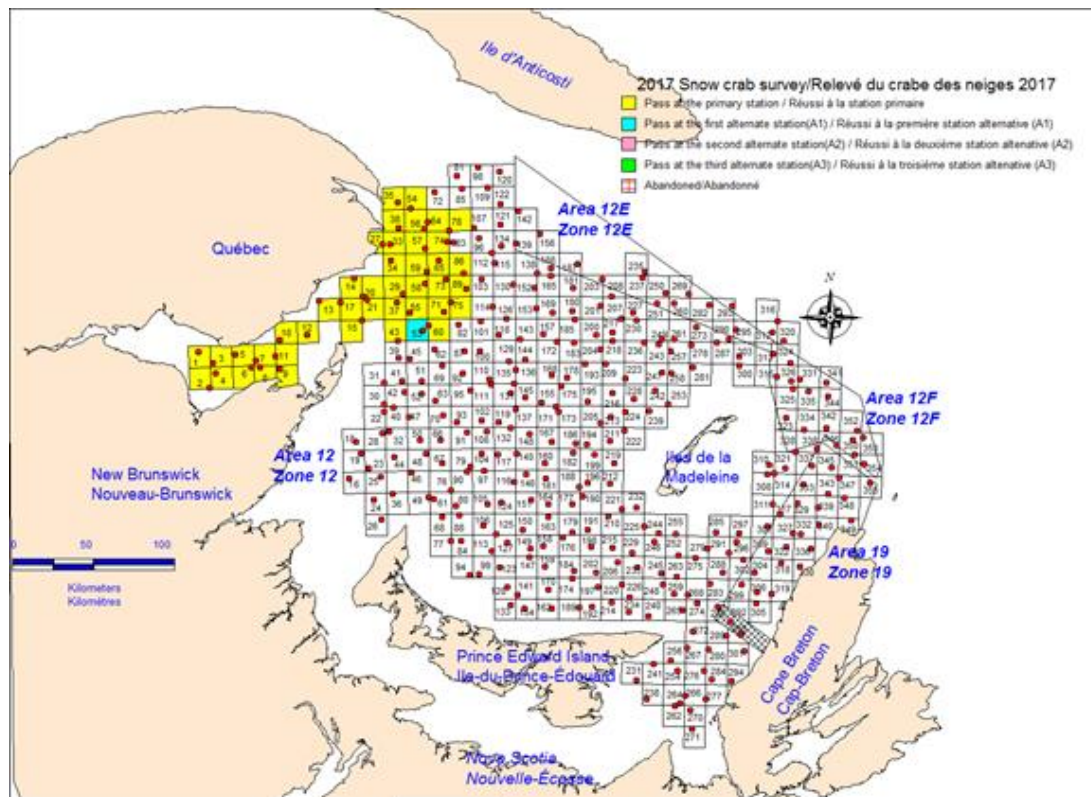
Appendix 1b. Stations visited during trip 2 in 2017. Alter. indicates alternate stations.

Date	Departure	Arrival	Station category					Total	Total successful tows	Number of damaged nets
			Primary	Alter. 1	Alter. 2	Alter. 3	Abandoned			
20-Jul	Souris	At sea	8	1	1	0	0	10	10	1
21-Jul	At sea	At sea	10	0	1	0	0	11	11	0
22-Jul	At sea	At sea	4	0	0	0	0	4	4	0
23-Jul	At sea	At sea	5	1	0	0	0	6	6	1
24-Jul	At sea	At sea	10	1	0	0	0	11	11	1
25-Jul	At sea	At sea	13	0	0	0	0	13	13	0
26-Jul	At sea	Caraquet	5	0	0	0	0	5	5	0
<b>Total (Trip 2)</b>			<b>55</b>	<b>3</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>60</b>	<b>60</b>	<b>3</b>
<b>Total cumulative</b>			<b>103</b>	<b>3</b>	<b>4</b>	<b>0</b>	<b>0</b>	<b>110</b>	<b>110</b>	<b>4</b>



Appendix 1c. Stations visited during trip 3 in 2017. Alter. indicates alternate stations.

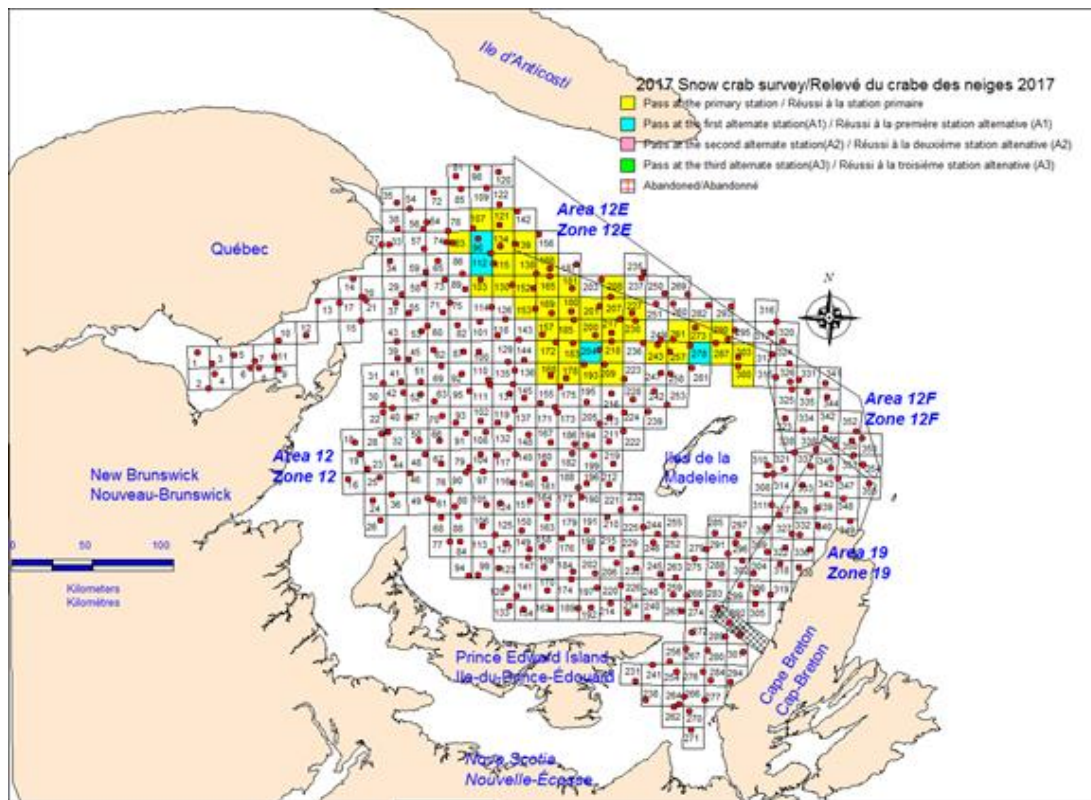
Date	Departure	Arrival	Station category					Total	Total successful tows	Number of damaged nets
			Primary	Alter. 1	Alter. 2	Alter. 3	Abandoned			
1-Aug	At sea	At sea	12	0	0	0	0	12	12	0
2-Aug	At sea	At sea	9	0	0	0	0	9	9	0
3-Aug	At sea	At sea	10	1	0	0	0	11	11	1
4-Aug	At sea	At sea	11	0	0	0	0	11	11	0
<b>Total (Trip 3)</b>			<b>42</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>43</b>	<b>43</b>	<b>1</b>
<b>Total cumulative</b>			<b>145</b>	<b>4</b>	<b>4</b>	<b>0</b>	<b>0</b>	<b>153</b>	<b>153</b>	<b>5</b>





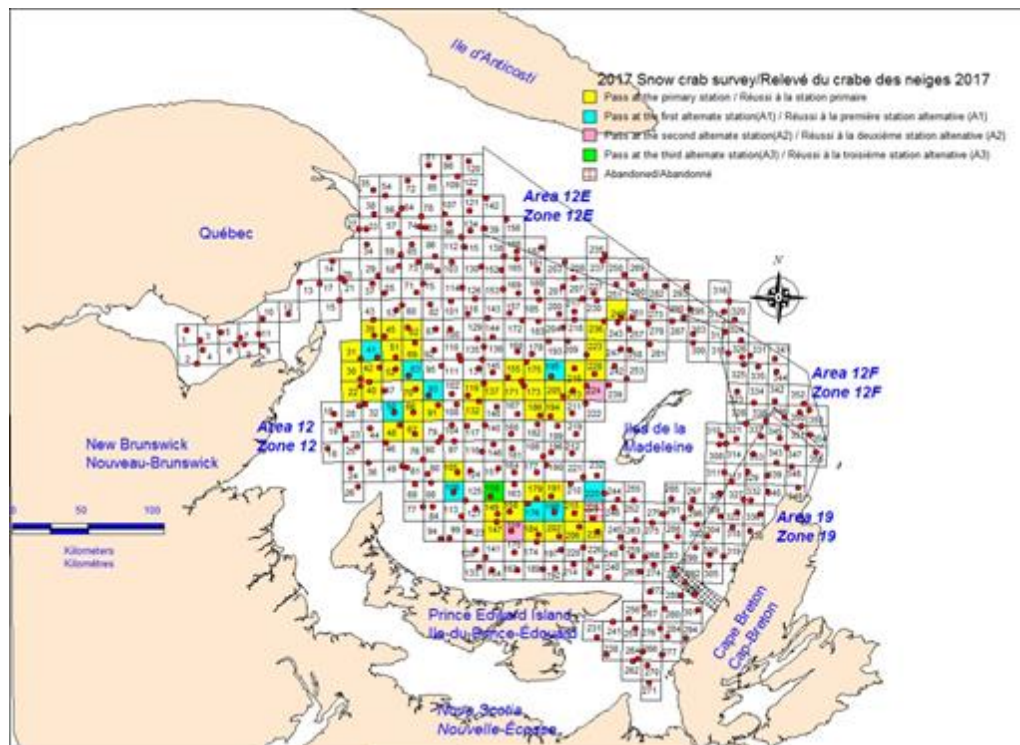
Appendix 1d. Stations visited during trip 4 in 2017. Alter. indicates alternate stations.

Date	Departure	Arrival	Station category					Total	Total successful tows	Number of damaged nets
			Primary	Alter. 1	Alter. 2	Alter. 3	Abandoned			
8-Aug	Moncton to Caraquet	At sea	-	-	-	-	-	-	-	-
9-Aug	At sea	At sea	7	2	0	0	0	9	9	2
10-Aug	At sea	At sea	13	0	0	0	0	13	13	0
11-Aug	At sea	At sea	12	1	0	0	0	13	13	0
12-Aug	At sea	At sea	8	1	0	0	0	9	9	1
13-Aug	Cap-aux-Meules	Strong winds	-	-	-	-	-	-	-	-
<b>Total (Trip 4)</b>			<b>40</b>	<b>4</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>44</b>	<b>44</b>	<b>3</b>
<b>Total cumulative</b>			<b>185</b>	<b>8</b>	<b>4</b>	<b>0</b>	<b>0</b>	<b>197</b>	<b>197</b>	<b>8</b>



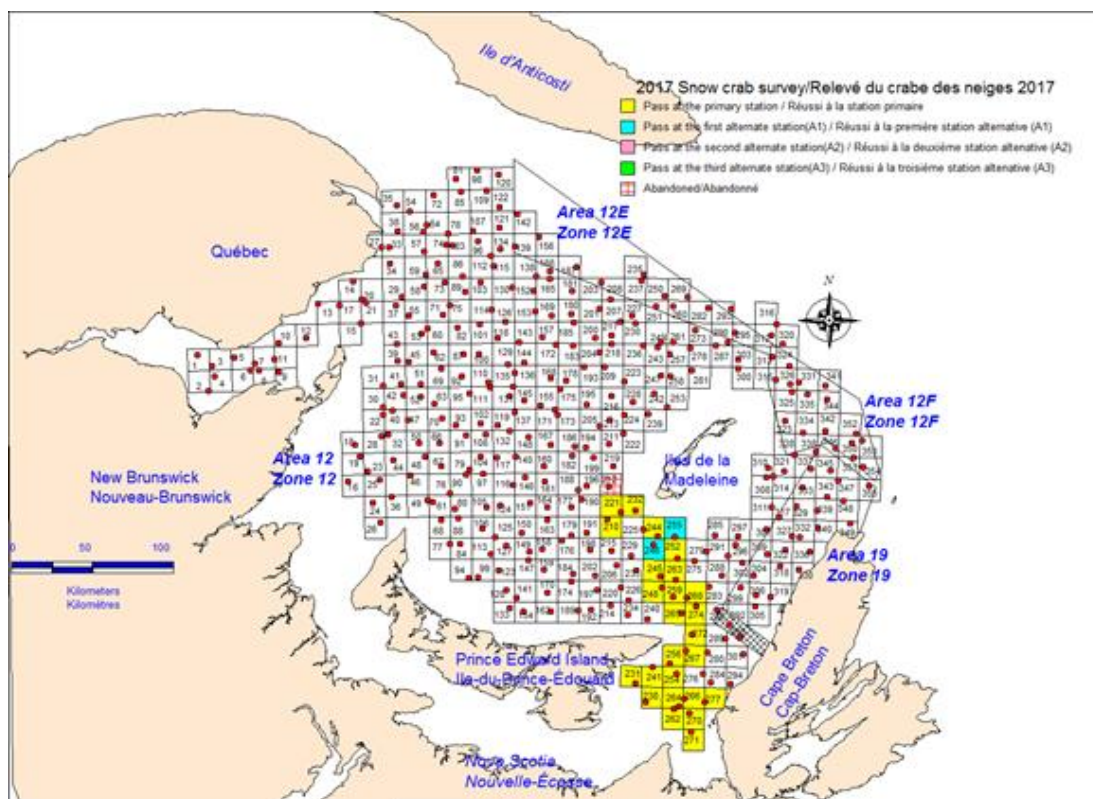
Appendix 1e. Stations visited during trip 5 in 2017. Alter. Indicates alternate stations.

