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Preliminary results from the ecosystemic survey in August 2019 in the Estuary and northern Gulf of St. Lawrence

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Canada

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.

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ABSTRACT

Fisheries and Oceans Canada conducts an annual multidisciplinary survey in the Estuary and northern Gulf of St. Lawrence. The objectives of this survey are varied; assess the biodiversity of species found near the bottom; estimate the abundance of groundfish and invertebrates; assess physical and biological (phytoplankton and zooplankton) oceanographic conditions; monitor the pelagic ecosystem; conduct an inventory of marine mammals, and collect samples for various research projects. In 2019, the survey was conducted between August 13 and September 4 on board the CCGS *Teleost*. The survey successfully carried out 128 trawl tows as well as 65 CTD water column casts, and 54 zooplankton samples.

This report presents the results from catches from the 128 tows. In total, 79 fish taxa and 208 invertebrate taxa were identified during the mission. Historical perspectives (catch rates, spatial distribution and length frequency) are presented for 25 taxa. These commercial fishery-independent data will be used in several stock assessments including cod (*Gadus morhua*), redfish (*Sebastes spp.*), Greenland halibut (*Reinhardtius hippoglossoides*), Atlantic halibut (*Hippoglossus hippoglossus*), witch flounder (*Glyptocephalus cynoglossus*) and northern shrimp (*Pandalus borealis*).

A preliminary analysis of water temperature data collected in 2019 shows that conditions have warmed at 150 m and deeper, reaching new records since 1915 at 250 and 300 m. The surface water and cold intermediate layer temperatures were near normal in August.

The ecosystem of the northern Gulf of St. Lawrence is currently undergoing major changes in the composition of the demersal species that are present there. The Atlantic redfish (*Sebastes mentella*) is making a strong comeback in channels of the Gulf of St. Lawrence, alone, it constituted more than 85% of the catches made during the survey. In addition, species that are found more frequently outside the Gulf of St. Lawrence and associated with warmer waters, were also caught frequently in this summer survey such as silver hake (*Merluccius bilinearis*), Atlantic argentine (*Argentina silus*) and northern shortfin squid (*Illex illecebrosus*). On the other hand, species associated with cold waters, such as northern shrimp and Greenland halibut, have been declining for more than a decade.

INTRODUCTION

Fisheries and Oceans Canada 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 and standardized protocols. This survey examines, among other things, spatial and temporal changes in the distribution and relative abundance of fish and their assemblages. It also aims to gather information on the biological parameters of commercial species.

The main objectives are to:

1. assess groundfish and Northern Shrimp population abundance and condition;
2. assess environmental conditions;
3. conduct a biodiversity inventory of benthic and demersal megafauna;
4. assess phytoplankton and mesozooplankton abundance;
5. monitor the pelagic ecosystem;
6. conduct an inventory of marine mammals;
7. collect samples for various research projects.

In 2019 the survey was conducted between August 13 and September 4 onboard the CCGS *Teleost* (mission IML-2019-036).

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, the 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 study area is 118,587 km^2.

A stratified random sampling strategy was used for this survey. This technique consists in subdividing the study area into more homogeneous strata. The area was 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, which is a number proportional to the stratum surface, with a minimum of two stations per stratum. The tow positions were chosen randomly within each stratum. Since 2014, a new rule 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 2019, 128 fishing stations were successfully completed (36 in 4R, 59 in 4S and 33 in 4T), which represent 40 stations less than in 2018, and the year with the fewest successful stations since 1990 (Annex 1). The decrease in the number of stations completed was caused by a shortening in the duration of the survey by 12 days. The coverage of the study area was therefore affected. Seventeen strata were not sampled with a minimum of two stations (Figure 3, Appendix 1). These partially or uncovered strata were mainly south of the west coast of Newfoundland, in the Laurentian Channel and the Strait of Belle Isle.

For each fishing tow, the catch was sorted and weighed by taxa; biological data were then collected on a sub-sample. For fish, crab, squid and sea pens, size and weight were gathered by individual. For some species, sex, maturity, and the weight of certain organs (stomach, liver, gonads) were also evaluated. Count of soft rays of the anal fin for redfish was conducted to separate the two species, and otoliths were saved for cod, Atlantic halibut, Greenland halibut and witch flounder to conduct ageing analysis. A roughly 2-kg shrimp sample was sorted and weighed by species (and by stage of maturity for northern shrimp). The shrimps were measured individually. The other invertebrates were counted (no individual measurements) and photographed. The photos are archived in a photo catalogue with associated keywords (taxonomic identification, station description, date, etc.).

Since 2001, digital photos have supported an increased effort in the identification of species. These additional efforts have targeted fish since 2004 (Dutil *et al.*, 2009) and invertebrates since 2005 (Nozères *et al.*, 2014). An identification guide for marine fishes in the estuary and northern Gulf of St. Lawrence (Nozères *et al.*, 2010), a shrimp atlas (Savard and Nozères 2012) and a guide for invertebrates (Nozères and Archambault 2014) were used during the mission to identify most taxa. The taxon codes and their names follow the list of Miller and Chabot (2014), with annual updates according to the World Register of Marine Species (WoRMS).

Additional samples were taken for various scientific projects:

1. Samples of herring, capelin and mackerel for maturity determination;
2. Black dogfish embryos and juveniles, and ray capsules in order to study their developmental morphology and their chondrification and mineralization processes;
3. Winter skate for identification of the population;
4. Marine mammal preys (several fish species and northern shrimp) to develop isotopic signatures of key species in the St. Lawrence ecosystem;
5. Stomachs of several fish species in order to describe their diet;
6. Identification of the maturity stages of the lumpfish and sampling for genetic studies;
7. Stage of maturity of small demersal fish;
8. Several specimens of fish and invertebrates for the identification of these species from morphometric and genetic analyses;
9. Sand lance samples to determine the genetic structure of the species;
10. Blood samples from Atlantic halibut and Greenland halibut to characterize the state of health of the ecosystem from molecular markers;
11. Small redfish (< 11 cm) for genetic identification of the species (*Sebastes fasciatus* and *S. mentella*) and the population of new cohorts observed in the Gulf;
12. Monitoring redfish growth from the 2011 cohort;
13. Redfish gonad samples to determine stage of maturity;
14. Redfish samples to quantify concentrations of emerging contaminants such as perfluoroalkyl and polyfluoroalkylated substances and polybrominated diphenyl ethers.
15. Northern shrimp samples for genetic analysis;
16. Squid samples to study its trophic role in the ecosystem;
17. Samples of sea pens (Pennatulacea);
18. Sponges (Porifera) for genetic identifications;
19. Invasive species monitoring to confirm the presence of invasive tunicates in the Gulf of St. Lawrence;
20. Boxes of shrimp and capelin for requests for aquaculture purposes at the MLI tank room.

Oceanographic conditions such as temperature, conductivity (salinity), turbidity, dissolved oxygen, luminosity and fluorescence were sampled during this survey. A total of 49 vertical profiles of the water column were done at the fishing stations and 16 more on extra stations that fall under the Atlantic Zone Monitoring Program (AZMP). The various equipment, *CTD SeaBird 911Plus*™, dissolved oxygen sensor (*SBE 43*), photometer (*Biospherical*) and fluorometer (*Eco-FLNTU Wetlabs*) were coupled to the rosette of Niskin bottles. For each profile obtained using the rosette, water samples were also taken at several depths to determine their salinity, pH, dissolved oxygen concentration (Winkler titration), nutritive salt content (nitrite, nitrate, phosphate, silicate) and chlorophyll content. In addition, a *CTD SBE 19Plus*™ device (temperature and salinity), coupled to a dissolved oxygen sensor (*SBE 63*), was also installed on the back of the trawl, thereby allowing oceanographic data to be collected for the 128 fishing tows.

To study of zooplankton distribution and biomass for the study area consisted of vertical tows from the sea floor to the surface using a zooplankton net (202 µm) at 54 stations.

Water column hydroacoustic data at four frequencies (38, 70, 120 and 200 kHz) were recorded using a *SIMRAD™ EK60* echosounder during the entirety of the mission. 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 conducted by an observer positioned at the front of the ship bridge when conditions permitted.

DATA ANALYSIS

The analysis of 2019 abundance and biomass data was integrated into the combined annual summer survey series initiated in 1990. These combined series were developed following a comparative study between the two vessel-gear tandems (1990-2005: CCGS *Alfred Needler – URI 81'/114'* trawl; 2004-2017: CCGS *Teleost – Campelen 1800* trawl) to establish specific correction factors for about twenty species caught (Bourdages *et al*. 2007). Results from this study led to an adjustment of *Needler* catches into *Teleost* equivalent catches.

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 provided 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 of 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 1990-2018 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 the distinction between the two redfish species, *S. 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.).

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 1990-2018 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 the 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 2019).

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 or five years. The interpolation of CPUE (catch per unit of effort) 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 20th, 40th, 60th and 80th percentiles of the non-zero values. The catch rate distribution for the 2019 survey only is also presented in a bubbles type map.

The preliminary results for the abundance and biomass indices, the catch rate distribution maps, and the size frequency distributions for about 25 taxa commercially fished are presented at figures 8 to 65. These results are preliminary and must be considered as such until validations and laboratory analyses have been completed.

The average weight per tow for 57 taxa of fish and 99 taxa of invertebrates is given in figures 66 and 67. In these figures, a color code is used to represent the difference between the CPUE in a given year and the average CPUE in the time series divided by the standard deviation of this average for each taxon.

The catches per tow for fish taxa are available on the St. Lawrence Global Observatory (OGSL).

Finally, Appendix 2 provides a list of all taxa, vertebrates and invertebrates, caught among the 128 successful tows achieved during the 2019 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.

RESULTS

Warning: the bottom trawl survey is designed to sample demersal species. However, catches may also include pelagic species and species associated with coastal or rocky habitats which are more difficult to trawl. Although these taxa are found in catches, they have a low catchability by trawl net. Some caution is required when interpreting the results obtained for these taxa.

BIODIVERSITY

In total, 79 fish taxa and 208 invertebrate taxa were identified in 2019 (Appendix 2).

In 2019, the biomass of the two redfish species combined accounted for 90% of the biomass of all captured organisms, while it averaged 15% between 1995 and 2012 (Figure 4). The Atlantic redfish (*Sebastes mentella*) constituted, alone, more than 85% of the catches made during the survey.

A specimen of the dream fish family, Oneirodidae, was caught for the first time during the 2019 survey (Figure 5). This is an oceanic bathypelagic species that is similar to the big eye (Epigonus pandionis), which was captured for the first time in 2016, and five times during both last year and this year surveys (Figure 6).

The butterfly bobtail squid (*Stoloteuthis leucoptera*) was captured at 7 stations in various channels (Anticosti, Esquiman, Laurentian) (Figure 7). Compared with resident sepiolids (*Rossia* sp.), this species is more pelagic and widespread in warmer waters. It was rarely captured in the area, with the last specimen dating from October 1989 in the estuary (permanent collection of the IML, OBIS).

Fish

The abundance and the biomass of the **black dogfish** (*Centroscyllium fabricii*) have been above average for the past eight years. (Figures 8 to 10)

Capelin (*Mallotus villosus*) was mainly distributed in the Estuary, in the western part of the Gulf and along the North Shore during the 2019 survey. Its presence in this survey's catches on the west coast of Newfoundland has been less frequent in the last few years, except north to the Belle Isle Strait. (Figure 11)

For the past six years, abundance and biomass of **Atlantic halibut** (*Hippoglossus hippoglossus*) has remained above the series average. (Figures 12 to 14)

In 2019, the abundance of **Greenland halibut** (*Reinhardtius hippoglossoides*) increased in comparison of 2018 and corresponds to the long-term average. Biomass has been showing a downward trend for about fifteen years. This index has been below the series average for 3 years. Size frequency distributions indicate that the 2018 cohort (16 cm mode) is above average abundance while the abundance of fish greater than 25 cm is below the series average. (Figures 15 to 17)

The **lumpfish** (*Cyclopterus lumpus*) was a rare but regular catch in this survey. Abundance and biomass have been above the series average for the past five years. (Figures 18 to 20)

Atlantic herring (*Clupea harengus*) was a frequent catch in this survey and was distributed throughout the northern Gulf of St. Lawrence with the exception of the depths of the Laurentian Channel. (Figure 21)

Atlantic wolffish (*Anarhichas lupus*) and **spotted wolffish** (*Anarhichas minor*) were caught on 20 and 2 occasions, respectively in 2019. These catches were mainly distributed in the northern eastern part of the Gulf of St. Lawrence. (Figures 22 and 23)

Since 2007, **silver hake** (*Merluccius bilinearis*) has been more common in the northern Gulf, before it was only occasionally observed. (Figures 24 to 26)

The abundance and biomass of the **longfin hake** (*Phycis chesteri*) has been increasing and is near average in 2019. This increase is attributable to a cohort observed over the past three years at 17, 25 and 32 cm, respectively. (Figures 27 to 29)

The abundance and biomass of **white hake** (*Urophycis tenuis*) has been above average since five years. (Figures 30 to 32)

The abundance and biomass of **cod** (*Gadus morhua*) decreased in 2019 and are below historical averages. A mode was observed at 18 cm (cohort 2018). Exceptionally in 2019, 13 strata were not covered (or partially), particularly south of the west coast of Newfoundland, along the North Shore and in the Strait of Belle Isle including several of these strata (8) are important for cod. The uncertainty for these indices is therefore higher in 2019 compared to other years. (Figures 33 to 35)

American plaice (*Hippoglossoides platessoides*) was frequently caught and its abundance is stable. (Figures 36 to 38)

Witch flounder (*Glyptocephalus cynoglossus*) was frequently caught. The strong cohorts from 2007 and 2009 have contributed to the increase in biomass; these fish are now larger than 30 cm. (Figures 39 to 41)

Thorny skate (*Amblyraja radiata*) and **smooth skate** (*Malacoraja senta*) were both very frequently caught. The abundance of thorny skate is increasing and decreasing for smooth skate. (Figures 42 to 47)

Arctic cod (*Boreogadus saida*) is a small cold water demersal fish. Catches in recent years have been made in the Estuary, along the North Shore and on the west coast of Newfoundland. (Figures 48 to 49)

The abundance and biomass of **Acadian redfish** (*Sebastes fasciatus*) were below the historical average. (Figures 50 to 52)

Three strong cohorts (2011, 2012 and 2013) of **Atlantic redfish** (*Sebastes mentella*) have contributed to this increase in abundance and biomass since 2013. The 2011 cohort, which is the most abundant, now has a modal length of 23 cm. These redfish are distributed throughout the channels of the northern Gulf. (Figures 53 to 55)

Invertebrates

The three most abundant **shrimp** species in the deep waters of the northern Gulf of St. Lawrence, namely northern shrimp (*Pandalus borealis*), striped pink shrimp (*Pandalus montagui*) and pink glass shrimp (*Pasiphaea multidentata*), have been declining for several years. (Figure 67)

The abundance and biomass of the **northern shrimp** (*Pandalus borealis*) has declined significantly since 2003 to reach the lowest values in the historical series since 2017. (Figures 56 to 58)

Northern shortfin squid (*Illex illecebrosus*), a seasonal pelagic species from the south, has been present in over 50% of the tows since 2017 in all areas except the estuary. This strong squid presence had not been observed for several years. (Figures 59 to 61)

For the first time since the beginning of this survey in 1990, two **lobsters** (*Homarus americanus*) were caught in the study area at more than 150 m of depth on the west and northeast of Anticosti Island. (Annex 2)

Four species of **sea pens** were present in the northern Gulf of St. Lawrence. The larger sea pens (*Anthoptilum grandiflorum, Halipteris finmarchica, Pennatula grandis*) are distributed in the deeper areas of the Laurentian Channel, while the spiny sea pen (*Pennatula aculeata*) had a more widespread distribution within the survey. (Figures 62 to 65)

PHYSICAL OCEANOGRAPHIC CONDITIONS

A preliminary analysis of water temperature data collected in 2019 (Figures 68 and 69) have shown that conditions are warmed at 150 m and deeper, reaching new records since 1915 at 250 and 300 m (note that these annual records may change with the addition of data sampled during the fall). Compared to conditions observed in August 2018, waters at 250 and 300 m have warmed by about 0.2°C and by 0.4 to 0.5°C at 150 and 200 m where inter-annual variability is higher. The August cold intermediate layer (CIL) minimum temperature was much colder in 2019, except in the Estuary and the northwest Gulf.

Air temperatures over the Gulf were below normal from April to June 2019, normal in July and above-normal in August. This led to near-normal average surface water temperatures for the period of May–August (+0.2 standard deviations [SD] relative to the 1982–2010 climatology) as well as for July–August (+0.3 SD).

At the end of winter 2019, the volume of water in the surface mixed layer with temperature lower than -1°C was the highest of the 24 years of observations, forecasting a strong cooling of the CIL compared with 2018 conditions. Its average minimum temperature, estimated for 2019 using only data from the August survey, was 0.5°C colder than 2018 conditions, reaching near-normal values (-0.5°C at -0.3 SD; Figure 69). The exception was the Estuary, where the CIL

volume was below normal (-0.9 SD) and the minimum temperature similar to that of 2018 (0.4°C; +0.3 SD; Figure 68).

Beneath the CIL, the estuarine flow that carries deep water to the channel heads has carried the increasingly warm waters that had been transitioning through Cabot Strait, central Gulf and Esquiman Channel, for the past several years further upstream. Consequently, deep water temperatures in August have increased since 2018 below 150 m everywhere with the exception of Esquiman Channel, and particularly strongly between 150 and 250 m in Cabot Strait (Figure 68). Taking into consideration all the data recorded in different months of the year, the four regions along the deep Laurentian Channel, meaning the Estuary, northwestern Gulf, Central Gulf and Cabot Strait, are all experiencing record temperatures at 300 m (5.9°C, 6.3°C, 6.7°C, 7.1°C). The annual mean has thus far exceeded 7°C in Cabot Strait for the first time of the time series; it will be interesting to see if the addition of further data later this year will alter this situation. The Gulf-wide average temperature at 300 m has reached a record level since 1915 of 6.57°C, an increase of 0.18°C since 2018 (Figure 69).

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FIGURES

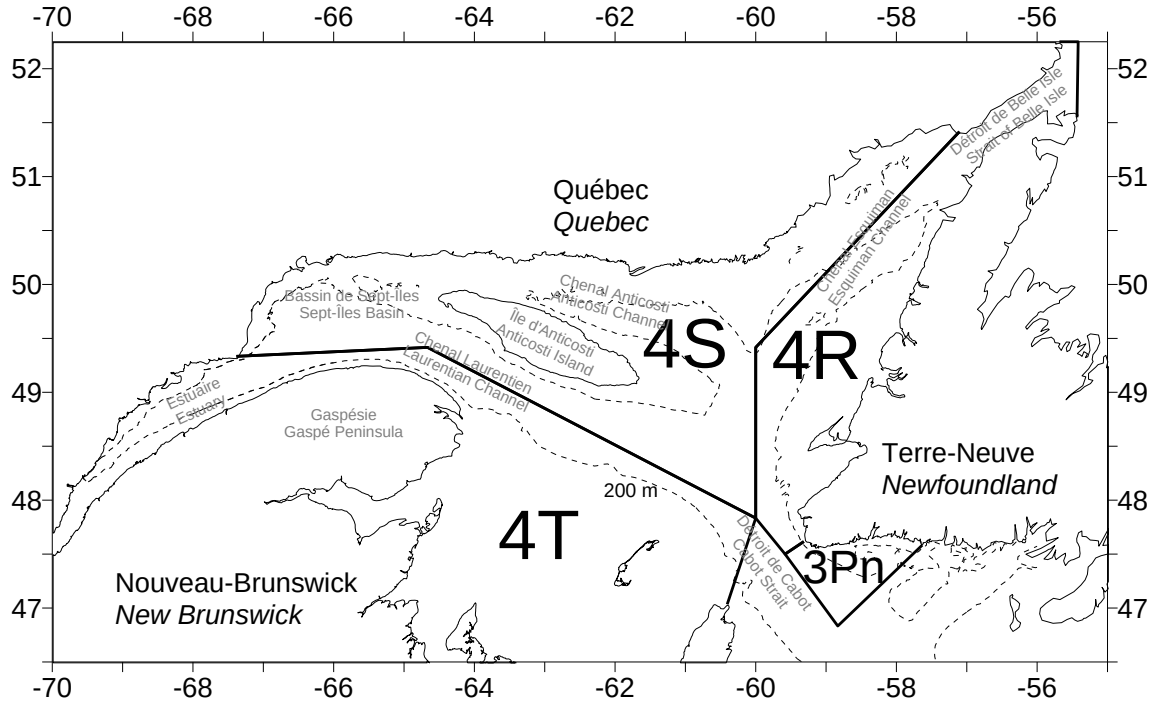

Figure 1. NAFO Divisions of the Estuary and Gulf of St. Lawrence and names of locations mentioned in the text.

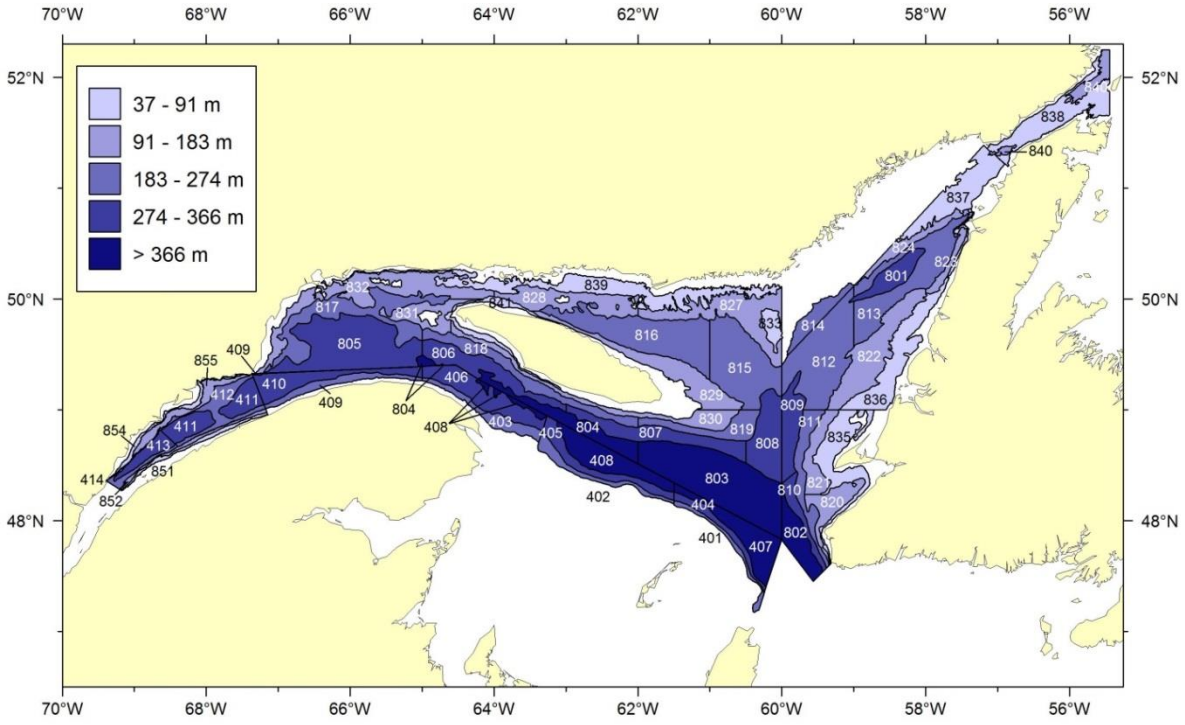

Figure 2. Stratification scheme used for the groundfish and shrimp research survey in the Estuary and northern Gulf of St. Lawrence.

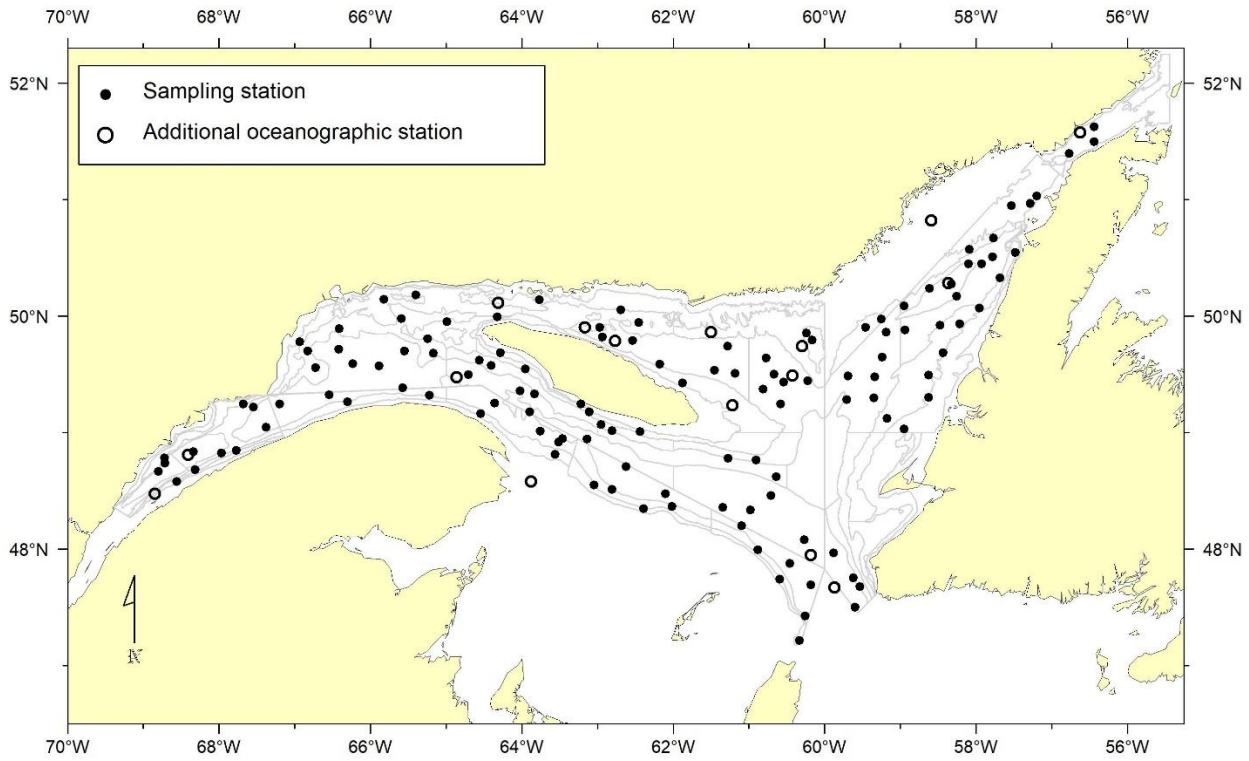

Figure 3. Locations of successful sampling stations (trawl and oceanography) and additional oceanographic stations for the 2019 survey.

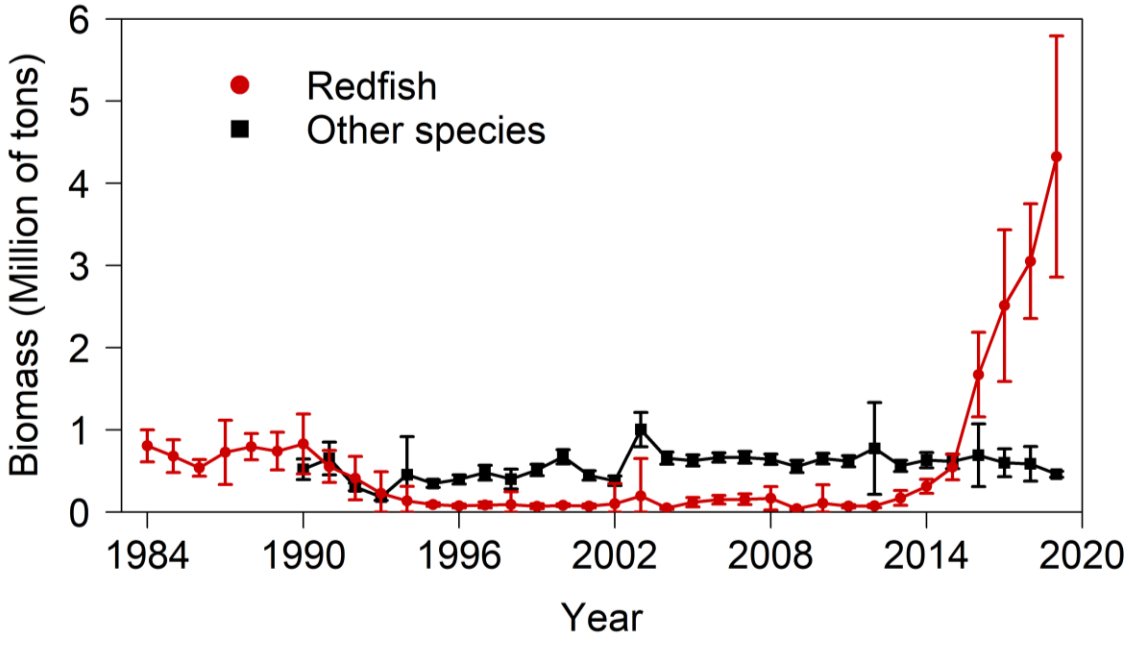

Figure 4. Biomass (1 000 000 of tons) of redfish spp. and all other species sampled in 4RST survey. Error bars represent 95% confidence intervals.

Figure 5. A dreamer fish (Oneirodidae) captured on the northern Gulf of St. Lawrence survey in 2019. First known specimen from this family in the region.

Figure 6. Big eye (Epigonus pandionis) captured for the first time in 2016 and five times in 2018 and 2019 during the northern Gulf of St. Lawrence survey.

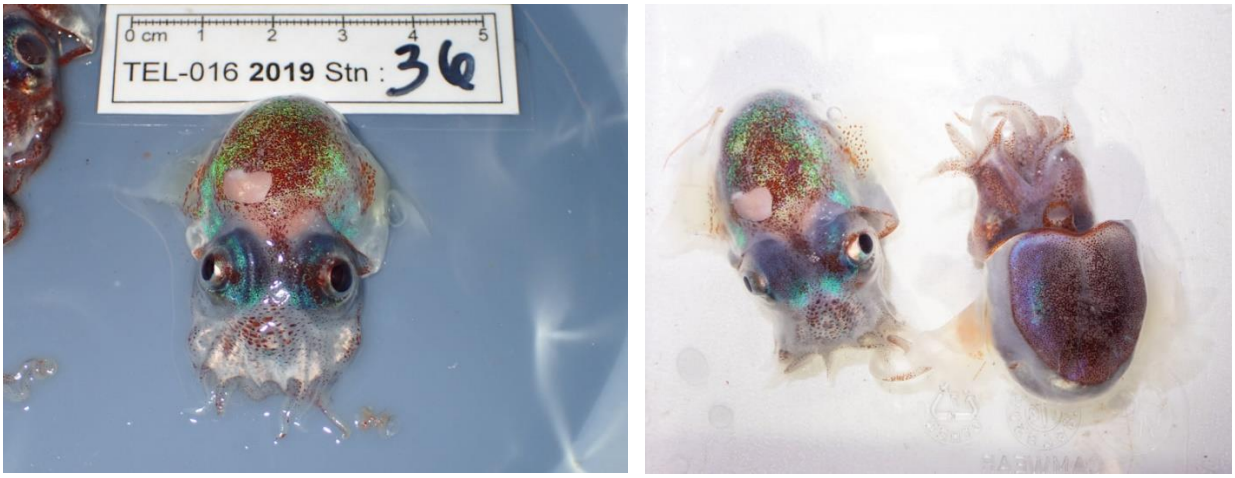

Figure 7. Several butterfly bobtail squid (Stoloteuthis leucoptera) were collected in August 2019 during the survey of the northern Gulf of St. Lawrence. Earlier observations in the region dated from 1989.

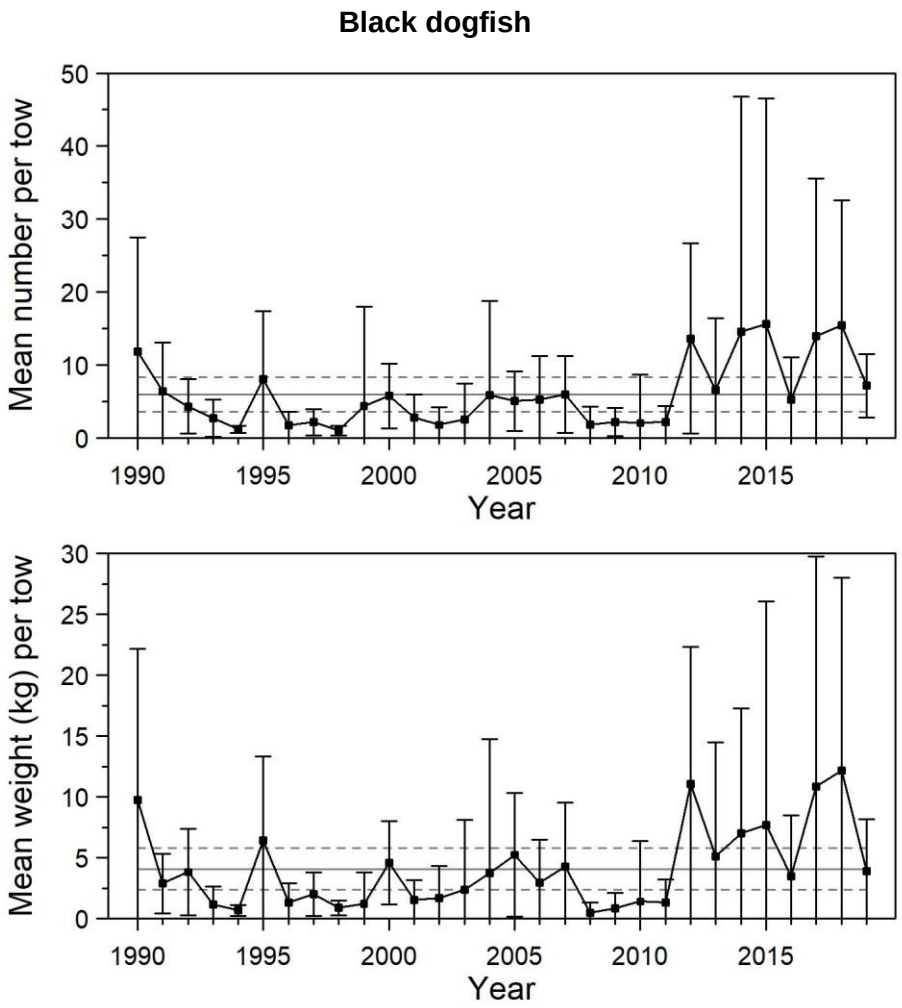

Figure 8. Mean numbers and mean weights per 15 minutes tow observed during the survey for black dogfish in 4RST. Error bars indicate the 95% confidence interval and the horizontal lines indicate the mean of the 1990-2018 period (solid line) and upper and lower reference (see text) limits (dashed lines).

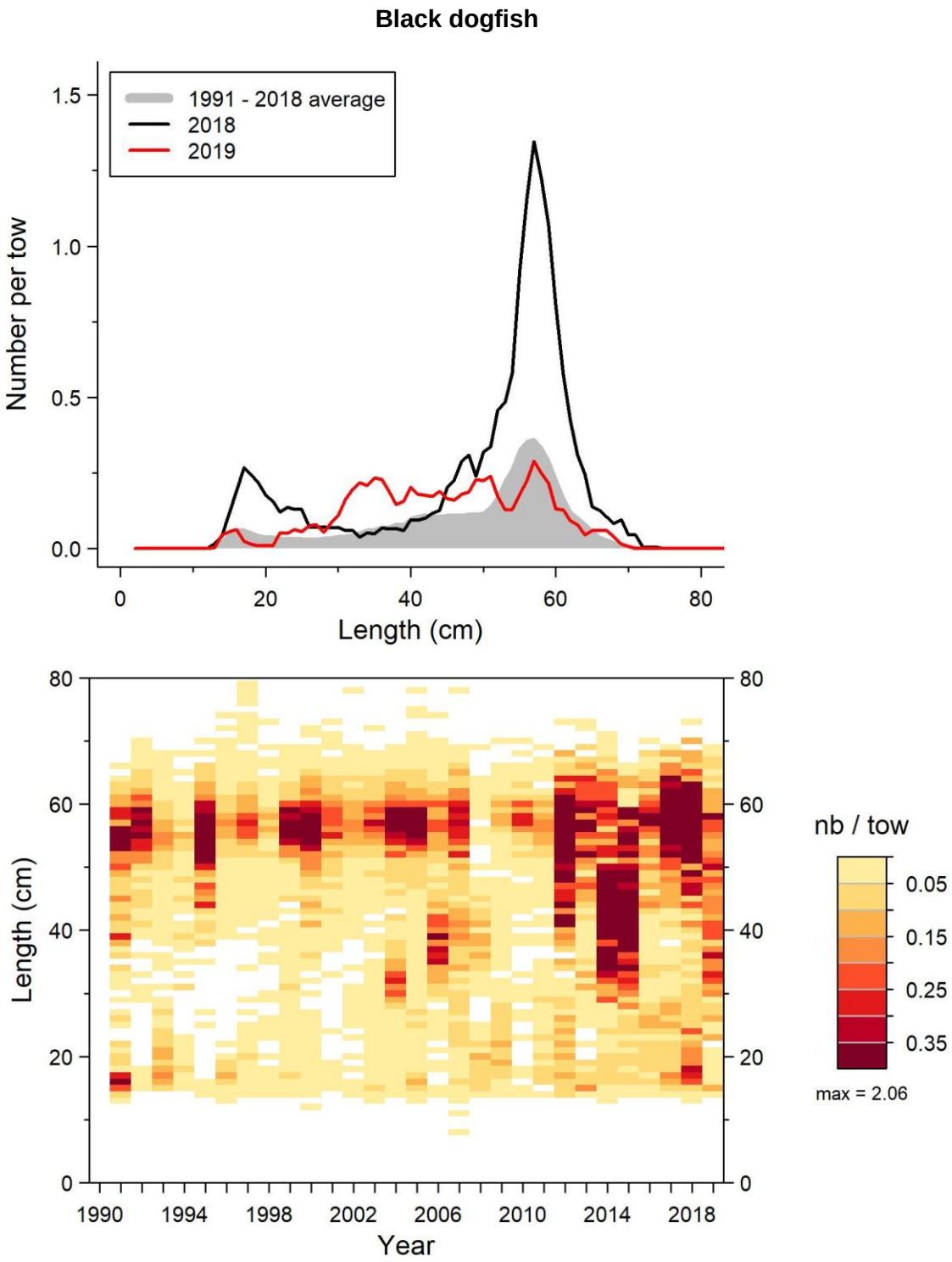

Figure 9. Length frequency distributions (mean number per 15 minutes tow) observed during the survey for black dogfish in 4RST.

Black dogfish

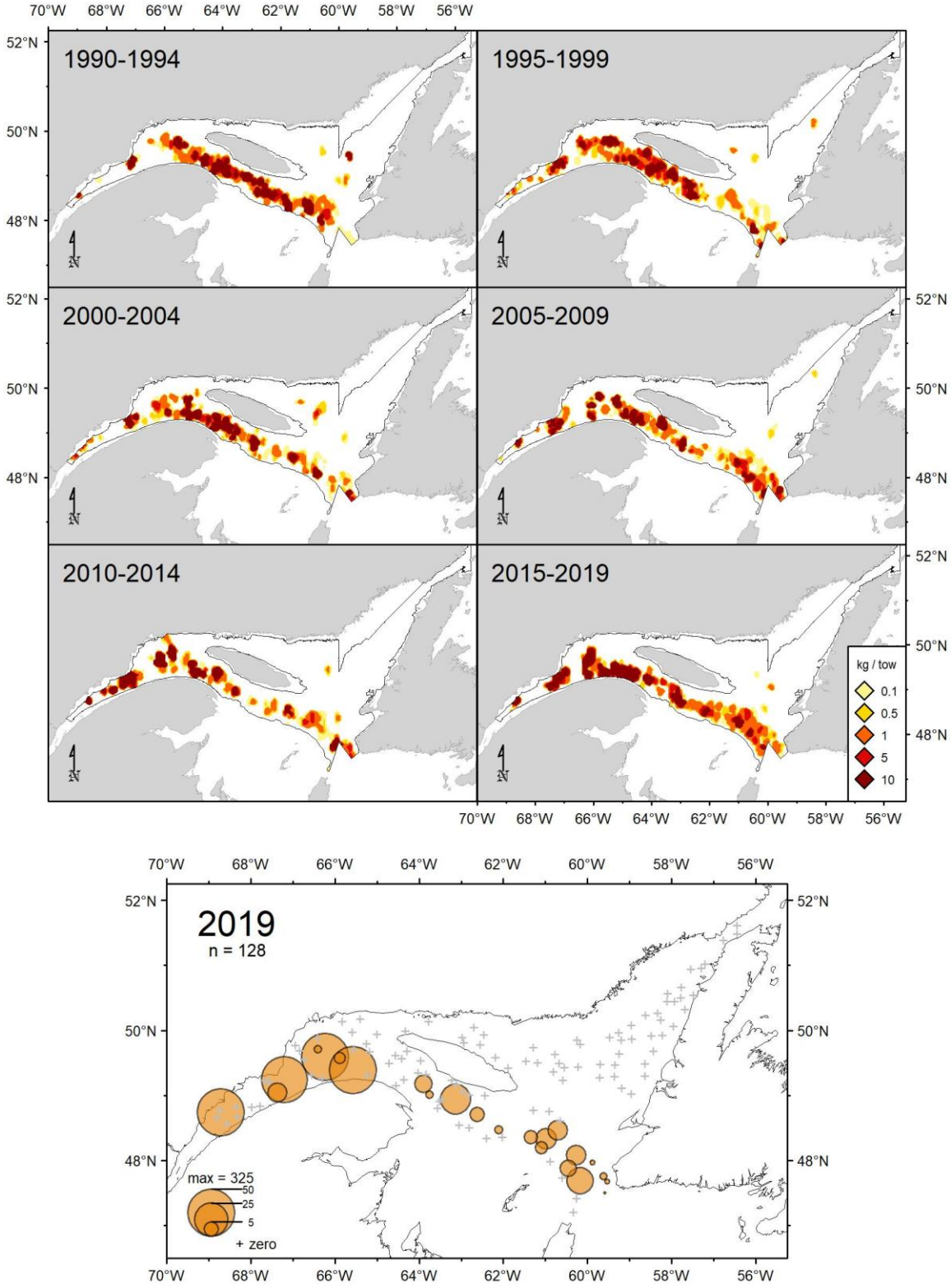

Figure 10. Black dogfish catch rates (kg/15 minutes tow) distribution.

