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Preliminary results from the groundfish and shrimp multidisciplinary survey in August 2014 in the Estuary and northern 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 Department of Fisheries and Oceans conducts an annual multidisciplinary survey in the Estuary and northern Gulf of St. Lawrence. The objectives of this survey are quite varied: assess the biodiversity of the species near the floor, estimate the abundance of groundfish and invertebrates, assess physical and biological oceanographic conditions (phytoplankton and zooplankton), monitor the pelagic ecosystem, take an inventory of marine mammals, and collect samples for various research projects. In 2014, the survey was conducted between August 1 and September 2 on board the *CCGS Teleost*. During this survey, 185 trawl tows was successful and 113 CTD casts of the water column and 93 zooplankton samples.

This report presents the results from catches from the 185 tows. In total, 82 fish taxa and 195 invertebrate taxa were identified during the mission. Historical perspectives (catch rates, spatial distribution and length frequency) are presented for about 20 taxa. These commercial fishery-independent data will be used in several stock assessments (cod, redfish, Greenland Halibut, Atlantic Halibut and Northern Shrimp). For these species, abundance and biomass indicators in 2014 are comparable to the average or show upward trends, especially for Atlantic Halibut and small redfish.

Preliminary data analysis for water temperature measured in 2014 shows hot conditions near the surface and under the cold intermediate layer, but near normal conditions for the cold intermediate layer.

RÉSUMÉ

Le Ministère des Pêches et des Océans réalise annuellement un relevé multidisciplinaire dans l'estuaire et le nord du golfe du Saint-Laurent. Les objectifs de ce relevé sont multiples : évaluer la biodiversité des espèces présentes près du fond; estimer l'abondance des poissons de fonds et des invertébrés; évaluer les conditions océanographiques physiques et biologiques (phytoplancton et zooplancton); monitorer l'écosystème pélagique; inventorier les mammifères marins et récolter des échantillons pour divers projets de recherche. En 2014, le relevé s'est déroulé du 1er août au 2 septembre, à bord du *NGCC Teleost*. Lors de cette mission, 185 traits de chalut ont été réussis ainsi que 113 profils verticaux de la colonne d'eau afin de caractériser les conditions océanographies et 93 échantillons de zooplanctons.

Ce rapport présente les résultats des captures des 185 traits de chalut. Au total, 82 taxons de poissons et 195 taxons d'invertébrés ont été identifiés lors de la mission. Les perspectives historiques (taux de capture, répartition spatiale, fréquence de longueur) sont présentées pour une vingtaine de taxons. Ces données indépendantes de la pêche commerciale serviront à plusieurs évaluations de stocks, dont la morue, les sébastes, le flétan du Groenland, le flétan atlantique et la crevette nordique. Pour ces espèces les indices d'abondance et biomasse en 2014 sont soit comparables à la moyenne ou montrent des tendances à l'augmentation, particulièrement pour le flétan atlantique et des petits sébastes.

L'analyse préliminaire des données de température de l'eau mesurée en 2014 montre des conditions chaudes près de la surface et sous la couche intermédiaire froide, mais près de la normale en ce qui concerne la couche intermédiaire froide.

INTRODUCTION

The Department of Fisheries and Oceans conducts an annual bottom trawl survey in the Estuary and the northern Gulf of St. Lawrence. This is a multi-species, commercial fishery-independent survey. Its purpose is to assess the ecosystem with consistent, standardized data to examine the spatial and temporal changes in 1) the distribution, relative abundance and assemblage of fish, and 2) commercial species' biological parameters.

The main objectives are to:

1. assess groundfish and Northern Shrimp population abundance and condition;
2. assess environmental conditions;
3. take a biodiversity inventory;
4. assess phytoplankton and mesozooplankton abundance;
5. monitor the pelagic ecosystem;
6. take a marine mammal inventory;
7. collect samples for various research projects.

In 2014, the survey was conducted between August 1 and September 2 on board the *CCGS Teleost* (mission #IML-2014-021).

SURVEY DESCRIPTION

The survey covers the waters of the Laurentian Channel and north of it, from the Lower Estuary in the west to the Strait of Belle Isle and the Cabot Strait in the east, namely, the Northwest Atlantic Fisheries Organization (NAFO) divisions 4R, 4S and the northern part of 4T (Figure 1). Since 2008, coverage of division 4T has been increased in the upstream part of the Lower Estuary in order to sample the depths between 37 and 183 m. The area of the study area is 118,587 km^2.

A stratified random sampling strategy is used for this survey. This technique consists in subdividing the study area into more homogeneous strata. This area is divided into 54 strata, which were divided based on depth, NAFO division and substrate type (Figure 2). A total of 200 trawl stations was initially allocated in the study area, a number proportional to the stratum surface, with a minimum of two stations per stratum. The tow positions were chosen randomly within each stratum. For 2014, a new rules was added to respect a minimum distance of 10 km between stations in the same stratum.

The fishing gear used on the *CCGS Teleost* is a four-sided Campelen 1800 shrimp trawl equipped with a Rockhopper footgear ("bicycle") (McCallum and Walsh 2002). The trawl lengthening and codend are equipped with a 12.7-mm knotless nylon lining. Standard trawling tows last 15 minutes, starting from the time the trawl touched the sea floor as determined by the *Scanmar*™ hydroacoustic system. Towing speed is 3 knots. Information on trawl geometry (horizontal spread of the doors and wings, vertical opening of the trawl, depth) was recorded for each tow using *Scanmar*™ hydroacoustic sensors mounted on the fishing gear.

In 2014, 185 fishing stations were successful, 65 in 4R, 77 in 4S and 43 in 4T (Appendix 1). Coverage of the study area was very good; all strata were covered with a minimum of two stations and sampling was conducted in the Strait of Belle Isle. This area was never covered in 2013 (Figure 3).

For each fishing tow, the catch was sorted and weighed by taxa; biological data were then collected. For fish, crab and squid, size and weight are gathered by individual and, for

some species, sex, gonad maturity, and the weight of certain organs (stomach, liver, gonads) are also evaluated. Count of soft rays of the anal fin for Redfish, and otoliths are saved for cod, Atlantic Halibut and Witch Flounder. A roughly 2-kg shrimp sample is sorted and weighed by species (and by stage of maturity for Northern Shrimp). The shrimp are measured individually. The other invertebrates are counted (no individual measurements) and photographed. The photos are archived in a photo catalogue with keywords (station description, scientific name, etc.).

Additional samples were taken for various scientific projects. These samples include:

1. Specimens taken for the Maurice Lamontagne Institute (MLI) collection;
2. Boxes of shrimp and capelin for requests for aquaculture purposes from the MLI tank room;
3. Black Dogfish embryos, ray capsules, Black Dogfish juveniles and redfish in order to study their developmental morphology and their chondrification and mineralization processes;
4. Invasive species (tunicates) to confirm their genetic and microscopic identification;
5. Fish stomachs (Atlantic Halibut, American Plaice, Black Dogfish, White Hake, Vahl's Eelpout, Labrador Wolf Eel) and squid (Short-fin Squid) to enhance knowledge of their diet;
6. Cod liver to study the spatial distribution of polybrominated diphenyl ethers (PBDEs) in fish in coastal areas of Newfoundland and Labrador;
7. Small redfish (< 11 cm) for genetic identification of the species (*Sebastes fasciatus* or *S. mentella*) and the population of new cohorts observed in the Gulf;
8. Sea pens (4 species) collected to study their reproduction and pathologies;
9. Marine mammal prey (several fish species and Northern Shrimp) to follow the development of St. Lawrence ecosystem key species' isotropic signatures;.
10. Saïda (Arctic Cod) for genetic study of the populations.

Oceanographic conditions such as temperature, conductivity (salinity), pH, dissolved oxygen, luminosity and fluorescence were sampled during this survey. A total of 113 vertical profiles of the water column were done, fourteen of which were at extra stations that fall under the Atlantic Zone Monitoring Program (AZMP). The various equipment, *CTD SeaBird 911Plus*™, dissolved oxygen sensor (*SBE 43*), *WETStar*™ photometer and fluorometer, are coupled to the rosette of Niskin bottles. For each profile obtained using the rosette, water samples are also taken at predetermined depths to determine their salinity, dissolved oxygen concentration (Winkler titration), nutritive salt content (nitrite, nitrate, phosphate, silicate) and chlorophyll content. In addition, a *CTD SBE 19Plus*™ device, coupled to a dissolved oxygen sensor (*Aanderaa* optode) and a *WETStar*™ photometer and fluorometer, was also installed on the back of the trawl, thereby allowing oceanographic data to be collected for the 185 fishing tows.

To study zooplankton distribution and biomass for the entire territory covered by the survey, a sampling program component consisted in using a zooplankton net (202 µm), pulled vertically from the floor to the surface at 93 of the 185 stations visited, to collect organisms.

Continuously throughout the mission, water column hydroacoustic data at four frequencies (38, 70, 120 and 200 kHz) were recorded using a *SIMRAD™ EK60* echosounder. These data will be used to develop a three-dimensional database to map the pelagic ecosystem.

A marine mammal inventory in the study area was taken by two observers stationed at the front of the bridge when conditions permitted.

DATA ANALYSIS

The analysis of 2014 abundance and biomass data were integrated into the combined annual summer survey series initiated in 1990. This combined series was developed following a comparative study between the two vessel-gear tandems (1990-2005: *CCGS Alfred Needler – URI 81'/114'* trawl; 2004-2012: *CCGS Teleost – Campelen 1800* trawl) to establish specific correction factors for about twenty species caught (Bourdages *et al.* 2007). This resulted in adjustment of *Needler* catches into *Teleost* equivalent catches. Note that the distinction between the two redfish species, *Sebastes fasciatus and S. mentella*, is based on the analysis of the soft anal fin rays count and the depth of capture of individuals (H. Bourdages, DFO Mont-Joli, pers. comm.).

Given that over the years, some strata were not sampled by a minimum of two successful tows (Appendix 1), a multiplicative model was used to estimate their catch rate indexes in number and weight. This model provides a predicted value for strata with less than two tows with the data of the current year and the previous three years. Thus, indicators presented for the series are representative of a standard total area 116 115 km^2, the sum of the area of all strata. In addition, reference points were also added to the catch rate figures. The solid line represents the 1990-2013 period average (long-term average) and the two dotted lines associated to the mean ±0.5 standard deviation corresponding respectively to the upper and lower reference limits. Note that for Capelin and Herring, the calculated indices are instead probability values (%) of encountering species during the survey. Indeed, due to the pelagic character of these two species, the bottom trawl is not an ideal fishing gear for their capture and, therefore, to accurately estimate abundance.

Length frequency distributions are presented in two different forms. The first figure shows the distribution for the last two years of the series plus the average distribution for the 1990-2013 period (long-term average distribution). Frequency values are expressed as the average number of individuals caught per tow in increment of 1 cm, except for Northern Shrimp (0.5 mm) and Atlantic Halibut (3 cm). The second figure represents the length distributions in length mean per class length for each year of the historical surveys series (1990 to 2014).

The geographical distribution of catches by weight per tow (kg/15 minutes tow, except for sea pens number/15 minutes tow) was made for periods of four years. The interpolation of CPUE was performed on a grid covering the study area using a ponderation inversely proportional to the distance (R version 2.13.0, Rgeos library; R Development Core Team 2011). The isoline contours were then plotted for four CPUE levels which approximate the 20^{th}, 40^{th}, 60^{th} and 80^{th} percentiles of the non-zero values. The catch rates distribution for the 2014 survey only is also presented in a bubbles type map.

The following section gives the preliminary results for the abundance and biomass indices, the catch rate distribution maps, and the size frequency distributions for about 20 taxa commercially fished. These results are preliminary and must be considered as such until validations and laboratory analyses have been completed.

Finally, Appendix 2 provides a list of all taxa, vertebrates and invertebrates, caught among the 185 successful tows achieved during the 2014 survey. The occurrence, or the number of tows where the species was identified, as well as the total catch, by weight and numbers, are also presented. The number of specimens measured per taxon and some descriptive statistics for the length parameter are also presented in Appendix 3. For 7 of the most common taxa, Appendix 4 presents per tow: geographic positions, depth, corresponding stratum and catches (number and weight).

RESULTS

ACADIAN REDFISH[1]

Mean numbers and mean weights per tow of Acadian Redfish (*Sebastes fasciatus)* dropped between 1990 and 1994 (Figure 4). They remained at a low and stable level until 2004. The increase observed between 2005 and 2007 resulted primarily from the recruitment of the strong 2003 year-class, whose abundance decreased in 2008. Thereafter, the numbers and weights averages remained at low levels. In 2013 and 2014, there was an increase of the indices due to the arrival of strong cohorts of small individuals. In 2014, mean numbers and mean weights per tow are above the 1990-2013 long term average.

The size frequency distributions indicate low abundances of individuals of large sizes since 1994 (Figure 5). The strong 2003-cohort, observed between 2005 and 2008, disappeared in 2009 before reaching 20 cm. The recruitment of fish around 10 cm observed in 2013 (2011 cohort) is still modal at 13 cm in 2014. Many individuals of around 10 cm are also present in 2014. It should be noted that several individuals of size around 4 to 5 cm were observed in 2012, 2013 and also in 2014.

In the early 1990s, significant concentrations were observed in the north and east of Anticosti Island, and in the southwest sector of the studied area. Thereafter, the distribution was concentrated in the southeast of Anticosti Island and the southern part of the Esquiman channel (Figure 6). In 2013 and 2014, there was a wide distribution of the species, with high catch rates west and south of Anticosti Island, as well as in Esquiman channel.

AMERICAN PLAICE

Mean numbers and mean weights per tow for American Plaice (*Hippoglossoides platessoides*) fluctuated without notable trends between 1990 and 2003 (Figure 7). Between 2004 and 2009, these indices have stabilized near the series average. They increased thereafter and were above the averages in 2011. They have decreased since and the values for 2014 are slightly below the series averages with a mean number of 43 individuals per set and a mean weight of 4 kg.

Since the onset of the survey in 1990, the range of the length frequency distributions for American Plaice has remained relatively stable, with sizes ranging between 5 and 45 cm

[1] Determining redfish species is based on a count of soft rays of the anal fin on a maximum of 60 redfish per tow. This method may skew the results, especially when the arrival of a strong cohort. Genetic analyzes are therefore essential to confirm the identification and the proportion of each species (*S. fasciatus and S. mentella*).

(Figure 8). Size structure in 2012 showed an important 8 cm mode found at 11-12 cm in 2013 and at 15 cm in 2014. The abundance of this cohort is, however, below the time series average. In 2014, the abundance of American Plaice whose size is between 5 and 30 cm is lower than the 1990-2013 long-term average.

The spatial distribution of American Plaice is generalized to the entire Estuary and Northern Gulf of St. Lawrence at depths of 250 m or less (Figure 9). In 2014, the species was caught in close to 80% of the fishing stations. In fact, it is the vertebrate species with the third highest occurrence value (Appendix 2). Catch rates for American Plaice in 2014 show the same spatial distribution as in previous years. Thus important catch rates were observed in the Estuary, in the area of Bay of Sept-Iles, and all along the west coast of Newfoundland

ATLANTIC HALIBUT

With low values throughout the 1990s, the average numbers and average weights per tow of Atlantic Halibut (*Hippoglossus hippoglossus*) have been steadily increasing until recent years (Figure 10). During last years, the observed yields remain high and well above the upper reference limit of the average of 1990-2013 period. In 2014, indices are at historical highs, for both abundance and biomass.

In 2014, the range of sizes remained very wide (23-155 cm), the median size being about 60 cm (Appendix 3). The numbers per tow are higher than both the 2013 values and the average distribution of the 1990-2013 period for almost every length classes (Figure 11).

The distribution pattern of Atlantic Halibut has changed little over the years, occupying the entire territory covered by the survey (Figure 12). However, since the mid-2000s, there was a marked increase in catch rates associated with higher yields per tow. The largest catch rates observed in 2014 were located along the 200 m isobath, on the slopes of Laurentian, Esquiman and Anticosti channels, and in the Sept-Iles sector and the Estuary.

BLACK DOGFISH

Mean numbers and mean weights per tow varied over the years for Black Dogfish (*Centroscyllium fabricii*) (Figure 13). Large confidence intervals are generally associated with the highest values. This could be caused by the gregarious behaviour of this species and by its limited spatial distribution in the Gulf. Since 2012, the indices values remained high, staying above the upper reference limits of the 1990-2013 average.

In general, size structures observed over the years have two main modes. The first observed between 15 and 20 cm (Figure 14), represents young-of-the-year fish, which are released at 14 cm by ovoviviparous females. The second mode includes adult dogfish whose lengths vary between 50 and 65 cm. In addition to these two modes, which are of similar magnitude to the 1990-2013 average, the size structure for 2014 shows values well higher the average for fish from 30 cm to 50 cm.

In general, the Black Dogfish distribution observed in the survey was concentrated on all of the Laurentian Channel and the Estuary (Figure 15). High catch rates were recorded in 2014 upstream in the Laurentian Channel, off the coast of the Gaspé Peninsula, as well as at the limit of the survey coverage, in Cabot Strait.

CAPELIN

Capelin (*Mallotus villosus*) is a common catch in the survey. Over the years, the highest catch rates have mainly been recorded in the St. Lawrence Estuary, around Anticosti Island, and in the Strait of Belle Isle area (Figure 16).

Compared to 2013, the probability of finding Capelin during the survey in 2014 was lower in the southern portion of the west coast of Newfoundland (sub-divisions and 4Rc 4Rd) and in the southeastern portion of the Anticosti Island (Figure 17).

In 4R division, the probability (average kriging) of finding Capelin has highly been highly variable since 1990 (Figure 18). The value obtained for 2014 dropped below the reference period 1990 to 2013 after a sharp upward trend between 2006 and 2013 where the values were even higher than the average between 2010 and 2013.

In division 4S, the probability of finding capelin has fluctuated less over the years (Figure 18). It is also higher than in 4R division. Between 2002 and 2010, the probability was stable and close to the average for the period 1990-2013, nearly 80%. However, the calculated value for 2014 dropped below the lower reference limit from 1990 to 2013 after similar and higher than average values between 2011 and 2013.

COD

Mean numbers and mean weighs per tow for Cod (*Gadus morhua*) have been low but stable since 1992 (Figure 19). In 2014, these indices have increased and are above the 1990-2013 series average. Since 1990, these values are respectively the second and fourth highest in mean numbers and mean weights per tow. It is noteworthy that all planed strata have been covered by 2014 the survey including the Strait of Belle Isle which has not always been the case, notably in 2013.

In 2014, the large frequency distribution reveals that the two modes observed in 2013 at 18 and 26 cm remained modal in 2014 at 23 cm (2 years) and 34 cm (3 years) (Figure 20). The abundance of these two modes is higher than the average of the 1990-2013 series. In contrast with years 2011, 2012 and 2013, no cod of less than 10 cm were captured in 2014.

From 1994 to 2005, concentrations of Cod in the north and west of Anticosti Island showed a gradual decrease to increase again from 2006 (Figure 21). The catch rate distributions from 1990-1994 and 2011-2014 are now comparable, with concentrations in the area of the Belle Isle strait, along the west coast of Newfoundland as well as in the north and west of Anticosti Island.

DEEPWATER REDFISH[2]

Mean numbers and mean weights per tow of Deepwater Redfish (*Sebastes mentella)* decreased significantly between 1990 and 1994 (Figure 22). They remained at a low and stable level until 2012. In 2013 and 2014, there was a rise in the indices due to the arrival of small individuals. It is worth noting that genetic analyses have confirmed this new cohort

[2] Determining redfish species is based on a count of soft rays of the anal fin on a maximum of 60 redfish per tow. This method may skew the results, especially when the arrival of a strong cohort. Genetic analyzes are therefore essential to confirm the identification and the proportion of each species (*S. fasciatus* and *S. mentella*).

to be essentially composed of Deepwater Redfish. In 2014, mean numbers and mean weights per tow are above the 1990-2013 period average.

The size frequency distributions indicate low abundances of individuals of large sizes since 1994 (Figure 23). The 2003 cohort, observed between 2005 and 2007, disappeared in 2008 before reaching 20 cm. The 10 cm mode observed in 2013 becomes modal at 13 cm in 2014. The recruitment around 10 cm observed in 2013 (2011 cohort) is still modal at 13 cm in 2014. Many individuals of around 10 cm are also present in 2014. It should be noted that several individuals of size around 4 to 5 cm were observed in 2012, 2013 and also in 2014.

The pattern of distribution of Deepwater Redfish observed in the early 1990s indicates a wide distribution extending south and east of Anticosti Island. Thereafter, the distribution was more limited with significant concentrations southeast of Anticosti Island, especially in the deeper waters of the Laurentian Channel (Figure 24). In 2013 and 2014, we again observed a broad distribution that extended westward into the Estuary, south to Cabot Strait and eastward in Esquiman Channel. Strong catch rates were recorded in the Esquiman Channel, southwest Newfoundland, southeast of Anticosti Island, and in the western sector of the Gulf (Sept-Iles).

GREENLAND HALIBUT

Mean catch per tow, in numbers and weights, of Greenland Halibut (*Reinhardtius hippoglossoides*) increased in 2014 and are above to the average for the 1990-2013 period (Figure 25).

The size frequency distribution in 2014 showed that the year-class 1 (15-20 cm), cohort of 2013, and the year-class 2 (20-30 cm), cohort of 2012, was more abundant than the average for the 1990-2013 period (Figure 26). The year-class 3 (30-37 cm), cohort of 2011, were few while the mean abundance of fish over three year-old (more than 37 cm) were above the average of the 1990-2013 period.

The pattern of distribution of Greenland Halibut observed in 2014 was similar to that which prevails since 2000. The largest catch rates are found mainly in the Estuary and the western sector of Anticosti Island, and at the head of the Esquiman, Laurentian and Anticosti channels, at depths of over 200 m (Figure 27).

HAGFISH

Mean numbers and mean weights per tow of Hagfish (*Myxine glutinosa*) fluctuated throughout the series (Figure 28). In 2014, they were similar to the average of the 1990-2013 period with a mean number of 20 individuals per tow for an average weight of about 1.1 kg.

The sampling of length data for this species began in 2003 (Figure 29). The size frequency distribution is composed of a single wide mode ranging between 20 and 50 cm. In 2014, the abundance of different size groups was similar to the 2003-2013 period average distribution.

Throughout the series, catches of Hagfish were concentrated in the Estuary and in the deep waters of the Laurentian Channel (Figure 30).

HERRING

Although pelagic (i.e., low catchability in bottom trawl), Atlantic Herring (*Clupea harengus harengus*) are regularly caught on the survey. They are associated with four spawning stocks and are found throughout the sampled area, particularly along the channels (Figure 31). Over the years, the highest catch rates (kg/tow) have been recorded in the St. Lawrence Estuary, along the Laurentian Channel, between Anticosti Island and the west coast of Newfoundland, and in the Strait of Belle Isle.

Compared to 2013, the probability of finding Herring during the survey in 2014 were lower in the estuary as well as to the north and southeast of Anticosti island (Figure 32).

In 4R, probabilities (average kriging) of finding Herring were relatively stable between 1993 and 1997 (Figure 33). Thereafter, they increased to a maximum of about 75% in 2000 and 2001 before falling to 25% in 2004. They increased in 2005 and remained stable until 2009 to dropped again in 2010 below the lower reference limit. After rising in 2011, they fluctuated and the probability measured in 2014 is higher than in 2013 and above the average for the period 1990-2013. Similar results were observed in division 4S but with smaller fluctuations (Figure 33). The chances of finding Herring there were higher than in 4R. However, unlike 4R, the 2014 value was lower than in 2013.

LONGFIN HAKE

The general trend in average numbers and average weight per tow of Longfin Hake (*Phycis chesteri*) shows a decline since the early 1990s (Figure 34). In 2014, they reached the lowest values in the series, well below the lower reference limit the 1990-2013 average.

The size frequency distributions of Longfin Hake extend mainly between 12 and 40 cm and this, throughout years of the survey (Figure 35). In 2013, the abundance of different size classes of fish caught still falls far short of the average distribution for the 1990-2013 period. Note that compared to the previous year, catches of fish under 20 cm were significantly less in 2014.

Since the beginning of the survey in 1990, the Longfin Hake is distributed in the southern part of the area sampled, from Cabot Strait to the Estuary (Figure 36). The highest catch rates were found in the downstream half of the Laurentian Channel.

LUMPFISH

Although regularly captured in the survey, the Lumpfish (*Cyclopterus lumpus*) is not too frequent. On average, the annual catch is composed of 30 individuals distributed in 20 fishing sets. In 2014, 41 individuals were captured in a total of 26 tows (Appendix 2). Mean numbers and mean weights per tow are generally low and stable (Figure 37). In 2014, they were slightly above the 1990-2013 period average with 0.29 individuals per tow for 0.16 kg on average.

The range of sizes of lumpfish caught in 2014 is similar to the series and varies from 4 to 48 cm (Figure 38); however, the abundance of the different mode is generally above the 1990-2013 average.

Over the survey series, Lumpfish catches occurred mainly north-west and north-east of Anticosti Island, at the head of Esquiman Channel and in the Strait of Belle Isle (Figure 39). Catches in 2014 were mainly localised in Bay of Sept-Iles and north of Anticosti.

NORTHERN SHRIMP

Preliminary data on Northern Shrimp (*Pandalus borealis*) are presented for the whole Northern Gulf rather than for each shrimp fishing area.

In 2014, the mean numbers of individuals caught per tow and the mean catches in weight showed a slight increase compared to 2013 and are similar to the average for the 1990-2013 period (Figure 40). However, the values of these indices are lower compared to those observed for mid-2000. In fact, these indices fell between 2003 and 2011.

The size frequency distributions show that in 2014, the majority of shrimp size categories were similar to the average for the 1990-2013 period, with exception for male of 14-17 mm (carapace length, CL) whose abundance is lower and for female larger than 21 mm whose abundance is higher (Figure 41).

Overall, the spatial distribution of Northern Shrimp in 2014 was similar to that observed in recent years (Figure 42). The best catch rates were observed along the Esquiman, Anticosti and Laurentian channels, as well as west of Anticosti Island through the Estuary.

SEA PENS

The identification of different taxa of sea pen in the catches began in 2011. The data collected allowed following the pattern of distribution and catching rates of four species: *Anthoptilum grandiflorum*, *Halipteris finmarchica*, *Pennatula aculeata* and *Pennatula grandis*.

With four years of data, the distribution patterns were confirmed and compared from one year to the next (Figures 43 to 46). Pens are mainly encountered in deep waters (> 200 m); they are not present in shallow areas on the west coast of Newfoundland and Labrador, in the Strait of Belle Isle or north of Anticosti Island. *P. aculeata* is the most widely distributed species in the northern Gulf; it is present in every channel (Esquiman, Anticosti and Laurentian). *P. grandis* and *A. grandiflorum* are mainly concentrated in the Laurentian Channel. Conversely, *H. finmarchica* distribution is limited to one area of the Laurentian Channel south of Anticosti Island.

SILVER HAKE

Until the mid-2000s, catches of Silver Hake (*Merluccius bilinearis*) were infrequent and of little importance during the survey (Figure 47). Increasing since 2009, the abundance and biomass indices reached levels never seen before in 2013, before lowering in 2014. 2014 values are still above the 1990 – 2013 average.

During the surveys, the sizes of Silver Hake caught ranged between 10 and 45 cm, the abundance of different size classes being very low until the late 2000s (Figure 48). From the two modes observed in 2013 in the size frequency of the survey, only the one centered around 30 cm remain in 2014 and the magnitude is lower.

Except for the northern west coast of Newfoundland, the distribution of Silver Hake extends over the survey area, although infrequently captured (Figure 49). In recent years, the highest catch rates were observed at the entrance of the Cabot Strait, on the Newfoundland side, and along the northern edge of the Laurentian Channel.

SMOOTH SKATE

Although variable throughout the 1990s, the average numbers of Smooth Skate (Malacoraja senta) caught per tow were low, ranging on or near the average for the 1990-

2013 period (Figure 50). Following a significant increase between 2002 and 2003 (two years where some species showed abnormal indices values in this survey), the abundance in number caught per tow declined somewhat to oscillate around the long-term period average up to 2013. In 2014, this index decreased and is below the long term average at a value comparable to those at the beginning of the time series. Meanwhile, the average catch weight per tow showed variations without tendencies between 1990 and 2003 and stabilised thereafter at values just under the long term average.

In 2014, the Smooth Skate length frequency distribution shows a range of sizes similar to previous years (Figure 51). The abundance of small (10-18 cm) and large (50-70 cm) individuals is comparable to the 1991-2013 long-term average. However, the abundance of skates of intermediate sizes (18-50 cm) is largely inferior to the long-term average.

Since the 2000s, the species is captured in more than half of the fishing sets (59%), the greatest abundances are met at depths greater than 100 m (Figure 52). In 2014, the highest catch rates were observed mainly south of Anticosti Island, in the Anticosti and Laurentian channels, and in the western part of the survey, in the Estuary and Sept-Iles sector.

SNOW CRAB

Declining from 2009 to 2013, the average number of Snow Crab (*Chionoecetes opilio*) per tow remained stable in 2014. It was well below the average for the 1990-2013 period (Figure 53). After a rising trend between 2006 and 2012, the average weight per tow declined significantly in 2013 and remained unchanged in 2014. The estimated weight for this last survey was also below the long term average.

Snow crabs were caught in each sampled survey sectors except in strait of Belle Isle and in the southern part of the Newfoundland west coast. Nonetheless, since 1999, its distribution pattern changed little over the years (Figure 54). This species is scarce beyond 200 meters.

In 2014, the distribution of catch rates showed a heterogeneous distribution, with a significant presence of the species in the western half area of the sampled area. The highest catch rates were observed mainly in the Sept-Iles and Rivière-au-Tonnerre sectors and in St-Lawrence estuary.

THORNY SKATE

Mean number and mean weight per tow indices for Thorny Skate (*Amblyraja radiatia*) emerge in two periods. For 1990's, the general trend for the mean number of fish caught is one of decline compared to the average for the 1990-2013 period (Figure 55). Meanwhile, the mean weights are exception of 1991, below the lower reference limit. Both indices showed a significant increase between 2002 and 2003 then exceeding the upper reference limit of the long-term period average. The two indices decreased somewhat thereafter but remained close (number per tow) or higher (weight per tow) to the average for the 1990-2013 period. In 2014, average number and weight per tow are comparable to 2013 and are close and below the long term average.

The length frequency distribution of Thorny Skate caught during the survey show similar pattern year after year. In 2014, the abundance of small (10-18 cm) and large (50-70 cm) individuals is greater than the 1991-2013 long term average (Figure 56). However the abundance of the intermediate sizes (18-50 cm) is lower than the long-term average.

The spatial distribution of Thorny Skate extends to the entire study area of the survey (Figure 57). In 2014, the species was found in 77 % (143/185) of tows, the highest catch rates are encountered at depths between 150 and 250 m. There is a recurring concentration at the head of the Laurentian Channel, in the St. Lawrence Estuary, while during the survey.

WHITE HAKE

The mean numbers and mean weights per tow of White Hake (*Urophycis tenuis*) for Divisions 4RST declined significantly between 1990 and 1994 (Figure 58). They have subsequently fluctuated until the mid-2000s showing no clear trend. Since 2004, the values are near and below the averages of the 1990-2013 period. In 2014, there was a slight increase in the indices whose values are comparable to the long-term averages.

The average length frequency distribution observed between 1990 and 2013 ranges from 20 to 60 cm (Figure 59). In 2013, the abundance of individuals between 30 and 36 cm was largely greater than the series average for the period 1990-2013. In 2014 these individuals are still present at 39-42 cm and their abundance remains greater than the series average. Furthermore, the adult hakes of 45 cm and over are rare.

Generally, the highest White Hake catch rates were observed in the southern portion of the sampled area (Figure 60). In 2014, the high catch rates were found in the lower half part of the Laurentian channel and in the southern sector of the Esquiman channel.

WITCH FLOUNDER

The mean numbers and mean weights per tow of Witch Flounder (*Glyptocephalus cynoglossus*) decreased between 1990 and 1993, then remained relatively stable and below the long term average from 1994 to 1998 (Figure 61). This period of stability was followed by two waves of increase and decrease between 1998 and 2005. Subsequently, the average numbers per tow increased gradually up to 2013 and remained near or somewhat above the average for the 1990-2013 period. In 2014, the abundance decreased to 14.6 below the long term average of 16.6. In contrast, the mean number per tow increased from 2010 and remains in 2014 above the long term average.

The size frequency distributions of Witch Flounder caught during the surveys remained relatively constant, with a range of lengths varying between 5 and 45 cm (Figure 62). However, the modes that characterize the different years are rather different and are mainly explained by the growth of stronger cohorts. Hence, the main mode observed at 26 cm in 2011, is observed at 28 cm in 2012, then 30-31 cm in 2013 and 33-34 cm in 2014. This abundant cohort is seen in the survey data since 2008. A second strong cohort identified since 2010 reaches 27-30 cm in 2014. The presence of these two strong cohorts explains that in 2014, the abundance of Witch Flounder between 25 and 42 cm is greater than the series average. Witch Flounder of less than 25 cm are however largely underrepresented in the 2014 survey.

Witch Flounder is present in close to 80 % of the fishing sets of the sampled area (Figure 63). It is largely distributed in the Northern Gulf of St-Lawrence but is absent from the Strait of Belle Isle. The largest catches are usually made at the head and along the southern slope of the Laurentian Channel, and in the Estuary. For some years, significant catches are also observed along the west coast of Newfoundland and on Beaugé Bank. The spatial distribution of Witch flounder in 2014 is similar to previous years.

WOLFFISHES

Three wolffish species were captured during the summer survey series (1990-2014): Atlantic Wolffish (*Anarhichas lupus*), Spotted Solffish (*Anarhichas minor*), and Northern Wolffish (*Anarhichas denticulatus*). According to the Act Species at Risk Act (SARA), Spotted Wolffish and Northern Wolffish have a threatened status, while the Atlantic Wolffish is considered as a special concern status.

Atlantic Wolffish is the most frequent of the three wolffish species in the study area. In 2014, 37 occurrences for a total of 628 individuals were recorded along the west coast of Newfoundland and Labrador and northeast of Anticosti Island (Figure 64). Individual lengths ranged from 7 to 76 cm. These observations are comparable to those of previous years.

Spotted Wolffish was caught occasionally during this survey. In 2014, 14 occurrences for a total of 23 individuals were recorded along the west coast of Newfoundland and Labrador and northeast of Anticosti Island (Figure 65). Individual lengths ranged from 9 to 90 cm. These observations are comparable to those of previous years.

There were no Northern Wolffish catches in 2014. Catches of this species during this mission are very rare; only five individuals have been caught since 1990.

INVERTEBRATES - GENERALITY

In 2014, 195 invertebrate taxa were identified. These taxa belong to thirteen phyla: Mollusc (55 taxa), Arthropod (48), Echinoderm (34), Cnidarian (29), Annelid (9), Tunicates (sub-phylum) (6), Sponge (4), Bryozoan (3), Brachiopods (2), Sipunculid (2), Ctenophore (1), Platyhelminths (1) and Echiurid (1).

The most frequently observed taxa (occurrence) are: Northern Shrimp *Pandalus borealis*, Sponges (Porifera), Snow Crab *Chionoecetes opilio*, Mud Star *Ctenodiscus crispatus*, White Shrimp *Pasiphea multidentata*, Polychaetes (Polychaeta), Striped Pink shrimp *Pandalus montagui*, Crown Jellyfish *Ptychogena lactea*, Ascidians (Ascidiacea), Sea Pen *Pennatula aculeate* and Heart Urchin *Brisaster fragilis* (Appendix 2).

While the highest catches are: Northern Shrimp *Pandalus borealis*, Striped Pink shrimp *Pandalus montagui*, White Shrimp *Pasiphea multidentata*, Heart Urchin *Brisaster fragilis*, Mud Star *Ctenodiscus crispatus*, Brittle Star *Ophiura sa*rsii and Greenland Shrimp *Eualus macilentus* (Appendix 2).

Note that a particular sampling has been done to document cases of invasive species associated with the group of Ascidians (Tunicates). In fact, some specimens of this group where observed. Depending upon the identification, this may well be the Tunicate *Botrylloides violaceus*, this species was observed for the first time in the Gulf of St-Lawrence in 2012.

PHYSICAL OCEANOGRAPHIC CONDITIONS

Preliminary analysis of 2014 water temperature data shows warm conditions near the surface as well as under the cold intermediate layer, but near-normal conditions in the cold intermediate layer.

Air temperatures over the Gulf in July 2014 were the warmest for that month since the beginning of records in 1873. This was followed in August by even warmer air temperatures in the northwest Gulf and in the estuary. This combination led to record high surface water temperatures in August, reaching an anomaly of +2.5°C averaged over the

whole Gulf (relative to the 1985-2010 climatology) and of +4°C in the estuary and northwestern Gulf.

After a particularly cold winter, the summer cold intermediate layer temperature and thickness returned to conditions close to the climatological normal for the first time since 2009, except in the estuary where they remained warm (Figures 66 and 67).

Below the cold intermediate layer, estuarine circulation that carries deep waters to the heads of the channels has transported warm waters that have been present for several years in Cabot Strait, central Gulf and Esquiman Channel upstream. Temperatures at 200 and 300 m have therefore increased in most areas since 2013, but in particular in these same three regions (Figure 66). Considering all data taken during the year, the regions of Cabot Strait and central Gulf are currently experiencing temperature records since 1915 at 200 m (6.4°C temperature, anomaly of +1.6°C or +2.7 S.D., and 5.9°C, +1.4°C and +2.6 S.D. respectively for the two regions), while Anticosti Channel has record temperatures at 300 m (6.3°C; +0.8°C; +2.8 S.D.). Averaged over the entire Gulf, the temperature reached a record high at 300 m (6.0°C, +0.5°C, +3.3 SD) and the highest value since 1980 at 200 m (5.9°C, +0.5°C, +2.0 S.D.).

Figure 67 summarizes these findings, showing the surface temperature records for the northern Gulf averaged for July and August and for May to August, the temperature record at 200 m and the maximum since 1980 at 300 m. The temperature of the cold intermediate layer is however back to near-normal.

ACKNOWLEDGEMENTS

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FIGURES

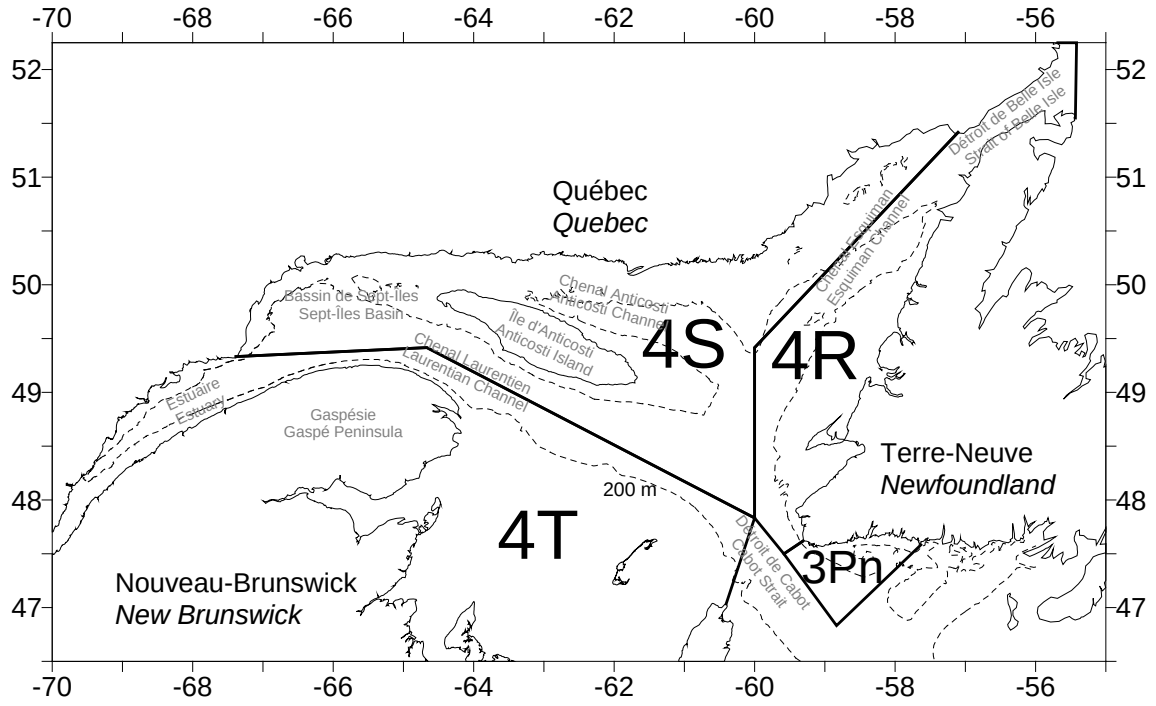


Figure 1. NAFO Divisions of the Estuary and Gulf of St. Lawrence and names of locations mentioned in the text.

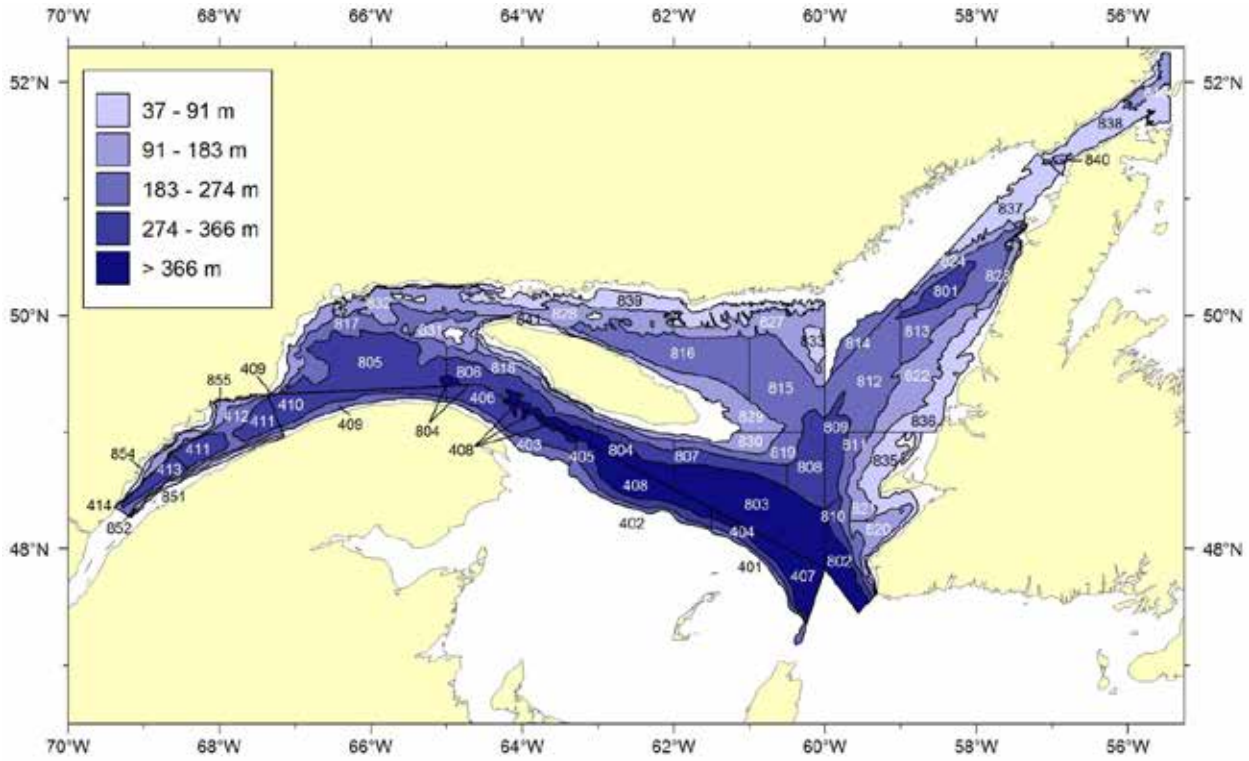


Figure 2. Stratification scheme used for the groundfish and shrimp research survey in the Estuary and northern Gulf of St. Lawrence.