Date	Departure	Arrival	Station category					Total	Total successful tows	Number of damaged nets
			Primary	Alter. 1	Alter. 2	Alter. 3	Abandoned			
18-Aug	Cheticamp	At sea	-	-	-	-	-	-	-	-
19-Aug	At sea	Cap-aux-Meules	2	0	0	0	1	3	2	1
20-Aug	Cap-Aux-Meules	Trawl repairs								
21-Aug	At sea	At sea	9	0	1	0	0	10	10	0
22-Aug	At sea	At sea	7	2	0	0	0	9	9	0
23-Aug	At sea	Strong winds								
24-Aug	At sea	At sea	3	1	1	1	0	6	6	1
25-Aug	At sea	At sea	10	1	0	0	0	11	11	0
26-Aug	At sea	At sea	6	3	0	0	0	9	9	0
27-Aug	At sea	At sea	7	1	0	0	0	8	8	1
28-Aug	At sea	Cap-aux-Meules								
<b>Total (Trip 5)</b>			<b>44</b>	<b>8</b>	<b>2</b>	<b>1</b>	<b>1</b>	<b>56</b>	<b>55</b>	<b>3</b>
<b>Total cumulative</b>			<b>229</b>	<b>16</b>	<b>6</b>	<b>1</b>	<b>1</b>	<b>253</b>	<b>252</b>	<b>11</b>



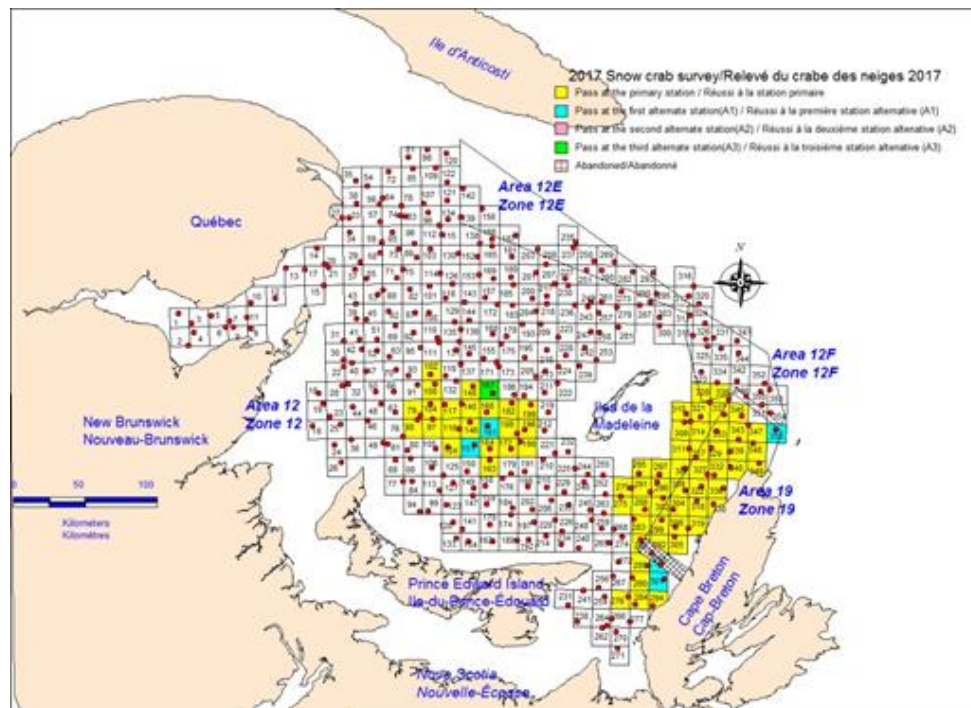
Appendix 1f. Stations visited during trip 6 in 2017. Alter. Indicates alternate stations.

Date	Departure	Arrival	Station category						Total successful tows	Number of damaged nets
			Primary	Alter. 1	Alter. 2	Alter. 3	Abandoned	Total		
05-Sept	Moncton	Cap-aux-Meules								
06-Sept	At sea	-	2	0	0	0	0	2	2	0
07-Sept	Cap-aux-Meules	Strong winds								
08-Sept	At sea	Cap-aux-Meules	10	0	0	0	0	10	10	0
09-Sept	At sea	Cap-aux-Meules	10	1	0	0	0	11	11	0
10-Sept	At sea	Cap-aux-Meules	3	1	0	0	1	5	4	1
Total (Trip 6)			25	2	0	0	1	28	27	1
Total cumulative			254	18	6	1	2	281	279	12



Appendix 1g. Stations visited during trip 7 in 2017. Alter. Indicates alternate stations.

Date	Departure	Arrival	Station category					Total	Total successful tows	Number of damaged nets
			Primary	Alter. 1	Alter. 2	Alter. 3	Abandoned			
12-Sept	Cap-aux-Meules	Trawl repairs / departure overnight								
13-Sept	At sea	At sea	8	0	0	0	0	8	8	0
14-Sept	At sea	At sea	5	2	0	1	0	8	8	1
15-Sept	At sea	At sea	8	0	0	0	0	8	8	0
16-Sept	At sea	At sea	7	2	0	0	0	9	9	0
17-Sept	At sea	At sea	7	1	0	0	0	8	8	0
18-Sept	At sea	At sea	11	0	0	0	0	11	11	0
19-Sept	At sea	At sea	10	0	0	0	0	10	10	0
20-Sept	At sea	Cap-aux-Meules	1	0	0	0	0	1	1	0
21-Sept	Cap-aux-Meules	At sea	6	0	0	0	0	6	6	0
22-Sept	At sea	Cheti-camp	5	0	0	0	0	5	5	0
Total (Trip 7)			68	5	0	1	0	74	74	1
Total cumulative			322	23	6	2	2	355	353	13



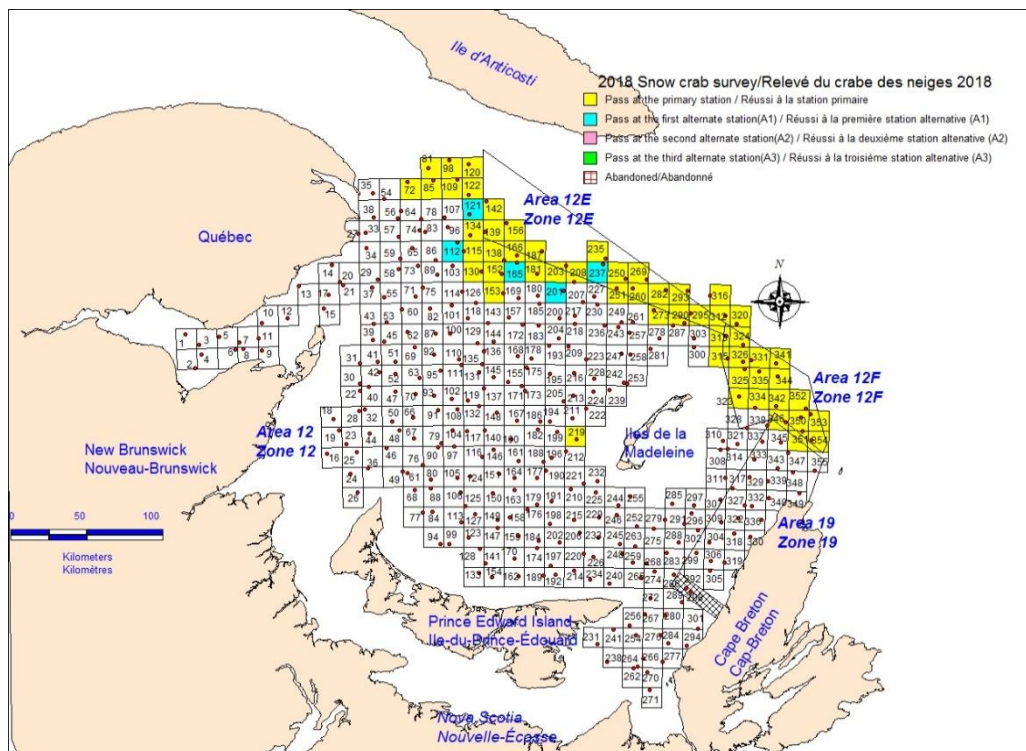


Appendix 2. Summary of progression of survey by trip, number of grids sampled, number of tows undertaken, number of successful tows and number of grids abandoned during the 2018 snow crab survey in the southern Gulf of St. Lawrence.

Number of grids sampled	355
Number of tows conducted	395
Number of successful tows	354
Number of grids abandoned	1

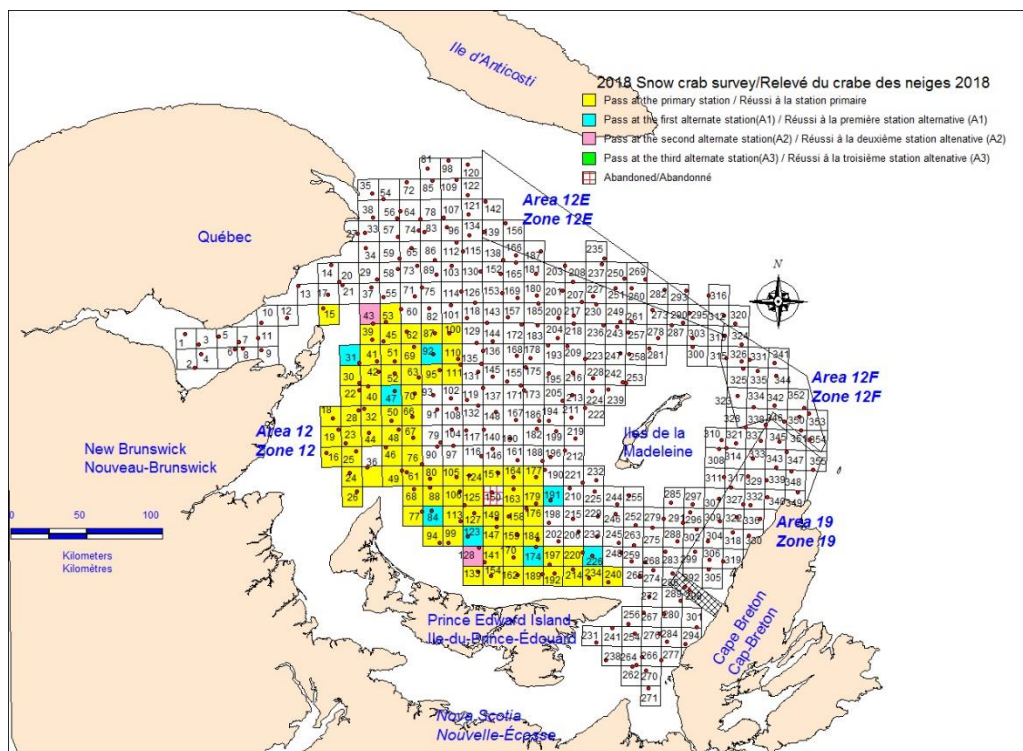
Appendix 2a. Stations visited during trip 1 in 2018. Alter. Indicates alternate stations.

Date	Departure	Arrival	Station category					Total	Total successful tows	Number of damaged nets
			Primary	Alter. 1	Alter. 2	Alter. 3	Abandoned			
18-Jul	Cheticamp	At sea	-	-	-	-	-	-	-	-
19-Jul	At sea	At sea	12	0	0	0	0	12	12	0
20-Jul	At sea	At sea	11	0	0	0	0	11	11	0
21-Jul	At sea	At sea	8	0	0	0	0	8	8	0
22-Jul	At sea	At sea	6	2	0	0	0	8	8	1
23-Jul	At sea	At sea	8	0	0	0	0	8	8	0
24-Jul	At sea	At sea	7	3	0	0	0	10	10	1
25-Jul	At sea	Cap-aux-Meules	1	0	0	0	0	1	1	0
<b>Total (Trip 1)</b>			<b>53</b>	<b>5</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>58</b>	<b>58</b>	<b>2</b>



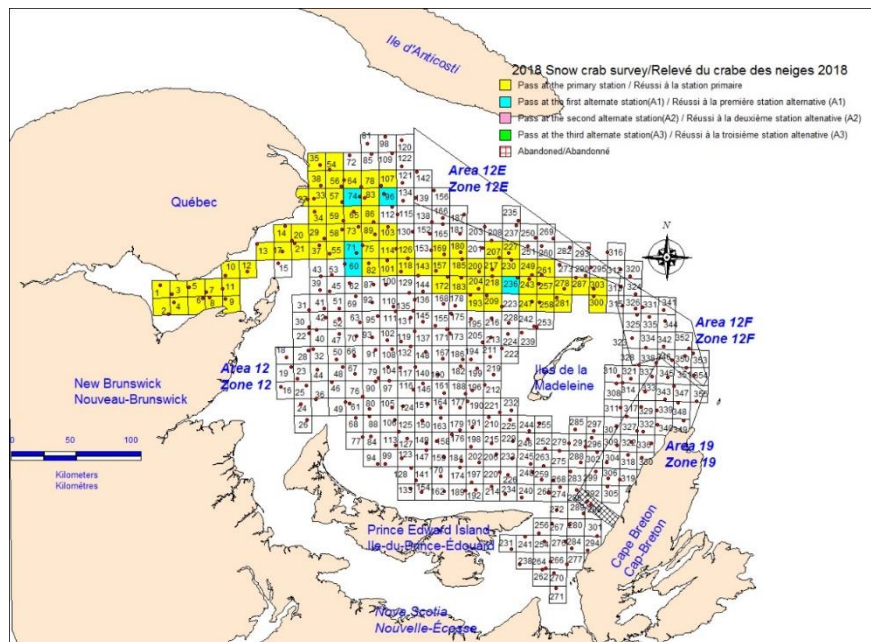
Appendix 2b. Stations visited during trip 2 in 2018. Alter. Indicates alternate stations.

Date	Departure	Arrival	Station category					Total	Total successful tows	Number of damaged nets
			Primary	Alter. 1	Alter. 2	Alter. 3	Abandoned			
30-Jul	Moncton	Cap-aux-Meules At sea	-	-	-	-	-	-	-	-
31-Jul	At sea	At sea	9	2	0	0	0	11	11	0
01-Aug	At sea	At sea	11	1	0	0	0	12	12	0
02-Aug	At sea	At sea	4	1	1	0	0	6	6	1
03-Aug	At sea	At sea	7	0	0	0	1	8	7	1
04-Aug	At sea	At sea	11	1	0	0	0	12	12	0
05-Aug	At sea	At sea	11	0	0	0	0	11	11	0
06-Aug	At sea	At sea	10	2	0	0	0	12	12	0
07-Aug	At sea	At sea	10	1	0	0	0	11	11	0
08-Aug	At sea	Caraquet	1	0	1	0	0	2	2	1
Total (Trip 2)			74	8	2	0	1	85	84	3
Total cumulative			127	13	2	0	1	143	142	5



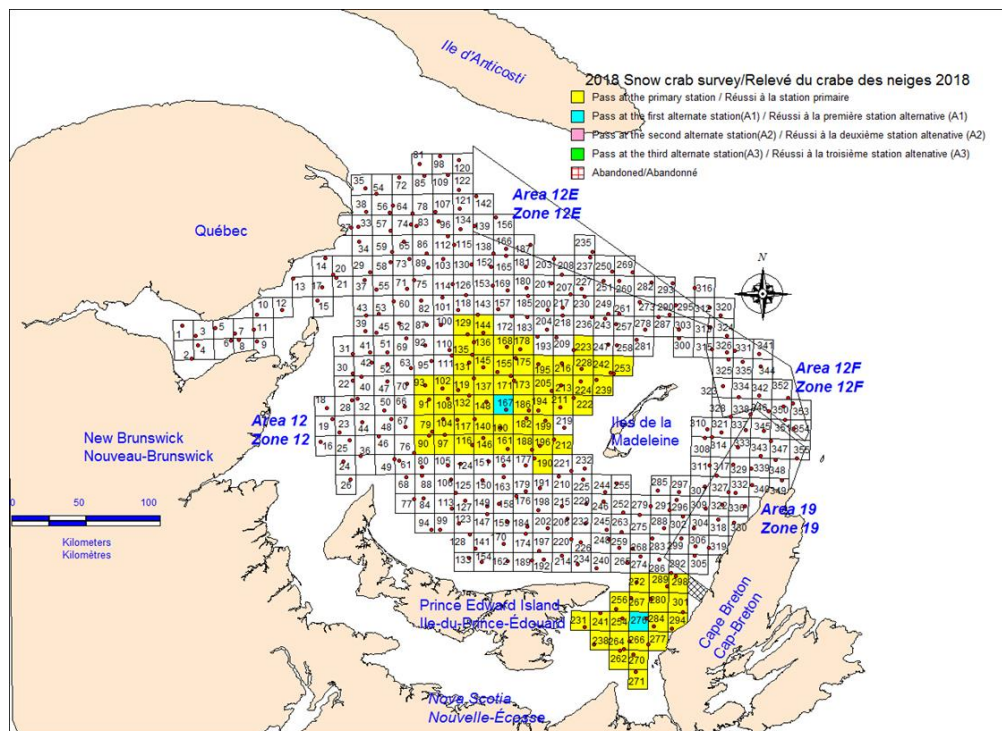
Appendix 2c. Stations visited during trip 3 in 2018. Alter. Indicates alternate stations.