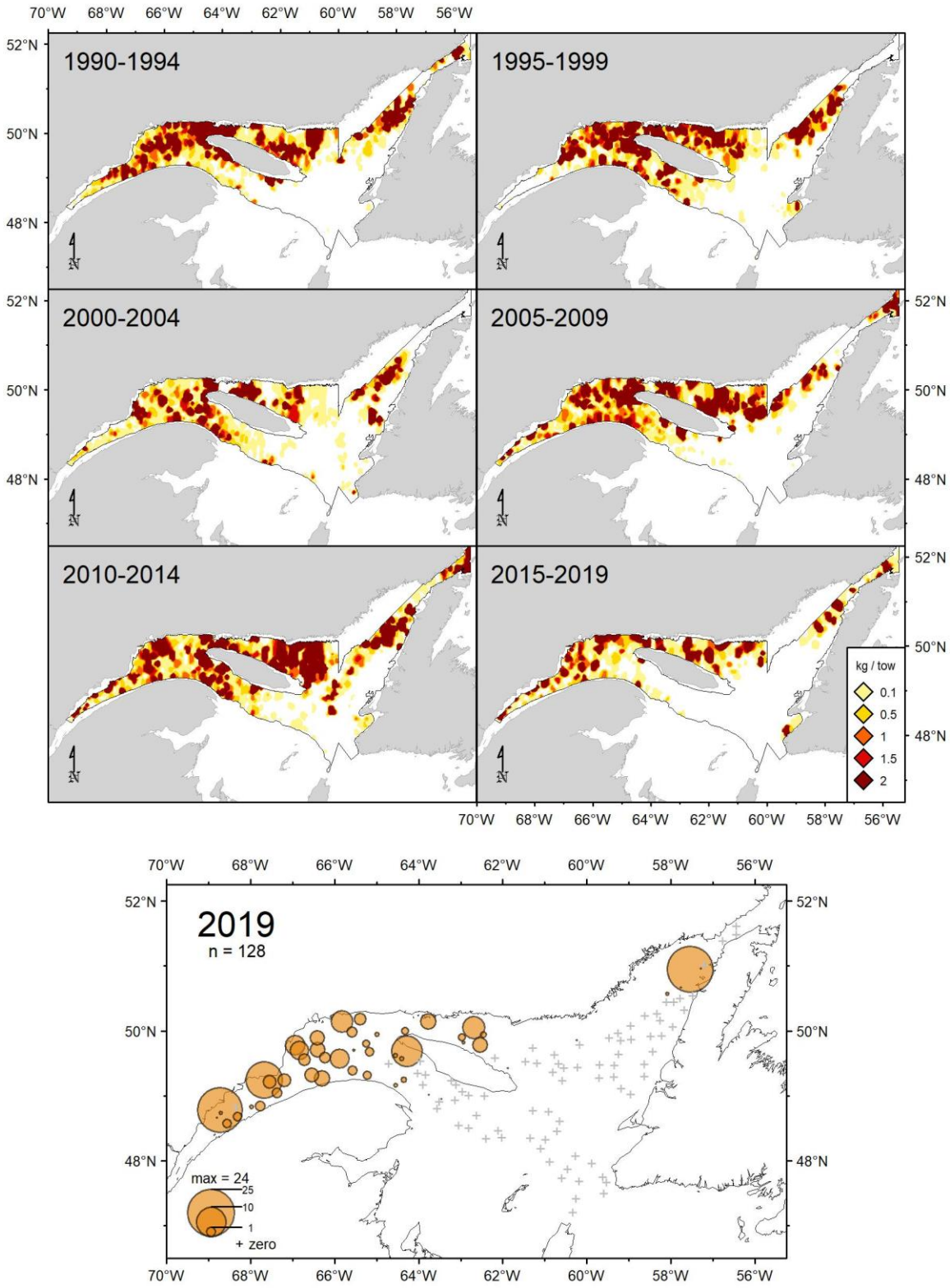

Figure 11. Capelin catch rates (kg/15 minutes tow) distribution.

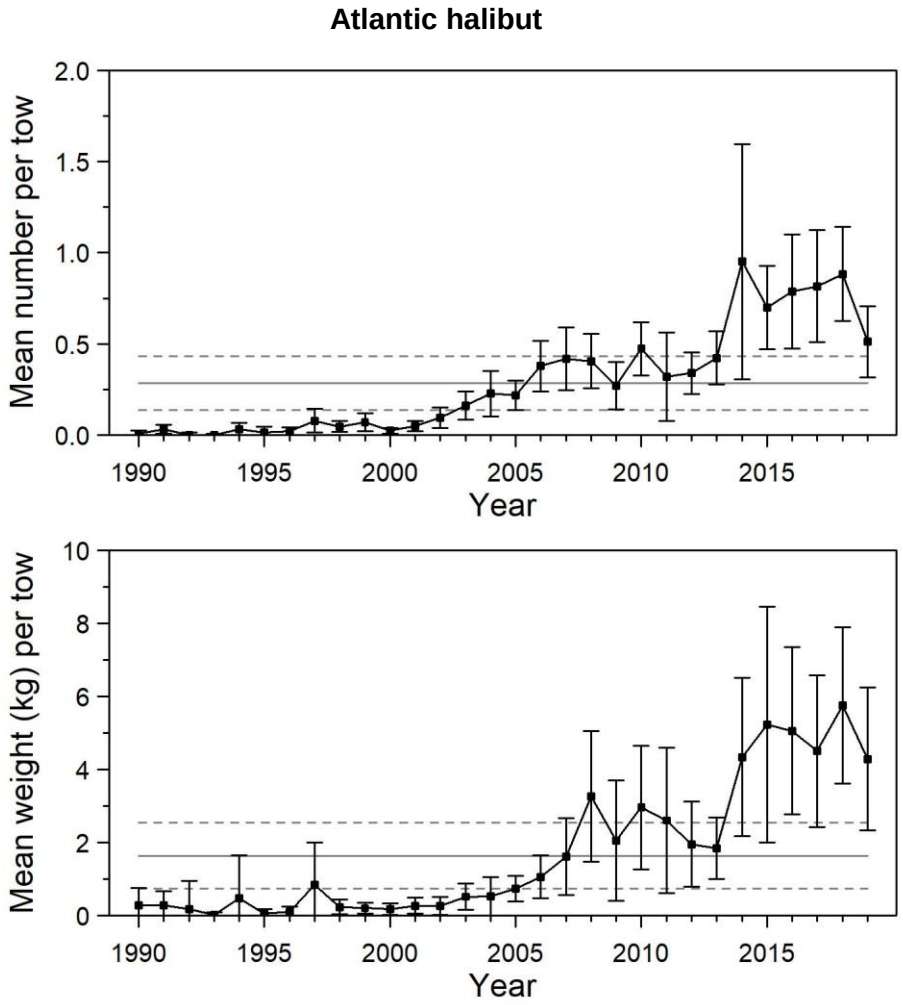

Figure 12. Mean numbers and mean weights per 15 minutes tow observed during the survey for Atlantic halibut in 4RST. Error bars indicate the 95% confidence interval and the horizontal lines indicate the mean of the 1990-2018 period (solid line) and upper and lower reference (see text) limits (dashed lines).

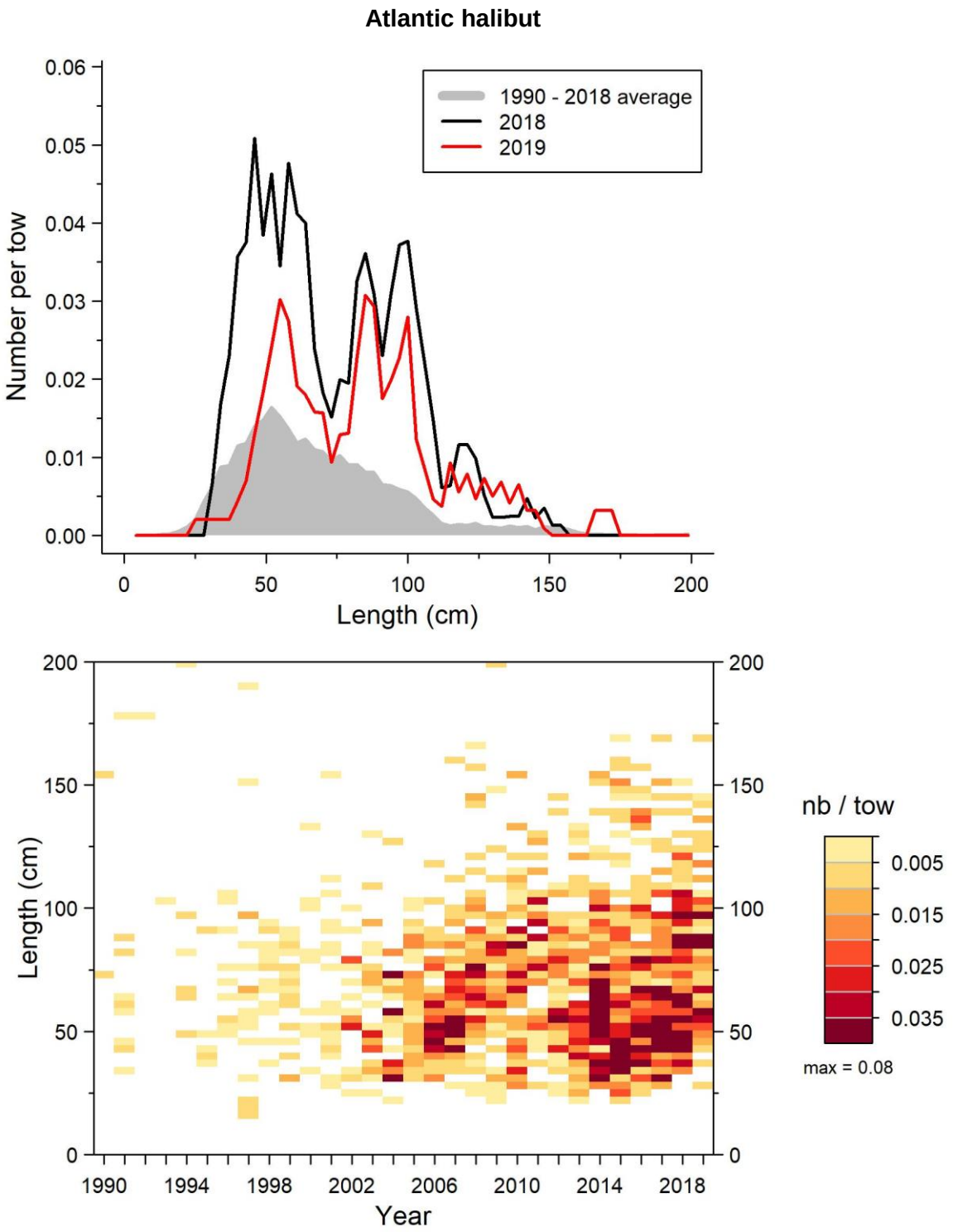

Figure 13. Length frequency distributions (mean number per 15 minutes tow) observed during the survey for Atlantic halibut in 4RST.

Atlantic halibut

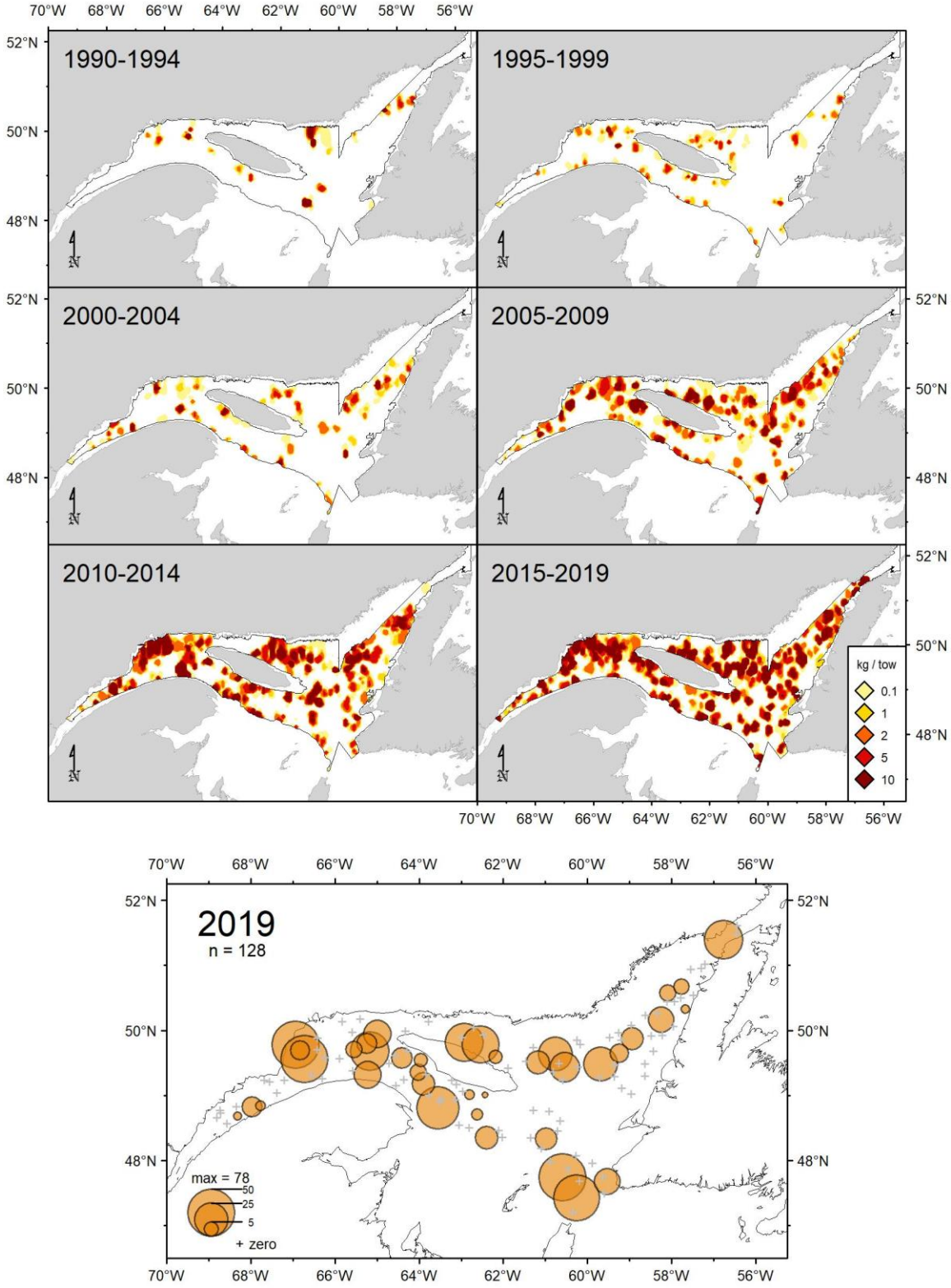

Figure 14. Atlantic halibut catch rates (kg/15 minutes tow) distribution.

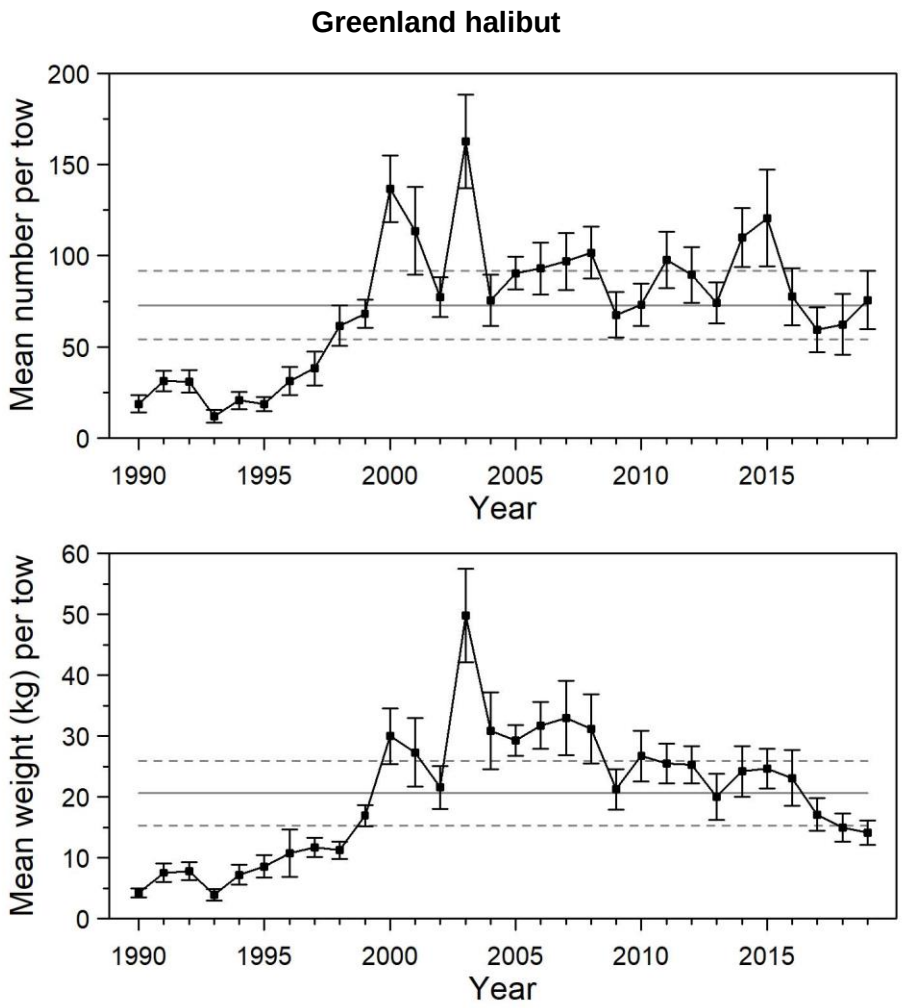

Figure 15. Mean numbers and mean weights per 15 minutes tow observed during the survey for Greenland halibut in 4RST. Error bars indicate the 95% confidence interval and the horizontal lines indicate the mean of the 1990-2018 period (solid line) and upper and lower reference (see text) limits (dashed lines).

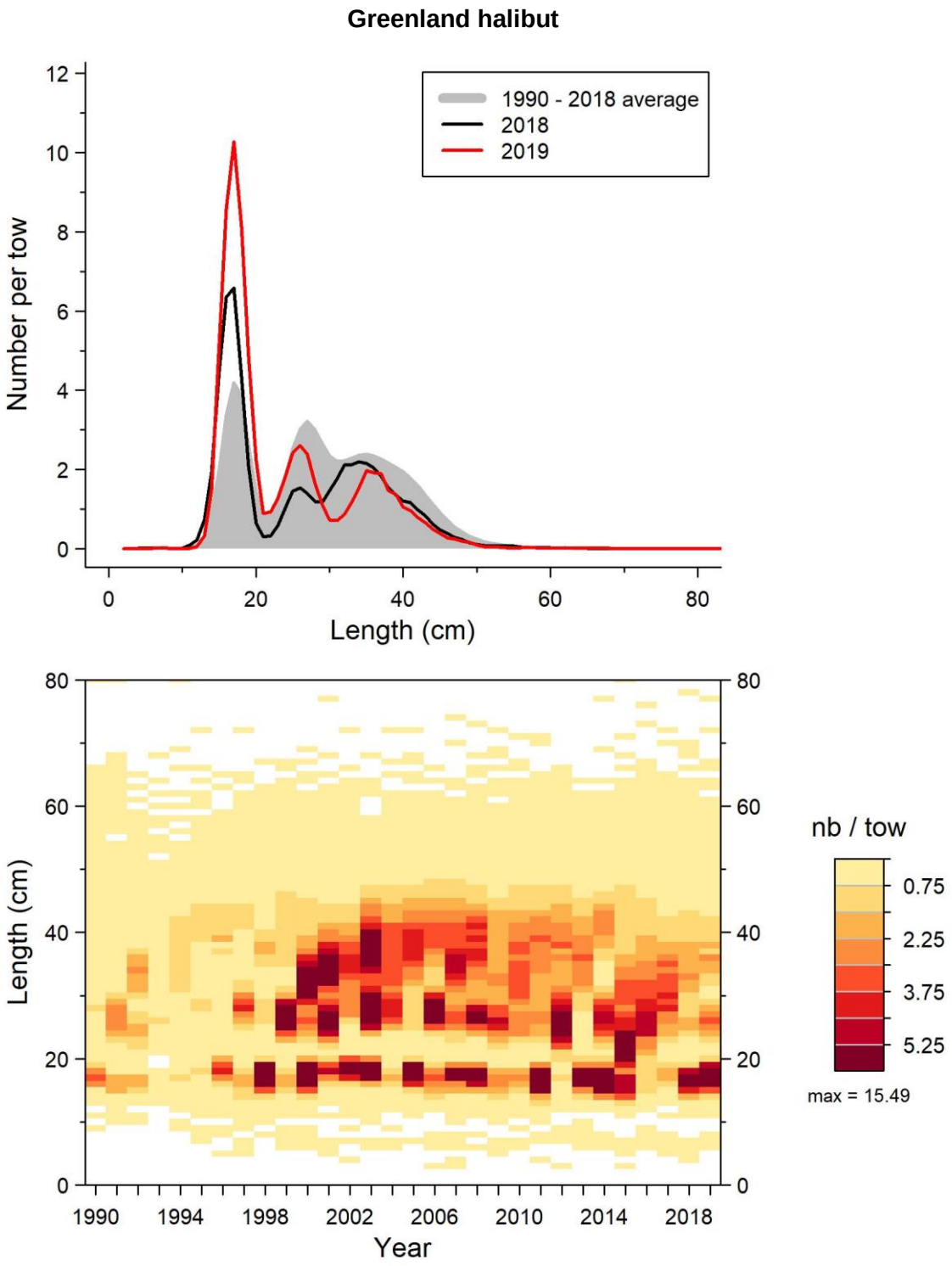

Figure 16. Length frequency distributions (mean number per 15 minutes tow) observed during the survey for Greenland halibut in 4RST.

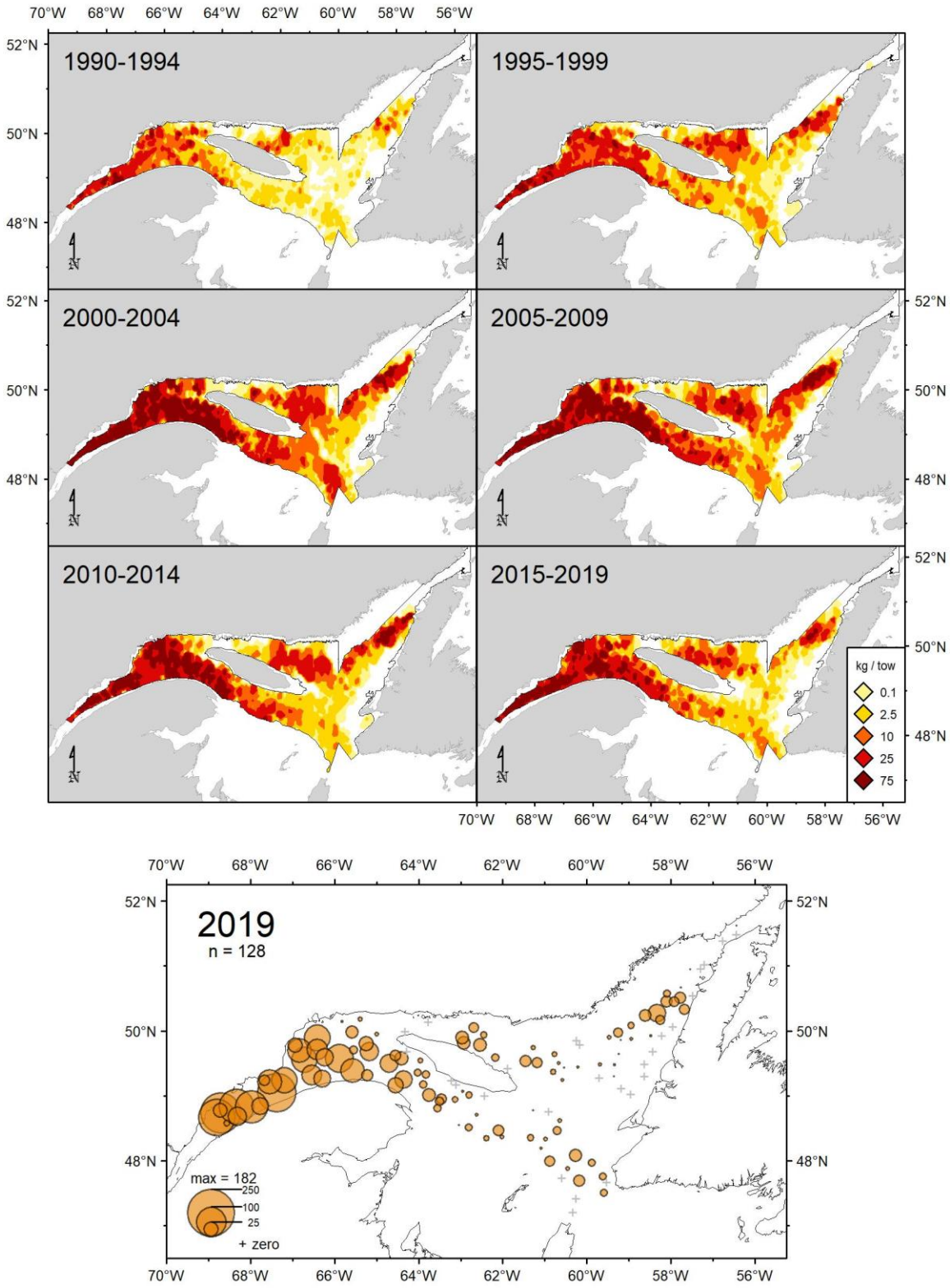

Figure 17. Greenland halibut catch rates (kg/15 minutes tow) distribution.

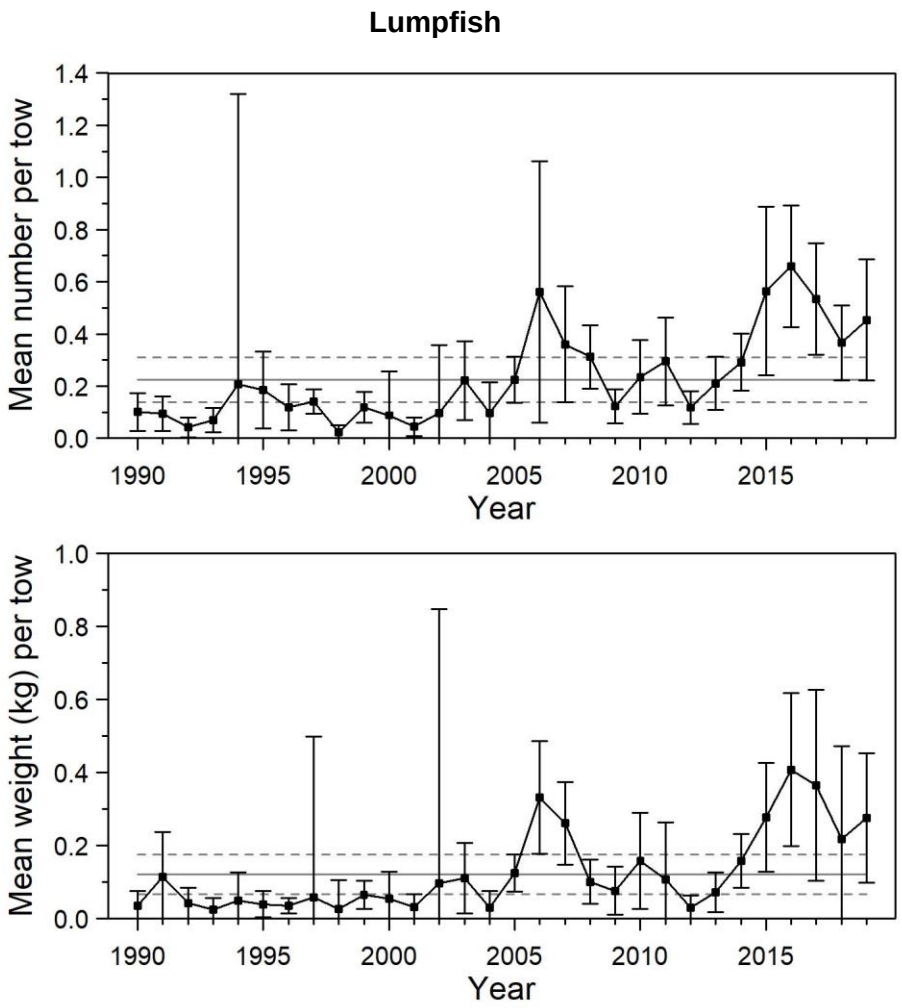

Figure 18. Mean numbers and mean weights per 15 minutes tow observed during the survey for lumpfish in 4RST. Error bars indicate the 95% confidence interval and the horizontal lines indicate the mean of the 1990-2018 period (solid line) and upper and lower reference (see text) limits (dashed lines).

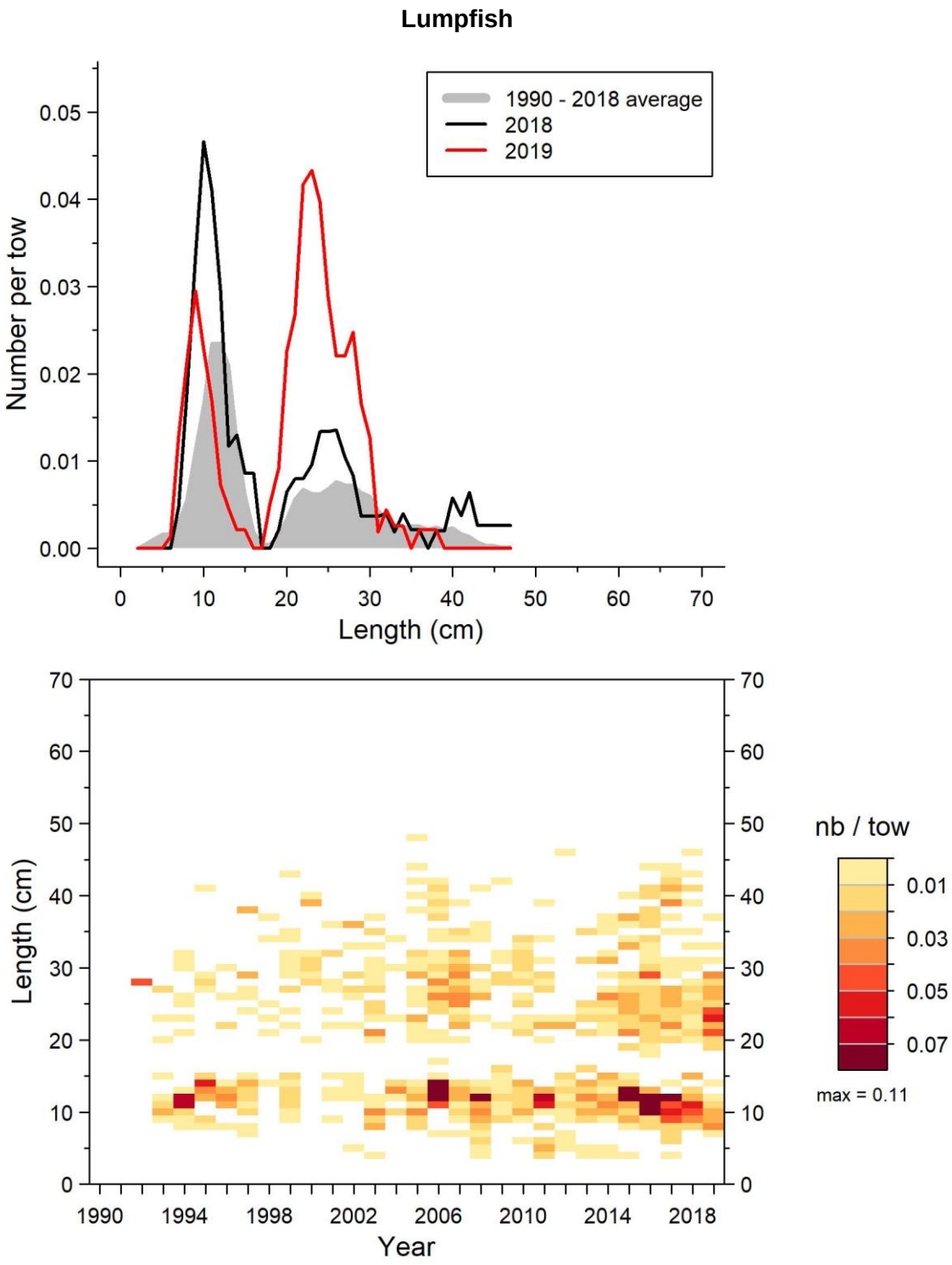

Figure 19. Length frequency distributions (mean number per 15 minutes tow) observed during the survey for lumpfish in 4RST.

Lumpfish

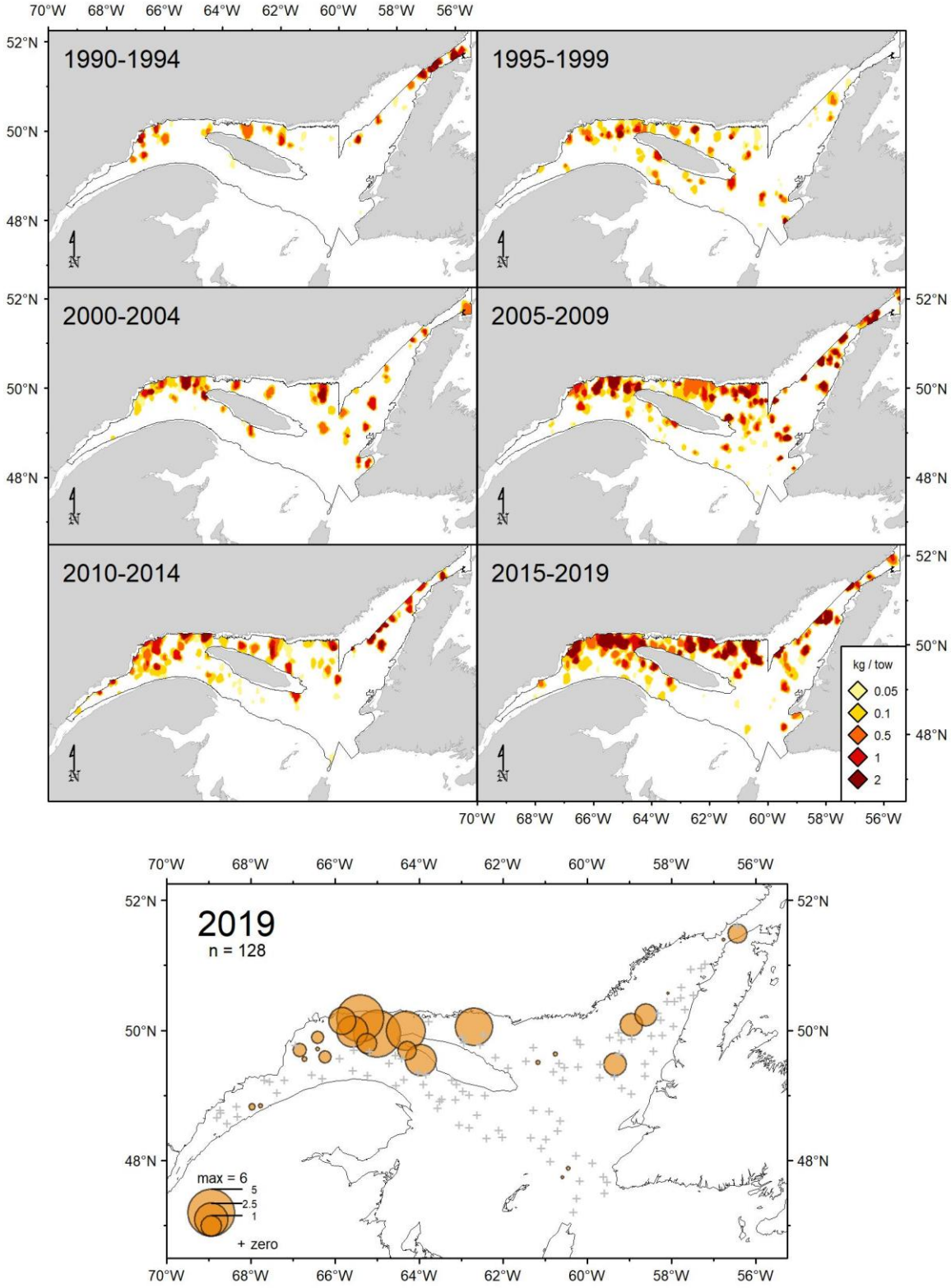

Figure 20. Lumpfish catch rates (kg/15 minutes tow) distribution.

Herring

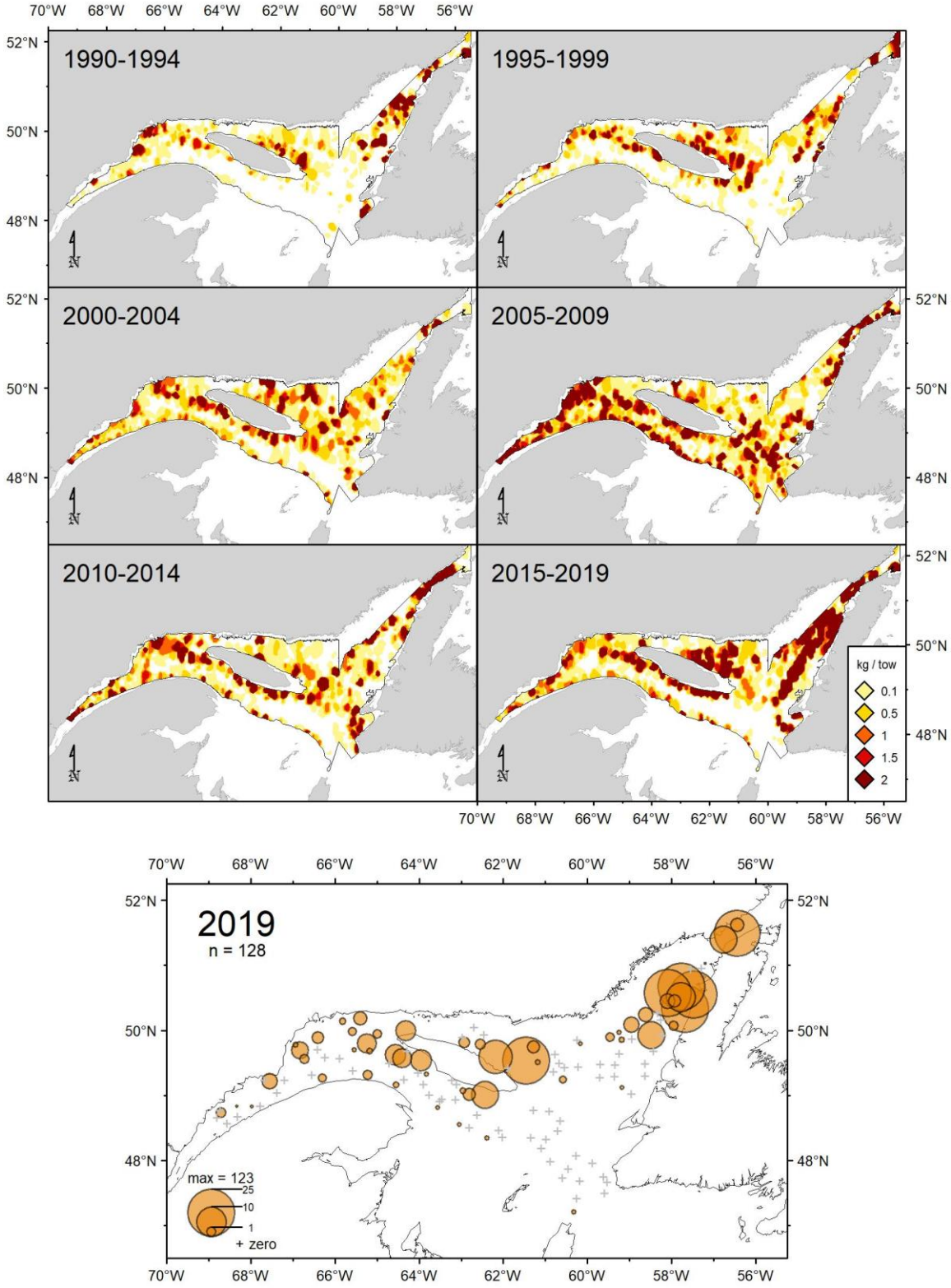

Figure 21. Herring catch rates (kg/15 minutes tow) distribution.

