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Assessment of Northern Shrimp Stocks in the Estuary and Gulf of St. Lawrence in 2025: Commercial Fishery and Research Survey Data

Hugo Bourdages, Marie-Claude Marquis, Laurie Isabel, Peter S. Galbraith, and Marjolaine Blais

Fisheries and Oceans Canada
Maurice-Lamontagne Institute
850 route de la Mer
Mont-Joli, Québec, G5H 3Z4

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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.

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ACRONYMS

B_{MSY} — Biomass at Maximum Sustainable Yield

CAQR — Canadian Atlantic Quota Report

CFV — Commercial Fishing Vessel

CIL — Cold Intermediate Layer

CL — Carapace Length

CPUE — Catch Per Unit Effort

DFO — Fisheries and Oceans Canada

DO — Dissolved Oxygen

EGSL — Estuary and Gulf of St. Lawrence

F — Fishing mortality

FM — Fisheries Management

F_{MSY} — Fishing mortality at Maximum Sustainable Yield

GSL — Gulf of St. Lawrence

HCR — Harvest Control Rules

ICES — International Council for the Exploration of the Sea

IFPM — Integrated Fisheries Management Plan

LRP — Limit Reference Point

M — natural Mortality

MCMC — Monte-Carlo by Markov chains

MSY — Maximum Sustainable Yield

NAFO — Northwest Atlantic Fisheries Organization

nGSL — northern Gulf of St. Lawrence

PA — Precautionary Approach

RR — Removal Reference

SAU — Stock Assessment Unit

SFA — Shrimp Fishing Area

SPM — Surplus Production Model

TAC — Total Allowable Catch

TRP — Target Reference Point

USR — Upper Stock Reference

VMS — Vessel Monitoring System

ZIFF — Zonal Interchange File Format (logbook data file)

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ABSTRACT

This report presents a detailed analysis of the status of northern shrimp (*Pandalus borealis*) stocks in the Estuary and Gulf of St. Lawrence, covering their biology, life cycle, ecology, as well as the impact of commercial fishing activities and environmental conditions. Northern shrimp plays a central role in the ecosystem, serving as a key forage species for several predators, including redfish and Greenland halibut.

Since the mid-2000s, stock productivity has experienced a marked decline, attributable to a combination of several factors: warming and oxygen depletion of deep waters, habitat loss, high predation pressure from redfish, poor recruitment, and a decrease in natural productivity. Furthermore, fishing, though limited and well-regulated by harvest control rules consistent with the precautionary approach, adds to these pressures.

Analyses show that the status of the stocks is uneven in 2025:

- The Estuary stock remains in the healthy zone, with biomass exceeding the upper stock reference point and a decrease expected in 2026.
- The Sept-Iles, Anticosti, and Esquiman stocks exhibit biomasses below their limit reference point, placing them in the critical zone. After historical lows in 2023, an improvement in biomass was observed in 2025, partly attributable to reduced fishing effort and decreased predation by redfish.

Despite improvement in certain ecosystem conditions, the overall context remains unfavorable for northern shrimp, and it is unlikely that the situation will improve. The outlook for these stocks therefore remains linked to the sensitivity and resilience of northern shrimp to environmental changes, predation pressure, and fishing pressure.

INTRODUCTION

Northern shrimp (*Pandalus borealis*) fishing began in the Gulf of St. Lawrence (GSL) in 1965 and gradually developed to become a major component of regional fishing activity. The resource is harvested using trawlers operating in four main shrimp fishing areas (SFA): Estuary (SFA 12), Sept-Iles (SFA 10), Anticosti (SFA 9), and Esquiman (SFA 8) (Figure 1). In recent years, the number of license holders in the GSL has stabilized at 97, among which 48 were active in 2025. The shrimp fleet includes operators from five provinces and seven First Nations, highlighting the socio-economic importance of northern shrimp fishing in the region.

The status of the resource is evaluated annually based on a set of indicators derived both from commercial fishing and from scientific surveys conducted by Fisheries and Oceans Canada (DFO). These indicators are compiled and analyzed for each of the four stock assessment units (SAU), allowing the monitoring of abundance, biomass, recruitment, and demographic structure of the exploited populations. This document aims to provide a comprehensive update of the commercial fishing data, covering the period from 1982 to 2025, as well as a synthesis of the main indicators derived from scientific surveys carried out from 1990 to 2025. It also details the methods used for collecting, processing, and analyzing these data, thus contributing to the continuous improvement of sustainable stock assessment and management.