Date	Departure	Arrival	Station category					Total	Total successful tows	Number of damaged nets
			Primary	Alter. 1	Alter. 2	Alter. 3	Abandoned			
13-Aug	Caraquet	At sea	4	0	0	0	0	4	4	0
14-Aug	At sea	At sea	10	0	0	0	0	10	10	0
15-Aug	At sea	At sea	9	0	0	0	0	9	9	0
16-Aug	At sea	At sea	9	0	0	0	0	9	9	0
17-Aug	At sea	At sea	7	2	0	0	0	9	9	1
18-Aug	At sea	At sea	7	2	0	0	0	9	9	0
19-Aug	At sea	At sea	12	0	0	0	0	12	12	0
20-Aug	At sea	At sea	12	1	0	0	0	13	13	1
21-Aug	At sea	At sea	2	0	0	0	0	2	2	0
<b>Total (Trip 3)</b>			<b>72</b>	<b>5</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>77</b>	<b>77</b>	<b>2</b>
<b>Total cumulative</b>			<b>199</b>	<b>18</b>	<b>2</b>	<b>0</b>	<b>1</b>	<b>220</b>	<b>219</b>	<b>7</b>



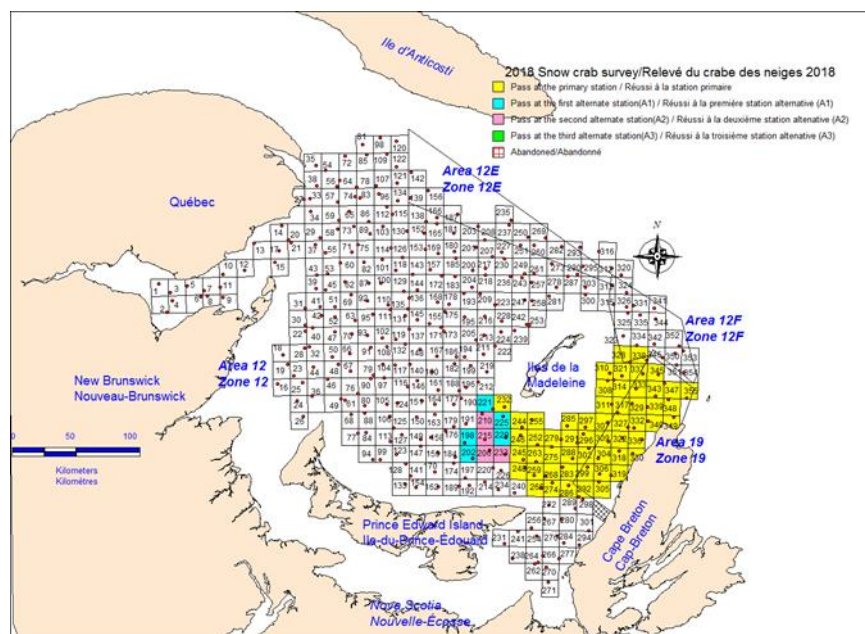
Appendix 2d. Stations visited during trip 4 in 2018. Alter. Indicates alternate stations.

Date	Departure	Arrival	Station category					Total	Total successful tows	Number of damaged nets
			Primary	Alter. 1	Alter. 2	Alter. 3	Abandoned			
24-Aug	Moncton	Cap-aux-Meules	-	-	-	-	-	-	-	-
25-Aug	At sea	At sea	10	0	0	0	0	10	10	0
26-Aug	At sea	At sea	11	0	0	0	0	11	11	0
27-Aug	At sea	At sea	13	0	0	0	0	13	13	0
28-Aug	At sea	At sea	10	0	0	0	0	10	10	0
29-Aug	Cap-aux-Meules	Strong winds	-	-	-	-	-	-	-	-
30-Aug	Cap-aux-Meules	Strong winds	-	-	-	-	-	-	-	-
31-Aug	Cap-aux-Meules	Strong winds	-	-	-	-	-	-	-	-
01-Sept	At sea	At sea	6	1	0	0	0	7	7	1
02-Sept	At sea	At sea	11	0	0	0	0	11	11	0
03-Sept	At sea	Cheticamp	8	1	0	0	0	9	9	1
<b>Total (Trip 4)</b>			<b>69</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>71</b>	<b>71</b>	<b>2</b>
<b>Total cumulative</b>			<b>268</b>	<b>20</b>	<b>2</b>	<b>0</b>	<b>1</b>	<b>291</b>	<b>290</b>	<b>9</b>



Appendix 2e. Stations visited during trip 5 in 2018. Alter. Indicates alternate stations.

Date	Departure	Arrival	Station category					Total	Total successful tows	Number of damaged nets
			Primary	Alter. 1	Alter. 2	Alter. 3	Abandoned			
07-Sept	At sea	At sea	9	0	1	0	0	10	10	0
08-Sept	At sea	At sea	0	0	1	0	0	1	1	1
09-Sept	At sea	At sea	-	-	-	-	-	-	-	-
10-Sept	At sea	At sea	0	4	1	0	0	5	5	1
11-Sept	At sea	At sea	1	1	1	0	0	3	3	0
12-Sept	At sea	At sea	7	0	0	0	0	7	7	0
13-Sept	At sea	At sea	11	0	0	0	0	11	11	0
14-Sept	At sea	At sea	12	0	0	0	0	12	12	0
15-Sept	At sea	At sea	10	0	0	0	0	10	10	0
16-Sept	At sea	Chéticamp	5	0	0	0	0	5	5	0
Total (Trip 5)			55	5	4	0	0	64	64	2
Total cumulative			323	25	6	0	1	355	354	11





Appendix 3. Summary details for each successful tow from the 2017 snow crab survey. Columns are: Date, Area (crab fishing area), Tow # (sequential daily tow number), Latitude (tow mid-point in decimal degrees), Longitude (tow mid-point in decimal degrees), Swept area (area covered by the trawl in square meters), Depth (water depth in meters), T (bottom temperature in °C, provided by the VEMCO® Minilog probe attached to the head rope), Commercial count (number of male commercial crab, >= 95 mm carapace width, all carapace conditions), commercial weight (weight of male commercial crab in kg), residual count (number of male commercial crab with carapace conditions 3, 4 and 5), residual weight (weight of male commercial crab with carapace conditions 3, 4 and 5 in kg), and station type (whether the station is primary (P) or an alternate station (A1, A2 or A3 (first, second and third alternate stations, respectively))).

Date (mm/dd)	Area	Tow number	Latitude	Longitude	Swept area (m <sup>2</sup> )	Depth (m)	Tempe- rature (°C)	Commercial count	Commercial weight (kg)	Residual count	Residual weight (kg)	Station type
07/10	F	1	47.38295	-60.39235	3262	80.5	1.0	0	0.0	0	0.0	P
07/10	F	2	47.42970	-60.46609	3028	93.3	1.6	7	4.4	1	0.7	P
07/10	F	3	47.52631	-60.40263	2593	301.8	6.6	0	0.0	0	0.0	P
07/10	F	4	47.55990	-60.44543	1726	228.6	5.8	0	0.0	0	0.0	P
07/10	F	5	47.51116	-60.48468	2929	140.8	3.2	0	0.0	0	0.0	P
07/10	12	6	47.48028	-60.60762	2590	76.8	0.9	8	4.7	8	4.7	P
07/10	F	7	47.57105	-60.69140	2576	56.7	0.8	11	6.4	3	1.4	P
07/10	F	8	47.56187	-60.86368	2346	49.4	0.8	1	0.4	1	0.4	P
07/10	F	9	47.62638	-61.00226	2833	38.4	3.4	7	3.7	0	0.0	P
07/10	F	10	47.78104	-60.95514	2459	54.9	0.9	79	45.3	16	10.3	P
07/11	F	8	47.84272	-61.09158	2692	49.4	0.9	3	1.6	1	0.7	A2
07/11	F	1	47.76914	-60.83215	2572	69.5	0.7	6	3.1	2	1.0	P
07/11	F	2	47.74207	-60.67678	2601	84.1	1.0	7	3.8	1	0.5	P
07/11	F	3	47.81399	-60.69300	2547	192.0	4.6	9	5.2	2	1.4	P
07/11	F	4	47.83071	-60.90022	2643	71.3	0.6	3	1.6	3	1.6	P
07/11	F	5	47.82104	-60.96419	2613	60.4	0.5	33	19.0	9	5.6	P
07/11	F	9	47.91752	-60.96766	2762	86.0	0.7	0	0.0	0	0.0	P
07/11	F	10	47.96776	-61.10728	2674	82.3	0.7	18	10.6	4	2.1	P
07/12	12	1	48.03507	-61.02321	2670	285.3	6.4	0	0.0	0	0.0	P
07/12	12	2	48.07904	-61.11586	2716	301.8	6.4	0	0.0	0	0.0	P
07/12	12	3	48.13913	-61.07119	2716	362.1	6.1	0	0.0	0	0.0	P
07/12	E	4	48.09433	-61.40407	2638	95.1	0.7	4	2.3	0	0.0	P
07/12	E	5	48.21966	-61.43024	2617	362.1	6.1	0	0.0	0	0.0	P
07/13	E	1	48.22242	-61.61374	2.654	314.6	6.3	0	0.0	0	0.0	P
07/13	E	2	48.28394	-61.77288	2566	340.2	6.2	0	0.0	0	0.0	P
07/13	E	3	48.23134	-61.88633	1304	214.0	6.0	1	0.4	1	0.4	P
07/13	E	4	48.28524	-61.95128	2293	241.4	6.0	0	0.0	0	0.0	P
07/13	E	5	48.23322	-62.02225	2560	102.4	1.6	0	0.0	0	0.0	P
07/13	E	6	48.36892	-62.13698	2578	287.1	6.4	0	0.0	0	0.0	P
07/13	E	7	48.39898	-62.11702	2578	362.1	6.2	0	0.0	0	0.0	P
07/13	E	8	48.36034	-62.44726	3088	254.2	6.2	0	0.0	0	0.0	P
07/13	E	9	48.44128	-62.64846	3187	334.7	6.2	0	0.0	0	0.0	P
07/14	12	1	48.82188	-63.76948	3169	182.9	4.2	0	0.0	0	0.0	P
07/14	12	2	48.83098	-63.55418	2856	237.7	5.5	0	0.0	0	0.0	P
07/14	12	3	48.89638	-63.59313	2828	296.3	6.0	0	0.0	0	0.0	P
07/14	12	4	48.94103	-63.42376	2816	351.1	6.1	0	0.0	0	0.0	P

Date (mm/dd)	Area	Tow number	Latitude	Longitude	Swept area (m <sup>2</sup> )	Depth (m)	Tempe- rature (°C)	Commercial count	Commercial weight (kg)	Residual count	Residual weight (kg)	Station type
07/14	12	5	48.92038	-63.26026	2943	382.2	6.0	0	0.0	0	0.0	P
07/14	12	6	48.83561	-63.35429	2943	305.4	6.1	0	0.0	0	0.0	P
07/14	12	7	48.75267	-63.25960	2956	276.1	6.0	0	0.0	0	0.0	P
07/14	E	8	48.71460	-63.11132	2911	340.2	6.1	0	0.0	0	0.0	P
07/14	E	9	48.59778	-62.94381	2888	343.8	NA	0	0.0	0	0.0	P
07/15	12	6	47.70685	-61.95863	2377	40.2	1.0	1	0.4	0	0.0	A2
07/15	12	1	47.89534	-61.74235	2709	58.5	0.2	6	3.2	1	0.4	P
07/15	12	2	47.86348	-61.90735	2740	54.9	0.3	21	10.7	1	0.6	P
07/15	12	3	47.86659	-61.98488	2782	53.0	0.3	4	2.5	0	0.0	P
07/15	12	7	47.69980	-61.93639	2579	38.4	1.2	1	0.6	0	0.0	P
07/15	12	8	47.66353	-62.08339	2887	42.1	1.5	0	0.0	0	0.0	P
07/15	12	9	47.55821	-62.27655	2510	54.9	-0.3	5	2.4	4	1.8	P
07/15	12	10	47.50621	-62.39183	2833	60.4	-0.5	5	2.2	5	2.2	P
07/15	12	11	47.38573	-62.35820	2375	51.2	-0.2	3	1.6	2	0.8	P
07/20	12	4	46.71678	-62.21624	3184	65.8	-0.4	1	0.6	0	0.0	A1
07/20	12	9	46.66193	-62.57577	2215	53.0	0.6	12	7.0	0	0.0	A2
07/20	12	1	46.56250	-62.08607	3083	43.9	1.3	0	0.0	0	0.0	P
07/20	12	2	46.58553	-62.24291	2472	49.4	1.2	0	0.0	0	0.0	P
07/20	12	5	46.73477	-62.29798	2662	65.8	-0.4	15	8.3	1	0.7	P
07/20	12	6	46.63870	-62.37532	2719	58.5	0.2	10	6.2	0	0.0	P
07/20	12	10	46.61188	-62.53528	2483	47.5	1.1	1	0.5	0	0.0	P
07/20	12	11	46.61030	-62.63218	2750	47.5	1.0	0	0.0	0	0.0	P
07/20	12	12	46.76558	-62.68918	3555	54.9	0.0	1	0.5	0	0.0	P
07/20	12	13	46.70406	-62.87948	2760	54.9	0.9	57	28.9	0	0.0	P
07/21	12	7	46.75958	-63.16602	2723	49.4	0.4	1	1.0	0	0.0	A2
07/21	12	1	46.60354	-62.84527	3531	53.0	1.0	2	0.9	0	0.0	P
07/21	12	2	46.60146	-63.06507	2741	47.5	1.7	5	2.3	1	0.4	P
07/21	12	3	46.62078	-63.16910	2299	43.9	0.9	3	1.5	0	0.0	P
07/21	12	4	46.67633	-63.11978	2538	45.7	0.9	2	1.3	0	0.0	P
07/21	12	8	46.82551	-63.25941	2725	49.4	-0.2	0	0.0	0	0.0	P
07/21	12	9	46.78763	-63.42000	2230	43.9	0.9	13	7.0	1	0.5	P
07/21	12	10	46.78727	-63.49576	2591	42.1	0.7	3	1.7	0	0.0	P
07/21	12	11	46.91194	-63.31715	2757	56.7	-0.5	12	5.4	4	1.6	P
07/21	12	12	46.95990	-63.20239	2568	58.5	-0.4	46	24.6	5	2.4	P
07/21	12	13	47.00550	-63.28507	2910	56.7	-0.6	16	7.7	2	0.9	P
07/22	12	2	46.97223	-63.56026	2481	45.7	1.3	8	4.9	0	0.0	P
07/22	12	3	46.97070	-63.64444	2692	43.9	1.7	1	0.6	0	0.0	P
07/22	12	4	47.09908	-63.70839	3088	54.9	0.0	6	2.9	0	0.0	P
07/22	12	5	47.10713	-63.57221	3804	40.2	-0.3	0	0.0	0	0.0	P
07/23	12	1	47.15899	-63.57308	1490	53.0	-0.5	0	0.0	0	0.0	A1
07/23	12	2	47.23977	-63.64242	2805	65.8	-0.8	9	4.5	1	0.4	P
07/23	12	3	47.19422	-63.77348	2926	54.9	-0.3	7	3.5	3	1.2	P
07/23	12	4	47.20173	-63.81287	2758	47.5	0.3	2	1.1	0	0.0	P
07/23	12	5	47.08289	-64.18714	3377	47.5	2.3	5	2.5	0	0.0	P
07/23	12	6	47.18961	-64.24504	2802	40.2	1.0	4	2.3	0	0.0	P
07/24	12	12	47.65400	-63.87359	3450	56.7	0.0	0	0.0	0	0.0	A1
07/24	12	1	47.22292	-64.09905	2590	40.2	1.5	1	0.4	0	0.0	P