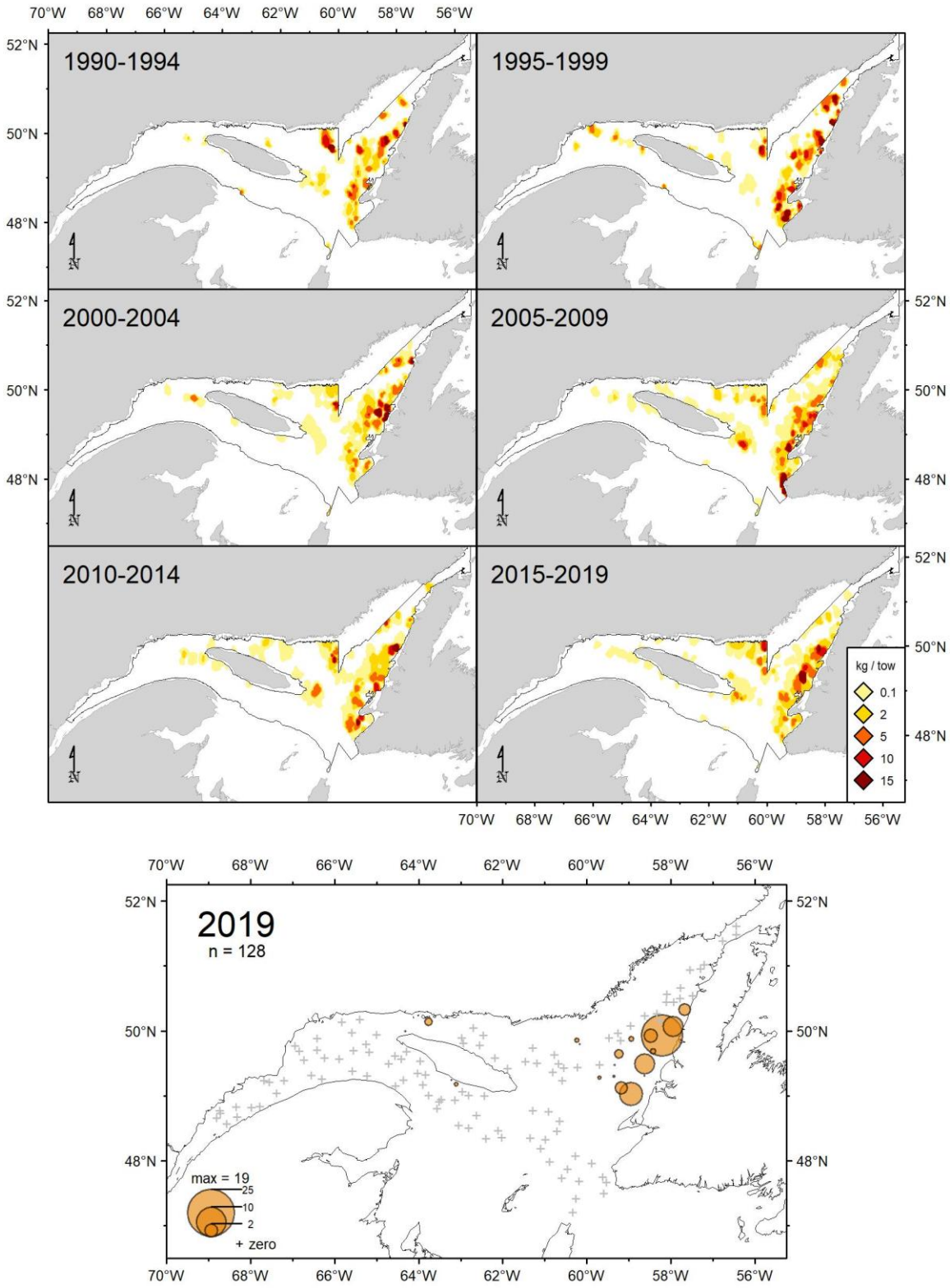

Figure 22. Atlantic wolffish catch rates (kg/15 minutes tow) distribution.

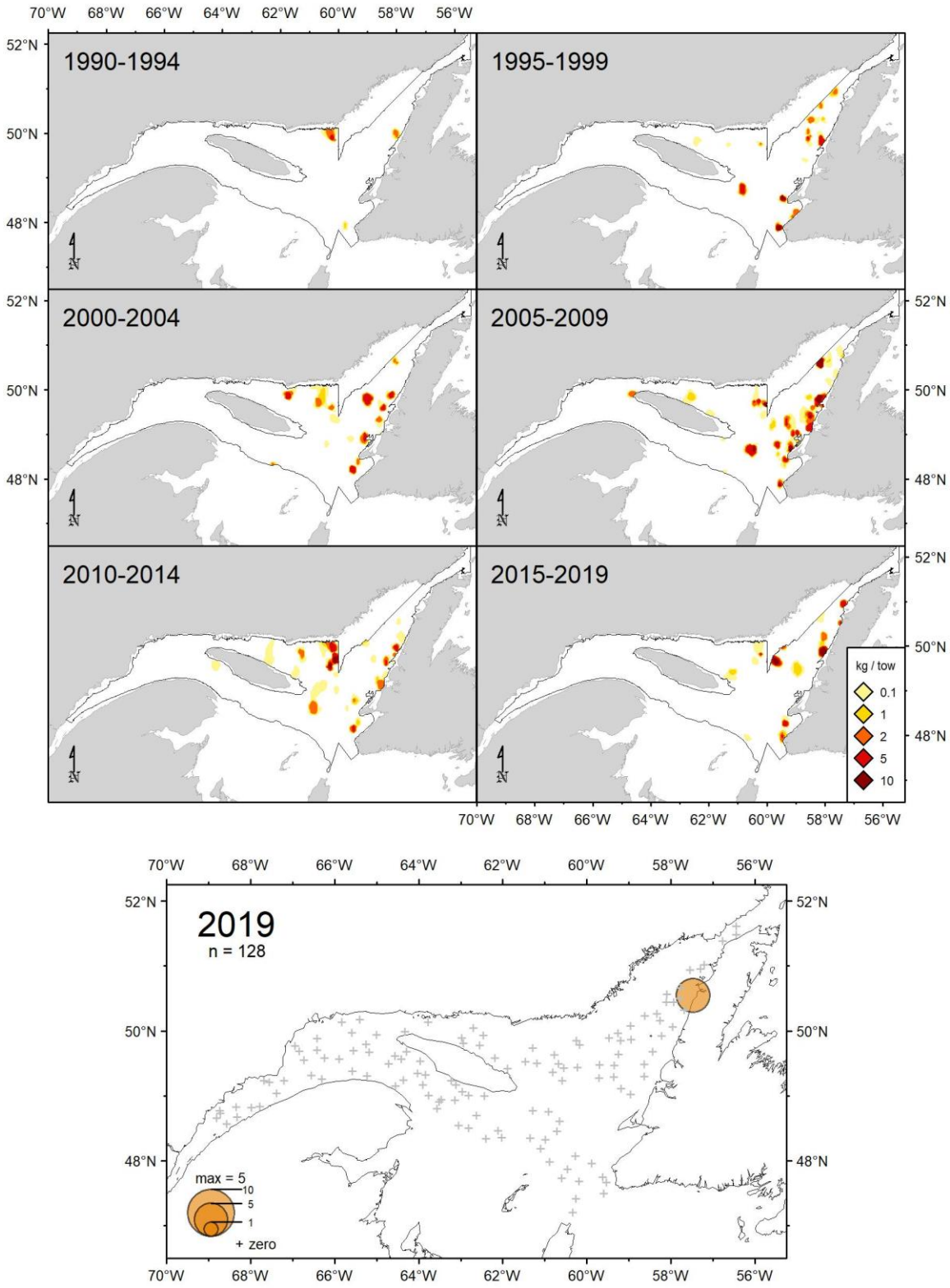

Figure 23. Spotted wolffish catch rates (kg/15 minutes tow) distribution.

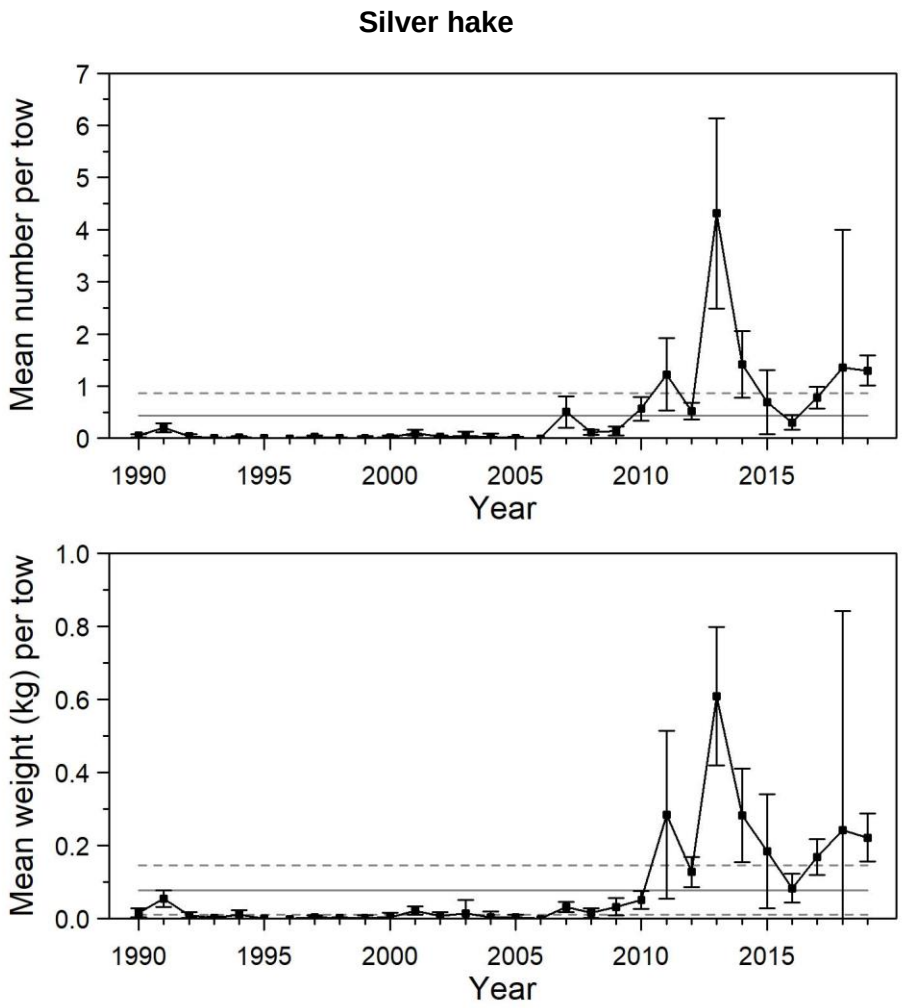

Figure 24. Mean numbers and mean weights per 15 minutes tow observed during the survey for silver hake in 4RST. Error bars indicate the 95% confidence interval and the horizontal lines indicate the mean of the 1990-2018 period (solid line) and upper and lower reference (see text) limits (dashed lines).

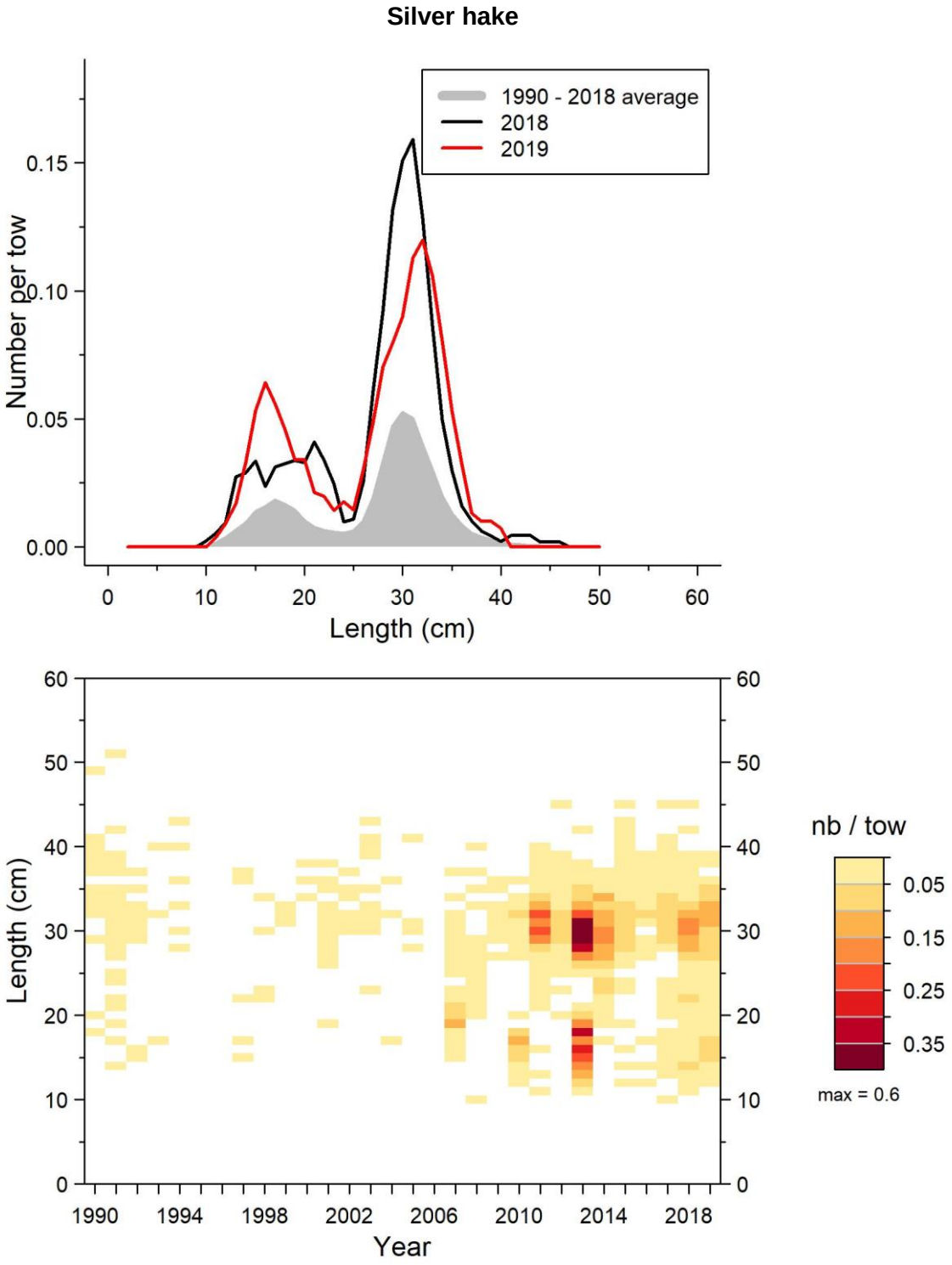

Figure 25. Length frequency distributions (mean number per 15 minutes tow) observed during the survey for silver hake in 4RST.

Silver hake

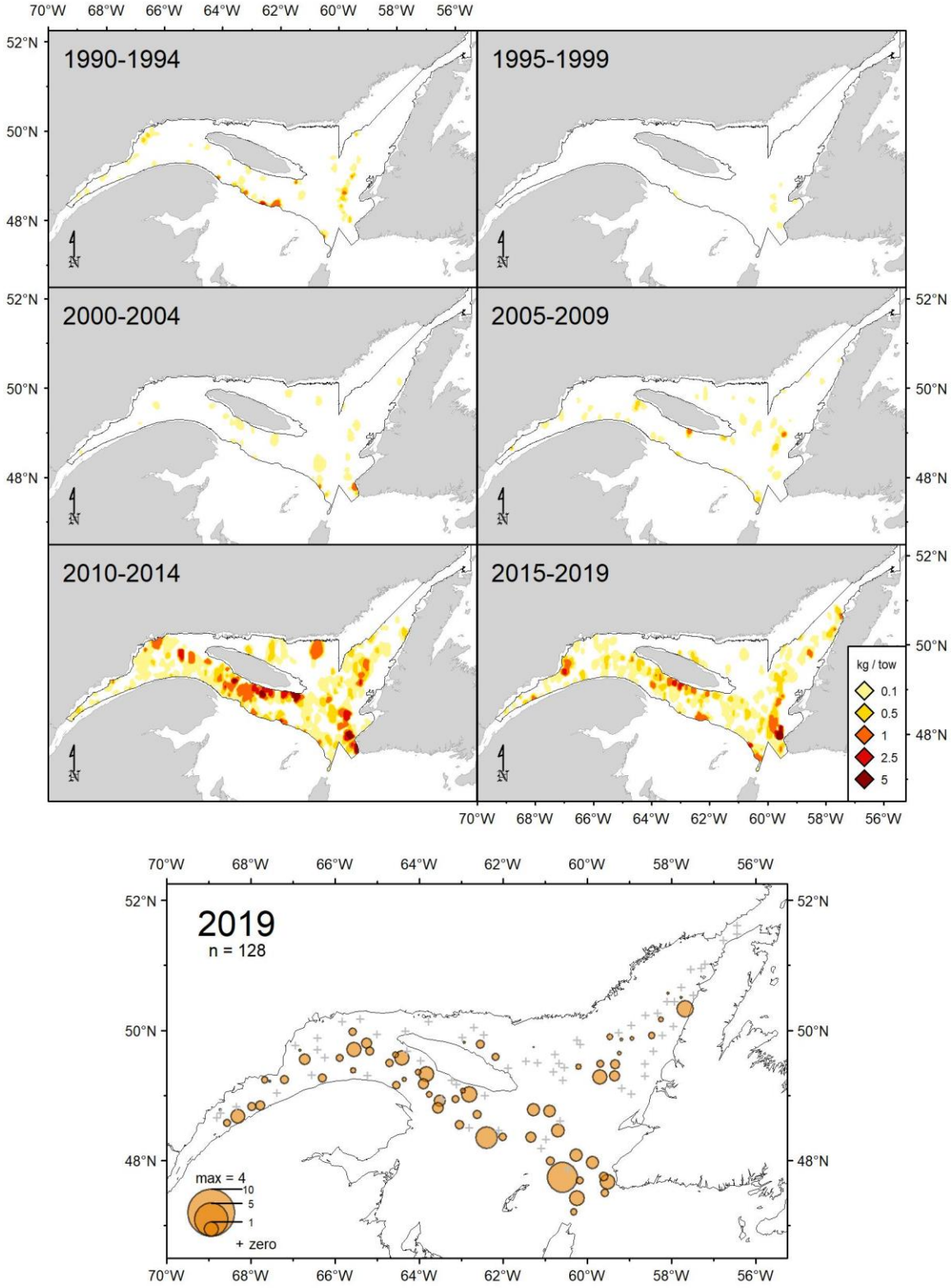

Figure 26. Silver hake catch rates (kg/15 minutes tow) distribution.

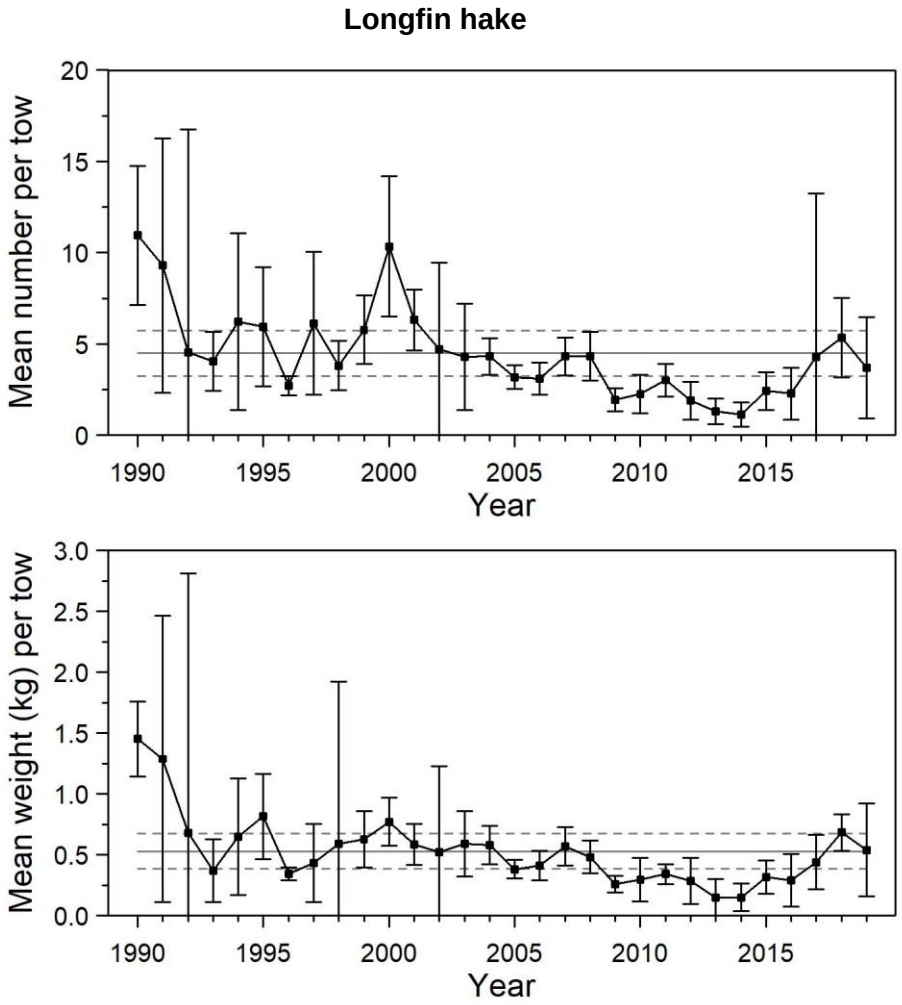

Figure 27. Mean numbers and mean weights per 15 minutes tow observed during the survey for longfin hake in 4RST. Error bars indicate the 95% confidence interval and the horizontal lines indicate the mean of the 1990-2018 period (solid line) and upper and lower reference (see text) limits (dashed lines).

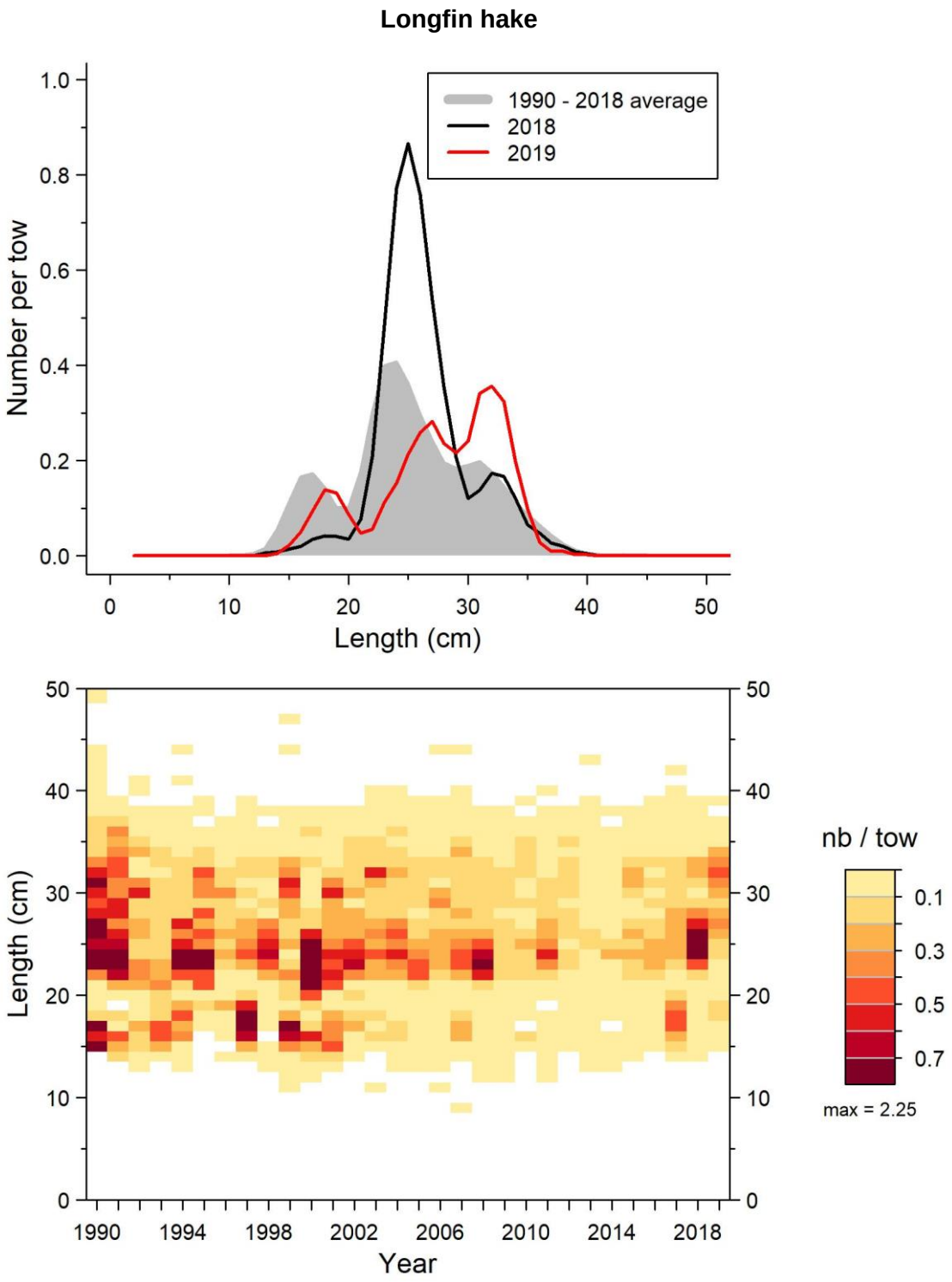

Figure 28. Length frequency distributions (mean number per 15 minutes tow) observed during the survey for longfin hake in 4RST.

Longfin hake

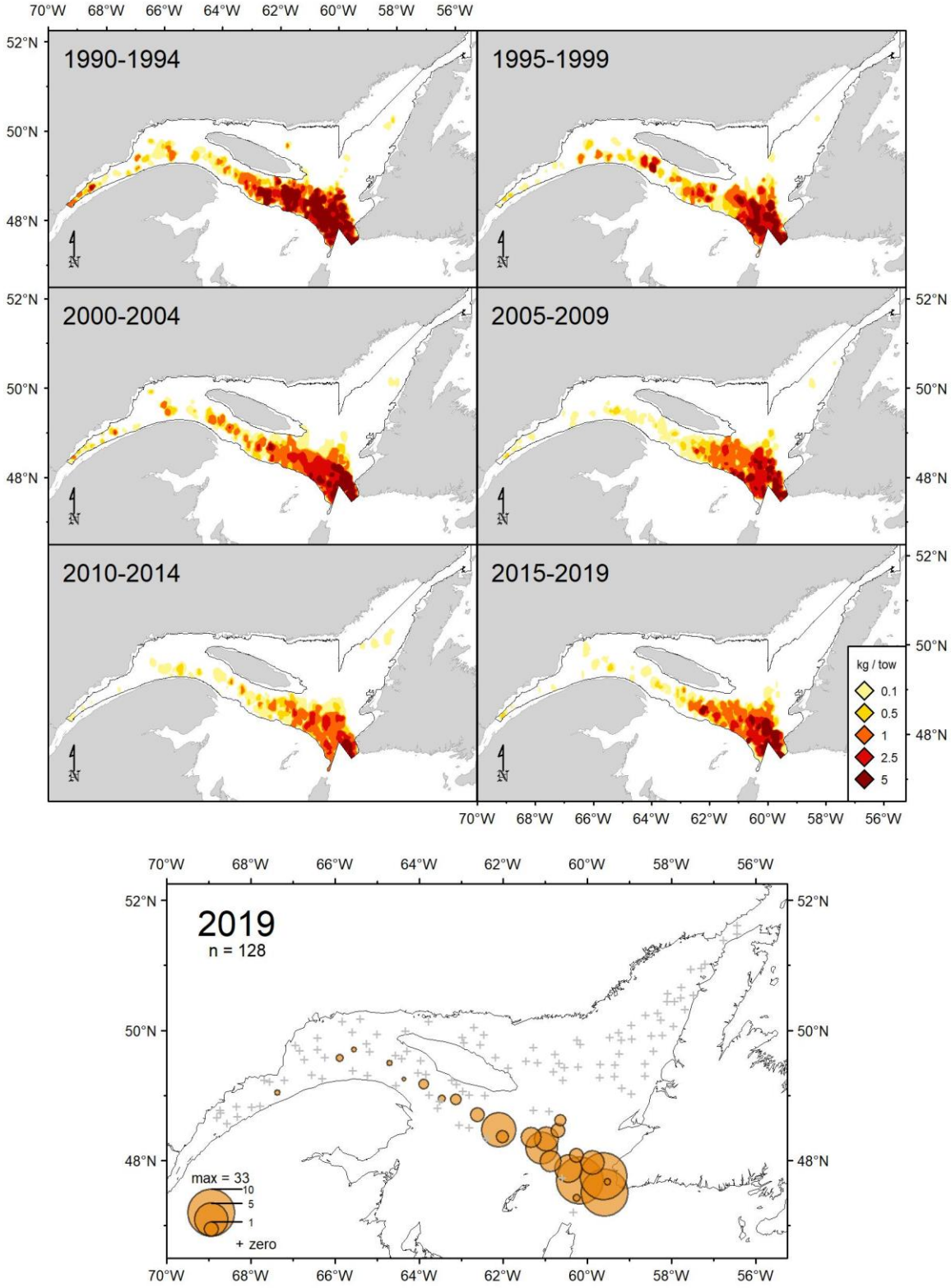

Figure 29. Longfin hake catch rates (kg/15 minutes tow) distribution.

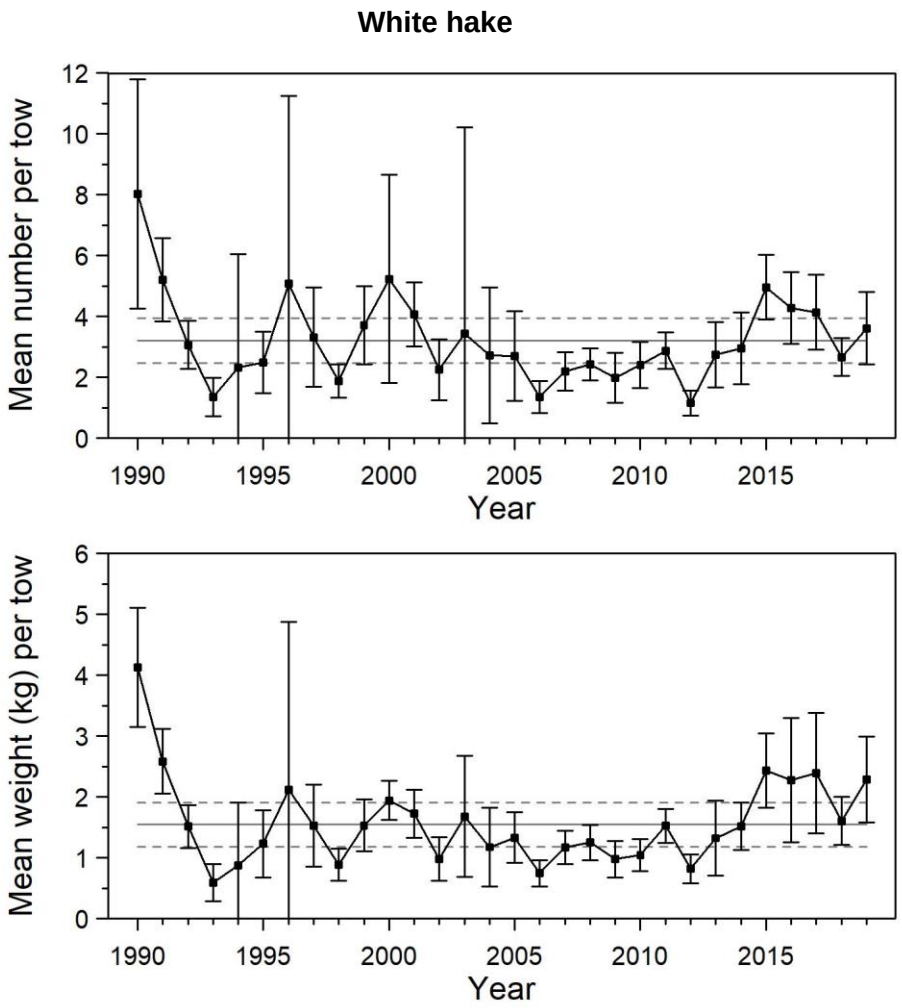

Figure 30. Mean numbers and mean weights per 15 minutes tow observed during the survey for white hake in 4RST. Error bars indicate the 95% confidence interval and the horizontal lines indicate the mean of the 1990-2018 period (solid line) and upper and lower reference (see text) limits (dashed lines).

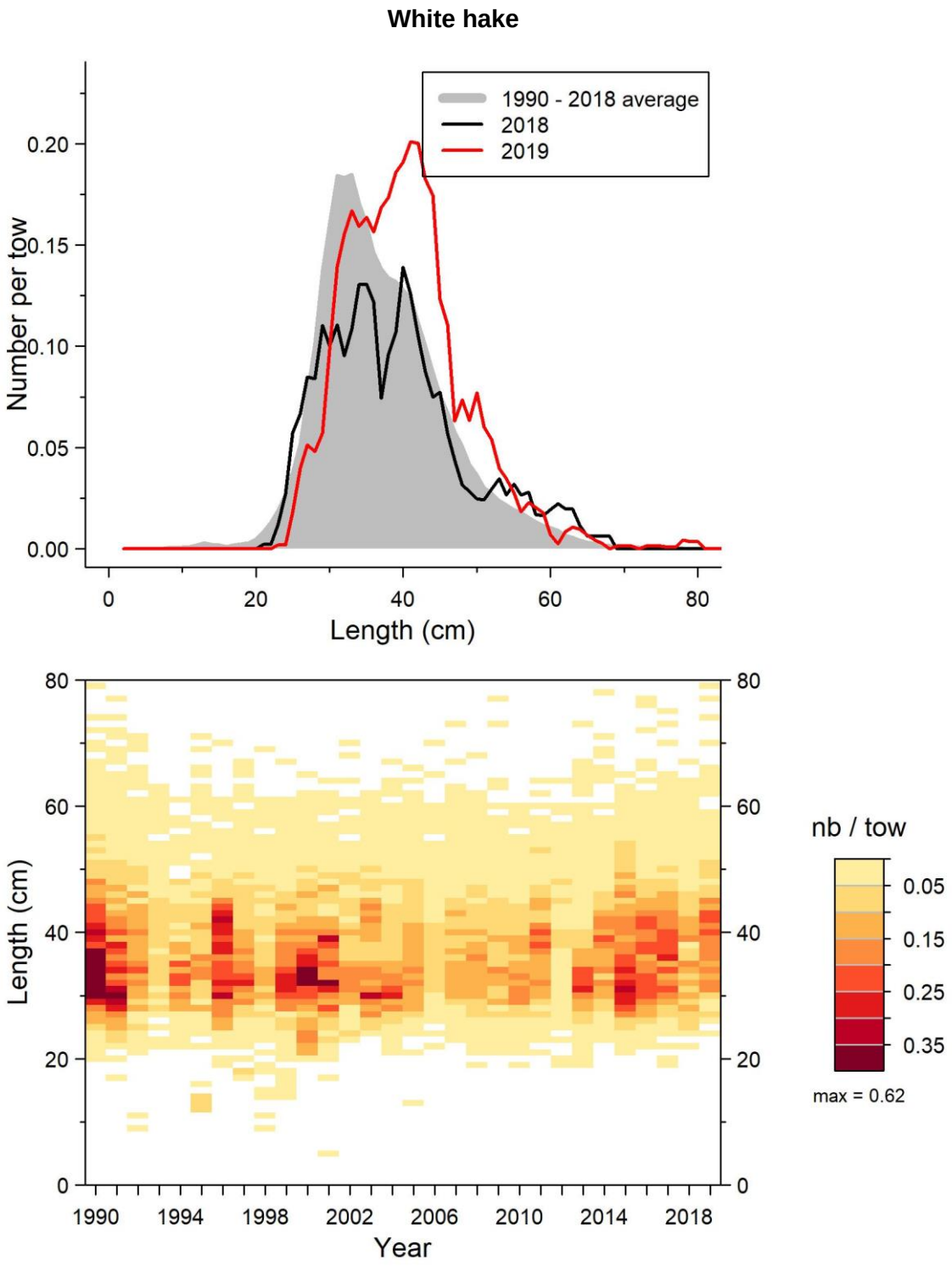

Figure 31. Length frequency distributions (mean number per 15 minutes tow) observed during the survey for white hake in 4RST.

White hake

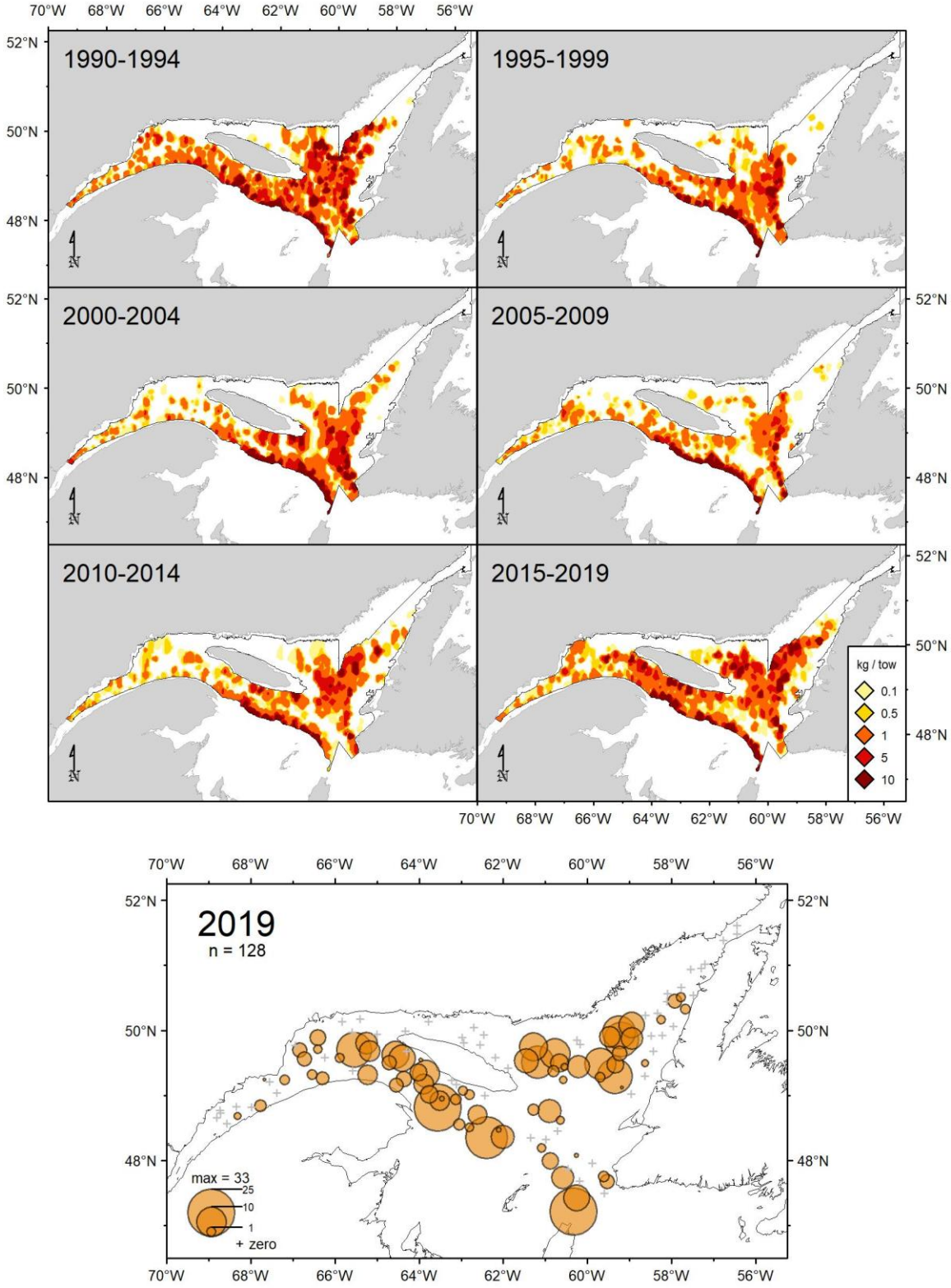

Figure 32. White hake catch rates (kg/15 minutes tow) distribution.