Northern shrimp fishers are subject to several control and monitoring measures to ensure responsible and transparent resource management. They must systematically complete a logbook detailing their operations, submit their catches for official dockside weighing, and, at the request of DFO, host an onboard observer to ensure scientific coverage of at least 5% of fishing trips. The fishing season runs from April 1 to December 31.

Fishery management is based on establishing a Total Allowable Catch (TAC), a measure in place since 1982, alongside the allocation of individual quotas to traditional fishers, a system implemented in the mid-1990s. Various regulatory measures complement this system: imposition of a minimum mesh size of 40 mm for trawls, mandatory use of the Nordmore grid since 1993 to reduce bycatch of fish, and implementation, since 2014, of a specific bycatch monitoring protocol focused on species targeted by commercial fisheries, such as Atlantic cod (*Gadus morhua*), redfish (*Sebastes* spp.), and Greenland halibut (*Reinhardtius hippoglossoides*). Additionally, the use of the Vessel Monitoring System (VMS) has been mandatory since 2012, allowing precise and real-time monitoring of fishing effort locations.

This regulatory and monitoring framework enables reliable data collection on fishing statistics, spatial distribution of fishing effort, catch per unit effort, size composition of landed shrimp, as well as the nature and amount of bycatch.

Since 1990, an annual research survey by trawl has been conducted in the estuary and northern Gulf of St. Lawrence (nGSL) aboard a DFO vessel. This ecosystem survey (hereafter the nGSL survey) aims to assess the abundance of several species, including northern shrimp, while documenting biodiversity and physical and biological oceanographic conditions in the area studied. It is the main source of fisheries-independent data for the scientific assessment of northern shrimp stocks, providing an objective perspective on population dynamics.

The results of the survey allow mapping the spatial distribution of northern shrimp, estimating abundance and biomass of the different stocks, and better understanding their demographic structure and evolution over time. The design of the sampling plan ensures comprehensive coverage of the shrimp distribution area in the nGSL. It is established that northern shrimp are found mainly on bottoms located under the cold intermediate layer, at depths generally greater than 150 meters, where ecological conditions are favorable for their maintenance and development.

The fundamental elements of the precautionary approach were revised in 2023 (DFO 2023). The main stock status indicator is based on a surplus production model adjusted for each assessment unit, allowing expression of biomass relative to biomass at maximum sustainable yield (B/B_{MSY}). On this basis, reference points have been established and harvest control rules (HCR) defined. These rules allow projecting the maximum allowable harvest for the following fishing season, depending on the value of the indicator and its position in one of the three classification zones: healthy, cautious, or critical. The determination of the Total Allowable Catch (TAC) for the 2026 fishing season will be carried out by Fisheries Management (FM) following the advisory committee.

Furthermore, this document presents certain ecosystem features observed in the nGSL, which may influence the dynamics of northern shrimp stocks. These environmental factors can affect various aspects of the species' biology, notably spatial distribution, growth, reproduction, and trophic relationships within the ecosystem.

DELINEATION OF MANAGEMENT AND ASSESSMENT UNITS

In the Estuary and Gulf of St. Lawrence (EGSL), sites with higher shrimp abundance are spatially isolated from one another. In light of historical information on the spatial distribution of fishing effort, the distribution of shrimp within the EGSL, and a recent population genomics study (Bourret et al. 2024), it was decided in 2023 to modify the stock assessment units to achieve better spatial alignment between stock status indicators and biological units. In summary, the changes consist of expanding the Estuary assessment unit, shifting the boundary between the Sept-Iles and Anticosti assessment units to the south of Anticosti Island, and no change for the Esquiman assessment unit (Figure 2). These modifications have been applied since the 2023 stock assessment.

Details of the history of the fishery management units, the criteria and data used for this new delineation are presented in Bourdages et al. (2023).

It was possible to recalculate all commercial fishing and DFO scientific survey indicators based on these new stock assessment units (SAU) since this information was all georeferenced. This research document and the resulting scientific advisory are formulated based on these new delineations of the stock assessment units.