Date (mm/dd)	Area	Tow number	Latitude	Longitude	Swept area (m <sup>2</sup> )	Depth (m)	Tempe- rature (°C)	Commercial count	Commercial weight (kg)	Residual count	Residual weight (kg)	Station type
07/24	12	2	47.33458	-63.94819	2650	40.2	1.3	6	4.0	0	0.0	P
07/24	12	3	47.41657	-64.08376	2194	36.6	0.5	4	2.3	0	0.0	P
07/24	12	4	47.31160	-64.19584	1893	45.7	0.5	0	0.0	0	0.0	P
07/24	12	5	47.35961	-64.28206	2473	54.9	0.0	3	1.6	0	0.0	P
07/24	12	6	47.30182	-64.44392	2200	42.1	1.5	6	3.0	0	0.0	P
07/24	12	7	47.43644	-64.34515	2715	53.0	0.5	15	7.6	2	0.8	P
07/24	12	8	47.50177	-64.39168	2712	45.7	1.3	16	9.1	0	0.0	P
07/24	12	9	47.54525	-64.17696	2739	64.0	0.1	8	4.3	1	0.4	P
07/24	12	10	47.55402	-64.12923	2239	65.8	0.1	3	1.6	0	0.0	P
07/25	12	1	47.98024	-63.41490	4266	76.8	0.2	1	0.7	1	0.7	P
07/25	12	2	47.98006	-63.53381	3294	76.8	0.4	1	0.4	1	0.4	P
07/25	12	3	47.86328	-63.54820	3076	64.0	-0.1	0	0.0	0	0.0	P
07/25	12	4	47.77151	-63.49158	3973	76.8	-0.1	7	3.1	0	0.0	P
07/25	12	5	47.80418	-63.32010	3257	80.5	-0.1	8	4.6	0	0.0	P
07/25	12	6	47.83485	-63.34123	3570	75.0	0.0	3	1.9	0	0.0	P
07/25	12	7	47.76236	-63.16989	3269	71.3	-0.1	3	1.6	0	0.0	P
07/25	12	8	47.73764	-63.05023	3432	71.3	-0.1	5	2.2	3	1.2	P
07/25	12	9	47.80853	-63.14503	2227	73.2	0.0	4	1.9	2	1.0	P
07/25	12	10	47.88238	-63.13064	3197	69.5	-0.1	2	1.1	1	0.5	P
07/25	12	11	47.93680	-63.05437	3094	62.2	0.0	3	1.7	2	1.0	P
07/25	12	12	47.92752	-63.18673	2741	64.0	-0.1	3	1.2	0	0.0	P
07/25	12	13	48.04166	-63.09722	2485	58.5	0.1	0	0.0	0	0.0	P
07/26	12	1	48.06733	-63.26524	4135	76.8	0.0	1	0.4	0	0.0	P
07/26	12	2	48.15386	-63.20183	3227	73.2	0.1	2	1.0	0	0.0	P
07/26	12	3	48.21418	-63.31451	4152	95.1	0.5	2	1.0	0	0.0	P
07/26	12	4	48.13668	-63.40050	2742	109.7	0.7	8	4.1	2	1.1	P
07/26	12	5	48.11849	-63.58301	3598	91.4	0.9	4	3.1	0	0.0	P
08/01	12	1	47.78498	-65.54242	2487	40.2	0.5	5	3.0	0	0.0	P
08/01	12	2	47.86123	-65.48880	2099	60.4	0.5	2	1.3	0	0.0	P
08/01	12	3	47.91608	-65.51509	2813	47.5	0.4	4	2.4	0	0.0	P
08/01	12	4	47.97608	-65.62636	2737	45.7	0.6	3	2.2	1	0.5	P
08/01	12	5	47.96085	-65.34078	2749	45.7	1.3	8	5.3	1	0.6	P
08/01	12	6	47.89200	-65.20878	2444	69.5	0.6	18	12.6	1	1.0	P
08/01	12	7	47.92962	-65.17351	2421	75.0	0.6	6	3.5	1	0.4	P
08/01	12	8	47.89640	-65.13913	2444	76.8	0.6	9	6.2	2	0.9	P
08/01	12	9	47.88763	-64.98907	2644	47.5	0.5	7	4.4	0	0.0	P
08/01	12	10	47.95243	-65.01570	1589	80.5	0.6	3	1.5	0	0.0	P
08/01	12	11	48.04105	-64.98703	2421	86.0	0.6	7	4.6	2	1.2	P
08/01	12	12	48.06711	-64.77342	2563	84.1	0.7	7	4.0	0	0.0	P
08/02	12	1	48.24576	-64.67508	2497	87.8	0.8	2	1.2	1	0.4	P
08/02	12	2	48.23594	-64.51548	2319	98.8	0.9	12	9.8	1	1.2	P
08/02	12	3	48.36446	-64.40386	3536	67.7	0.8	1	0.4	0	0.0	P
08/02	12	4	48.27012	-64.33418	2481	111.6	1.0	14	9.5	1	0.6	P
08/02	12	5	48.25148	-64.30598	2374	95.1	0.8	4	2.2	0	0.0	P
08/02	12	6	48.14206	-64.33754	2284	34.7	1.3	0	0.0	0	0.0	P
08/02	12	7	48.23735	-64.06902	3057	62.2	0.6	4	2.3	1	0.4	P
08/02	12	8	48.28057	-64.01718	3673	71.3	0.7	0	0.0	0	0.0	P



Date (mm/dd)	Area	Tow number	Latitude	Longitude	Swept area (m <sup>2</sup> )	Depth (m)	Tempe- rature (°C)	Commercial count	Commercial weight (kg)	Residual count	Residual weight (kg)	Station type
08/02	12	9	48.18173	-63.96463	2926	51.2	0.7	0	0.0	0	0.0	P
08/02	12	3	48.04268	-63.94556	2707	82.3	0.7	3	2.0	0	0.0	A1
08/03	12	1	48.03378	-64.05473	1758	40.2	1.3	0	0.0	0	0.0	P
08/03	12	4	48.11706	-63.81650	2848	91.4	0.9	1	0.8	0	0.0	P
08/03	12	5	48.18811	-63.70103	2187	104.2	1.0	2	0.9	0	0.0	P
08/03	12	6	48.23796	-63.64515	3191	98.8	1.1	1	0.9	0	0.0	P
08/03	12	7	48.30781	-63.52035	3516	96.9	1.1	0	0.0	0	0.0	P
08/03	12	8	48.39044	-63.53846	3308	109.7	1.1	0	0.0	0	0.0	P
08/03	12	9	48.35913	-63.68293	3708	89.6	0.2	0	0.0	0	0.0	P
08/03	12	10	48.34048	-63.84274	2280	107.9	2.2	5	2.3	3	1.3	P
08/03	12	11	48.39830	-63.83304	3134	109.7	2.7	6	3.5	1	0.6	P
08/03	12	12	48.45811	-63.73294	1331	153.6	3.6	0	0.0	0	0.0	P
08/04	12	1	48.51918	-63.84437	3326	58.5	0.6	0	0.0	0	0.0	P
08/04	12	2	48.45592	-64.11568	3158	65.8	1.4	1	0.7	0	0.0	P
08/04	12	3	48.53865	-64.17963	2529	78.6	1.3	3	2.9	0	0.0	P
08/04	12	4	48.54192	-64.12191	2347	100.6	2.1	9	6.6	1	1.1	P
08/04	12	5	48.62679	-64.05030	2210	84.1	1.3	1	0.5	1	0.5	P
08/04	12	6	48.75970	-64.06074	3476	76.8	1.1	0	0.0	0	0.0	P
08/04	12	7	48.73058	-63.96387	2334	144.5	3.7	3	1.7	2	1.0	P
08/04	12	8	48.62132	-63.85018	2851	168.2	3.8	0	0.0	0	0.0	P
08/04	12	9	48.66216	-63.82285	3983	142.6	3.5	0	0.0	0	0.0	P
08/04	12	10	48.61796	-63.65303	2875	120.7	NA	0	0.0	0	0.0	P
08/04	12	11	48.55575	-63.66732	3054	140.8	3.5	0	0.0	0	0.0	P
08/09	12	4	48.57363	-63.43372	1882	128.0	3.2	0	0.0	0	0.0	A1
08/09	12	9	48.48633	-63.35244	3608	118.9	3.3	0	0.0	0	0.0	A1
08/09	12	1	48.54809	-63.61961	3195	124.4	3.7	0	0.0	0	0.0	P
08/09	12	2	48.62790	-63.45867	3065	157.3	4.4	0	0.0	0	0.0	P
08/09	12	5	48.64395	-63.25238	2110	206.7	4.5	0	0.0	0	0.0	P
08/09	E	6	48.54578	-63.12723	2764	223.1	4.7	0	0.0	0	0.0	P
08/09	12	7	48.52991	-63.24583	2799	126.2	3.1	0	0.0	0	0.0	P
08/09	12	10	48.44023	-63.29699	4113	98.8	2.7	0	0.0	0	0.0	P
08/09	12	11	48.36038	-63.39670	2639	86.0	1.0	0	0.0	0	0.0	P
08/10	12	1	48.06925	-62.92063	2624	65.8	0.1	3	1.5	3	1.5	P
08/10	12	2	48.02868	-62.80842	3420	80.5	0.2	5	2.2	3	1.3	P
08/10	12	3	48.02448	-62.67458	4031	86.0	0.5	2	1.0	0	0.0	P
08/10	12	4	48.14582	-62.66469	4165	98.8	1.1	2	0.9	2	0.9	P
08/10	12	5	48.19267	-62.68294	3362	91.4	0.9	2	1.2	1	0.5	P
08/10	12	6	48.18113	-62.84290	2778	75.0	0.2	0	0.0	0	0.0	P
08/10	12	7	48.20629	-62.97060	3305	73.2	0.2	1	0.4	0	0.0	P
08/10	12	8	48.31433	-62.98237	2827	78.6	0.8	3	1.2	1	0.4	P
08/10	12	9	48.32939	-63.15158	2477	51.2	0.2	0	0.0	0	0.0	P
08/10	12	10	48.38989	-62.96485	2718	75.0	0.1	1	0.6	0	0.0	P
08/10	12	11	48.41797	-62.85763	3120	166.4	3.2	0	0.0	0	0.0	P
08/10	12	12	48.37577	-62.85483	3582	91.4	1.4	0	0.0	0	0.0	P
08/10	12	13	48.31300	-62.68476	3836	93.3	2.2	0	0.0	0	0.0	P
08/11	12	10	47.95373	-62.50524	2533	65.8	0.2	0	0.0	0	0.0	A1
08/11	12	1	48.21796	-62.46593	3104	64.0	0.1	0	0.0	0	0.0	P

Date (mm/dd)	Area	Tow number	Latitude	Longitude	Swept area (m <sup>2</sup> )	Depth (m)	Tempe- rature (°C)	Commercial count	Commercial weight (kg)	Residual count	Residual weight (kg)	Station type
08/11	12	2	48.26833	-62.37708	2793	75.0	0.7	2	0.9	1	0.4	P
08/11	12	3	48.15473	-62.30305	2775	78.6	0.8	1	0.6	0	0.0	P
08/11	12	4	48.18620	-62.20963	2342	86.0	1.6	5	2.8	1	0.5	P
08/11	12	5	48.14288	-62.18533	2646	87.8	1.6	2	0.8	1	0.4	P
08/11	12	6	48.07938	-62.37378	2862	73.2	0.4	4	1.8	0	0.0	P
08/11	12	7	48.03418	-62.37273	2497	80.5	1.0	4	2.3	2	1.1	P
08/11	12	8	48.06503	-62.50068	2772	60.4	0.4	0	0.0	0	0.0	P
08/11	12	11	47.90950	-62.42794	2830	73.2	0.5	3	1.1	1	0.4	P
08/11	12	12	47.91453	-62.58669	2870	64.0	-0.1	0	0.0	0	0.0	P
08/11	12	13	47.84108	-62.73178	3312	69.5	0.1	3	1.3	1	0.4	P
08/11	12	14	47.85383	-62.84688	3406	76.8	0.1	4	1.8	3	1.3	P
08/12	12	7	47.95253	-61.66850	3148	58.5	0.4	1	0.4	0	0.0	A1
08/12	12	1	47.90503	-61.37784	2619	54.9	1.1	0	0.0	0	0.0	P
08/12	12	2	47.95431	-61.37865	2816	58.5	0.7	6	3.5	0	0.0	P
08/12	12	3	48.04131	-61.45949	2826	69.5	0.3	0	0.0	0	0.0	P
08/12	12	4	48.02787	-61.55358	3035	60.4	0.4	0	0.0	0	0.0	P
08/12	12	5	48.10993	-61.71124	2717	93.3	1.4	6	3.2	1	0.6	P
08/12	12	8	48.04556	-61.88520	2814	62.2	0.2	3	1.4	2	0.9	P
08/12	12	9	47.98327	-61.91598	2665	58.5	0.4	9	4.6	2	0.9	P
08/12	12	10	48.01549	-62.00634	2926	56.7	0.4	1	0.4	1	0.4	P
08/19	12	7	47.08305	-62.19579	1648	47.5	0.8	0	0.0	0	0.0	A1
08/19	12	1	46.82656	-62.17384	3461	82.3	0.1	18	8.9	1	0.6	P
08/21	12	8	47.65381	-62.21744	2664	53.0	0.2	6	2.6	2	0.7	A2
08/21	12	1	48.04221	-61.98521	3102	58.5	0.3	0	0.0	0	0.0	P
08/21	12	2	48.02403	-62.11983	2737	58.5	0.2	2	1.0	0	0.0	P
08/21	12	3	47.83673	-62.27785	2970	60.4	0.2	6	2.7	3	1.2	P
08/21	12	4	47.75998	-62.37862	2709	64.0	-0.1	2	1.1	1	0.6	P
08/21	12	5	47.72639	-62.20948	2942	56.7	0.0	3	1.3	0	0.0	P
08/21	12	9	47.63235	-62.38516	2961	54.9	-0.2	11	5.4	1	0.6	P
08/21	12	10	47.60087	-62.46511	3555	73.2	-0.2	11	5.4	8	4.1	P
08/21	12	11	47.48819	-62.57722	2642	67.7	-0.2	8	4.7	6	3.4	P
08/21	12	12	47.48803	-62.65910	2702	58.5	0.1	2	0.8	0	0.0	P
08/22	12	4	46.90432	-62.58072	2804	62.2	0.1	2	1.1	0	0.0	A1
08/22	12	1	46.85238	-62.33155	2876	64.0	0.2	5	2.5	0	0.0	P
08/22	12	2	46.92833	-62.37603	3119	62.2	0.4	25	13.1	3	1.2	P
08/22	12	5	47.03123	-62.56666	2781	62.2	0.1	2	0.9	1	0.4	P
08/22	12	6	47.01366	-62.68495	3095	67.7	0.1	10	5.2	6	3.2	P
08/22	12	9	46.94208	-62.91454	2532	60.4	-0.3	22	12.1	6	2.8	P
08/22	12	10	46.92613	-63.01660	3016	60.4	-0.3	15	7.2	10	4.7	P
08/22	12	11	46.88265	-63.02068	3479	60.4	-0.2	4	1.9	1	0.4	P
08/22	12	8	46.98939	-62.76595	2751	64.0	0.2	24	12.3	6	3.3	P
08/24	12	9	47.08501	-63.32395	2742	56.7	-0.3	11	5.1	2	0.8	A1
08/24	12	4	46.83383	-62.84310	2631	58.5	0.0	17	9.3	1	0.6	A2
08/24	12	8	47.08109	-63.05766	2370	56.7	0.1	2	1.3	0	0.0	A3
08/24	12	1	46.79608	-62.49738	2606	60.4	0.1	18	10.0	0	0.0	P
08/24	12	2	46.80542	-62.67539	2801	60.4	0.2	24	12.9	0	0.0	P
08/24	12	10	47.16746	-63.35030	3474	56.7	-0.3	9	5.1	0	0.0	P