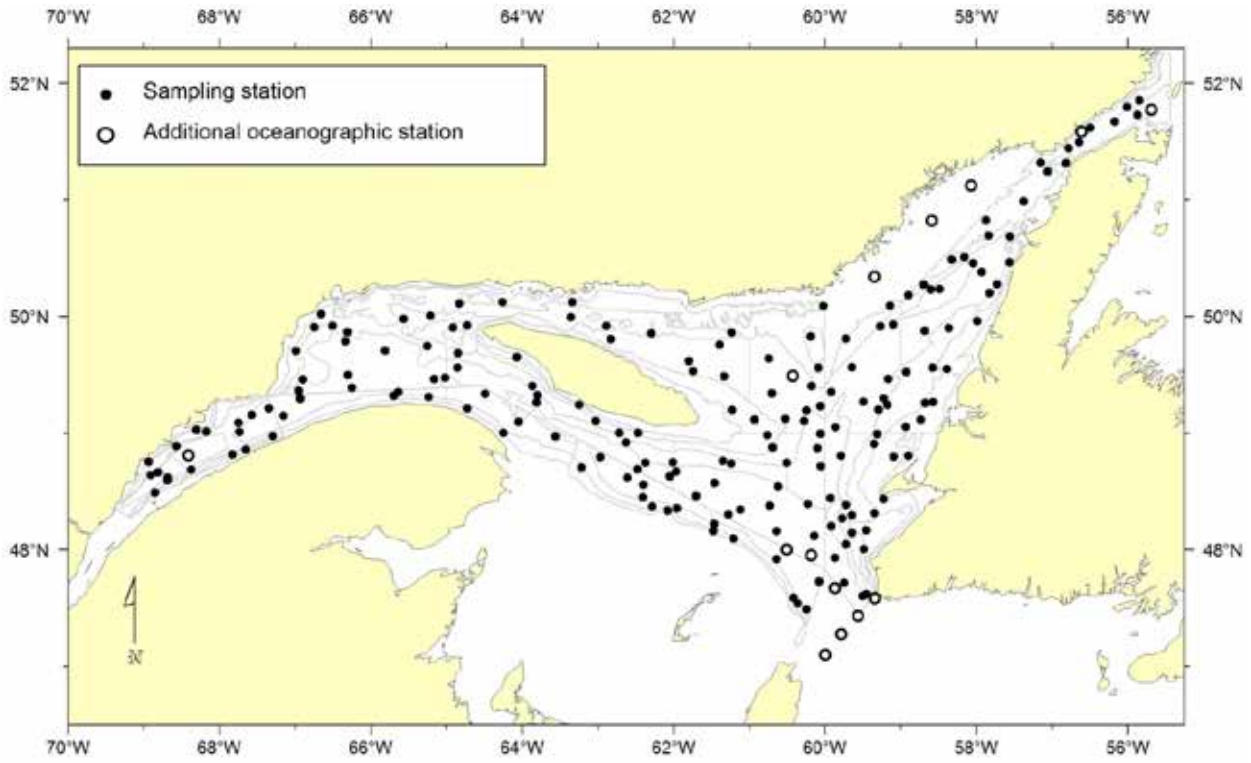


Figure 3. Locations of successful sampling stations (trawl and oceanography) and additional oceanographic stations for the 2014 survey.

Acadian Redfish

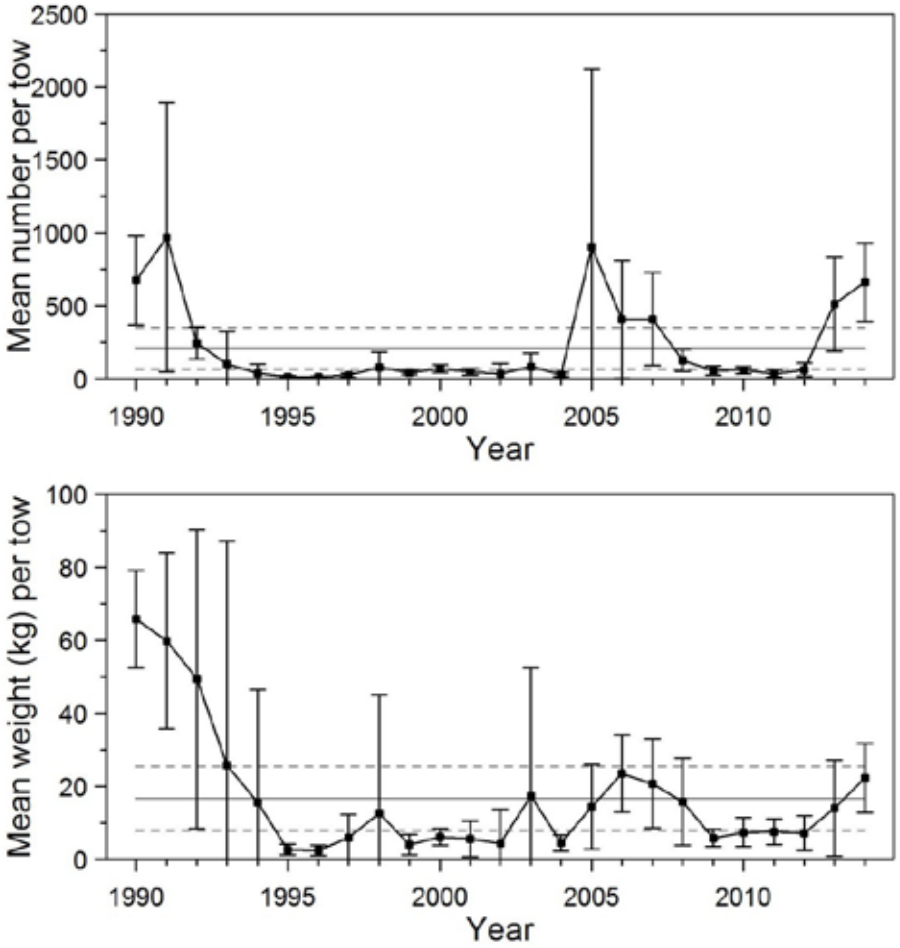


Figure 4. Mean numbers and mean weights per 15 minutes tow observed during the survey for Acadian Redfish in 4RST. Error bars indicate the 95% confidence interval and the horizontal lines indicate the mean of the 1990-2013 period (solid line) and upper and lower reference (see text) limits (dashed lines).

Acadian Redfish

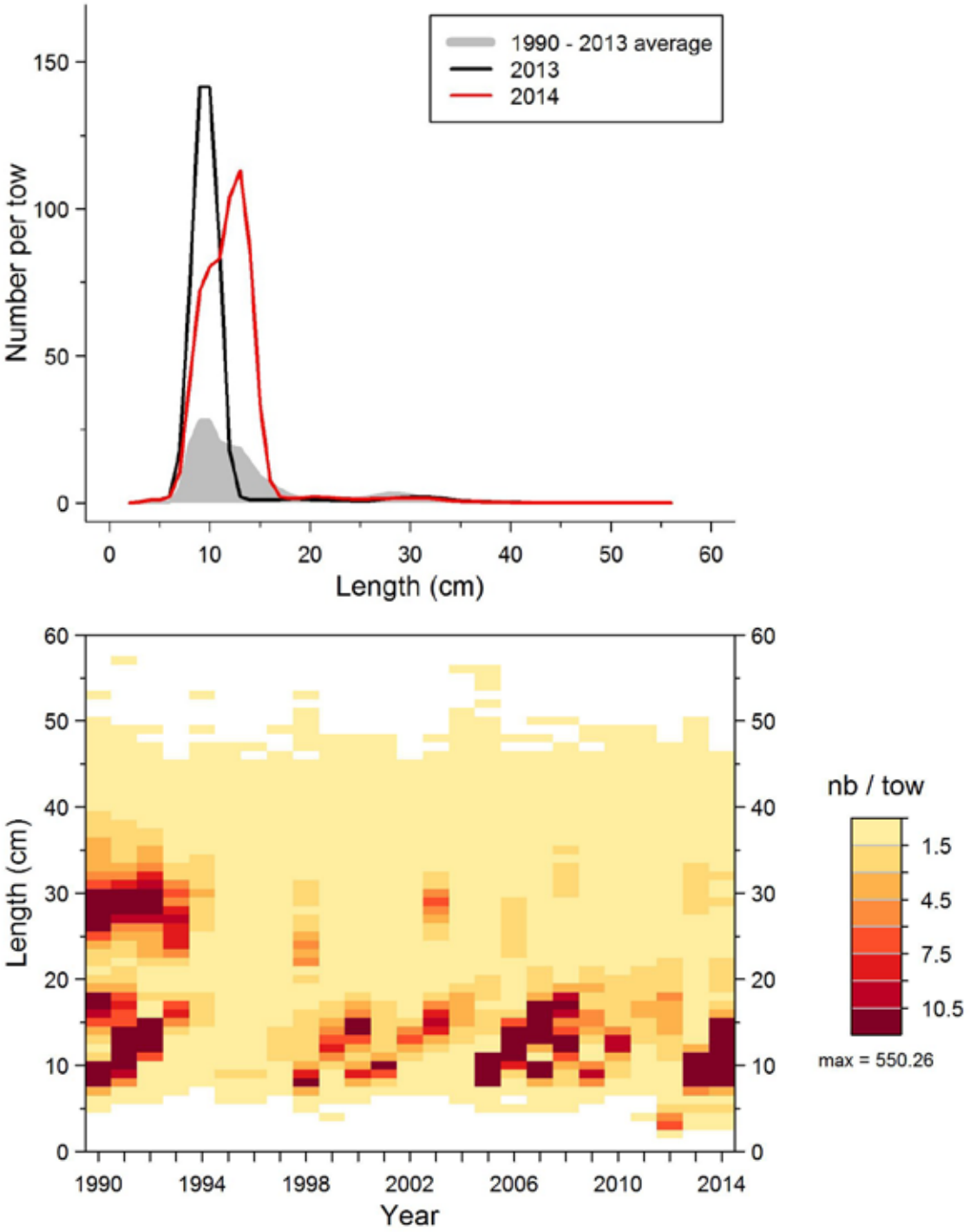


Figure 5. Length frequency distributions (mean number per 15 minutes tow) observed during the survey for Acadian Redfish in 4RST.

Acadian Redfish

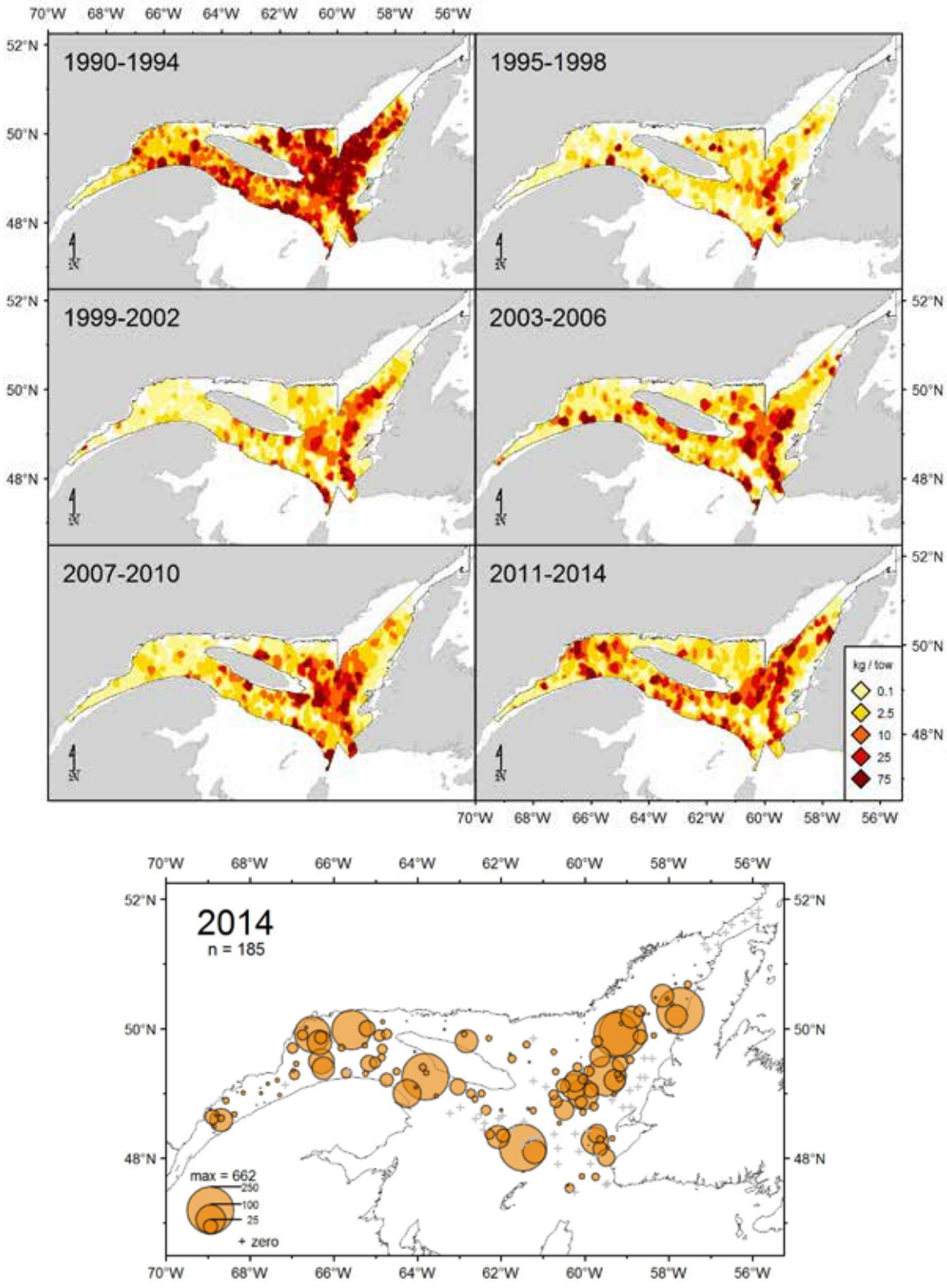


Figure 6. Acadian Redfish catch rates (kg/15 minutes tow) distribution.

American Plaice

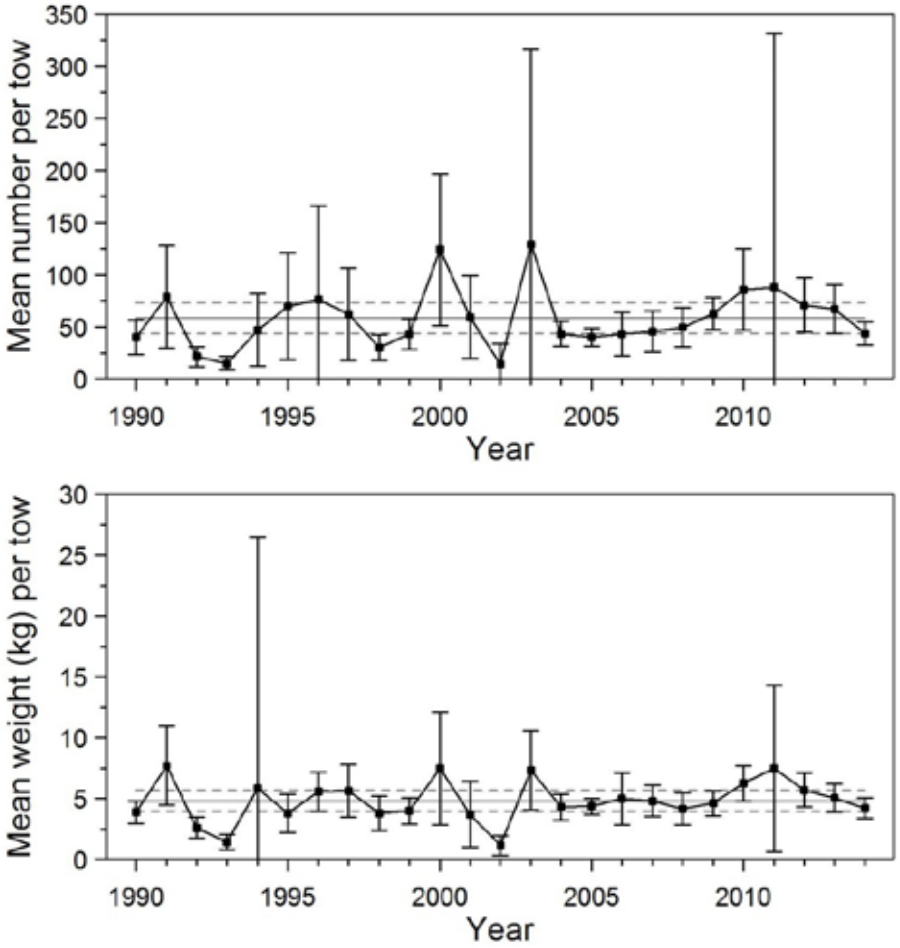


Figure 7. Mean numbers and mean weights per 15 minutes tow observed during the survey for American Plaice in 4RST. Error bars indicate the 95% confidence interval and the horizontal lines indicate the mean of the 1990-2013 period (solid line) and upper and lower reference (see text) limits (dashed lines).

American Plaice

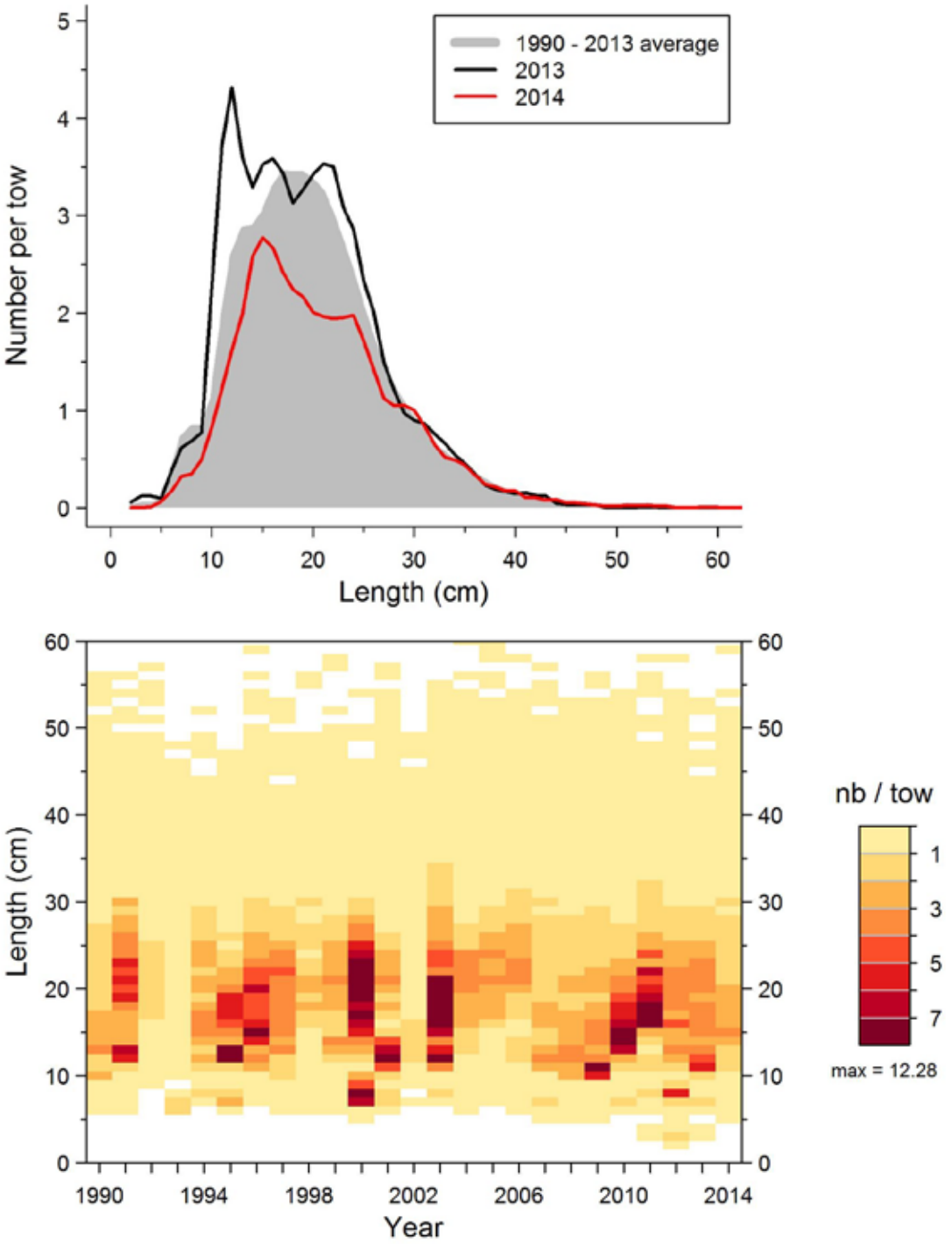


Figure 8. Length frequency distributions (mean number per 15 minutes tow) observed during the survey for American Plaice in 4RST.

American Plaice

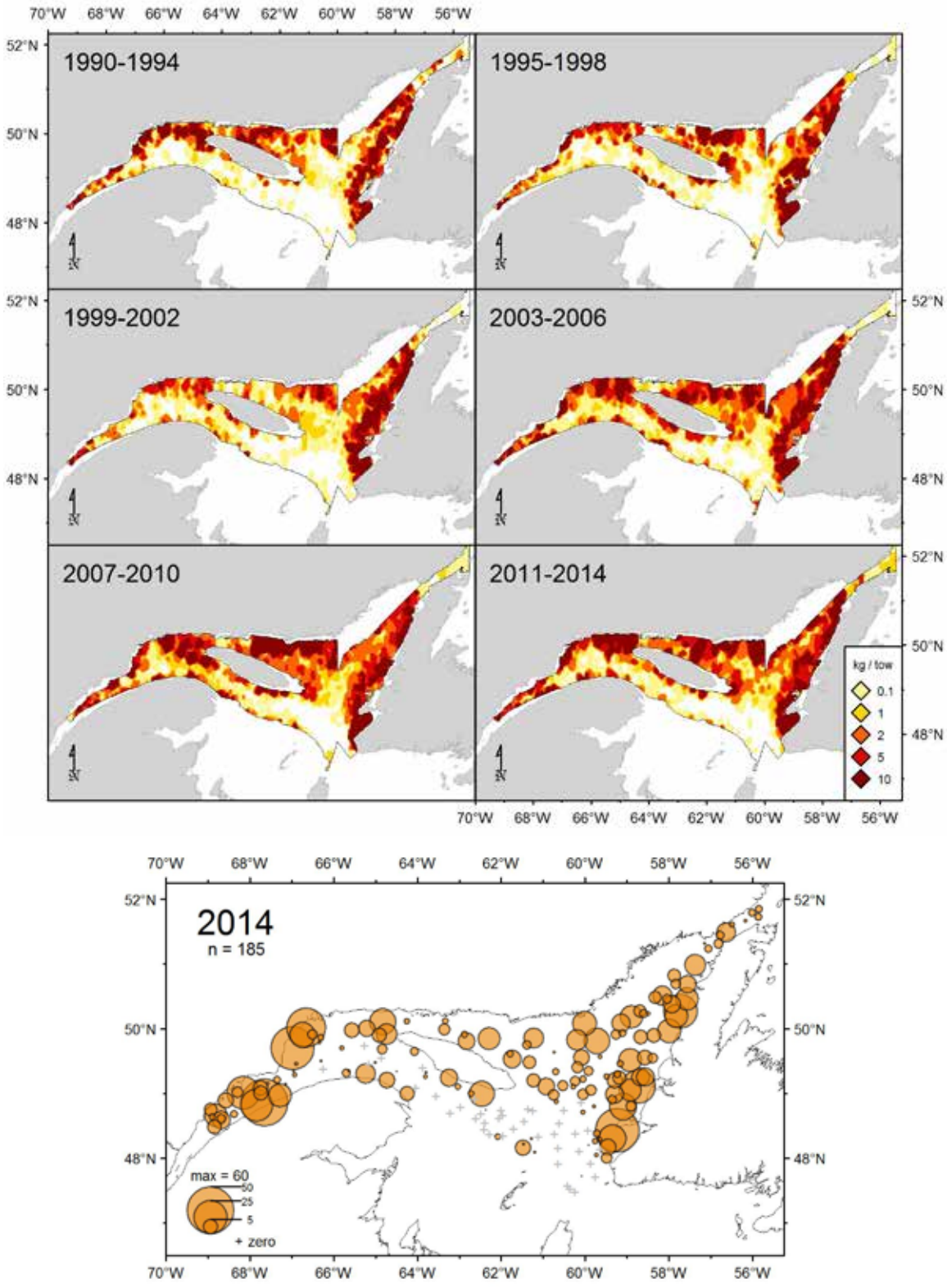


Figure 9. American Plaice catch rates (kg/15 minutes tow) distribution.

Atlantic Halibut

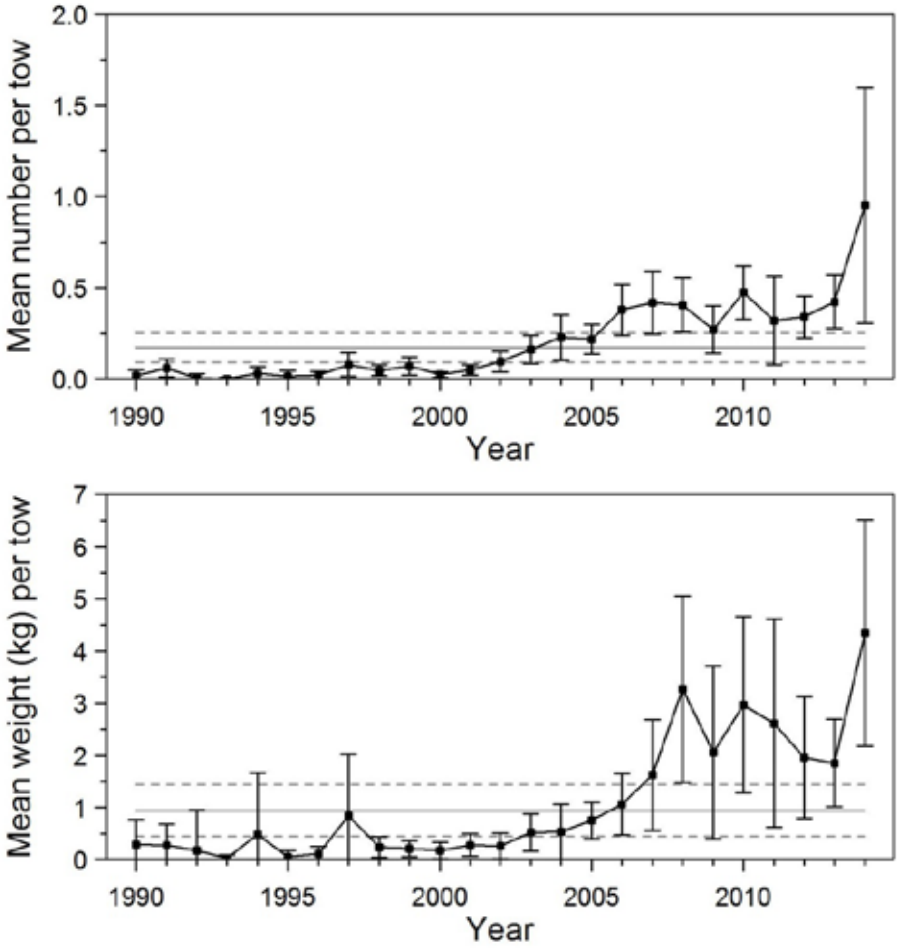


Figure 10. Mean numbers and mean weights per 15 minutes tow observed during the survey for Atlantic Halibut in 4RST. Error bars indicate the 95% confidence interval and the horizontal lines indicate the mean of the 1990-2013 period (solid line) and upper and lower reference (see text) limits (dashed lines).

Atlantic Halibut

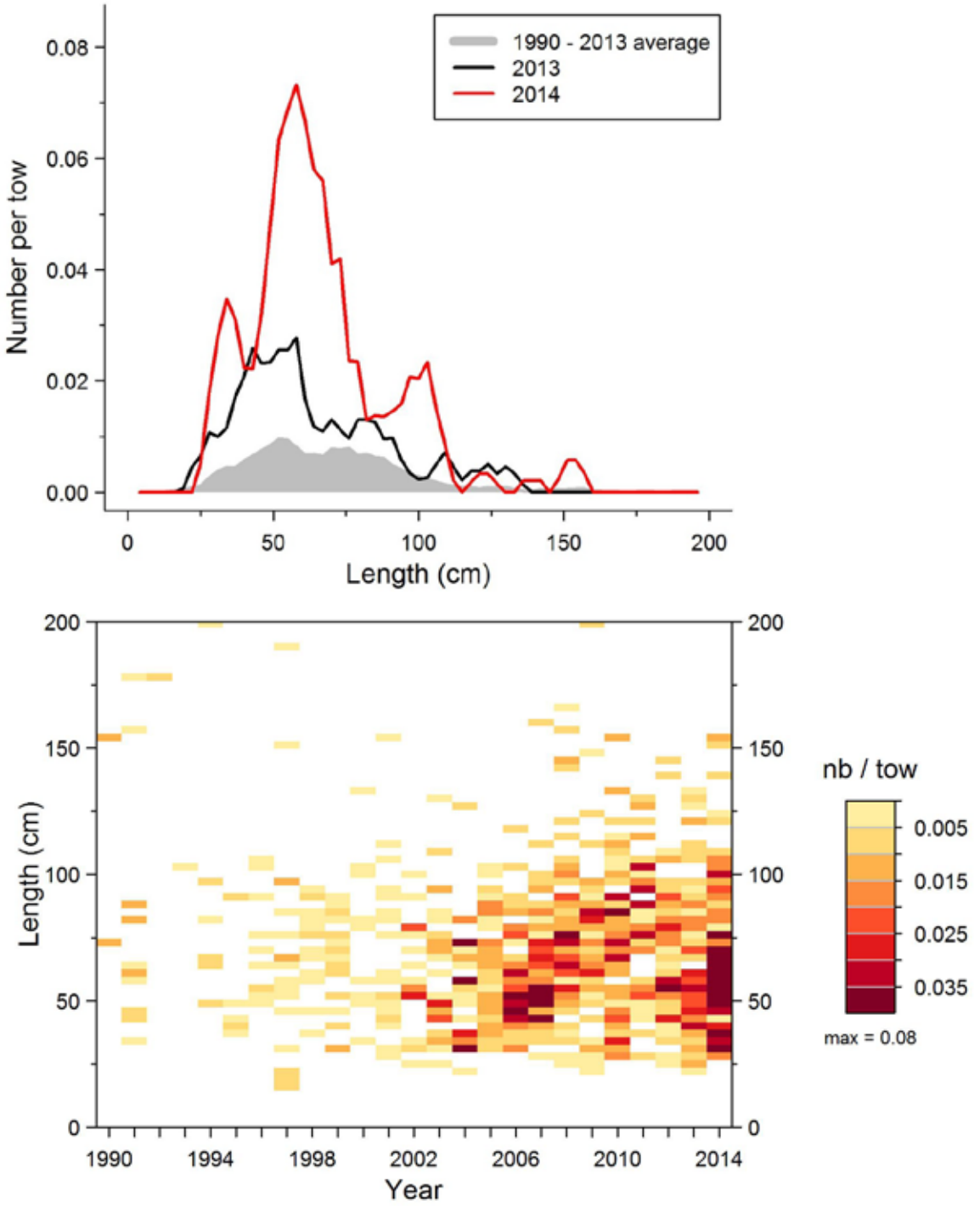


Figure 11. Length frequency distributions (mean number per 15 minutes tow) observed during the survey for Atlantic Halibut in 4RST.

Atlantic Halibut

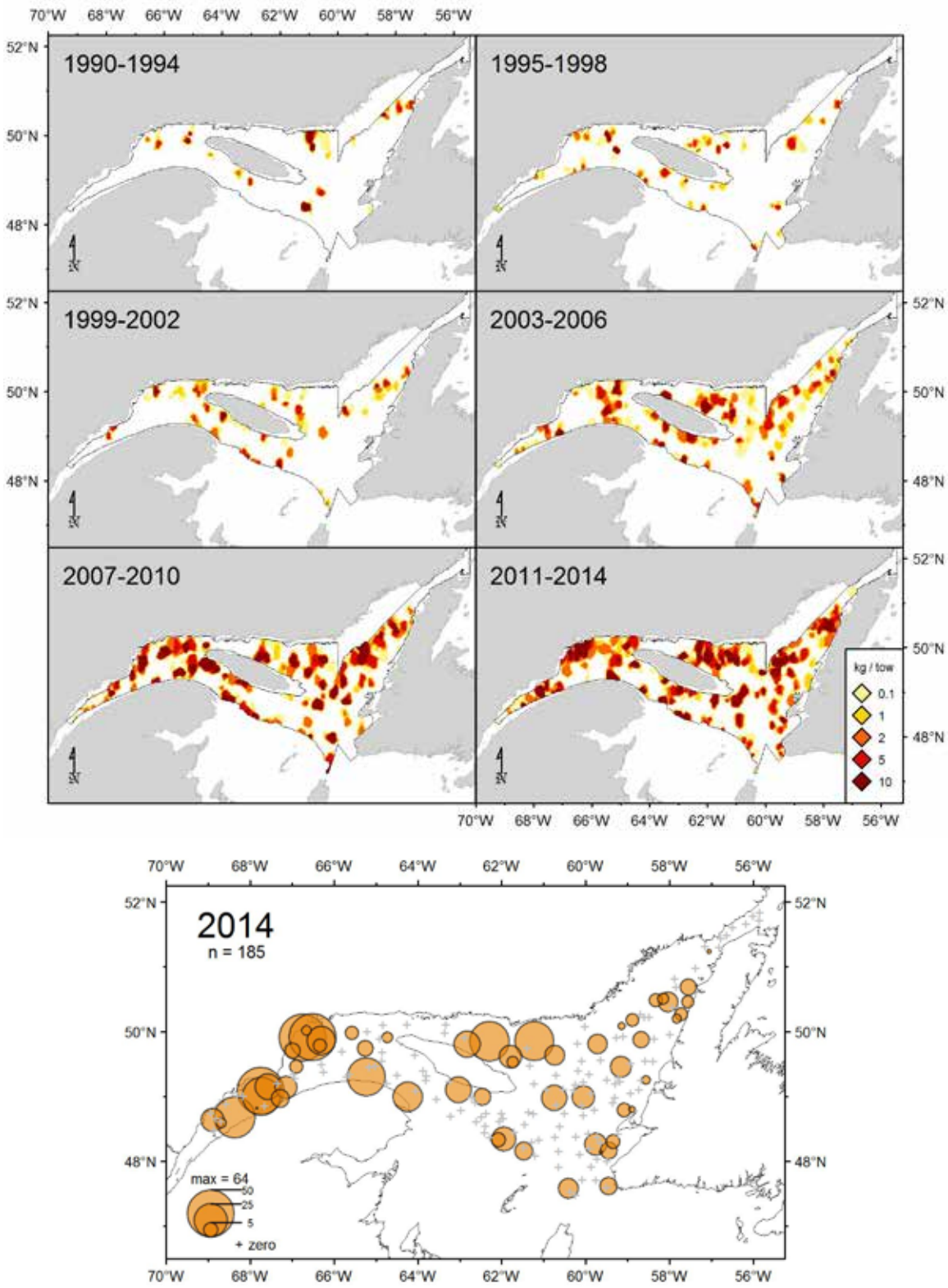


Figure 12. Atlantic Halibut catch rates (kg/15 minutes tow) distribution.

Black Dogfish

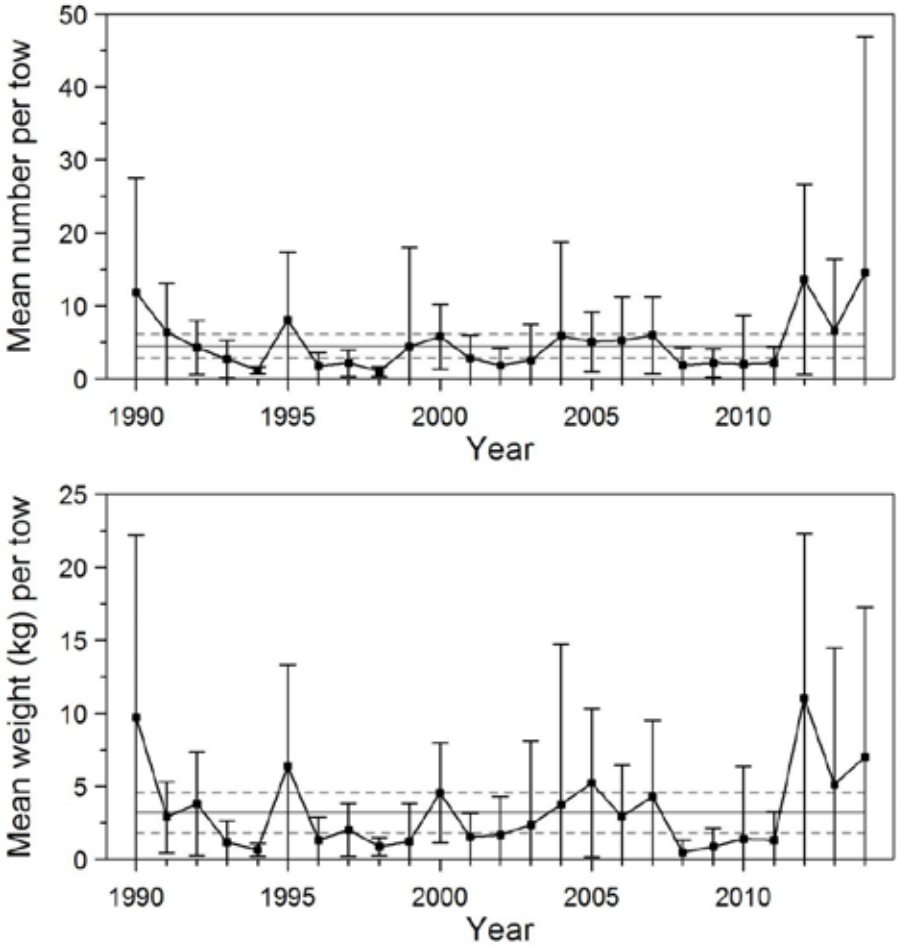


Figure 13. Mean numbers and mean weights per 15 minutes tow observed during the survey for Black Dogfish in 4RST. Error bars indicate the 95% confidence interval and the horizontal lines indicate the mean of the 1990-2013 period (solid line) and upper and lower reference (see text) limits (dashed lines).

Black Dogfish

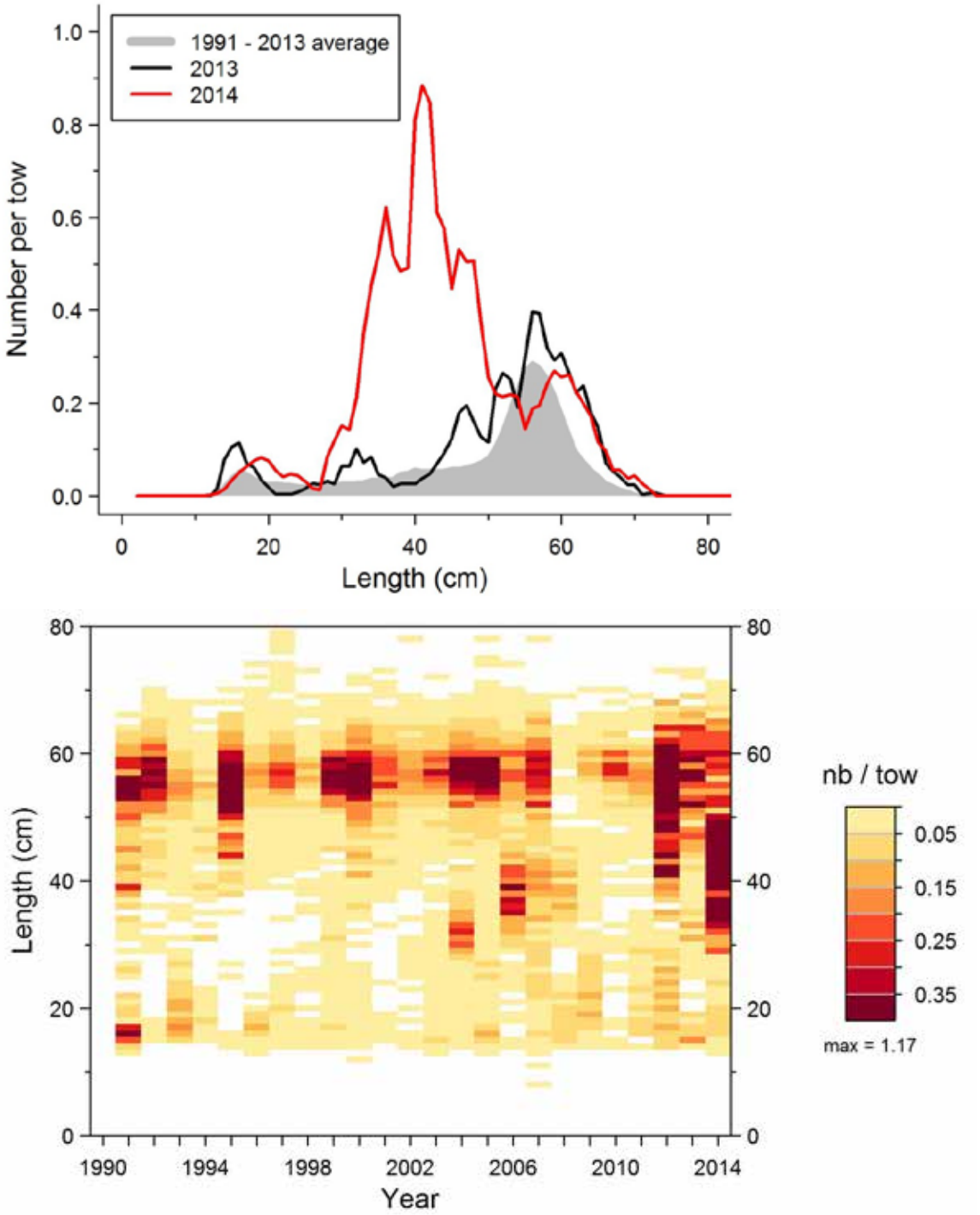


Figure 14. Length frequency distributions (mean number per 15 minutes tow) observed during the survey for Black Dogfish in 4RST.

Black Dogfish

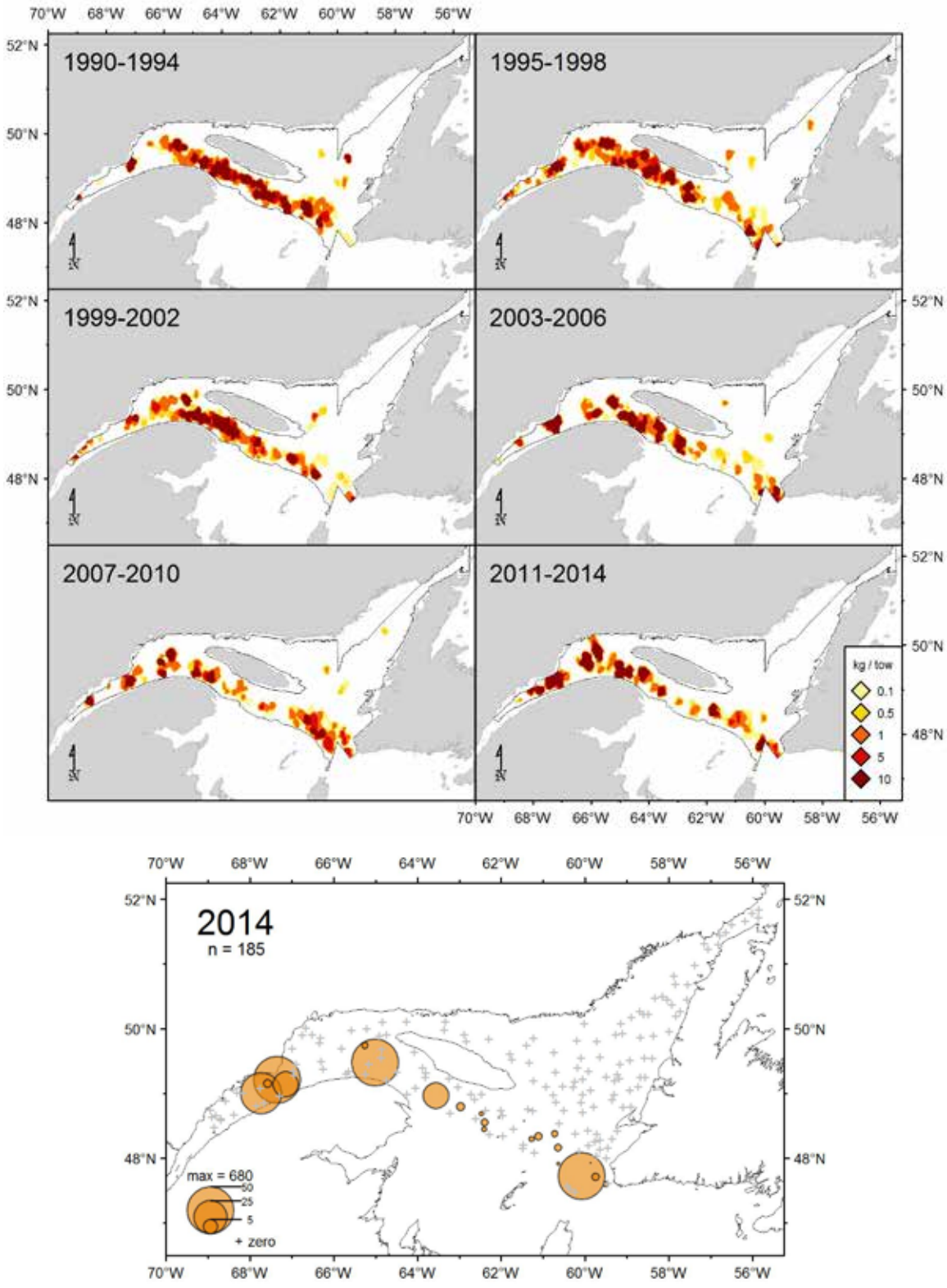


Figure 15. Black Dogfish catch rates (kg/15 minutes tow) distribution.