BIOLOGY AND ENVIRONMENT

Twenty-seven shrimp species have been recorded in the northern Gulf of St. Lawrence (nGSL), with northern shrimp being by far the most abundant (Savard and Nozères 2012). Shrimp are considered forage species, in accordance with the Policy on New Fisheries for Forage Species. They play a central role in the ecosystem by ensuring the transfer of energy from lower trophic levels, such as zooplankton, to higher-level predators, including fish, marine mammals, and seabirds. Maintaining ecological relationships, including predation and competition, among species directly or indirectly affected by fishing remains essential to ensure that these interactions stay within the natural fluctuations of these ecosystems.

LIFE CYCLE

Northern shrimp is a protandrous hermaphrodite species, meaning that individuals first reach sexual maturity as males before changing sex to become females. This particularity of the life cycle is of major importance in the development of harvest and management strategies, since the largest individuals targeted by the fishery are mainly large males and females.

In the nGSL, shrimp larvae hatch in the spring, generally in April or May. The larvae then remain pelagic for a few months (Figure 3). Towards the end of summer, they gradually acquire adult

characteristics and begin to adopt supra-benthic behavior, living near the bottom. At this stage, post-larvae or juveniles remain too small to be caught by the trawls used in commercial fishing. During their second year, juveniles reach male sexual maturity. Reproduction takes place in the autumn, and males can participate in reproduction for two to three years before undergoing sex change, which occurs during the winter, usually at the age of 4 or 5 years, when the carapace length (CL) reaches about 21 mm.

Recently transformed females, called primiparous females, are easily identifiable in commercial catches in the spring and summer as they retain certain male sexual characteristics. These females reproduce as early as the following autumn, typically in September or October. Fertilized eggs are carried under the abdomen during incubation, which lasts around eight months, until the larvae hatch the following spring.

Females that have spawned at least once, known as multiparous females, are distinguished from primiparous females by morphological characteristics such as the sternal spines, which disappear after the prenuptial molt preceding reproduction. Females can reproduce at least twice in their lifetime, and the estimated lifespan of the species in the nGSL is about seven years (Hansen and Aschan 2001).

REPRODUCTIVE CYCLE

The reproductive cycle of shrimp is strongly influenced by local environmental conditions. The duration of egg development, while carried under the female’s abdomen, depends in particular on the temperature of the ocean floor: colder water slows embryonic development, while warmer water accelerates it. Egg hatching in the spring must be synchronized with the spring bloom of phytoplankton, which provides the primary food resource for the larvae.

Different populations of northern shrimp have thus developed specific adaptations enabling them to adjust the timing of egg hatching to the optimal period of phytoplankton availability, according to local temperature and phenology variations (Koeller et al. 2009). This adaptive synchronism maximizes larval survival under average conditions. However, this strategy increases vulnerability to interannual oceanographic variability and disturbances caused by long-term climate change, which may result in mismatches between hatching and the period of phytoplankton bloom.

Monitoring of the reproductive cycle in the Sept-Iles area is undertaken through samples collected during fishing operations (see section "Commercial Catch Sampling"). For each sample, the proportion of ovigerous females, i.e., those carrying eggs under the abdomen, is calculated by dividing the number of ovigerous females by the total number of females observed. In addition, the proportion of females in maturation is determined by comparing the number of females with a green head to the total number of females, excluding those already ovigerous. This annual monitoring is possible only in the Sept-Iles area as it is the only zone where fishing occurs from spring to autumn.

The reproductive calendar is estimated by fitting logistic curves to the collected data (Figure 4). Thus, the spring day on which 50% of the females have released their eggs (hatching) and the autumn day on which 50% of the females are carrying eggs (spawning) are determined. In the same way, the point of the year when 50% of the females enter the maturation phase is established.

Over recent years, warming of the deep waters of the GSL, habitat of northern shrimp, has led to anticipated changes in the reproductive cycle of this species. Notably, female maturation, which usually occurs at the end of June, began to be delayed from 2013 onwards. In 2023, this phenomenon was observed at the end of July, 45 days later than the historical average (Figure 5). Similarly, spawning, which normally takes place at the end of September, was postponed by over 20 days during the same period. It was observed that in August of the last

two years, some females had moved to shallower depths where water temperatures are colder, which could partially explain the return to normal dates for maturation and spawning. In contrast, larval hatching in spring remains remarkably stable over time, generally occurring at the end of April to coincide with the start of the spring phytoplankton bloom.