Date (mm/dd)	Area	Tow number	Latitude	Longitude	Swept area (m <sup>2</sup> )	Depth (m)	Tempe- rature (°C)	Commercial count	Commercial weight (kg)	Residual count	Residual weight (kg)	Station type
08/25	12	1	47.90603	-63.70853	3376	67.7	0.7	1	0.4	1	0.4	P
08/25	12	2	47.99188	-63.76839	2433	96.9	1.2	5	3.4	3	1.9	P
08/25	12	3	47.93799	-63.96731	2660	91.4	0.9	4	2.7	1	0.5	P
08/25	12	4	47.94373	-64.05631	3357	62.2	0.9	2	1.6	0	0.0	P
08/25	12	5	47.81290	-64.16583	3155	58.5	0.7	2	0.8	2	0.8	P
08/25	12	6	47.69898	-64.16481	1987	71.3	0.7	2	0.9	2	0.9	P
08/25	12	7	47.65878	-64.16419	2572	69.5	0.7	1	0.7	0	0.0	P
08/25	12	8	47.68283	-64.09176	2006	75.0	0.7	10	5.3	3	1.3	P
08/25	12	9	47.76338	-64.00457	2389	82.3	0.7	6	3.5	0	0.0	P
08/25	12	12	47.82351	-63.87455	2164	82.3	0.8	3	2.2	0	0.0	P
08/25	12	11	47.82382	-64.02253	2134	89.6	0.7	6	2.6	5	2.2	P
08/26	12	3	47.73109	-63.67124	3587	69.5	0.8	11	7.2	1	0.5	A1
08/26	12	6	47.63200	-63.54987	3116	67.7	0.5	12	7.0	5	2.5	A1
08/26	12	10	47.48839	-63.89996	2928	60.4	0.4	13	7.0	2	0.8	A1
08/26	12	1	47.75394	-63.87427	2910	75.0	0.7	18	10.5	0	0.0	P
08/26	12	4	47.64212	-63.70368	3327	71.3	0.7	10	4.8	7	2.7	P
08/26	12	7	47.55088	-63.51273	3513	71.3	0.2	5	3.5	0	0.0	P
08/26	12	8	47.50973	-63.72415	3784	69.5	0.5	2	1.0	0	0.0	P
08/26	12	11	47.43828	-63.83723	3700	60.4	0.1	3	1.3	1	0.4	P
08/26	12	12	47.38977	-63.71422	3604	65.8	0.3	2	1.3	1	0.4	P
08/27	12	2	47.75449	-62.58266	2640	69.5	0.4	9	4.2	5	2.1	A1
08/27	12	3	47.66050	-62.78897	2967	58.5	0.0	2	0.8	1	0.4	P
08/27	12	4	47.68683	-62.81321	3086	58.5	0.0	3	1.2	2	0.8	P
08/27	12	5	47.79229	-62.77712	3361	64.0	0.1	0	0.0	0	0.0	P
08/27	12	6	47.70770	-62.92974	2917	58.5	0.1	1	0.4	0	0.0	P
08/27	12	7	47.67228	-63.13109	2817	65.8	0.1	12	6.1	6	2.9	P
08/27	12	8	47.57488	-63.17311	2900	65.8	0.0	9	4.5	1	0.7	P
08/27	12	9	47.60358	-63.26787	4019	86.0	0.1	8	4.0	6	2.5	P
09/06	12	1	46.32165	-61.91784	3611	40.2	3.0	14	10.6	1	0.8	P
09/06	12	2	46.29878	-62.04857	1952	40.2	3.2	0	0.0	0	0.0	P
09/08	12	1	46.21525	-62.18386	1961	32.9	4.4	0	0.0	0	0.0	P
09/08	12	2	46.11008	-62.10283	2513	38.4	3.1	0	0.0	0	0.0	P
09/08	12	3	46.07156	-61.88011	1904	45.7	1.6	4	2.3	1	0.7	P
09/08	12	4	46.08405	-61.84463	1837	47.5	1.4	6	4.2	2	1.5	P
09/08	12	5	46.04825	-61.76388	1937	51.2	1.3	6	4.1	3	1.9	P
09/08	12	6	45.94698	-61.74571	2010	40.2	1.7	9	6.3	1	0.7	P
09/08	12	7	46.10994	-61.63837	1887	49.4	1.3	5	3.1	0	0.0	P
09/08	12	8	46.12882	-61.79777	1791	49.4	1.3	4	2.5	0	0.0	P
09/08	12	9	46.26403	-61.86172	1980	49.4	1.3	19	13.0	1	0.7	P
09/08	12	10	46.38780	-61.78718	2516	40.2	2.3	8	5.3	0	0.0	P
09/09	12	11	47.07353	-62.07958	2471	45.7	1.1	0	0.0	0	0.0	A1
09/09	12	1	46.47959	-61.73947	2579	40.2	1.1	1	0.7	0	0.0	P
09/09	12	2	46.59546	-61.81908	2844	56.7	0.7	0	0.0	0	0.0	P
09/09	12	3	46.63313	-61.70567	3098	62.2	1.1	3	1.5	0	0.0	P
09/09	12	4	46.67906	-61.77637	3033	65.8	0.8	8	4.4	4	1.8	P
09/09	12	5	46.68131	-61.88991	3037	56.7	0.7	2	1.1	0	0.0	P
09/09	12	6	46.73437	-61.97378	3360	82.3	0.7	11	5.7	2	0.9	P

Date (mm/dd)	Area	Tow number	Latitude	Longitude	Swept area (m <sup>2</sup> )	Depth (m)	Tempe- rature (°C)	Commercial count	Commercial weight (kg)	Residual count	Residual weight (kg)	Station type
09/09	12	7	46.79102	-61.99316	2968	58.5	1.0	3	2.0	0	0.0	P
09/09	12	8	46.77489	-61.86862	3109	67.7	1.0	4	1.9	1	0.5	P
09/09	12	9	46.88944	-61.85418	2656	58.5	1.0	29	17.7	1	0.4	P
09/09	12	12	47.01237	-62.00778	2609	47.5	1.0	9	4.5	1	0.4	P
09/10	12	2	47.05938	-61.90899	2368	36.6	1.6	0	0.0	0	0.0	A1
09/10	12	3	47.14785	-62.18398	2300	36.6	2.5	0	0.0	0	0.0	P
09/10	12	4	47.13652	-62.29833	2268	49.4	0.5	2	1.1	0	0.0	P
09/10	12	5	47.10039	-62.40574	2774	56.7	0.4	2	1.3	1	0.7	P
09/13	12	1	47.34652	-63.38028	2660	73.2	0.2	10	5.2	4	1.8	P
09/13	12	2	47.33982	-63.51401	3779	69.5	0.2	21	9.5	7	3.0	P
09/13	12	3	47.36505	-63.48828	3616	73.2	0.4	18	9.5	7	3.1	P
09/13	12	4	47.43813	-63.39726	2482	80.5	0.6	4	2.2	1	0.4	P
09/13	12	5	47.43309	-63.27358	3657	69.5	0.2	11	6.7	6	3.5	P
09/13	12	6	47.55698	-63.35649	3528	78.6	0.5	7	4.6	1	0.4	P
09/13	12	7	47.61483	-63.39912	3070	78.6	0.7	20	11.0	7	3.3	P
09/13	12	8	47.53853	-63.02294	2840	53.0	0.5	1	0.8	1	0.8	P
09/14	12	5	47.26310	-62.84009	2804	54.9	0.4	3	1.5	0	0.0	A1
09/14	12	1	47.48969	-62.85283	2842	49.4	1.0	0	0.0	0	0.0	A3
09/14	12	2	47.43494	-63.12816	3473	69.5	0.2	40	20.2	22	10.5	P
09/14	12	3	47.38456	-62.90385	2563	49.4	0.6	5	3.9	0	0.0	P
09/14	12	6	47.32876	-63.05375	2664	64.0	-0.1	25	12.7	5	2.4	P
09/14	12	7	47.28686	-63.14531	2736	67.7	-0.2	13	7.0	6	3.2	P
09/14	12	8	47.17684	-63.24489	3365	65.8	-0.3	16	8.7	5	2.6	P
09/14	12	10	47.18800	-63.00595	4095	60.4	0.2	10	5.5	0	0.0	P
09/15	12	1	47.16703	-62.87513	2788	60.4	0.2	15	7.3	2	0.8	P
09/15	12	2	47.09782	-62.87552	2648	58.5	0.2	15	7.6	3	1.3	P
09/15	12	3	47.16430	-62.68548	3165	65.8	0.0	17	8.6	9	4.5	P
09/15	12	4	47.20842	-62.61113	2990	65.8	0.0	12	5.8	8	3.8	P
09/15	12	5	47.25722	-62.63178	3315	64.0	0.0	8	4.0	4	2.2	P
09/15	12	6	47.27938	-62.56910	3057	64.0	0.0	9	4.1	4	1.6	P
09/15	12	7	47.44125	-62.67900	2795	64.0	0.1	4	1.8	1	0.4	P
09/15	12	8	47.42823	-62.51689	3185	75.0	0.1	7	3.2	2	0.9	P
09/16	12	6	46.30388	-61.34648	1974	47.5	2.3	1	0.5	0	0.0	A1
09/16	12	8	46.51430	-61.40674	2890	58.5	1.4	3	1.8	2	1.1	A1
09/16	12	1	46.20486	-61.43723	3081	38.4	3.1	2	1.1	0	0.0	P
09/16	12	2	46.21813	-61.59450	2243	54.9	1.3	2	1.1	0	0.0	P
09/16	12	3	46.26372	-61.65138	2017	60.4	1.4	3	1.8	1	0.4	P
09/16	12	4	46.38228	-61.62030	3046	54.9	1.1	17	9.9	2	1.0	P
09/16	12	9	46.45668	-61.47671	1785	64.0	1.4	3	1.7	3	1.7	P
09/16	12	10	46.53486	-61.44650	3434	64.0	1.3	2	1.4	2	1.4	P
09/16	12	11	46.61284	-61.54598	2978	60.4	0.8	6	3.2	5	2.5	P
09/17	19	7	47.20928	-60.36868	3056	186.5	5.7	0	0.0	0	0.0	A1
09/17	19	1	47.05191	-60.75005	2847	146.3	4.1	5	3.7	2	1.9	P
09/17	19	2	47.14993	-60.75915	2592	137.2	4.1	1	0.6	0	0.0	P
09/17	19	3	47.22233	-60.67783	2599	95.1	2.5	0	0.0	0	0.0	P
09/17	19	4	47.19858	-60.54782	1824	137.2	4.8	0	0.0	0	0.0	P
09/17	19	5	47.07734	-60.49885	481	135.3	NA	3	1.8	2	1.1	P

Date (mm/dd)	Area	Tow number	Latitude	Longitude	Swept area (m <sup>2</sup> )	Depth (m)	Tempe- rature (°C)	Commercial count	Commercial weight (kg)	Residual count	Residual weight (kg)	Station type
09/17	19	8	47.30862	-60.58993	2777	64.0	1.4	0	0.0	0	0.0	P
09/17	19	9	47.36693	-60.64958	2705	64.0	1.3	1	0.5	0	0.0	P
09/18	12	1	47.37135	-60.80528	2451	64.0	1.5	5	2.7	5	2.7	P
09/18	12	2	47.46212	-60.76629	2416	56.7	1.9	10	5.6	5	3.1	P
09/18	12	3	47.44855	-60.93324	2347	49.4	2.1	4	2.4	0	0.0	P
09/18	12	4	47.35988	-61.01077	2081	51.2	1.8	5	2.3	0	0.0	P
09/18	12	5	47.37844	-61.13764	2308	43.9	2.3	11	5.9	0	0.0	P
09/18	12	6	47.32503	-61.15459	2343	45.7	2.0	4	2.0	0	0.0	P
09/18	12	7	47.32913	-61.09754	2452	51.2	1.6	10	5.3	0	0.0	P
09/18	19	8	47.27064	-60.87188	3623	84.1	1.4	13	6.7	6	2.9	P
09/18	19	9	47.16962	-60.91558	3441	82.3	1.5	7	3.5	2	1.2	P
09/18	12	10	47.16775	-61.11319	3024	58.5	1.5	5	3.1	1	0.5	P
09/18	19	11	47.10858	-61.05353	3303	76.8	1.5	11	6.6	2	1.3	P
09/19	12	1	47.04308	-61.15663	3434	58.5	1.5	2	1.5	0	0.0	P
09/19	19	2	46.93663	-61.00670	3442	80.5	2.1	17	11.3	6	4.7	P
09/19	19	3	47.00878	-60.95319	2437	102.4	2.0	12	7.3	4	2.7	P
09/19	19	4	47.00668	-60.89159	3112	113.4	2.5	10	6.1	1	0.6	P
09/19	19	5	46.92643	-60.80982	2880	133.5	3.9	13	8.5	11	7.3	P
09/19	19	6	46.83075	-60.90341	3489	89.6	2.1	2	1.3	1	0.6	P
09/19	19	7	46.84848	-61.04363	3177	102.4	2.0	24	14.6	5	3.5	P
09/19	19	8	46.91287	-61.14799	2962	62.2	1.4	1	0.7	1	0.7	P
09/19	12	9	46.86638	-61.34329	3351	62.2	1.4	8	4.7	2	1.2	P
09/19	12	10	46.90233	-61.45490	3538	58.5	1.3	3	1.5	0	0.0	P
09/20	12	1	46.96219	-61.39674	3039	47.5	1.7	7	3.1	0	0.0	P
09/21	12	1	47.01006	-61.37715	2404	45.7	2.0	5	2.6	0	0.0	P
09/21	12	2	47.01784	-61.55658	2103	32.9	3.6	0	0.0	0	0.0	P
09/21	12	3	46.92867	-61.62206	1892	49.4	1.4	2	1.0	0	0.0	P
09/21	12	4	46.87531	-61.71583	2769	54.9	1.3	12	6.6	2	1.2	P
09/21	12	5	46.73930	-61.60292	3584	73.2	1.2	8	4.6	2	1.1	P
09/21	12	6	46.79751	-61.50483	2857	64.0	1.3	8	4.7	6	3.2	P
09/22	19	1	46.63457	-61.24185	3042	78.6	1.9	4	2.0	4	2.0	P
09/22	19	2	46.69272	-61.23793	3156	113.4	2.0	25	15.6	20	12.4	P
09/22	19	3	46.73602	-61.35509	2829	67.7	1.2	10	5.8	10	5.8	P
09/22	19	4	46.79968	-61.25116	3134	65.8	1.4	4	2.4	1	0.6	P
09/22	19	5	46.68244	-61.12213	2597	80.5	1.6	1	0.8	0	0.0	P

Appendix 4. Summary details for each successful tow from the 2018 snow crab survey. Columns are: Date, Area (crab fishing area), Tow # (sequential daily tow number), Latitude (tow mid-point in decimal degrees), Longitude (tow mid-point in decimal degrees), Swept area (area covered by the trawl in square meters), Depth (water depth in meters), T (bottom temperature in °C, provided by the VEMCO® Minilog probe attached to the head rope), Commercial count (number of male commercial crab, >= 95 mm carapace width, all carapace conditions), commercial weight (weight of male commercial crab in kg), residual count (number of male commercial crab with carapace conditions 3, 4 and 5), residual weight (weight of male commercial crab with carapace conditions 3, 4 and 5 in kg), and station type (whether the station is primary (P) or an alternate station (A1, A2 or A3 (first, second and third alternate stations, respectively))).