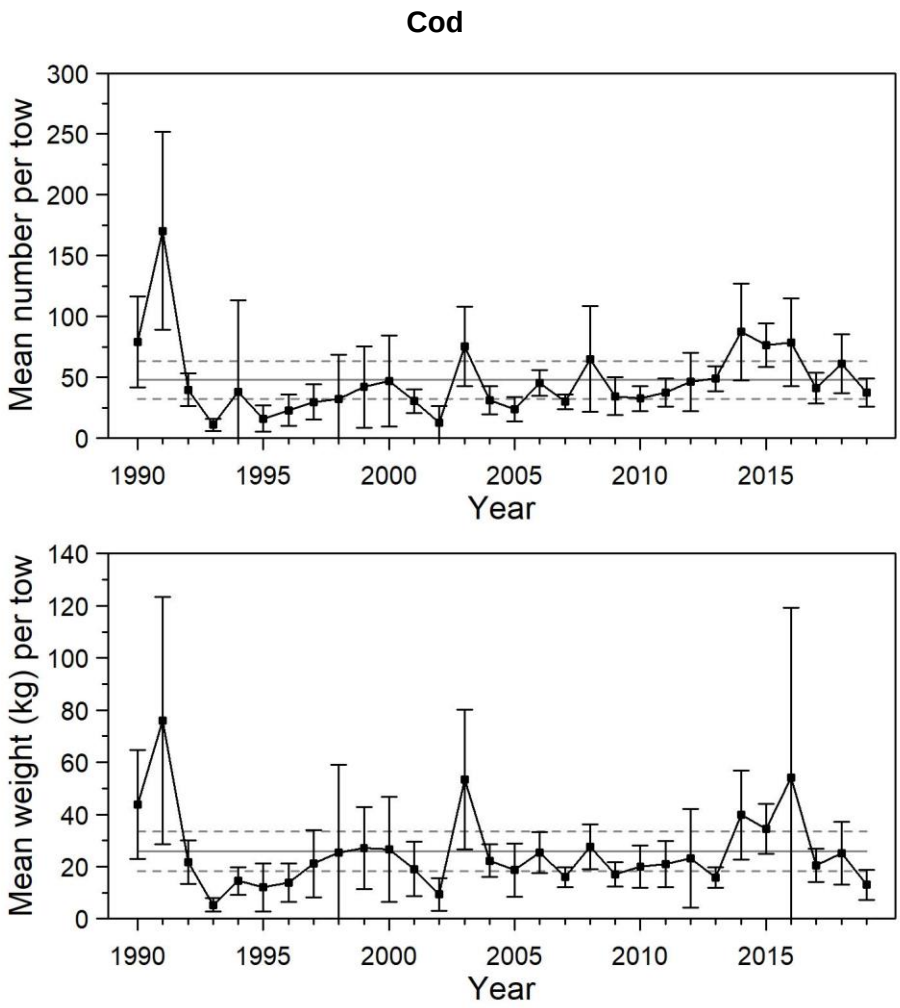

Figure 33. Mean numbers and mean weights per 15 minutes tow observed during the survey for cod in 4RS. Error bars indicate the 95% confidence interval and the horizontal lines indicate the mean of the 1990-2018 period (solid line) and upper and lower reference (see text) limits (dashed lines).

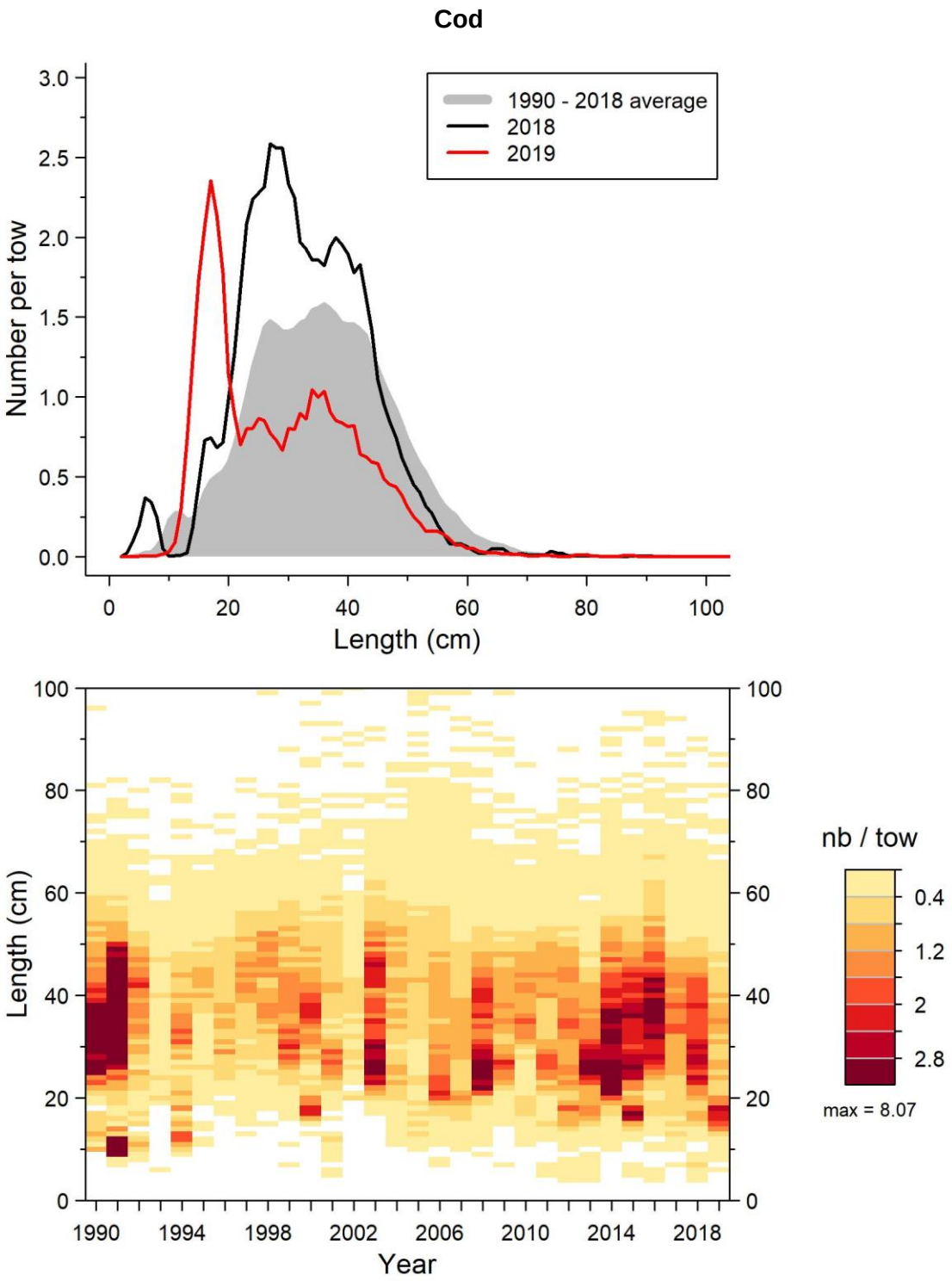

Figure 34. Length frequency distributions (mean number per 15 minutes tow) observed during the survey for cod in 4RS.

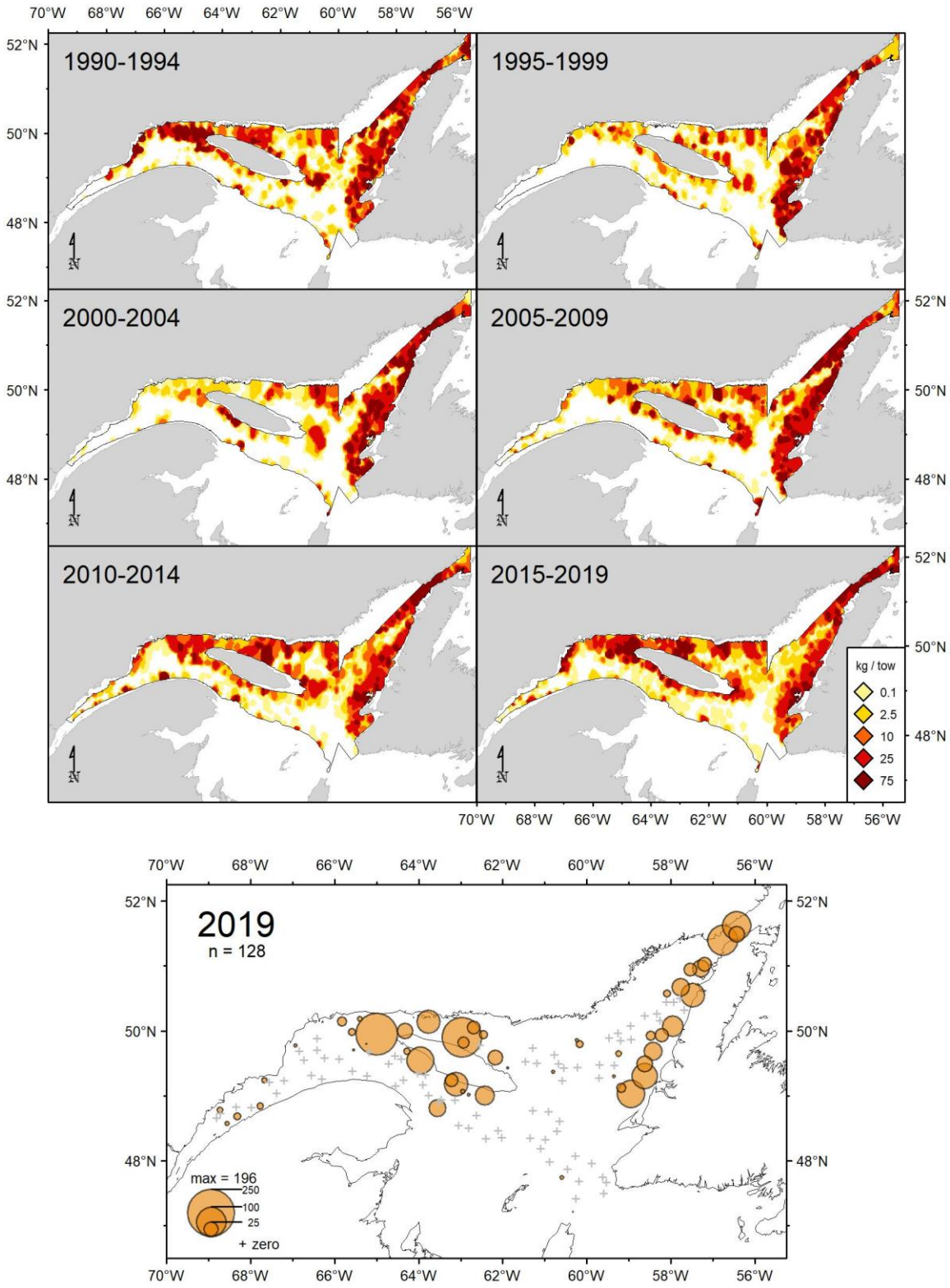

Figure 35. Cod catch rates (kg/15 minutes tow) distribution.

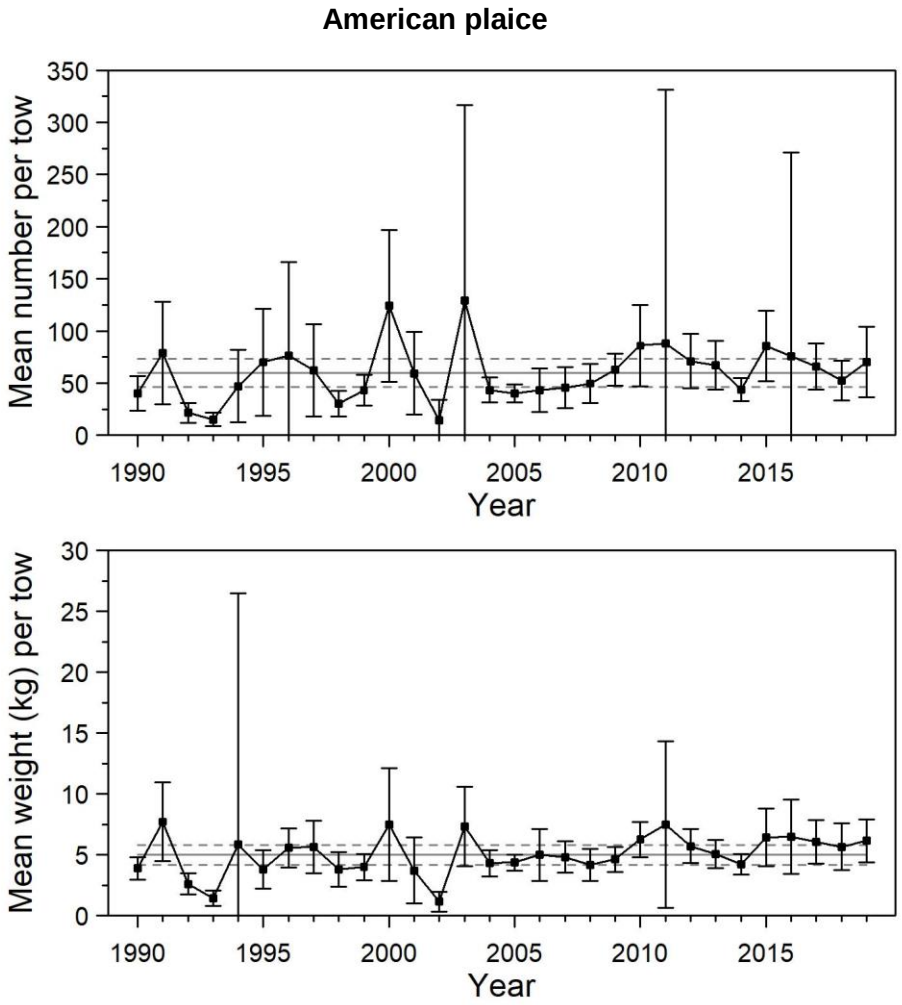

Figure 36. Mean numbers and mean weights per 15 minutes tow observed during the survey for American plaice in 4RST. Error bars indicate the 95% confidence interval and the horizontal lines indicate the mean of the 1990-2018 period (solid line) and upper and lower reference (see text) limits (dashed lines).

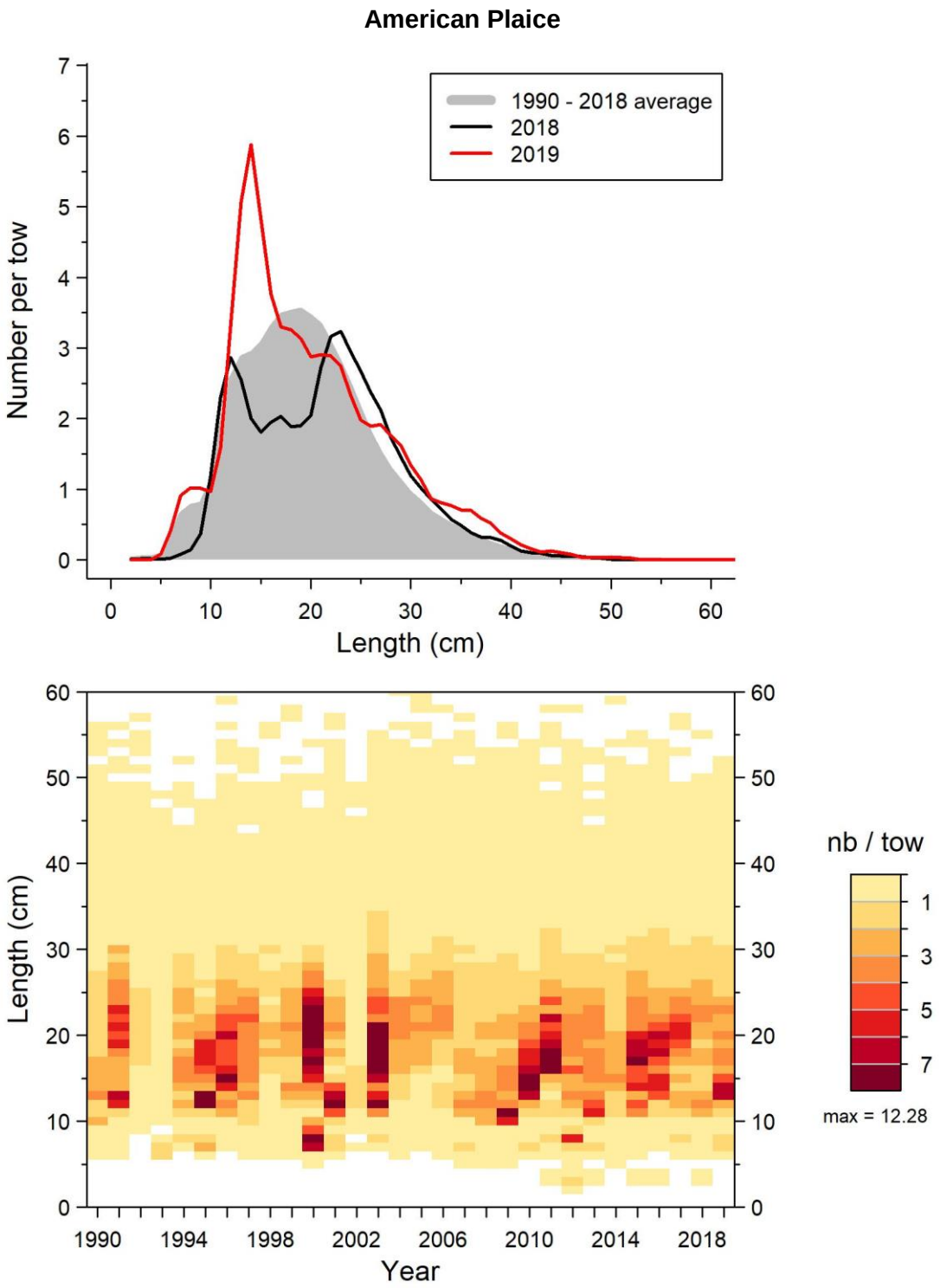

Figure 37. Length frequency distributions (mean number per 15 minutes tow) observed during the survey for American plaice in 4RST.

American plaice

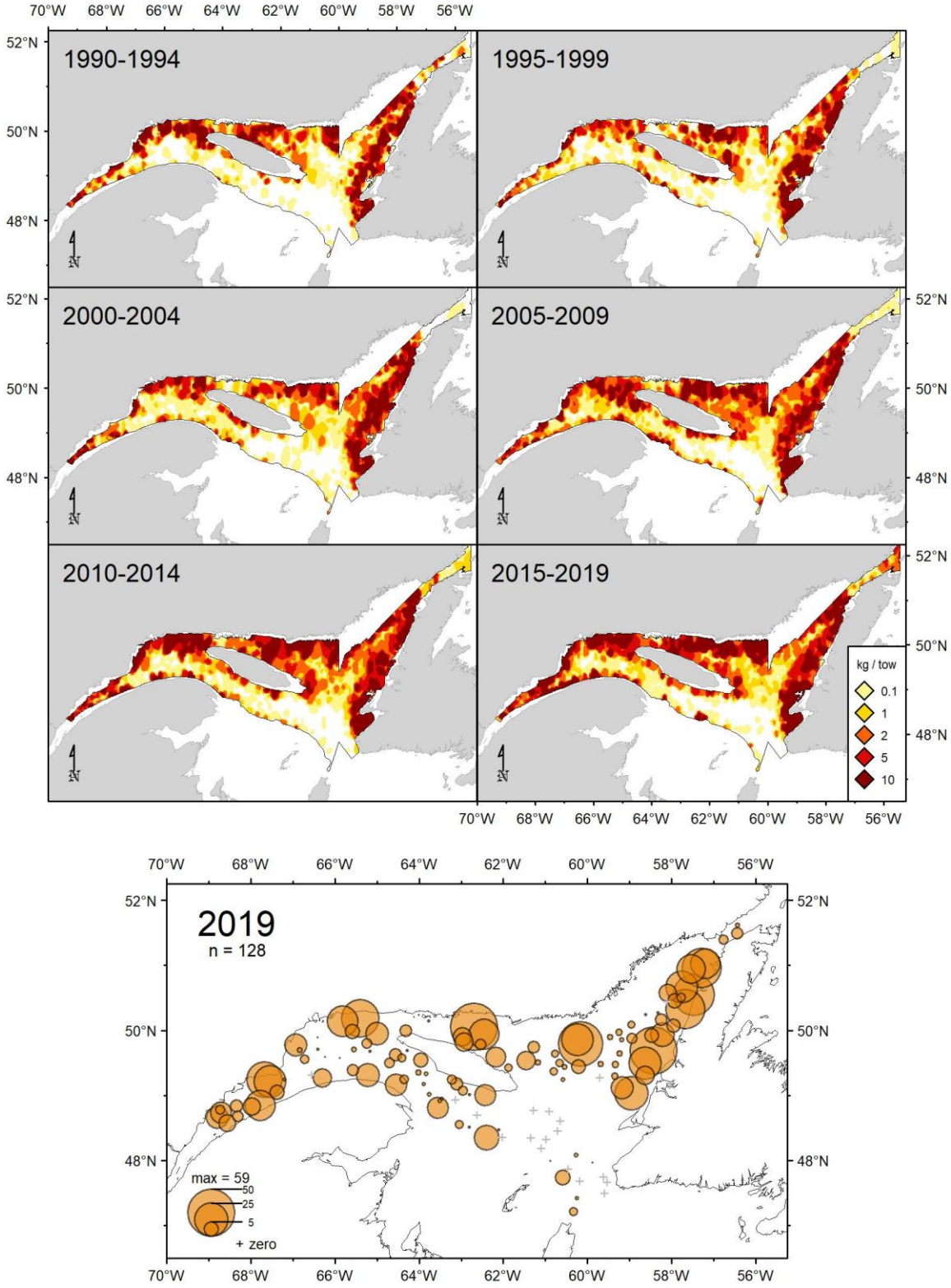

Figure 38. American plaice catch rates (kg/15 minutes tow) distribution.

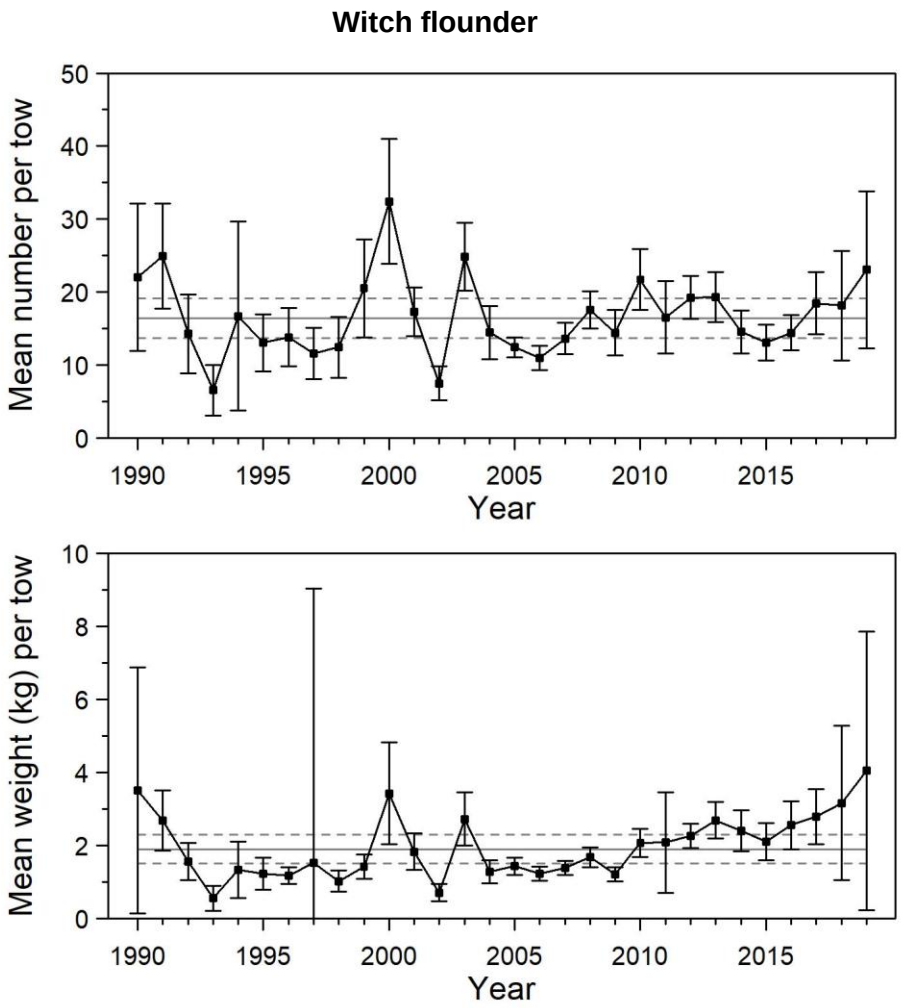

Figure 39. Mean numbers and mean weights per 15 minutes tow observed during the survey for witch flounder in 4RST. Error bars indicate the 95% confidence interval and the horizontal lines indicate the mean of the 1990-2018 period (solid line) and upper and lower reference (see text) limits (dashed lines).

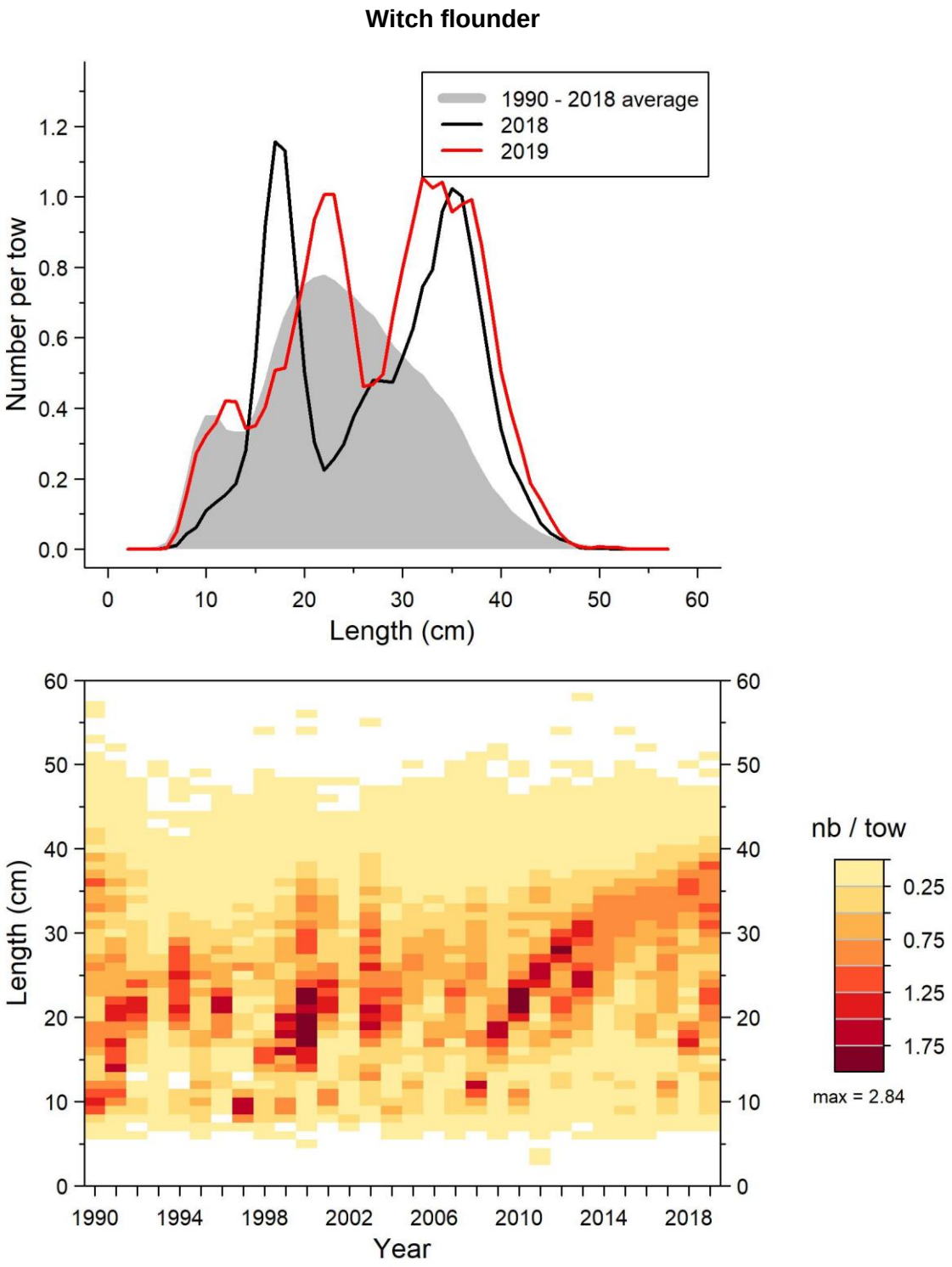

Figure 40. Length frequency distributions (mean number per 15 minutes tow) observed during the survey for witch flounder in 4RST.

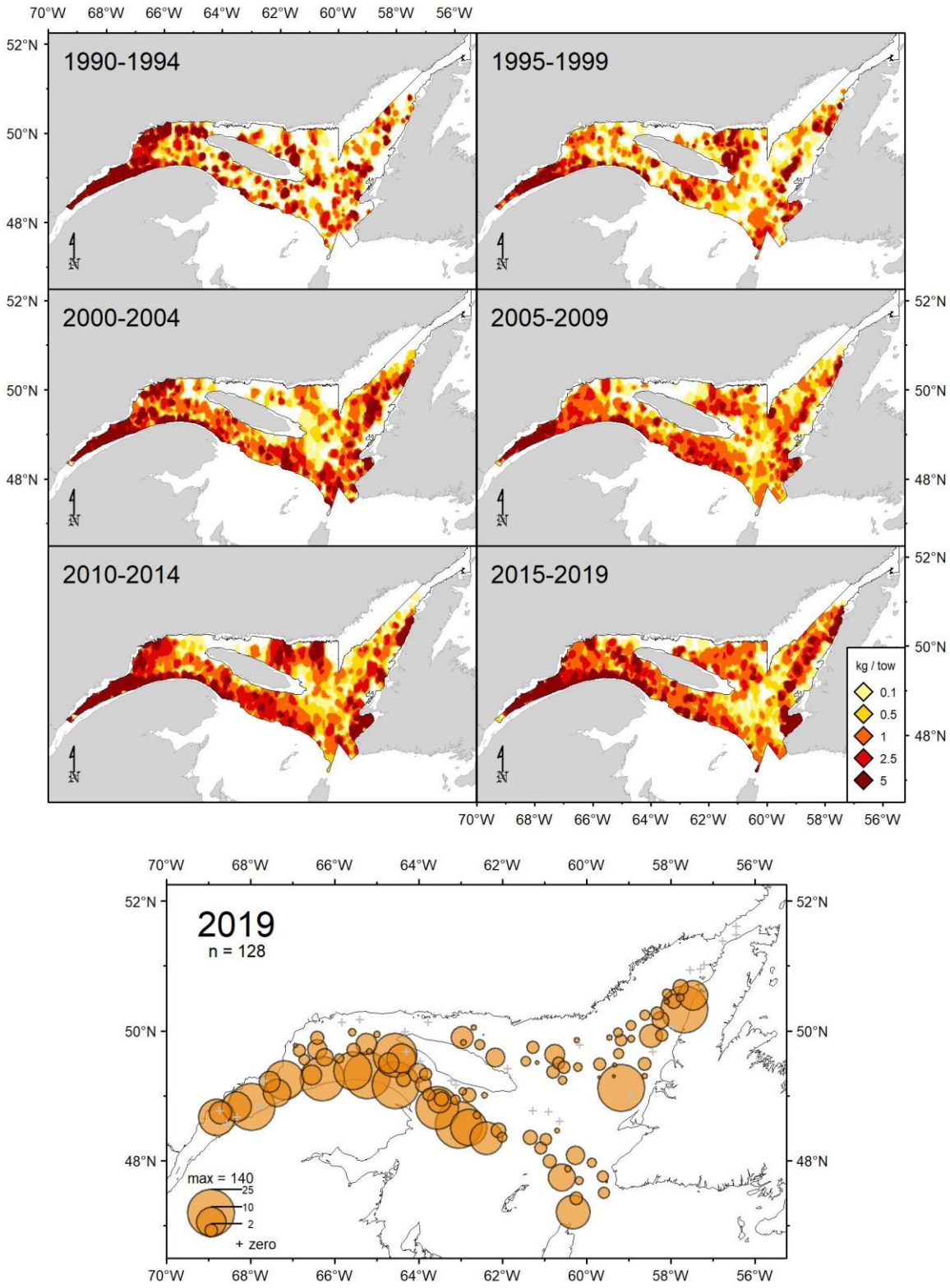

Figure 41. Witch flounder catch rates (kg/15 minutes tow) distribution.

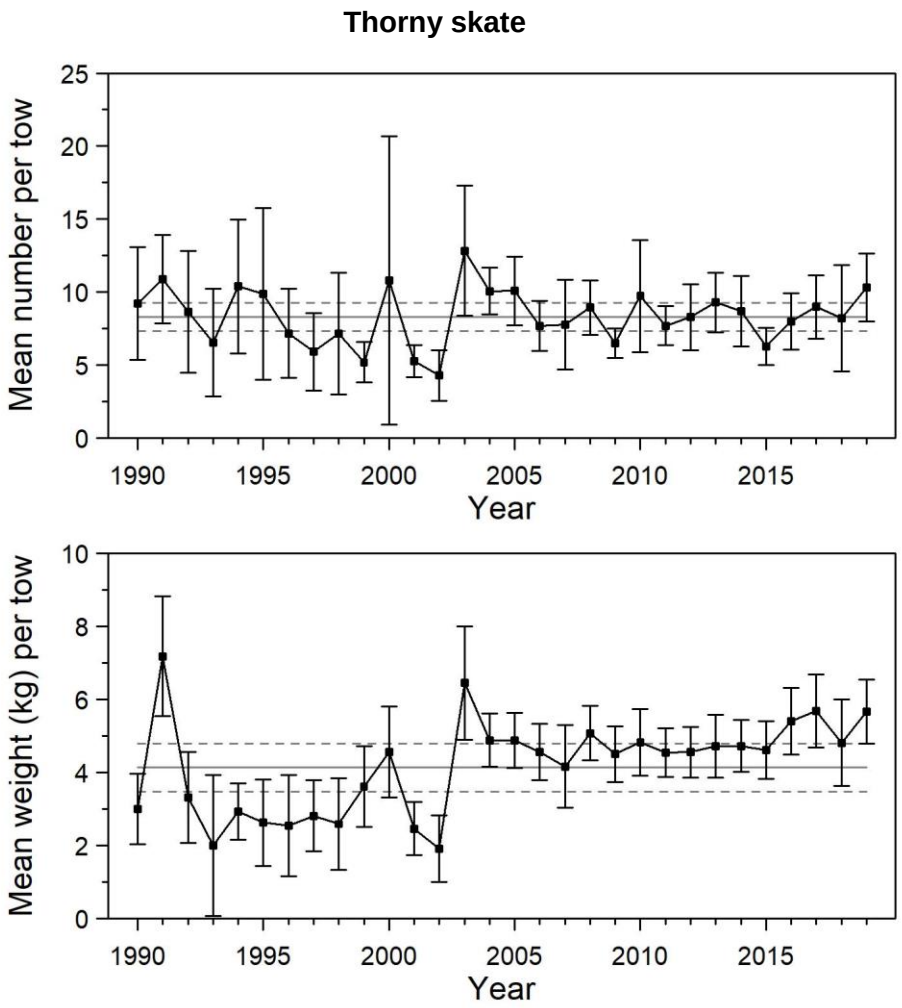

Figure 42. Mean numbers and mean weights per 15 minutes tow observed during the survey for thorny skate in 4RST. Error bars indicate the 95% confidence interval and the horizontal lines indicate the mean of the 1990-2018 period (solid line) and upper and lower reference (see text) limits (dashed lines).

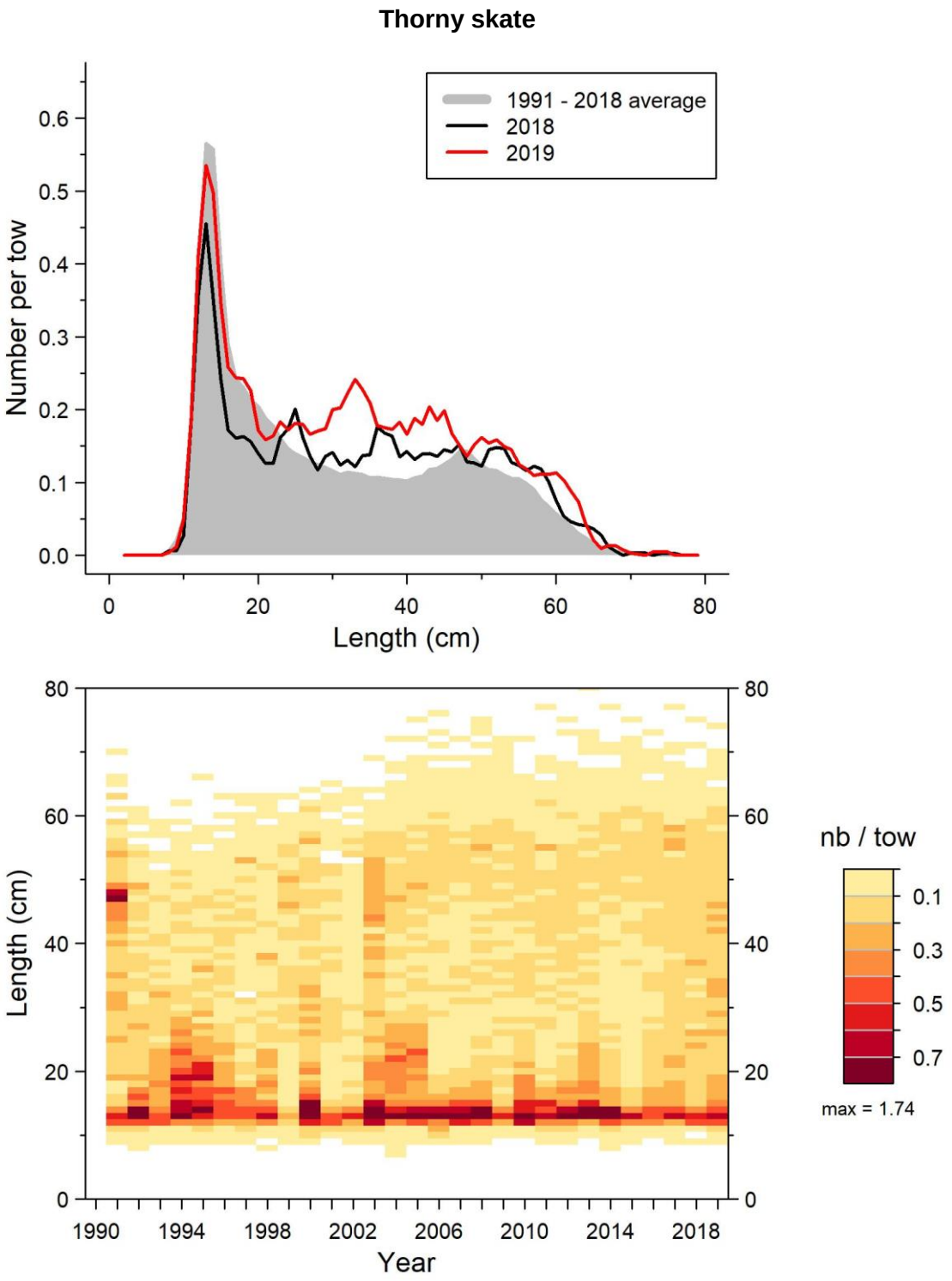

Figure 43. Length frequency distributions (mean number per 15 minutes tow) observed during the survey for thorny skate in 4RST.