Thus, these observations suggest that changes in the phenology of northern shrimp are closely linked to increased temperatures in deep waters and modifications to their spatial distribution. The delay in maturation and spawning, as well as the reduction in larval development time in warmer waters, reflect the direct impact of environmental conditions on the species' biological cycle. However, the synchronization of larval hatching with the spring phytoplankton bloom remains unchanged, indicating resilience in this essential ecological coupling.

BEHAVIOUR

Shrimp begin to be caught by commercial trawls while still males, reaching around 15 mm carapace length (CL). The probability of capture by the trawl increases with individual size, and shrimp are fully recruited when they measure about 22 mm (CL). Commercial catches therefore include both male and female shrimp, with their proportions varying depending on the fishing period and area.

Fishers are well acquainted with the seasonal migratory patterns of shrimp and have adapted their fishing strategies to optimize their catches. Generally, they aim to maintain high catch rates while maximizing the proportion of large shrimp in their catches and minimizing bycatch.

Each year, shrimp undertake migrations closely linked to their reproductive cycle. At the end of autumn and beginning of winter, ovigerous females start migrating towards the shallowest areas of their range. In spring, these females concentrate in sites favorable for larval release, while males remain distributed across the territory. Fishers exploit these spring aggregations of ovigerous females to optimize their yield.

After larval hatching, females undergo a molt and then redistribute to deeper habitats, generally between 200 and 300 m. The spatial distribution of shrimp also varies with age: juveniles are found mostly in shallow sectors, often at the head of channels, whereas older individuals, mainly females, occupy deeper waters. In shallow areas, the density of young shrimp is often much higher than that of large shrimp found in deeper waters. The composition of spring commercial catches generally reflects this distribution pattern. Since fishing mainly takes place in shallower waters at this time of year, catches are often composed of two distinct groups: ovigerous females and very small males.

Shrimp are also known to perform daily vertical migrations. Each night, they leave the bottom to rise into the water column and feed on plankton before returning to the bottom during the day. The amplitude of these vertical migrations varies according to the developmental stage of the individuals and local environmental conditions. For example, smaller shrimp tend to leave the bottom earlier and rise higher in the water column than larger females.

Since shrimp trawlers mainly use bottom trawls, fishing yields may be lower at night when many individuals are not accessible to fishing gear. However, the average size of shrimp caught tends to increase during this period, mainly because the proportion of males in catches is lower. Moreover, nighttime fishing for northern shrimp may have an additional advantage: it can reduce accidental capture of capelin (*Mallotus villosus*), a species that also leaves the bottom at night for its own vertical migrations.

The average size of females exhibits a marked east-west gradient, with the smallest observed in the Esquiman channel and the largest in the estuary. Notably, individual fecundity is positively correlated with size, so the total egg production for the same number of females would theoretically be lower in the more eastern sectors.

The number of individuals per unit mass also varies between fishing areas. This ratio, that is the number of shrimp caught per kilogram, depends on fishing patterns, which notably influence the proportion of males in the catches and the average size of females. From west to east, this number tends to increase significantly, explained by a greater proportion of males in commercial catches combined with a decrease in the average size of females.

PREDATORS

Until the early 1990s, the GSL ecosystem was dominated by groundfish. Subsequently, a shift occurred toward an ecosystem mainly composed of forage species. This change in structure was accompanied by a marked increase in the northern shrimp population during the 1990s and up to the 2010s, in response to the decline of large groundfish species.

In recent years, however, a different dynamic has been observed: the abundance of redfish and Atlantic halibut is increasing, while that of northern shrimp and Greenland halibut shows a downward trend (Figure 6). Three strong cohorts of Atlantic redfish (*Sebastes mentella*), from the 2011, 2012, and 2013 year classes, have significantly contributed to the increase in the biomass of this species since 2013, and these now have a modal size of 25 cm. Currently, redfish biomass exceeds levels observed in the early 1990s (Figure 7), even though a decline has been noted since 2020 (Senay et al. 2026). Redfish are presently distributed throughout the deep channels of the GSL and, to a lesser extent, in the estuary (Figure 8).