Date (mm/dd)	Zone	Tow number	Latitude	Longitude	Swept area (m <sup>2</sup> )	Depth (m)	Temperature (°C)	Commercial count	Commercial weight (kg)	Residual count	Residual weight (kg)	Station type
07/19	F	1	47.38257	-60.39028	2303	80	1.6	0	0	0	0	P
07/19	F	2	47.43028	-60.46490	2753	95	1.8	13	6.9	8	4.5	P
07/19	F	3	47.52619	-60.40168	2466	311	6.7	0	0	0	0	P
07/19	F	4	47.55757	-60.44150	2482	234	6.1	0	0	0	0	P
07/19	F	5	47.50930	-60.48295	1981	141	2.7	15	8.4	7	3.5	P
07/19	F	6	47.48036	-60.60839	2605	73	1.2	19	11.6	15	9.7	P
07/19	F	7	47.57081	-60.69165	2935	57	0.9	26	14.1	12	6.1	P
07/19	F	8	47.56286	-60.86593	2445	49	2.1	0	0	0	0	P
07/19	F	9	47.62701	-61.00351	2283	40	4.3	3	1.4	0	0	P
07/19	F	10	47.78198	-60.95510	2485	53	1.3	25	14.4	3	1.7	P
07/19	F	11	47.76932	-60.83326	2370	70	0.5	5	2.7	4	2	P
07/19	F	12	47.74011	-60.67730	1946	84	1.1	2	1	1	0.4	P
07/20	F	1	47.81470	-60.69152	1672	192	4.1	14	6.8	1	0.7	P
07/20	F	2	47.83125	-60.90045	2372	71	0.4	3	1.4	2	0.8	P
07/20	F	3	47.82109	-60.98057	2399	57	0.8	6	2.9	1	0.4	P
07/20	F	4	47.84365	-61.09023	2083	49	2.6	0	0	0	0	P
07/20	F	5	47.91623	-60.96757	2635	86	0.7	3	1.7	2	1.3	P
07/20	F	6	47.96853	-61.10778	2377	82	0.7	1	0.4	0	0	P
07/20	12	7	48.03478	-61.02752	2476	285	6.4	0	0	0	0	P
07/20	12	8	48.07948	-61.11668	2414	294	6.4	0	0	0	0	P
07/20	12	9	48.19791	-61.23938	2559	386	6.2	0	0	0	0	P
07/20	E	10	48.09510	-61.40418	2952	93	0.8	10	5.2	1	0.5	P
07/20	12	11	48.04170	-61.45970	2531	70	0.2	3	1.7	0	0	P
07/21	12	1	48.22274	-61.43109	2668	362	6.3	0	0	0	0	P
07/21	E	2	48.22462	-61.61362	2877	315	6.2	0	0	0	0	P
07/21	12	3	48.11206	-61.70980	2690	93	0.8	7	3	1	0.4	P
07/21	E	4	48.23408	-61.88513	3093	214	4.9	0	0	0	0	P
07/21	E	5	48.28345	-61.77564	2781	340	6.3	0	0	0	0	P
07/21	E	6	48.28540	-61.94738	3304	249	5.9	0	0	0	0	P
07/21	E	7	48.23522	-62.01964	2125	106	1	0	0	0	0	P

Date (mm/dd)	Zone	Tow number	Latitude	Longitude	Swept area (m <sup>2</sup> )	Depth (m)	Tempe- rature (°C)	Commercial count	Commercial weight (kg)	Residual count	Residual weight (kg)	Station type
07/21	E	8	48.39877	-62.11810	2709	362	6.3	0	0	0	0	P
07/22	E	1	48.36232	-62.11153	2564	280	6.2	0	0	0	0	A1
07/22	E	2	48.36060	-62.44889	2881	254	6	0	0	0	0	P
07/22	12	3	48.26822	-62.37702	2850	75	0	1	0.6	0	0	P
07/22	12	5	48.16059	-62.52447	3092	66	0	0	0	0	0	A1
07/22	12	6	48.31019	-62.68298	2572	93	0.5	0	0	0	0	P
07/22	E	7	48.44243	-62.64727	3078	340	6.4	0	0	0	0	P
07/22	12	8	48.41902	-62.85163	2094	172	4.5	1	0.4	1	0.4	P
07/22	E	9	48.59874	-62.94283	2766	366	6.3	0	0	0	0	P
07/23	12	1	48.81923	-63.76730	2960	183	4.2	0	0	0	0	P
07/23	12	2	48.82982	-63.55781	3037	243	5.8	0	0	0	0	P
07/23	12	3	48.89914	-63.58944	2470	304	6.1	0	0	0	0	P
07/23	12	4	48.93801	-63.42853	2572	349	6.3	0	0	0	0	P
07/23	12	5	48.92096	-63.26306	2618	384	6.3	0	0	0	0	P
07/23	12	6	48.83545	-63.35237	2618	305	6.2	0	0	0	0	P
07/23	12	7	48.75149	-63.26048	2657	271	6	0	0	0	0	P
07/23	E	8	48.71360	-63.10986	3342	344	6.2	0	0	0	0	P
07/24	12	1	48.66893	-63.24184	2359	229	5.4	0	0	0	0	A1
07/24	12	2	48.53148	-63.24226	2479	126	3	0	0	0	0	P
07/24	E	3	48.54448	-63.13028	2404	223	4.8	1	0.5	1	0.5	P
07/24	12	5	48.43573	-63.40815	2776	117	2.1	0	0	0	0	A1
07/24	12	6	48.43923	-63.29860	3349	99	1.4	0	0	0	0	P
07/24	12	7	48.32921	-63.15272	2687	51	1.1	1	0.4	0	0	P
07/24	12	8	48.38844	-62.96560	2849	75	0.6	0	0	0	0	P
07/24	12	10	48.33305	-62.84698	3857	82	0.1	0	0	0	0	A1
07/24	12	11	48.31532	-62.98418	3154	79	0.9	1	0.4	1	0.4	P
07/24	12	12	48.20849	-62.97049	3379	71	0.2	0	0	0	0	P
07/25	12	1	47.38472	-62.35913	2269	53	1.2	2	0.8	1	0.4	P
07/31	12	1	46.56298	-62.08785	2687	44	1.7	0	0	0	0	P
07/31	12	2	46.58520	-62.24209	2248	49	1.1	1	0.4	0	0	P
07/31	12	4	46.70459	-62.21224	1784	68	0.3	2	1.2	0	0	A1
07/31	12	5	46.73373	-62.30152	2763	66	0.4	32	18.3	1	0.4	P
07/31	12	6	46.63902	-62.37695	2761	58	0.5	4	2.4	0	0	P
07/31	12	7	46.61295	-62.53654	2610	48	1.1	2	1.2	0	0	P
07/31	12	8	46.66299	-62.57713	2570	53	0.8	5	2.7	0	0	P
07/31	12	9	46.61218	-62.63143	3122	48	1.1	0	0	0	0	P
07/31	12	10	46.60362	-62.84601	2550	53	0.9	4	2.1	0	0	P
07/31	12	11	46.70434	-62.88092	2752	55	0.6	35	18.8	0	0	P
07/31	12	13	46.66457	-62.79044	2230	53	0.7	0	0	0	0	A1

Date (mm/dd)	Zone	Tow number	Latitude	Longitude	Swept area (m <sup>2</sup> )	Depth (m)	Tempe- rature (°C)	Commercial count	Commercial weight (kg)	Residual count	Residual weight (kg)	Station type
08/01	12	1	46.80604	-62.67643	2740	60	0.5	31	16.6	0	0	P
08/01	12	2	46.83468	-62.83968	2584	58	0.5	23	12.2	1	0.4	P
08/01	12	3	46.88225	-63.02053	2769	60	0.3	2	1.1	0	0	P
08/01	12	4	46.92620	-63.01655	3167	60	0.5	3	1.7	1	0.5	P
08/01	12	5	46.94216	-62.91751	2543	60	0.5	4	2.6	2	1.2	P
08/01	12	6	46.98831	-62.76928	2891	64	0.3	11	5.9	3	1.3	P
08/01	12	7	47.01286	-62.68619	3292	68	0.3	6	3.1	1	0.4	P
08/01	12	9	47.09583	-62.52539	3214	70	0.3	9	4.7	3	1.2	A1
08/01	12	10	47.16313	-62.68237	3011	66	0.1	66	35.2	1	0.5	P
08/01	12	11	47.09747	-62.87401	2610	58	0.3	26	15.2	0	0	P
08/01	12	12	47.16609	-62.87435	3096	60	0.3	37	20.9	0	0	P
08/01	12	13	47.18739	-63.00227	2690	60	0.2	48	28.6	0	0	P
08/02	12	1	46.60124	-63.06805	2417	48	1.3	0	0	0	0	P
08/02	12	2	46.62054	-63.16728	2308	44	1.3	6	2.9	0	0	P
08/02	12	3	46.67628	-63.11928	2526	46	1.2	4	1.7	0	0	P
08/02	12	6	46.73944	-63.23718	2736	46	0.6	0	0	0	0	A2
08/02	12	8	46.82663	-63.28795	2574	49	0.4	9	4.4	0	0	A1
08/02	12	9	46.79148	-63.42218	2336	46	0.9	7	3.5	0	0	P
08/03	12	1	46.78543	-63.49733	2449	42	1.1	2	1.5	0	0	P
08/03	12	2	46.91071	-63.31836	2710	58	0.1	4	2.1	0	0	P
08/03	12	3	46.95962	-63.20293	2783	58	0.3	31	17.2	0	0	P
08/03	12	8	47.17649	-63.24439	3900	66	0.2	12	5.8	0	0	P
08/03	12	9	47.16811	-63.34954	2778	57	0.1	3	1.5	0	0	P
08/03	12	10	47.08479	-63.32548	3132	57	0	8	3.9	0	0	P
08/03	12	11	47.00818	-63.28713	2982	57	0.2	7	3.4	0	0	P
08/04	12	1	46.95508	-63.51334	2106	49	0.5	0	0	0	0	A1
08/04	12	2	46.96842	-63.63494	2778	44	0.9	8	5.1	0	0	P
08/04	12	3	47.09726	-63.70765	3000	55	0.2	0	0	0	0	P
08/04	12	4	47.10647	-63.56553	1627	49	0	5	2.1	0	0	P
08/04	12	5	47.15738	-63.57082	1413	53	-0.2	0	0	0	0	P
08/04	12	6	47.23946	-63.64267	3323	66	-0.2	14	7.2	1	0.4	P
08/04	12	7	47.19602	-63.76866	2793	55	0.2	5	2.5	0	0	P
08/04	12	8	47.20093	-63.81234	2408	48	0	7	3.9	2	0.8	P
08/04	12	9	47.33381	-63.95018	2404	40	-0.2	1	0.6	0	0	P
08/04	12	10	47.22492	-64.09558	2371	40	0.9	2	1.1	0	0	P
08/04	12	11	47.08590	-64.18801	2764	40	-0.1	5	2.5	0	0	P
08/04	12	12	47.18976	-64.24467	2789	40	0.3	7	3.4	0	0	P
08/05	12	1	47.31584	-64.19163	2956	46	0.2	5	2.6	0	0	P
08/05	12	2	47.41678	-64.08428	2080	37	0.6	0	0	0	0	P



Date (mm/dd)	Zone	Tow number	Latitude	Longitude	Swept area (m <sup>2</sup> )	Depth (m)	Tempe- rature (°C)	Commercial count	Commercial weight (kg)	Residual count	Residual weight (kg)	Station type
08/05	12	3	47.35826	-64.28333	2886	55	0.2	6	3.1	0	0	P
08/05	12	4	47.30223	-64.44352	2532	42	0.1	3	1.4	0	0	P
08/05	12	5	47.43628	-64.34552	2446	53	-0.1	9	5	1	0.7	P
08/05	12	6	47.50255	-64.39118	2575	46	-0.1	45	26.3	1	0.5	P
08/05	12	7	47.54435	-64.17799	2568	64	0.2	13	6.8	11	5.6	P
08/05	12	8	47.55388	-64.12889	1938	66	0.3	13	7	9	4.9	P
08/05	12	9	47.48865	-63.89941	2907	66	-0.5	18	9.5	2	0.8	P
08/05	12	10	47.44130	-63.83462	3545	60	-0.4	3	1.9	0	0	P
08/05	12	11	47.38968	-63.71375	3247	60	-0.1	8	4.7	3	1.4	P
08/06	12	1	47.50901	-63.72332	3027	70	-0.4	13	7.4	2	1.6	P
08/06	12	2	47.63994	-63.70536	3486	64	-0.5	25	12.5	8	3.8	P
08/06	12	3	47.72908	-63.67130	3571	70	0.1	12	8	5	3.1	P
08/06	12	5	47.64376	-63.95727	2637	51	-0.6	2	1.2	0	0	A1
08/06	12	6	47.65848	-64.16061	1761	57	0.4	8	4.2	7	3.7	P
08/06	12	7	47.69851	-64.15968	2176	71	0.4	40	22.4	34	18.7	P
08/06	12	8	47.68336	-64.09386	2006	71	0.5	21	10.9	11	5.9	P
08/06	12	9	47.76313	-64.00720	2126	75	0.5	12	7.7	6	4	P
08/06	12	10	47.75421	-63.87762	2309	82	0.4	19	11.4	4	2.2	P
08/06	12	11	47.82122	-63.87458	2126	82	0.6	12	7.1	7	4.1	P
08/06	12	12	47.82449	-64.02318	3737	82	0.5	4	2.6	2	1.1	P
08/06	12	14	47.86537	-64.18539	2241	46	1	0	0	0	0	A1
08/07	12	1	47.94433	-64.05395	3394	62	0.6	13	8.2	1	0.4	P
08/07	12	2	47.93891	-63.96978	1992	91	0.6	1	1.1	0	0	P
08/07	12	3	47.90611	-63.70940	3237	64	0.5	1	0.4	1	0.4	P
08/07	12	5	47.85562	-63.64346	3588	71	0.1	0	0	0	0	A1
08/07	12	6	47.77282	-63.49225	4046	77	0	9	4.9	3	1.6	P
08/07	12	7	47.80467	-63.31743	3940	82	0.4	10	5.1	4	2.2	P
08/07	12	8	47.83443	-63.33951	3834	77	0.4	3	2.2	1	0.8	P
08/07	12	9	47.97507	-63.41303	4020	77	0.6	2	1.3	2	1.3	P
08/07	12	10	47.97968	-63.53275	3833	77	0.6	1	0.4	1	0.4	P
08/07	12	11	47.99339	-63.76846	1737	97	0.7	11	7.5	2	1.1	P
08/07	12	12	48.03994	-63.94514	2197	82	0.4	4	2.9	0	0	P
08/08	12	3	48.11173	-64.06528	1488	40	1.2	0	0	0	0	A2
08/08	12	4	48.12030	-64.47247	2680	46	1.4	1	0.9	0	0	P
08/13	12	1	47.88703	-64.98705	2969	48	0.5	5	3.1	0	0	P
08/13	12	2	47.89688	-65.13930	2881	77	0.5	7	4.7	2	1.4	P
08/13	12	3	47.89244	-65.20902	2881	71	0.5	12	7.8	3	2.1	P
08/13	12	4	47.78509	-65.54159	2992	40	0.5	3	1.7	1	0.4	P
08/14	12	1	47.97618	-65.62631	1759	46	1	7	4.5	0	0	P