Capelin

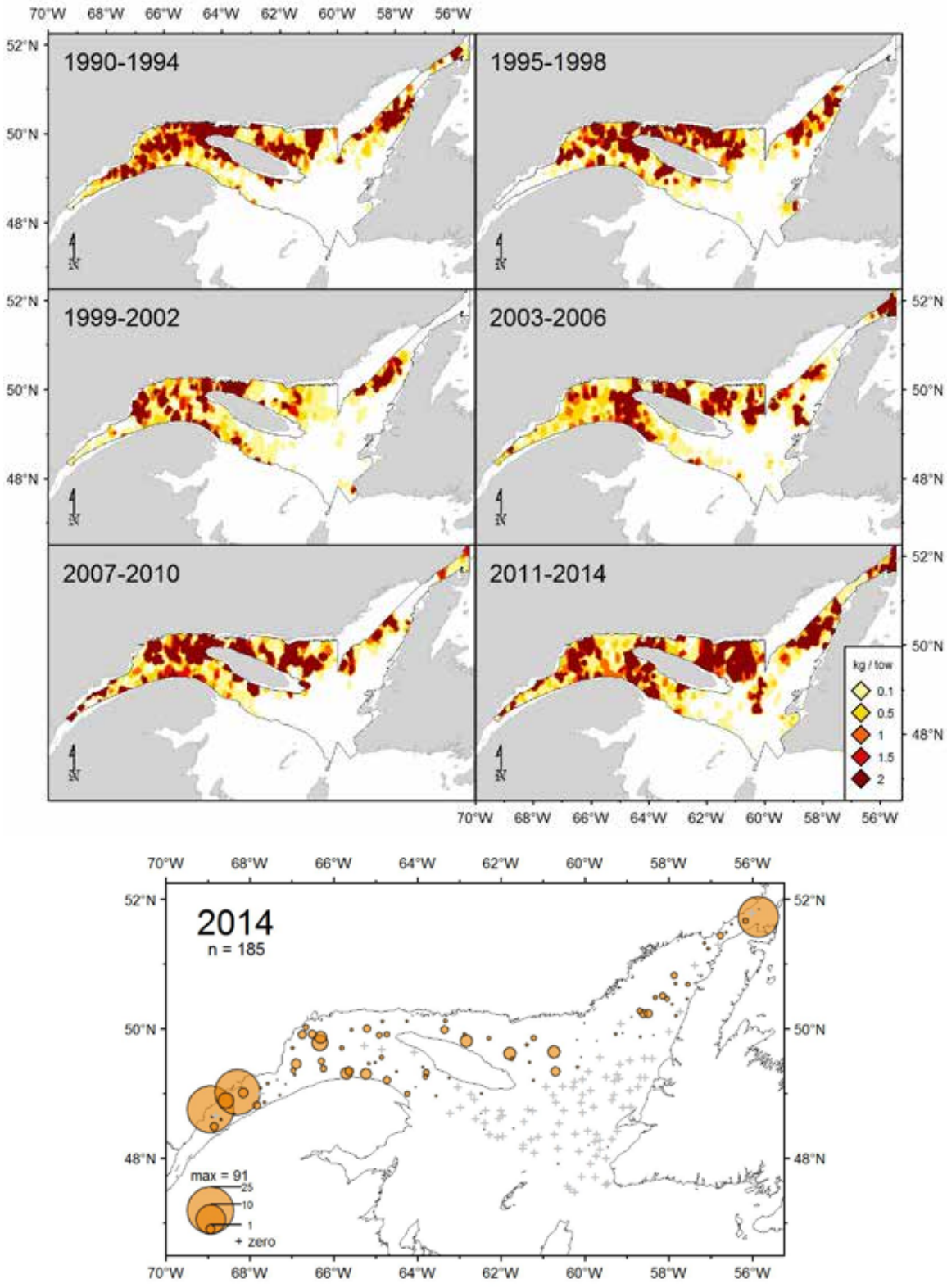


Figure 16. Capelin catch rates (kg/15 minutes tow) distribution.

Capelin

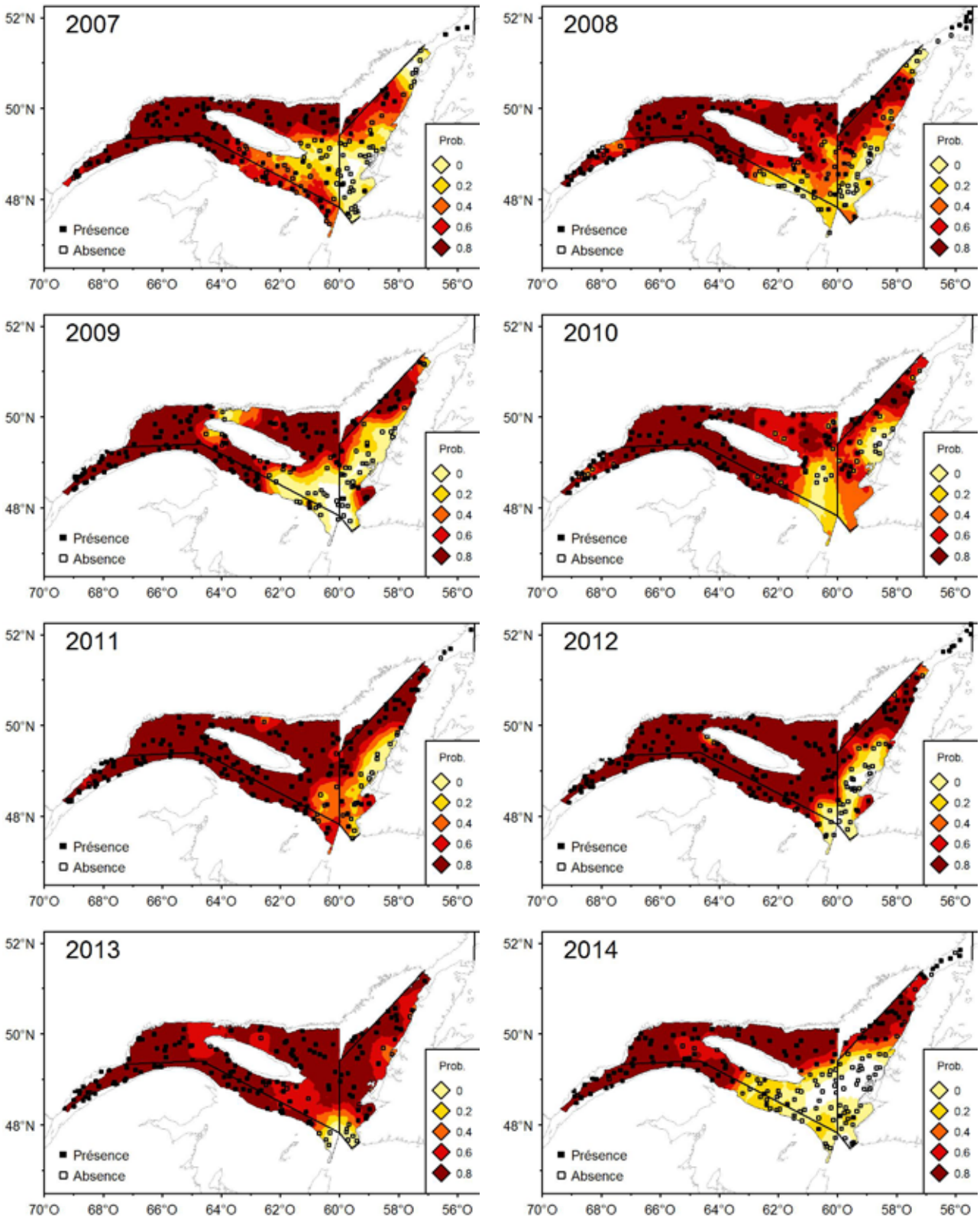
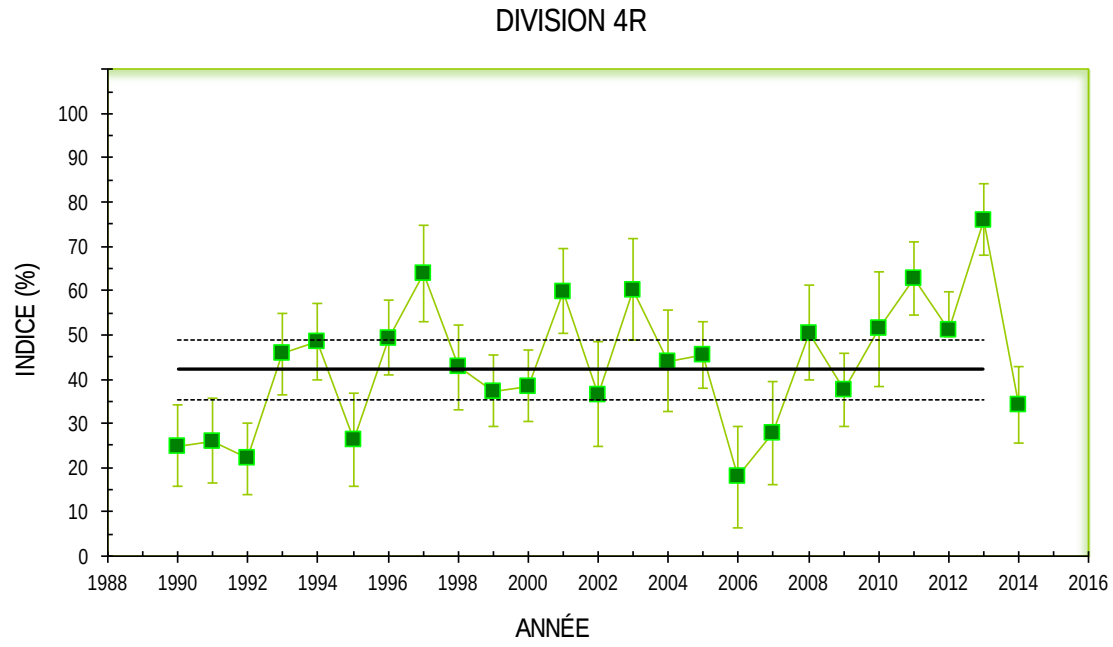


Figure 17. Probabilities areas (%) associated with the presence of Capelin.

Capelin



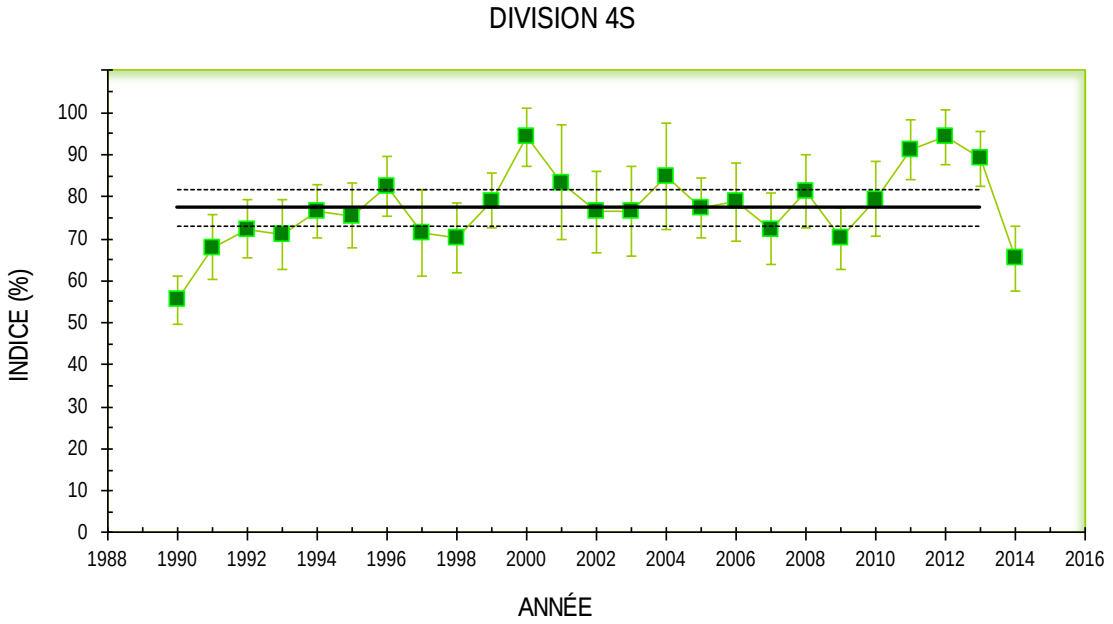


Figure 18. Mean probabilities of finding Capelin in NAFO Divisions 4R and 4S. Error bars indicate the 95% confidence interval and the horizontal lines indicate the mean of the 1990-2013 period (solid line) and upper and lower reference (see text) limits (dashed lines).

Cod

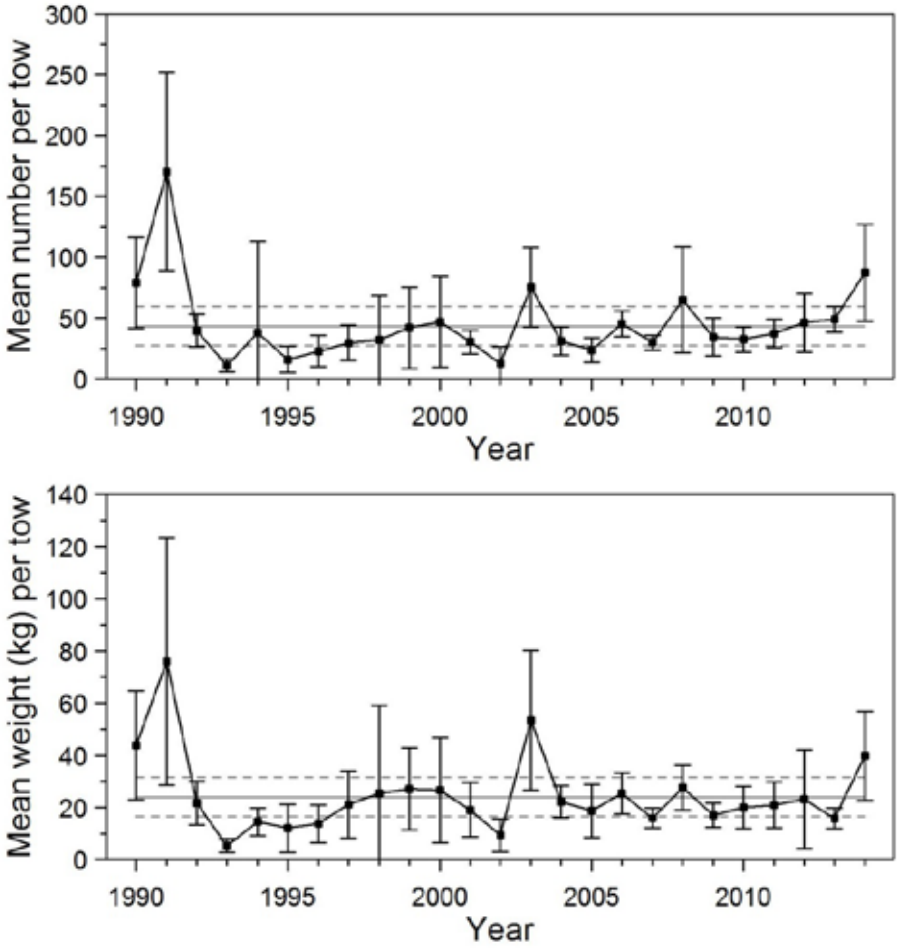


Figure 19. Mean numbers and mean weights per 15 minutes tow observed during the survey for Cod in 4RS. Error bars indicate the 95% confidence interval and the horizontal lines indicate the mean of the 1990-2013 period (solid line) and upper and lower reference (see text) limits (dashed lines).

Cod

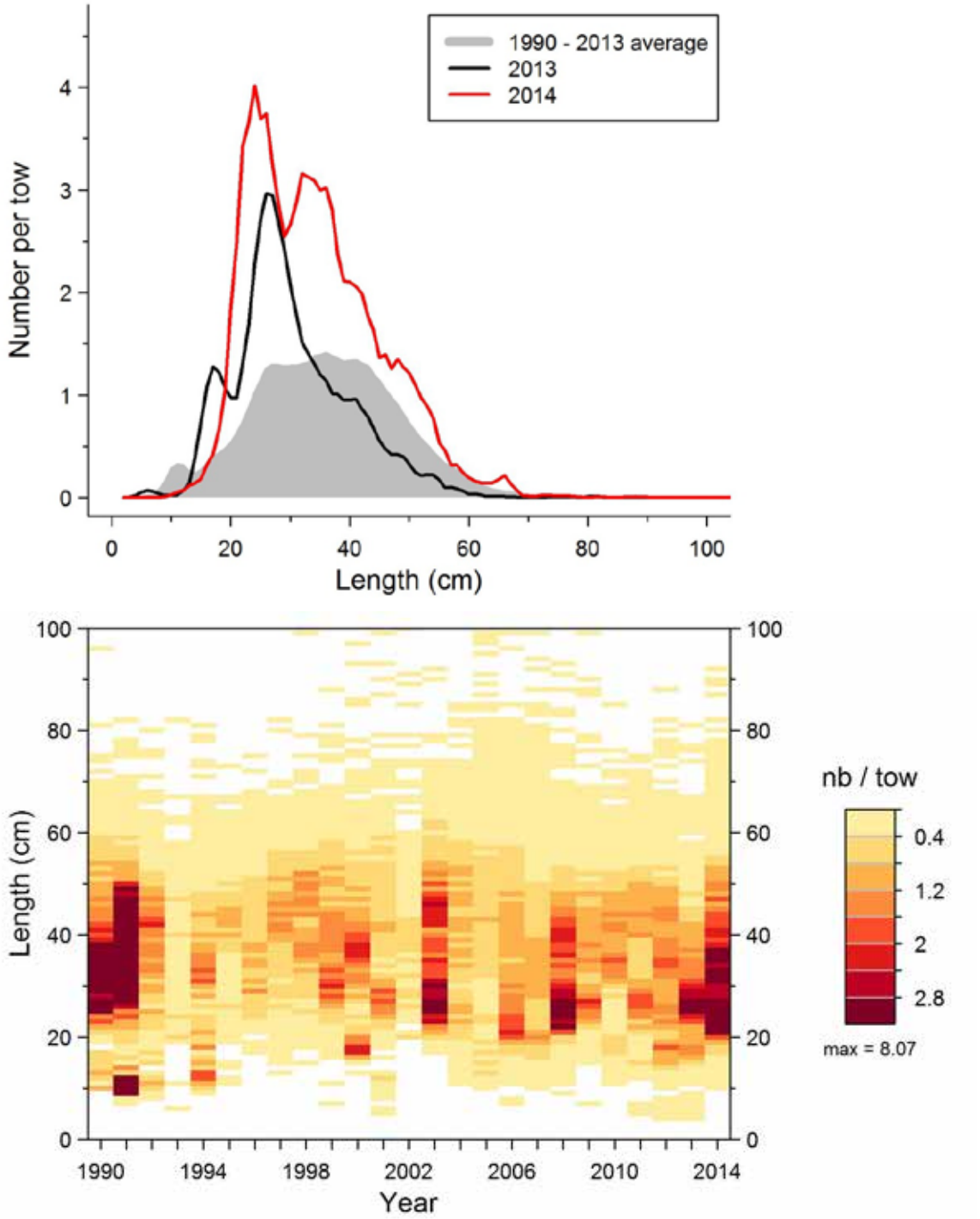


Figure 20. Length frequency distributions (mean number per 15 minutes tow) observed during the survey for Cod in 4RS.

Cod

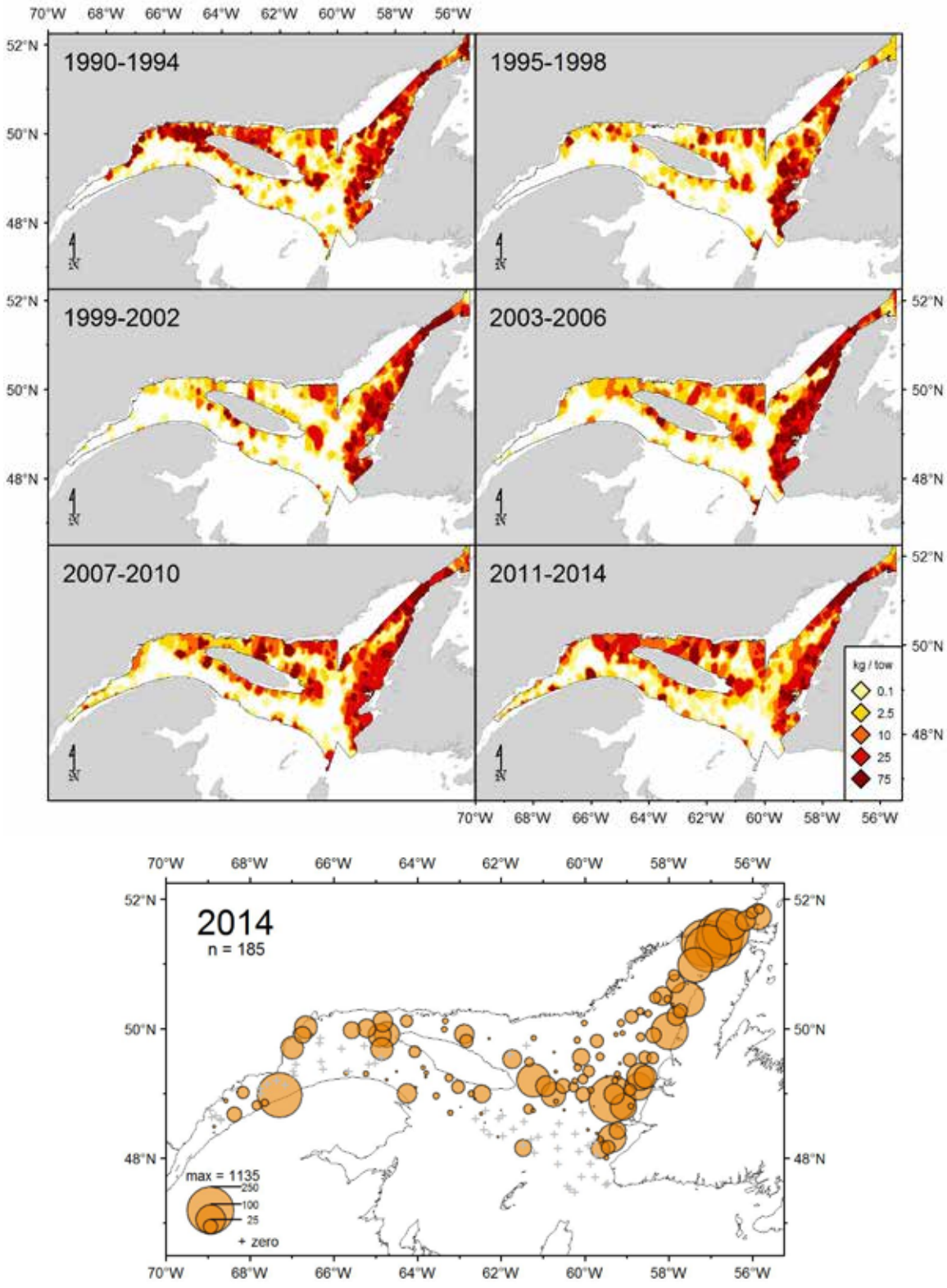


Figure 21. Cod catch rates (kg/15 minutes tow) distribution.

Deepwater Redfish

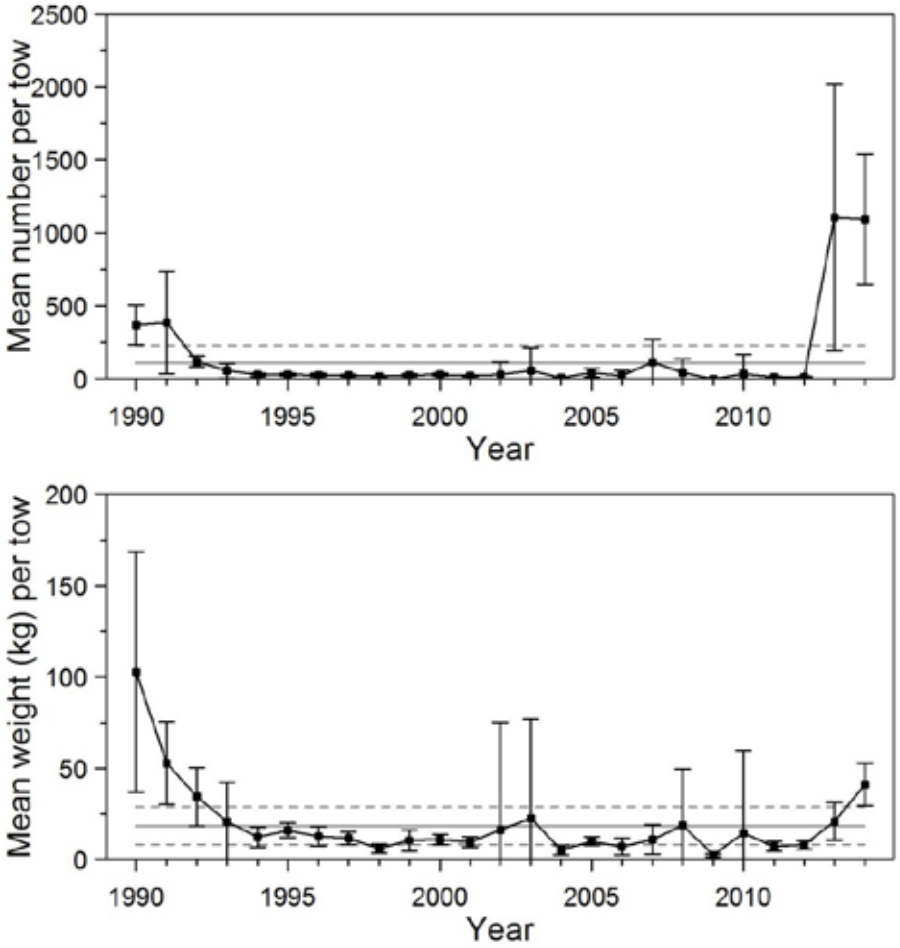


Figure 22. Mean numbers and mean weights per 15 minutes tow observed during the survey for Deepwater Redfish in 4RST. Error bars indicate the 95% confidence interval and the horizontal lines indicate the mean of the 1990-2013 period (solid line) and upper and lower reference (see text) limits (dashed lines).

Deepwater Redfish

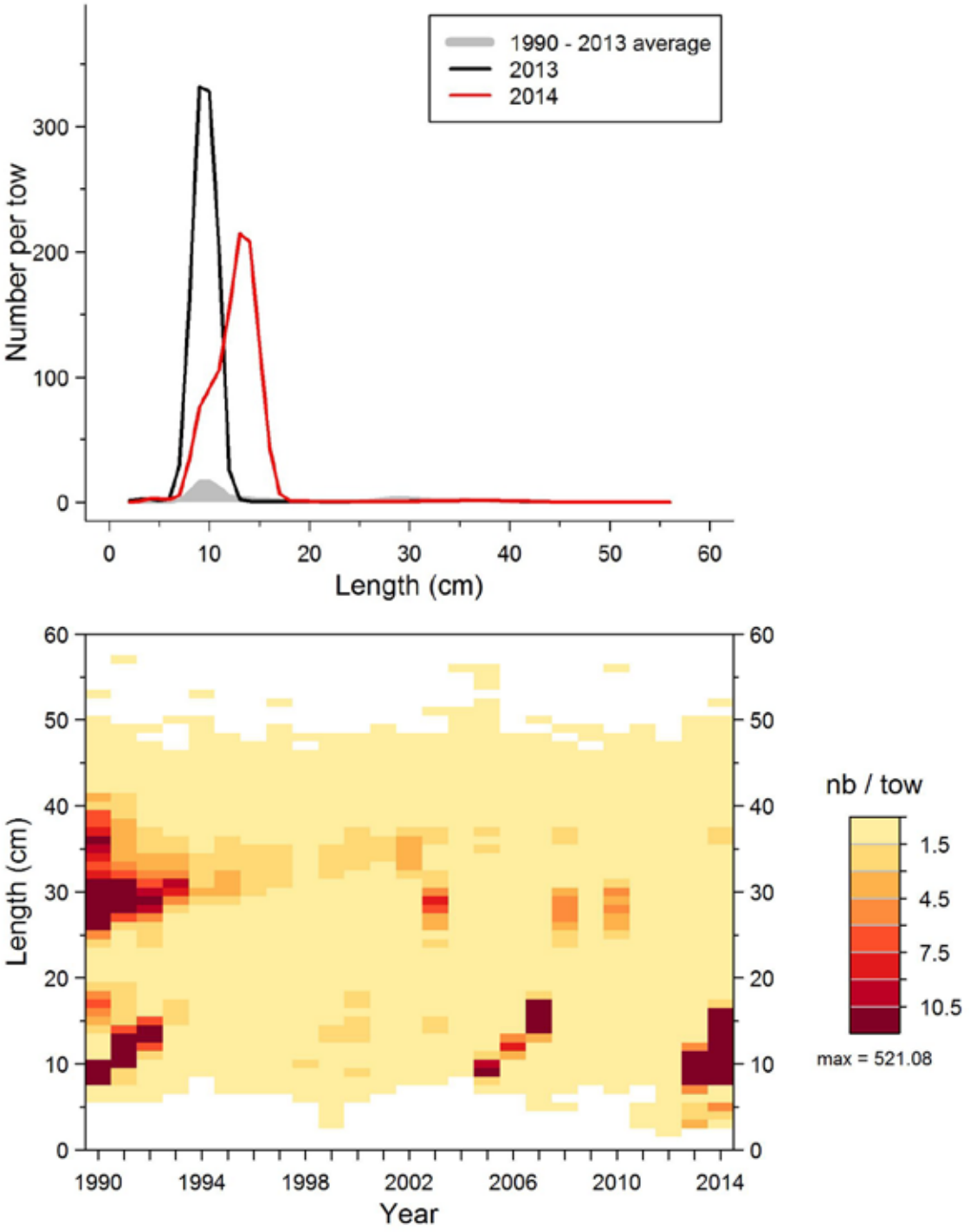


Figure 23. Length frequency distributions (mean number per 15 minutes tow) observed during the survey for Deepwater Redfish in 4RST.

Deepwater Redfish

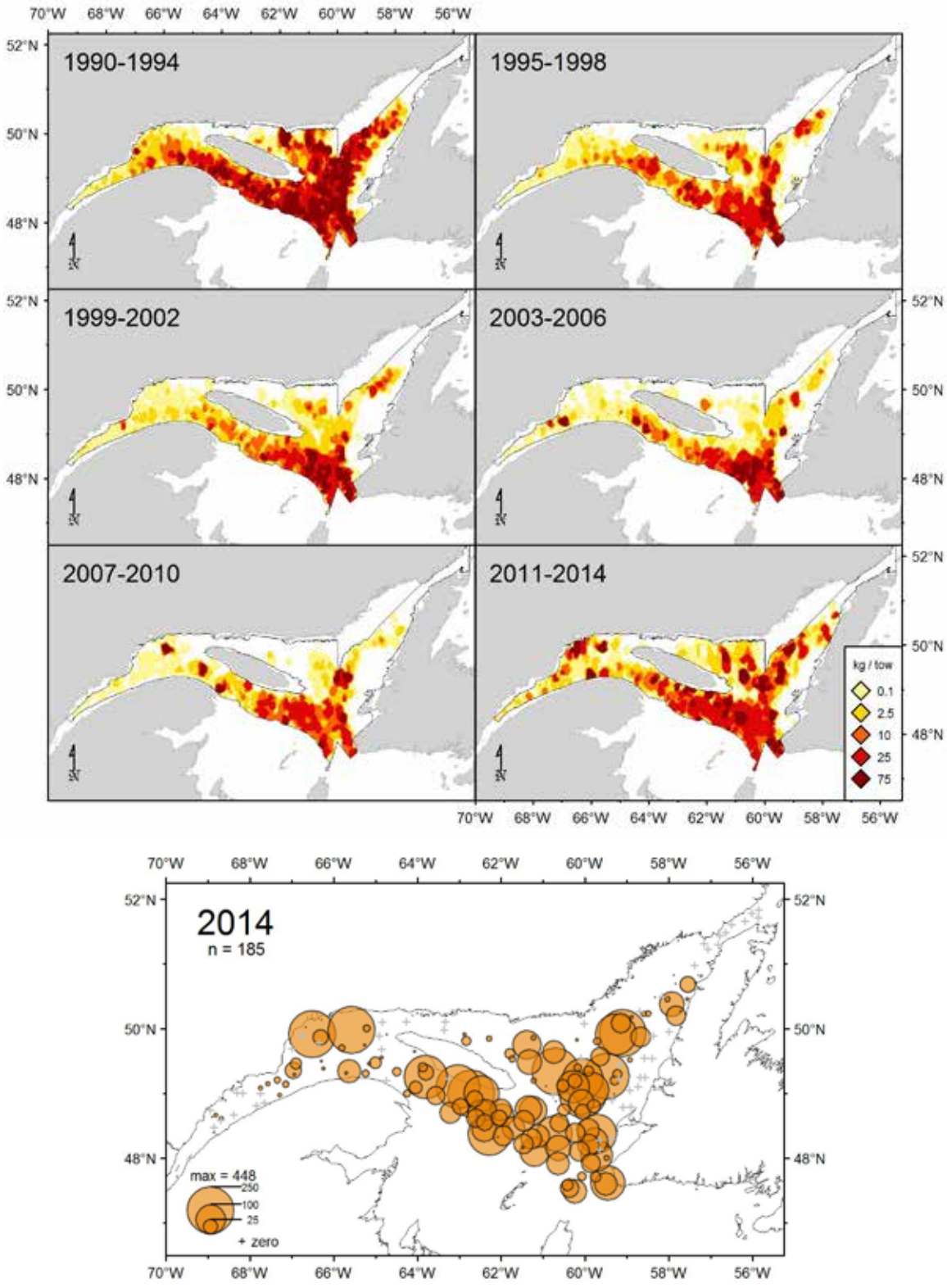


Figure 24. Deepwater Redfish catch rates (kg/15 minutes tow) distribution.

Greenland Halibut

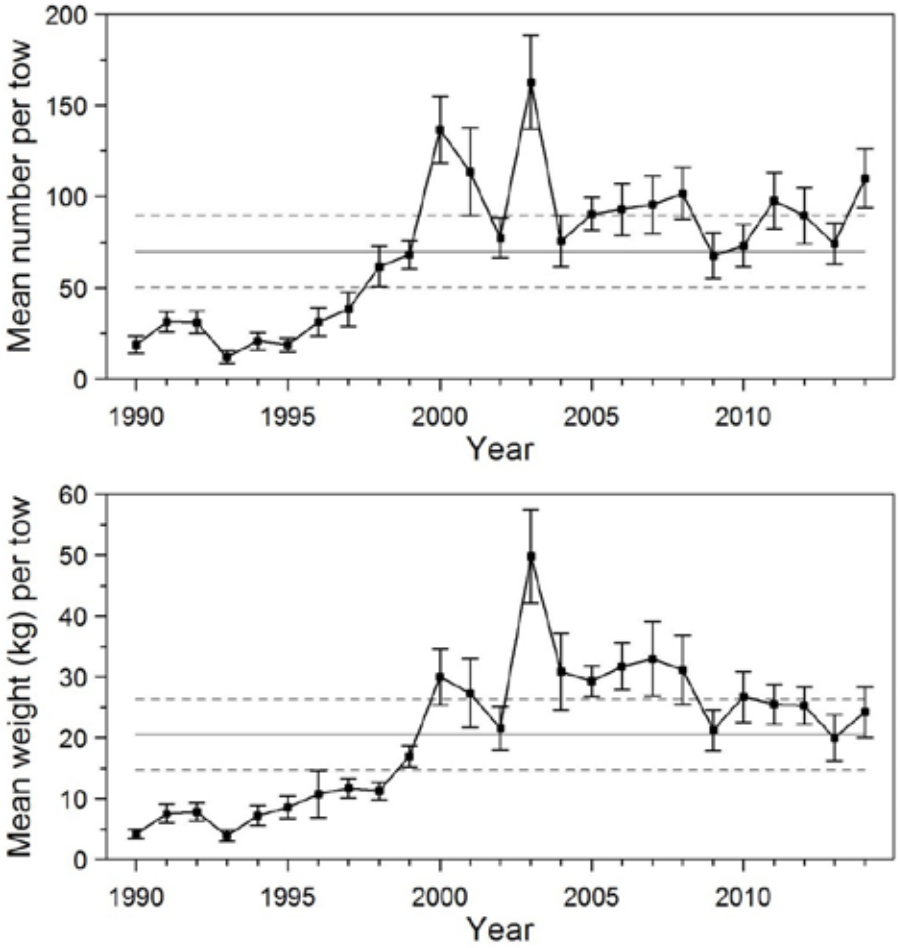


Figure 25. Mean numbers and mean weights per 15 minutes tow observed during the survey for Greenland Halibut in 4RST. Error bars indicate the 95% confidence interval and the horizontal lines indicate the mean of the 1990-2013 period (solid line) and upper and lower reference (see text) limits (dashed lines).

Greenland Halibut

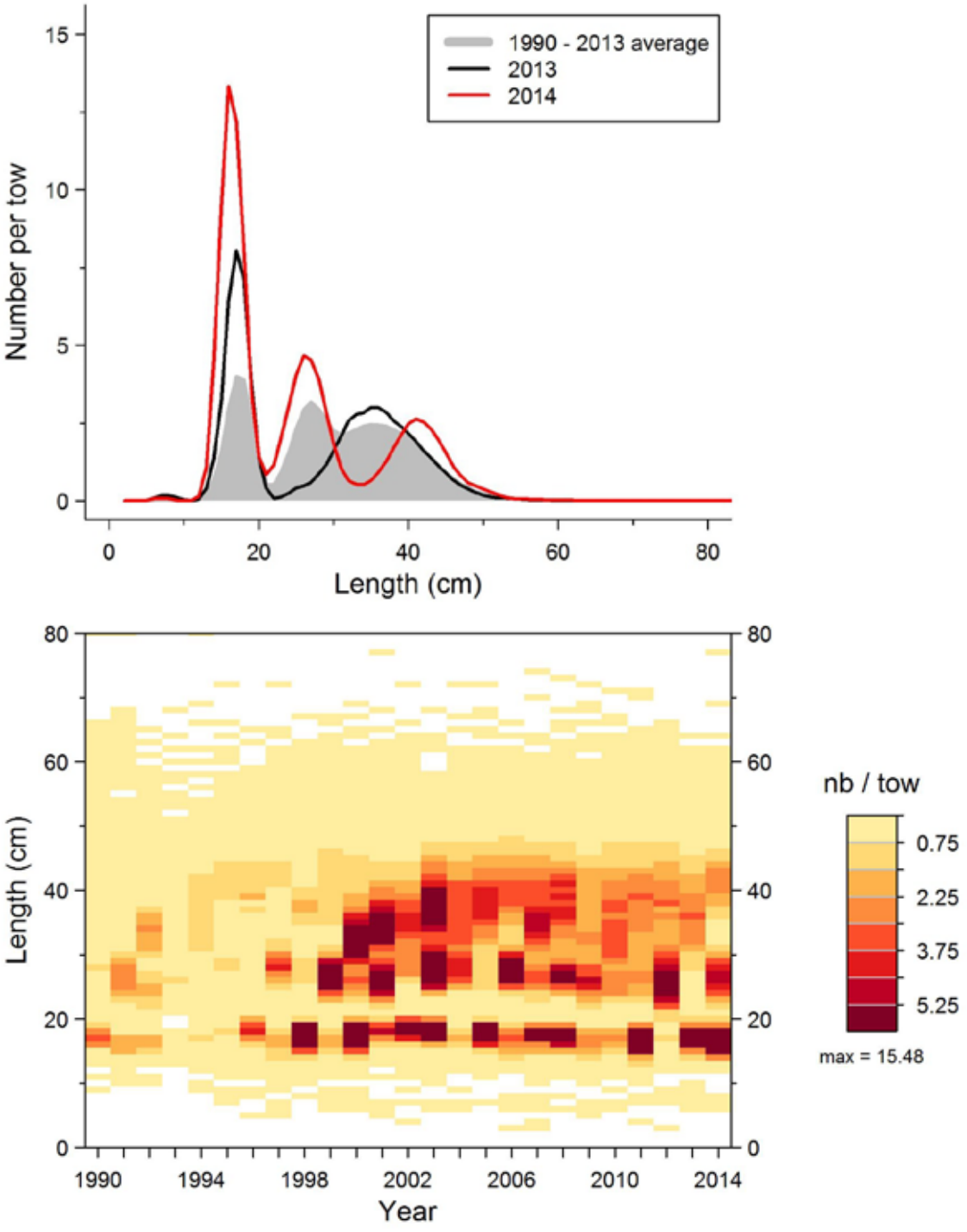


Figure 26. Length frequency distributions (mean number per 15 minutes tow) observed during the survey for Greenland Halibut in 4RST.

Greenland Halibut

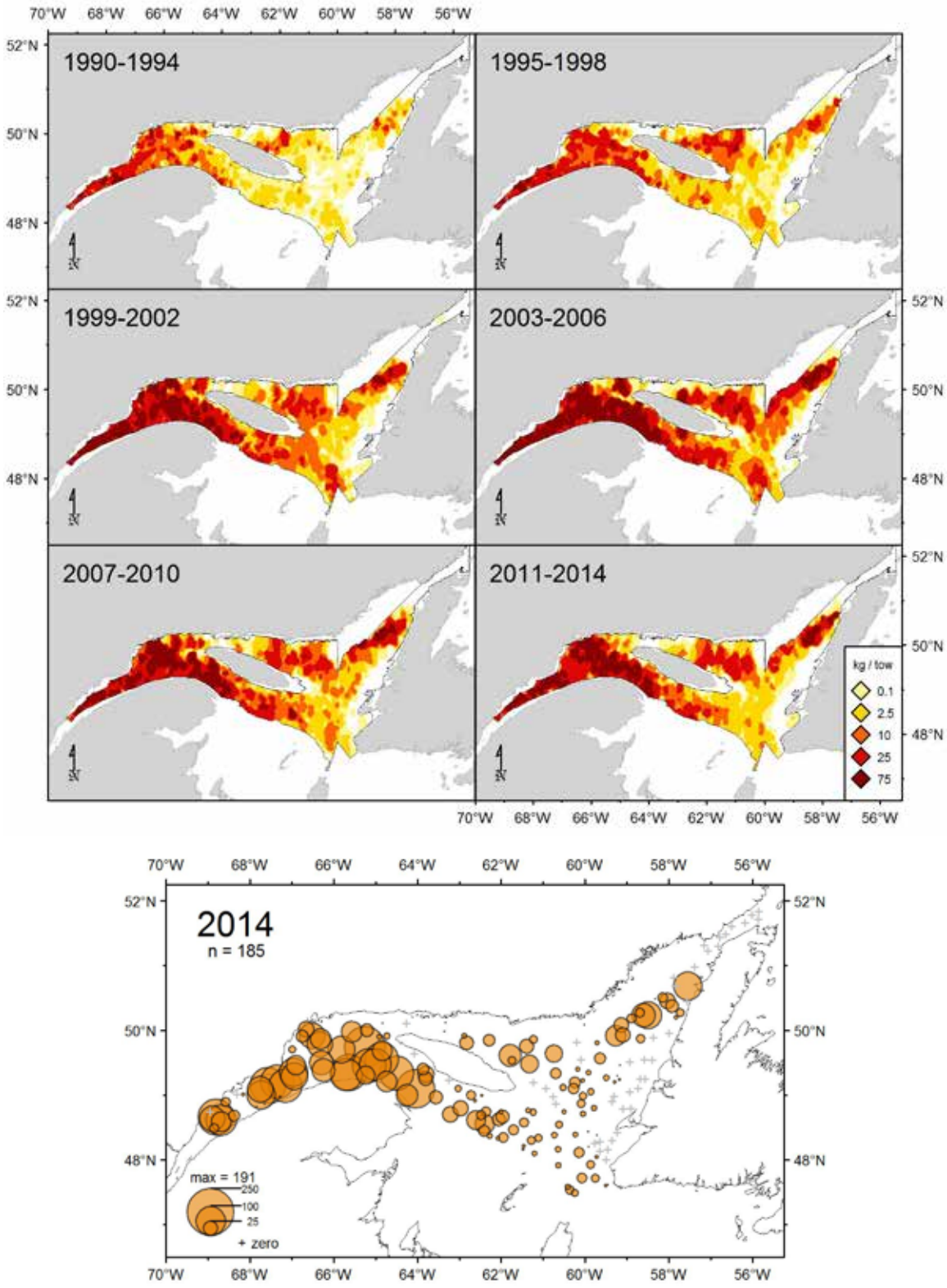


Figure 27. Greenland Halibut catch rates (kg/15 minutes tow) distribution.