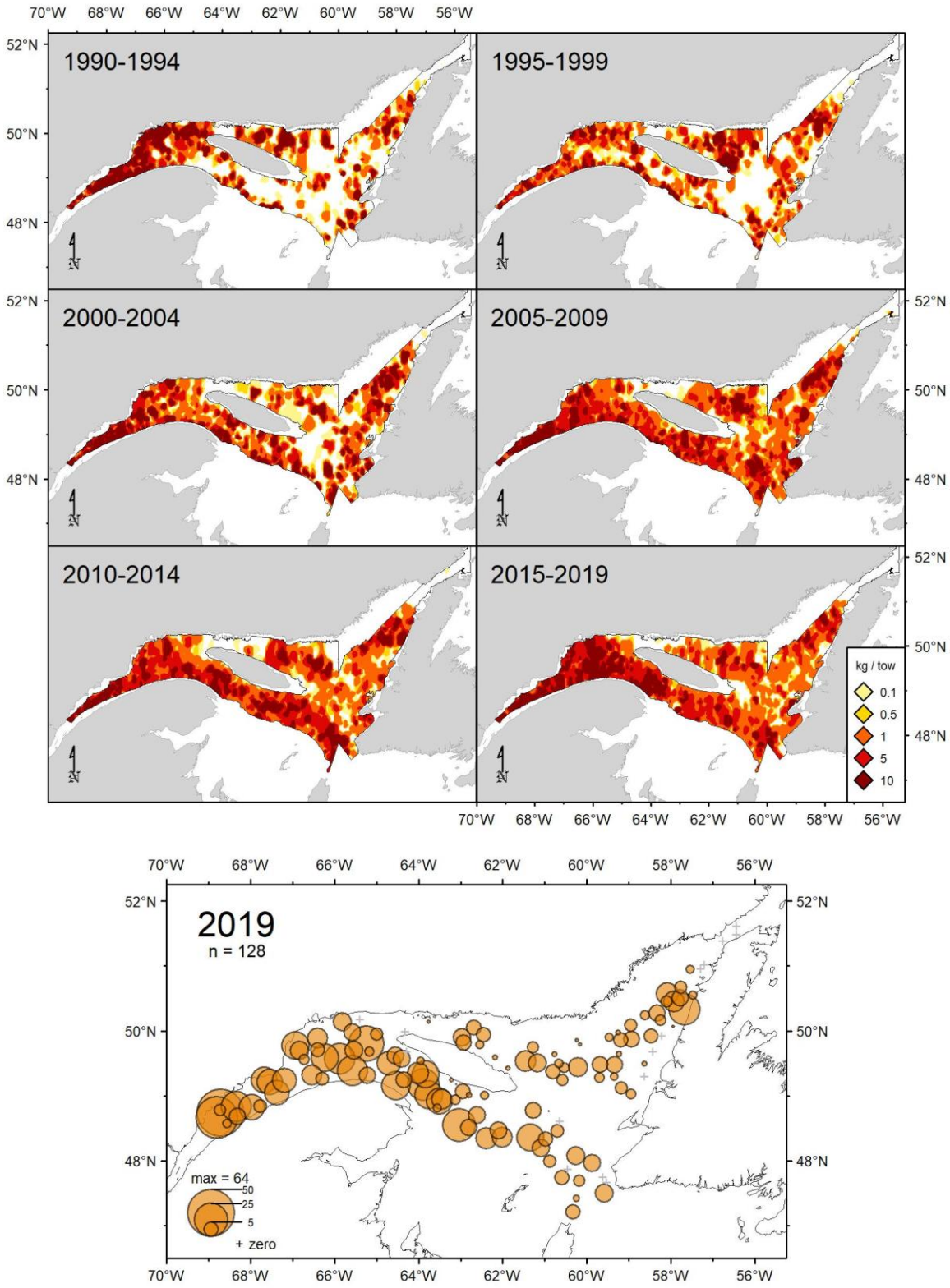

Figure 44. Thorny skate catch rates (kg/15 minutes tow) distribution.

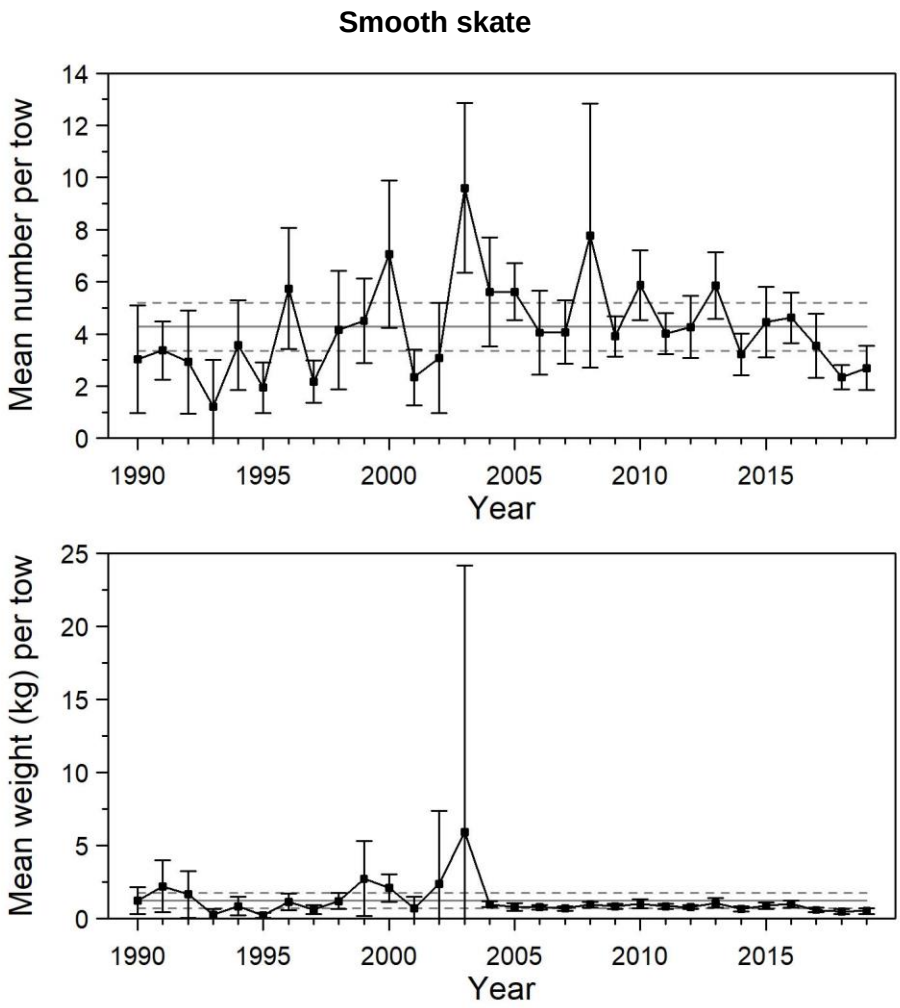

Figure 45. Mean numbers and mean weights per 15 minutes tow observed during the survey for smooth skate in 4RST. Error bars indicate the 95% confidence interval and the horizontal lines indicate the mean of the 1990-2018 period (solid line) and upper and lower reference (see text) limits (dashed lines).

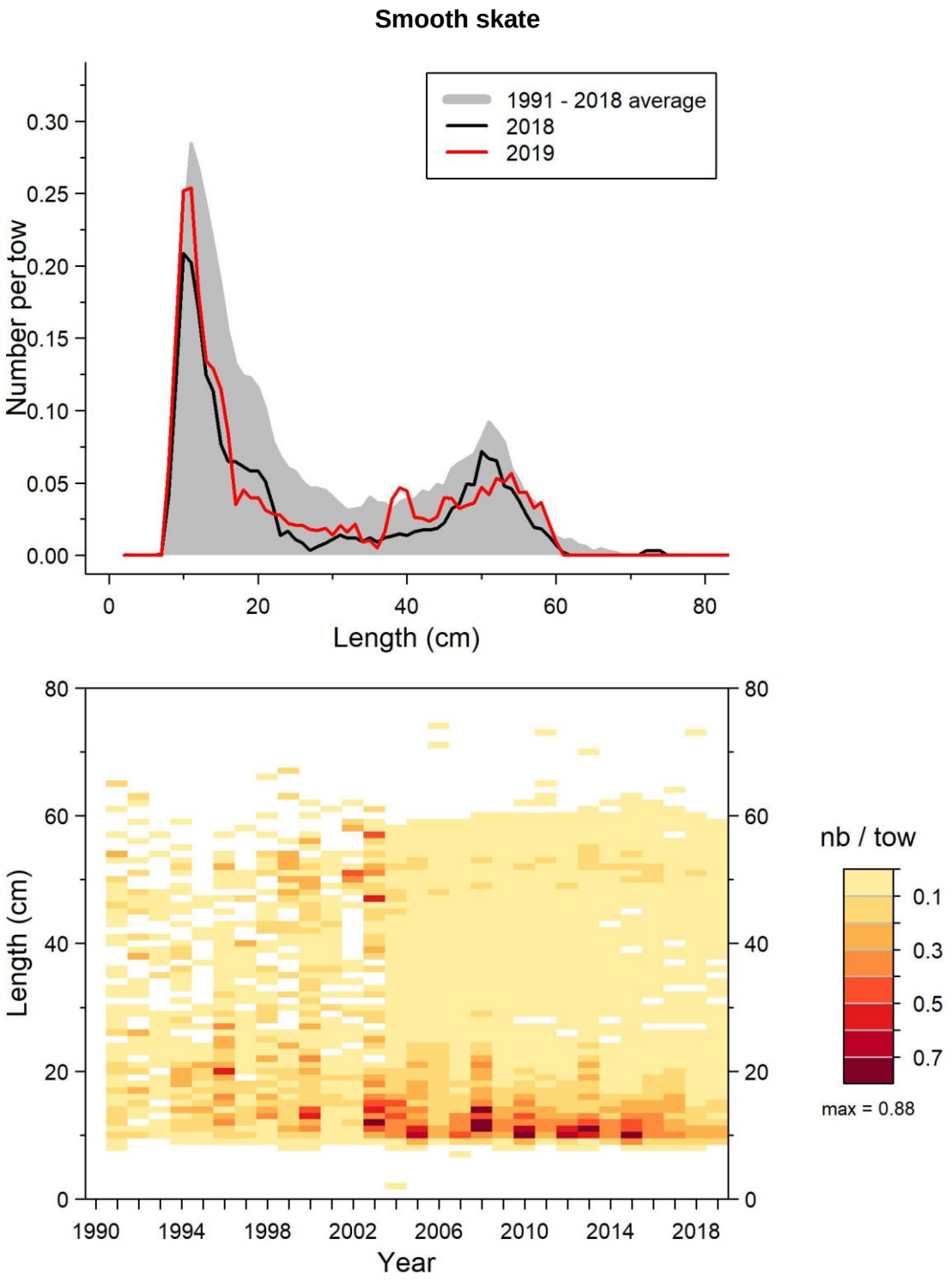

Figure 46. Length frequency distributions (mean number per 15 minutes tow) observed during the survey for smooth skate in 4RST.

Smooth skate

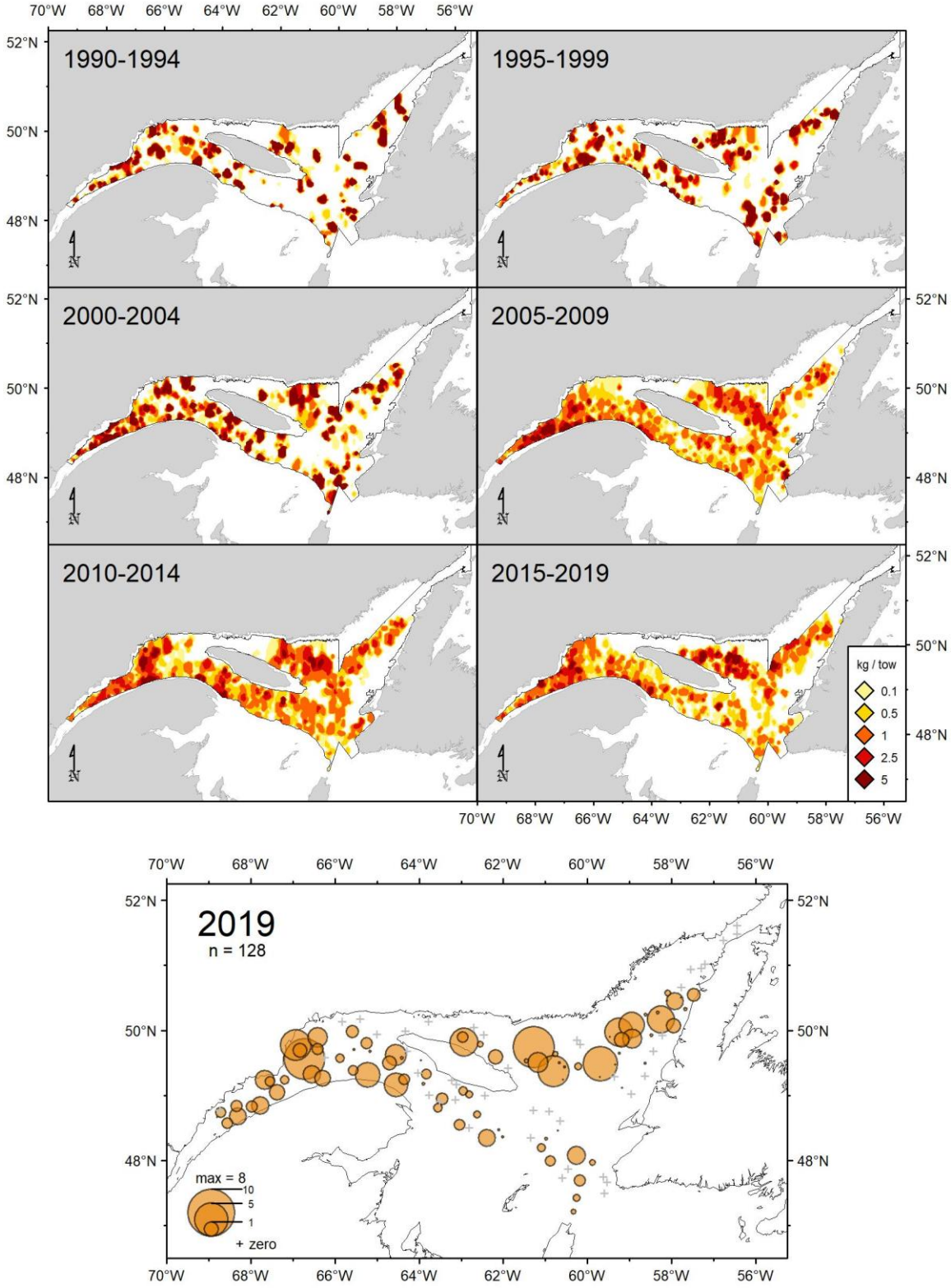

Figure 47. Smooth skate catch rates (kg/15 minutes tow) distribution.

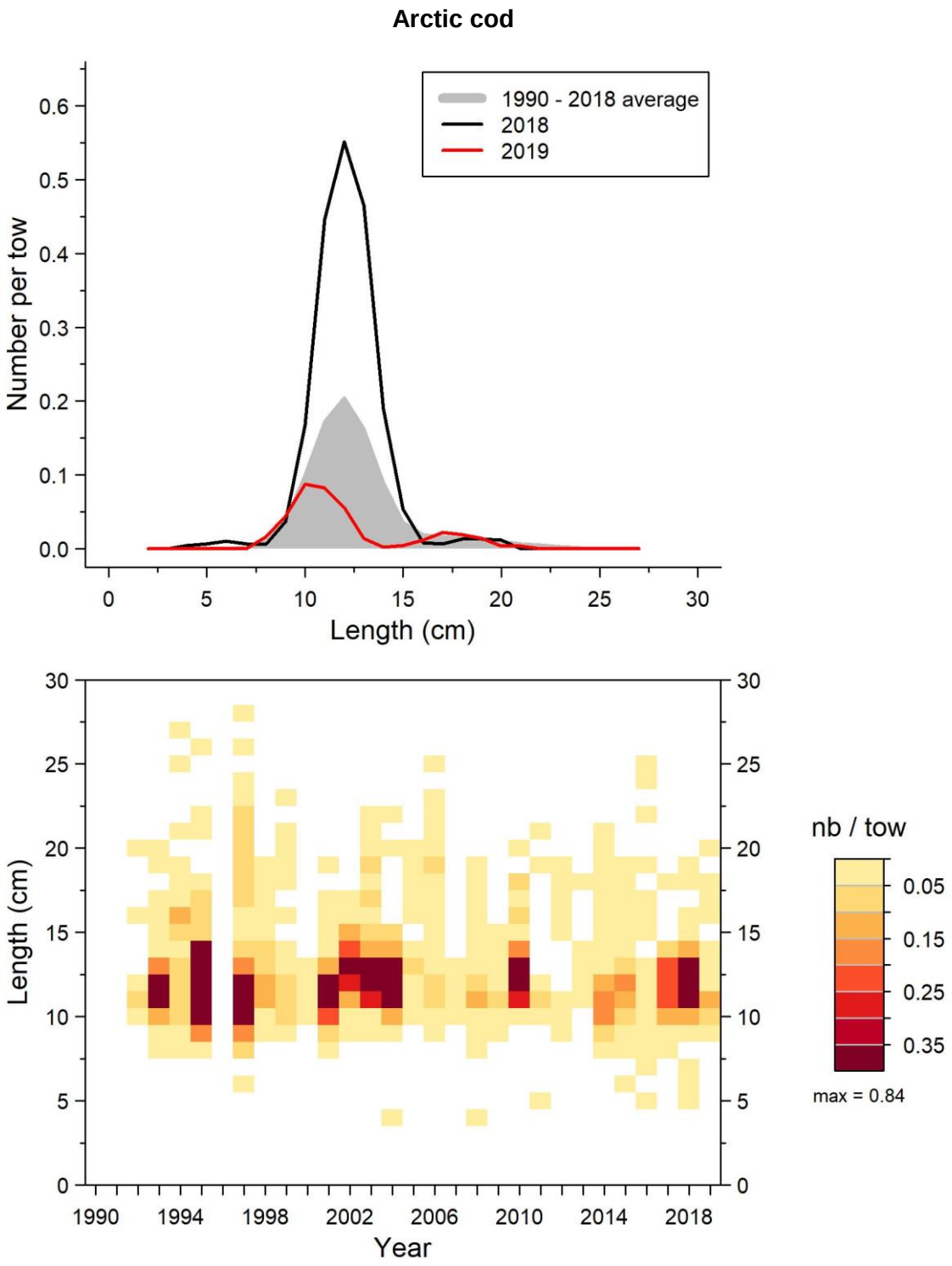

Figure 48. Length frequency distributions (mean number per 15 minutes tow) observed during the survey for Arctic cod in 4RST.

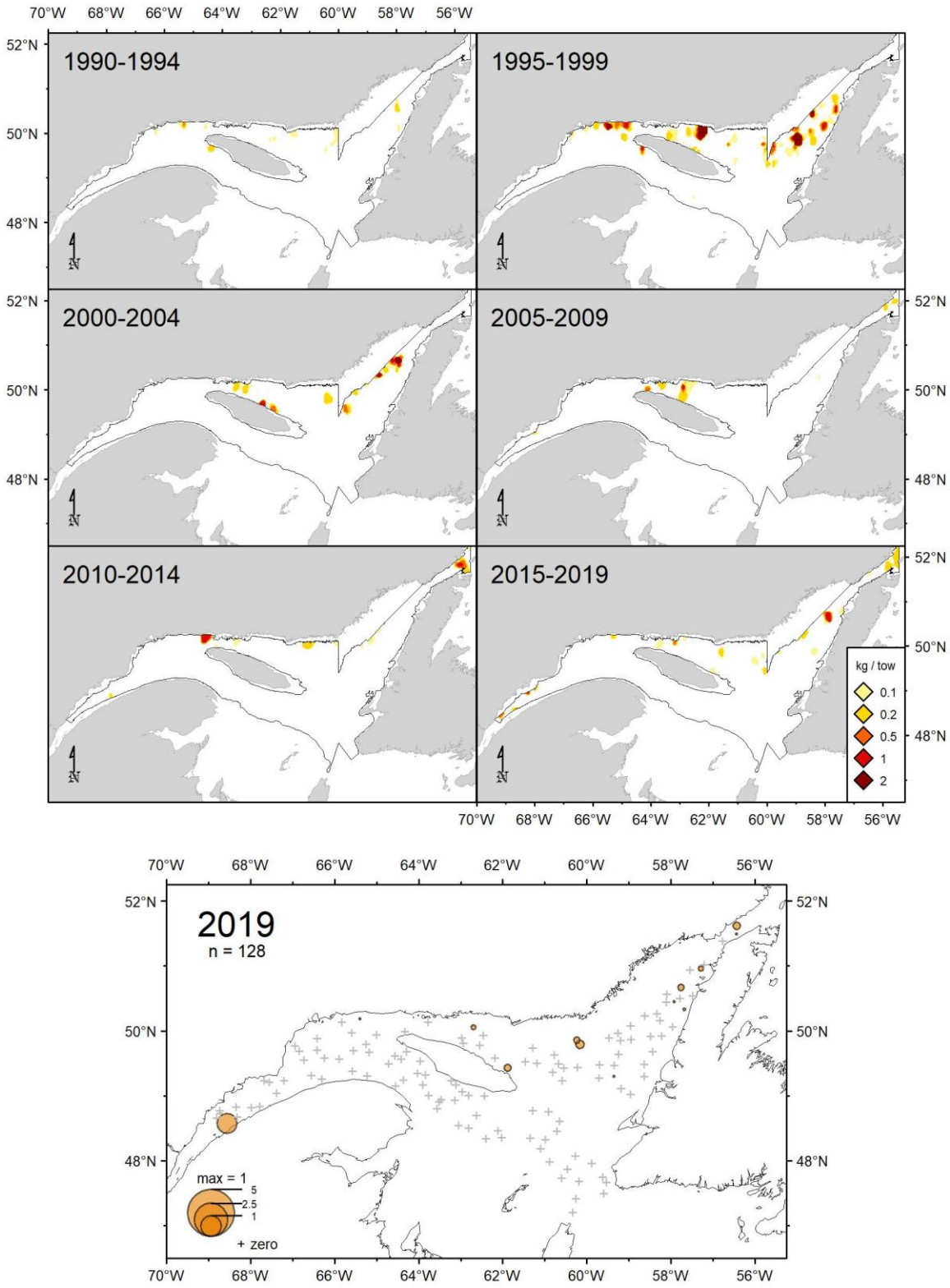

Figure 49. Arctic cod catch rates (kg/15 minutes tow) distribution.

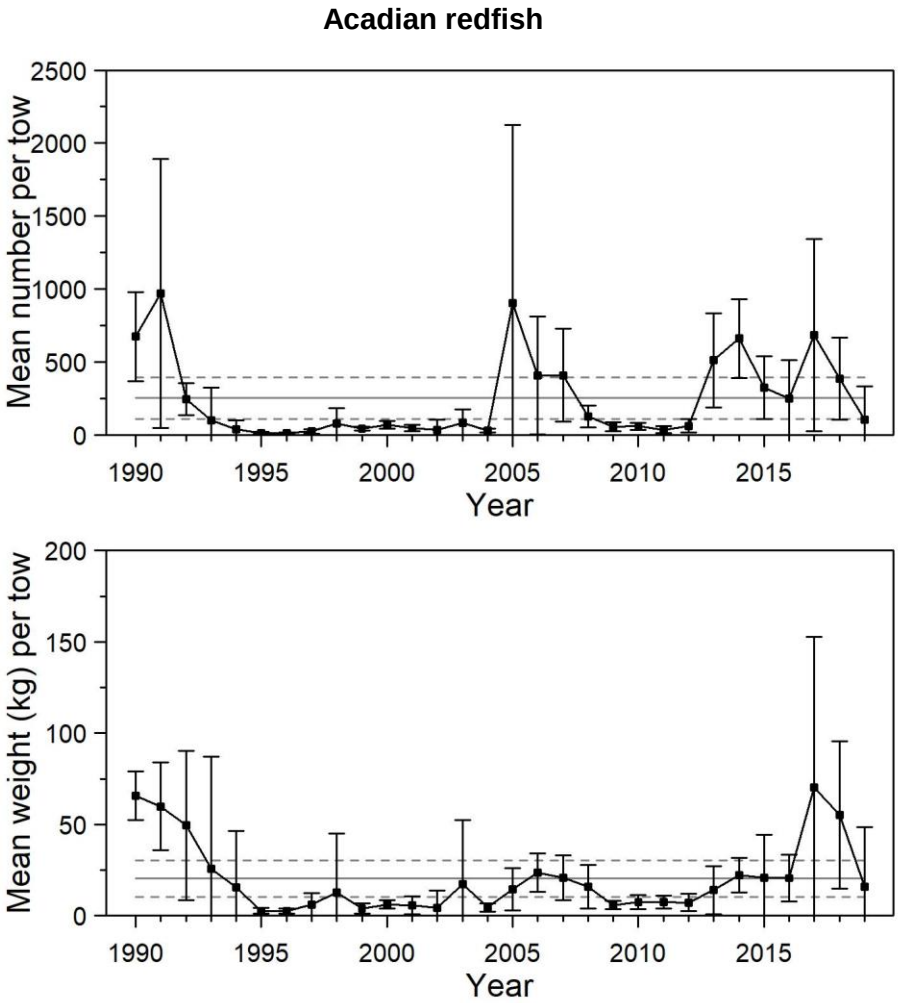

Figure 50. Mean numbers and mean weights per 15 minutes tow observed during the survey for Acadian redfish in 4RST. Error bars indicate the 95% confidence interval and the horizontal lines indicate the mean of the 1990-2018 period (solid line) and upper and lower reference (see text) limits (dashed lines).

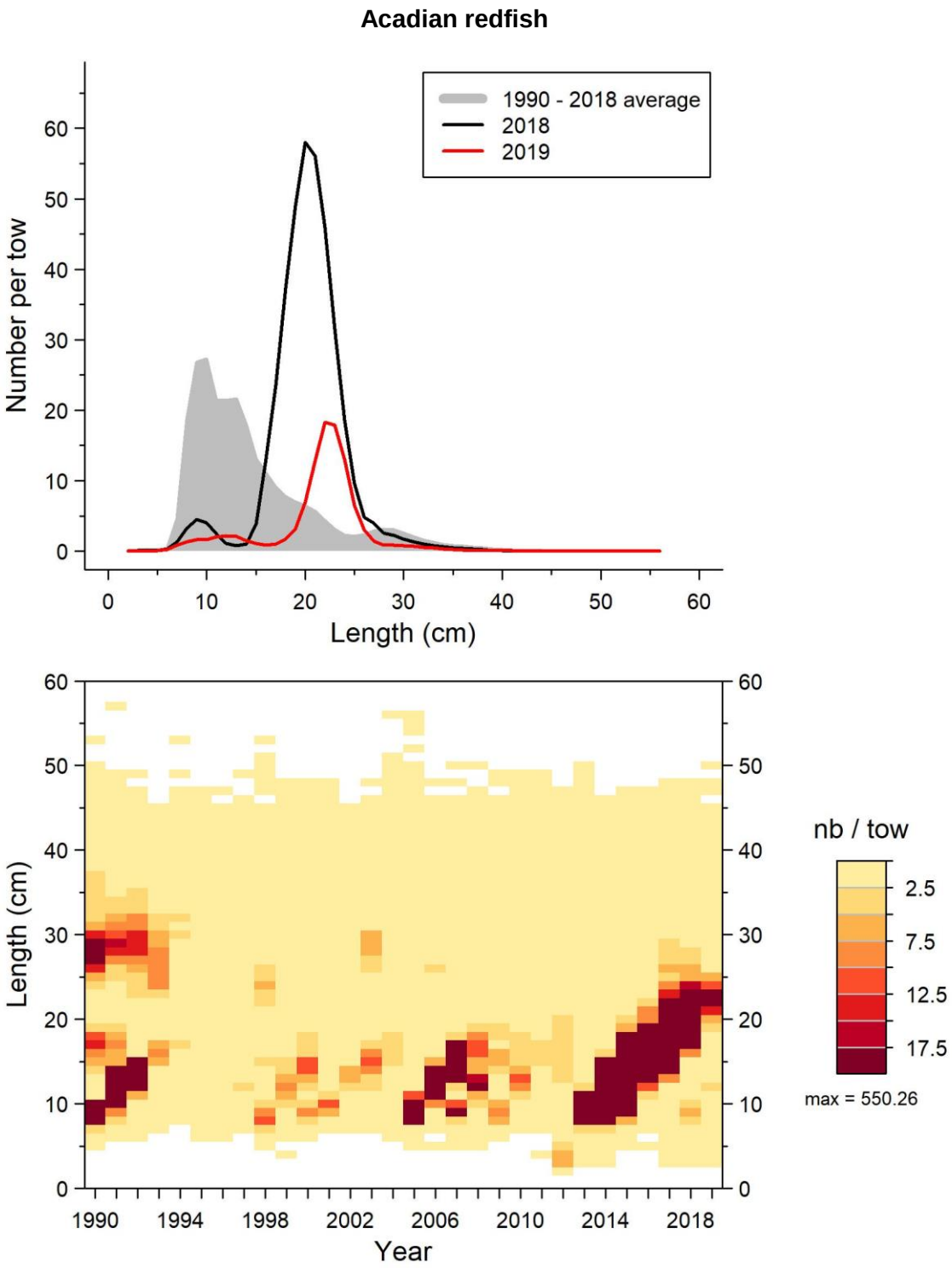

Figure 51. Length frequency distributions (mean number per 15 minutes tow) observed during the survey for Acadian redfish in 4RST.

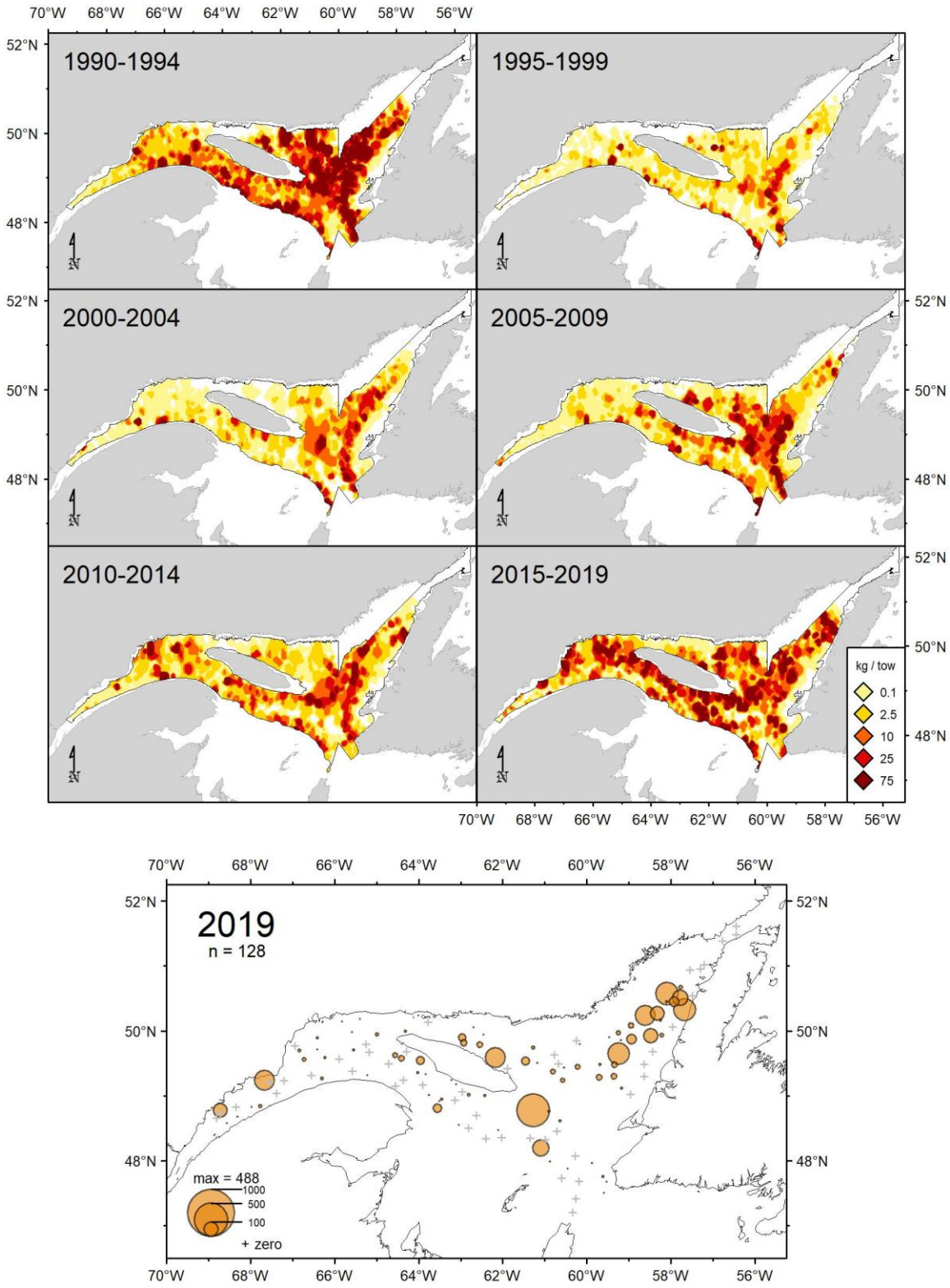

Figure 52. Acadian redfish catch rates (kg/15 minutes tow) distribution.

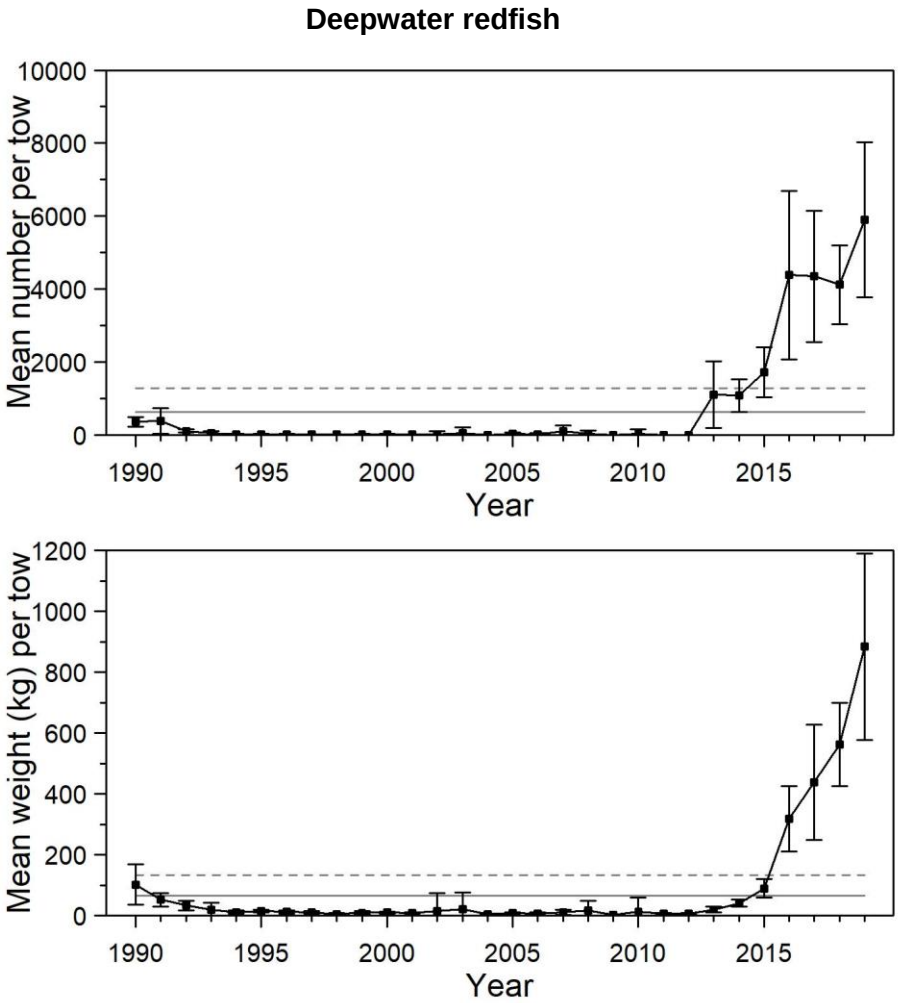

Figure 53. Mean numbers and mean weights per 15 minutes tow observed during the survey for deepwater redfish in 4RST. Error bars indicate the 95% confidence interval and the horizontal lines indicate the mean of the 1990-2018 period (solid line) and upper and lower reference (see text) limits (dashed lines).

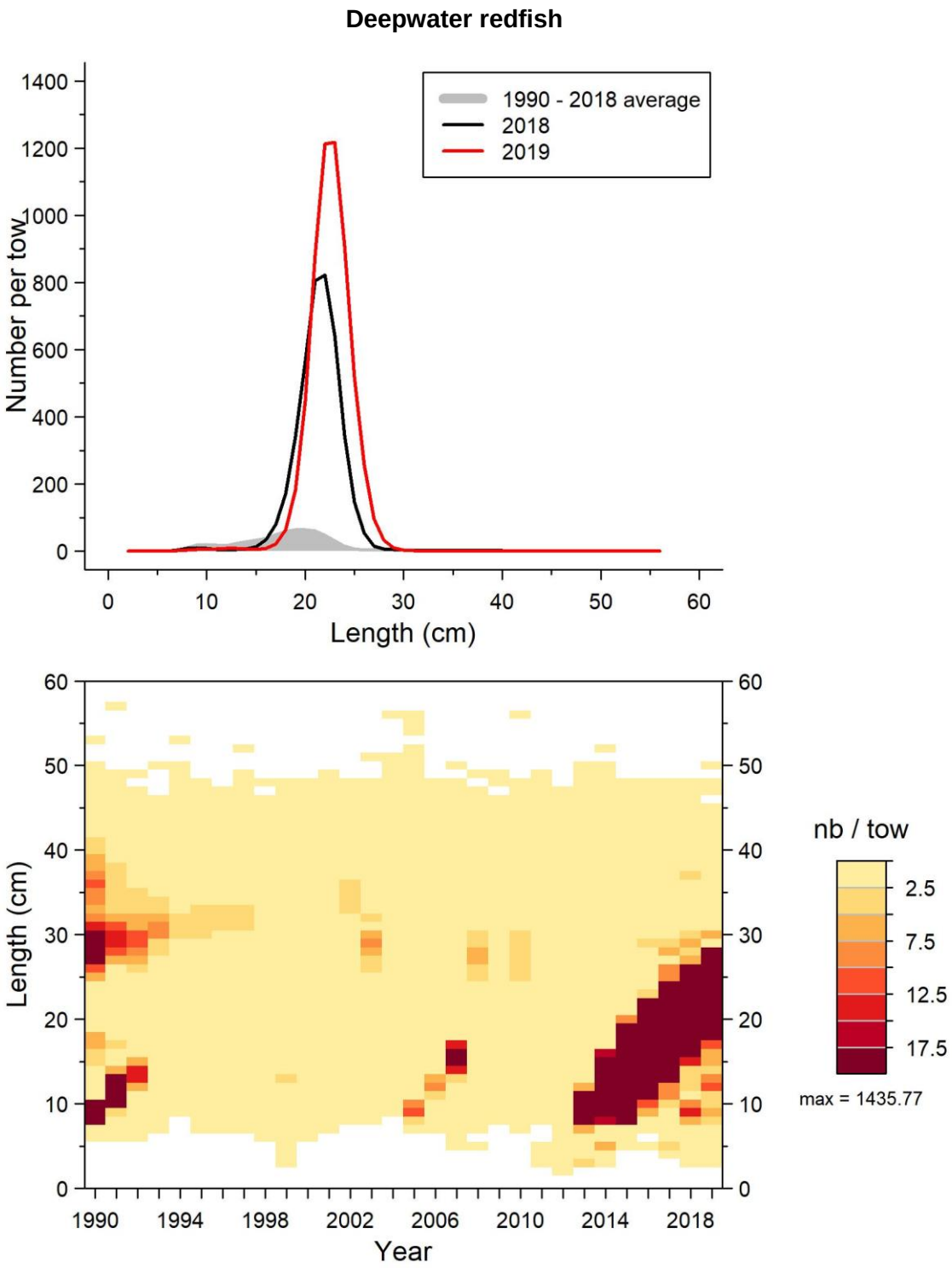

Figure 54. Length frequency distributions (mean number per 15 minutes tow) observed during the survey for deepwater redfish in 4RST.