In this context, trophic changes may have occurred in recent years and could take place in the coming years, as northern shrimp represent an important prey for many species. During the assessment of the Greenland halibut stock in divisions 4RST (DFO 2025a), it was reported that the body condition of halibut measuring 35 cm or more reached, in 2022, 2023, and 2024, the three lowest values of the time series. These findings coincide with historical lows in the feeding intensity index, as well as a marked decrease in the contribution of capelin and northern shrimp, the two main prey, to the stomach fullness index. Similarly, the assessment conducted on cod in 3Pn, 4RS (DFO 2025b) revealed that the relationships between feeding intensity, condition, and total mortality suggest that recent bottom-up environmental effects may be key factors driving low stock productivity in recent years. The availability of prey, particularly capelin and northern shrimp, two key prey species for cod, has likely influenced natural mortality induced by starvation in recent years.

Diet of predators

Redfish (without species distinction) and Greenland halibut are two of the main predators of northern shrimp in the GSL (Savenkoff et al. 2006). Stomachs from these two predators were collected at various times during DFO research vessel surveys. The stomachs were analyzed in the laboratory and the data are archived in a database. Diet analysis was conducted using the methodology described in Ouellette-Plante et al. (2020).

The diet of Greenland halibut is varied and depends on size (Chamberland et al. 2026b). About 22,000 stomachs from this species have been collected over the past three decades. For this analysis, they were grouped into three periods to determine whether the consumption of northern shrimp has changed over time: the 1990s, the 2000s, and 2015–2024. The results show that northern shrimp contributes very little to the diet of Greenland halibut under 20 cm (1 year old), with a total fullness index (CFI) contribution of less than 1%, regardless of the period considered (Table 1, Figure 9). At age 2 (20–30 cm), northern shrimp is more frequently found in the stomachs of Greenland halibut, and this increased frequency is also observed among the different periods, rising from 1% in the 1990s to 2.5% during 2015–2024. The CFI shows a similar pattern, with 3% during the 1990s, 5% in the 2000s, and 11% in the most recent period. For individuals over 30 cm in length (≥ 3 years), northern shrimp alone represents more than 9% of the Greenland halibut's total fullness index, which is considerable given the dozens of

prey observed in stomachs over the years. Northern shrimp was more important in the diet of Greenland halibut ≥ 30 cm in length during the 2000s than in the two other periods. This was also the period when northern shrimp abundance was highest in the GSL.

The diet of redfish varies by size, with smaller redfish mainly feeding on zooplankton, and gradually including more shrimp and fish as they grow larger (Senay et al. 2021). Numbers of stomachs analyzed were 3,321, 3,834, and 3,588 from the ecosystem surveys of the 1990s, 2015–2019, and 2020–2024, respectively (Table 1, Figure 10). In contrast to Greenland halibut, no stomach data are available for the 2000s. The recent period (2015–2024) was divided into two sub-periods to better track possible changes in the redfish diet as stock size evolved.

For redfish less than 25 cm in length, northern shrimp is present in less than 1% of analyzed stomachs, regardless of the period. For fish over 25 cm, the occurrence of northern shrimp increased in the 1990s with fish length, rising from 1.5% to over 20% in fish longer than 45 cm. For fish over 25 cm in recent periods, occurrence rates ranged from 5.4% to 9% in 2015–2019, and from 0.4% to 17% in 2020–2024. A length effect is observed for all periods, but the highest occurrences of shrimp are found in different size classes. The mass contributions (CM) and CFI of northern shrimp are low in the diet of redfish up to 20 cm in length (< 4% for all periods). In the 1990s, the CFI increased with length, from 3% up to 21%. For 2015–2019, the highest CFI values for northern shrimp were found in the 25–30 cm and 30–35 cm length categories, estimated at 25.7% and 28.7%, respectively, while they were under 15% for redfish over 35 cm. In 2020–2024, the CFI for northern shrimp in redfish under 35 cm was slightly lower than in 2015–2019 but increased thereafter, reaching 41% for fish between 35 and 40 cm. It then dropped for fish 40–45 cm to 27%. Northern shrimp appears to play a more significant role in the diet of redfish over 35 cm for 2020–2024 than in 2015–2019.