Hagfish

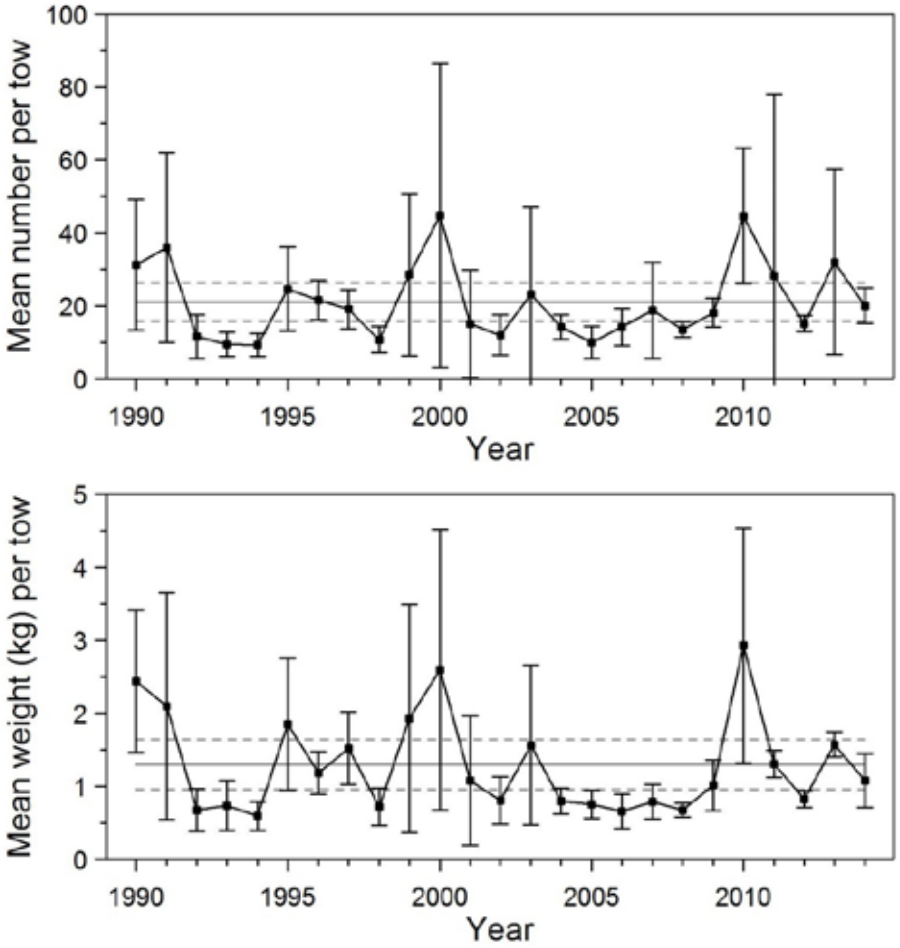


Figure 28. Mean numbers and mean weights per 15 minutes tow observed during the survey for Hagfish in 4RST. Error bars indicate the 95% confidence interval and the horizontal lines indicate the mean of the 1990-2013 period (solid line) and upper and lower reference (see text) limits (dashed lines).

Hagfish

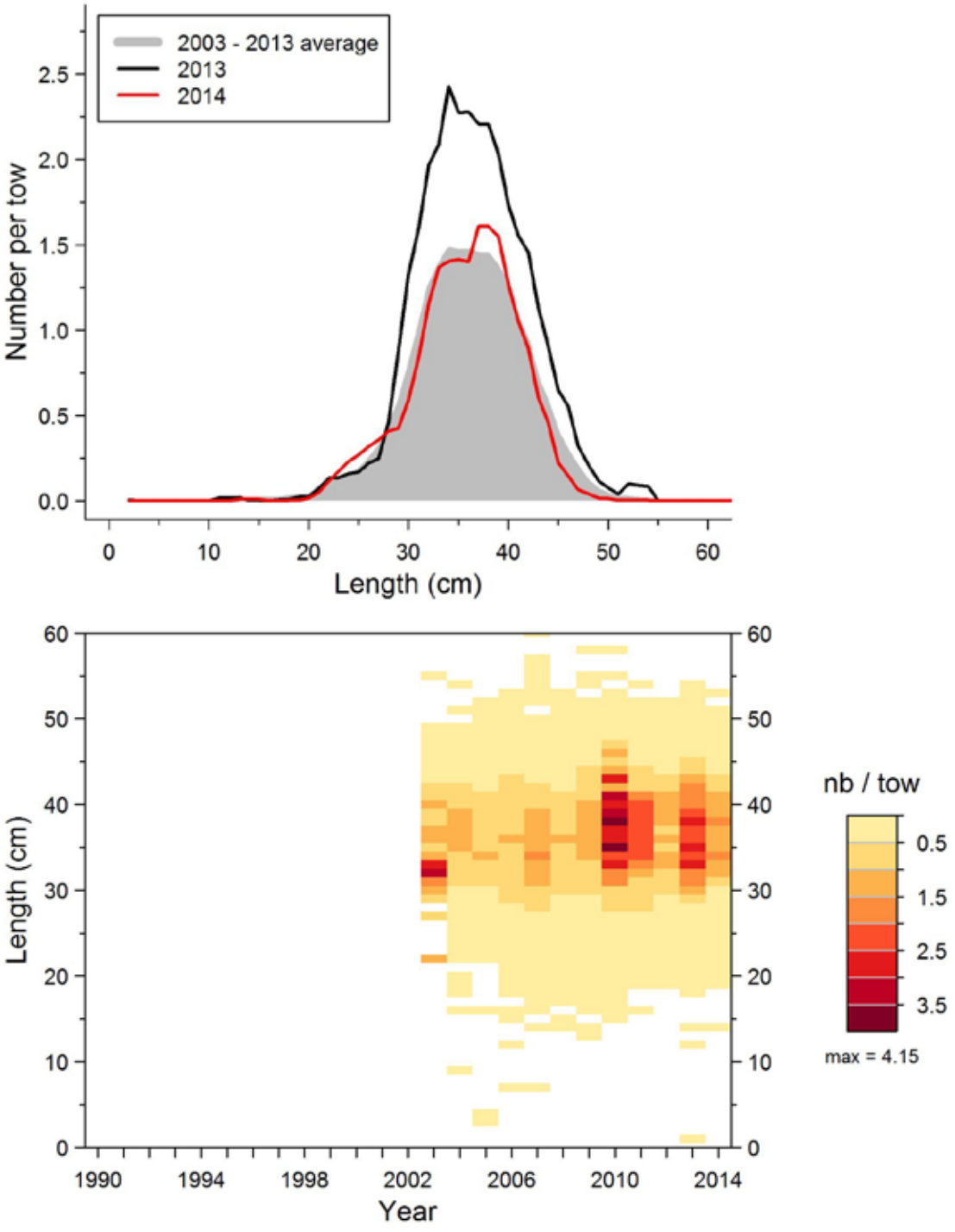


Figure 29. Length frequency distributions (mean number per 15 minutes tow) observed during the survey for Hagfish in 4RST.

Hagfish

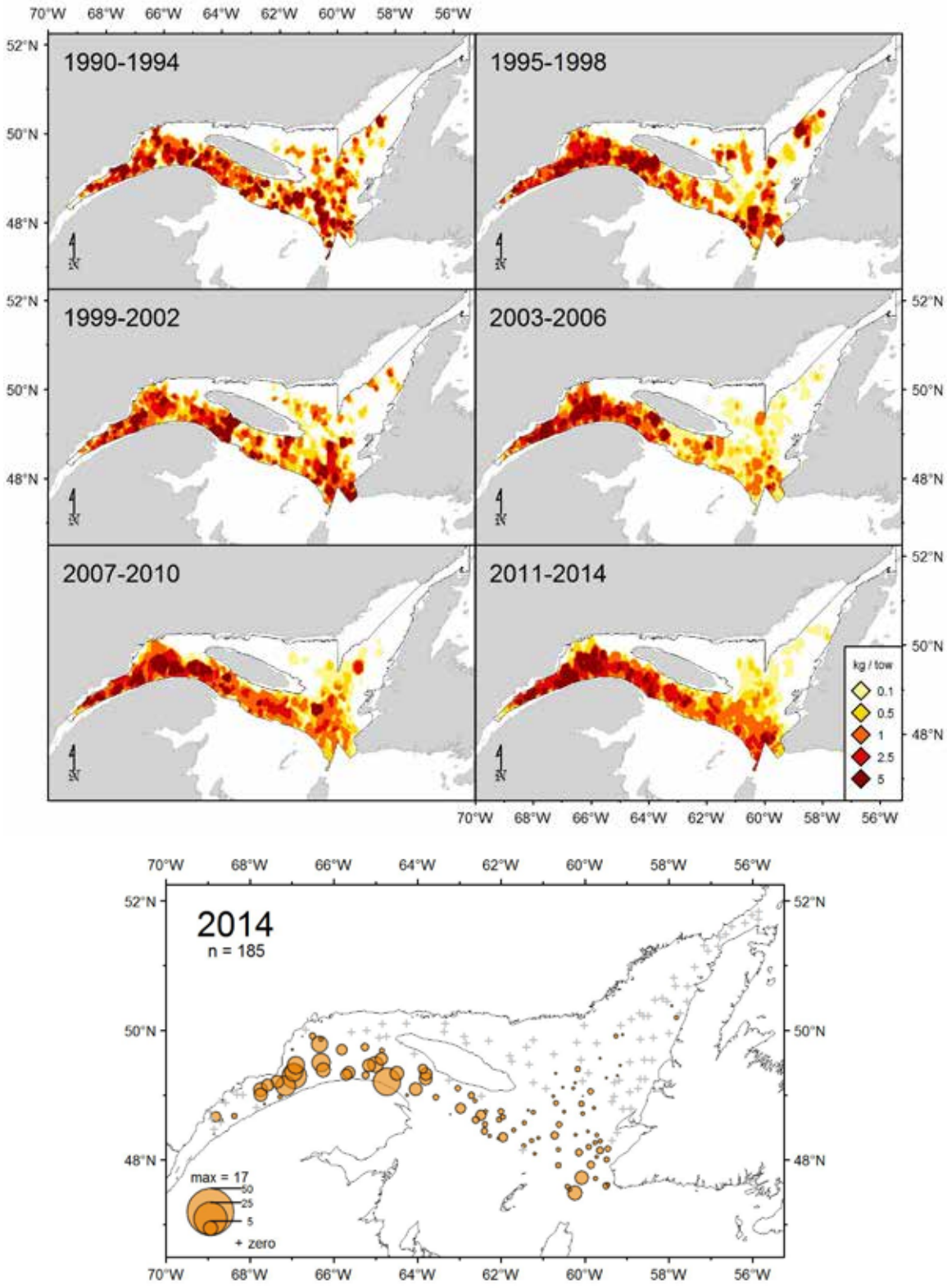


Figure 30. Hagfish catch rates (kg/15 minutes tow) distribution.

Herring

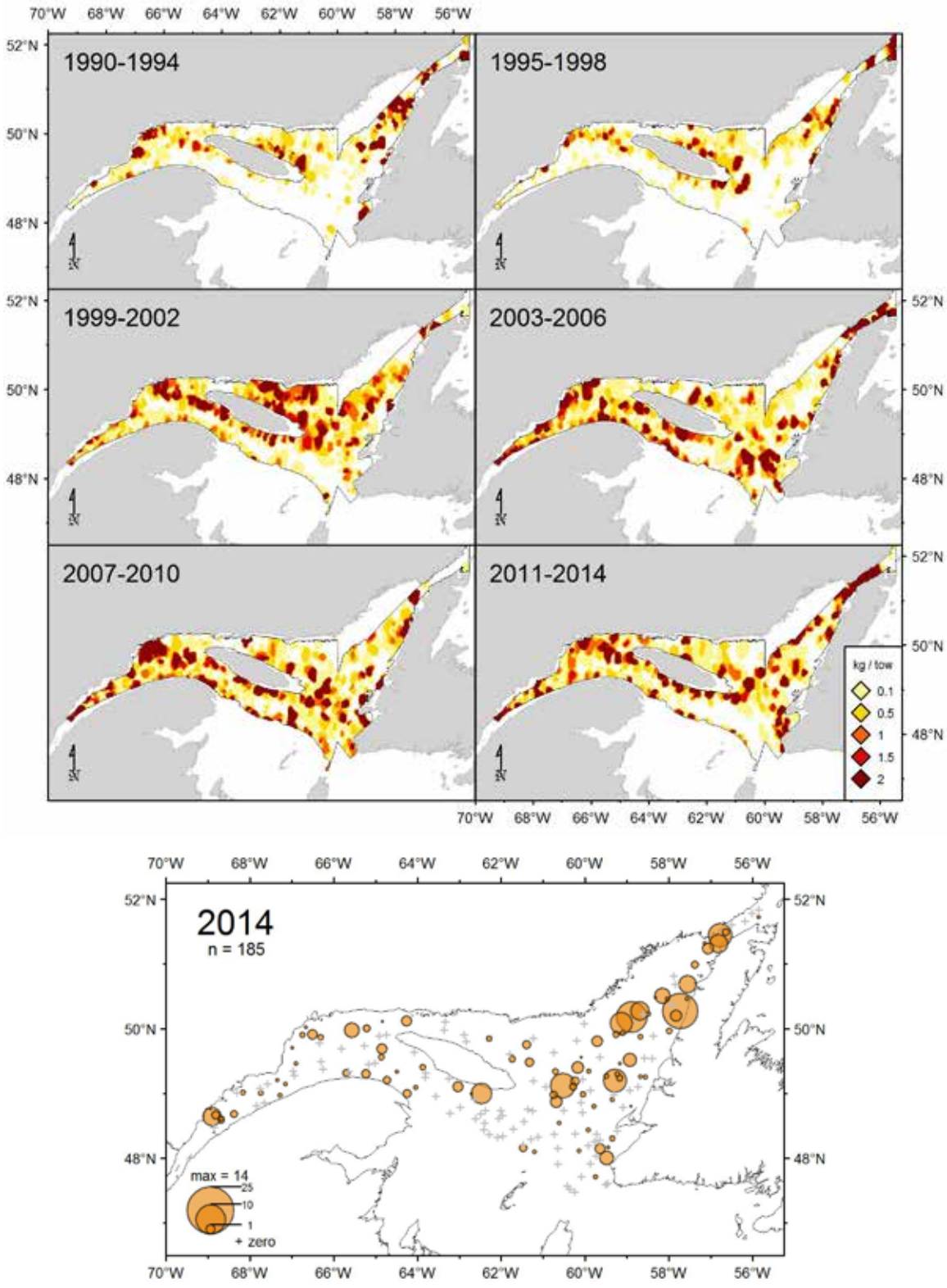


Figure 31. Herring catch rates (kg/15 minutes tow) distribution.

Herring

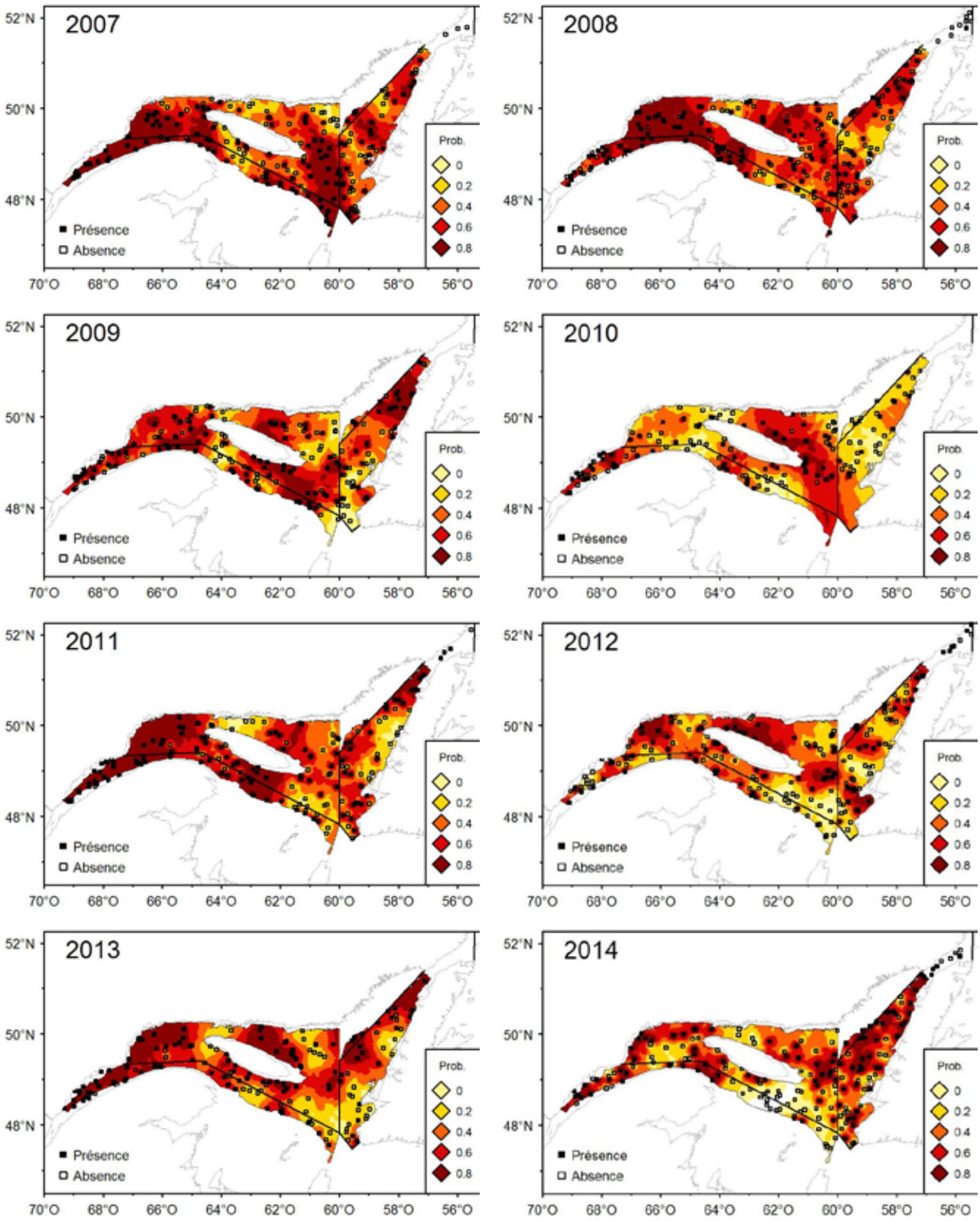


Figure 32. Probabilities areas (%) associated with the presence of Herring.

Herring

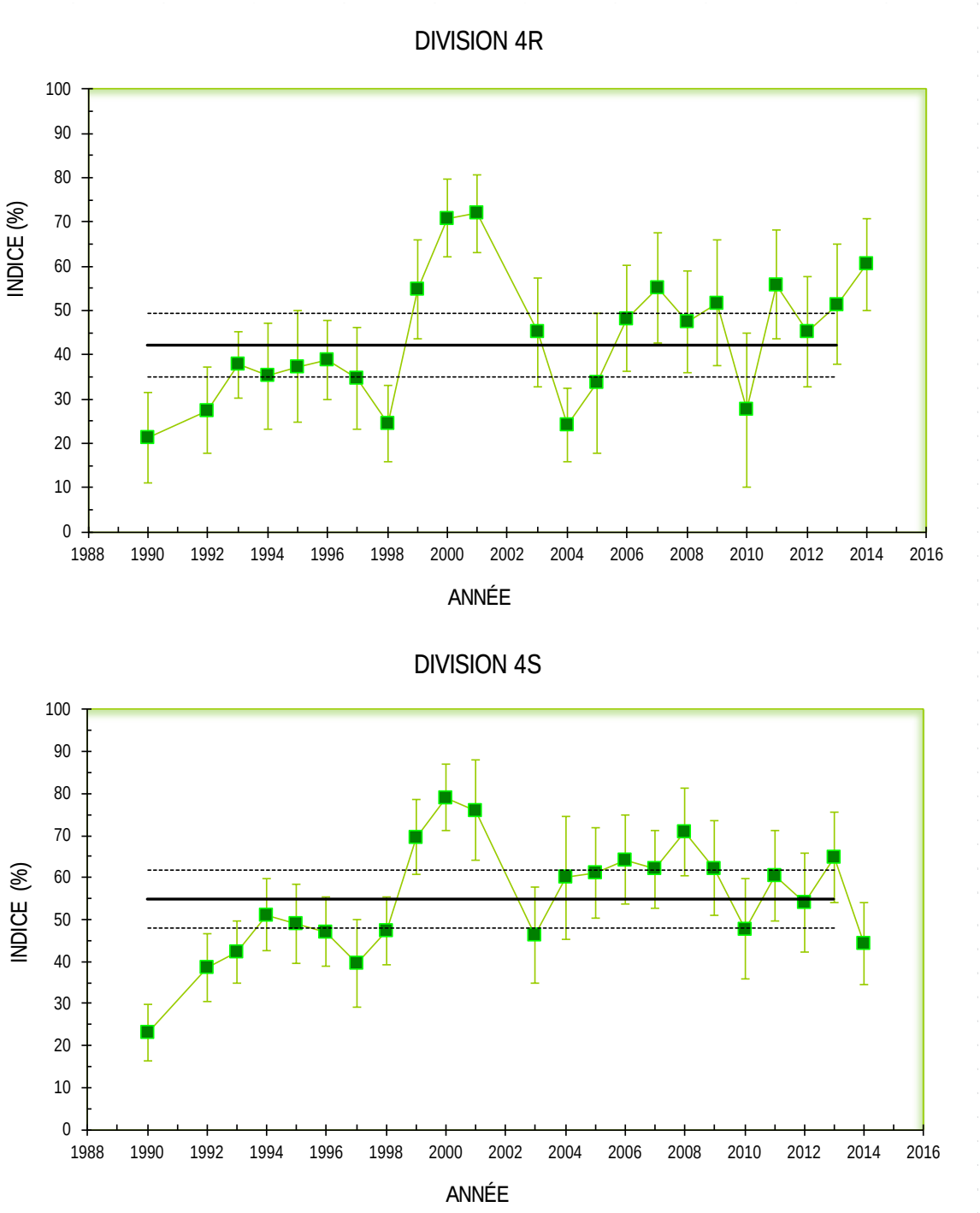


Figure 33. Mean probabilities of finding Herring in NAFO Divisions 4R and 4S. Error bars indicate the 95% confidence interval and the horizontal lines indicate the mean of the 1990-2013 period (solid line) and upper and lower reference (see text) limits (dashed lines).

Longfin Hake

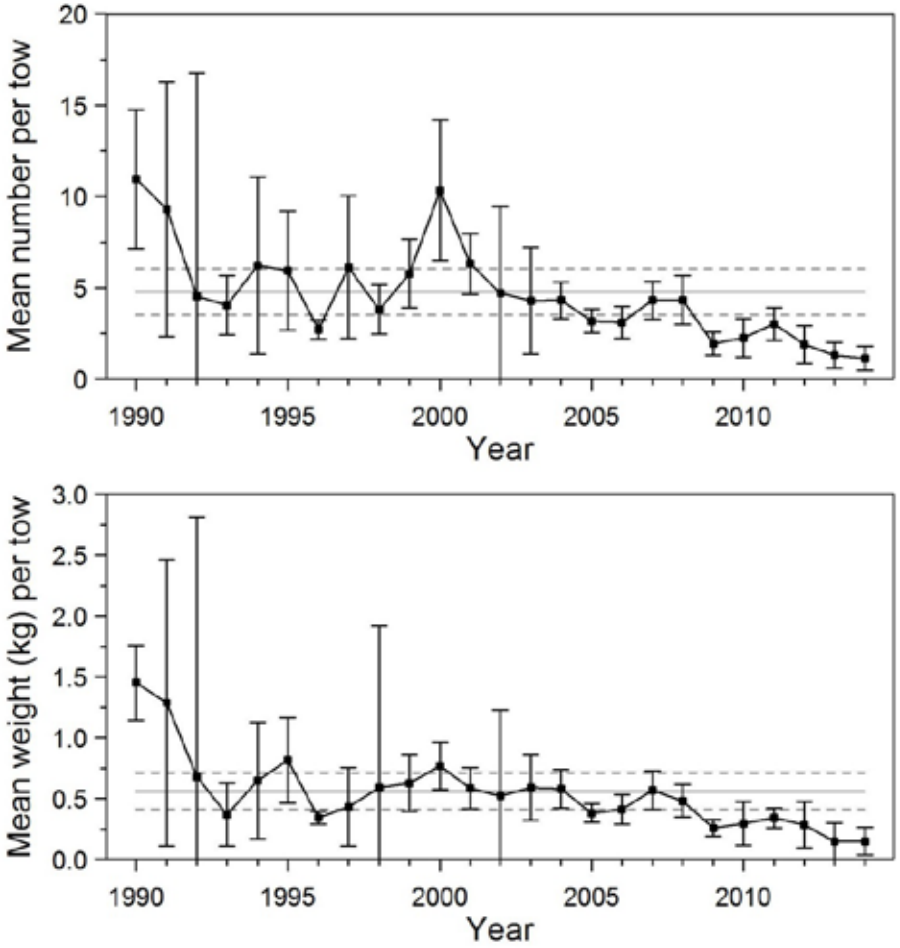


Figure 34. Mean numbers and mean weights per 15 minutes tow observed during the survey for Longfin Hake in 4RST. Error bars indicate the 95% confidence interval and the horizontal lines indicate the mean of the 1990-2013 period (solid line) and upper and lower reference (see text) limits (dashed lines).

Longfin Hake

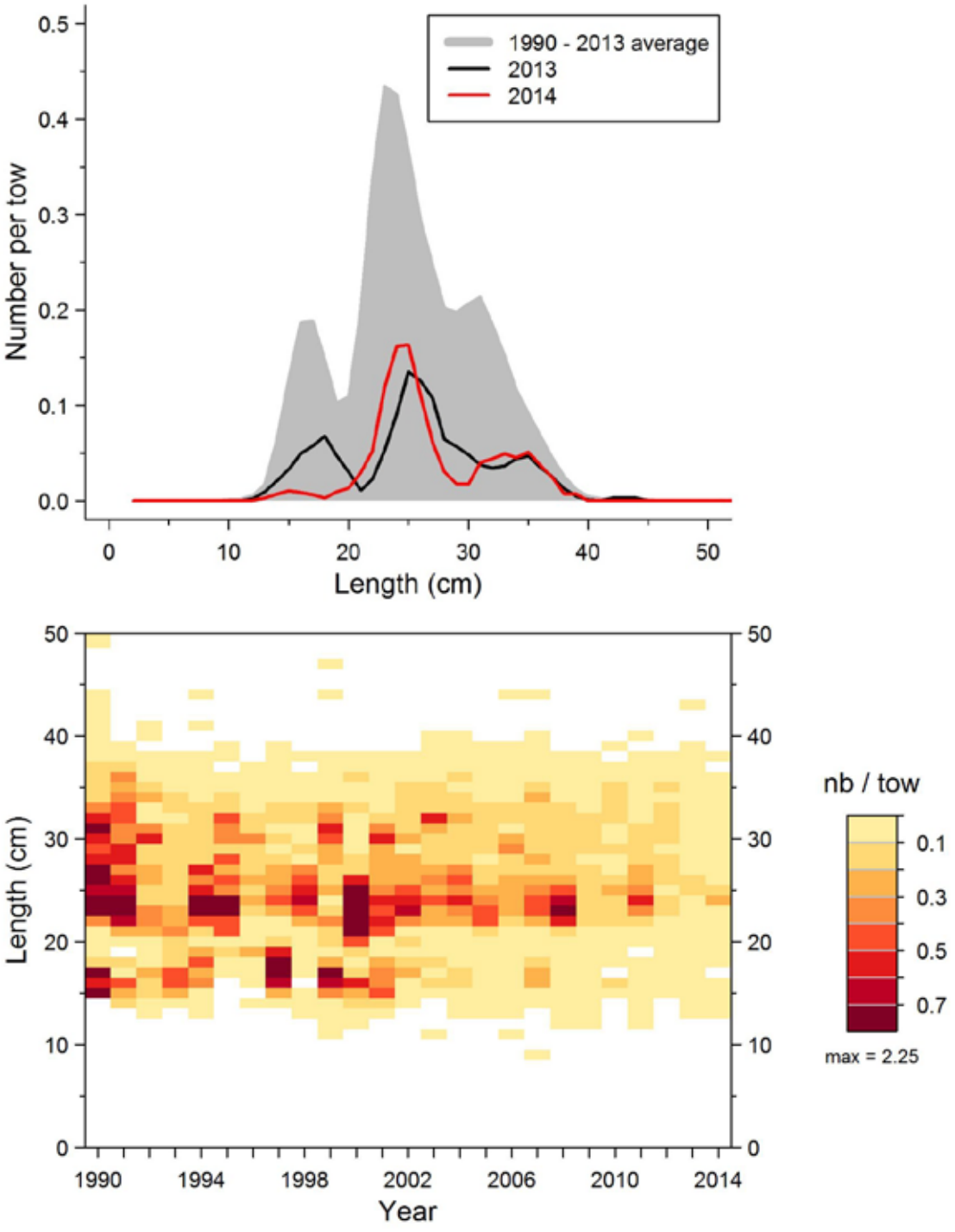


Figure 35. Length frequency distributions (mean number per 15 minutes tow) observed during the survey for Longfin Hake in 4RST.

Longfin Hake

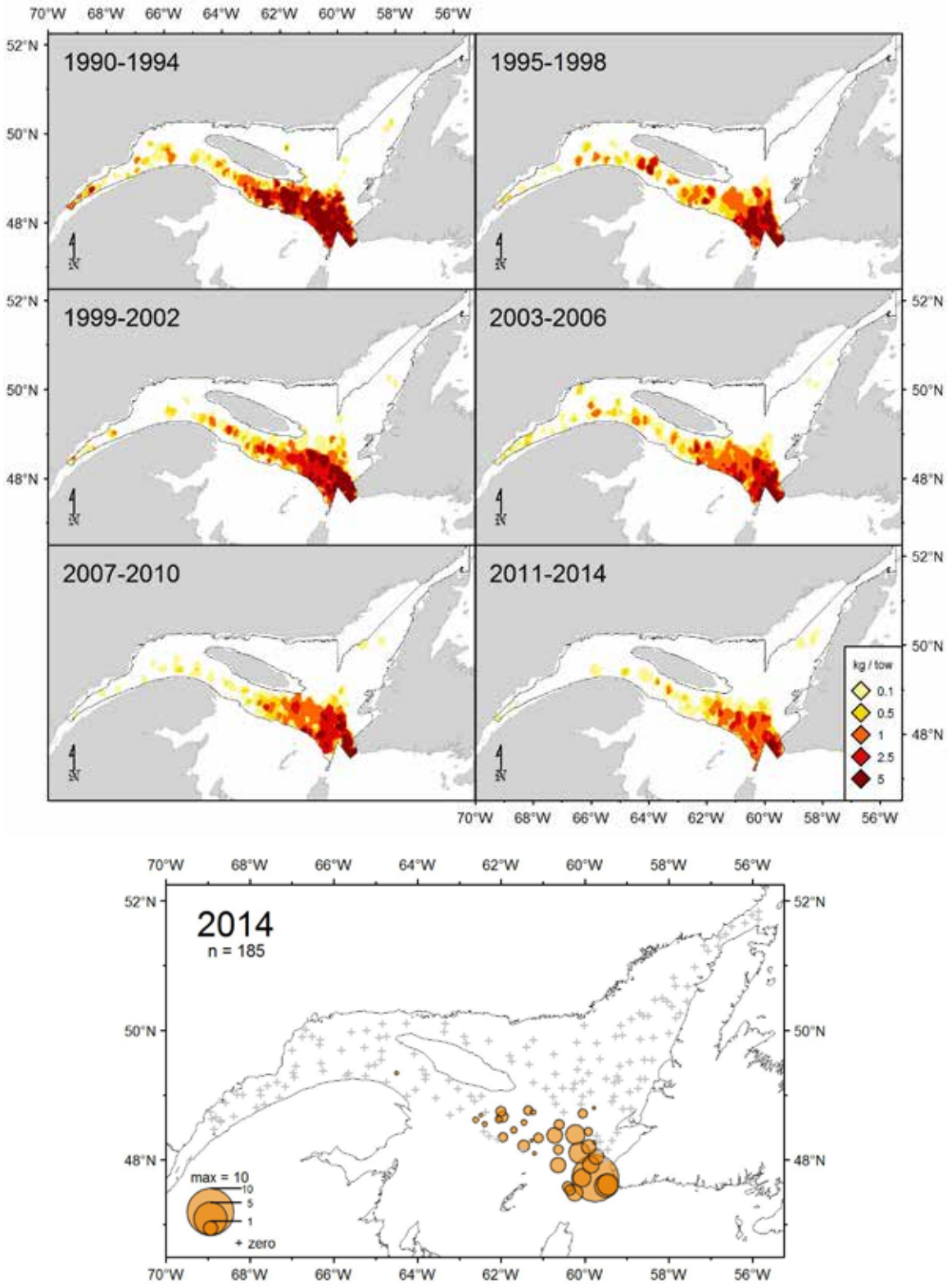


Figure 36. Longfin Hake catch rates (kg/15 minutes tow) distribution.

Lumpfish

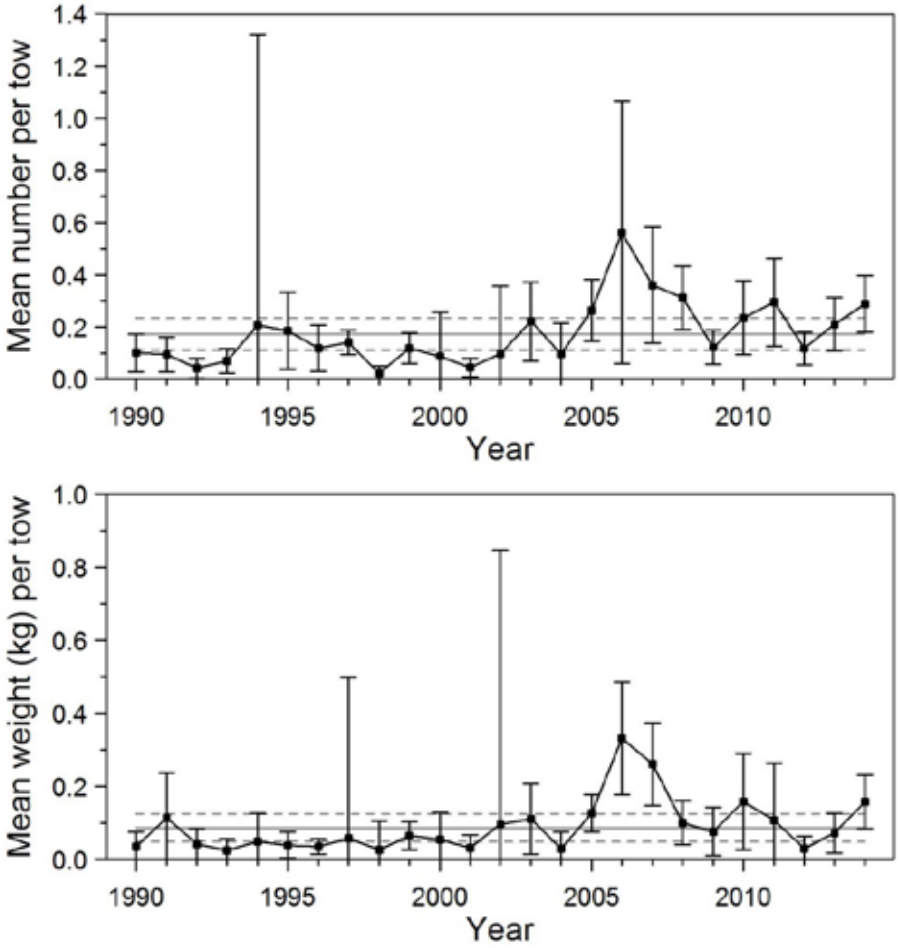


Figure 37. Mean numbers and mean weights per 15 minutes tow observed during the survey for Lumpfish in 4RST. Error bars indicate the 95% confidence interval and the horizontal lines indicate the mean of the 1990-2013 period (solid line) and upper and lower reference (see text) limits (dashed lines).

Lumpfish

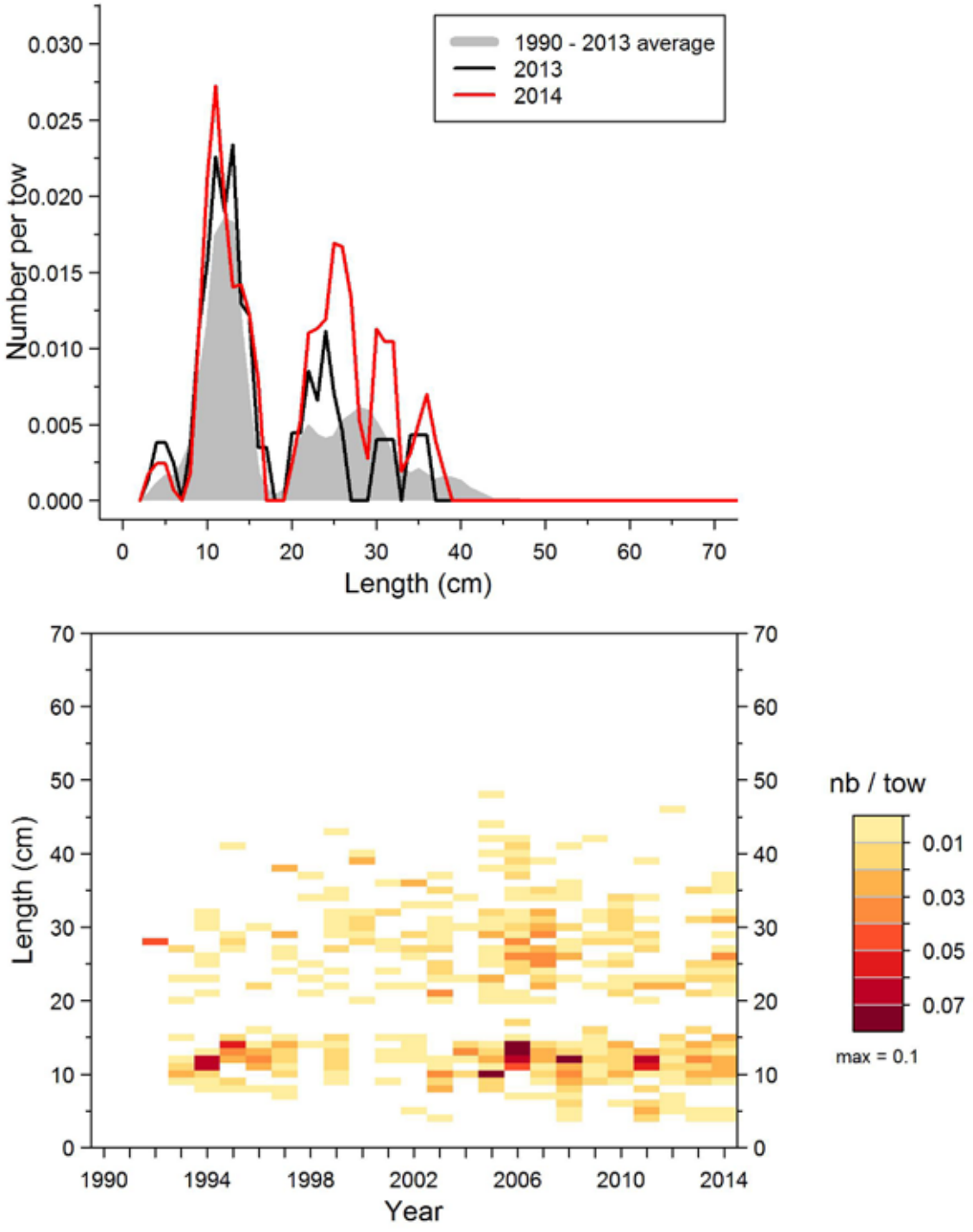


Figure 38. Length frequency distributions (mean number per 15 minutes tow) observed during the survey for Lumpfish in 4RST.

Lumpfish

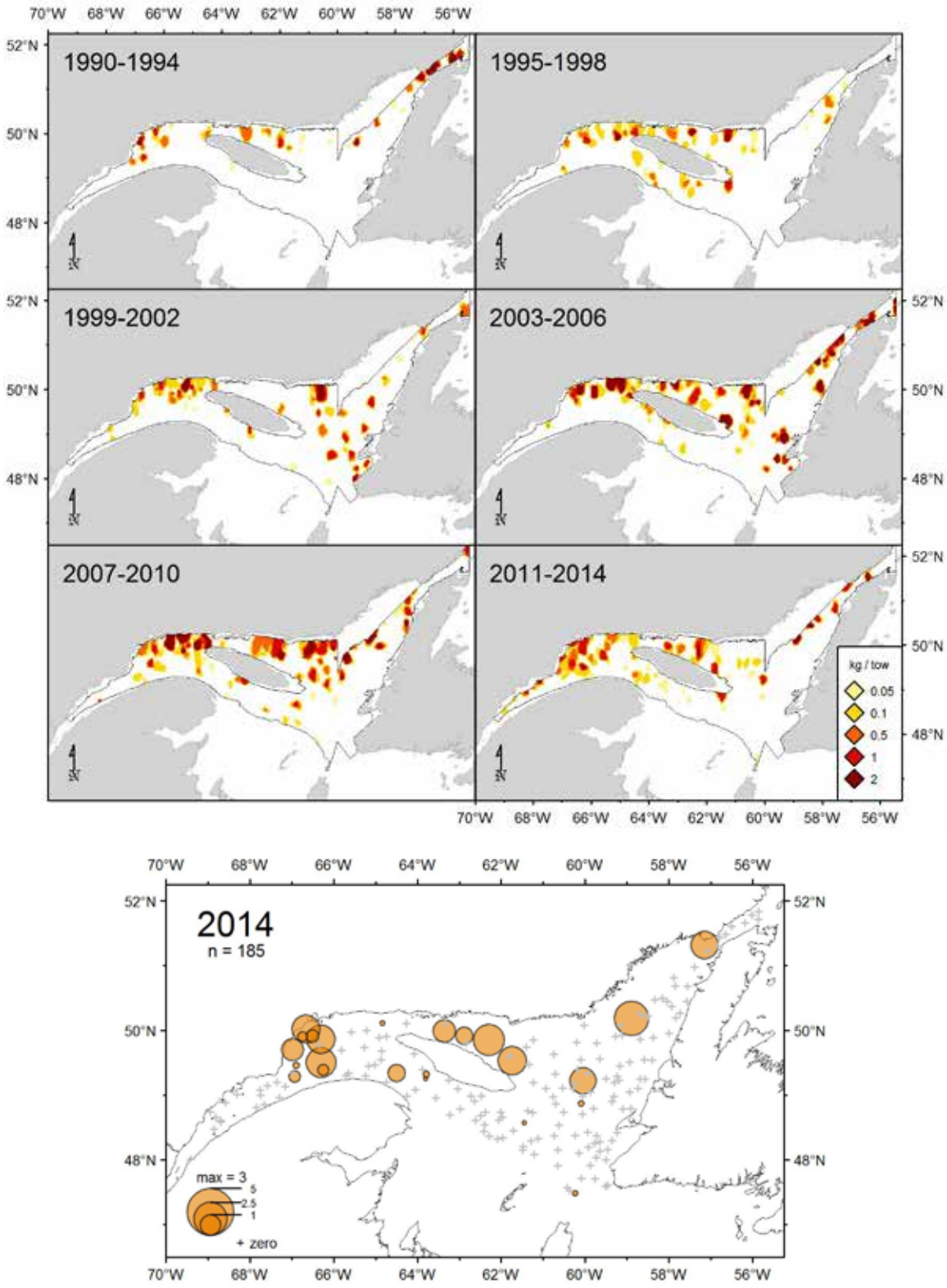


Figure 39. Lumpfish catch rates (kg/15 minutes tow) distribution.