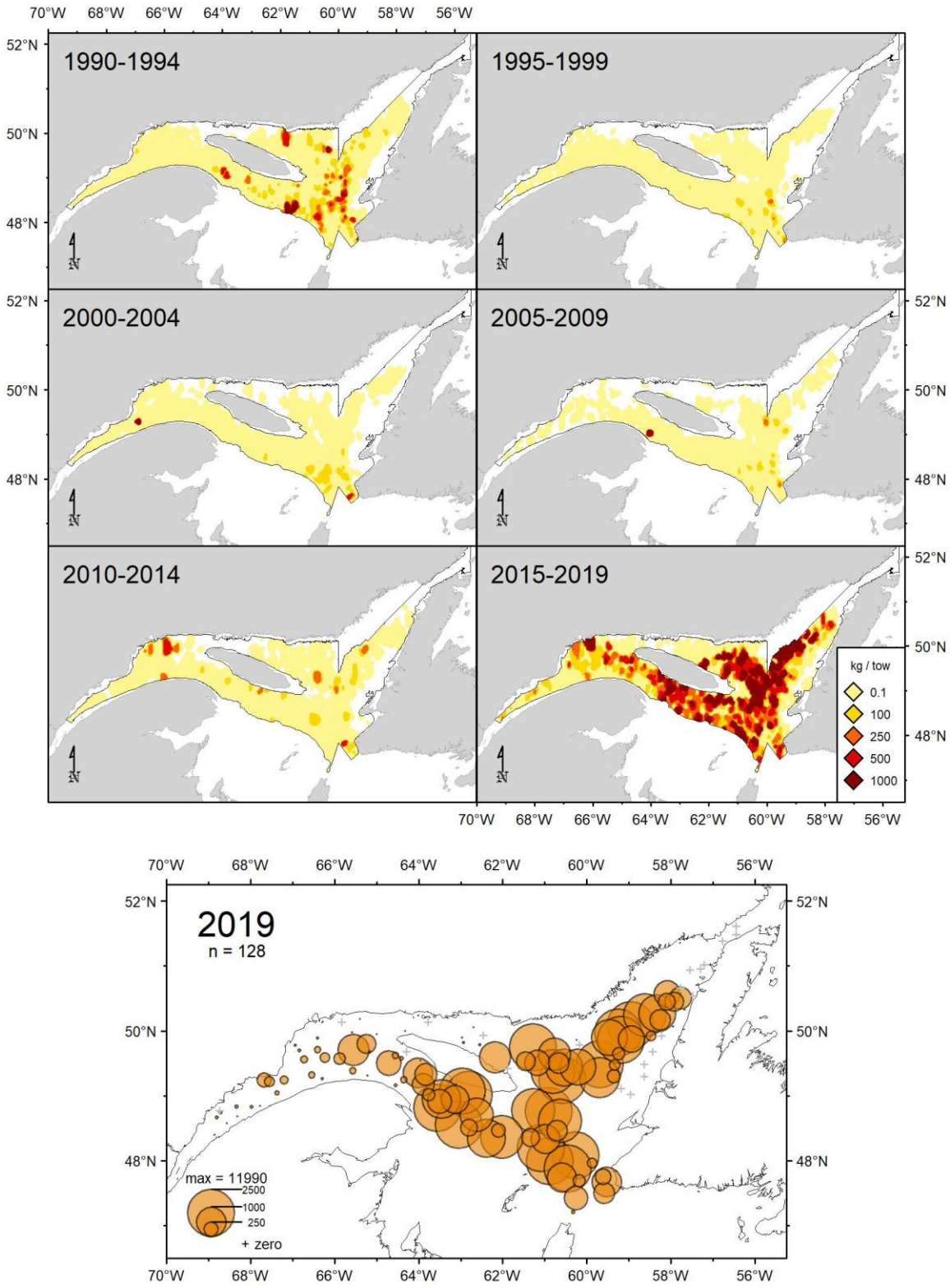

Figure 55. Deepwater redfish catch rates (kg/15 minutes tow) distribution.

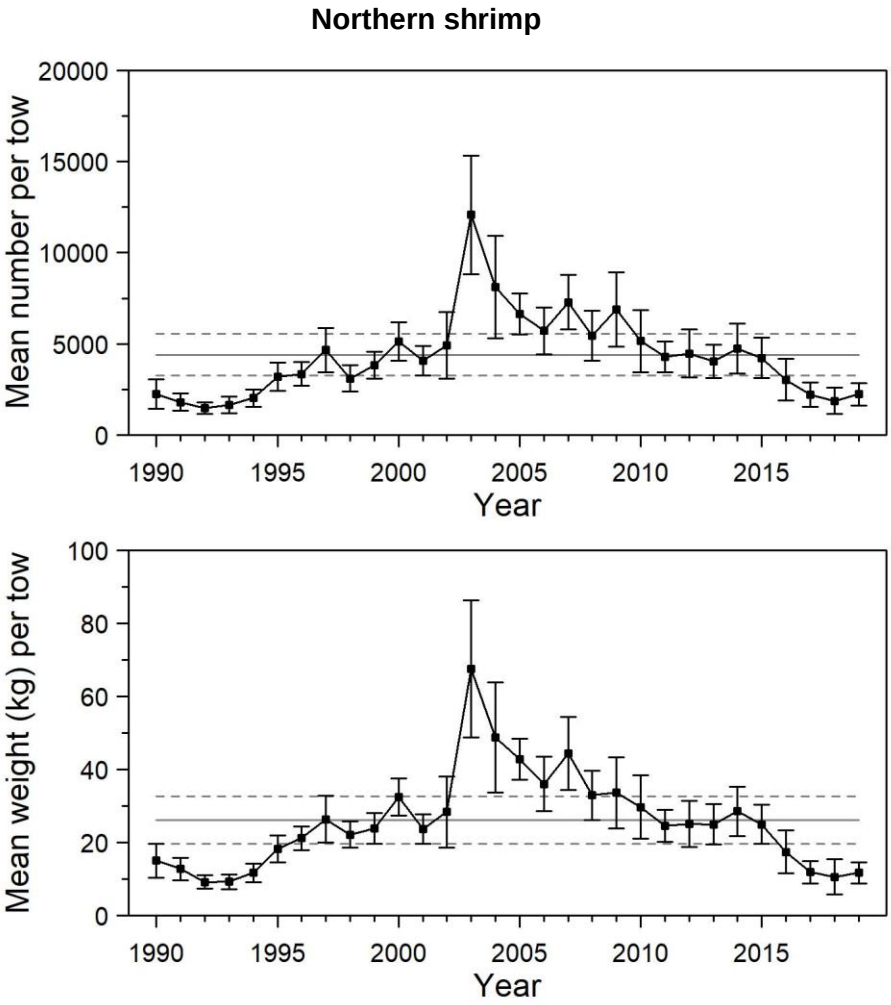

Figure 56. Mean numbers and mean weights per 15 minutes tow observed during the survey for northern shrimp in 4RST. Error bars indicate the 95% confidence interval and the horizontal lines indicate the mean of the 1990-2018 period (solid line) and upper and lower reference (see text) limits (dashed lines).

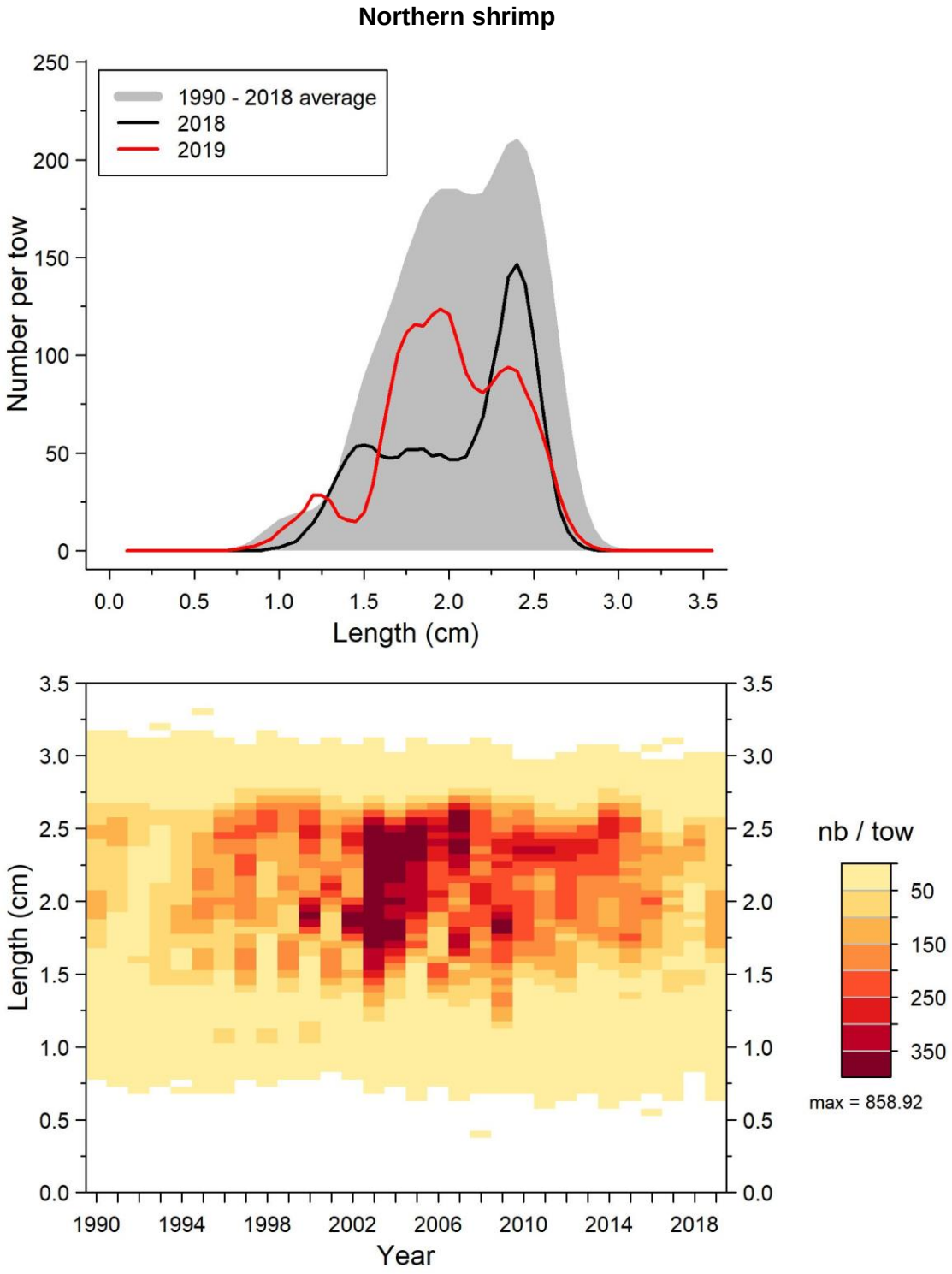

Figure 57. Carapace length frequency distributions (mean number per 15 minutes tow) observed during the survey for northern shrimp in 4RST.

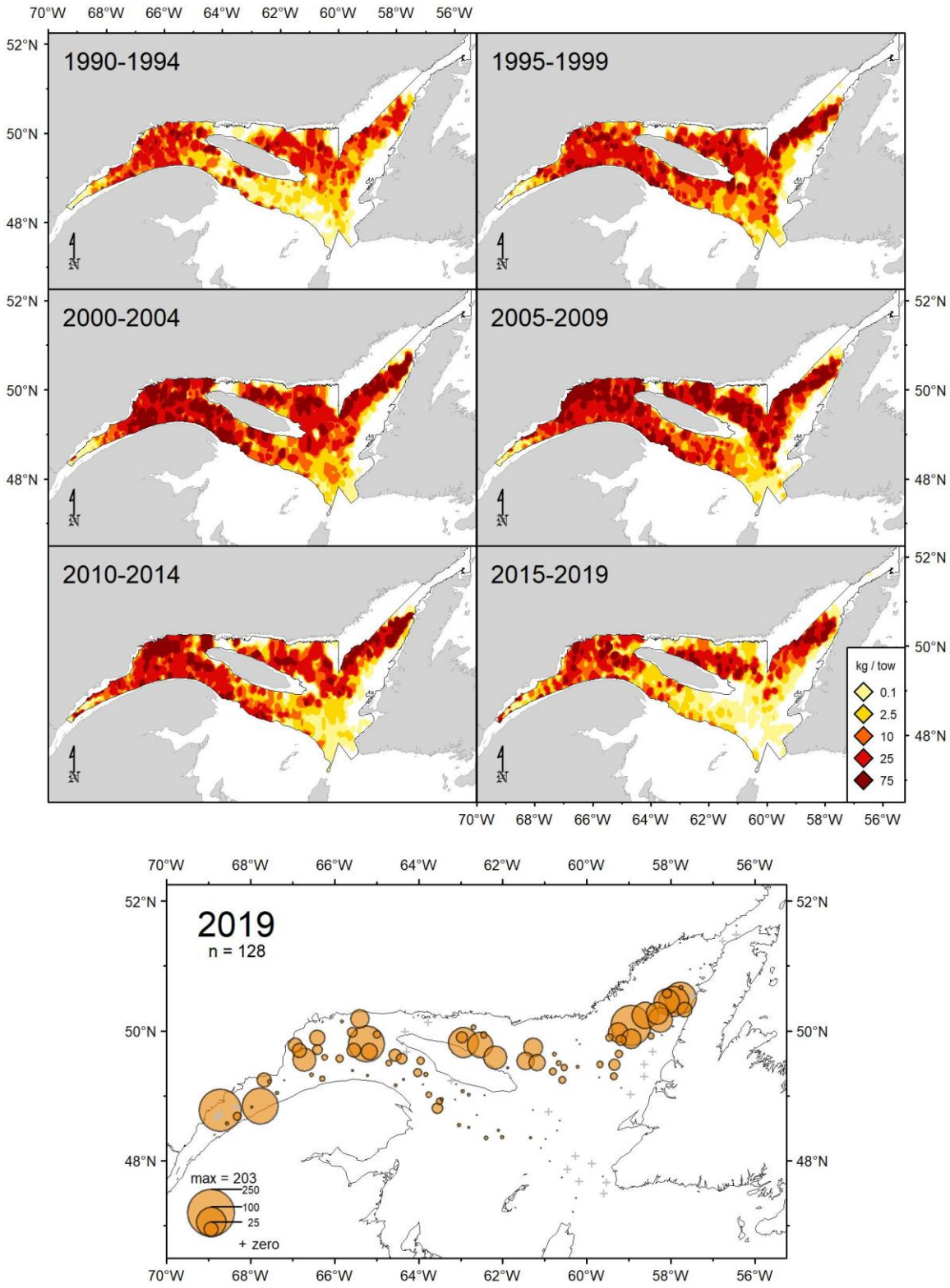

Figure 58. Northern shrimp catch rates (kg/15 minutes tow) distribution.

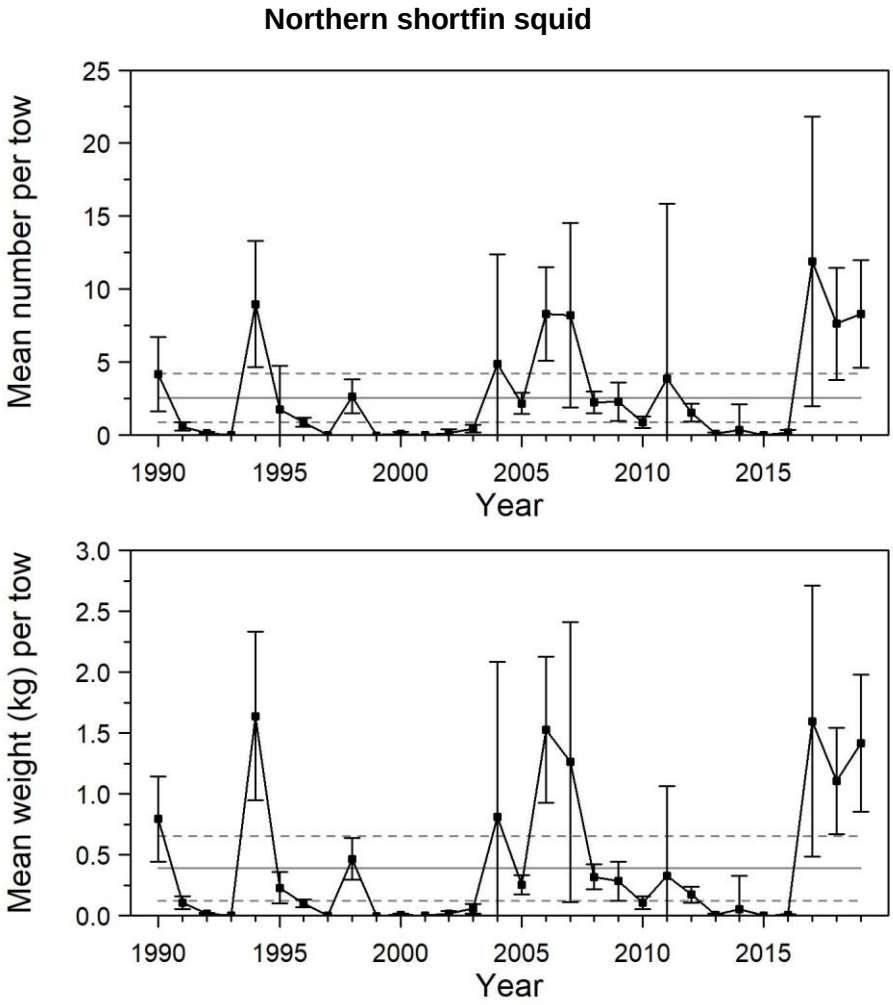

Figure 59. Mean numbers and mean weights per 15 minutes tow observed during the survey for northern shortfin squid in 4RST. Error bars indicate the 95% confidence interval and the horizontal lines indicate the mean of the 1990-2018 period (solid line) and upper and lower reference (see text) limits (dashed lines).

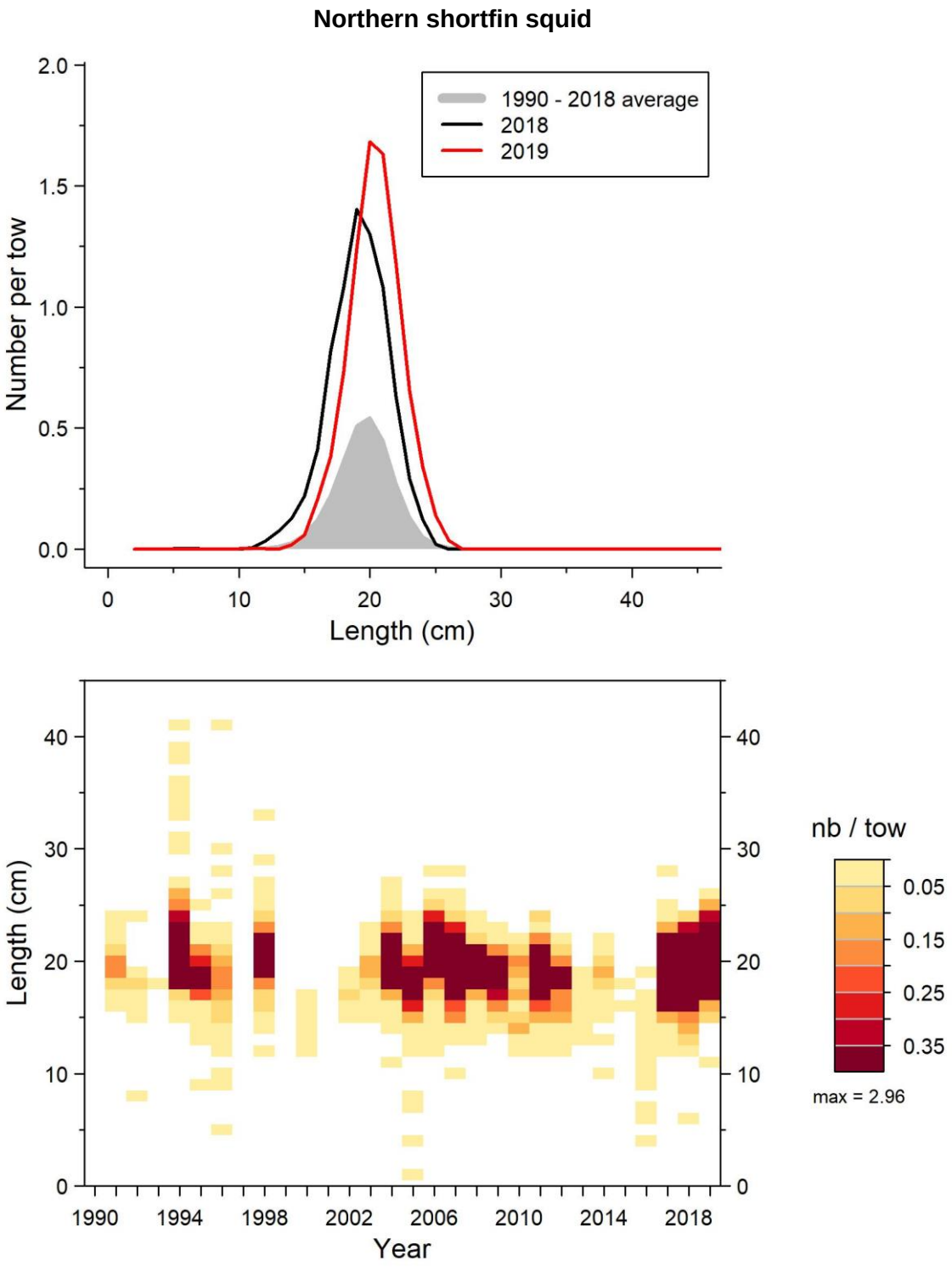

Figure 60. Mantle length frequency distributions (mean number per 15 minutes tow) observed during the survey for northern shortfin squid in 4RST.

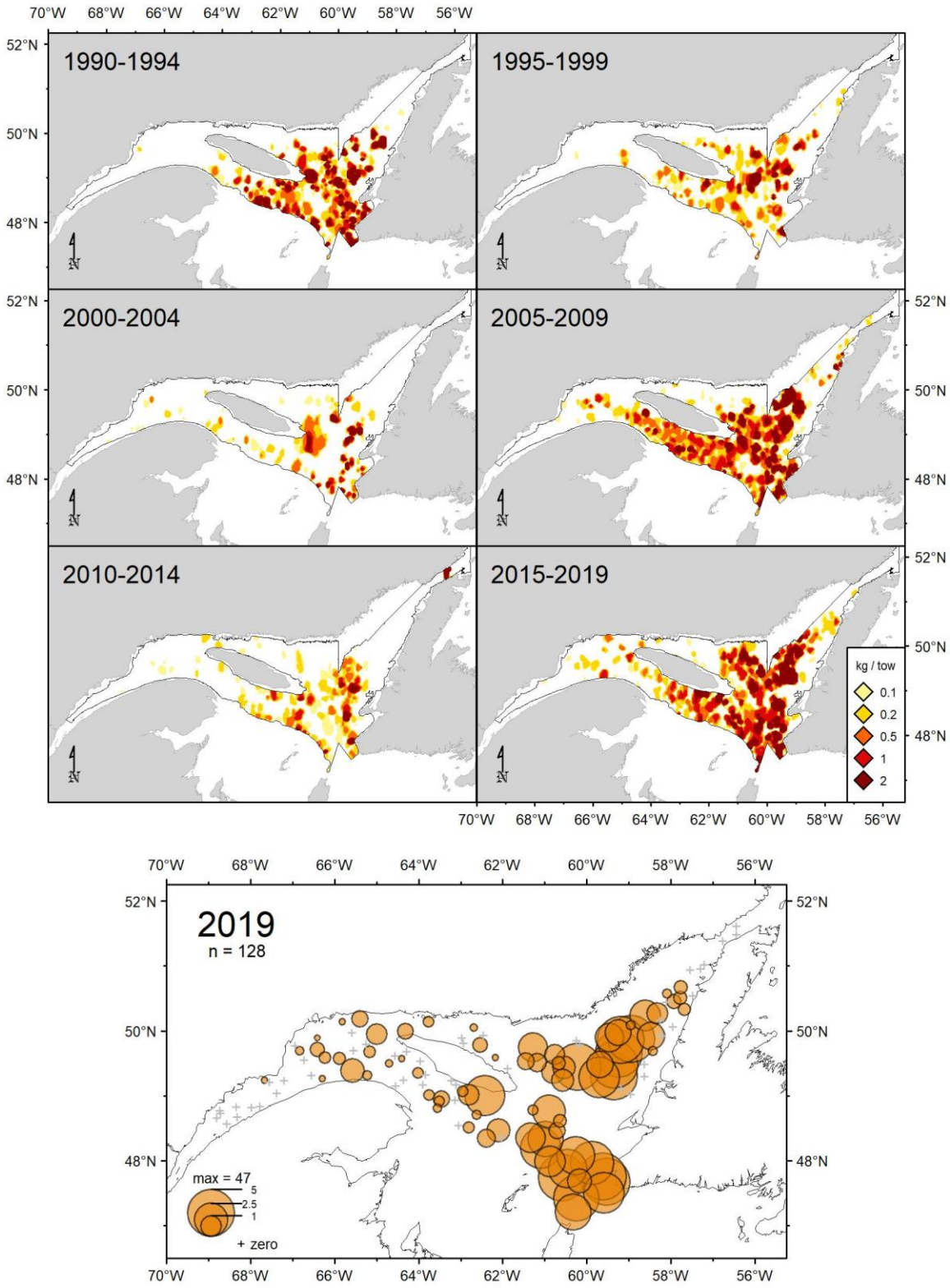

Figure 61. Northern shortfin squid catch rates (kg/15 minutes tow) distribution.

Sea pen (*Anthoptilum grandiflorum*)

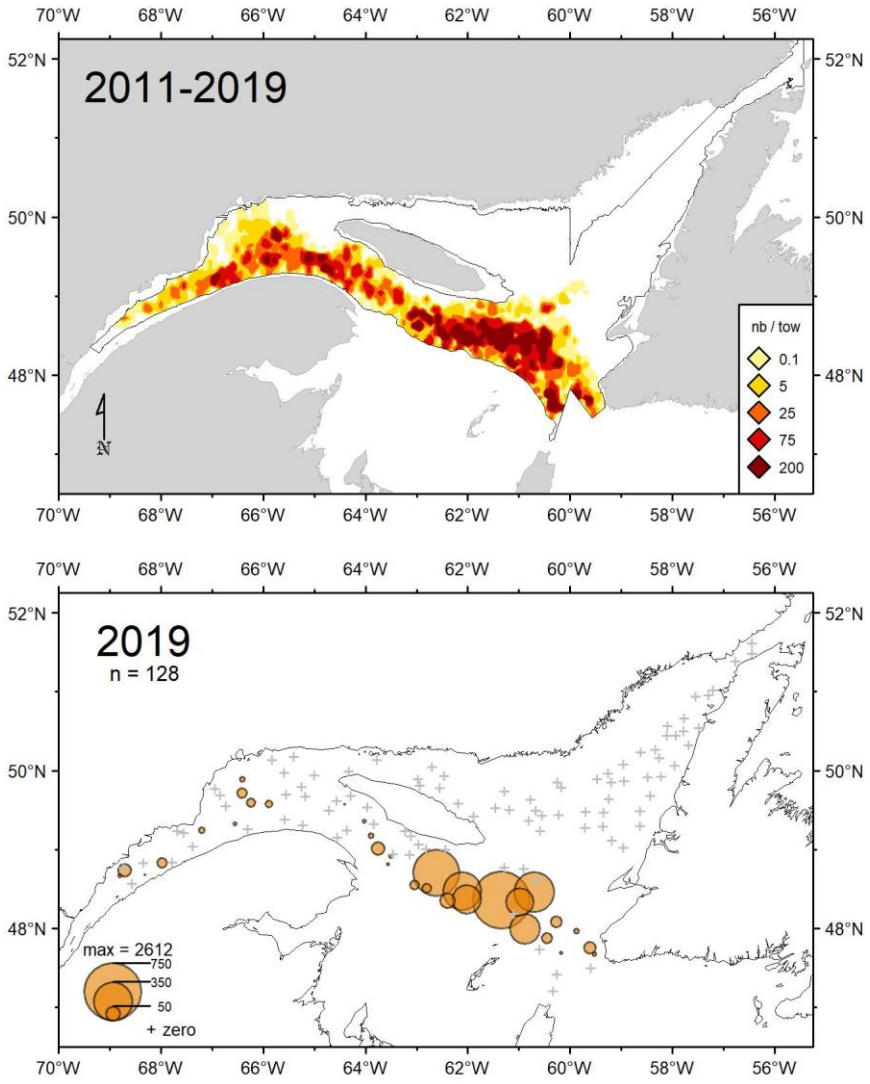

Figure 62. Sea pen (Anthoptilum grandiflorum) catch rates (nb/15 minutes tow) distribution.

Sea pen (*Halipteris finmarchica*)

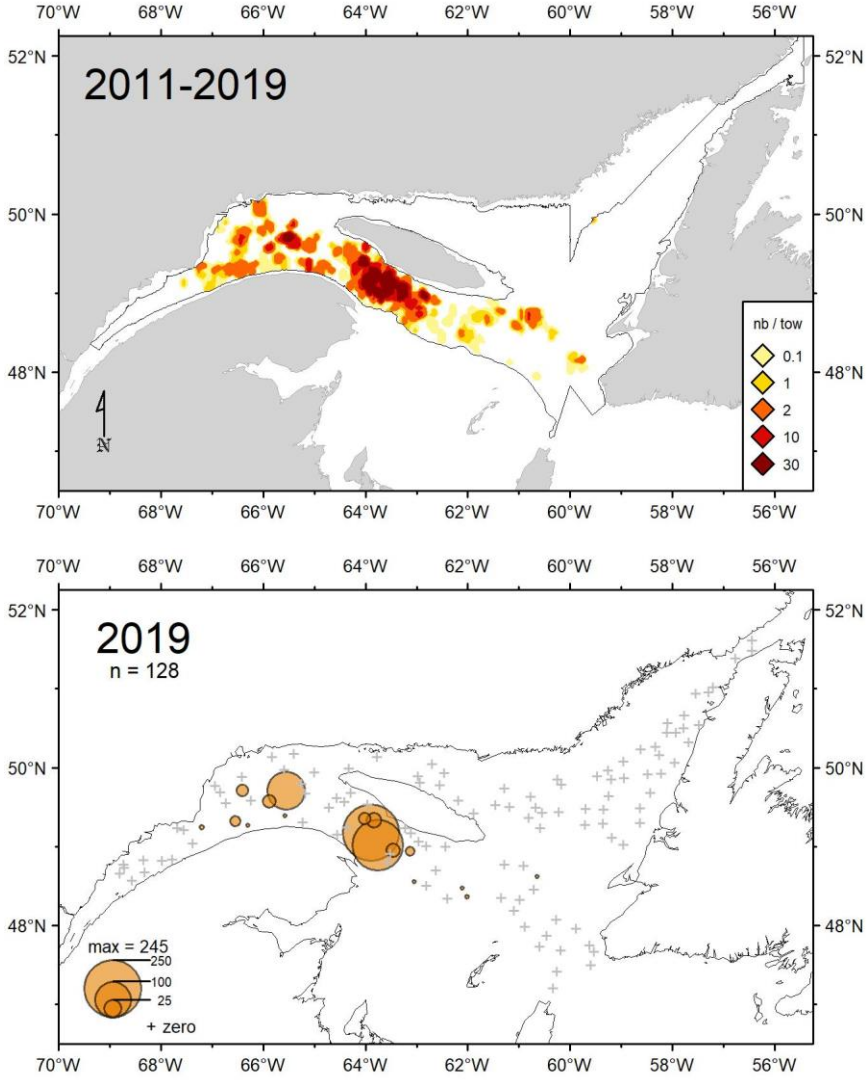

Figure 63. Sea pen (Halipteris finmarchica) catch rates (nb/15 minutes tow) distribution.

Sea pen (*Pennatula aculeata*)

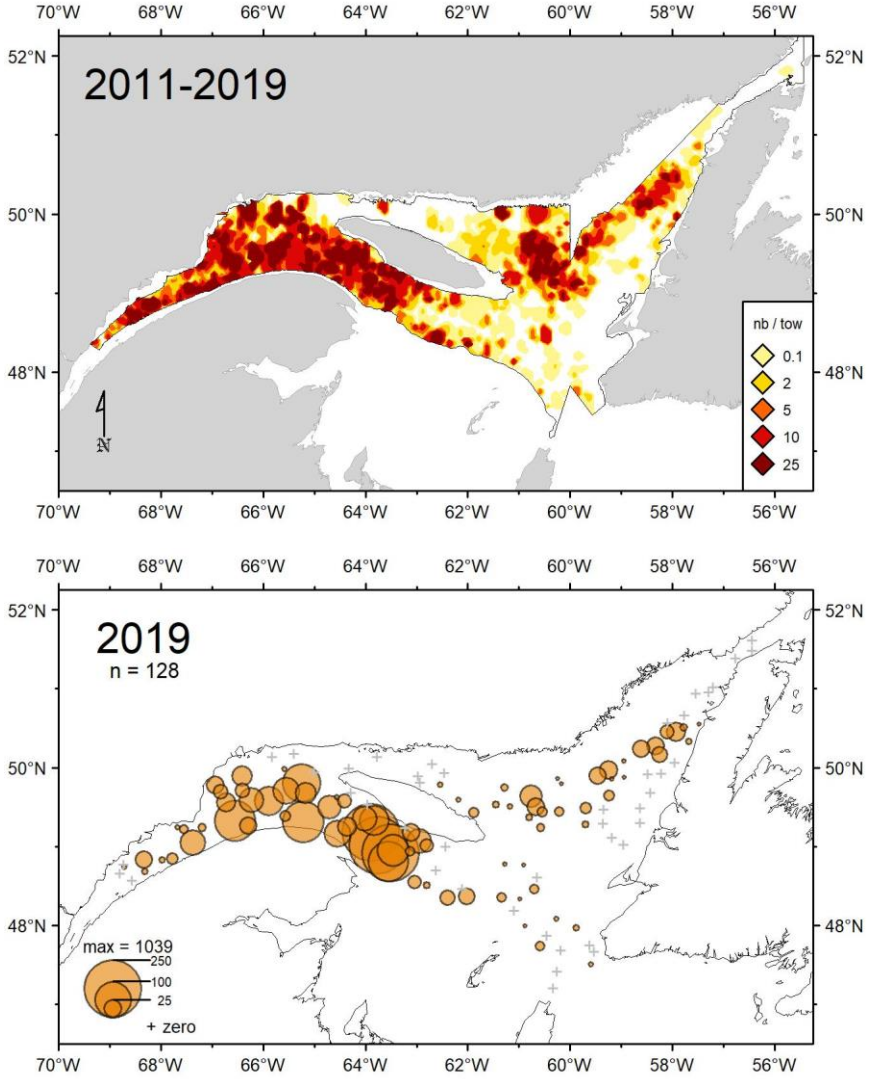

Figure 64. Sea pen (Pennatula aculeate) catch rates (nb/15 minutes tow) distribution.

Sea pen (*Pennatula grandis*)

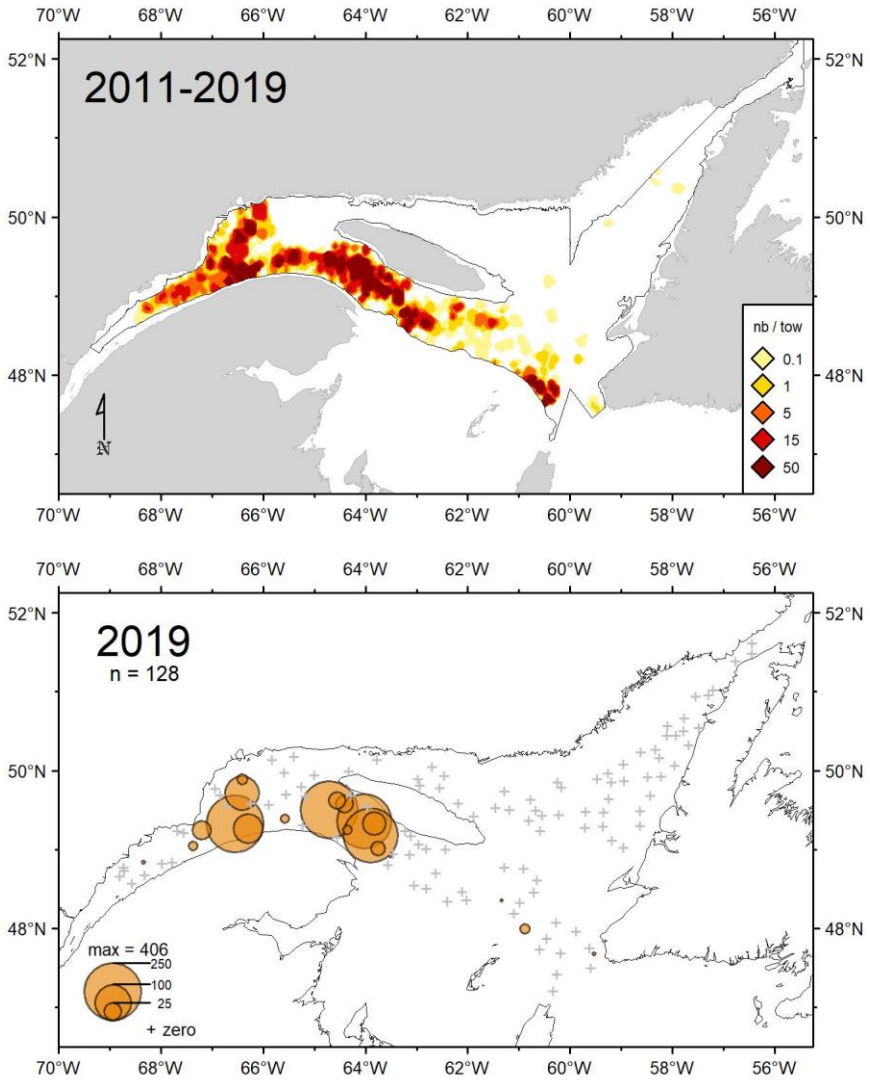

Figure 65. Sea pen (Pennatula grandis) catch rates (nb/15 minutes tow) distribution.

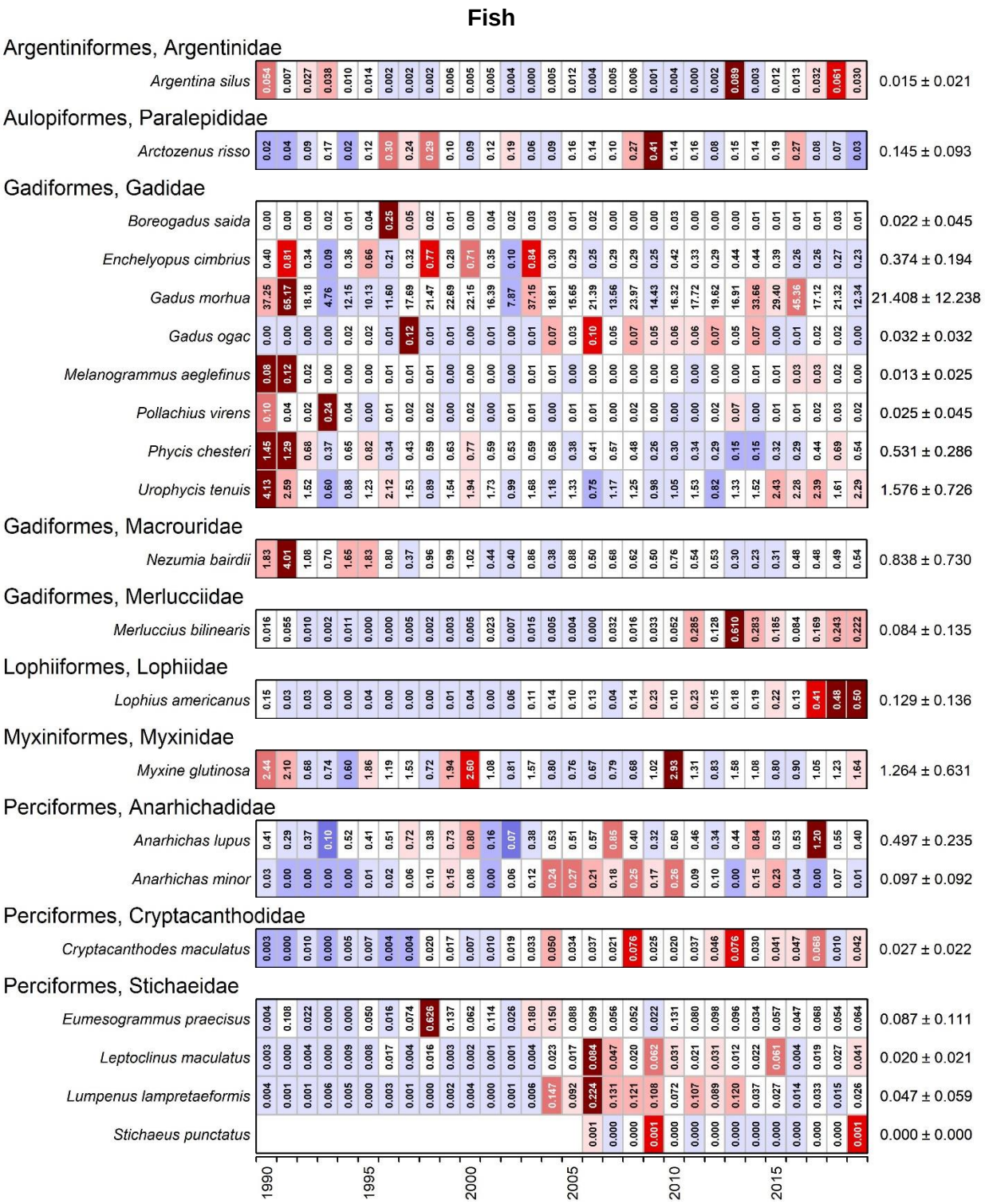

Figure 66. Average weight per 15-minute tow during the fish taxa survey. The colour code represents the anomaly value of the difference between the CPUE in a given year and the average CPUE in the time series divided by the standard deviation of this average for each taxon.