Based on the redfish diet data, an estimate of the annual relative consumption (Q) of northern shrimp was made for the periods 2015–2019 and 2020–2024, compared with 1995–1999, i.e., before the arrival of the strong 2011 to 2013 year classes. Relative consumption was calculated using the method described in Isabel et al. (2026). The redfish collected for the diet study are representative of the entire northern GSL, including areas fished by shrimpers (Figure 11). In the 1990s, consumption varied from 1% to 4% of the maximum consumption recorded. Between 2015 and 2021, northern shrimp consumption increased tenfold (Figure 12). This increase can be attributed to the growth in length of the strong redfish cohorts and increased predation on northern shrimp within their diet (Figure 13). Since peaking in 2021, northern shrimp consumption by redfish has dropped by 50% in 2024. The reduction in shrimp biomass in the ecosystem could have contributed, at least in part, to the decreased consumption observed in recent years. Furthermore, as the redfish stock is declining, the impact of their predation on northern shrimp could continue to decrease in the coming years, though it may remain at historically high levels.

ENVIRONMENTAL CONDITIONS

The deep-water layer (>150 m) of the GSL results from the mixing of Labrador Current waters (cold, less salty, and well-oxygenated) and Gulf Stream waters (warm, saltier, and less well-oxygenated). This mixing occurs outside the GSL and then enters via the Laurentian Channel, progressing toward the heads of the Esquiman, Anticosti, and Laurentian channels. The progression of these waters from the Cabot Strait to the head of the Laurentian Channel spans approximately three to four years. In recent decades, the proportion of Gulf Stream water in this mix has increased, leading to warming and decreased oxygen levels in the deep waters of the GSL (Galbraith et al. 2025; Blais et al. 2025).

After reaching record temperatures at 150, 200, 250, and 300 m in 2022 in the four ecoregions covering the GSL shrimp stocks, temperatures have stabilized or slightly decreased over the past three years (Figure 14). Despite this recent stabilization, deep waters remain significantly

warmer than the historical average. In 2025, there are no longer any areas of the seafloor covered by water with temperatures exceeding 7 °C, unlike the period from 2020 to 2022, when such conditions were observed in the Anticosti and Esquiman channels (Figure 15). Currently, these same seafloors are exposed to temperatures ranging from 6 to 7 °C, whereas before 2009, they were mainly covered by waters with temperatures ranging from 5 to 6 °C.

The Cold Intermediate Layer (CIL) continues to display temperatures above the historical average since 2020. In contrast, surface water temperatures decreased in 2025, returning to near-normal values during the May to August period.

At depths of 200 and 250 m, the Anticosti and Esquiman stocks are located in warmer waters compared to those of Sept-Iles and Estuary. However, at 150 m, the situation is reversed, with generally colder waters in the Anticosti and Esquiman sectors, where the CIL is colder, compared to the Sept-Iles and Estuary stocks.

In the GSL, the lowest dissolved oxygen (DO) saturation in bottom waters is observed in the deep portion of the estuary (Figure 16). In 2025, hypoxic waters (defined as saturation levels below 30%) were found along the channel, from the estuary to the middle of Anticosti Island. Unlike the years 2020–2024, when hypoxic waters covered much of the Anticosti and Esquiman Channels, they were virtually absent from these regions in 2025.

Analysis of annual means of DO saturation shows a decreasing trend over the past decade, both at the bottom and at depths of 200, 250 and 300 m throughout the GSL (Figure 17). In 2025, a slight improvement was observed, although saturation levels remain mostly below the reference period averages (2002–2020). Conditions measured in 2025 in the Esquiman area thus approached the reference means at all depths, for the first time since 2016. At 200 m, mean DO saturations were 25.0%, 26.5%, 41.1%, and 47.0% for the Estuary, Northwest Gulf (Sept-Iles), Anticosti, and Esquiman ecoregions, respectively. The Estuary and Sept-Iles shrimp fishing areas are the most affected by hypoxia.