Northern Shrimp

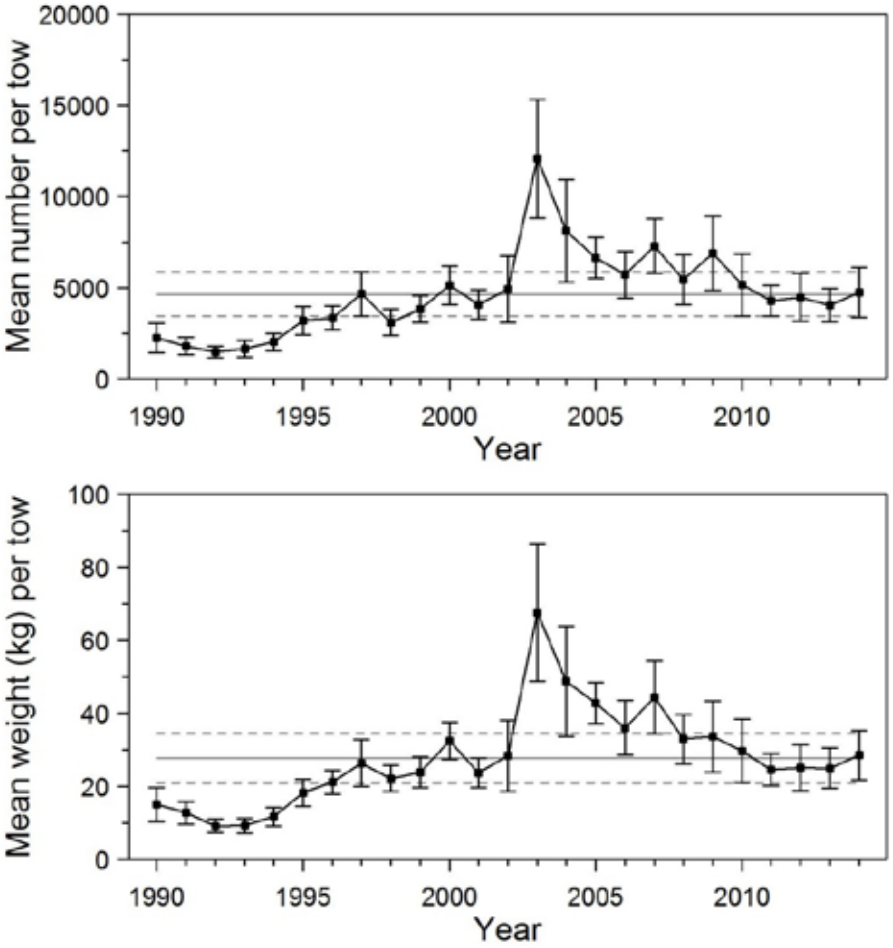


Figure 40. Mean numbers and mean weights per 15 minutes tow observed during the survey for Northern Shrimp in 4RST. Error bars indicate the 95% confidence interval and the horizontal lines indicate the mean of the 1990-2013 period (solid line) and upper and lower reference (see text) limits (dashed lines).

Northern Shrimp

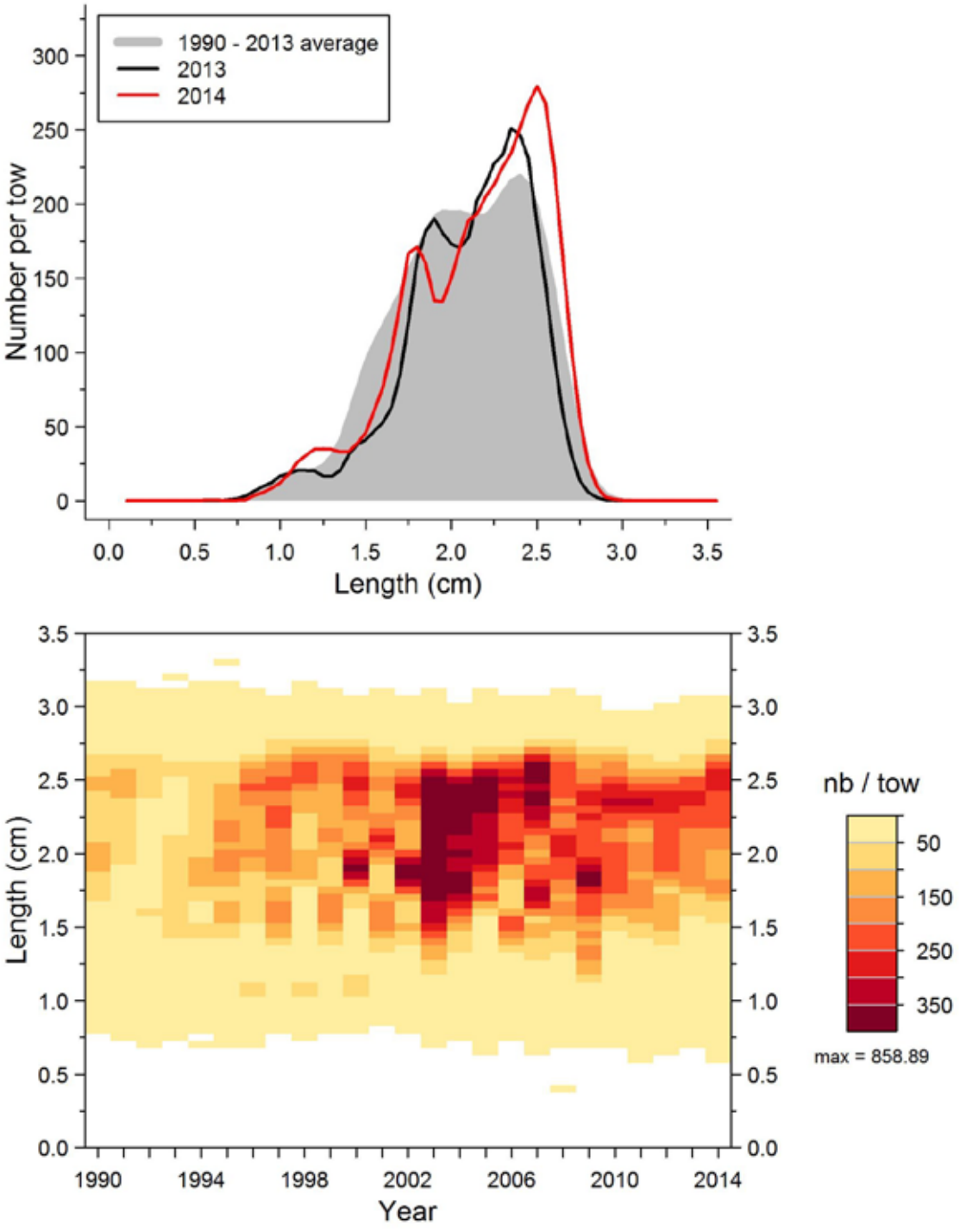


Figure 41. Carapace length frequency distributions (mean number per 15 minutes tow) observed during the survey for Northern Shrimp in 4RST.

Northern Shrimp

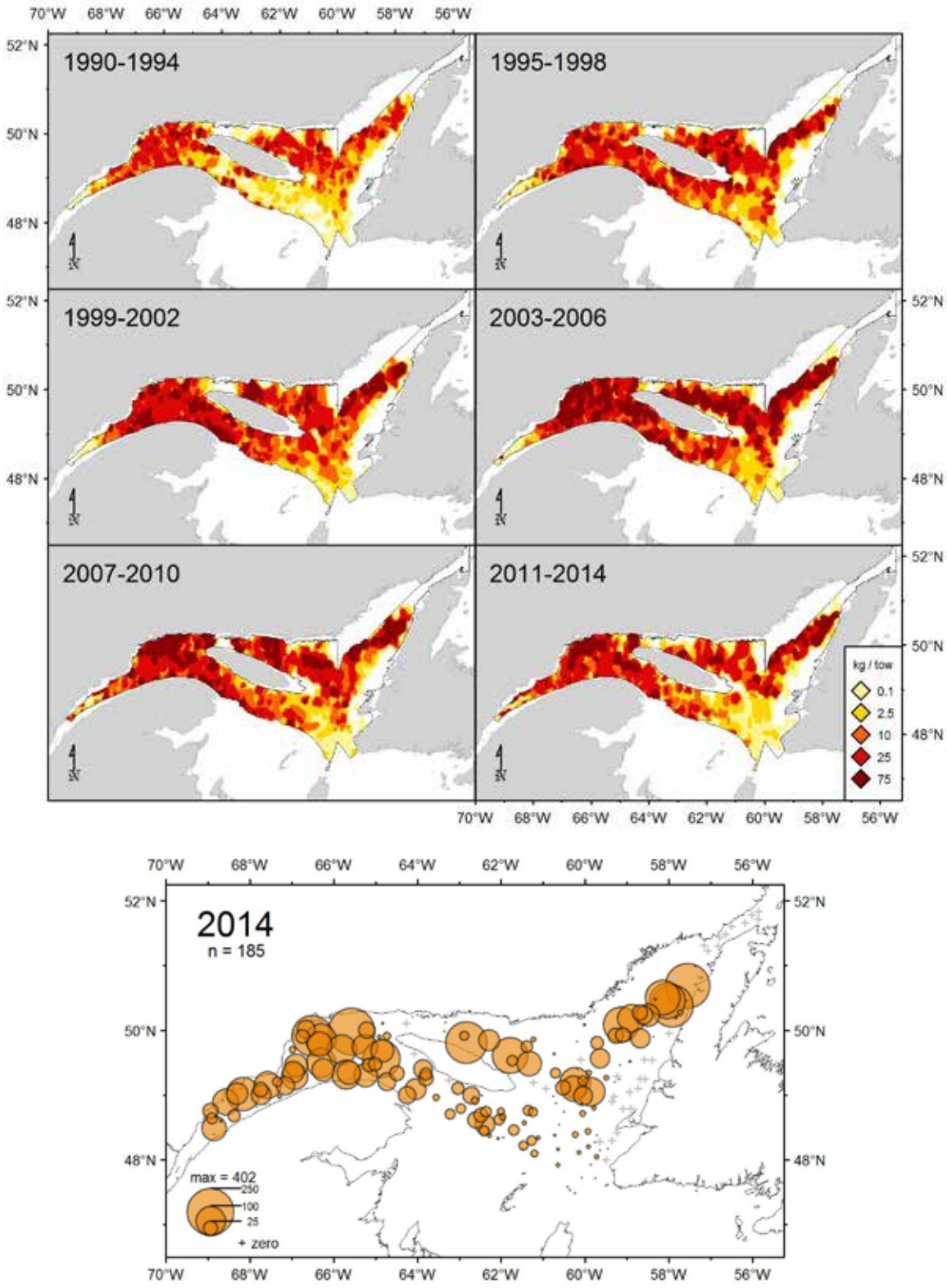


Figure 42. Northern Shrimp catch rates (kg/15 minutes tow) distribution.

Sea pen (*Anthoptilum grandiflorum*)

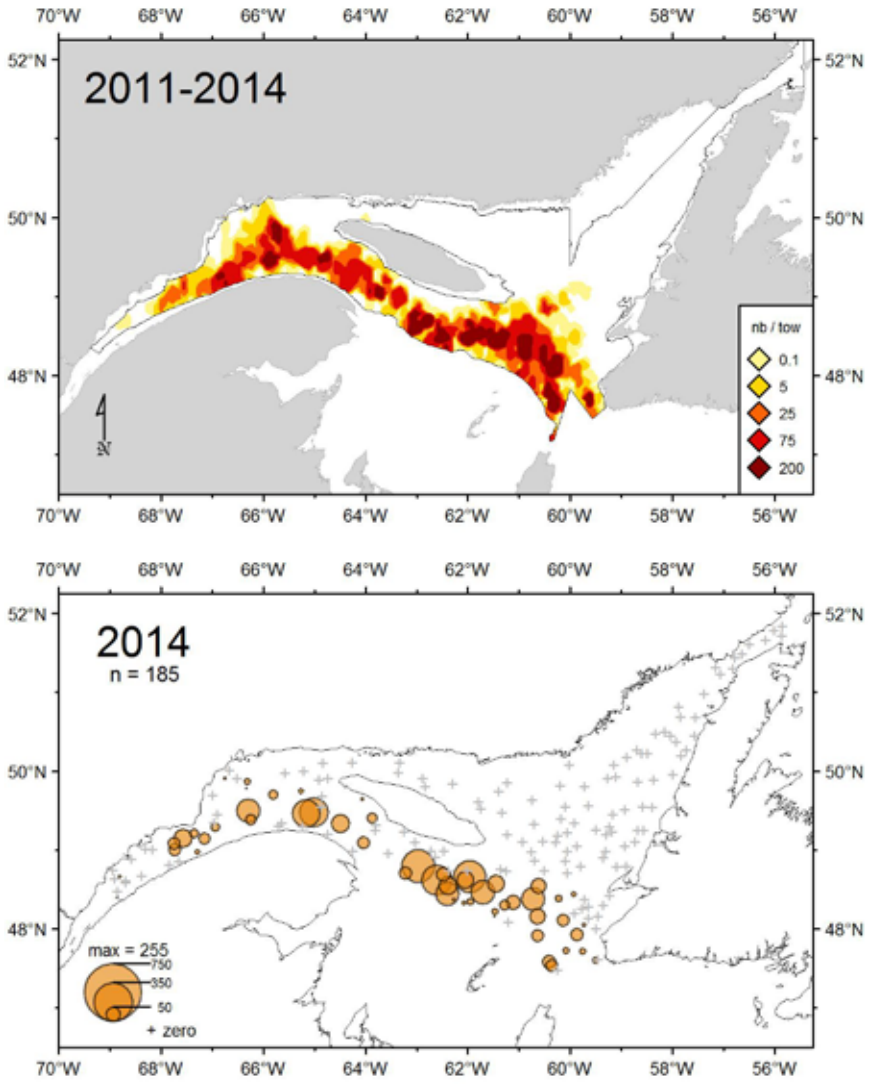


Figure 43. Sea pen Anthoptilum grandiflorum catch rates (nb/15 minutes tow) distribution.

Sea pen (*Halipteris finmarchica*)

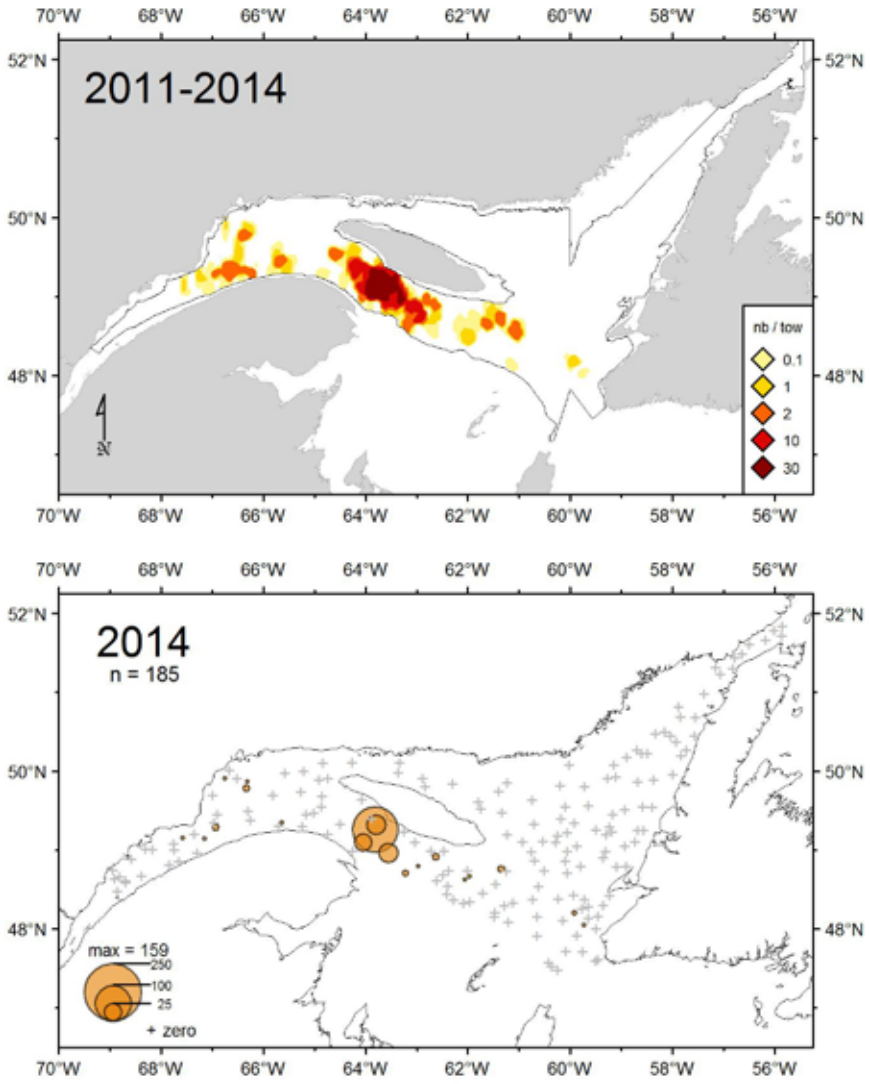


Figure 44. Sea pen Halipteris finmarchica catch rates (nb/15 minutes tow) distribution.

Sea pen (*Pennatula aculeata*)

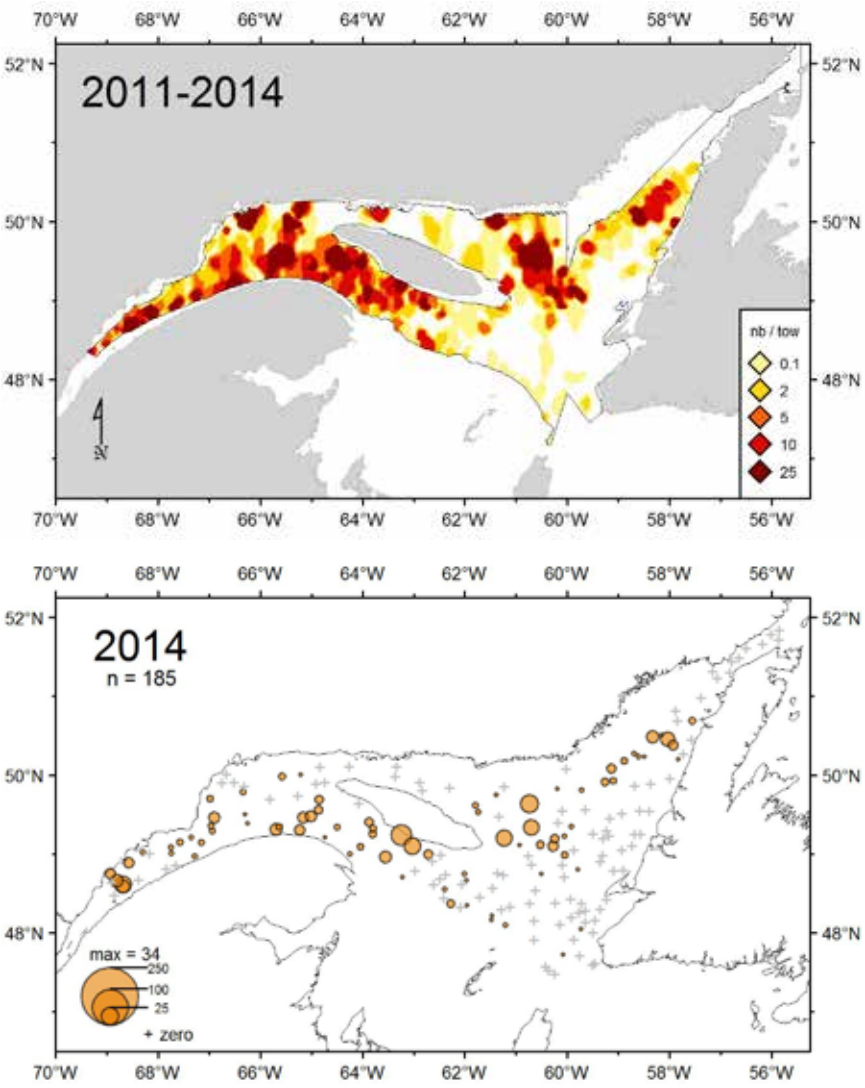


Figure 45. Sea pen Pennatula aculeata catch rates (nb/15 minutes tow) distribution.

Sea pen (*Pennatula grandis*)

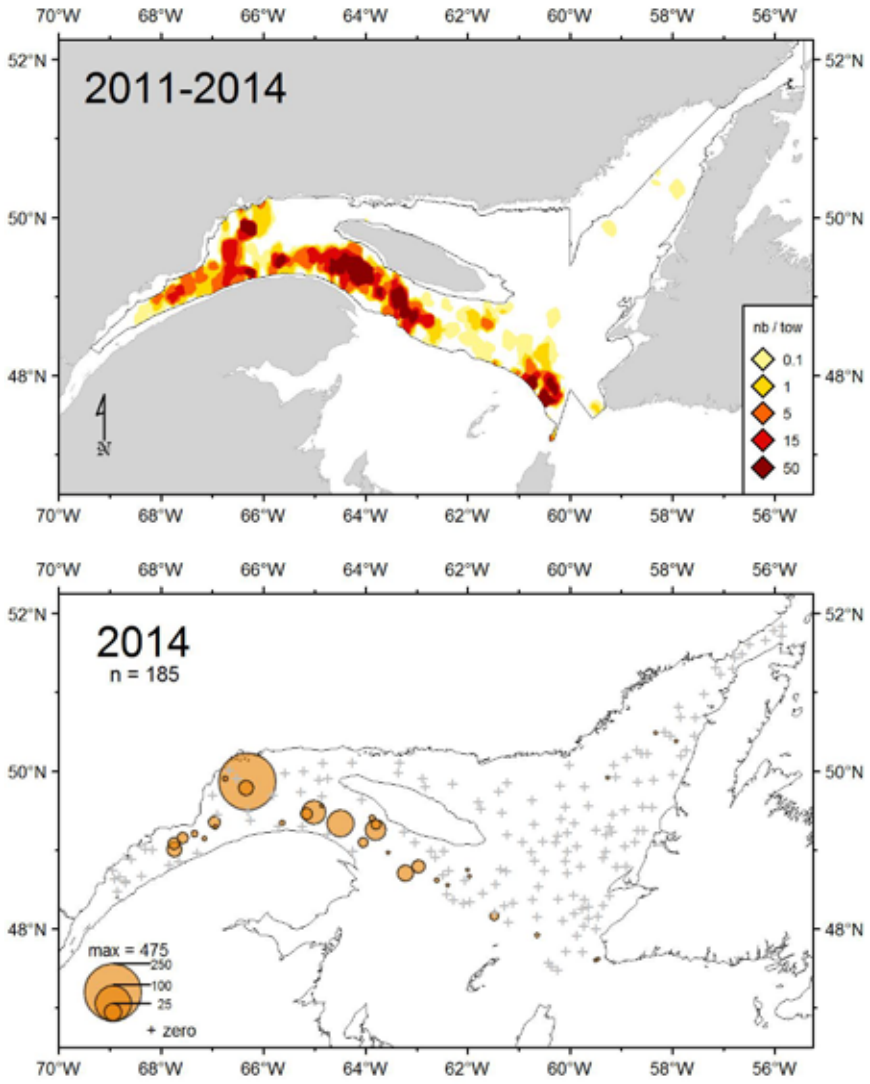


Figure 46. Sea pen Pennatula grandis catch rates (nb/15 minutes tow) distribution.

Silver Hake

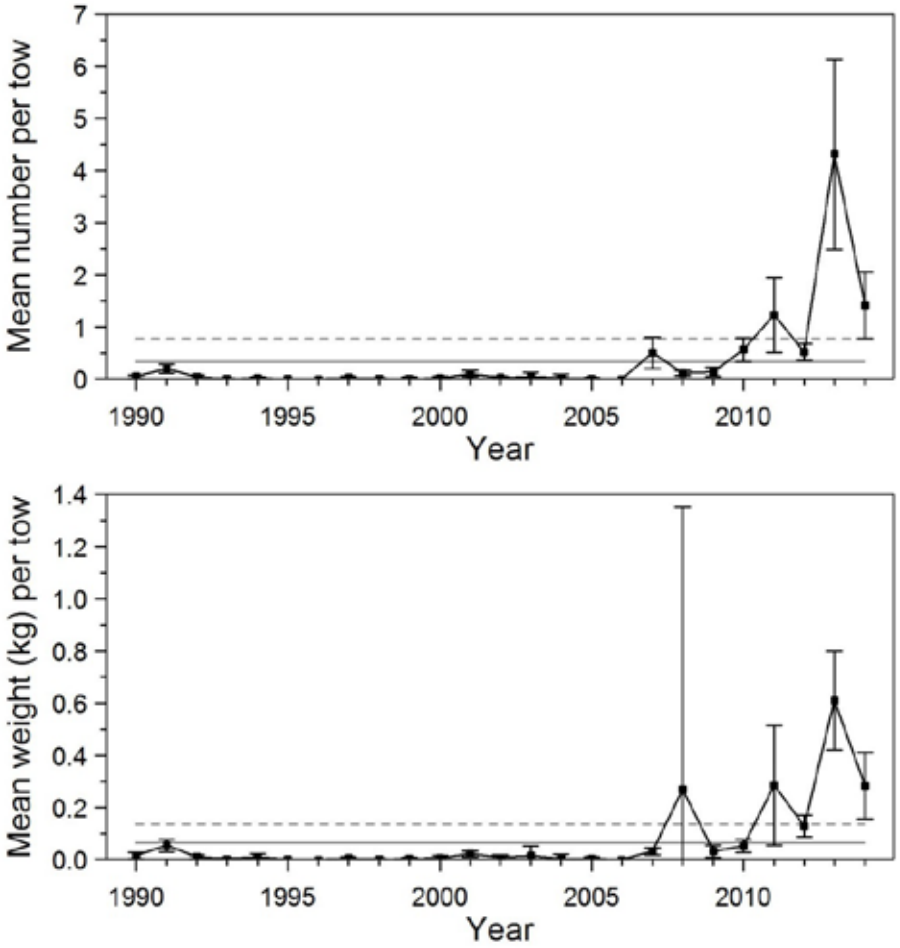


Figure 47. Mean numbers and mean weights per 15 minutes tow observed during the survey for Silver Hake in 4RST. Error bars indicate the 95% confidence interval and the horizontal lines indicate the mean of the 1990-2013 period (solid line) and upper and lower reference (see text) limits (dashed lines).

Silver Hake

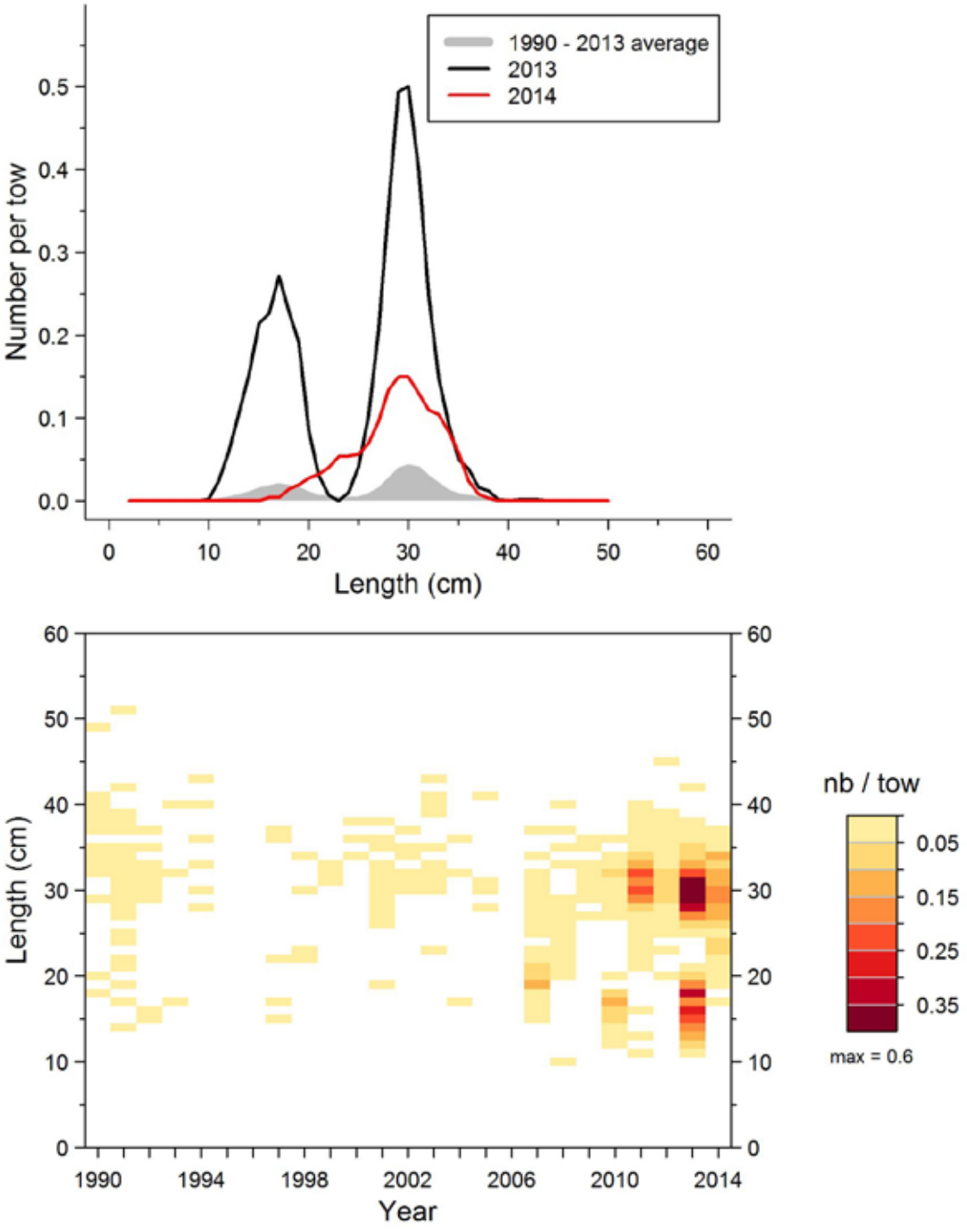


Figure 48. Length frequency distributions (mean number per 15 minutes tow) observed during the survey for Silver Hake in 4RST.

Silver Hake

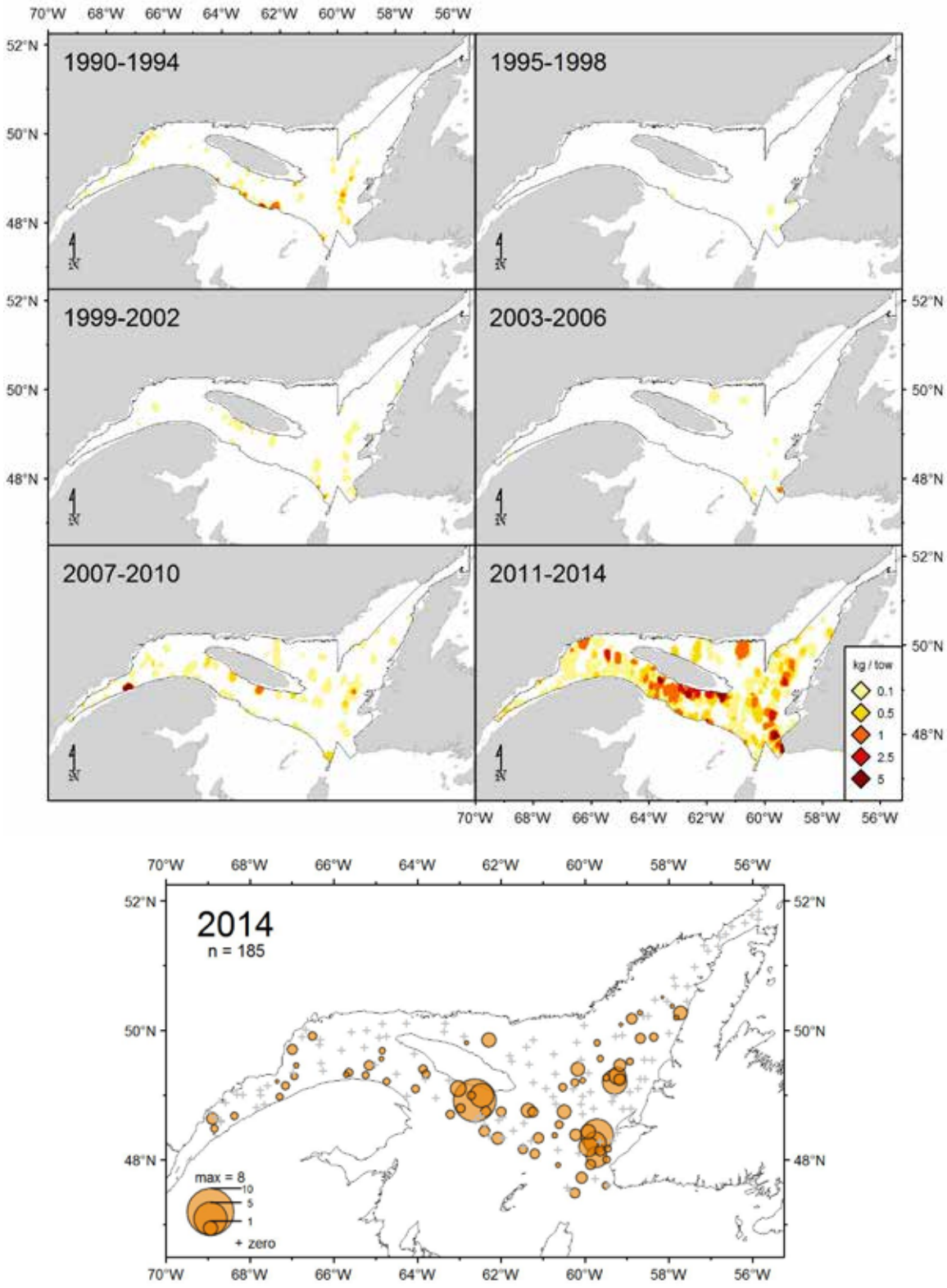


Figure 49. Silver Hake catch rates (kg/15 minutes tow) distribution.

Smooth Skate

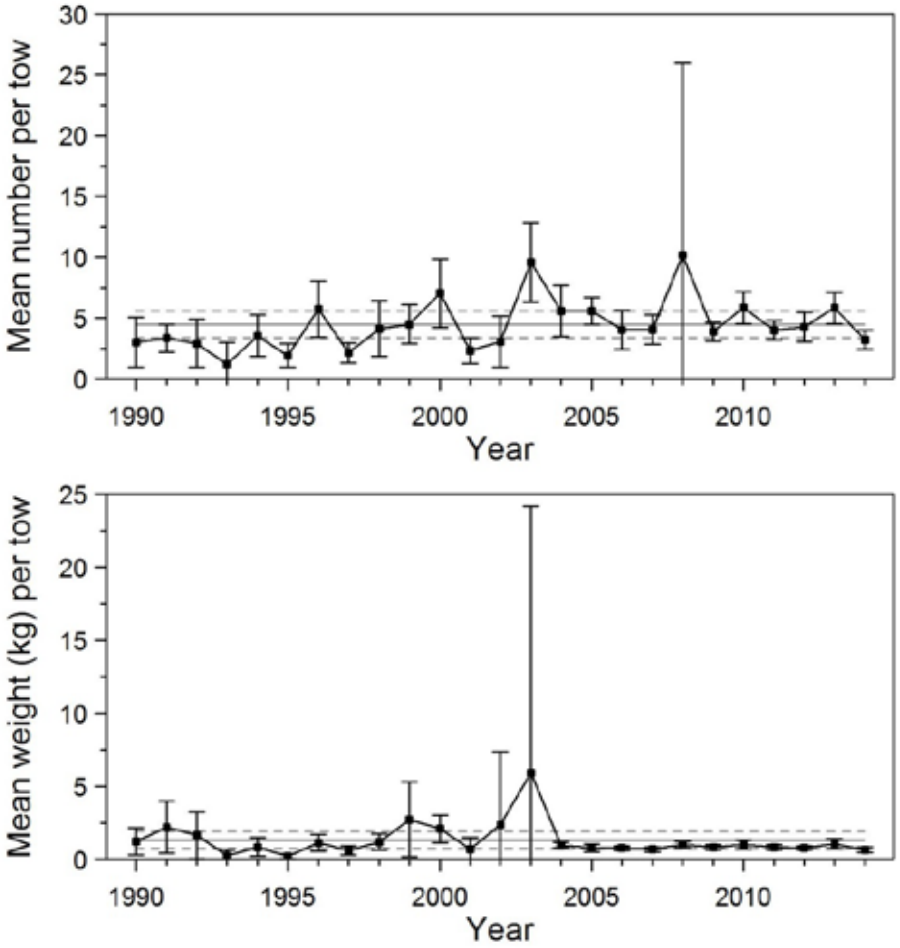


Figure 50. Mean numbers and mean weights per 15 minutes tow observed during the survey for Smooth Skate in 4RST. Error bars indicate the 95% confidence interval and the horizontal lines indicate the mean of the 1990-2013 period (solid line) and upper and lower reference (see text) limits (dashed lines).

Smooth Skate

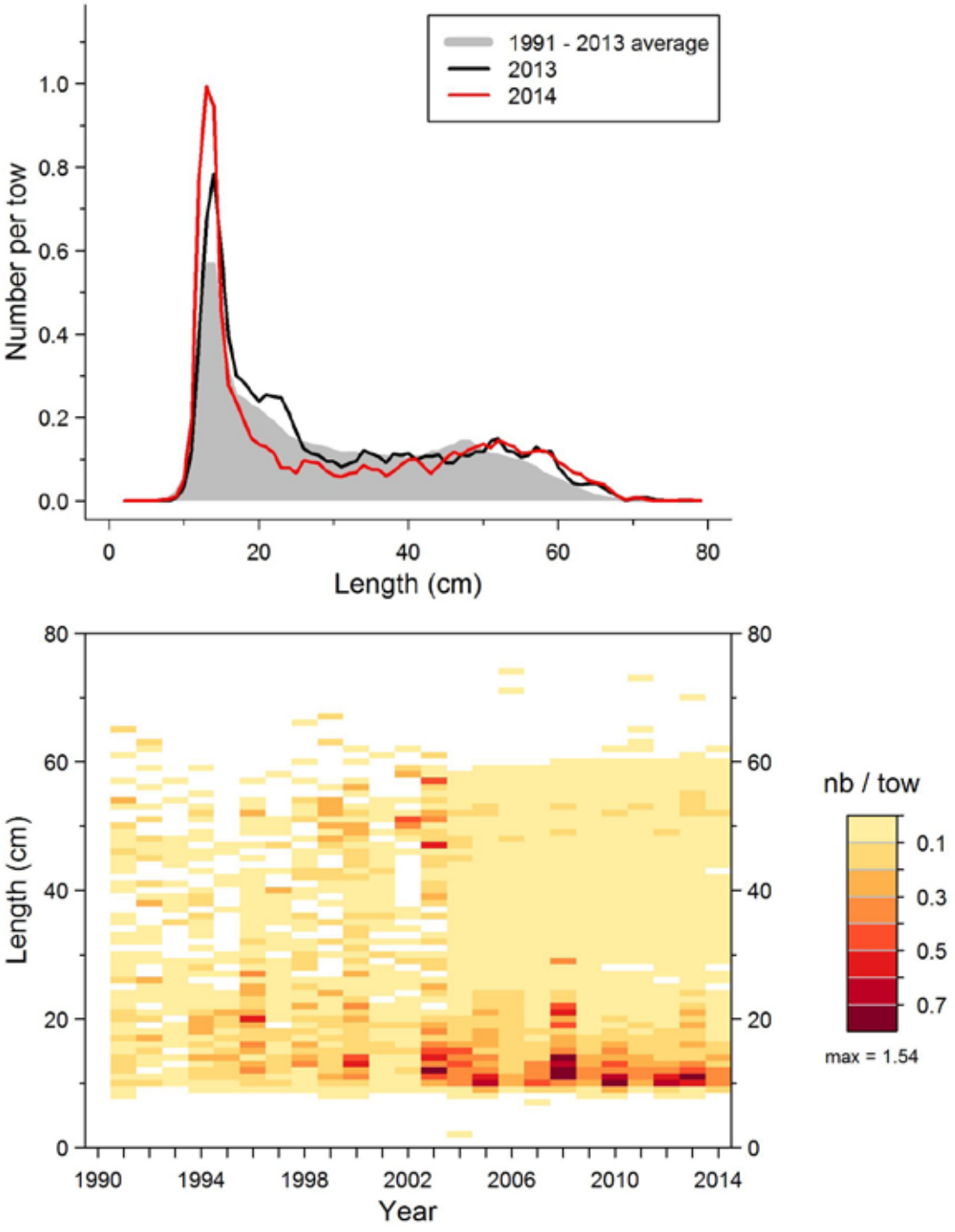


Figure 51. Length frequency distributions (mean number per 15 minutes tow) observed during the survey for Smooth Skate in 4RST.

Smooth Skate

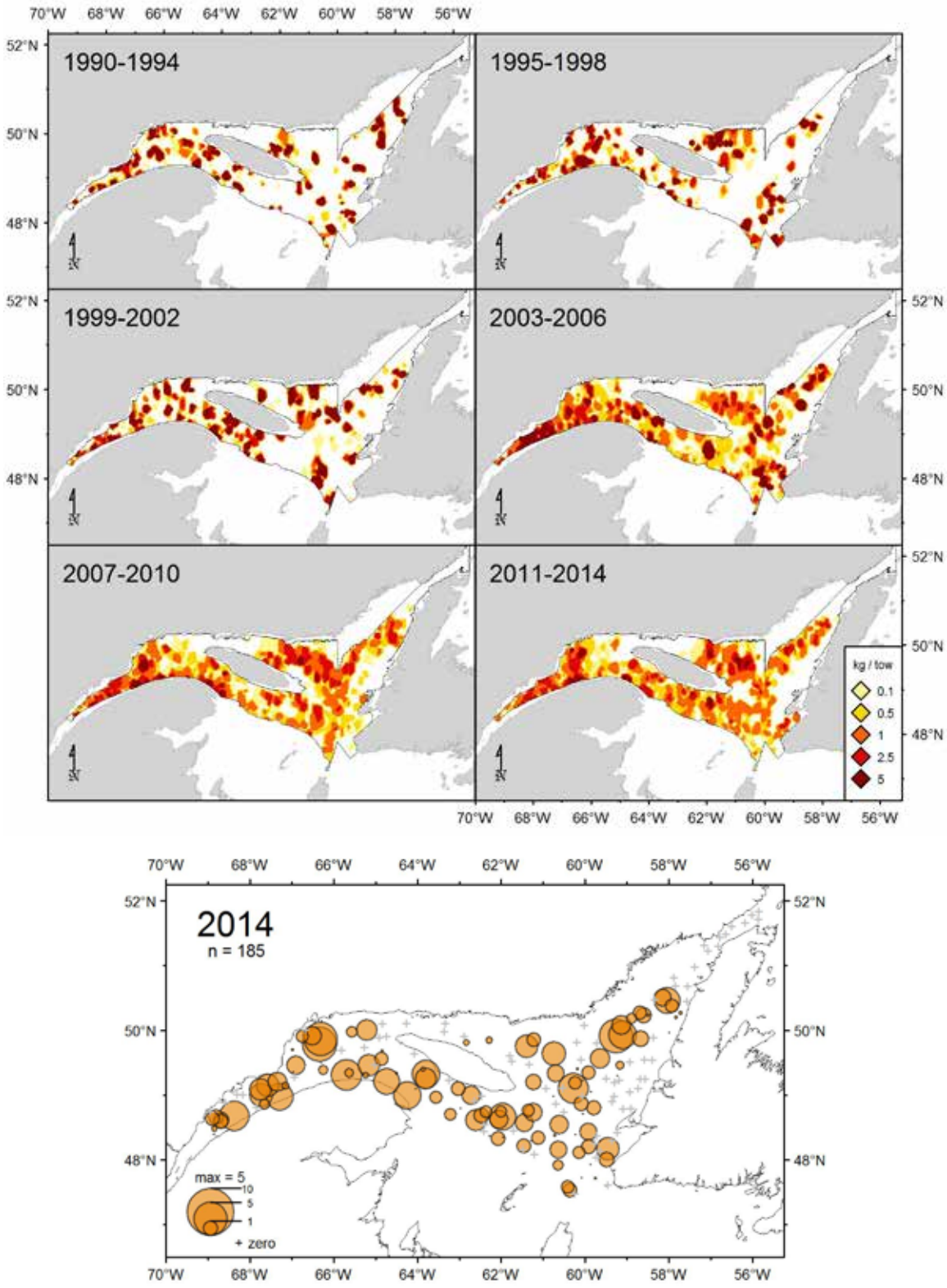


Figure 52. Smooth Skate catch rates (kg/15 minutes tow) distribution.