Date (mm/dd)	Zone	Tow number	Latitude	Longitude	Swept area (m <sup>2</sup> )	Depth (m)	Tempe- rature (°C)	Commercial count	Commercial weight (kg)	Residual count	Residual weight (kg)	Station type
08/14	12	2	47.91640	-65.49019	2197	51	1	0	0	0	0	P
08/14	12	3	47.86147	-65.48482	2653	60	0.5	2	1.3	0	0	P
08/14	12	4	47.96089	-65.34173	3012	46	1.6	12	7.3	0	0	P
08/14	12	5	47.92947	-65.17331	4167	75	0.5	7	5.2	4	2.9	P
08/14	12	6	47.95184	-65.01463	1291	79	0.5	5	4	0	0	P
08/14	12	7	48.04287	-64.99022	3508	80	0.6	0	0	0	0	P
08/14	12	8	48.06628	-64.77529	3061	84	0.6	8	4.7	1	0.5	P
08/14	12	9	48.24414	-64.67539	4257	84	0.5	7	4.9	3	2	P
08/14	12	10	48.19703	-64.42483	3466	95	0.6	1	0.8	1	0.8	P
08/15	12	1	48.36446	-64.40412	2976	68	0.8	0	0	0	0	P
08/15	12	2	48.26954	-64.33456	1985	112	0.6	7	5.2	0	0	P
08/15	12	3	48.25313	-64.30609	3316	108	0.5	26	19.5	2	1.8	P
08/15	12	4	48.23682	-64.06966	3127	62	0.5	6	3.4	0	0	P
08/15	12	5	48.18069	-63.96277	2645	51	0.7	0	0	0	0	P
08/15	12	6	48.28103	-64.01684	1716	71	0.5	0	0	0	0	P
08/15	12	7	48.34230	-63.84196	2831	106	0.9	6	3.3	2	1.1	P
08/15	12	8	48.39251	-63.83310	2916	112	1.4	3	1.8	0	0	P
08/15	12	9	48.45543	-64.11562	3229	66	0.7	0	0	0	0	P
08/16	12	1	48.53858	-64.17641	2596	77	0.7	1	0.4	0	0	P
08/16	12	2	48.54208	-64.12542	2782	102	0.8	6	2.9	0	0	P
08/16	12	3	48.62591	-64.05233	1317	84	0.7	0	0	0	0	P
08/16	12	4	48.75796	-64.06113	4320	75	1	0	0	0	0	P
08/16	12	5	48.73062	-63.96338	1730	144	3	1	0.4	0	0	P
08/16	12	6	48.66096	-63.82353	2692	144	2.9	0	0	0	0	P
08/16	12	7	48.61676	-63.65467	2269	121	1.6	0	0	0	0	P
08/16	12	8	48.62539	-63.84590	1518	170	NA	0	0	0	0	P
08/16	12	9	48.52071	-63.84574	2833	60	0.9	0	0	0	0	P
08/17	12	1	48.62685	-63.45790	2550	157	2.8	0	0	0	0	P
08/17	12	3	48.59788	-63.36290	2242	157	2.9	0	0	0	0	A1
08/17	12	4	48.54808	-63.61589	2537	119	1.5	0	0	0	0	P
08/17	12	5	48.60463	-63.79542	3341	141	2.2	0	0	0	0	A1
08/17	12	6	48.45783	-63.73278	2392	152	2	0	0	0	0	P
08/17	12	7	48.36015	-63.68221	2629	90	0.4	1	0.4	1	0.4	P
08/17	12	8	48.39047	-63.53913	3446	110	0.8	0	0	0	0	P
08/17	12	9	48.36058	-63.39623	2240	86	0.6	0	0	0	0	P
08/17	12	10	48.30849	-63.52012	3604	97	0.9	0	0	0	0	P
08/18	12	1	48.20220	-63.50741	3154	97	0.7	6	4.5	0	0	A1
08/18	12	3	48.17447	-63.82044	3377	90	0.4	6	3.6	2	1	A1
08/18	12	5	48.06023	-63.67428	2298	99	0.7	15	11.1	5	3.4	A1

Date (mm/dd)	Zone	Tow number	Latitude	Longitude	Swept area (m <sup>2</sup> )	Depth (m)	Tempe- rature (°C)	Commercial count	Commercial weight (kg)	Residual count	Residual weight (kg)	Station type
08/18	12	6	48.11763	-63.58179	3042	91	0.6	7	4.8	1	0.8	P
08/18	12	7	48.13703	-63.40021	2652	90	0.5	3	2.1	2	1.2	P
08/18	12	8	48.21408	-63.31309	4432	95	0.5	9	5.1	2	1.4	P
08/18	12	9	48.15450	-63.20298	3213	73	0.2	3	1.7	0	0	P
08/18	12	10	48.06764	-63.26568	3516	77	0.5	3	1.6	1	0.4	P
08/18	12	11	48.04303	-63.09606	2625	57	-0.1	0	0	0	0	P
08/19	12	1	48.07076	-62.92042	2690	66	0.2	6	3.3	1	0.4	P
08/19	12	2	48.18115	-62.84231	2974	73	0.5	1	0.6	0	0	P
08/19	12	3	48.19431	-62.68225	3479	93	0.9	0	0	0	0	P
08/19	12	4	48.14480	-62.66533	3631	99	1	2	0.9	0	0	P
08/19	12	5	48.02994	-62.80808	3918	82	0.6	1	0.5	0	0	P
08/19	12	6	48.02361	-62.67423	3325	86	0.7	6	3.1	1	0.6	P
08/19	12	7	47.91323	-62.58636	2644	64	0.2	5	2.5	1	0.7	P
08/19	12	8	47.90904	-62.42767	2865	73	0.2	4	1.7	0	0	P
08/19	12	9	47.95375	-62.50403	2747	66	0.1	6	3	1	0.5	P
08/19	12	10	48.03343	-62.37299	2648	80	0.4	6	2.4	4	1.7	P
08/19	12	11	48.06658	-62.49760	2659	60	0.2	1	0.4	0	0	P
08/19	12	12	48.08003	-62.37548	2692	73	0.4	5	2.8	0	0	P
08/20	12	1	48.15363	-62.30183	2701	73	0.3	7	3.4	1	0.5	P
08/20	12	2	48.18515	-62.21038	1972	86	0.5	2	1.1	0	0	P
08/20	12	3	48.14156	-62.18645	2698	88	0.8	1	0.4	0	0	P
08/20	12	5	47.96088	-62.25968	3427	73	0.3	1	0.4	0	0	A1
08/20	12	6	48.01475	-62.00739	2671	58	0.2	3	1.6	0	0	P
08/20	12	7	48.04410	-61.98412	3900	58	0.3	0	0	0	0	P
08/20	12	8	48.04351	-61.88728	2599	62	0.2	1	0.4	1	0.4	P
08/20	12	9	47.98505	-61.91453	2835	57	0.6	3	1.6	0	0	P
08/20	12	10	47.86728	-61.98443	2635	53	2.2	6	3.7	0	0	P
08/20	12	11	47.86411	-61.91010	2545	55	2.3	7	4.2	0	0	P
08/20	12	12	47.89399	-61.74268	2471	58	1.3	8	4.2	1	0.4	P
08/20	12	13	47.95241	-61.66805	2713	57	0.2	1	0.9	0	0	P
08/20	12	14	48.02828	-61.55480	2869	60	0.1	0	0	0	0	P
08/21	12	1	47.95339	-61.37763	2579	58	1.4	2	0.9	0	0	P
08/21	12	2	47.90497	-61.37803	2464	53	2.2	0	0	0	0	P
08/25	12	1	47.20715	-62.61102	3248	66	0.2	16	7.7	0	0	P
08/25	12	2	47.27852	-62.56888	2627	64	0.1	13	6.3	3	1.1	P
08/25	12	3	47.25732	-62.63116	2750	64	0	21	12.3	6	3.5	P
08/25	12	4	47.26260	-62.84043	2584	57	0.1	6	3.2	0	0	P
08/25	12	5	47.38358	-62.90452	2267	49	1.2	5	3.2	0	0	P
08/25	12	6	47.32608	-63.05658	2603	57	0.6	57	30.6	5	2.8	P

Date (mm/dd)	Zone	Tow number	Latitude	Longitude	Swept area (m <sup>2</sup> )	Depth (m)	Tempe- rature (°C)	Commercial count	Commercial weight (kg)	Residual count	Residual weight (kg)	Station type
08/25	12	7	47.28560	-63.14728	3106	68	0.3	31	15.4	0	0	P
08/25	12	8	47.43353	-63.12948	3946	70	0.6	17	8.8	4	2.2	P
08/25	12	9	47.43213	-63.27539	3462	70	0.8	23	14.7	4	2.8	P
08/25	12	10	47.34720	-63.37968	3097	75	0.2	12	5.9	1	0.4	P
08/26	12	1	47.34037	-63.51533	2766	70	0.3	21	12.4	6	3.5	P
08/26	12	2	47.36586	-63.48832	3034	73	0	26	13.5	10	5.3	P
08/26	12	3	47.43748	-63.39944	2441	80	-0.2	25	14.6	6	3.9	P
08/26	12	4	47.55785	-63.35548	3995	77	-0.3	36	23.8	3	2.1	P
08/26	12	5	47.55205	-63.51234	3321	70	-0.1	6	3.4	2	1.3	P
08/26	12	6	47.63295	-63.55088	2929	68	-0.1	17	10.5	2	0.8	P
08/26	12	7	47.61629	-63.39869	3389	82	-0.2	26	16.2	7	4.3	P
08/26	12	8	47.60497	-63.26609	3204	86	-0.1	20	11.3	7	4.5	P
08/26	12	9	47.57539	-63.17249	3003	60	0.8	21	10.6	5	3.1	P
08/26	12	10	47.53797	-63.02168	2068	51	2.5	0	0	0	0	P
08/26	12	11	47.67300	-63.13105	2659	66	0.2	12	6.2	4	2	P
08/27	12	1	47.66003	-62.78943	2368	58	0.7	6	2.9	3	1.1	P
08/27	12	2	47.68649	-62.81388	2457	58	0.8	2	0.9	0	0	P
08/27	12	3	47.70773	-62.93004	2566	58	0.8	1	0.4	0	0	P
08/27	12	4	47.73825	-63.04982	3606	71	0	10	4.8	1	0.4	P
08/27	12	5	47.76338	-63.16958	3929	71	0.1	7	3.9	1	0.7	P
08/27	12	6	47.80947	-63.14455	4275	73	0.3	5	2.6	3	1.5	P
08/27	12	7	47.88329	-63.13170	3369	70	0.1	5	2.8	2	1	P
08/27	12	8	47.92780	-63.18621	3561	64	0	4	2.1	1	0.4	P
08/27	12	9	47.93578	-63.05618	2493	62	0.2	1	0.6	0	0	P
08/27	12	10	47.85414	-62.84629	3493	77	0.5	8	3.7	2	1.3	P
08/27	12	11	47.84138	-62.73072	3043	70	0.4	6	2.7	0	0	P
08/27	12	12	47.79211	-62.77632	3255	64	-0.1	2	0.8	0	0	P
08/27	12	13	47.75469	-62.58420	2906	66	0.2	9	3.8	1	0.5	P
08/28	12	1	47.75955	-62.37956	2634	62	1.6	2	0.8	1	0.4	P
08/28	12	2	47.82496	-62.29145	2688	64	0.8	2	0.9	1	0.4	P
08/28	12	3	47.72617	-62.21003	2781	57	1	4	2.3	0	0	P
08/28	12	4	47.70650	-61.96089	2678	40	4.6	0	0	0	0	P
08/28	12	5	47.69848	-61.93826	2728	40	4.7	0	0	0	0	P
08/28	12	6	47.66260	-62.08454	2379	42	4.3	0	0	0	0	P
08/28	12	7	47.65428	-62.21763	2713	53	2.2	10	4.6	0	0	P
08/28	12	8	47.55758	-62.27681	2649	57	1.5	2	0.9	0	0	P
08/28	12	9	47.50616	-62.39243	2849	58	1.1	5	2.6	0	0	P
08/28	12	10	47.31864	-62.44747	2776	57	0.5	3	1.4	0	0	P
09/01	12	1	47.63252	-62.38406	2678	55	1.3	26	12.9	0	0	P

Date (mm/dd)	Zone	Tow number	Latitude	Longitude	Swept area (m <sup>2</sup> )	Depth (m)	Tempe- rature (°C)	Commercial count	Commercial weight (kg)	Residual count	Residual weight (kg)	Station type
09/01	12	2	47.60093	-62.46455	3627	73	0.3	18	7.6	2	1.1	P
09/01	12	3	47.48941	-62.57689	2819	68	0.2	37	18	4	2	P
09/01	12	4	47.48806	-62.65922	2565	58	0.2	10	5.5	1	0.6	P
09/01	12	6	47.54815	-62.83340	2114	53	0.5	1	0.4	0	0	A1
09/01	12	7	47.44138	-62.68005	2690	62	0.2	9	4.2	0	0	P
09/01	12	8	47.42893	-62.51729	3553	68	0.2	16	7.8	4	1.9	P
09/02	12	1	46.38850	-61.78676	2792	42	2.6	1	0.6	0	0	P
09/02	12	2	46.32003	-61.91765	2420	40	2.6	7	4.4	0	0	P
09/02	12	3	46.26357	-61.86158	2161	49	1.6	3	2	0	0	P
09/02	12	4	46.29770	-62.04989	2344	40	3.4	0	0	0	0	P
09/02	12	5	46.21325	-62.18549	2387	33	4.1	0	0	0	0	P
09/02	12	6	46.10936	-62.10263	3404	38	2.9	1	0.5	0	0	P
09/02	12	7	46.07148	-61.88188	1909	48	1.9	8	4.9	0	0	P
09/02	12	8	46.08168	-61.84516	1950	48	1.6	5	2.9	0	0	P
09/02	12	9	45.94653	-61.74570	2317	40	1.6	9	6	0	0	P
09/02	12	10	46.04703	-61.76393	1942	49	1.6	5	3	1	0.8	P
09/02	12	11	46.12493	-61.79633	2640	49	1.5	5	2.7	0	0	P
09/03	12	1	46.10874	-61.63958	2165	49	1.6	2	1.2	0	0	P
09/03	12	3	46.25195	-61.74059	2038	53	1.5	4	2	0	0	A1
09/03	12	4	46.21769	-61.59543	2275	55	1.5	1	0.6	0	0	P
09/03	12	5	46.20325	-61.43924	2688	38	1.9	2	1	0	0	P
09/03	12	6	46.30115	-61.34867	2784	48	2	2	1.2	1	0.7	P
09/03	12	7	46.38267	-61.61908	2740	55	1	4	2.7	1	0.9	P
09/03	12	8	46.47906	-61.74263	2835	40	1.5	1	0.5	0	0	P
09/03	12	9	46.45701	-61.47613	2968	64	1.3	2	1	2	1	P
09/03	12	10	46.51322	-61.40819	3116	58	1.3	0	0	0	0	P
09/07	12	1	46.53482	-61.44576	3387	60	1.4	5	2.5	3	1.8	P
09/07	12	2	46.61138	-61.54669	3285	62	1.2	6	3.5	3	1.9	P
09/07	12	3	46.61630	-61.70789	2868	64	0.9	2	1.2	0	0	P
09/07	12	4	46.59542	-61.81929	2781	55	1	0	0	0	0	P
09/07	12	5	46.67930	-61.77598	2693	66	0.9	5	3	0	0	P
09/07	12	6	46.68113	-61.88966	3232	57	1.2	4	1.7	0	0	P
09/07	12	7	46.73346	-61.97541	3055	77	0.9	7	3.4	0	0	P
09/07	12	8	46.77488	-61.86859	2408	68	1.1	2	0.8	1	0.4	P
09/07	12	9	46.78983	-61.99294	3096	68	0.9	7	3.7	0	0	P
09/07	12	12	46.81163	-62.21488	2811	68	1	45	25.7	1	0.5	A2
09/08	12	3	46.87794	-62.43435	2485	62	1.2	17	8.6	0	0	A2
09/10	12	2	46.83537	-62.60363	2189	60	1.1	5	2.6	0	0	A1
09/10	12	4	46.89148	-62.50040	1758	62	1.2	3	1.3	0	0	A1