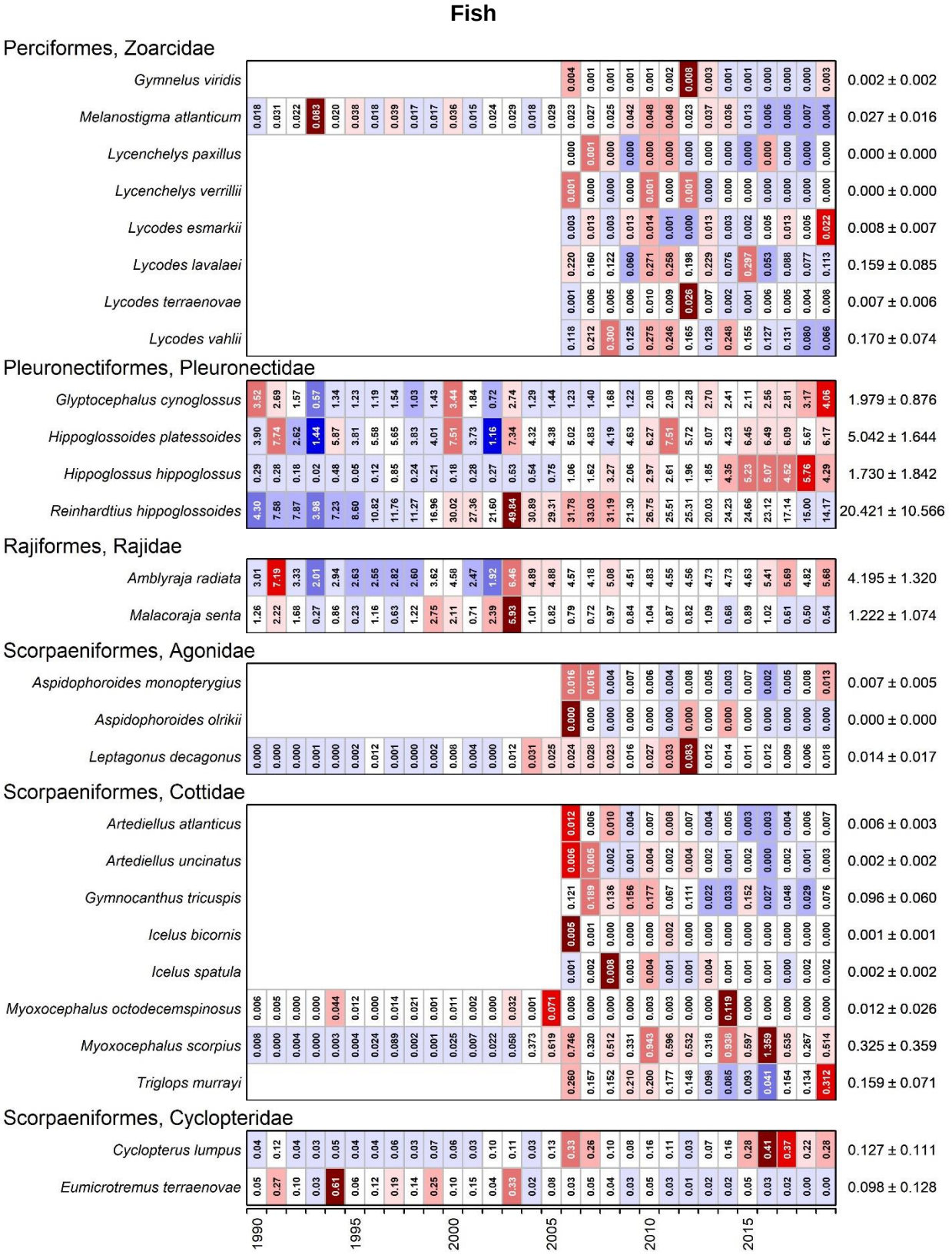

Figure 66. Continued.

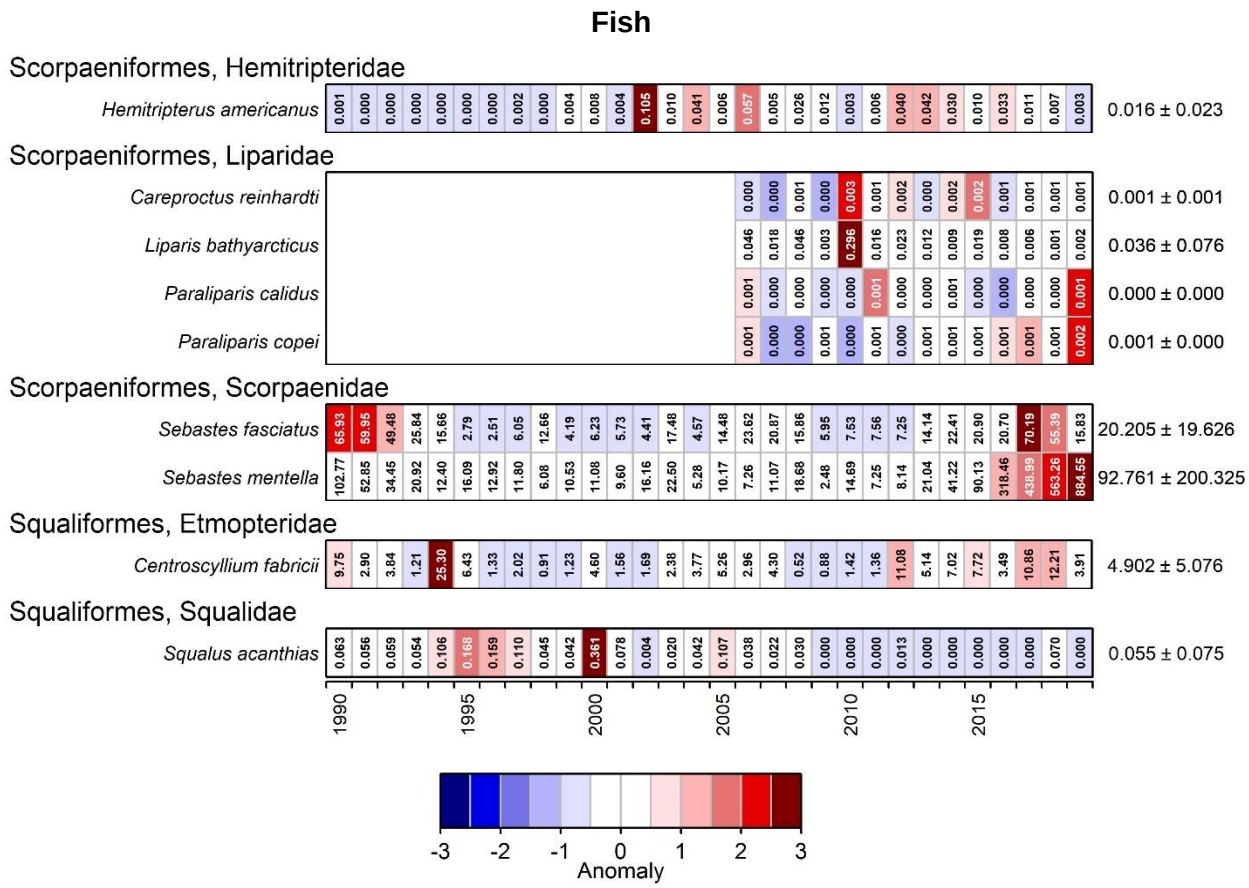

Figure 66. Continued.

Invertebrates

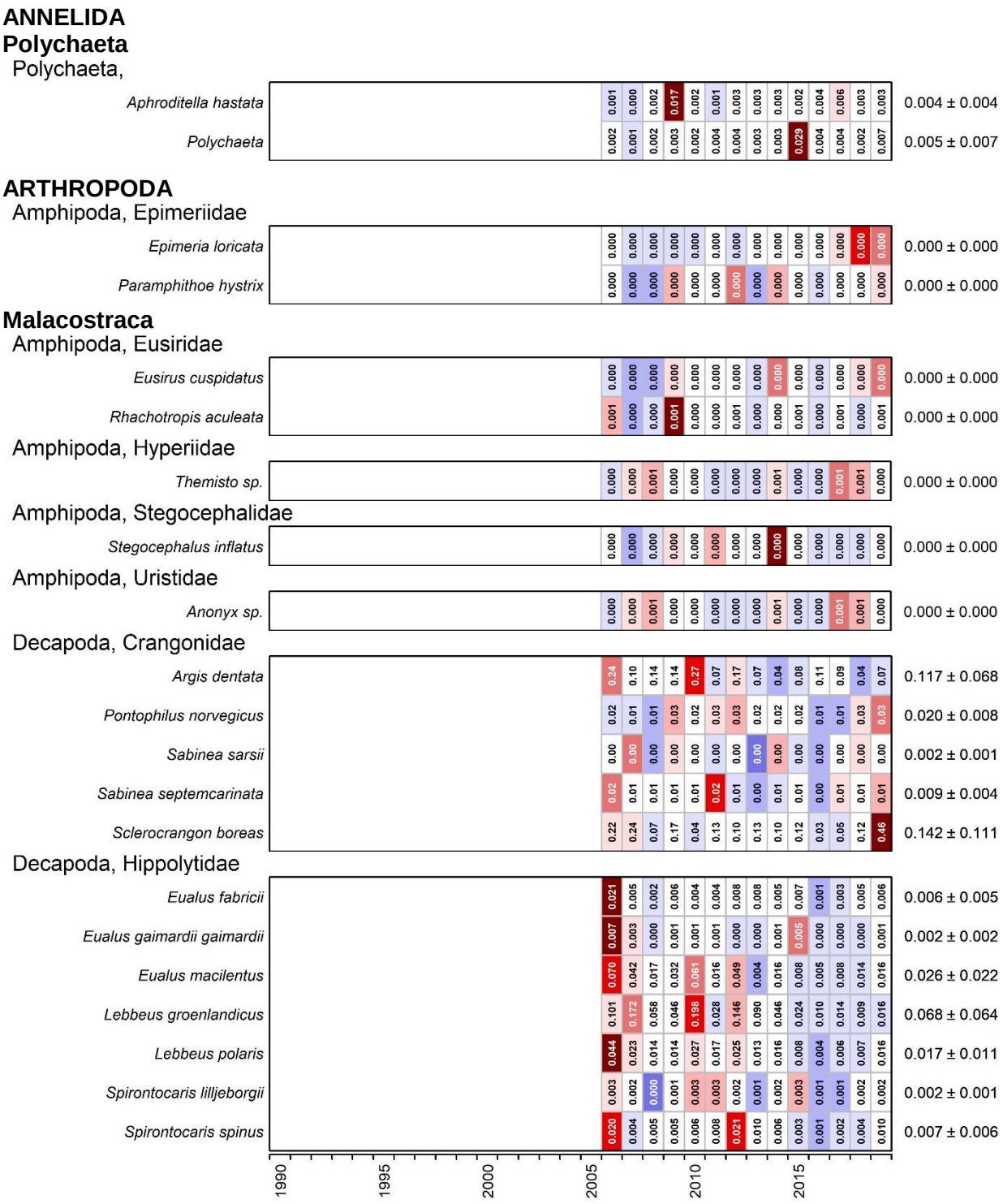

Figure 67. Average weight per 15-minute tow during the invertebrates. The colour code represents the anomaly value of the difference between the CPUE in a given year and the average CPUE in the time series divided by the standard deviation of this average for each taxon.

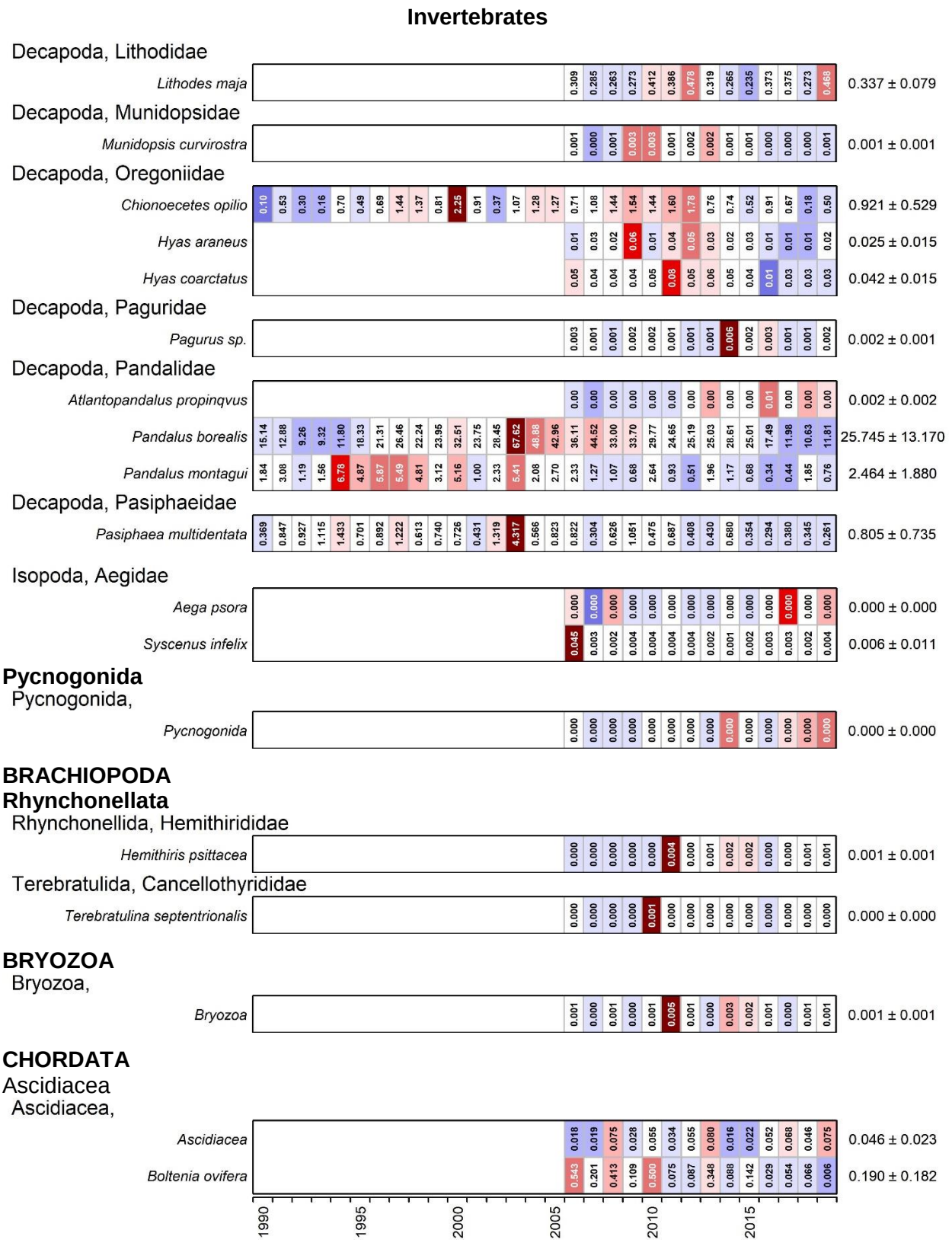

Figure 67. Continued.

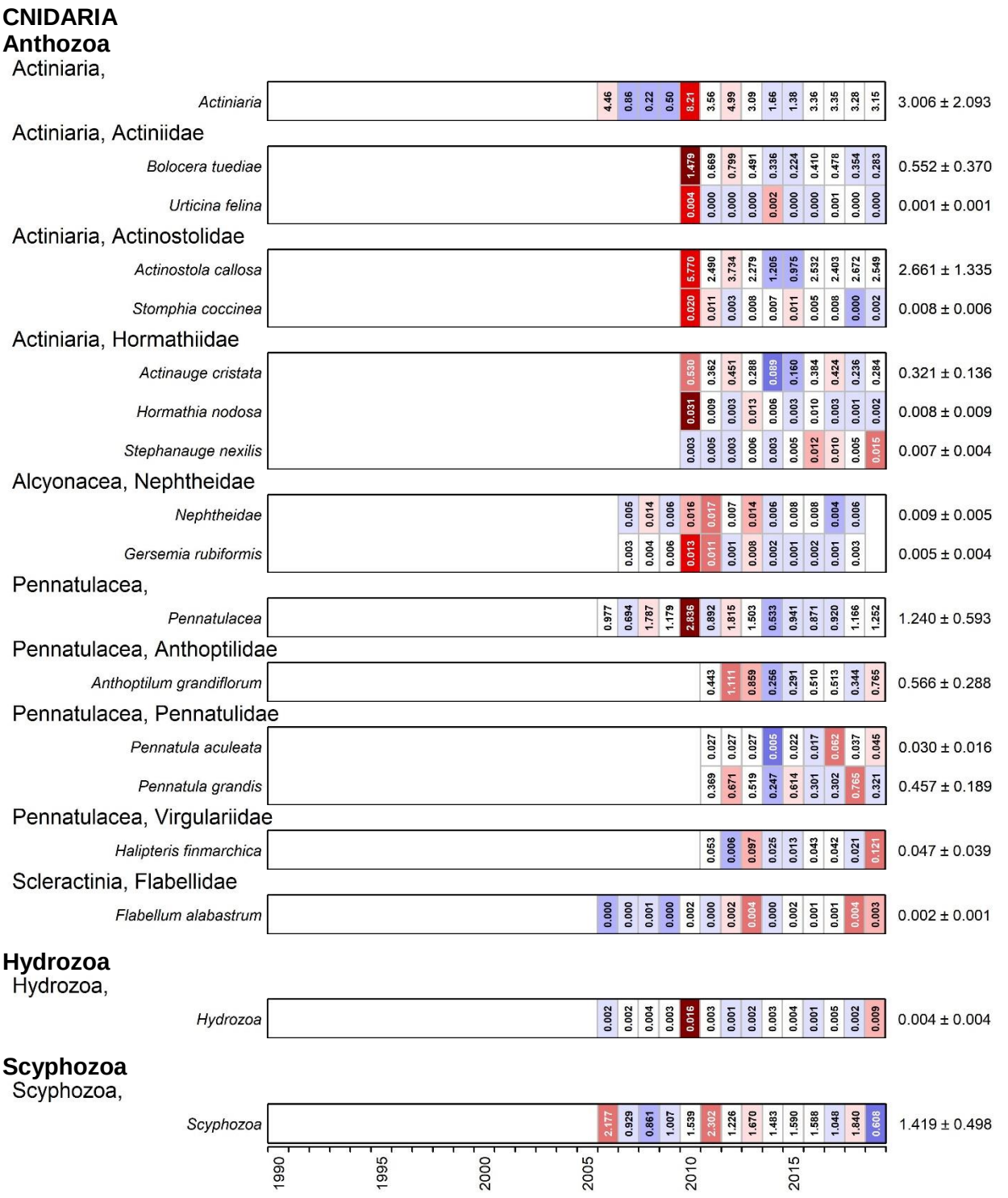

Figure 67. Continued.

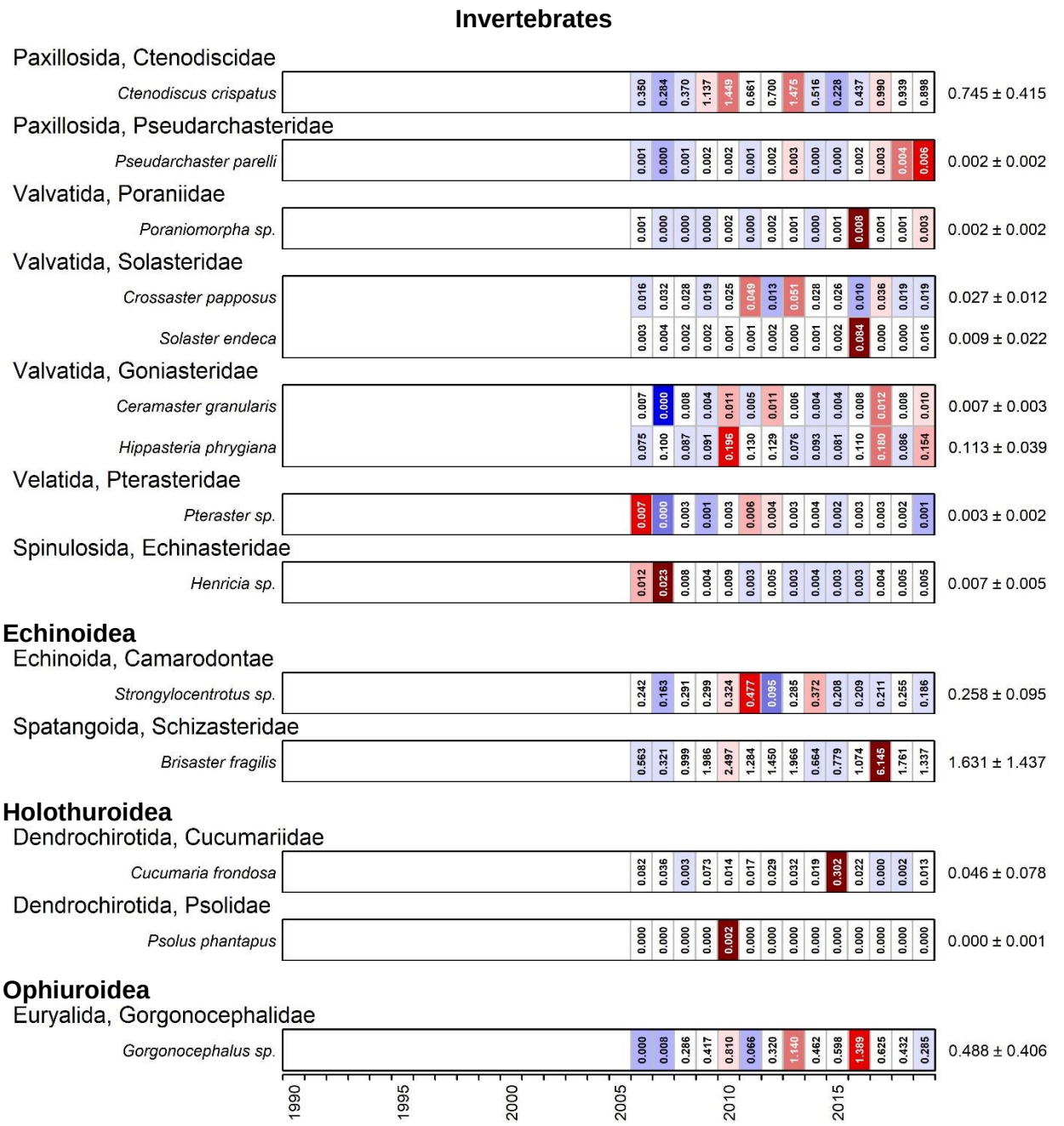

Figure 67. Continued.

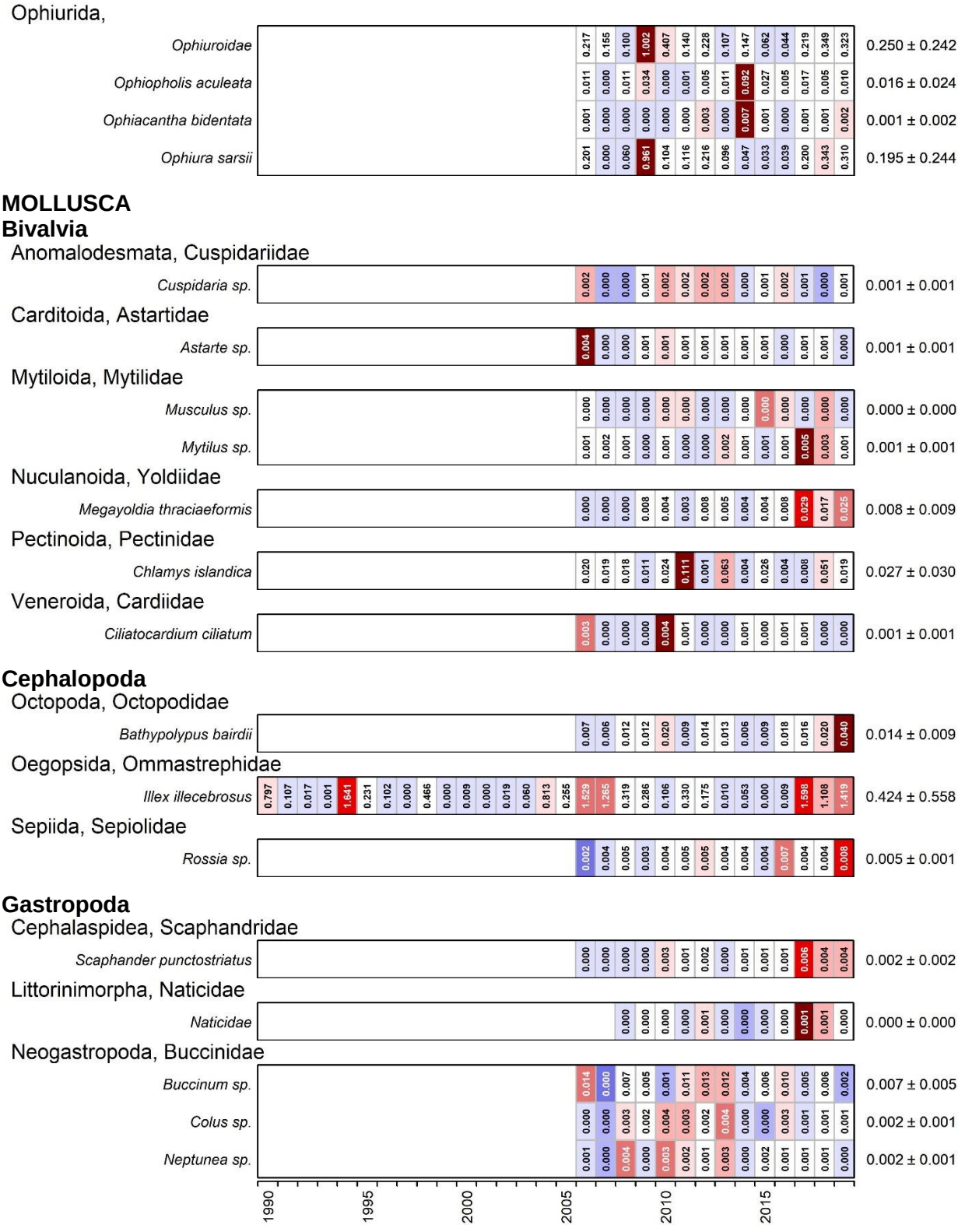

Figure 67. Continued.

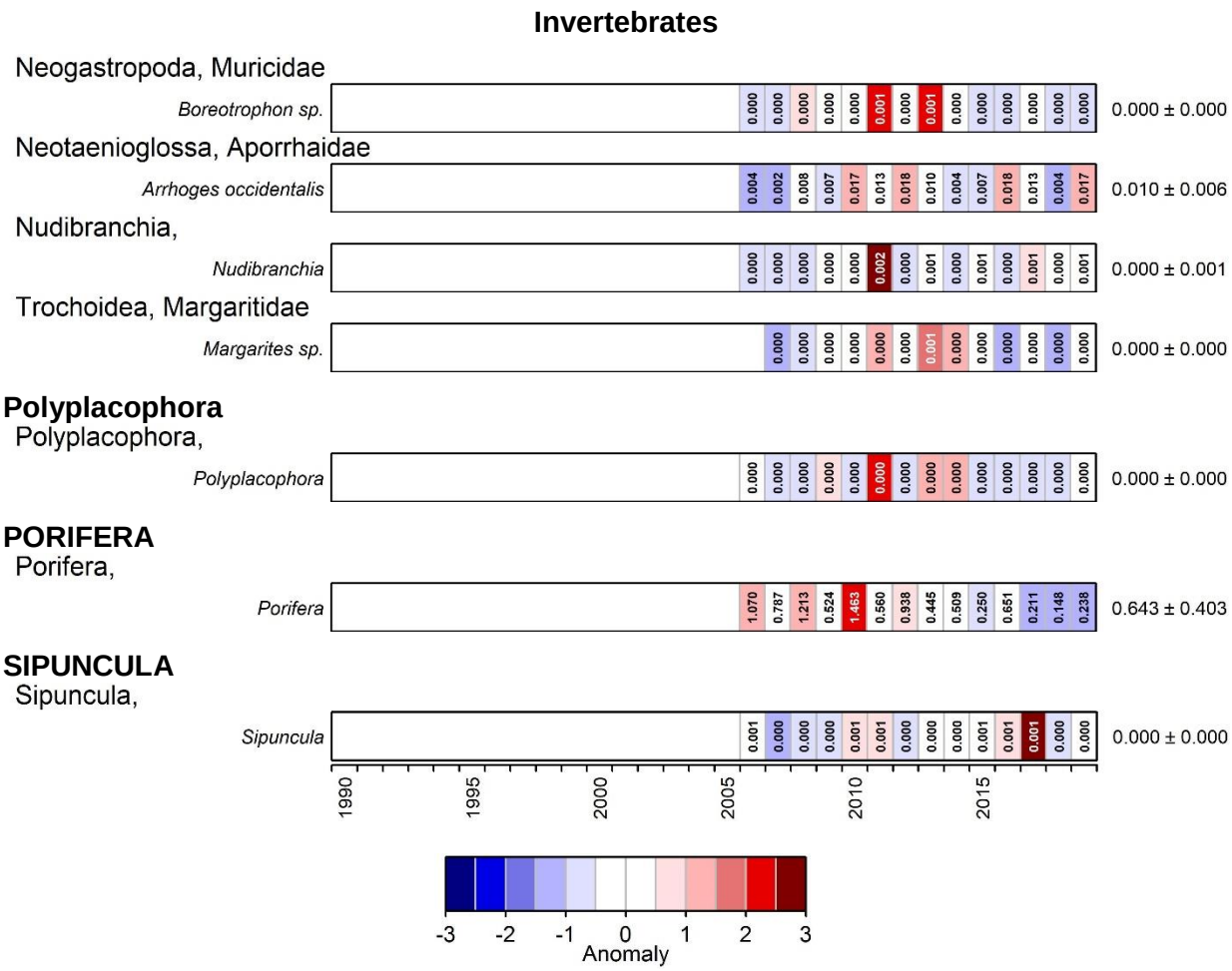

Figure 67. Continued.

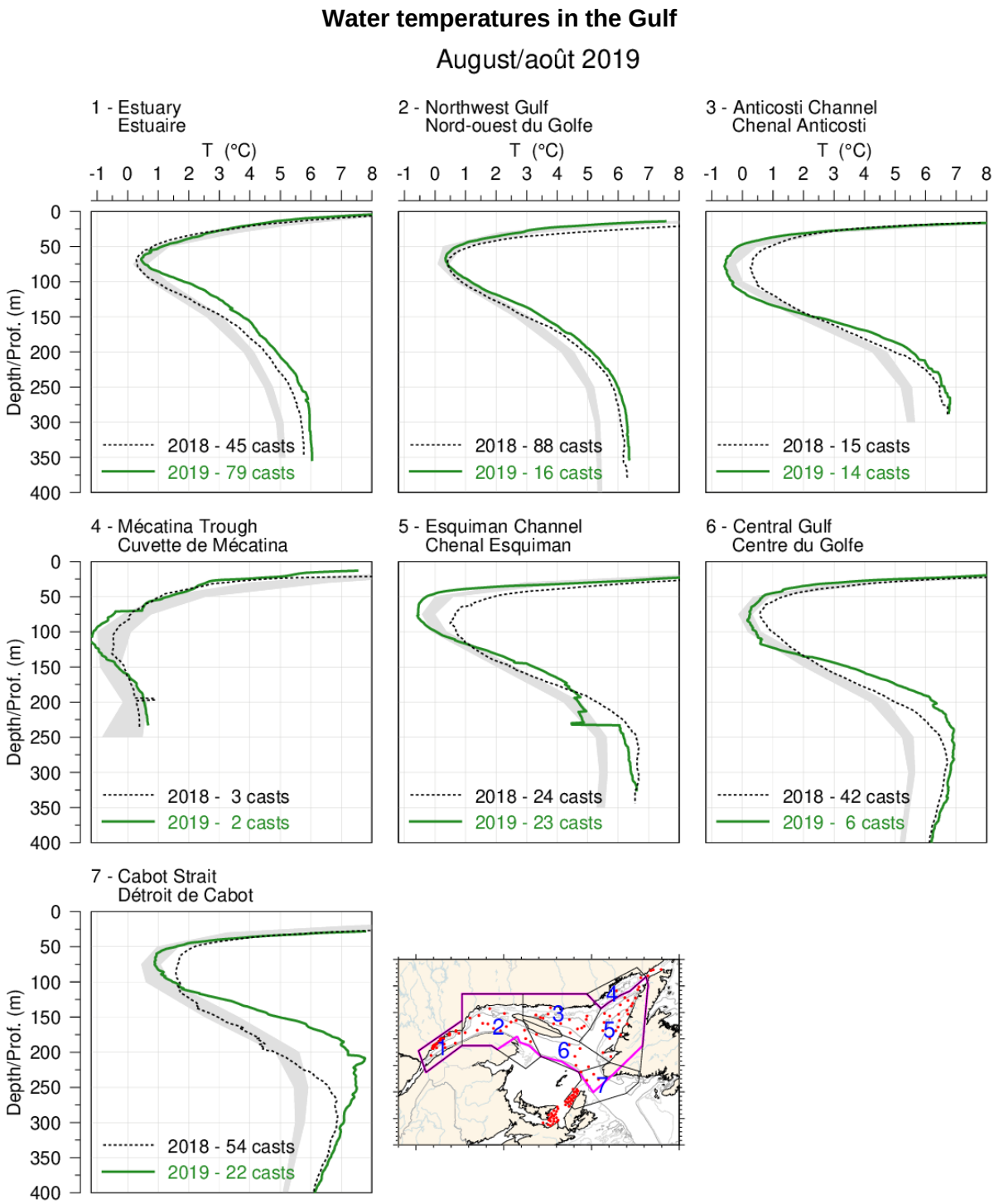

Figure 68. Mean temperature profiles observed in each region of the Gulf during August 2019. The shaded area represents the 1981–2010 climatological monthly mean ± 0.5 SD for August. Mean profiles for August and September 2018 are also shown for comparison. The violet outline on the map shows the area over which sea surface temperature is averaged for figure 69.

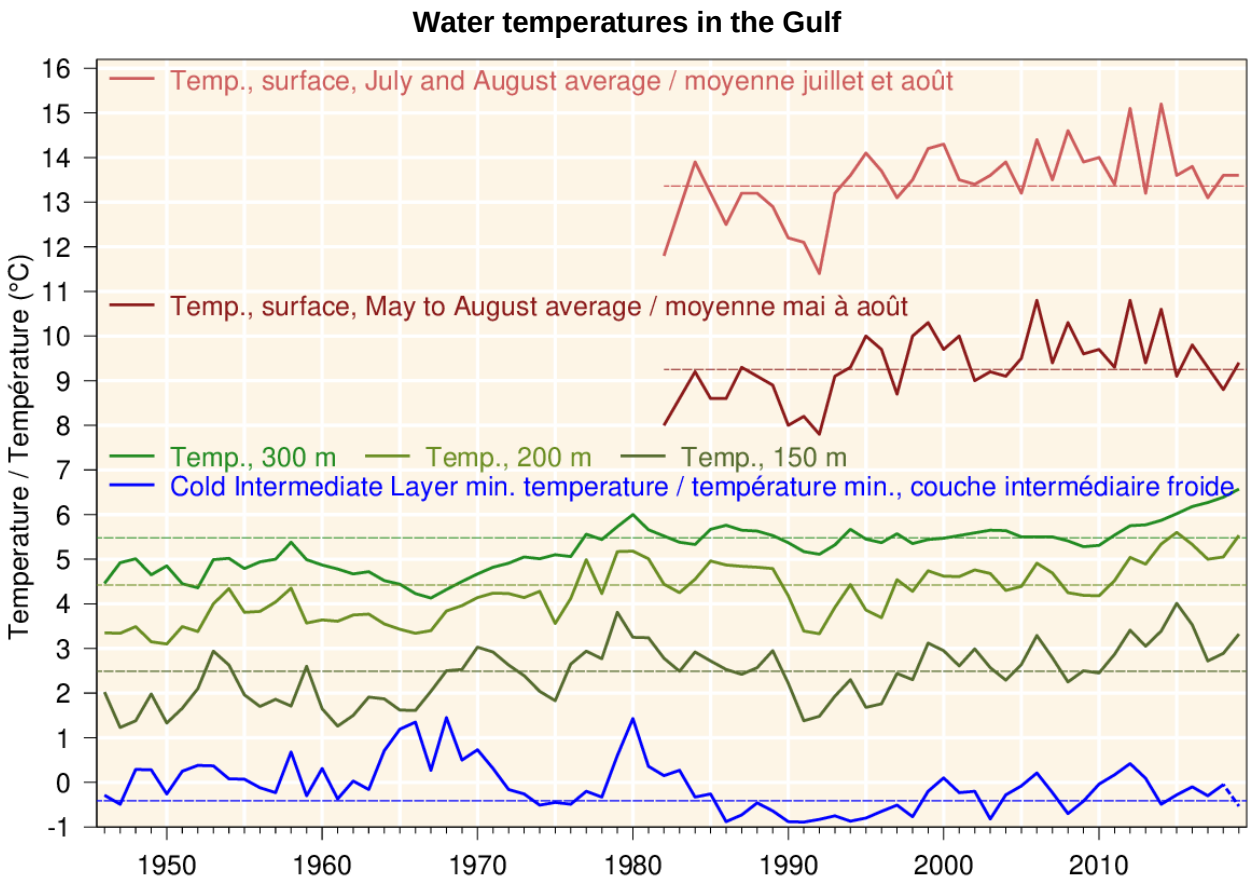

Figure 69. Water temperatures in the Gulf. Sea-surface temperature averaged over the Estuary and the northern Gulf (see violet outline on map of figure 68) for July–August and May-August (1982–2019) (red lines). Layer-averaged temperature for the Gulf of St. Lawrence at 150, 200 and 300 m (green lines). Cold intermediate layer minimum temperature index in the Gulf of St. Lawrence adjusted to July 15, with 2019 value estimated only from August survey data (blue line).

APPENDICES

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

Stratum	NAFO	Surface (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	2015	2016	2017	2018	2019
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	3	2	2	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	3	2	2	2	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	3	2	2	1	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	3	2	2	2	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	3	2	2	2	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	4	4	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	4	2	3	4	3
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	4	2	4	3	2
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	2	2	2	2	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	3	3	3	2	2
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	2	3	3	3	2
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	2	2	2	2	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	2	2	2	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	2	2	0	2	1
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	3	2	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	3	2	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	8	5	8	8	4
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	4	4	4	3	3
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	7	9	7	5	6
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	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	4	4	4	3	2
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	4	4	4	4	0
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	3	4	3	3	0
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	2	2	2	2	1
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	2	2	2	2	0
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	7	6	6	5	6
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	6	4	3	5	5
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	2	2	2	2	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	7	6	6	5	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	8	7	7	5	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	4	6	6	5	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	5	4	5	4	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	2	2	2	2	1
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	3	2	3	3	0
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	2	2	3	3	0
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	3	4	2	3	4
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	3	2	2	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	2	1	2	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	3	3	3	4	0
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	2	2	4	4	3
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	4	3	2	3	1
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	4	4	3	3	3
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	2	2	2	2	1
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	4	3	5	5	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	2	2	2	2	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	3	3	4	4	0
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	5	2	3	4	3
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	4	3	3	2	3
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	4	5	3	5	3
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	3	2	2	2	1
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	3	2	0	1	0
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	2	2	2	1	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	182	159	163	160	124
851	4T	456	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	3	3	3	3	3	2	2	2	2	2	1
852	4T	427	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	3	3	3	2	3	2	2	2	1	2	2
854	4T	465	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	3	3	2	2	2	2	2	2	2	2	0
855	4T	928	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	4	3	2	3	3	2	2	2	2	2	1

Appendix 2. Occurrences and total catches, in weight and number, by taxon during the 2019 survey (128 successful tows). Taxonomic codes (STRAP) follow Miller and Chabot (2014), with scientific name updates by the World Marine Species Registry (WoRMS 2018, http://www.marinespecies.org).