Snow Crab

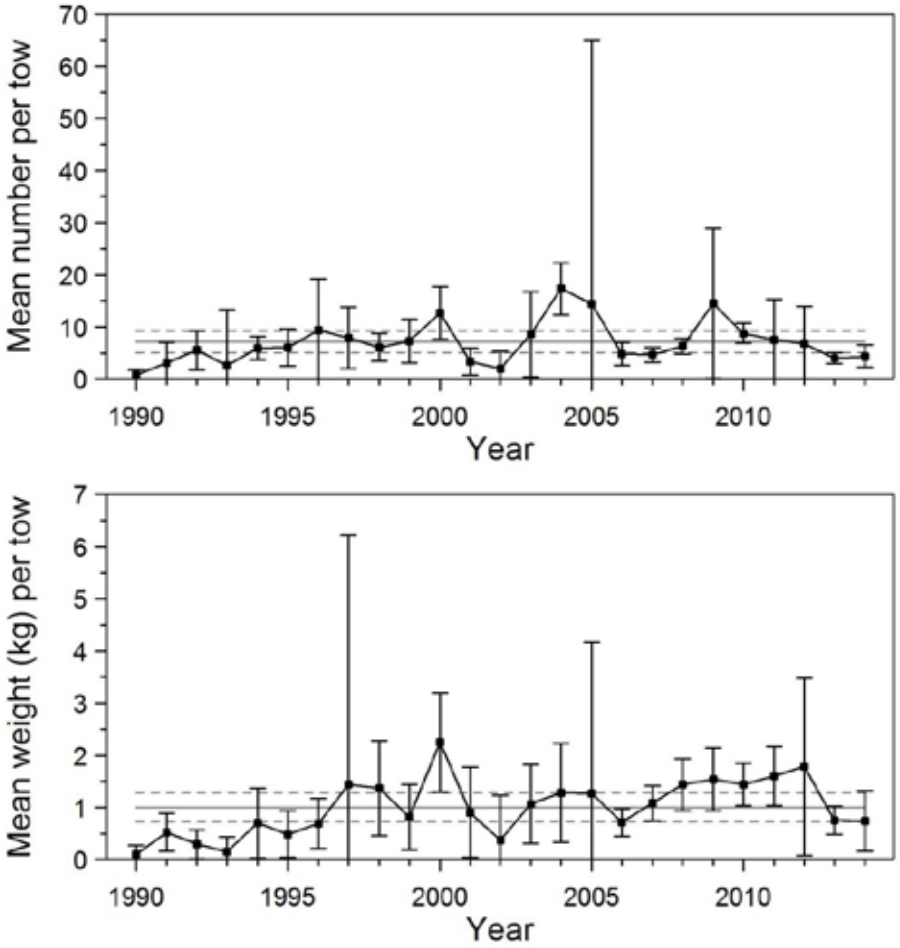


Figure 53. Mean numbers and mean weights per 15 minutes tow observed during the survey for Snow Crab in 4RST. Error bars indicate the 95% confidence interval and the horizontal lines indicate the mean of the 1990-2013 period (solid line) and upper and lower reference (see text) limits (dashed lines).

Snow Crab

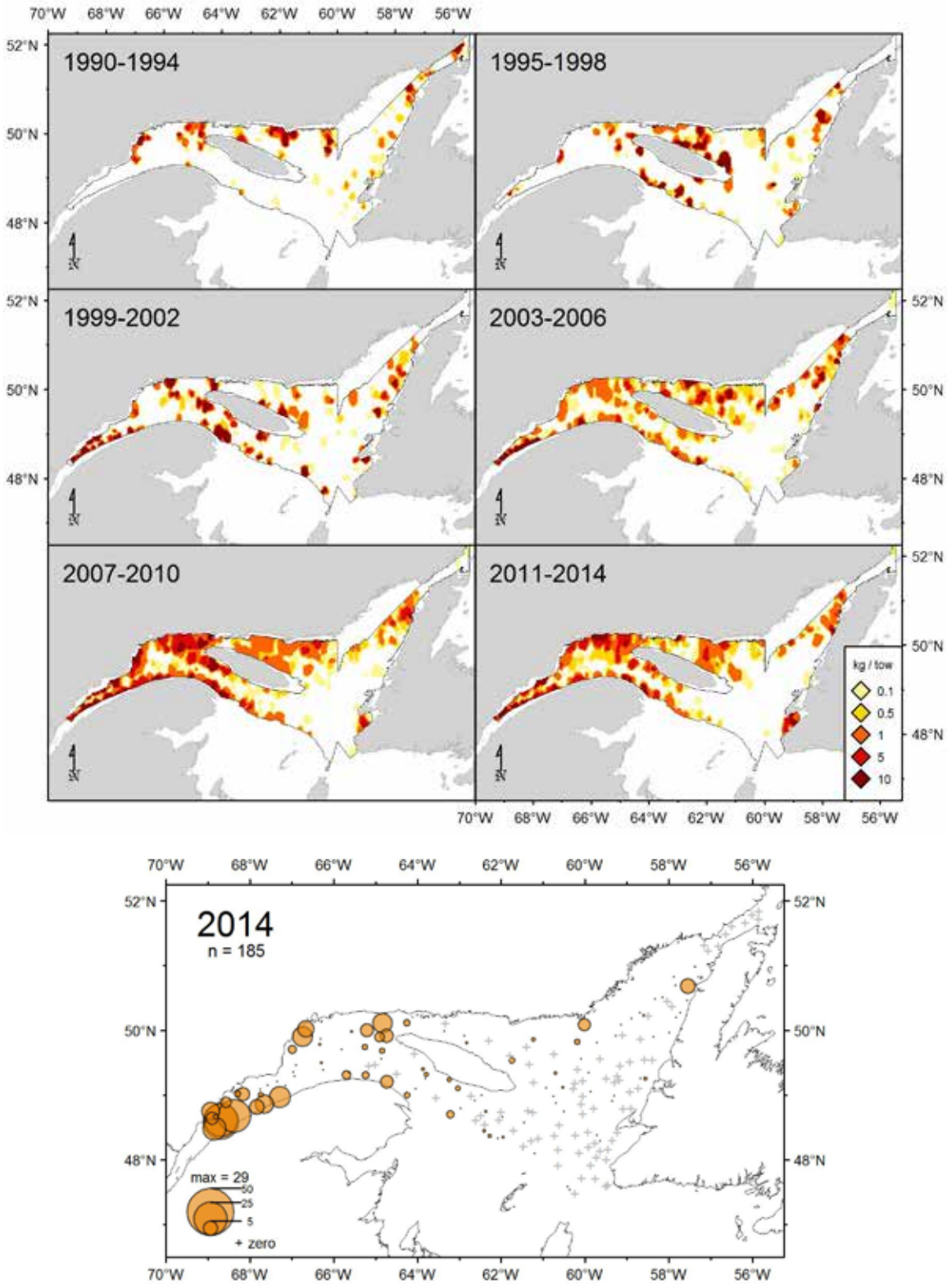


Figure 54. Snow Crab catch rates (kg/15 minutes tow) distribution.

Thorny Skate

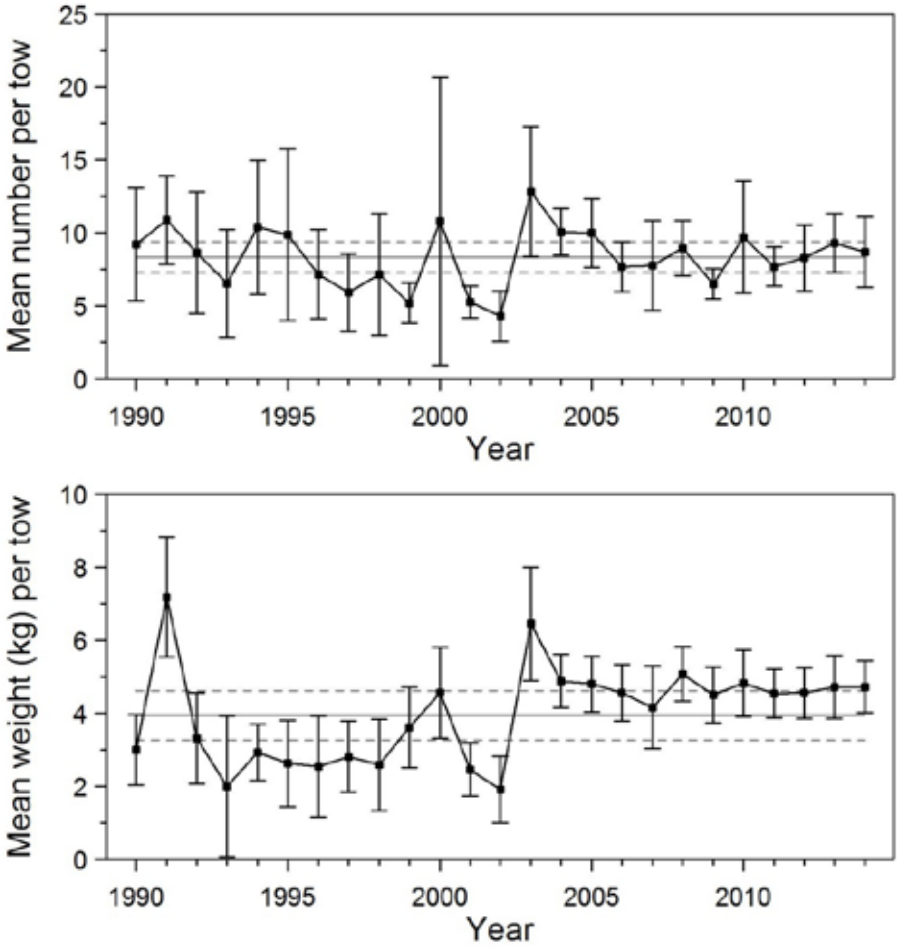


Figure 55. Mean numbers and mean weights per 15 minutes tow observed during the survey for Thorny Skate in 4RST. Error bars indicate the 95% confidence interval and the horizontal lines indicate the mean of the 1990-2013 period (solid line) and upper and lower reference (see text) limits (dashed lines).

Thorny Tkate

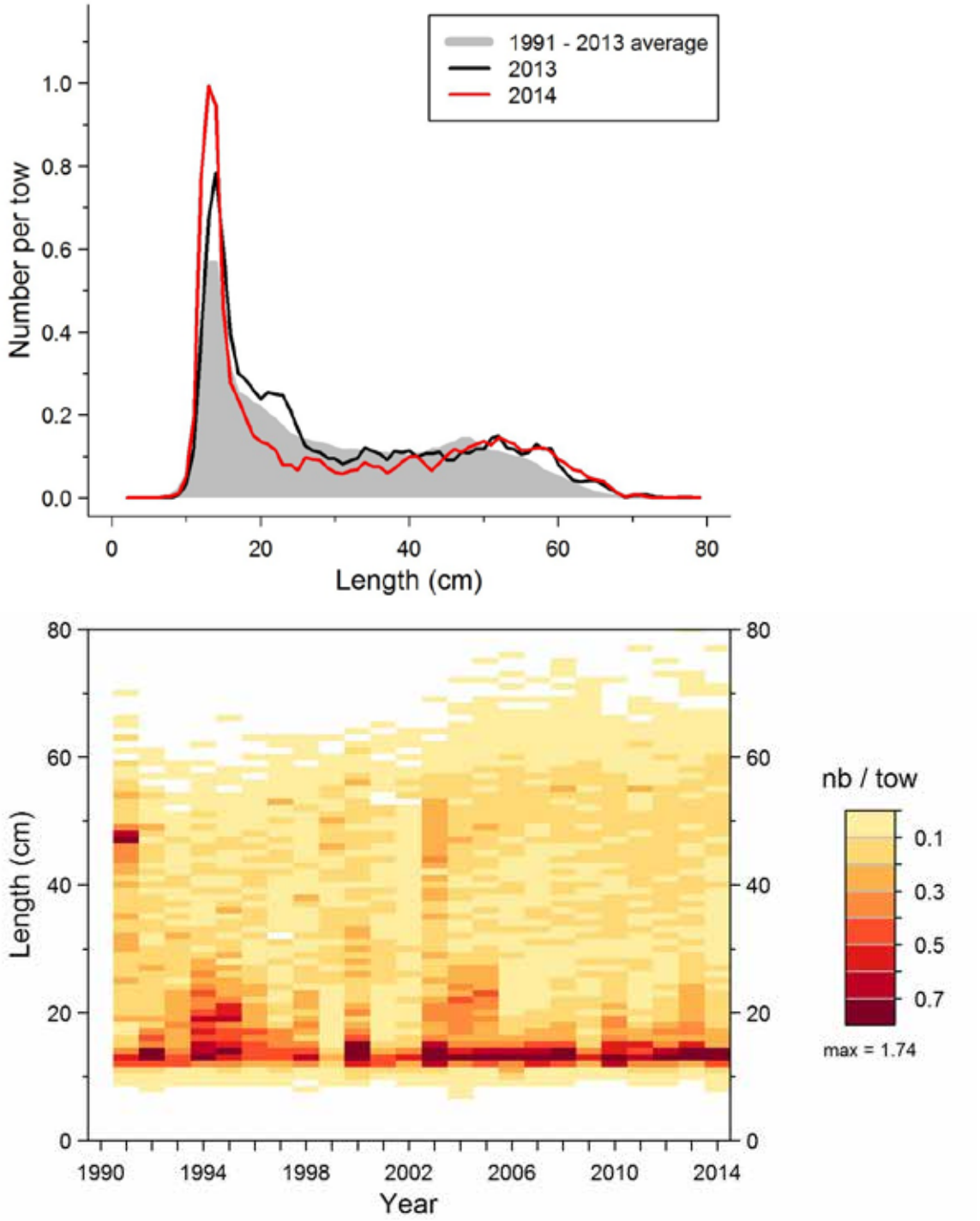


Figure 56. Length frequency distributions (mean number per 15 minutes tow) observed during the survey for Thorny Skate in 4RST.

Thorny Skate

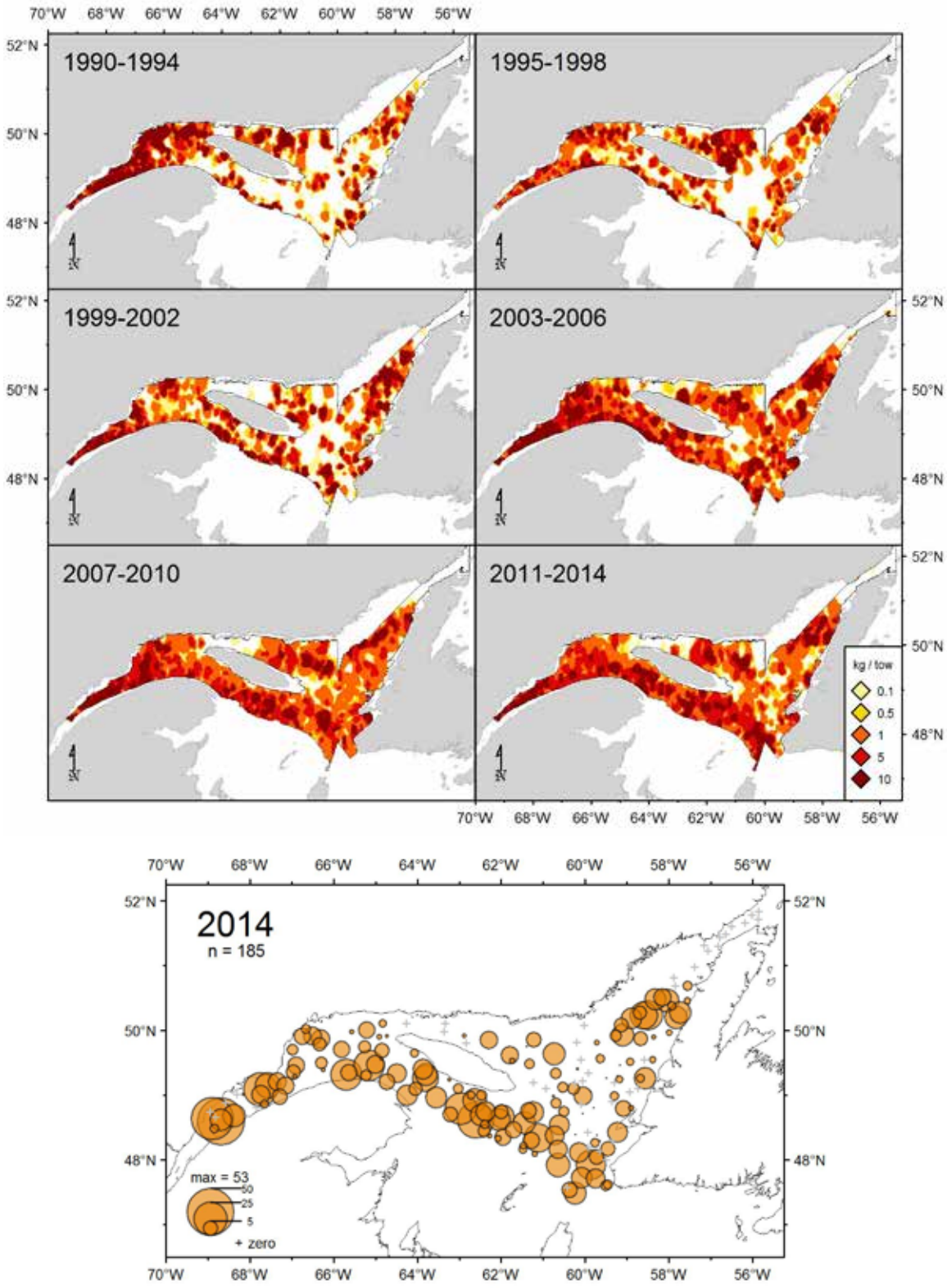


Figure 57. Thorny Skate catch rates (kg/15 minutes tow) distribution.

White Hake

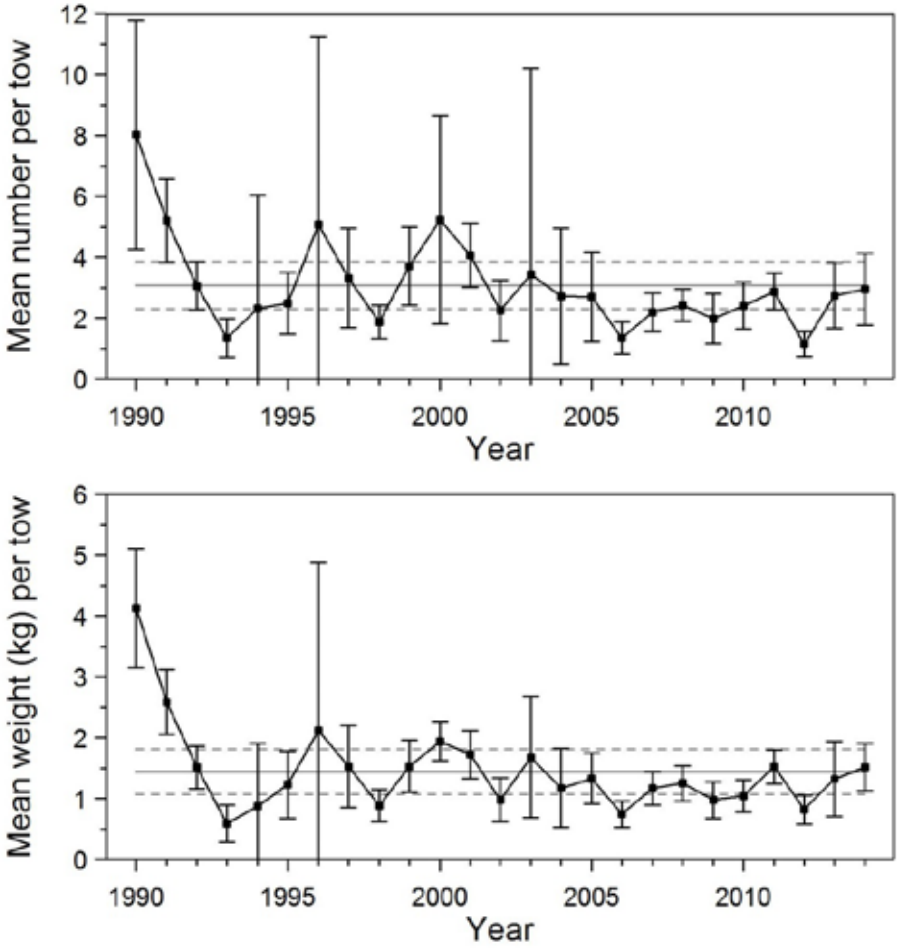


Figure 58. Mean numbers and mean weights per 15 minutes tow observed during the survey for White Hake in 4RST. Error bars indicate the 95% confidence interval and the horizontal lines indicate the mean of the 1990-2013 period (solid line) and upper and lower reference (see text) limits (dashed lines).

White Hake

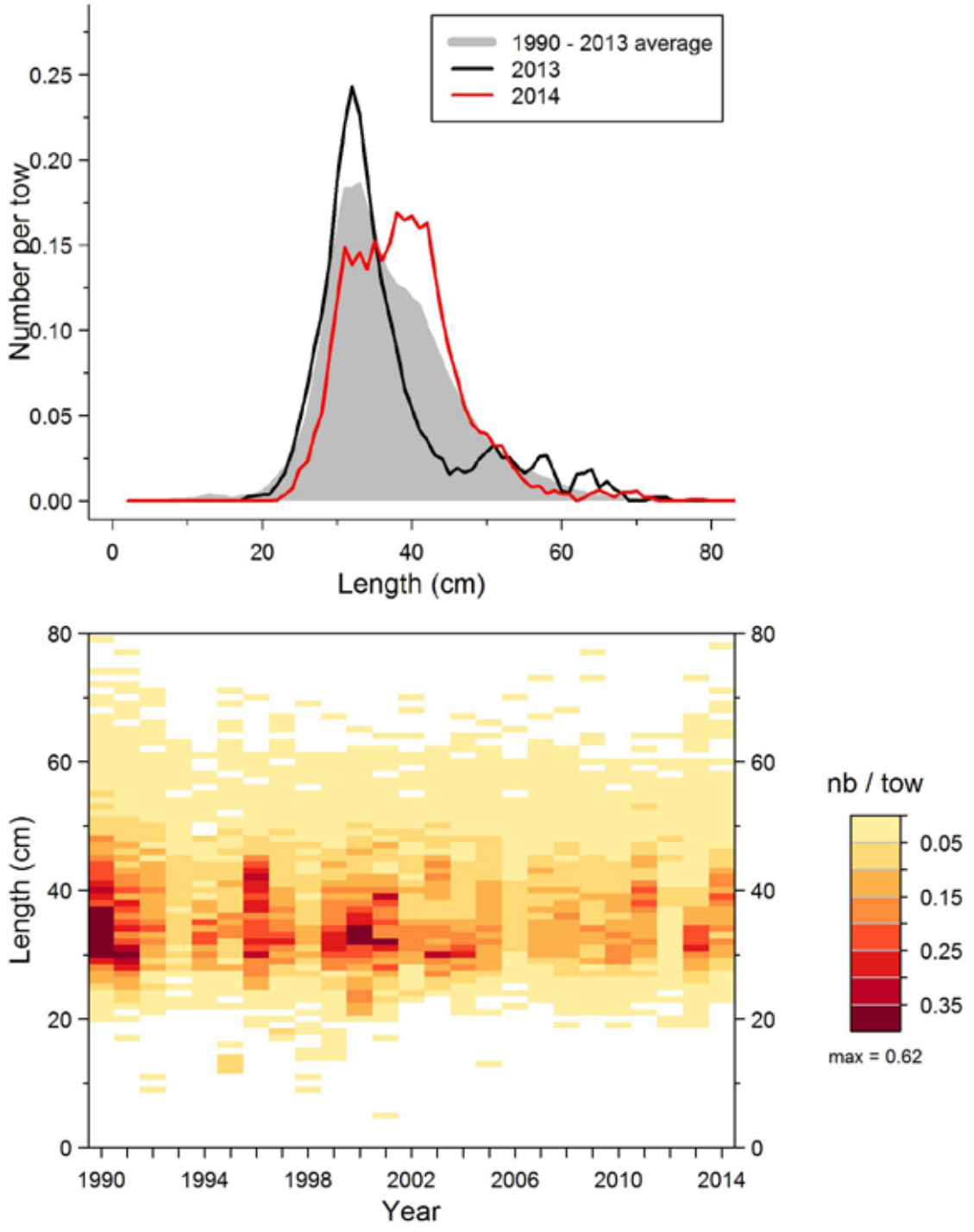


Figure 59. Length frequency distributions (mean number per 15 minutes tow) observed during the survey for White Hake in 4RST.

White Hake

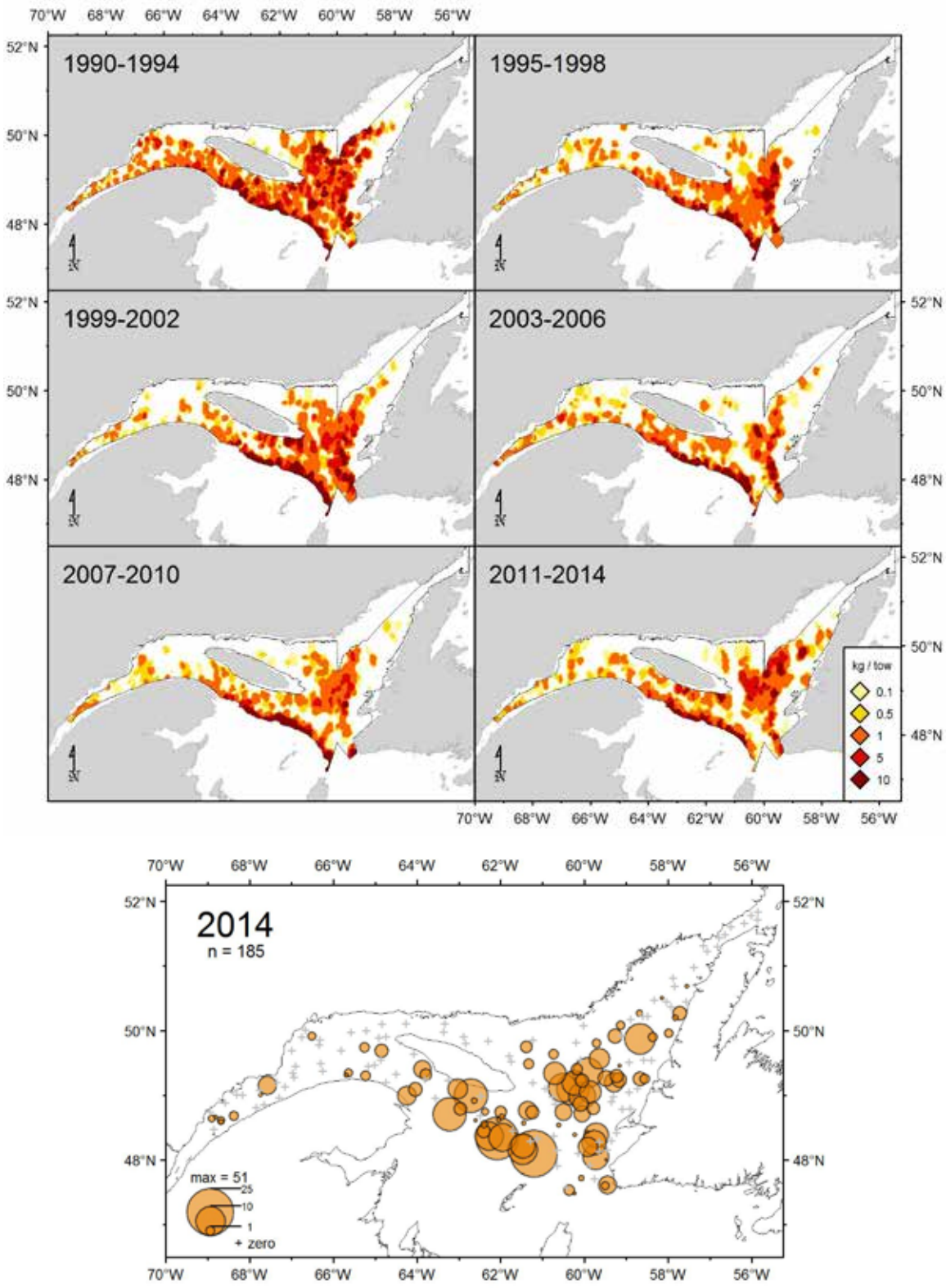


Figure 60. White Hake catch rates (kg/15 minutes tow) distribution.

Witch Flounder

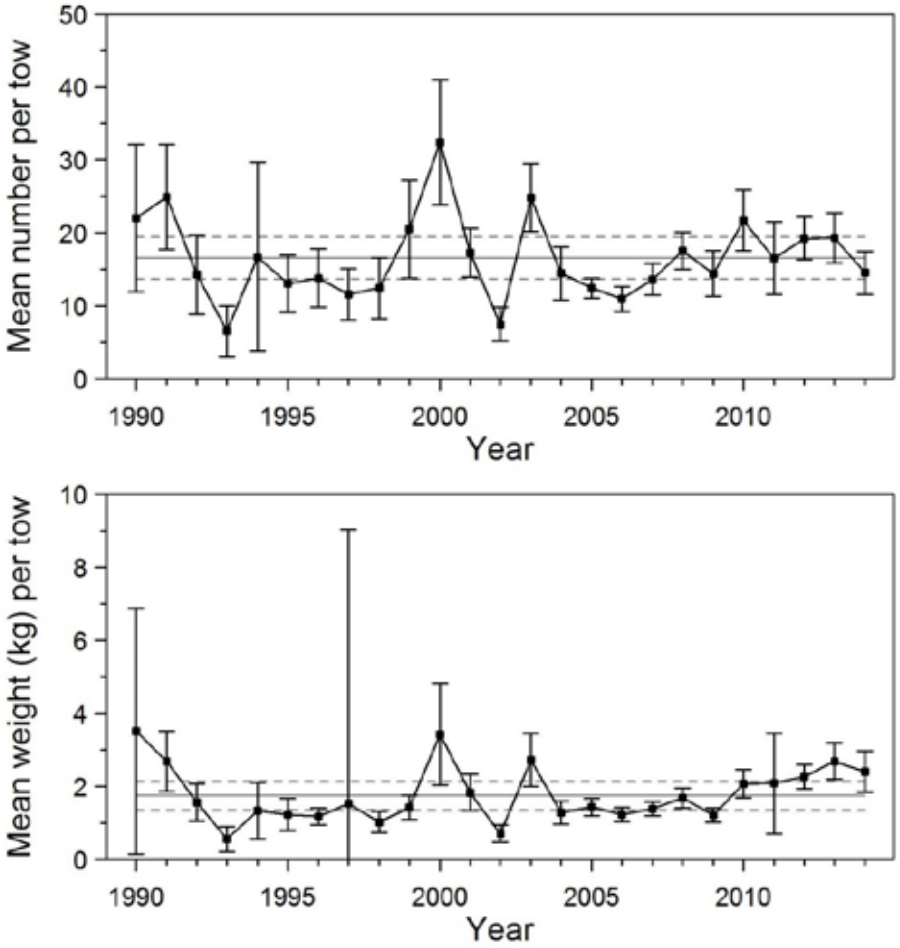


Figure 61. Mean numbers and mean weights per 15 minutes tow observed during the survey for Witch Flounder in 4RST. Error bars indicate the 95% confidence interval and the horizontal lines indicate the mean of the 1990-2013 period (solid line) and upper and lower reference (see text) limits (dashed lines).

Witch Flounder

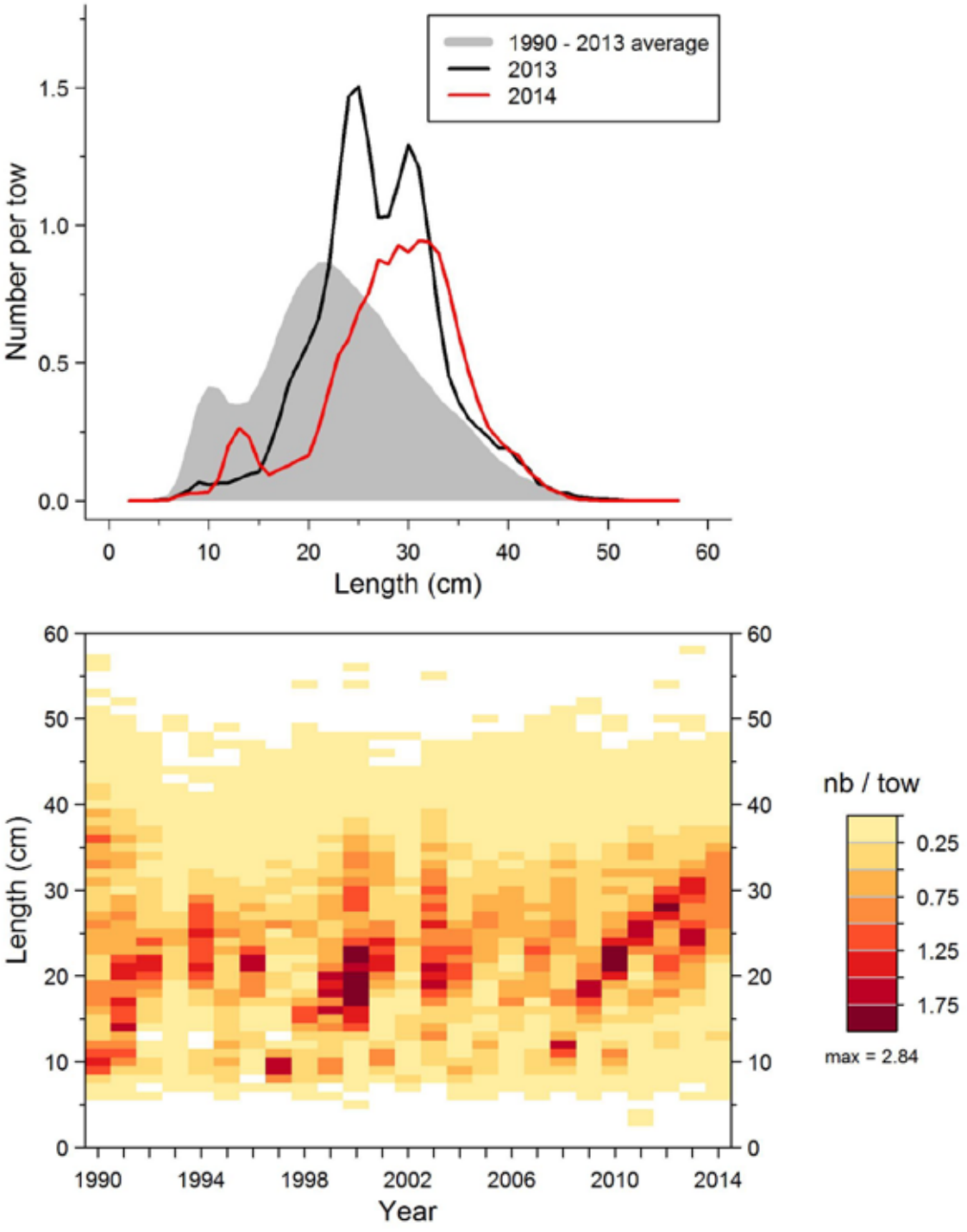


Figure 62. Length frequency distributions (mean number per 15 minutes tow) observed during the survey for Witch Flounder in 4RST.

Witch Flounder

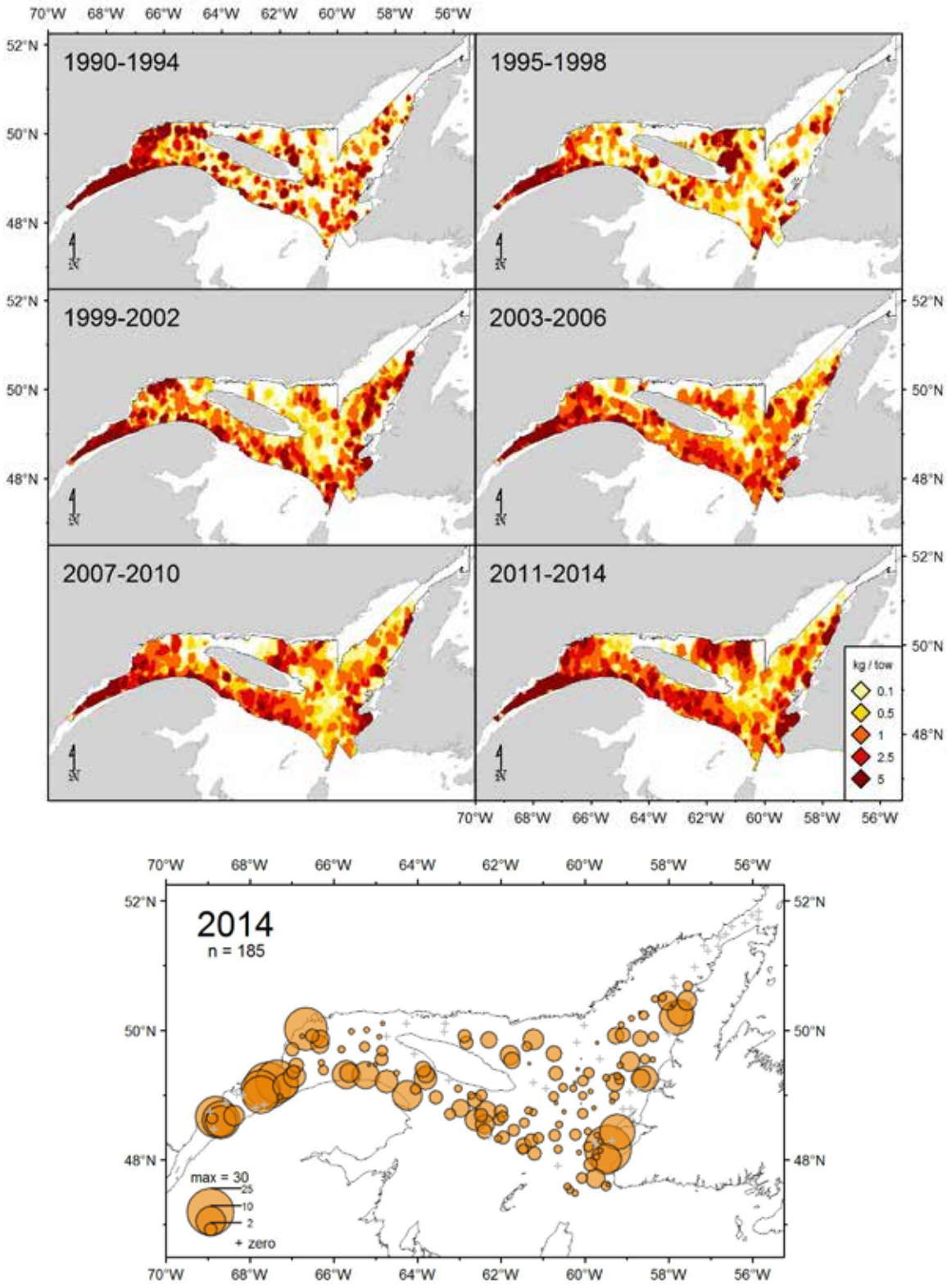


Figure 63. Witch Flounder catch rates (kg/15 minutes tow) distribution.

Wolffish, Atlantic Wolffish

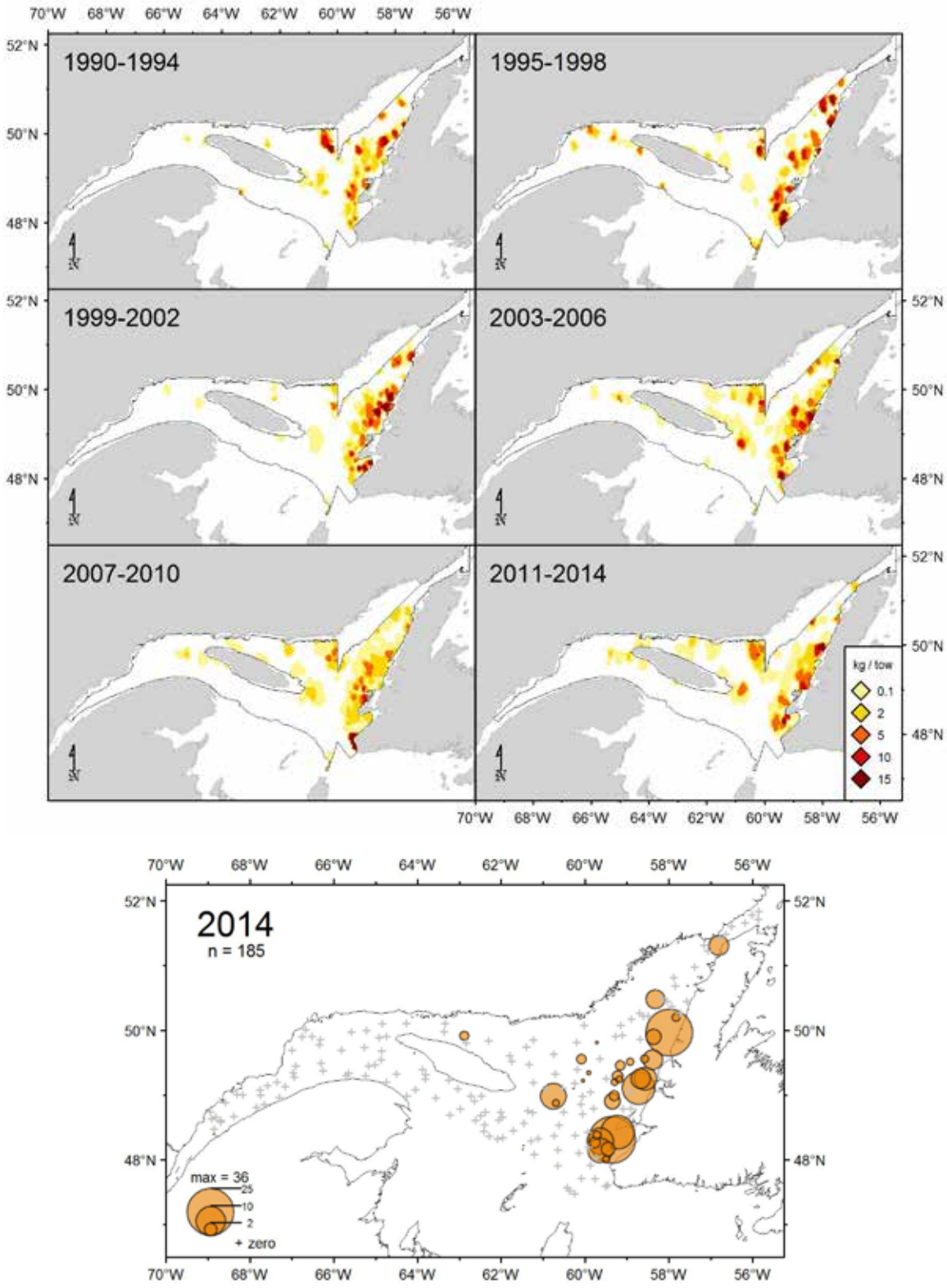


Figure 64. Atlantic Wolffish catch rates (kg/15 minutes tow) distribution.