Date (mm/dd)	Zone	Tow number	Latitude	Longitude	Swept area (m <sup>2</sup> )	Depth (m)	Tempe- rature (°C)	Commercial count	Commercial weight (kg)	Residual count	Residual weight (kg)	Station type
09/10	12	7	46.99419	-62.38284	3110	66	1.2	24	12.2	5	2.5	A2
09/10	12	9	46.96084	-62.16064	1941	53	1.9	0	0	0	0	A1
09/10	12	11	47.11208	-62.20957	1925	46	3.1	0	0	0	0	A1
09/11	12	2	47.00782	-62.33463	2531	57	1.1	1	0.5	0	0	A2
09/11	12	4	47.20605	-62.40297	2848	55	1.3	1	0.4	0	0	A1
09/11	12	5	47.14845	-62.18651	2618	37	6.4	0	0	0	0	P
09/12	12	1	47.05825	-61.90586	2655	37	7.5	0	0	0	0	P
09/12	12	2	47.01209	-62.00929	2583	48	3.7	2	1	0	0	P
09/12	12	3	46.95788	-62.02090	2655	53	2.6	1	0.8	0	0	P
09/12	12	4	46.88948	-61.85507	2745	58	2.4	10	4.8	1	0.7	P
09/12	12	5	46.87515	-61.71627	2874	55	2.5	12	5.9	1	0.5	P
09/12	12	6	46.92948	-61.62310	2950	48	3.1	8	3.8	0	0	P
09/12	12	7	47.01825	-61.55666	3052	33	5.2	0	0	0	0	P
09/13	12	1	47.32558	-61.15558	2384	48	3.2	16	8.2	2	1	P
09/13	12	2	47.32776	-61.09812	2506	51	1.6	8	4	0	0	P
09/13	12	3	47.37786	-61.13910	2204	44	3.7	0	0	0	0	P
09/13	12	4	47.36053	-61.01393	2159	49	1.2	11	5.3	4	1.9	P
09/13	12	5	47.44843	-60.93381	2327	49	1.3	8	4.3	3	1.6	P
09/13	12	6	47.46125	-60.76669	2499	57	1.2	7	4.1	4	2.5	P
09/13	19	7	47.37088	-60.80444	2287	60	1.6	11	5.8	7	4.2	P
09/13	19	8	47.36704	-60.65013	2404	64	1.7	1	0.7	1	0.7	P
09/13	19	9	47.30854	-60.58949	2950	68	1.7	2	0.8	0	0	P
09/13	19	10	47.20925	-60.36996	2955	186	6.6	0	0	0	0	P
09/13	19	11	47.07758	-60.49704	2104	132	2.8	8	4.8	5	2.8	P
09/14	19	1	47.19840	-60.54673	4566	165	5.3	0	0	0	0	P
09/14	19	2	47.22285	-60.68012	3689	95	1.7	1	0.5	0	0	P
09/14	19	3	47.27193	-60.87502	1758	84	1.7	9	5.2	8	4.6	P
09/14	19	4	47.17148	-60.91615	3651	82	1.7	2	1.1	1	0.6	P
09/14	19	5	47.15053	-60.75796	2825	157	3.1	15	8.1	4	2.1	P
09/14	19	6	47.05281	-60.74984	2860	146	3.4	16	9.6	7	4.2	P
09/14	19	7	46.92755	-60.80914	2449	134	3.1	19	13.1	14	9.4	P
09/14	19	8	47.00609	-60.89172	2094	113	2	1	1	0	0	P
09/14	19	9	47.00764	-60.95319	2497	104	1.9	8	4.2	1	0.6	P
09/14	19	10	47.10808	-61.05049	2657	77	1.6	9	4.7	6	3.2	P
09/14	12	11	47.16655	-61.11210	3139	58	1.7	4	1.6	2	0.8	P
09/14	12	12	47.04564	-61.15591	3628	58	1.5	4	1.7	4	1.7	P
09/15	19	1	46.93648	-61.00680	2939	99	1.7	19	12	5	3.6	P
09/15	19	2	46.83076	-60.90363	2863	90	1.6	0	0	0	0	P
09/15	19	3	46.84989	-61.04085	2921	102	2.3	31	19.6	4	2	P

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Date (mm/dd)	Zone	Tow number	Latitude	Longitude	Swept area (m <sup>2</sup> )	Depth (m)	Tempe- rature (°C)	Commercial count	Commercial weight (kg)	Residual count	Residual weight (kg)	Station type
09/15	19	4	46.91073	-61.14907	3044	62	1.9	2	1.3	0	0	P
09/15	19	5	46.79948	-61.25310	2715	66	1.8	3	1.9	1	0.7	P
09/15	12	6	46.86532	-61.34493	3519	62	1.8	11	5.3	7	3.6	P
09/15	12	7	47.00853	-61.38018	2081	46	2.7	8	4.1	4	1.9	P
09/15	12	8	46.96223	-61.39878	2566	48	2.3	9	5.7	1	0.4	P
09/15	12	9	46.90207	-61.45630	3527	58	1.9	3	1.4	0	0	P
09/15	12	10	46.80114	-61.50331	2929	64	1.7	4	2.1	3	1.5	P
09/16	12	1	46.73972	-61.60513	3610	73	1.3	14	6.7	6	3	P
09/16	19	2	46.73598	-61.35454	3236	68	1.5	7	4.2	4	2.5	P
09/16	19	3	46.69223	-61.23357	2997	113	2.1	38	24.3	32	21.2	P
09/16	19	4	46.68317	-61.12376	3034	80	1.6	1	0.5	1	0.5	P
09/16	19	5	46.63361	-61.24181	3700	79	1.5	3	1.8	3	1.8	P

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Appendix 5a. Summary of total by-catches (by number and total weight in kg) by species (excluding snow crab), genus or group of invertebrates and number of grids sampled where the species were present in the catches of the survey in 2016 to 2018. A dash indicates no record. The data for 2016 are reported in Wade et al. (2017).

Common name	Latin name	2018			2017			2016		
		Count	Grids	Weight (kg)	Count	Grids	Weight (kg)	Count	Grids	Weight (kg)
Anemone	Actiniaria	662	83	83	2,411	86	166	993	81	168
Basket star	<i>Gorgonocephalus</i> sp.	2,944	110	660	3,198	136	667	3,548	153	731
Brittle star	Ophiuroidea	0	11	708	3	12	122	15	11	415
Clam	Mactridea	46	28	3	-	-	-	-	-	-
Cockle, Iceland	Cardiidae	247	36	10	633	70	30	542	29	21
Crab, hermit	<i>Pagurus</i> sp.	468	103	16	509	108	16	437	111	15
Crab, northern stone	<i>Lithodes maja</i>	101	25	30	115	30	36	91	32	32
Crab, rock	<i>Cancer irroratus</i>	12	4	2	20	5	1	39	7	3
Crab, toad, araneus	<i>Hyas araneus</i>	732	104	95	726	98	95	617	78	74
Crab, toad, corarctatus	<i>Hyas coarctatus</i>	1,498	175	98	1,649	164	120	2,127	167	143
Jellyfish	<i>Atolla</i> sp.	396	180	381	18	13	8	44	42	57
Lobster	<i>Homarus americanus</i>	84	4	22	154	6	39	27	11	7
Mussel	Mytilidae	1	1	0	26	15	3	-	-	-
Octopus	Incirrina	10	10	0	15	9	1	6	6	1
Quahog	<i>Arctica islandica</i>	92	13	8	3	3	0	62	7	2
Sand dollar	Clypeasteroidea	9,350	80	183	7,659	98	152	10,848	82	208
Scallop	Pectinidae	119	37	14	74	31	8	120	39	11
Sea cucumber	Holothuroidea	579	56	239	594	67	293	1,061	62	726
Sea mouse	<i>Aphrodita hastata</i>	6	4	0	10	8	0	14	8	1
Sea pen	Pennatulacea	276	11	46	137	9	124	-	-	-
Sea squirt	Ascidacea	2,761	92	263	2,801	99	289	2,782	92	303
Sea worm	Polychaeta	6	5	0	-	-	-	3	3	0
Shrimp	Decapoda	8,162	93	66	3,437	70	34	17,640	100	71
Sponge	Porifera	44	31	43	31	64	89	12	50	147
Squid	Cephalopoda	35	25	3	12	11	2	1	1	0
Starfish	Asteroidea	7,408	292	536	11,782	290	6112	6,636	289	745
Urchin, green sea	<i>Strongylocentrotus</i> sp.	14,366	209	565	19,877	214	754	17,385	219	653
Urchin, heart	Spatangoida	24	3	5	50,494	3	52	-	-	-
Whelk	Buccinidae	725	162	22	628	153	24	874	169	31
Whelk eggs	Buccinidae	103	49	6	10	43	8	298	42	10



Appendix 5b. Summary of total by-catches (by number and total weight in kg) by species, genus or group of fish, and number of grids sampled where the species were present in the catches of the survey in 2016 to 2018. A dash indicates no record. The data for 2016 are reported in Wade et al. (2017).

Common name	Latin name	2018			2017			2016		
		Count	Grids	Weight (kg)	Count	Grids	Weight (kg)	Count	Grids	Weight (kg)
Alewife	<i>Alosa pseudoharengus</i>	-	-	-	-	-	-	-	-	-
Aligatorfish	<i>Aspidophoroides monopterygius</i>	328	106	2	292	78	2	310	57	2
Aligatorfish, Arctic	<i>Aspidophoroides olrikii</i>	4	4	0	1	1	1	-	-	-
American plaice	<i>Hippoglossoides platessoides</i>	32,883	332	2252	34,905	330	2545	37,611	333	2,831
Atlantic hagfish	<i>Myxine glutinosa</i>	1	1	0	1	1	0	-	-	-
Atlantic sea poacher	<i>Leptagonus decagonus</i>	145	67	4	214	69	6	200	74	6
Blenny, fourline snake	<i>Eumesogrammus praecisus</i>	149	46	5	87	35	3	115	28	4
Blenny, snake	<i>Lumpenus lumpretaeformis</i>	82	32	2	121	47	2	120	25	4
Blenny, stout eel	<i>Anisarchus medius</i>	-	-	-	-	-	-	34	20	0
Capelin	<i>Mallotus villosus</i>	246	33	3	389	49	2	148	23	2
Cod, Atlantic	<i>Gadus morhua</i>	1,555	168	577	1,954	183	838	2,802	208	1,363
Cod, rock	<i>Gadus ogac</i>	4	3	1	9	8	2	91	8	43
Common wolf eel	<i>Lycenchelys paxillus</i>	-	-	-	3	3	0	3	2	0
Dogfish	<i>Centroscyllium fabricii</i>	15	1	4	-	-	-	-	-	-
Daubed shanny	<i>Leptoclinus maculatus</i>	33	23	0	-	-	-	-	-	-
Eelpout, Atlantic	<i>Lycodes terraenovae</i>	-	-	-	-	-	-	3	3	1
Eelpout, laval's	<i>Lycodes lavalaei</i>	138	75	32	158	83	54	155	80	65
Eelpout, wolf	<i>Lycenchelys verrillii</i>	-	-	-	3	3	0	-	-	-
Flounder, winter	<i>Pseudopleuronectes</i>	191	7	19	345	9	41	188	7	15
Flounder, witch	<i>Glyptocephalus cynoglossus</i>	872	79	229	730	92	208	967	83	291
Flounder, yellowtail	<i>Limanda ferruginea</i>	2,308	88	124	1,477	92	96	1,273	92	90
Fourbeard rockling	<i>Enchelyopus cimbrius</i>	68	23	4	87	32	3	53	21	2
Grenadier, marlin-spike	<i>Nezumian bairdii</i>	669	24	28	644	27	25	591	26	22
Haddock	<i>Melanogrammus aeglefinus</i>	4	2	3	5	3	4	3	2	2
Hake, longfin	<i>Phycis chesteri</i>	34	10	3	36	11	8	19	8	3
Hake, silver	<i>Merluccius bilinearis</i>	50	18	13	36	19	16	24	11	6
Hake, white	<i>Urophycis tenuis</i>	333	42	146	333	45	137	420	42	139
Halibut	<i>Hippoglossus hippoglossus</i>	6	3	20	19	16	229	11	9	55
Herring	<i>Clupea harengus</i>	19	4	3	210	11	32	33	8	4
Lumpfish	<i>Cyclopterus lumpus</i>	19	14	2	4	4	3	2	2	1
Mackerel	<i>Scomber scombrus</i>	-	-	-	-	-	-	-	-	-
Monkfish	<i>Lophius americanus</i>	2	2	10	7	5	38	7	6	1
Northern sand lance	<i>Ammodytes dubius</i>	16	10	0	24	5	0	-	-	-
Ocean pout	<i>Zoarces americanus</i>	12	9	2	18	13	5	-	-	-
Redfish	<i>Sebastes</i> sp.	19,904	57	2775	6,344	94	721	7,694	62	701
Sculpin, Atlantic hookear	<i>Artediellus atlanticus</i>	26	17	0	1	1	0	4	3	0

		2018			2017			2016		
Common name	Latin name	Count	Grids	Weight (kg)	Count	Grids	Weight (kg)	Count	Grids	Weight (kg)
Sculpin, Arctic hookear	<i>Arctiellus uncinatus</i>	-	-	-	-	-	-	-	-	-
Sculpin, Arctic staghorn	<i>Gymnocanthus tricuspid</i>	583	121	44	984	138	64	778	134	69
Sculpin, grubby	<i>Myoxocephalus aeneus</i>	4	2	0	15	5	5	-	-	-
Sculpin, longhorn	<i>Myoxocephalus octodecemspinosus</i>	50	20	9	57	20	10	164	46	18
Sculpin, moustache	<i>Triglops murrayi</i>	456	148	9	401	135	7	422	104	8
Sculpin, shorthorn	<i>Myoxocephalus scorpius</i>	176	68	34	230	83	43	199	67	44
Sculpin, spatulate	<i>Icelus spatula</i>	176	41	2	9	7	0	45	15	1
Sculpin, two horn	<i>Icelus bicornis</i>	64	11	1	166	40	2	159	38	2
Sea raven	<i>Hemitripterus americanus</i>	10	8	3	10	7	5	14	8	5
Sea tadpole	<i>Careproctus reinhardti</i>	10	7	1	3	2	0	4	3	0
Skate, eggs	Rajidae	51	4	1	238	6	4	132	11	2
Skate, smooth	<i>Malacoraja senta</i>	145	26	42	86	31	41	111	41	69
Skate, thorny	<i>Amblyraja radiata</i>	561	75	200	556	87	199	528	79	184
Skate, winter	<i>Leucoraja ocellata</i>	2	2	2	7	5	7	1	1	2
Smelt	<i>Osmerus mordax</i>	-	-	-	5	2	0	-	-	-
Snailfish	Liparidae	165	74	21	218	58	13	40	20	4
Spiny lump sucker	<i>Eumicrotremus spinosus</i>	33	26	1	71	47	2	19	14	1
Turbot	<i>Reinhardtius hippoglossoides</i>	78	28	41	58	26	24	52	27	36
Wolfish, Atlantic	<i>Anarhichas lupus</i>	12	8	3	5	3	1	8	6	5
Wolfish, spotted	<i>Anarhichas minor</i>	-	-	-	2	2	5	-	-	-
Wrymouth	<i>Cryptacanthodes maculatus</i>	3	2	0	-	-	-	-	-	-