Vertebrates

Code STRAP	Scientific Name	French Name	English Name	Occurrence	Weight (kg)	Number
90	*Amblyraja radiata*	Raie épineuse	Thorny Skate	113	827.3	1760
696	*Ammodytes* sp.	Lançons	Sand Lances	25	0.1	74
700	*Anarhichas lupus*	Loup atlantique	Atlantic Wolffish	20	41.4	162
701	*Anarhichas minor*	Loup tacheté	Spotted Wolffish	2	5.2	2
718	*Anisarchus medius*	Lompénie naine	Stout Eelblenny	2	0.3	67
320	*Arctozenus risso*	Lussion blanc	White Barracudina	62	3.9	216
193	*Argentina silus*	Grande argentine	Atlantic Argentine	10	2.8	65
811	*Artediellus atlanticus*	Hameçon atlantique	Atlantic Hookear Sculpin	25	0.8	170
810	*Artediellus* sp.	Hameçons	Hookear Sculpins	4	< 0.1	8
812	*Artediellus uncinatus*	Hameçon neigeux	Arctic Hookear Sculpin	6	0.2	46
838	*Aspidophoroides monopterygius*	Poisson-alligator atlantique	Alligatorfish	30	0.9	292
102	*Bathyraja spinicauda*	Raie à queue épineuse	Spinytail Skate	1	0.2	1
451	*Boreogadus saida*	Saïda franc	Arctic Cod	13	1.7	73
865	*Careproctus reinhardti*	Petite limace de mer	Sea Tadpole	8	0.3	13
27	*Centroscyllium fabricii*	Aiguillat noir	Black Dogfish	23	655.9	951
150	*Clupea harengus*	Hareng atlantique	Atlantic Herring	58	490.3	2607
829	*Cottunculus microps*	Cotte polaire	Polar Sculpin	1	< 0.1	1
721	*Cryptacanthodes maculatus*	Terrassier tacheté	Wrymouth	13	6.6	14
849	*Cyclopterus lumpus*	Grosse poule de mer	Lumpfish	26	30.2	58
208	*Cyclothone microdon*	Cyclothone à petites dents	Small-Toothed Bristlemouth	2	< 0.1	3
461	*Enchelyopus cimbrius*	Motelle à quatre barbillons	Fourbeard Rockling	100	34.9	1154
618	*Epigonus pandionis*	Cardinal	Big Eye	2	0.1	2
711	*Eumesogrammus praecisus*	Quatre-lignes atlantique	Fourline Snakeblenny	18	4.7	219
847	*Eumicrotremus terraenovae*	Petite poule Terre-Neuve	Newfoundland Spiny Lumpsucker	20	4.4	346
438	*Gadus morhua*	Morue franche	Atlantic Cod	52	1468.9	7827
439	*Gadus ogac*	Ogac, morue ogac	Greenland Cod	1	0.2	1
426	*Gasterosteus aculeatus aculeatus*	Épinoche à trois épines	Threespine Stickleback	5	< 0.1	16
890	*Glyptocephalus cynoglossus*	Plie grise	Witch Flounder	101	652.1	3615
746	*Gymnelus viridis*	Unernak caméléon	Fish Doctor	6	0.2	18
823	*Gymnocanthus tricuspis*	Tricorne arctique	Arctic Staghorn Sculpin	20	8.2	268
797	*Helicolenus dactylopterus*	Chèvre impériale	Blackbelly Rosefish	1	0.5	2
809	*Hemitripterus americanus*	Hémitriptère atlantique	Sea Sculpin	4	0.1	5

Code STRAP	Scientific Name	French Name	English Name	Occurrence	Weight (kg)	Number
889	*Hippoglossoides platessoides*	Plie canadienne	American Plaice	110	821.4	9514
893	*Hippoglossus hippoglossus*	Flétan atlantique	Atlantic Halibut	38	655.1	84
832	*Icelus spatula*	Icèle spatulée	Spatulate Sculpin	7	0.2	39
836	*Leptagonus decagonus*	Agone atlantique	Atlantic Poacher	13	4.0	201
717	*Leptoclinus maculatus*	Lompénie tachetée	Daubed Shanny	33	5.0	968
891	*Limanda ferruginea*	Limande à queue jaune	Yellowtail Flounder	2	0.1	2
868	*Liparis bathyarcticus*	Limace nébuleuse	Nebulous Snailfish	14	2.7	60
857	*Liparis* sp.	Limaces	Snailfishes	1	< 0.1	1
966	*Lophius americanus*	Baudroie d'Amérique	Monkfish, Goosefish	8	55.2	9
716	*Lumpenus lampretaeformis*	Lompénie-serpent	Snakeblenny	27	3.5	178
750	*Lycenchelys paxillus*	Lycode commune	Common Wolf Eel	2	0.1	5
752	*Lycenchelys verrillii*	Lycode à tête longue	Wolf Eelpout	7	< 0.1	7
727	*Lycodes esmarkii*	Lycode d'Esmark	Esmark's Eelpout	6	1.9	7
728	*Lycodes lavalaei*	Lycode du Labrador	Newfoundland Eelpout	18	14.1	120
726	*Lycodes* sp.	Lycodes	Eelpouts	1	0.1	1
734	*Lycodes terraenovae*	Lycode atlantique	Atlantic Eelpout	2	0.9	3
730	*Lycodes vahlii*	Lycode à carreaux	Vahl's Eelpout	29	12.7	307
484	*Malacocephalus occidentalis*	Queue-de-rat d'Amérique	American Straptail Grenadier	1	0.1	1
91	*Malacoraja senta*	Raie lisse	Smooth Skate	86	76.0	414
187	*Mallotus villosus*	Capelan	Capelin	49	122.5	14701
745	*Melanostigma atlanticum*	Molasse atlantique	Atlantic Soft Pout	29	0.5	176
449	*Merluccius bilinearis*	Merlu argenté	Silver Hake	67	30.0	177
272	Myctophidae	Poissons-lanterne	Lanternfishes	22	0.7	267
820	*Myoxocephalus octodecemspinosus*	Chaboisseau à dix-huit-épines	Longhorn Sculpin	1	0.1	1
819	*Myoxocephalus scorpius*	Chaboisseau à épines courtes	Shorthorn Sculpin	23	57.0	130
12	*Myxine glutinosa*	Myxine du nord	Northern Hagfish	81	217.4	3894
368	*Nemichthys scolopaceus*	Avocette ruban	Atlantic Snipe Eel	1	0.1	1
278	*Neoscopelus macrolepidotus*	Lanterne à grandes écailles	Glowingfish	3	0.1	2
478	*Nezumia bairdii*	Grenadier du grand Banc	Common Grenadier	73	64.0	1942
275	*Notoscopelus kroyeri*	Lanterne-voilière nordique	Kroyer's Lanternfish	6	0.2	9
984	Oneirodidae	Pêcheur rêveur	Dreamer	1	< 0.1	1
874	*Paraliparis calidus*	Limace ardente	Lowfin Snailfish	13	0.1	19
856	*Paraliparis copei copei*	Limace à museau noir	Blacksnout Seasnail	4	0.3	9
854	*Paraliparis* sp.	Limaces	Snailfishes	1	< 0.1	1
444	*Phycis chesteri*	Merluche à longues nageoires	Longfin Hake	25	83.3	579
443	*Pollachius virens*	Goberge	Pollock	2	6.9	3
222	*Polyipnus clarus*	Hache	Slope Hachetfish	3	< 0.1	3
244	*Polymetme thaeocoryla*	Poisson lumineux	Ligthfishes	1	< 0.1	1

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892	*Reinhardtius hippoglossoides*	Flétan du Groenland, turbot	Greeenland Halibut, Turbot	101	2151.6	13019
572	*Scomber scombrus*	Maquereau bleu	Atlantic Mackerel	17	2.1	46
796	*Sebastes fasciatus*	Sébaste acadien	Acadian Redfish	80	2441.1	17421
794	*Sebastes mentella*	Sébaste atlantique	Deepwater Redfish	107	99011.0	638021
710	*Stichaeus punctatus punctatus*	Stichée arctique	Arctic Shanny	2	0.1	11
373	*Synaphobranchus kaupii*	Anguille égorgée bécuée	Northern Cutthroat Eel	1	0.2	1
814	*Triglops murrayi*	Faux-trigle armé	Moustache Sculpin	34	34.5	2701
815	*Triglops nybelini*	Faux-trigle à grands yeux	Bigeye Sculpin	1	< 0.1	1
447	*Urophycis tenuis*	Merluche blanche	White Hake	73	305.2	605
	Total	**Vertébrés**	**Vertebrates**		110 425	725 719

Invertebrates

Code STRAP	Scientific Name	French Name	English Name	Occurrence	Weight (kg)	Number
1100		Invertébrés	Invertebrates	1	0.2	28
2182	*Actinauge cristata*	Anémone de mer	Anemone	33	37.4	3855
2165	Actiniaria	Actinies et Anémones	Sea Anemones	20	0.4	111
2162	*Actinostola callosa*	Anémones de mer	Anemone	53	404.4	4175
6771	*Aega psora*	Isopode	Isopod	9	<0.1	15
2675	*Alcyonidium* sp.	Bryozoaire	Bryozoan	1	<0.1	8
3891	*Aldisa zetlandica*	Nudibranche	Nudibranch	2	<0.1	2
6996	*Ampelisca* sp.	Gammaride	Amphipod	1	<0.1	1
8593	*Amphiura* sp.	Ophiures	Brittle star	9	<0.1	88
4219	*Anomia* sp.	Anomies	Jingle shells	1	<0.1	1
7389	*Anonyx* sp.	Gammarides	Gammarids	6	<0.1	29
2218	*Anthoptilum grandiflorum*	Grande plume fleurie	Great flowered sea pen	32	63.6	5102
5002	*Aphroditella hastata*	Souris de mer	Sea Mouse	13	0.4	19
6594	*Arcoscalpellum michelottianum*	Balane	Barnacle	5	0.2	10
8138	*Argis dentata*	Crevette verte	Arctic Argid	21	5.8	1502
3305	*Ariadnaria borealis*	Gastéropode	Boreal hairysnail	1	<0.1	1
3418	*Arrhoges occidentalis*	Pied-de-pélican	American Pelicanfoot	15	1.6	177
8742	*Ascidia* sp.	Ascidie	Sea squirts	35	6.9	1286
8680	Ascidiacea	Ascidies, tuniqués sessiles	Ascidians, Sessile Tunicates	23	2.2	487
1120	*Asconema foliatum*	Éponge	Sponge	6	3.5	
4231	*Astarte borealis*	Astarte	Boreal Astarte	2	<0.1	2
4227	*Astarte* sp.	Astartes	Astartes	17	<0.1	24

Code STRAP	Scientific Name	French Name	English Name	Occurrence	Weight (kg)	Number
8396	*Asterias rubens*	Astérie boréale commune	Common Seastar	5	0.1	7
8113	*Atlantopandalus propinqvus*	Crevette	Shrimp	11	0.4	121
2097	*Atolla wyvillei*	Méduse	Jellyfish	4	0.3	5
3583	*Aulacofusus brevicauda*	Buccin	Whelk	1	<0.1	1
2085	*Aurelia aurita*	Méduse de lune	Moon Jelly	1	<0.1	1
6595	Balanidae	Balanes	Barnacles	1	<0.1	
4904	*Bathypolypus bairdii*	Poulpe	North Atlantic Octopus	56	4.6	163
3995	Bivalvia	Bivalves	Bivalves	3	<0.1	3
2158	*Bolocera tuediae*	Anémone de mer	Anemone	53	36.2	698
8793	*Boltenia echinata*	Cactus de mer	Cactus Sea Squirt	1	<0.1	2
8792	*Boltenia ovifera*	Patate de mer	Sea Potato	7	0.2	18
3488	*Boreotrophon* sp.	Murex	Murex	2	<0.1	2
8798	*Botrylloides* sp.	Ascidie	Tunicate	2	<0.1	3
5755	*Brada inhabilis*	Polychète	Flabelligerid worm	3	<0.1	5
8378	*Brisaster fragilis*	Oursin coeur	Heart Urchin	51	200.6	18363
2670	Bryozoa	Bryozoaires	Bryozoans	6	<0.1	41
3520	*Buccinum cyaneum*	Buccin bleu	Bluish Whelk	18	2.4	154
3518	*Buccinum polare*	Buccin	Thin Whelk	2	<0.1	5
3523	*Buccinum scalariforme*	Buccin	Ladder Whelk	3	0.2	7
3516	*Buccinum* sp.	Buccins	Whelk	3	<0.1	3
3517	*Buccinum undatum*	Buccin commun	Waved Whelk	8	0.2	16
8173	*Calocaris templemani*	Crevette fouisseuse	Lobster Shrimp	5	<0.1	5
8206	*Cancer irroratus*	Crabe commun	Common Rock Crab	1	0.1	1
8429	*Ceramaster granularis*	Étoile de mer	Sea Star	19	1.2	79
8213	*Chionoecetes opilio*	Crabe des neiges	Snow Crab	82	118.6	845
6593	*Chirona hameri*	Balane turbané	Turban Barnacle	1	<0.1	1
4167	*Chlamys islandica*	Pétoncle d' Islande	Iceland Scallop	10	1.4	35
4351	*Ciliatocardium ciliatum*	Coque d'Islande	Iceland Cockle	3	0.1	6
5617	*Cistenides granulata*	Ver-trompette	Trumpet Worm	1	<0.1	5
3908	*Colga villosa*	Nudibranche	Nudibranch	6	<0.1	8
3577	*Colus pubescens*	Buccin	Hairy Whelk	3	0.1	7
3575	*Colus* sp.	Buccins	Whelks	1	0.1	2
3576	*Colus stimpsoni*	Buccin	Whelk	1	0.1	2
1130	*Craniella polyura*	Éponge	Sponge	2	0.1	73
4124	*Crenella faba*	Crénella fauve	Bean crenella	1	<0.1	1
8447	*Crossaster papposus*	Soleil de mer épineux	Spiny Sun Star	22	1.3	115
3422	*Cryptonatica affinis*	Lunaties	Arctic moonsnail	6	<0.1	6
8407	*Ctenodiscus crispatus*	Étoile de mer	Mud Star	74	133.7	32295

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8312	*Cucumaria frondosa*	Concombre de mer	Orange Footed Sea Cucumber	3	1.9	5
4526	*Cuspidaria glacialis*	Mye	Gacial Dipperclam	19	0.1	72
2080	*Cyanea capillata*	Crinière de lion	Lion's Mane	29	9.8	34
4268	*Cyclocardia borealis*	Vénéricarde boréale	Northern Cyclocardia	1	<0.1	1
3894	*Dendronotus frondosus*	Nudibranche	Nudibranch	2	<0.1	3
3893	*Dendronotus* sp.	Nudibranche	Nudibranch	2	<0.1	2
8408	*Diplopteraster multipes*	Étoile de mer	Sea Star	1	<0.1	1
2191	*Drifa glomerata*	Corail mou	Soft coral	4	<0.1	6
2183	*Duva florida*	Corail mou	Sea Cauliflower	7	0.1	10
8373	*Echinarachnius parma*	Dollar de sable	Common Sand Dollar	3	0.1	8
7383	*Epimeria loricata*	Gammaride	Gammarid	11	<0.1	27
2157	*Epizoanthus* sp.	Anémone de mer	Sea Anemone	22	0.2	2258
8075	*Eualus fabricii*	Bouc Arctique	Arctic Eualid	12	1.4	2755
8081	*Eualus belcheri*	Bouc	Circumpolar Eualid	2	<0.1	10
8080	*Eualus gaimardii*	Bouc	Circumpolar Eualid	6	0.1	61
8077	*Eualus macilentus*	Bouc du Groenland	Greenland Shrimp	13	2.4	2087
8074	*Eualus* sp.	Bouc	Eualid	1	<0.1	3
8778	*Eudistoma vitreum*	Ascidie	Tunicate	9	0.2	54
5045	*Eunoe nodosa*	Polychète	Seaworm	1	<0.1	2
8033	*Eusergestes arcticus*	Crevette	Shrimp	11	0.1	101
7195	*Eusirus cuspidatus*	Gammaride	Gammarid	7	<0.1	14
3437	*Euspira pallida*	Lunatie du Groenland	Pale Moonsnail	6	0.1	9
2295	Fecampiidae	Vers flats	Flatworms	1	<0.1	2
2224	*Flabellum alabastrum*	Madrépore	Cup coral	7	0.3	28
2184	*Gersemia rubiformis*	Corail mou	Sea Strawberry	13	0.1	48
5902	*Golfingia margaritacea*	Sipunculide	Sipunculid	3	<0.1	6
8541	*Gorgonocephalus arcticus*	Gorgonocéphale	Northen Basket Star	3	70.4	312
8540	*Gorgonocephalus* sp.	Gorgonocéphales	Basket Stars	14	27.6	131
2217	*Halipteris finmarchica*	Plume de Finmark	Finmark’s sea pen	18	15.7	660
8797	*Halocynthia pyriformis*	Pêche de mer	Sea Peach	2	0.1	2
5934	*Hamingia arctica*	Échiure	Echiurid	1	<0.1	2
8263	*Heliometra glacialis*	Lis de mer	Feather star	2	<0.1	2
1131	*Hemigellius arcofer*	Éponge	Sponge	8	12.6	
3090	*Hemithiris psittacea*	Brachiopode	Lamp Shell	4	<0.1	27
8483	*Henricia* sp.	Étoiles de mer	Sea Stars	38	0.8	118
4437	*Hiatella arctica*	Saxicave arctique	Arctic Saxicave	2	<0.1	2
8431	*Hippasteria phrygiana*	Étoile de mer	Sea Star	43	25.6	95
8154	*Homarus americanus*	Homard américain	American Lobster	2	1.5	2

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2150	*Hormathia digitata*	Anémone	Anemone	12	0.3	119
2167	*Hormathia nodosa*	Anémone noduleuse	Rugose Anemone	2	0.1	2
8217	*Hyas araneus*	Crabe lyre	Atlantic Lyre Crab	12	2.2	171
8218	*Hyas coarctatus*	Crabe lyre	Arctic Lyre Crab	35	2.4	436
1341	Hydrozoa	Hydrozoaires	Hydrozoans	20	0.5	
4753	*Illex illecebrosus*	Encornet rouge nordique	Northern Shortfin Squid	78	213.4	1300
5003	*Laetmonice filicornis*	Polychète	Seaworm	40	0.2	179
8092	*Lebbeus groenlandicus*	Bouc	Spiny Lebbeid	8	0.7	179
8095	*Lebbeus microceros*	Bouc	Shrimp	4	<0.1	5
8093	*Lebbeus polaris*	Bouc	Polar Lebbeid	37	1.3	941
8511	*Leptasterias polaris*	Étoile de mer polaire	Polar Sea Star	4	2.1	22
8510	*Leptasterias* sp.	Étoiles de mer	Sea Stars	9	<0.1	24
8521	*Leptychaster arcticus*	Stelléridé	Sea Star	8	<0.1	12
3459	*Limneria undata*	Veloutée rayée	Wavy Lamellaria	1	<0.1	1
2207	*Liponema multicorne*	Anémone	Sea anemone	5	1.6	39
8196	*Lithodes maja*	Crabe épineux du Nord	Norway King Crab	50	51.2	145
4395	*Macoma calcarea*	Bivalve	Chalky Macoma	6	0.1	42
3219	*Margarites costalis*	Margarite rosé du Nord	Boreal Rosy Margarite	4	<0.1	6
3216	*Margarites groenlandicus*	Troque	Greenland marguerite	4	<0.1	8
7994	*Meganyctiphanes norvegica*	Euphauside	Horned Krill	3	<0.1	6
4025	*Megayoldia thraciaeformis*	Bivalve	Broad Yoldia	25	3.8	695
7268	*Melita dentata*	Gammaride	Gammarid	1	<0.1	1
8322	*Molpadia oolitica*	Holothurie	Sea Cucumber	2	0.1	2
8164	*Munidopsis curvirostra*	Munidopsis curvirostra	Squat Lobster	11	0.1	72
1117	*Mycale lingua*	Éponge	Sponge	15	3.3	
4121	*Mytilus* sp.	Moules	Mussels	9	0.2	23
3000	Nemertea	Némerte	Ribbon Worm	1	<0.1	1
7483	*Neohela monstrosa*	Gammaride	Gammarid	4	<0.1	5
5053	*Neoleanira tetragona*	Polychète	Scaled worm	10	<0.1	17
2219	Nephtheidae	Coraux mous	Soft corals	20	0.3	74
5113	*Nephtys* sp.	Polychète errante	Red-Lined Worm	4	<0.1	5
3567	*Neptunea despecta*	Neptunée commune du nord	Lader Whelk	2	0.1	2
3565	*Neptunea* sp.	Buccins	Whelks	2	0.1	2
5475	*Nothria conchylega*	Polychète	Seaworm	1	<0.1	1
8448	*Novodinia americana*	Étoile de mer	Sea star	2	0.5	2
4019	*Nuculana* sp.	Bivalves	Nutclams	1	<0.1	1
3850	Nudibranchia	Nudibranches	Nudibranchs	3	<0.1	3
5961	*Nymphon* sp.	Araignées de mer	Sea Spiders	29	0.1	167

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8575	*Ophiacantha bidentata*	Ophiure épineuse	Brittle Star	22	0.2	532
8583	*Ophiopholis aculeata*	Ophiure paquerette	Daisy Brittle Star	33	1.2	1028
8585	*Ophioscolex glacialis*	Ophiure	Brittle star	14	<0.1	47
8552	*Ophiura robusta*	Ophiure	Brittle Star	2	<0.1	2
8553	*Ophiura sarsii*	Ophiure	Brittle Star	51	71.3	41449
8530	Ophiuroidea	Ophiures	Brittle Stars	5	<0.1	6
8178	*Pagurus* sp.	Bernard hermite droitier	Hermit Crab	18	0.1	37
8111	*Pandalus borealis*	Crevette nordique	Northern Shrimp	107	1911.0	343230
8112	*Pandalus montagui*	Crevette ésope	Striped Pink Shrimp	53	75.5	27317
7586	*Paramphithoe hystrix*	Gammaride	Gammarid	8	<0.1	19
8057	*Pasiphaea multidentata*	Sivade rose, Crevette blanche	Pink Glass Shrimp	62	35.8	11140
2203	*Pennatula aculeata*	Petite plume aiguë	Spiny sea pen	84	6.1	3200
2210	*Pennatula grandis*	Grande plume du nord	Great northern sea pen	20	42.0	1416
2096	*Periphylla periphylla*	Méduse à coronne	Crown jellyfish	30	66.1	48
5907	*Phascolion strombus*	Sipunculide	Hermit Sipunculid	4	<0.1	12
2255	*Pleurobrachia pileus*	Groseille de mer ronde	Sea Gooseberry	4	<0.1	21
8783	*Polycarpa fibrosa*	Ascidie	Tunicate	1	<0.1	1
4950	Polychaeta	Polychètes	Polychaetes	39	0.3	393
1123	*Polymastia grimaldii*	Éponge	Sponge	1	0.1	8
1109	*Polymastia* sp.	Éponge	Sponge	18	0.4	54
5007	Polynoidae	Polychète errante	Fifteen-Scaled Worm	32	0.1	89
5264	*Polyphysia crassa*	Polychète	Sea worm	4	0.1	10
8135	*Pontophilus norvegicus*	Crevette	Norwegian Shrimp	75	3.9	2297
8435	*Poraniomorpha* sp.	Étoile de mer	Sea star	4	0.3	6
1101	Porifera	Éponges	Sponges	60	29.4	
8433	*Pseudarchaster parelii*	Étoile de mer	Sea Star	13	0.5	32
8520	*Psilaster andromeda*	Étoile de mer	Sea Star	12	2.6	499
8295	*Psolus fabricii*	Psolus écarlate	Scarlet Psolus	1	<0.1	1
8294	*Psolus phantapus*	Holothurie	Sea Cucumber	2	<0.1	3
8410	*Pteraster militaris*	Étoile de mer	Sea Star	9	0.1	17
8411	*Pteraster pulvillus*	Étoile de mer	Sea Star	6	<0.1	13
8409	*Pteraster* sp.	Étoiles de mer	Sea stars	1	<0.1	5
1353	*Ptychogena lactea*	Méduse	Jellyfish	10	0.1	21
1107	*Radiella hemisphaerica*	Éponge	Sponge	13	1.3	231
7211	*Rhachotropis aculeata*	Gammaride	Gammarid	15	0.1	260
1380	Rhodaliidae	Siphonophore benthique	Benthic siphonophore	1	<0.1	1
4557	*Rossia* sp.	Sépioles	Bobtails	43	0.8	89
8129	*Sabinea sarsii*	Crevette	Sars Shrimp	9	0.2	180

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8128	*Sabinea septemcarinata*	Crevette	Sevenline Shrimp	17	1.7	803
8127	*Sabinea* sp.	Crevette	Shrimp	1	<0.1	5
3491	*Scabrotrophon fabricii*	Murex	Murex	1	<0.1	1
3715	*Scaphander punctostriatus*	Céphalaspide	Giant Canoe Bubble	26	0.6	258
8119	*Sclerocrangon boreas*	Crevette de roche	Scultured Shrimp	10	31.2	3498
2040	Scyphozoa	Scyphozoaires	Scyphozoans	4	0.4	6
4191	*Similipecten greenlandicus*	Pétoncle	Greenland Glass-Scallop	2	<0.1	2
1375	Siphonophorae	Siphonophore		6	0.1	25
5900	Sipuncula	Sipunculides	Sipunculids	2	<0.1	2
8445	*Solaster endeca*	Soleil de mer pourpre	Purple Sunstar	3	0.7	4
8087	*Spirontocaris liljeborgii*	Bouc épineux	Friendly Blade Shrimp	36	0.3	207
8086	*Spirontocaris phippsii*	Bouc	Punctate Blade Shrimp	4	<0.1	18
8084	*Spirontocaris* sp.	Bouc	Blade Shrimp	7	<0.1	
8085	*Spirontocaris spinus*	Bouc perroquet	Parrot Shrimp	21	0.8	742
7750	*Stegocephalus inflatus*	Gammaride	Gammarid	9	<0.1	22
2159	*Stephanauge nexilis*	Anémone de mer	Sea anemone	13	1.9	154
4587	*Stoloteuthis leucoptera*	Sépiole	Butterfly Squid	5	<0.1	10
2173	*Stomphia coccinea*	Anémone marbrée	Anemone	20	0.2	47
8363	*Strongylocentrotus* sp.	Oursins	Sea Urchins	34	19.8	1703
8801	*Styela rustica*	Ascidie	Tunicate	1	<0.1	2
1112	*Stylocordyla borealis*	Éponge	Sponge	11	<0.1	79
1115	*Suberites ficus*	Éponge	Fig sponge	9	40.7	2635
8776	*Synoicum pulmonaria*	Ascidie	Tunicate	5	1.0	16
6791	*Syscenus infelix*	Isopode	Isopod	51	0.4	290
3310	*Tachyrhynchus erosus*	Gastropode	Eroded Turritsnail	1	<0.1	1
1108	*Tentorium semisuberites*	Éponge	Sponge	6	<0.1	47
3101	*Terebratulina septentrionalis*	Térébratule du Nord	Northern Lamp Shell	10	<0.1	14
6972	*Themisto libellula*	Hypéride	Hyperiid	25	<0.1	170
1114	*Thenea muricata*	Éponge	Sponge	3	0.6	11
1357	*Thuiaria thuja*	Hydrozoaire	Bottlebrush Hydroid	10	<0.1	80
3134	*Tonicella* sp.	Chitons	Chitons	1	<0.1	1
8446	*Tremaster mirabilis*	Étoile de mer	Sea star	1	0.1	1
3460	*Velutina velutina*	Veloutée lisse	Smooth lamellaria	1	<0.1	2
1127	*Weberella bursa*	Éponge	Sponge	2	0.3	1
4074	*Yoldia* sp.	Bivalves	Bivalves	1	<0.1	1
	Total	**Invertebrés**	**Invertebrates**	**-**	3 835	528 269

Others

Code STRAP	Scientific Name	French Name	English Name	Occurrence	Weight (kg)	Number
9965		Capsule de raie lisse	Smooth Skate egg	28	0.4	61
9966		Capsule de raie épineuse	Thorny Skate egg	25	1.3	87
2296		Capsule d'oeuf de Fecampiidae	Fecampiidae egg capsule	4	<0.1	4
9218	*Ascophyllum* sp.	Algues brunes	Brown algeas	1	<0.1	1

Appendix 3. Number of measured and weighed specimens and descriptive statistics for the length in 2019. Taxonomic codes (STRAP) follow Miller and Chabot (2014), with scientific name updates by the World Marine Species Registry (WoRMS 2018).

Vertebrates

Code STRAP	Scientific name	Sampled number		Length (cm)				
		Length	Weight	Min	P1**	Median	P99**	Max
90	*Amblyraja radiata*	1336	946	9.1	11.4	30.5	63.0	74.0
696	*Ammodytes* sp.	66	63	5.0	5.0	6.6	10.5	10.5
700	*Anarhichas lupus*	123	92	7.0	7.7	23.5	61.2	65.0
701	*Anarhichas minor*	2	2	10.0	10.0	40.0	70.0	70.0
718	*Anisarchus medius*	31	16	10.0	10.0	11.9	13.6	13.6
320	*Arctozenus risso*	205	169	16.9	19.4	24.7	27.3	27.9
193	*Argentina silus*	65	39	8.8	8.8	17.0	43.5	43.5
811	*Artediellus atlanticus*	170	100	4.0	4.5	7.4	10.0	10.2
810	*Artediellus* sp.	8	8	3.6	3.6	4.8	6.9	6.9
812	*Artediellus uncinatus*	46	19	4.6	4.6	6.1	8.1	8.1
838	*Aspidophoroides monopterygius*	209	99	5.2	8.6	12.2	15.0	15.8
102	*Bathyraja spinicauda*	1	1	38.0	38.0	38.0	38.0	38.0
451	*Boreogadus saida*	73	67	8.5	8.5	12.2	22.5	22.5
865	*Careproctus reinhardti*	13	13	5.6	5.6	11.5	14.5	14.5
27	*Centroscyllium fabricii*	464	216	14.2	14.8	41.9	66.2	68.6
150	*Clupea harengus*	1211	705	14.9	20.3	29.3	37.9	40.0
829	*Cottunculus microps*	1	1	10.2	10.2	10.2	10.2	10.2
721	*Cryptacanthodes maculatus*	14	14	16.7	16.7	35.1	87.1	87.1
849	*Cyclopterus lumpus*	58	55	7.4	7.4	22.8	38.1	38.1
208	*Cyclothone microdon*	1	0	5.5	5.5	5.5	5.5	5.5
461	*Enchelyopus cimbrius*	1072	394	5.1	7.4	19.2	27.8	30.2
618	*Epigonus pandionis*	2	2	13.9	13.9	14.4	14.8	14.8
711	*Eumesogrammus praecisus*	178	59	6.7	7.8	14.0	19.9	20.9
847	*Eumicrotremus terraenovae*	295	119	1.9	2.2	4.7	11.9	12.5
438	*Gadus morhua*	3197	1195	5.7	11.5	29.5	60.6	86.7
439	*Gadus ogac*	1	1	26.8	26.8	26.8	26.8	26.8
426	*Gasterosteus aculeatus*	16	13	2.7	2.7	6.4	6.6	6.6
890	*Glyptocephalus cynoglossus*	2668	1648	7.3	8.8	29.1	43.9	51.1
746	*Gymnelus viridis*	18	15	8.9	8.9	14.4	18.6	18.6
823	*Gymnocanthus tricuspis*	182	67	5.6	6.2	13.1	21.6	25.6
797	*Helicolenus dactylopterus*	2	2	25.0	25.0	25.1	25.2	25.2
809	*Hemitripterus americanus*	5	5	5.1	5.1	8.6	16.5	16.5
889	*Hippoglossoides platessoides*	4054	1879	5.5	6.9	20.5	43.2	52.4
893	*Hippoglossus hippoglossus*	84	82	27.0	27.0	76.4	170.0	170.0
832	*Icelus spatula*	39	29	3.5	3.5	6.5	13.4	13.4
836	*Leptagonus decagonus*	158	57	6.5	7.0	19.0	23.0	23.1
717	*Leptoclinus maculatus*	421	159	7.9	8.3	12.0	19.0	19.5
891	*Limanda ferruginea*	2	2	14.9	14.9	17.0	19.0	19.0
868	*Liparis bathyarcticus*	60	44	3.0	3.0	12.4	29.1	29.1
857	*Liparis* sp.	1	1	3.0	3.0	3.0	3.0	3.0
966	*Lophius americanus*	9	8	14.3	14.3	77.3	100.2	100.2
716	*Lumpenus lampretaeformis*	178	100	13.6	13.7	26.7	37.9	39.4
750	*Lycenchelys paxillus*	5	5	13.9	13.9	19.3	21.2	21.2
752	*Lycenchelys verrillii*	7	7	9.9	9.9	11.6	12.7	12.7
727	*Lycodes esmarkii*	7	7	27.5	27.5	40.0	44.1	44.1
728	*Lycodes lavalaei*	105	67	8.2	8.8	18.4	52.3	61.0
726	*Lycodes* sp.	1	1	25.7	25.7	25.7	25.7	25.7
734	*Lycodes terraenovae*	3	3	31.5	31.5	35.3	36.2	36.2
730	*Lycodes vahlii*	241	113	6.7	9.3	17.9	39.4	40.2
484	*Malacocephalus occidentalis*	1	1	29.9	29.9	29.9	29.9	29.9
91	*Malacoraja senta*	404	361	8.6	9.0	16.1	58.1	59.0
187	*Mallotus villosus*	1292	222	6.9	7.8	14.4	16.4	16.9
745	*Melanostigma atlanticum*	164	88	5.6	5.8	10.9	14.3	14.9

Code STRAP	Scientific name	Sampled number		Length (cm)				
		Length	Weight	Min	P1**	Median	P99**	Max
449	*Merluccius bilinearis*	177	177	12.4	12.9	29.6	37.6	39.2
820	*Myoxocephalus octodecemspinosus*	1	1	22.3	22.3	22.3	22.3	22.3
819	*Myoxocephalus scorpius*	130	90	9.3	11.4	29.2	39.8	40.2
12	*Myxine glutinosa*	1758	485	13.8	23.0	36.2	49.1	59.6
368	*Nemichthys scolopaceus*	1	1	120.7	120.7	120.7	120.7	120.7
278	*Neoscopelus macrolepidotus*	2	2	11.2	11.2	13.5	15.8	15.8
478	*Nezumia bairdii*	1485	359	5.6	8.4	22.0	31.9	33.5
275	*Notoscopelus kroyeri*	8	8	11.2	11.2	15.6	16.9	16.9
984	Oneirodidae	1	0	8.2	8.2	8.2	8.2	8.2
874	*Paraliparis calidus*	19	18	5.2	5.2	9.5	13.6	13.6
856	*Paraliparis copei copei*	9	9	7.9	7.9	11.2	13.1	13.1
854	*Paraliparis* sp.	1	1	3.5	3.5	3.5	3.5	3.5
444	*Phycis chesteri*	437	245	15.3	16.3	27.5	36.2	38.6
443	*Pollachius virens*	3	3	43.7	43.7	61.3	64.5	64.5
222	*Polyipnus clarus*	3	2	5.7	5.7	6.3	6.5	6.5
244	*Polymetme thaeocoryla*	1	1	14.0	14.0	14.0	14.0	14.0
892	*Reinhardtius hippoglossoides*	5658	2744	6.1	14.2	24.5	49.6	76.7
572	*Scomber scombrus*	42	42	9.1	9.1	14.4	31.1	31.1
792	*Sebastes* sp.	11996	4943	3.1	7.5	21.9	37.8	50.1
710	*Stichaeus punctatus punctatus*	11	11	8.9	8.9	10.1	12.5	12.5
373	*Synaphobranchus kaupii*	1	1	54.3	54.3	54.3	54.3	54.3
814	*Triglops murrayi*	819	137	4.7	7.4	12.3	16.0	17.1
815	*Triglops nybelini*	1	1	9.6	9.6	9.6	9.6	9.6
447	*Urophycis tenuis*	610	485	19.5	25.0	37.4	63.9	78.9

Invertebrates

Code STRAP	Scientific name	Sampled number		Length (cm)				
		Length	Weight	Min	P1**	Median	P99**	Max
2218	*Anthoptilum grandiflorum*	393	237	14.5	18.8	43.5	63.5	74.7
8138	*Argis dentata*	531	0	0.5	0.8	1.6	2.1	2.3
8113	*Atlantopandalus propinqvus*	33	0	1.0	1.0	1.8	2.3	2.3
8206	*Cancer irroratus*	1	1	7.9	7.9	7.9	7.9	7.9
8213	*Chionoecetes opilio*	725	363	0.7	0.7	4.1	12.3	13.2
8075	*Eualus fabricii*	143	0	0.6	0.6	0.8	1.0	1.1
8081	*Eualus belcheri*	2	0	1.2	1.2	1.2	1.3	1.3
8080	*Eualus gaimardii*	41	0	0.6	0.6	1.0	1.2	1.2
8077	*Eualus macilentus*	212	0	0.6	0.7	1.0	1.3	1.4
8074	*Eualus* sp.	2	0	0.7	0.7	0.7	0.8	0.8
8033	*Eusergestes arcticus*	75	0	1.0	1.0	1.6	2.0	2.0
2217	*Halipteris finmarchica*	132	83	1.8	18.3	67.2	102.5	114.1
8154	*Homarus americanus*	2	2	7.4	7.4	9.8	12.2	12.2
8217	*Hyas araneus*	104	48	0.6	0.7	1.5	7.8	7.8
8218	*Hyas coarctatus*	278	107	0.6	0.6	1.7	4.9	7.2
4753	*Illex illecebrosus*	719	546	11.4	15.2	20.4	24.5	25.5
8092	*Lebbeus groenlandicus*	44	0	0.9	0.9	1.4	1.8	1.8
8095	*Lebbeus microceros*	3	0	0.6	0.6	1.1	1.2	1.2
8093	*Lebbeus polaris*	241	0	0.5	0.6	1.0	1.3	1.3
8196	*Lithodes maja*	137	116	1.0	1.6	8.0	11.8	13.0
8111	*Pandalus borealis*	15277	995	0.7	0.9	2.1	2.8	3.0
8112	*Pandalus montagui*	1212	0	0.7	0.8	1.4	2.0	2.2
8057	*Pasiphaea multidentata*	1862	0	1.1	1.4	2.5	3.1	3.4
2203	*Pennatula aculeata*	845	478	1.0	4.0	11.1	27.0	33.5
2210	*Pennatula grandis*	267	140	5.1	6.6	30.1	47.5	52.2
8135	*Pontophilus norvegicus*	902	0	0.6	0.7	1.3	1.6	1.7
8129	*Sabinea sarsii*	74	0	0.5	0.5	1.0	1.5	1.5
8128	*Sabinea septemcarinata*	411	0	0.5	0.6	1.2	1.6	1.8
8127	*Sabinea* sp.	3	0	0.8	0.8	0.9	1.7	1.7
8119	*Sclerocrangon boreas*	252	0	0.7	0.9	1.6	3.0	3.1

Code STRAP	Scientific name	Sampled number		Length (cm)				
		Length	Weight	Min	P1**	Median	P99**	Max
8087	*Spirontocaris liljeborgii*	71	0	0.6	0.6	1.2	1.5	1.5
8086	*Spirontocaris phippsii*	5	0	0.6	0.6	0.7	0.7	0.7
8084	*Spirontocaris* sp.	6	0	0.5	0.5	0.7	1.1	1.1
8085	*Spirontocaris spinus*	197	0	0.4	0.6	0.9	1.4	1.5

** Codes for vertebrates and invertebrates used by the Quebec Region of DFO (Miller and Chabot 2014).*
*** P1 : 1st percentile P99 : 99th percentile*