Wolffish, Spotted Wolffish

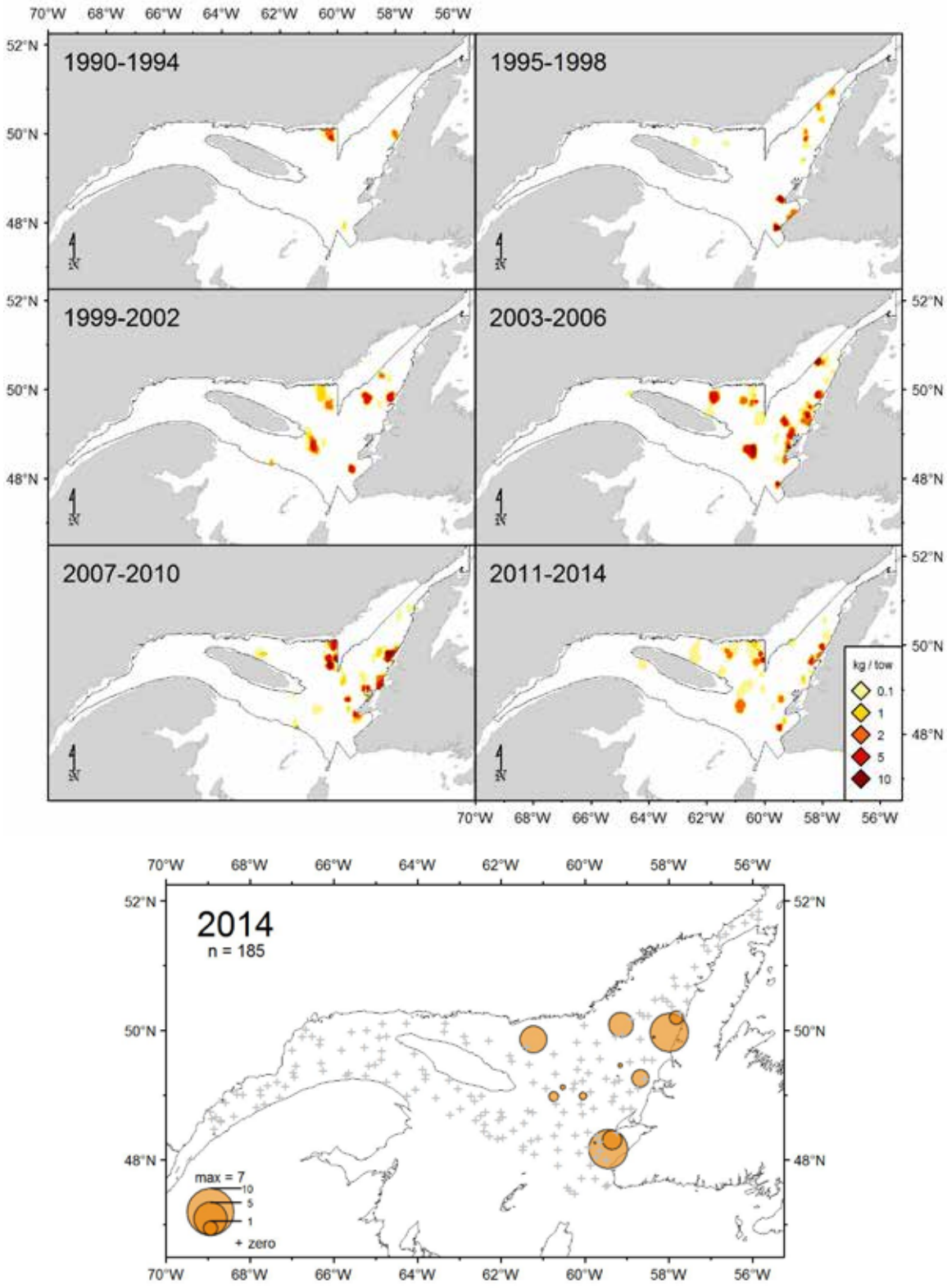


Figure 65. Spotted Wolffish catch rates (kg/15 minutes tow) distribution.

Water temperatures in the Gulf

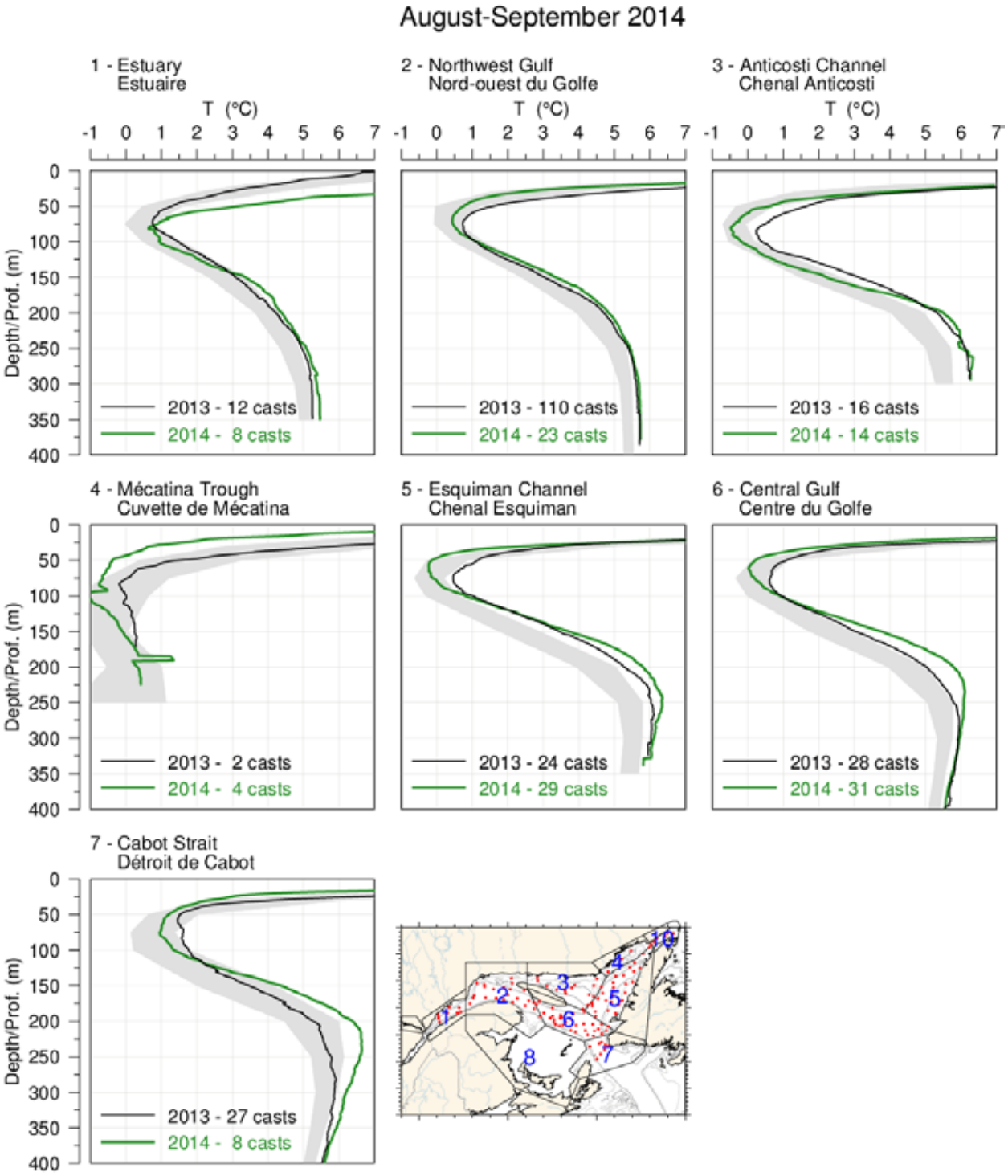


Figure 66. Mean temperature profiles observed in each region of the Gulf during August 2014. The shaded area represents the 1981–2010 climatological monthly mean ± 0.5 SD. Mean profiles for 2013 are also shown for comparison.

Water temperatures in the Gulf

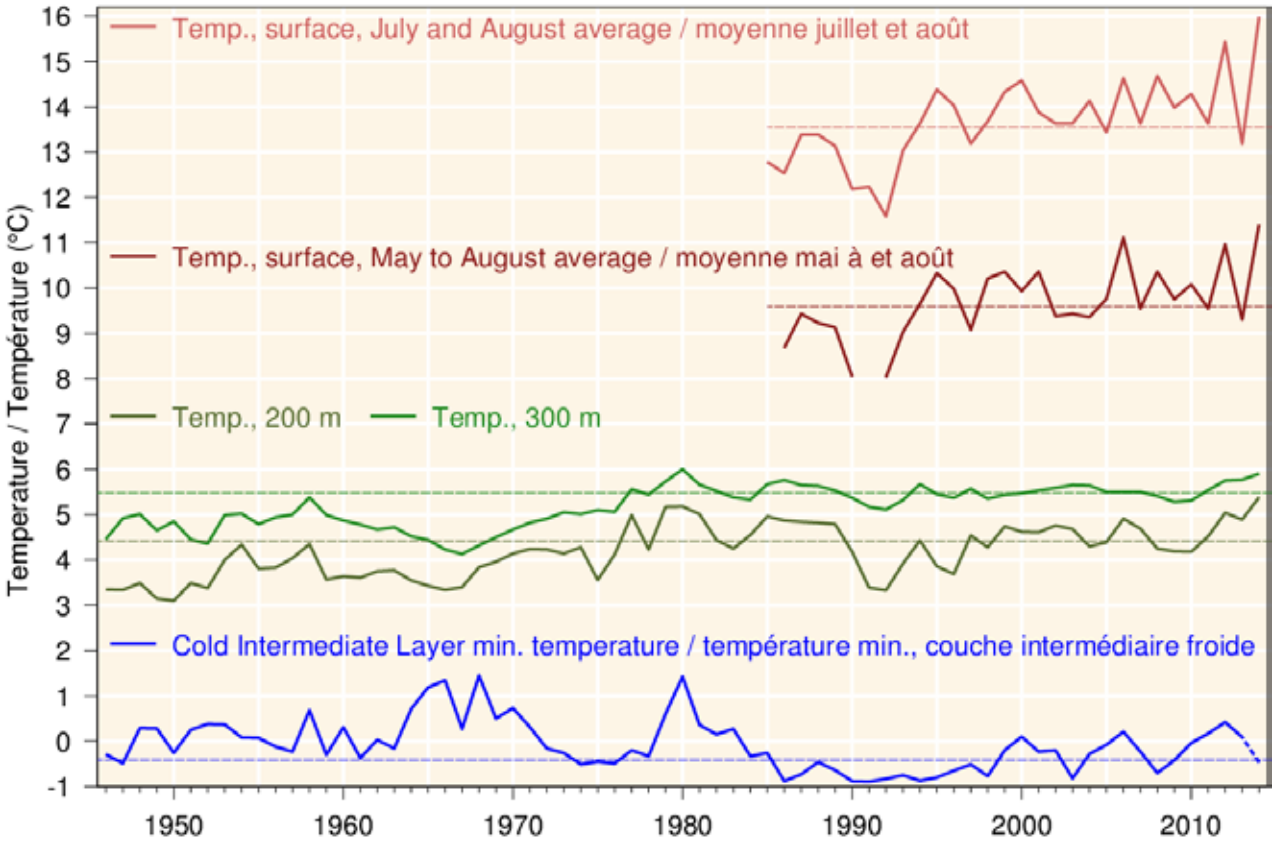


Figure 67. Water temperatures in the Gulf of St. Lawrence. July-August and May to August sea surface temperature averaged over the Estuary and northern Gulf (red lines). Layer-averaged temperature for the Gulf of St. Lawrence at 200 and 300 m (green lines). Cold intermediate layer minimum temperature index (adjusted to July 15) in the Gulf of St. Lawrence, with the 2014 value estimated using data from the August survey (blue line). Climatological averages based on the 1981-2010 period are indicated by thin dashed lines.

APPENDICES

Appendix 1. Number of successful stations per stratum for the DFO survey.

Stratum	NAFO	Area (km^2)	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
401	4T	545	3	4	4	4	3	3	3	3	3	3	3	3	3	3	3	6	3	3	3	3	0	3	3	2	2
402	4T	909	3	5	5	3	3	1	3	2	3	5	3	3	3	2	0	3	3	3	3	3	3	3	3	3	2
403	4T	1190	3	3	3	3	3	3	10	10	3	5	3	3	3	3	6	4	3	3	3	3	3	3	3	2	2
404	4T	792	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	6	3	3	3	3	0	3	3	3	2
405	4T	1478	3	3	3	3	3	3	3	2	4	4	4	3	3	3	2	9	3	3	3	3	3	3	3	3	2
406	4T	2579	5	3	3	3	3	3	5	5	3	5	3	4	5	3	5	6	4	4	4	3	3	3	4	3	3
407	4T	2336	5	3	3	3	3	3	3	3	2	3	3	3	3	5	3	5	3	3	3	3	0	3	3	2	4
408	4T	2734	4	5	5	3	2	3	3	2	5	5	4	3	3	3	2	11	4	4	4	4	3	3	4	3	4
409	4T	909	3	3	3	3	0	3	4	3	3	4	4	4	3	3	3	4	3	3	3	3	3	3	2	3	2
410	4T	1818	2	3	3	3	4	6	10	6	5	4	4	4	5	3	3	6	3	3	3	3	3	3	3	3	3
411	4T	1859	3	3	3	3	4	7	9	7	6	9	5	9	4	3	5	8	3	3	3	3	3	3	3	3	3
412	4T	1283	3	3	3	3	4	5	3	3	3	4	4	4	3	3	2	5	3	3	3	3	3	3	3	3	2
413	4T	731	3	4	3	3	0	3	3	4	3	4	4	4	3	3	1	5	3	3	3	3	3	3	3	2	2
414	4T	388	3	2	3	3	1	3	3	3	3	4	4	4	3	3	3	6	3	3	2	1	3	3	2	3	2
801	4R	1214	3	3	3	4	3	3	3	3	4	5	5	5	2	3	3	4	3	3	3	3	2	3	3	3	3
802	4R	1369	3	3	3	3	3	3	3	3	3	3	3	3	2	8	3	8	2	3	3	3	0	3	3	3	3
803	4S	6976	14	3	2	4	3	3	3	3	4	5	3	4	6	2	1	14	6	8	8	7	3	6	7	3	10
804	4S	2490	5	4	3	3	4	3	3	3	3	3	3	6	3	2	3	10	3	3	3	3	3	3	3	3	4
805	4S	5762	14	7	4	4	6	4	11	8	4	5	5	5	12	8	4	10	8	7	7	6	4	5	7	5	7
806	4S	2127	4	4	3	3	3	3	3	3	3	3	3	3	3	3	5	4	3	3	2	3	3	3	3	3	3
807	4S	2370	3	12	11	10	5	5	4	4	3	3	4	3	2	1	0	7	3	3	3	3	3	2	3	3	4
808	4S	2428	4	7	6	4	5	4	3	3	2	4	3	3	3	3	0	3	3	3	3	3	2	3	3	2	4
809	4R	1547	3	9	7	6	4	3	3	3	3	3	3	3	3	3	1	5	3	3	3	3	3	3	2	3	3
810	4R	765	3	4	5	4	3	3	3	3	4	4	4	4	6	5	3	8	3	3	4	3	0	3	3	2	3
811	4R	1506	3	4	4	4	5	3	8	6	3	3	3	3	3	3	3	7	3	3	3	2	2	2	3	2	2
812	4R	4648	7	9	8	11	4	3	3	3	3	3	3	3	3	3	4	5	5	4	5	4	5	3	5	3	8
813	4R	3958	6	6	5	9	3	4	6	5	7	4	6	8	2	5	3	9	5	3	5	3	4	4	6	3	6
814	4S	1029	3	4	4	4	3	0	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	2
815	4S	4407	9	15	11	8	5	4	3	3	8	9	9	2	6	3	3	14	5	5	6	5	5	3	6	4	6
816	4S	5032	9	11	9	9	6	6	17	17	20	21	21	1	6	4	4	11	7	7	7	6	4	4	3	6	6
817	4S	3646	7	18	11	7	9	10	9	5	11	17	13	14	8	5	2	7	5	5	4	5	3	3	4	4	5
818	4S	2774	4	7	5	4	3	3	3	4	4	4	4	5	7	5	1	6	4	4	2	4	3	4	3	3	4
819	4S	1441	3	7	9	5	4	5	3	2	3	3	4	1	1	3	0	8	2	3	3	2	3	3	3	3	2
820	4R	1358	3	3	3	3	3	3	7	5	6	5	5	3	2	3	3	14	3	3	3	3	0	2	3	3	3
821	4R	1272	3	3	3	3	2	3	3	2	3	3	3	3	3	3	3	7	3	3	3	3	2	4	3	3	3
822	4R	3245	6	4	3	2	3	3	6	4	10	8	10	9	3	3	3	8	4	4	4	3	4	2	4	2	5
823	4R	556	3	3	3	3	2	3	2	3	1	3	2	3	2	5	2	10	3	3	3	3	2	3	3	3	3
824	4R	837	3	1	3	1	3	3	3	3	3	3	2	3	2	2	3	6	3	3	3	3	2	3	3	2	2
827	4S	3231	0	1	1	1	3	3	0	2	3	1	3	0	2	2	3	6	4	4	3	3	3	2	3	2	2
828	4S	2435	4	1	2	2	3	3	3	3	3	1	0	1	0	3	3	1	3	3	3	3	3	2	2	2	2
829	4S	2692	3	2	3	3	3	3	3	0	3	3	2	0	2	1	0	8	4	4	3	2	3	2	2	3	2
830	4S	1917	3	3	4	3	3	3	2	2	3	3	3	2	1	1	0	6	3	3	3	3	3	3	2	3	2
831	4S	1204	3	0	2	3	3	3	3	2	3	4	3	3	1	3	3	4	3	3	3	3	3	3	3	2	2
832	4S	3962	4	12	11	7	7	9	8	5	3	3	3	3	2	3	4	8	4	5	5	3	4	3	6	4	4
833	4S	559	3	1	3	3	3	3	3	3	3	3	3	0	3	3	2	6	3	3	3	3	3	3	3	1	2
835	4R	2641	0	6	7	6	3	3	3	3	6	5	6	5	6	3	3	8	5	5	5	4	0	4	5	2	4
836	4R	3149	0	7	8	6	3	3	3	3	3	3	3	3	3	2	4	10	5	3	5	4	3	4	4	3	5
837	4R	2668	0	5	6	3	2	3	4	4	3	3	3	3	5	5	2	4	4	3	5	3	3	2	5	1	4
838	4R	3378	0	9	8	7	5	5	0	0	0	2	0	4	4	0	3	10	6	3	6	0	0	3	5	0	6
839	4S	4390	0	2	5	5	3	2	2	1	2	3	3	0	0	3	2	3	6	5	4	3	3	2	2	3	2
840	4R	765	0	3	3	1	1	0	0	0	0	0	0	2	0	0	0	5	3	0	3	0	0	1	3	0	2
841	4S	816	0	0	1	3	3	3	3	0	2	1	2	3	2	3	3	3	3	3	2	3	3	3	2	3	2
Total		116115	191	250	239	214	175	182	217	185	204	224	209	183	171	163	133	354	192	183	189	164	132	156	178	141	177
851	4T	456																			3	3	3	3	3	3	2
852	4T	427																			3	3	3	3	2	3	2
854	4T	83																			3	3	3	2	2	2	2
855	4T	465																			3	4	3	2	3	3	2

Appendix 2. Occurrences and total catches, in weight and number, by taxon during the 2014 survey (185 successful tows).

STRAP* code	Scientific name	French name	English name	Occurrence	Weight (kg)	Number
			Vertebrates			
1		Vertébrés	Vertebrates	2	< 0.1	4
90	*Amblyraja radiata*	Raie épineuse	Thorny Skate	143	914.2	1755
696	*Ammodytes* sp.	Lançons	Sand Lances	39	3.6	1014
700	*Anarhichas lupus*	Loup atlantique	Atlantic Wolffish	37	157.1	628
701	*Anarhichas minor*	Loup tacheté	Spotted Wolffish	14	24.3	23
718	*Anisarchus medius*	Lompénie naine	Stout Eelblenny	6	0.3	40
320	*Arctozenus risso*	Lussion blanc	White Barracudina	116	26.5	1769
193	*Argentina silus*	Grande argentine	Atlantic Argentine	4	0.5	9
811	*Artediellus atlanticus*	Hameçon atlantique	Atlantic Hookear Sculpin	45	1.2	253
810	*Artediellus* sp.	Hameçons	Hookear Sculpins	9	0.2	71
812	*Artediellus uncinatus*	Hameçon neigeux	Arctic Hookear Sculpin	14	0.3	96
838	*Aspidophoroides monopterygius*	Poisson-alligator atlantique	Alligatorfish	46	0.8	282
102	*Bathyraja spinicauda*	Raie à queue épineuse	Spinytail Skate	5	37.6	9
451	*Boreogadus saida*	Saïda franc	Arctic Cod	24	3.8	264
865	*Careproctus reinhardti*	Petite limace de mer	Sea Tadpole	11	0.4	20
27	*Centroscyllium fabricii*	Aiguillat noir	Black Dogfish	23	1361.7	2857
227	*Chauliodus sloani*	Chauliode très lumineux	Sloane's Viperfish	1	< 0.1	1
150	*Clupea harengus*	Hareng atlantique	Atlantic Herring	92	116.5	670
808	Cottidae	Chaboisseaux	Sculpins	3	< 0.1	5
829	*Cottunculus microps*	Cotte polaire	Polar Sculpin	1	< 0.1	1
721	*Cryptacanthodes maculatus*	Terrassier tacheté	Wrymouth	5	4.5	6
849	*Cyclopterus lumpus*	Grosse poule de mer	Lumpfish	26	20.6	41
208	*Cyclothone microdon*	Cyclothone à petites dents	Small-Toothed Bristlemouth	10	< 0.1	10
461	*Enchelyopus cimbrius*	Motelle à quatre barbillons	Fourbeard Rockling	122	86.8	2177
711	*Eumesogrammus praecisus*	Quatre-lignes atlantique	Fourline Snakeblenny	25	4.9	180
844	*Eumicrotremus spinosus*	Petite poule de mer atlantique	Atlantic Spiny Lumpsucker	34	4.5	290
438	*Gadus morhua*	Morue franche	Atlantic Cod	129	6435	13648
439	*Gadus ogac*	Ogac, morue ogac	Greenland Cod	8	8.4	12
455	*Gaidropsarus argentatus*	Mustèle argentée	Silver Rockling	1	< 0.1	1
453	*Gaidropsarus* sp.	Mustèles	Threebeard Rocklings	1	< 0.1	1
426	*Gasterosteus aculeatus*	Épinoche à trois épines	Threespine Stickleback	10	0.1	35
890	*Glyptocephalus cynoglossus*	Plie grise	Witch Flounder	145	461.2	2745
205	*Gonostomatidae*	Cyclothones	Bristlemouths	1	< 0.1	1
746	*Gymnelus viridis*	Unernak caméléon	Fish Doctor	8	0.2	27
823	*Gymnocanthus tricuspis*	Tricorne arctique	Arctic Staghorn Sculpin	18	8.4	106

STRAP* code	Scientific name	French name	English name	Occurrence	Weight (kg)	Number
797	*Helicolenus dactylopterus*	Chèvre impériale	Blackbelly Rosefish	1	0.5	3
809	*Hemitripterus americanus*	Hémitriptère atlantique	Sea Sculpin	8	5.8	11
889	*Hippoglossoides platessoides*	Plie canadienne	American Plaice	146	829.7	11188
893	*Hippoglossus hippoglossus*	Flétan atlantique	Atlantic Halibut	56	644.9	146
831	*Icelus bicornis*	Icèle à deux cornes	Twohorn Sculpin	2	< 0.1	2
830	*Icelus* sp.	Icèles	Spatulate and Twohorn Sculpin	1	< 0.1	3
832	*Icelus spatula*	Icèle spatulée	Spatulate Sculpin	13	0.3	61
285	*Lampadena speculigera*	Lanterne-miroir	Mirror Lanternfish	8	0.9	40
836	*Leptagonus decagonus*	Agone atlantique	Atlantic Poacher	22	12.2	599
717	*Leptoclinus maculatus*	Lompénie tachetée	Daubed Shanny	80	12	1884
891	*Limanda ferruginea*	Limande à queue jaune	Yellowtail Flounder	6	32.6	186
862	*Liparis gibbus*	Limace marbrée	Variegated Snailfish	12	3	48
966	*Lophius americanus*	Baudroie d'Amérique	Monkfish, Goosefish	6	33.9	7
716	*Lumpenus lampretaeformis*	Lompénie-serpent	Snakeblenny	25	20.5	850
750	*Lycenchelys paxillus*	Lycode commune	Common Wolf Eel	2	< 0.1	2
752	*Lycenchelys verrillii*	Lycode à tête longue	Wolf Eelpout	9	< 0.1	13
727	*Lycodes esmarkii*	Lycode d'Esmark	Esmark's Eelpout	2	0.5	2
728	*Lycodes lavalaei*	Lycode du Labrador	Newfoundland Eelpout	23	16.2	108
733	*Lycodes polaris*	Lycode polaire	Canadian Eelpout	2	0.1	5
734	*Lycodes terraenovae*	Lycode atlantique	Atlantic Eelpout	7	0.3	9
730	*Lycodes vahlii*	Lycode à carreaux	Vahl's Eelpout	46	39.6	736
91	*Malacoraja senta*	Raie lisse	Smooth Skate	109	124	582
187	*Mallotus villosus*	Capelan	Capelin	99	166.9	11741
441	*Melanogrammus aeglefinus*	Aiglefin	Haddock	6	3.7	10
745	*Melanostigma atlanticum*	Molasse atlantique	Atlantic Soft Pout	63	6.2	1890
449	*Merluccius bilinearis*	Merlu argenté	Silver Hake	75	52.8	264
272	Myctophidae	Poissons-lanterne	Lanternfishes	21	0.7	197
271	Myctophiformes	Poissons des profondeurs	Deepwater Fishes	1	< 0.1	3
820	*Myoxocephalus octodecemspinosus*	Chaboisseau à dix-huit-épines	Longhorn Sculpin	3	21	71
819	*Myoxocephalus scorpius*	Chaboisseau à épines courtes	Shorthorn Sculpin	30	175	356
817	*Myoxocephalus* sp.	Chaboisseaux	Sculpins	3	< 0.1	5
12	*Myxine glutinosa*	Myxine du nord	Northern Hagfish	105	187.3	3487
278	*Neoscopelus macrolepidotus*	Lanterne à grandes écailles	Glowingfish	3	0.1	3
478	*Nezumia bairdii*	Grenadier du grand Banc	Common Grenadier	85	42.3	1149
874	*Paraliparis calidus*	Limace ardente	Lowfin Snailfish	8	0.1	9
856	*Paraliparis copei*	Limace à museau noir	Blacksnout Seasnail	4	0.2	18
444	*Phycis chesteri*	Merluche à longues nageoires	Longfin Hake	36	34	265
895	*Pseudopleuronectes americanus*	Plie rouge	Winter Flounder	1	0.1	1

STRAP* code	Scientific name	French name	English name	Occurrence	Weight (kg)	Number
892	*Reinhardtius hippoglossoides*	Flétan du Groenland, turbot	Greeenland Halibut, Turbot	140	4249.7	20583
572	*Scomber scombrus*	Maquereau bleu	Atlantic Mackerel	16	0.5	28
796	*Sebastes fasciatus*	Sébaste acadien	Acadian Redfish	167	6821.6	230785
794	*Sebastes mentella*	Sébaste atlantique	Deepwater Redfish	165	5254	106136
793	*Sebastes norvegicus*	Sébaste orangé	Golden Redfish	1	1.6	1
710	*Stichaeus punctatus*	Stichée arctique	Arctic Shanny	1	< 0.1	1
814	*Triglops murrayi*	Faux-trigle armé	Moustache Sculpin	42	16.1	1458
815	*Triglops nybelini*	Faux-trigle à grands yeux	Bigeye Sculpin	2	< 0.1	2
837	*Ulcina olrikii*	Poisson-alligator arctique	Arctic Alligatorfish	4	0.1	29
447	*Urophycis tenuis*	Merluche blanche	White Hake	86	328.6	659
725	Zoarcidae	Lycodes, Loquettes, Molasses	Eelpouts, Pouts, Wolf Eels	2	< 0.1	2
	Total	**Vertébrés**	**Vertebrates**		28 823	424 689
			Invertebrates			
1100		Invertébrés	Invertebrates	8	< 0.1	24
2182	*Actinauge cristata*	Anémone de mer	Anemone	40	15.3	1128
2165	Actiniaria	Actinies et Anémones	Sea Anemones	5	< 0.1	14
2162	*Actinostola callosa*	Anémones de mer	Anemone	60	245.2	1924
6771	*Aega psora*	Isopode	Isopod	15	< 0.1	22
2675	*Alcyonidium* sp.	Bryozoaire	Bryozoan	5	0.2	15
3164	*Amicula vestita*	Chiton	Chiton	2	< 0.1	2
6930	Amphipoda	Amphipodes	Amphipods	8	< 0.1	44
8593	*Amphiura* sp.	Ophiures	Brittle star	5	< 0.1	20
4219	*Anomia* sp.	Pétoncle	Jingle shells	1	< 0.1	1
7389	*Anonyx* sp.	Gammarides	Gammarids	14	< 0.1	20
2218	*Anthoptilum grandiflorum*	Plume de mer	Sea pen	52	43.3	2757
5002	*Aphroditella hastata*	Polychète errante	Sea Mouse	6	0.4	10
6594	*Arcoscalpellum michelottianum*	Balane	Barnacle	2	0.1	5
8138	*Argis dentata*	Crevette verte	Arctic Argid	36	18	3733
3418	*Arrhoges occidentalis*	Pied-de-pélican	American Pelicanfoot	17	0.6	68
8680	Ascidiacea	Ascidies, tuniqués sessiles	Ascidians, Sessile Tunicates	82	2.7	587
4227	*Astarte* sp.	Astartes	Astartes	37	0.2	102
8390	Asteroidea	Étoiles de mer	Sea Stars	1	< 0.1	1
8113	*Atlantopandalus propinqvus*	Crevette	Shrimp	16	0.3	83
2097	*Atolla wyvillei*	Méduse	Jellyfish	3	0.5	9
2085	*Aurelia aurita*	Méduse de lune	Moon Jelly	59	109.4	872
6595	Balanidae	Balanes	Barnacles	9	0.4	61
4904	*Bathypolypus bairdii*	Poulpe	North Atlantic Octopus	37	1.2	52

STRAP* code	Scientific name	French name	English name	Occurrence	Weight (kg)	Number
3995	Bivalvia	Bivalves	Bivalves	8	< 0.1	26
2158	*Bolocera tuediae*	Anémone de mer	Anemone	75	54.1	661
8793	*Boltenia echinata*	Cactus de mer	Cactus Sea Squirt	4	0	16
8792	*Boltenia ovifera*	Patate de mer	Sea Potato	28	8.6	121
3487	*Boreotrophon clathratus*	Murex	Clathrate Trophon	3	< 0.1	6
3488	*Boreotrophon* sp.	Murex	Murex	6	< 0.1	25
8798	*Botrylloides* sp.	Ascidie	Tunicate	1	< 0.1	
5755	*Brada inhabilis*	Polychète	Flabelligerid worm	1	< 0.1	2
8378	*Brisaster fragilis*	Oursin coeur	Heart Urchin	79	126.9	15182
2670	Bryozoa	Bryozoaires	Bryozoans	29	1.1	924
3515	Buccinidae	Buccinidés	Whelks	1	< 0.1	1
3523	*Buccinum scalariforme*	Buccin	Ladder Whelk	4	< 0.1	4
3516	*Buccinum* sp.	Buccins	Whelk	20	0.9	63
3517	*Buccinum undatum*	Buccin commun	Waved Whelk	6	0.1	9
8429	*Ceramaster granularis*	Étoile de mer	Sea Star	18	0.8	33
8213	*Chionoecetes opilio*	Crabe des neiges	Snow Crab	108	193.9	1130
6593	*Chirona hameri*	Balane turbané	Turban Barnacle	3	0.1	4
4167	*Chlamys islandica*	Pétoncle d'Islande	Iceland Scallop	17	1.4	40
4351	*Ciliatocardium ciliatum ciliatum*	Coque d'Islande	Iceland Cockle	5	0.7	36
3908	*Colga villosa*	Nudibranche	Nudibranch	14	< 0.1	35
3575	*Colus* sp.	Buccins	Whelks	1	< 0.1	1
3576	*Colus stimpsoni*	Buccin	Whelk	3	0.1	3
4124	*Crenella faba*	Crénella fauve	Bean crenella	2	< 0.1	2
8447	*Crossaster papposus*	Soleil de mer épineux	Spiny Sun Star	33	3.4	306
3422	*Cryptonatica affinis*	Lunaties	Arctic moonsnail	1	< 0.1	1
8407	*Ctenodiscus crispatus*	Étoile de mer	Mud Star	105	97.6	14725
8312	*Cucumaria frondosa*	Concombre de mer	Orange Footed Sea Cucumber	5	2.1	8
4525	*Cuspidaria* sp.	Myes	Dipperclams	32	0.1	73
2080	*Cyanea capillata*	Crinière de lion	Lion's Mane	62	23.6	122
4268	*Cyclocardia borealis*	Vénéricarde boréale	Northern Cyclocardia	3	< 0.1	5
3893	*Dendronotus* sp.	Nudibranche	Nudibranch	6	< 0.1	8
8408	*Diplopteraster multipes*	Étoile de mer	Sea Star	1	0.3	1
3965	*Doridoxa ingolfiana*	Nudibranche	Nudibranch	1	< 0.1	5
2191	*Drifa glomerata*	Corail mou	Soft coral	26	0.4	84
2183	*Duva florida*	Corail mou	Sea Cauliflower	4	0.1	8
8373	*Echinarachnius parma*	Dollar de sable	Common Sand Dollar	4	1.6	129
5930	Echiura	Échiure	Echiurid	2	< 0.1	3
7383	*Epimeria loricata*	Gammaride	Gammarid	9	< 0.1	16

STRAP* code	Scientific name	French name	English name	Occurrence	Weight (kg)	Number
2156	*Epizoanthus erdmanni*	Zoanthide	Zoanthid	1	< 0.1	2
2157	*Epizoanthus* sp.	Anémone de mer	Sea Anemone	41	0.1	638
8075	*Eualus fabricii*	Bouc Arctique	Arctic Eualid	19	0.4	609
8081	*Eualus gaimardii belcheri*	Bouc	Circumpolar Eualid	1	< 0.1	6
8080	*Eualus gaimardii gaimardii*	Bouc	Circumpolar Eualid	12	0.1	166
8077	*Eualus macilentus*	Bouc du Groenland	Greenland Shrimp	20	8.1	7443
8778	*Eudistoma vitreum*	Ascidie	Tunicate	20	0.3	158
5461	*Euphrosine borealis*	Polychète	Seaworm	3	< 0.1	3
7195	*Eusirus cuspidatus*	Gammaride	Gammarid	15	< 0.1	60
2295	Fecampiidae	Vers flats	Flatworms	4	< 0.1	8
2224	*Flabellum alabastrum*	Madrépore	Cup coral	6	0.1	8
3175	Gastropoda	Gastéropodes	Gastropods	9	< 0.1	19
2184	*Gersemia rubiformis*	Corail mou	Sea Strawberry	35	0.5	270
8541	*Gorgonocephalus arcticus*	Gorgonocéphale	Northen Basket Star	1	5.1	18
8540	*Gorgonocephalus* sp.	Gorgonocéphales	Basket Stars	27	48.9	339
2217	*Halipteris finmarchica*	Plume de mer	Sea pen	19	3.6	242
8797	*Halocynthia pyriformis*	Pêche de mer	Sea Peach	1	< 0.1	1
8263	*Heliometra glacialis*	Lis de mer	Feather star	1	< 0.1	2
3090	*Hemithiris psittacea*	Brachiopode	Lamp Shell	10	0.4	196
8483	*Henricia* sp.	Étoiles de mer	Sea Stars	59	0.6	267
4437	*Hiatella arctica*	Saxicave arctique	Arctic Saxicave	3	< 0.1	6
8431	*Hippasteria phrygiana*	Étoile de mer	Sea Star	34	14.9	52
8290	Holothuroidea	Cocombres de mer	Sea Cucumbers	2	0.2	12
2167	*Hormathia nodosa*	Anémone noduleuse	Rugose Anemone	10	0.8	28
8217	*Hyas araneus*	Crabe lyre	Atlantic Lyre Crab	20	4.5	330
8218	*Hyas coarctatus*	Crabe lyre	Arctic Lyre Crab	55	7.9	718
1341	Hydrozoa	Hydrozoaires	Hydrozoans	61	0.4	
6977	*Hyperia galba*	Hypéride	Hyperiid	8	< 0.1	28
4753	*Illex illecebrosus*	Encornet rouge nordique	Northern Shortfin Squid	28	9.3	69
5003	*Laetmonice filicornis*	Polychète	Seaworm	4	< 0.1	10
8092	*Lebbeus groenlandicus*	Bouc	Spiny Lebbeid	16	7.5	2415
8095	*Lebbeus microceros*	Bouc	Shrimp	6	< 0.1	8
8093	*Lebbeus polaris*	Bouc	Polar Lebbeid	56	2.1	1600
8511	*Leptasterias polaris*	Étoile de mer polaire	Polar Sea Star	8	5.1	63
8510	*Leptasterias* sp.	Étoiles de mer	Sea Stars	15	0.1	36
8521	*Leptychaster arcticus*	Stelléridé	Sea Star	5	< 0.1	10
3459	*Limneria undata*	Veloutée rayée	Wavy Lamellaria	5	< 0.1	6
2207	*Liponema multicorne*	Anémone	Sea anemone	10	1.4	28

STRAP* code	Scientific name	French name	English name	Occurrence	Weight (kg)	Number
8196	*Lithodes maja*	Crabe épineux du Nord	Norway King Crab	53	50	124
3437	*Lunatia pallida*	Lunatie	Pale Moonsnail	7	< 0.1	7
4395	*Macoma calcarea*	Bivalve	Chalky Macoma	9	0.1	22
7279	*Maera loveni*	Gammaride	Gammarid	1	< 0.1	1
3219	*Margarites costalis*	Margarite rosé du Nord	Boreal Rosy Margarite	13	< 0.1	33
3216	*Margarites groenlandicus*	Troque	Greenland marguerite	3	< 0.1	7
3212	*Margarites* sp.	Patelle	Topsnail	3	< 0.1	3
4025	*Megayoldia thraciaeformis*	Bivalve	Broad Yoldia	17	0.8	127
5646	*Melinna cristata*	Polychète	Seaworm	1	< 0.1	1
7268	*Melita dentata*	Gammaride	Gammarid	1	< 0.1	1
8164	*Munidopsis curvirostra*	Munidopsis curvirostra	Squat Lobster	25	0.3	273
4127	*Musculus niger*	Moule noire	Black Mussel	1	< 0.1	1
4126	*Musculus* sp.	Moules	Mussels	2	< 0.1	2
4428	*Mya truncata*	Mye tronquée	Truncate Softshell Clam	1	< 0.1	5
4121	*Mytilus* sp.	Moules	Mussels	14	0.4	62
3420	Naticidae	Lunaties	Moonsnails	2	< 0.1	2
7483	*Neohela monstrosa*	Gammaride	Gammarid	7	< 0.1	12
2219	Nephtheidae	Coraux mous	Soft corals	8	0.1	41
5113	*Nephtys* sp.	Polychète errante	Red-Lined Worm	1	< 0.1	8
3566	*Neptunea decemcostata*	Neptunée à dix côtes	Wrinkle Whelk	2	0.1	2
3567	*Neptunea despecta*	Neptunée commune du nord	Lader Whelk	1	0.1	1
3565	*Neptunea* sp.	Buccins	Whelks	1	< 0.1	1
5236	*Nereis pelagica*	Polychète	Clam worm	1	< 0.1	1
3483	*Nucella lapillus*	Pourpre de l'Atlantique	Atlantic Dogwinkle	1	< 0.1	1
4019	*Nuculana* sp.	Bivalves	Nutclams	8	0.1	86
3850	Nudibranchia	Nudibranches	Nudibranchs	3	< 0.1	4
5961	*Nymphon* sp.	Araignées de mer	Sea Spiders	10	0.1	244
8575	*Ophiacantha bidentata*	Ophiure épineuse	Brittle Star	38	1	2881
8583	*Ophiopholis aculeata*	Ophiure paquerette	Daisy Brittle Star	61	4.6	3035
8585	*Ophioscolex glacialis*	Ophiure	Brittle star	6	< 0.1	30
8552	*Ophiura robusta*	Ophiure	Brittle Star	8	< 0.1	22
8553	*Ophiura sarsii*	Ophiure	Brittle Star	40	14.1	10044
8530	Ophiuroidea	Ophiures	Brittle Stars	9	0.1	195
8178	*Pagurus* sp.	Bernards hermites droitiers	Hermits Crabs	22	1.1	40
8111	*Pandalus borealis*	Crevette nordique	Northern Shrimp	152	5184.6	860206
8112	*Pandalus montagui*	Crevette ésope	Striped Pink Shrimp	97	224	84329
4438	*Panomya norvegica*	Saxicave	Arctic Roughmya	1	0.1	
7586	*Paramphithoe hystrix*	Gammaride	Gammarid	9	< 0.1	20

STRAP* code	Scientific name	French name	English name	Occurrence	Weight (kg)	Number
8057	*Pasiphaea multidentata*	Sivade rose, Crevette blanche	Pink Glass Shrimp	99	119.7	41283
2203	*Pennatula aculeata*	Plume de mer	Sea Pen	80	0.9	448
2210	*Pennatula grandis*	Plume de mer	Sea Pen	33	36.8	705
2096	*Periphylla periphylla*	Méduse à coronne	Crown jellyfish	58	142	150
5907	*Phascolion strombus strombus*	Sipunculide	Hermit Sipunculid	3	< 0.1	3
2255	*Pleurobrachia pileus*	Groseille de mer ronde	Sea Gooseberry	36	0.5	460
3578	*Plicifusus kroeyeri*	Colus	Arctic Whelk	2	< 0.1	2
4950	Polychaeta	Polychètes	Polychaetes	99	0.5	612
1109	*Polymastia* sp.	Éponge	Sponge	1	< 0.1	4
5264	*Polyphysia crassa*	Polychète	Sea worm	3	< 0.1	10
3125	Polyplacophora	Chitons	Chitons	1	< 0.1	1
8135	*Pontophilus norvegicus*	Crevette	Norwegian Shrimp	77	3.8	2182
8435	*Poraniomorpha* sp.	Étoile de mer	Sea star	1	< 0.1	1
1101	Porifera	Éponges	Sponges	123	436.8	
8433	*Pseudarchaster parelii*	Étoile de mer	Sea Star	3	0.1	3
8520	*Psilaster andromeda*	Étoile de mer	Sea Star	10	1.7	339
8294	*Psolus phantapus*	Holothurie	Sea Cucumber	6	< 0.1	10
8410	*Pteraster militaris*	Étoile de mer	Sea Star	15	0.5	50
8412	*Pteraster obscurus*	Étoile de mer	Sea Star	2	0.1	5
8411	*Pteraster pulvillus*	Étoile de mer	Sea Star	14	0.2	108
1353	*Ptychogena lactea*	Méduse	Jellyfish	83	5.5	1029
5951	Pycnogonida	Araignées de mer	Sea Spiders	7	< 0.1	12
7211	*Rhachotropis aculeata*	Gammaride	Gammarid	19	0.1	168
4557	*Rossia* sp.	Sépioles	Bobtails	43	0.7	69
8129	*Sabinea sarsii*	Crevette	Sars Shrimp	18	0.7	312
8128	*Sabinea septemcarinata*	Crevette	Sevenline Shrimp	28	1	639
8127	*Sabinea* sp.	Crevette	Shrimp	1	< 0.1	
3491	*Scabrotrophon fabricii*	Murex	Murex	2	< 0.1	4
3715	*Scaphander punctostriatus*	Céphalaspide	Giant Canoe Bubble	25	0.2	171
3975	Scaphopoda	Scaphopodes	Tuskshells	1	< 0.1	93
8119	*Sclerocrangon boreas*	Crevette de roche	Scultured Shrimp	14	22.9	2970
2040	Scyphozoa	Scyphozoaires	Scyphozoans	63	28.4	493
2679	*Securiflustra securifrons*	Bryozoaires marins	Marine bryozoans	14	< 0.1	29
8033	*Sergestes arcticus*	Crevette	Shrimp	13	< 0.1	40
4352	*Serripes groenlandicus*	Coque du Groenland	Greenland Smoothcockle	2	< 0.1	2
4191	*Similipecten greenlandicus*	Pétoncle	Greenland Glass-Scallop	3	< 0.1	9
5900	Sipuncula	Sipunculides	Sipunculids	13	< 0.1	36
8445	*Solaster endeca*	Soleil de mer pourpre	Purple Sunstar	4	0.2	5

STRAP* code	Scientific name	French name	English name	Occurrence	Weight (kg)	Number
8087	*Spirontocaris lilljeborgii*	Bouc épineux	Friendly Blade Shrimp	36	0.3	277
8086	*Spirontocaris phippsii*	Bouc	Punctate Blade Shrimp	3	< 0.1	10
8084	*Spirontocaris* sp.	Boucs	Blade Shrimps	4	< 0.1	
8085	*Spirontocaris spinus*	Bouc perroquet	Parrot Shrimp	29	1.3	788
1352	*Staurophora mertensii*	Méduse à croix blanche	Whitecross Jellyfish	8	0.4	18
7750	*Stegocephalus inflatus*	Gammaride	Gammarid	32	0.1	185
8515	*Stephanasterias albula*	Étoile de mer	Sea star	9	< 0.1	15
2159	*Stephanauge nexilis*	Anémone de mer	Sea anemone	13	0.5	52
2173	*Stomphia coccinea*	Anémone marbrée	Anemone	31	0.6	136
8363	*Strongylocentrotus* sp.	Oursins	Sea Urchins	59	33.6	2153
1112	*Stylocordyla borealis*	Éponge	Sponge	28	< 0.1	164
6791	*Syscenus infelix*	Isopode	Isopod	43	0.2	110
1108	*Tentorium semisuberites*	Éponge	Sponge	1	< 0.1	13
3101	*Terebratulina septentrionalis*	Térébratule du Nord	Northern Lamp Shell	12	< 0.1	25
4498	*Teredo navalis*	Taret commun	Naval shipworm	2	< 0.1	21
6972	*Themisto libellula*	Hypéride	Hyperiid	32	< 0.1	287
1357	*Thuiaria thuja*	Hydrozoaire	Bottlebrush Hydroid	17	0.1	132
3134	*Tonicella* sp.	Chitons	Chitons	3	< 0.1	3
2176	*Urticina felina*	Anémone de mer	Sea Anemone	1	0.1	3
7691	*Wimvadocus torelli*	Gammaride	Gammarid	2	< 0.1	2
4074	*Yoldia* sp.	Bivalves	Bivalves	2	< 0.1	18
	Total	**Invertebrés**	**Invertebrates**		7 400	1 079 989
			Other			
9995		Déchets	Trash	185	110.3	
9970		Capsule de raie	Skate Egg	25	0.9	66

** : STRAP code based in part on works of Akenhead LeGrow (1981) for vertebrates and Lilly (1982) for invertebrates, as well as works on predation by marine organisms by the region of Quebec.*

Appendix 3. Number of measured and weighed specimens and descriptive statistics for the length in 2014.

STRAP* code	Scientific name	Sampled number		Length (cm)				
		Length	Weight	Min	P1**	Median	P99**	Max
	Vertebrates							
1		4	4	3.3	3.3	3.45	4.2	4.2
90	*Amblyraja radiata*	1271	1112	8.4	11.1	26.9	66	77
696	*Ammodytes* sp.	222	164	5.3	5.7	8.95	21.9	22.1
700	*Anarhichas lupus*	532	354	6.5	7	16.3	72.3	76
701	*Anarhichas minor*	23	22	9	9	23	89.5	89.5
718	*Anisarchus medius*	40	29	8.4	8.4	13.2	15.5	15.5
320	*Arctozenus risso*	1457	1136	12.5	17.8	23	27.5	28.2
193	*Argentina silus*	9	9	11.2	11.2	16.6	29.7	29.7
811	*Artediellus atlanticus*	253	235	3.6	3.6	6.6	13.1	13.8
810	*Artediellus* sp.	65	50	3.1	3.1	6.1	8.6	8.6
812	*Artediellus uncinatus*	81	66	4.4	4.4	6.4	10.5	10.5
838	*Aspidophoroides monopterygius*	273	244	3.6	6.2	12	15.9	16.6
102	*Bathyraja spinicauda*	9	9	12.1	12.1	57.5	145.1	145.1
451	*Boreogadus saida*	264	175	8.2	8.3	11.8	20.5	22.5
865	*Careproctus reinhardti*	20	20	6.6	6.6	9.45	15.5	15.5
27	*Centroscyllium fabricii*	520	317	13.4	15.1	50	69.5	71
227	*Chauliodus sloani*	1	1	13.2	13.2	13.2	13.2	13.2
150	*Clupea harengus*	651	558	14.7	16.8	28.6	37	38
808	Cottidae	5	5	2.7	2.7	3.4	4	4
829	*Cottunculus microps*	1	1	4.5	4.5	4.5	4.5	4.5
721	*Cryptacanthodes maculatus*	6	4	56	56	79.5	87.5	87.5
849	*Cyclopterus lumpus*	37	35	3.8	3.8	14.7	37.2	37.2
208	*Cyclothone microdon*	7	7	5.2	5.2	5.9	7.5	7.5
461	*Enchelyopus cimbrius*	1223	809	4.7	6.1	20.4	28.3	30.5
711	*Eumesogrammus praecisus*	157	126	5.4	8.8	15	21	22.4
844	*Eumicrotremus spinosus*	256	196	2	2.6	5.05	12.3	13
438	*Gadus morhua*	5226	2574	10.2	14.5	34.9	63.1	92
439	*Gadus ogac*	12	12	19.4	19.4	39.75	45.8	45.8
455	*Gaidropsarus argentatus*	1	1	6.1	6.1	6.1	6.1	6.1
453	*Gaidropsarus* sp.	1	1	5.5	5.5	5.5	5.5	5.5
426	*Gasterosteus aculeatus*	35	34	3.1	3.1	6.6	7.5	7.5
890	*Glyptocephalus cynoglossus*	2620	1847	6.2	11.1	29.4	42.7	47.9
746	*Gymnelus viridis*	27	27	5.5	5.5	12	17.4	17.4
823	*Gymnocanthus tricuspis*	94	75	9.5	9.5	17.15	27.1	27.1
797	*Helicolenus dactylopterus*	3	3	21.9	21.9	22.2	23	23
809	*Hemitripterus americanus*	11	11	5.1	5.1	31	42.5	42.5
889	*Hippoglossoides platessoides*	5603	2757	4.5	7.2	20	43.4	59.4
893	*Hippoglossus hippoglossus*	146	145	22.9	29.1	60.1	149.5	155.4
831	*Icelus bicornis*	2	2	4	4	5.55	7.1	7.1
830	*Icelus* sp.	3	3	4.3	4.3	4.5	5.7	5.7
832	*Icelus spatula*	61	61	4.1	4.1	7.1	13.7	13.7
285	*Lampadena speculigera*	40	33	9.7	9.7	14.5	15.7	15.7
836	*Leptagonus decagonus*	258	159	3.9	4.1	17.8	22	23
717	*Leptoclinus maculatus*	809	541	8.2	8.6	11	18	18.9
891	*Limanda ferruginea*	114	44	16.2	16.7	26.1	36	37.4
862	*Liparis gibbus*	48	48	3.1	3.1	10.35	25.4	25.4
966	*Lophius americanus*	7	7	46.8	46.8	58.5	84.5	84.5
716	*Lumpenus lampretaeformis*	318	222	9.6	12.5	29.6	42	46.5
750	*Lycenchelys paxillus*	2	2	18.3	18.3	19.55	20.8	20.8
752	*Lycenchelys verrillii*	13	13	9.6	9.6	12.1	14.1	14.1
727	*Lycodes esmarkii*	2	2	38.3	38.3	38.75	39.2	39.2
728	*Lycodes lavalaei*	108	108	7.1	8.9	21.15	54.3	57.5
733	*Lycodes polaris*	5	5	10	10	18.1	21.5	21.5
734	*Lycodes terraenovae*	9	9	13.2	13.2	18.2	26	26
730	*Lycodes vahlii*	429	293	7.8	8.6	23.1	37.7	40.3
91	*Malacoraja senta*	569	468	8.8	9	14.9	59.2	61.6

STRAP* code	Scientific name	Sampled number		Length (cm)				
		Length	Weight	Min	P1**	Median	P99**	Max
187	*Mallotus villosus*	1532	950	5.3	6.8	14.9	18	19.5
441	*Melanogrammus aeglefinus*	10	10	19.5	19.5	33.45	42.8	42.8
745	*Melanostigma atlanticum*	801	517	4.9	6.9	11	13.6	16.2
449	*Merluccius bilinearis*	264	255	16.5	18.9	29.2	35.7	37.4
272	Myctophidae	63	60	4.4	4.4	5.6	15.6	15.6
271	Myctophiformes	3	3	8.7	8.7	8.9	10	10
820	*Myoxocephalus octodecemspinosus*	39	24	8.9	8.9	29.6	39.7	39.7
819	*Myoxocephalus scorpius*	217	160	12.5	14.1	29.5	42.1	48.5
817	*Myoxocephalus* sp.	5	5	3.1	3.1	4	8.6	8.6
12	*Myxine glutinosa*	1620	1087	14.3	23	36.15	47.1	53.2
278	*Neoscopelus macrolepidotus*	3	3	9.1	9.1	10.5	18	18
478	*Nezumia bairdii*	978	719	5.6	8.5	21.8	32	34.8
874	*Paraliparis calidus*	9	9	5.6	5.6	11.5	12	12
856	*Paraliparis copei*	18	18	7.1	7.1	10.1	14.7	14.7
444	*Phycis chesteri*	263	232	13.2	14.8	25.1	38	38.4
895	*Pseudopleuronectes americanus*	1	1	22.1	22.1	22.1	22.1	22.1
892	*Reinhardtius hippoglossoides*	7654	3848	6	14.1	26.6	51.8	76.5
572	*Scomber scombrus*	27	27	4.7	4.7	12.5	19.5	19.5
793	*Sebastes norvegicus*	1	1	44.7	44.7	44.7	44.7	44.7
792	*Sebastes* sp.	12910	7068	2.7	4.7	14.5	43.2	52.4
710	*Stichaeus punctatus*	1	1	9.1	9.1	9.1	9.1	9.1
814	*Triglops murrayi*	578	359	3.3	6.9	11.5	15.5	17.8
815	*Triglops nybelini*	2	2	11.2	11.2	12	12.8	12.8
837	*Ulcina olrikii*	29	29	6	6	8	9.2	9.2
447	*Urophycis tenuis*	628	540	23.1	25.7	37.95	65.2	77.7
725	Zoarcidae	2	2	7.7	7.7	9.45	11.2	11.2
	Invertebrates							
2218	*Anthoptilum grandiflorum*	69	0	40.5	40.5	58.0	72.0	72.0
8138	*Argis dentata*	811	0	0.6	0.7	1.5	2.4	2.5
8113	*Atlantopandalus propinqvus*	33	0	1.2	1.2	1.7	2.4	2.4
8213	*Chionoecetes opilio*	757	325	0.5	0.5	5.1	12.3	13.0
8075	*Eualus fabricii*	178	0	0.5	0.5	0.8	1.1	1.2
8081	*Eualus gaimardii belcheri*	6	0	0.7	0.7	0.9	1.5	1.5
8080	*Eualus gaimardii gaimardii*	52	0	0.5	0.5	0.8	1.3	1.3
8077	*Eualus macilentus*	380	0	0.6	0.7	1.0	1.3	1.4
2217	*Halipteris finmarchica*	30	0	23.0	23.0	67.1	95.4	95.4
8217	*Hyas araneus*	249	124	0.4	0.5	1.2	7.2	7.3
8218	*Hyas coarctatus*	561	307	0.4	0.5	1.5	6.6	8.0
4753	*Illex illecebrosus*	69	55	10.1	10.1	18.5	22.0	22.0
8092	*Lebbeus groenlandicus*	259	0	0.5	0.6	1.2	2.3	2.4
8095	*Lebbeus microceros*	5	0	0.7	0.7	1.1	1.2	1.2
8093	*Lebbeus polaris*	504	0	0.5	0.6	1.0	1.3	1.4
8196	*Lithodes maja*	123	91	0.7	4.3	8.3	12.3	12.4
8111	*Pandalus borealis*	27168	932	0.6	0.9	2.3	2.8	3.1
8112	*Pandalus montagui*	3016	0	0.6	0.7	1.4	2.1	2.3
8057	*Pasiphaea multidentata*	2765	0	0.9	1.4	2.4	3.0	3.3
2203	*Pennatula aculeata*	69	0	4.5	4.5	11.2	25.0	25.0
2210	*Pennatula grandis*	74	0	0.1	0.1	44.6	55.1	55.1
8135	*Pontophilus norvegicus*	838	0	0.6	0.6	1.2	1.7	1.8
8129	*Sabinea sarsii*	138	0	0.5	0.5	1.2	1.5	1.8
8128	*Sabinea septemcarinata*	377	0	0.5	0.5	1.1	1.6	1.7
8119	*Sclerocrangon boreas*	442	0	0.6	0.9	1.5	2.7	3.0
8033	*Sergestes arcticus*	27	0	1.2	1.2	1.6	1.9	1.9
8087	*Spirontocaris lilljeborgii*	86	0	0.6	0.6	1.1	1.4	1.4
8086	*Spirontocaris phippsii*	6	0	0.6	0.6	0.7	0.8	0.8
8085	*Spirontocaris spinus*	339	0	0.4	0.5	0.9	1.5	1.7

** STRAP code based in part on works of Akenhead LeGrow (1981) for vertebrates and Lilly (1982) for invertebrates, as well as works on predation by marine organisms by the region of Quebec.*
*** P1 : 1st percentile P99 : 99th percentile*

Appendix 4. Set positions and depth of successful fishing sets, and standardized catches (0.75 nm) in number and weight for cod, Greenland halibut, redfish, northern shrimp, Atlantic halibut, herring and capelin during the 2014 survey.

Set	Stratum	Latitude Deg-Min	Longitude Deg-Min	Depth (m)	Cod		Greenland Halibut		Redfish		Northern Shrimp		Atlantic Halibut		Herring		Capelin	
					n	kg	n	kg	n	kg	n	kg	n	kg	n	kg	n	kg
1	406	48º 58'	63º 33'	390	12.0	4.9	62.0	20.3	200	42.3	623	5.4	0.0	0.0	0.0	0.0	6.0	0.1
2	807	48º 55'	62º 38'	311	2.0	0.5	8.0	1.5	159	37.0	993	7.2	0.0	0.0	0.0	0.0	0.0	0.0
3	804	48º 45'	62º 22'	378	0.0	0.0	20.0	11.7	120	61.6	1634	13.4	0.0	0.0	0.0	0.0	0.0	0.0
4	807	48º 45'	62º 00'	365	1.0	0.4	12.0	2.8	128	55.6	811	6.2	0.0	0.0	0.0	0.0	0.0	0.0
5	807	48º 46'	61º 21'	335	24.0	11.4	17.0	2.9	299	82.8	1675	12.9	0.0	0.0	0.0	0.0	0.0	0.0
6	807	48º 44'	61º 14'	339	5.0	2.7	18.0	5.1	386	95.7	1314	9.7	0.0	0.0	0.0	0.0	0.0	0.0
7	819	48º 45'	60º 30'	339	1.9	0.7	5.8	2.6	979	63.5	49	0.4	0.0	0.0	0.0	0.0	0.0	0.0
8	819	48º 52'	60º 41'	193	22.0	3.4	0.0	0.0	426	18.3	137	0.4	0.0	0.0	12.0	1.6	0.0	0.0
9	830	48º 59'	60º 45'	153	184.5	71.4	0.0	0.0	517	10.8	4	0.0	2.0	14.9	4.0	0.7	0.0	0.0
10	808	48º 60'	60º 04'	280	23.0	25.4	29.0	6.9	11065	543.7	5804	43.2	1.2	12.0	1.2	0.4	0.0	0.0
11	809	49º 03'	59º 52'	289	7.5	5.2	32.8	5.4	1866	174.3	15151	92.1	0.0	0.0	0.0	0.0	0.0	0.0
12	808	49º 06'	60º 17'	285	15.0	11.6	73.5	13.6	4779	194.7	12152	75.0	0.0	0.0	2.0	0.6	0.0	0.0
13	815	49º 07'	60º 31'	245	53.0	26.0	12.0	5.1	516	39.2	3522	26.0	0.0	0.0	35.0	7.1	0.0	0.0
14	815	49º 12'	60º 15'	271	9.0	4.5	77.6	14.7	1844	76.1	18943	108.1	0.0	0.0	3.0	0.9	0.0	0.0
15	815	49º 14'	60º 03'	249	18.8	11.4	20.6	2.2	6296	201.5	1602	10.7	0.0	0.0	0.0	0.0	0.0	0.0
16	812	49º 21'	59º 55'	239	18.8	16.2	6.6	2.9	712	26.3	420	3.4	0.0	0.0	0.9	0.2	0.0	0.0
17	815	49º 24'	60º 10'	232	16.0	7.3	5.0	2.3	383	17.7	15	0.1	0.0	0.0	7.0	1.6	6.0	0.1
19	833	49º 34'	60º 05'	89	123.0	35.4	0.0	0.0	7	0.1	0	0.0	0.0	0.0	1.0	0.0	1.0	0.0
20	812	49º 34'	59º 39'	273	11.0	8.0	41.0	15.0	1608	89.1	8675	44.9	0.0	0.0	0.0	0.0	0.0	0.0
21	814	49º 48'	59º 43'	190	71.0	20.7	58.0	2.6	777	20.7	4474	18.5	1.0	8.9	9.0	1.3	1.0	0.0
22	833	49º 50'	60º 11'	76	8.0	5.1	0.0	0.0	17	1.3	1	0.0	0.0	0.0	0.0	0.0	2.0	0.0
24	827	50º 05'	60º 01'	117	12.1	4.6	2.4	0.0	5	0.0	316	0.6	0.0	0.0	0.0	0.0	1.2	0.0
25	812	49º 55'	59º 16'	261	2.0	2.2	70.0	48.2	9527	419.0	4469	28.2	0.0	0.0	2.0	0.5	8.0	0.1
26	812	49º 56'	59º 06'	271	5.0	3.3	51.0	25.4	26641	870.3	3270	26.8	0.0	0.0	1.0	0.3	1.0	0.0
27	814	50º 05'	59º 08'	222	9.1	6.4	160.2	26.3	1336	46.1	27083	141.1	1.0	1.2	30.0	5.8	0.0	0.0
29	813	50º 11'	58º 54'	190	48.0	20.1	33.0	9.7	3151	58.3	24596	91.3	2.0	4.0	72.0	10.9	2.0	0.0
31	801	50º 14'	58º 29'	333	14.0	6.5	152.3	84.2	200	5.7	10271	58.5	0.0	0.0	1.0	0.3	45.5	0.8
32	801	50º 14'	58º 36'	301	1.9	0.4	170.0	64.5	187	5.0	6291	39.5	0.0	0.0	0.0	0.0	48.7	0.8
33	813	50º 16'	58º 42'	203	15.0	6.9	52.5	9.5	784	14.4	7385	27.9	0.0	0.0	21.6	3.9	36.6	0.5
34	824	50º 29'	58º 19'	161	84.2	16.5	1.2	0.0	42	0.7	648	0.8	3.5	4.1	1.2	0.1	18.5	0.3
35	813	50º 30'	58º 09'	207	109.0	41.4	46.0	11.4	2315	59.9	22669	140.6	1.0	3.0	13.0	2.7	35.0	0.6
37	824	50º 42'	57º 50'	101	89.1	40.4	0.0	0.0	36	0.5	6	0.0	0.0	0.0	0.0	0.0	4.0	0.1
38	837	50º 49'	57º 53'	73	31.0	15.0	0.0	0.0	5	0.0	0	0.0	0.0	0.0	0.0	0.0	186.4	0.5
40	837	51º 19'	57º 09'	83	715.7	483.3	0.0	0.0	0	0.0	0	0.0	0.0	0.0	1.0	0.2	14.0	0.1
42	838	51º 19'	56º 49'	61	284.8	328.1	0.0	0.0	0	0.0	0	0.0	0.0	0.0	11.3	4.0	0.0	0.0
43	838	51º 26'	56º 47'	50	2626.1	1135.0	0.0	0.0	7	0.0	0	0.0	0.0	0.0	17.0	6.6	27.0	0.5
44	838	51º 29'	56º 39'	51	538.2	372.0	0.0	0.0	1	0.0	0	0.0	0.0	0.0	2.0	0.6	3.0	0.1

Set	Stratum	Latitude Deg-Min	Longitude Deg-Min	Depth (m)	Cod		Greenland Halibut		Redfish		Northern Shrimp		Atlantic Halibut		Herring		Capelin	
					n	kg	n	kg	n	kg	n	kg	n	kg	n	kg	n	kg
46	838	51º 37'	56º 30'	68	188.5	107.2	0.0	0.0	0	0.0	0	0.0	0.0	0.0	0.0	0.0	1.9	0.0
47	840	51º 47'	56º 01'	101	19.0	18.0	0.0	0.0	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
48	840	51º 51'	55º 51'	122	26.0	11.0	0.0	0.0	0	0.0	0	0.0	0.0	0.0	0.0	0.0	1.0	0.0
50	838	51º 43'	55º 52'	61	132.1	77.9	0.0	0.0	0	0.0	0	0.0	0.0	0.0	2.8	0.2	841.6	18.6
51	838	51º 40'	56º 10'	75	200.7	46.8	0.0	0.0	0	0.0	0	0.0	0.0	0.0	0.0	0.0	19.2	0.3
52	837	51º 14'	57º 04'	56	1641.4	688.1	0.0	0.0	0	0.0	0	0.0	1.0	0.5	4.0	1.5	6.0	0.1
53	837	50º 59'	57º 22'	67	497.6	137.2	0.0	0.0	32	0.2	1	0.0	0.0	0.0	3.0	0.6	0.0	0.0
54	813	50º 41'	57º 33'	264	1.0	0.1	322.5	94.8	1141	37.4	43467	227.0	1.0	6.2	15.4	3.6	16.3	0.3
55	823	50º 28'	57º 34'	142	273.9	136.9	0.0	0.0	76	1.5	4	0.0	0.9	3.6	0.9	0.2	2.8	0.0
56	801	50º 27'	58º 02'	284	10.0	7.2	83.0	30.4	198	5.7	23208	144.8	1.5	9.5	1.0	0.2	21.0	0.3
57	813	50º 23'	57º 56'	251	4.0	1.7	102.6	18.7	3350	72.4	37799	201.0	0.0	0.0	0.0	0.0	6.0	0.1
58	823	50º 16'	57º 44'	176	38.0	24.6	26.0	7.8	45179	662.1	2546	4.7	3.0	3.8	63.0	14.1	0.0	0.0
59	823	50º 12'	57º 50'	172	63.5	42.9	6.7	1.8	4350	102.3	1077	1.1	1.9	2.0	7.7	1.5	5.8	0.1
60	836	49º 58'	57º 59'	67	344.3	154.4	0.0	0.0	100	1.8	0	0.0	0.0	0.0	2.0	0.4	0.0	0.0
61	822	49º 54'	58º 22'	140	77.0	27.8	0.0	0.0	103	3.6	160	0.1	0.0	0.0	0.0	0.0	1.0	0.0
62	813	49º 53'	58º 41'	208	11.0	9.1	49.3	8.6	2591	71.1	9741	43.6	1.0	6.3	2.0	0.3	2.0	0.0
65	836	49º 33'	58º 23'	90	25.0	16.6	0.0	0.0	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
66	822	49º 34'	58º 35'	103	38.0	19.3	0.0	0.0	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
67	822	49º 31'	58º 56'	168	83.7	20.3	0.0	0.0	565	10.8	316	0.4	0.0	0.0	12.5	2.1	0.0	0.0
68	812	49º 28'	59º 10'	194	3.8	1.2	1.0	0.2	1403	30.3	7	0.0	1.9	10.1	1.0	0.1	0.0	0.0
69	812	49º 18'	59º 14'	200	6.7	4.1	1.0	0.0	602	15.7	0	0.0	0.0	0.0	1.9	0.3	0.0	0.0
70	822	49º 14'	59º 11'	181	13.5	2.1	4.5	0.5	253	7.1	93	0.1	0.0	0.0	1.5	0.5	0.0	0.0
71	812	49º 16'	59º 30'	248	2.0	0.9	14.0	4.7	13887	418.3	405	3.1	0.0	0.0	1.0	0.3	0.0	0.0
72	812	49º 12'	59º 17'	192	13.0	5.2	19.0	1.2	756	64.2	35	0.2	0.0	0.0	45.0	6.2	0.0	0.0
73	821	48º 59'	59º 18'	127	107.7	48.2	0.0	0.0	75	3.3	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
74	821	48º 54'	59º 21'	107	587.5	283.6	0.0	0.0	0	0.0	0	0.0	0.0	0.0	1.0	0.3	0.0	0.0
75	835	48º 48'	59º 06'	51	112.3	79.5	0.0	0.0	0	0.0	0	0.0	3.2	4.6	0.0	0.0	0.0	0.0
76	835	48º 48'	58º 54'	41	17.0	4.5	0.0	0.0	0	0.0	0	0.0	2.0	1.0	1.0	0.0	0.0	0.0
77	836	49º 03'	58º 56'	60	36.0	18.5	0.0	0.0	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
78	836	49º 07'	58º 44'	74	130.3	85.2	0.0	0.0	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
79	822	49º 15'	58º 41'	97	217.6	82.9	0.0	0.0	0	0.0	0	0.0	0.0	0.0	1.0	0.2	0.0	0.0
80	836	49º 16'	58º 34'	82	88.5	63.5	0.0	0.0	0	0.0	0	0.0	1.0	1.8	1.0	0.3	0.0	0.0
81	809	48º 48'	59º 47'	291	1.0	0.3	8.7	3.7	315	29.8	237	2.4	0.0	0.0	1.0	0.2	0.0	0.0
82	808	48º 52'	60º 06'	317	1.0	0.5	16.0	8.2	904	91.5	110	0.8	0.0	0.0	0.0	0.0	0.0	0.0
83	808	48º 43'	60º 03'	335	0.0	0.0	8.0	3.7	234	32.8	580	4.4	0.0	0.0	0.0	0.0	0.0	0.0
84	803	48º 32'	60º 37'	388	0.0	0.0	9.0	5.8	75	41.6	14	0.1	0.0	0.0	1.0	0.2	0.0	0.0
85	803	48º 23'	60º 14'	388	0.0	0.0	5.0	3.1	87	45.4	483	4.1	0.0	0.0	0.0	0.0	0.0	0.0
86	809	48º 26'	59º 56'	331	2.0	1.1	4.0	0.2	394	59.4	447	4.4	0.0	0.0	1.0	0.2	0.0	0.0
87	811	48º 23'	59º 43'	237	2.0	1.1	1.0	0.1	5505	215.3	12	0.1	0.0	0.0	0.0	0.0	0.0	0.0
88	835	48º 26'	59º 14'	67	61.0	33.3	0.0	0.0	7	0.2	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
89	835	48º 19'	59º 21'	70	187.8	89.3	0.0	0.0	91	3.7	0	0.0	3.0	4.4	2.0	0.4	0.0	0.0

Set	Stratum	Latitude Deg-Min	Longitude Deg-Min	Depth (m)	Cod		Greenland Halibut		Redfish		Northern Shrimp		Atlantic Halibut		Herring		Capelin	
					n	kg	n	kg	n	kg	n	kg	n	kg	n	kg	n	kg
90	820	48º 10'	59º 27'	142	41.0	22.1	0.0	0.0	48	1.7	217	0.2	1.0	6.7	1.0	0.1	1.0	0.0
91	821	48º 18'	59º 38'	152	14.0	5.3	0.0	0.0	203	6.6	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
92	820	48º 09'	59º 39'	167	57.0	41.5	0.0	0.0	747	24.6	12	0.0	1.0	0.3	5.0	1.3	0.0	0.0
93	811	48º 16'	59º 46'	254	0.0	0.0	0.0	0.0	1963	160.5	12	0.1	1.0	11.2	0.0	0.0	0.0	0.0
94	810	48º 12'	59º 55'	350	0.0	0.0	3.0	0.1	121	53.5	250	2.1	0.0	0.0	0.0	0.0	1.0	0.0
95	803	48º 07'	60º 08'	481	0.0	0.0	25.0	13.0	68	46.2	211	1.9	0.0	0.0	1.0	0.2	0.0	0.0
96	810	48º 03'	59º 43'	351	0.0	0.0	5.0	1.4	410	114.2	331	2.7	0.0	0.0	0.0	0.0	0.0	0.0
97	820	48º 00'	59º 29'	170	15.6	2.9	0.0	0.0	1436	39.0	0	0.0	0.0	0.0	11.0	2.2	0.0	0.0
98	802	47º 56'	59º 52'	484	0.0	0.0	13.5	7.5	55	41.9	33	0.4	0.0	0.0	0.0	0.0	0.0	0.0
100	407	47º 43'	60º 05'	516	0.0	0.0	18.0	11.0	26	12.8	13	0.1	0.0	0.0	0.0	0.0	0.0	0.0
102	802	47º 43'	59º 45'	519	0.0	0.0	13.0	7.9	34	20.0	1	0.0	0.0	0.0	1.0	0.3	0.0	0.0
103	802	47º 36'	59º 30'	425	0.0	0.0	2.5	1.3	113	59.7	6	0.1	0.0	0.0	0.0	0.0	0.0	0.0
105	810	47º 37'	59º 27'	332	0.0	0.0	1.0	0.0	315	133.9	7	0.1	1.0	7.0	0.0	0.0	0.0	0.0
109	407	47º 29'	60º 15'	471	0.0	0.0	10.0	6.5	97	64.3	25	0.2	0.0	0.0	0.0	0.0	0.0	0.0
110	407	47º 32'	60º 22'	392	0.0	0.0	10.0	8.6	133	50.1	26	0.2	0.0	0.0	0.0	0.0	0.0	0.0
111	404	47º 35'	60º 25'	352	0.0	0.0	3.0	3.6	132	15.9	30	0.2	1.0	9.4	0.0	0.0	0.0	0.0
112	407	47º 55'	60º 38'	386	0.0	0.0	12.2	3.6	105	60.7	228	2.2	0.0	0.0	0.0	0.0	2.8	0.0
114	803	48º 10'	60º 38'	435	0.0	0.0	11.3	4.5	98	73.5	142	1.2	0.0	0.0	0.0	0.0	0.0	0.0
115	803	48º 23'	60º 44'	437	0.0	0.0	7.0	4.8	160	142.8	95	0.9	0.0	0.0	0.0	0.0	0.0	0.0
116	803	48º 21'	61º 07'	411	0.0	0.0	14.0	6.8	122	60.5	193	1.8	0.0	0.0	0.0	0.0	0.0	0.0
117	803	48º 18'	61º 16'	399	0.0	0.0	15.4	7.5	78	48.6	1235	11.0	0.0	0.0	0.0	0.0	0.0	0.0
118	401	48º 06'	61º 13'	248	0.0	0.0	15.0	2.8	3953	160.0	780	6.1	0.0	0.0	1.0	0.2	0.0	0.0
119	401	48º 10'	61º 29'	218	27.9	34.1	7.7	0.4	2826	559.2	7	0.0	2.9	7.5	3.8	0.7	0.0	0.0
120	404	48º 13'	61º 28'	354	0.0	0.0	20.2	1.6	324	45.2	1180	9.6	0.0	0.0	0.0	0.0	0.0	0.0
121	803	48º 34'	61º 27'	409	0.0	0.0	23.0	9.7	93	48.5	314	2.8	0.0	0.0	0.0	0.0	0.0	0.0
122	803	48º 28'	61º 42'	425	0.0	0.0	38.0	11.9	114	59.7	1468	13.8	0.0	0.0	0.0	0.0	1.0	0.0
123	803	48º 40'	61º 58'	406	0.0	0.0	33.7	20.1	101	60.0	533	5.0	0.0	0.0	0.0	0.0	0.0	0.0
124	804	48º 38'	62º 03'	414	0.0	0.0	35.0	20.5	59	28.8	1524	13.2	0.0	0.0	0.0	0.0	0.0	0.0
125	405	48º 21'	61º 57'	336	0.0	0.0	27.0	11.0	193	68.1	45	0.3	1.0	13.4	0.0	0.0	0.0	0.0
126	402	48º 20'	62º 05'	218	1.0	0.9	33.0	2.1	278	63.5	98	0.8	1.0	5.0	0.0	0.0	0.0	0.0
127	405	48º 22'	62º 17'	299	0.0	0.0	13.0	3.9	4792	218.2	241	2.1	0.0	0.0	0.0	0.0	0.0	0.0
128	408	48º 27'	62º 24'	373	0.0	0.0	43.0	14.7	331	70.8	1388	12.5	0.0	0.0	0.0	0.0	1.0	0.0
129	408	48º 33'	62º 24'	433	2.0	0.3	135.3	43.6	76	31.6	5363	45.8	0.0	0.0	0.0	0.0	0.0	0.0
130	804	48º 41'	62º 29'	382	1.0	1.4	29.0	9.8	147	85.7	3011	24.8	0.0	0.0	0.0	0.0	1.0	0.0
131	408	48º 37'	62º 37'	434	0.0	0.0	133.0	42.8	85	39.7	3772	32.2	0.0	0.0	0.0	0.0	0.0	0.0
132	408	48º 48'	62º 58'	389	1.0	0.2	112.5	28.4	101	31.4	1194	11.3	0.0	0.0	0.0	0.0	0.0	0.0
133	402	48º 42'	63º 13'	203	4.7	3.7	105.0	30.1	943	50.8	2025	12.2	0.0	0.0	0.0	0.0	0.0	0.0
137	406	49º 06'	64º 03'	355	1.0	0.7	728.8	168.1	896	21.8	5919	51.2	0.0	0.0	1.0	0.2	1.0	0.0
138	403	49º 00'	64º 15'	212	42.5	45.7	63.8	55.5	592	96.5	5588	34.9	2.8	20.2	4.7	0.8	27.2	0.4
139	403	49º 13'	64º 44'	259	3.0	1.0	85.0	49.2	1910	20.3	4165	37.3	0.0	0.0	5.0	0.7	52.0	0.7
140	406	49º 20'	64º 30'	384	1.0	0.5	326.0	134.0	351	15.6	2718	26.3	0.0	0.0	1.0	0.2	5.0	0.1

Set	Stratum	Latitude Deg-Min	Longitude Deg-Min	Depth (m)	Cod		Greenland Halibut		Redfish		Northern Shrimp		Atlantic Halibut		Herring		Capelin	
					n	kg	n	kg	n	kg	n	kg	n	kg	n	kg	n	kg
141	818	49º 24'	63º 52'	268	4.8	2.7	37.5	17.0	295	15.4	4805	42.7	0.0	0.0	1.9	0.4	2.9	0.0
142	841	49º 39'	64º 04'	62	235.3	16.0	0.0	0.0	124	1.2	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
143	818	49º 41'	64º 51'	240	81.0	59.1	117.0	46.6	479	11.5	8246	63.9	0.0	0.0	12.0	1.2	0.0	0.0
144	806	49º 33'	64º 51'	321	0.0	0.0	301.3	131.1	352	8.7	21909	158.7	0.0	0.0	1.9	0.5	16.9	0.3
145	804	49º 28'	65º 01'	375	0.0	0.0	547.6	115.5	1521	30.7	2118	21.3	0.0	0.0	0.0	0.0	2.9	0.0
146	805	49º 28'	65º 10'	372	0.0	0.0	673.7	129.4	1436	32.8	1991	21.3	0.0	0.0	0.0	0.0	6.0	0.1
147	409	49º 19'	65º 14'	228	7.3	3.8	126.3	41.1	418	11.0	11359	65.0	2.4	32.6	9.7	0.9	88.6	1.3
148	410	49º 21'	65º 38'	295	0.0	0.0	376.3	152.8	3205	62.1	7339	64.2	0.0	0.0	0.0	0.0	64.9	0.9
149	409	49º 19'	65º 42'	237	8.8	3.1	215.7	117.8	554	13.0	13868	98.1	0.0	0.0	7.5	0.6	125.1	1.7
150	805	49º 30'	66º 18'	331	0.0	0.0	533.0	69.5	3624	75.1	11392	101.4	0.0	0.0	0.0	0.0	30.8	0.5
151	805	49º 23'	66º 15'	338	0.0	0.0	512.7	62.8	3255	61.8	6706	61.1	0.0	0.0	0.0	0.0	28.8	0.5
152	410	49º 18'	66º 56'	310	0.0	0.0	398.1	82.8	865	13.1	8275	81.1	0.0	0.0	0.0	0.0	5.0	0.1
153	410	49º 09'	67º 09'	326	0.0	0.0	437.9	125.2	278	5.0	3882	38.9	1.0	11.6	1.0	0.2	2.0	0.0
154	852	48º 58'	67º 17'	152	418.3	227.4	20.6	0.9	146	3.9	285	1.9	3.6	7.7	3.6	0.2	2.4	0.0
155	851	48º 51'	67º 39'	80	11.0	6.8	1.0	0.0	21	0.1	29	0.0	0.0	0.0	0.0	0.0	8.0	0.1
156	851	48º 49'	67º 50'	86	21.0	10.9	3.0	0.1	30	0.1	35	0.0	1.0	0.1	0.0	0.0	40.2	0.7
158	412	48º 41'	68º 22'	211	34.9	26.7	280.6	14.6	733	3.7	1936	17.3	21.6	38.2	2.8	0.6	4.7	0.1
159	414	48º 36'	68º 41'	268	0.0	0.0	922.3	46.4	3140	62.3	113	0.6	1.1	2.5	4.3	0.5	3.2	0.0
160	852	48º 29'	68º 51'	115	6.0	0.9	325.4	9.8	184	1.8	9652	70.9	0.0	0.0	0.0	0.0	31.6	0.8
161	414	48º 38'	68º 54'	247	0.0	0.0	1195.3	73.8	1825	25.7	1514	14.9	7.6	12.3	52.1	4.1	3.8	0.1
162	413	48º 37'	68º 41'	313	0.0	0.0	1254.5	105.6	575	8.8	23	0.1	0.0	0.0	2.8	0.4	0.9	0.0
163	413	48º 40'	68º 49'	334	0.0	0.0	984.1	145.5	188	3.0	94	0.6	0.0	0.0	5.0	0.7	0.0	0.0
164	854	48º 45'	68º 56'	61	0.0	0.0	0.0	0.0	100	0.4	9751	27.4	0.0	0.0	1.0	0.0	6797.3	90.6
165	855	48º 53'	68º 34'	130	45.9	2.3	419.9	10.4	867	5.4	12644	78.2	0.0	0.0	1.1	0.0	223.7	2.9
166	854	49º 01'	68º 18'	85	5.9	0.3	0.0	0.0	43	0.2	18988	55.5	0.0	0.0	0.0	0.0	1531.1	23.3
167	855	49º 01'	68º 10'	113	260.5	17.9	48.1	1.3	504	2.7	18384	126.9	0.0	0.0	2.4	0.3	79.5	1.1
168	411	49º 00'	67º 44'	290	0.0	0.0	566.3	95.0	51	1.5	4832	46.7	2.0	32.6	1.0	0.3	0.0	0.0
169	412	49º 05'	67º 45'	262	0.0	0.0	463.7	76.7	163	2.9	3032	26.4	1.3	52.1	0.0	0.0	3.8	0.1
170	411	49º 09'	67º 35'	290	0.0	0.0	530.8	147.9	255	4.1	8816	83.5	1.3	15.1	0.0	0.0	6.4	0.1
171	411	49º 13'	67º 21'	312	0.0	0.0	504.1	130.3	568	7.9	1041	11.0	0.0	0.0	1.0	0.2	1.0	0.0
172	805	49º 22'	66º 57'	304	0.0	0.0	452.3	93.1	2218	34.1	5726	53.9	0.0	0.0	0.0	0.0	21.0	0.3
173	805	49º 27'	66º 54'	297	0.0	0.0	321.2	43.5	1096	18.3	8892	63.8	0.9	4.3	0.9	0.2	76.6	1.1
174	832	49º 42'	66º 59'	160	172.7	59.8	23.1	6.2	789	14.1	1494	5.3	4.8	5.7	1.9	0.1	10.6	0.1
176	805	49º 47'	66º 20'	304	0.0	0.0	421.4	73.7	3805	71.4	8477	72.5	1.0	4.2	0.0	0.0	190.3	3.0
177	832	49º 54'	66º 45'	170	62.9	34.6	143.8	17.2	825	14.1	3671	22.1	6.0	64.2	2.4	0.3	67.7	0.8
178	832	50º 01'	66º 39'	172	73.6	60.0	140.8	28.9	174	1.7	7759	37.9	0.9	2.3	1.9	0.1	36.8	0.4
179	817	49º 55'	66º 30'	241	1.0	0.2	361.8	76.5	28260	423.5	33537	189.8	3.0	52.8	14.0	1.2	60.2	0.8
180	817	49º 52'	66º 19'	274	0.0	0.0	266.5	49.9	3774	47.7	13796	108.0	2.3	18.4	2.3	0.4	122.2	1.8
181	817	49º 59'	65º 34'	221	51.0	34.6	202.8	51.8	29717	519.8	75469	401.9	1.9	4.2	15.9	2.6	9.4	0.1
182	805	49º 42'	65º 49'	336	0.0	0.0	651.1	83.6	595	11.9	11228	98.9	0.0	0.0	0.0	0.0	16.1	0.2
183	817	49º 45'	65º 15'	308	0.0	0.0	411.0	190.7	169	4.3	9855	73.2	1.0	6.0	0.0	0.0	0.0	0.0

Set	Stratum	Latitude Deg-Min	Longitude Deg-Min	Depth (m)	Cod		Greenland Halibut		Redfish		Northern Shrimp		Atlantic Halibut		Herring		Capelin	
					n	kg	n	kg	n	kg	n	kg	n	kg	n	kg	n	kg
184	817	50º 00'	65º 13'	204	44.3	40.8	101.8	18.7	2305	36.0	7419	31.1	0.0	0.0	4.9	0.6	61.5	0.7
185	831	49º 54'	64º 55'	153	140.8	61.4	9.0	3.1	951	16.0	804	2.0	0.0	0.0	0.0	0.0	36.1	0.4
186	831	49º 55'	64º 44'	167	121.9	73.3	24.4	5.1	1231	13.0	1409	6.8	3.8	2.6	0.0	0.0	28.8	0.4
187	832	50º 06'	64º 50'	126	71.5	46.7	1.8	0.2	290	2.3	492	0.7	0.0	0.0	0.9	0.0	24.2	0.1
188	839	50º 07'	64º 16'	75	43.5	17.1	0.0	0.0	21	0.2	0	0.0	0.0	0.0	7.5	1.3	28.5	0.1
189	828	49º 59'	63º 21'	129	12.0	4.8	13.5	0.3	72	0.5	168	0.2	0.0	0.0	0.0	0.0	70.4	0.7
190	839	50º 07'	63º 20'	78	4.2	4.6	5.7	0.0	37	0.1	44	0.0	0.0	0.0	0.0	0.0	32.5	0.2
191	816	49º 55'	62º 53'	203	57.2	45.4	48.3	3.2	350	5.8	1955	10.2	0.0	0.0	0.0	0.0	14.0	0.2
192	816	49º 48'	62º 50'	226	20.0	20.1	156.9	22.2	804	72.9	55673	197.0	2.0	16.3	0.0	0.0	128.3	1.8
193	828	49º 51'	62º 18'	190	1.0	0.6	256.1	16.0	348	7.7	13990	50.9	10.6	35.2	1.9	0.4	14.6	0.2
195	827	49º 52'	61º 14'	163	3.8	4.0	127.1	8.2	720	3.4	2188	3.0	10.2	34.6	0.0	0.0	40.7	0.4
196	816	49º 45'	61º 23'	251	0.0	0.0	172.9	24.2	3438	99.5	3263	16.9	0.0	0.0	6.6	0.8	11.0	0.2
197	816	49º 37'	61º 48'	263	0.0	0.0	241.0	56.1	627	13.4	23477	147.4	0.9	12.1	0.0	0.0	124.7	1.8
198	816	49º 32'	61º 45'	212	76.3	41.9	83.9	7.5	650	13.7	4294	13.6	1.3	3.1	3.8	0.5	12.7	0.2
199	816	49º 29'	61º 20'	234	13.1	10.1	183.9	37.3	3766	71.8	12560	70.8	0.0	0.0	8.4	0.9	4.1	0.1
200	815	49º 38'	60º 44'	289	1.9	0.7	99.7	34.8	1277	65.1	145	0.8	0.9	9.5	0.0	0.0	115.5	1.7
201	815	49º 20'	60º 42'	261	3.9	1.7	55.3	14.1	11288	369.4	1459	12.8	0.0	0.0	2.6	0.4	67.5	1.1
202	829	49º 12'	61º 14'	102	531.9	127.1	0.0	0.0	107	3.4	0	0.0	0.0	0.0	0.0	0.0	3.1	0.1
203	829	49º 07'	60º 56'	96	246.3	50.4	0.0	0.0	3	0.1	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
204	830	48º 60'	62º 28'	189	150.2	37.6	17.8	0.6	6949	147.3	223	0.3	10.2	6.6	44.5	4.9	2.5	0.0
205	818	49º 00'	62º 43'	261	9.0	5.0	46.9	9.8	13898	434.6	4213	34.1	0.0	0.0	0.9	0.1	0.0	0.0
206	818	49º 06'	63º 02'	229	25.3	19.7	11.3	5.0	8415	247.2	2159	18.1	2.8	15.3	5.6	1.3	0.0	0.0
208	841	49º 14'	63º 15'	112	40.7	8.1	0.0	0.0	24	0.2	0	0.0	0.0	0.0	0.0	0.0	2.5	0.1
209	806	49º 16'	63º 48'	350	2.5	0.7	126.2	23.1	2274	672.0	3049	25.9	0.0	0.0	0.0	0.0	21.6	0.3
210	806	49º 19'	63º 48'	316	2.8	2.7	55.3	31.8	433	31.2	1984	18.2	0.0	0.0	0.0	0.0	33.8	0.5