For more than 15 years, northern shrimp in the St. Lawrence Estuary and Gulf (EGSL) has faced warming waters and declining DO saturation in its preferred habitat (Table 2, Figure 18). These changes have altered the distribution of the Estuary and Sept-Iles stocks, with shrimp now occupying shallower depths than before (Figure 19). No depth-related distribution changes have yet been observed for the Anticosti and Esquiman stocks.

By moving closer to the Cold Intermediate Layer, Estuary and Sept-Iles shrimps now occupy colder and better-oxygenated waters (Figures 20 and 21). In contrast, by remaining at their usual depths, Anticosti and Esquiman stocks continue to be exposed to warm and low DO conditions. Between 2022 and 2025, more than 50% of female shrimp biomass from Anticosti and Esquiman were exposed to temperatures exceeding 6.5 °C and DO levels below 30%.

Northern shrimp are particularly adapted to hypoxia. Females, however, are less tolerant than males, and both sexes become increasingly vulnerable as temperature rises. Lethal thresholds at 5 °C and 8 °C are 9% and 14% saturation for males and 15% and 22% saturation for females, respectively (Dupont-Prinet et al. 2013). In addition to tolerating severe hypoxia, shrimp can cope chronically with oxygen levels near their lethal limits (Dupont-Prinet et al. 2013; Pillet et al. 2016). Portions of the Sept-Iles, Anticosti, and Esquiman populations are approaching these lethal thresholds. Furthermore, laboratory experiments on combined warming, acidification, and hypoxia suggest that shrimp survival and aerobic performance could decrease significantly under the cumulative impact of these factors (Guscelli et al. 2023).

These oceanographic changes have exposed parts of the northern shrimp population to environmental conditions approaching the species' tolerance limits, and have likely affected stock productivity. While deep-water temperatures have stabilized in the past three years, these conditions may continue to deteriorate in the long term under various climate change scenarios

(Lavoie et al. 2020), potentially leading to a reduction in suitable habitat for northern shrimp (Shink et al. in prep.; Stortini et al. 2017).

RECRUITMENT

Environmental conditions affect northern shrimp recruitment from the larval stage through to juvenile settlement on the seabed. Brosset et al. (2018) showed, for the Sept-Iles, Anticosti, and Esquiman stocks, that recruitment of northern shrimp from 2001 to 2016 appeared to be more linked to the characteristics of the spring phytoplankton bloom and resulting zooplankton phenology, as well as the abundance of northern shrimp, than to the biomass of predatory fish. Notably, the significant variables explaining recruitment were specific to each stock, implying that the effects of environmental variability and stock abundance depend on the area considered. Looking ahead, with moderate warming, the Esquiman area could experience an increase in recruitment, whereas Sept-Iles recruitment may be impacted. These results enhance our understanding of stock-specific recruitment dynamics of northern shrimp in a changing environment, and could ultimately improve management in the GSL.

COMMERCIAL FISHERY

FISHING STATISTICS

Holders of a shrimp fishing license are required to systematically record the details of their fishing operations in a logbook. Each day at sea, they must indicate the estimated shrimp catch, the number of trawling hours, and the precise coordinates of fishing locations. The catch data are then verified using purchase slips provided by processing plants or through the dockside monitoring program. Introduced in 1991, this program requires all fishers to have their landings weighed by independent observers present in designated ports.

The resolution of the information entered in the logbook and recorded in the zonal file (ZIFF, Zonal Interchange File Format) corresponds to one fishing day for each site visited. Fishermen must report the total estimated catch and the number of trawling hours for each site on a daily basis. The official landing, which generally occurs after several days at sea and is based on the dockside weigh-in, is then distributed among the fishing sites according to the proportion of daily catches recorded in the logbook.

Public DFO statistics on landings by fishing area come from the Canadian Atlantic Quota Report (RCCA) and are available in the Gulf quota report.

Total landings of northern shrimp in the EGSL have increased progressively, from nearly 1,000 t at the beginning of exploration in the 1970s to over 35,000 t at the end of the 2000s (Figure 22). Landings subsequently decreased, reaching 2,570 t in 2024 and 3,381 t in 2025 (preliminary data as of January 5, 2026) on global total allowable catches (TACs) of 3,060 t and 3,809 t, respectively. The landings for 2024 and 2025 are the lowest recorded since 1974.

Preliminary statistics indicate landings by fishing area in 2024 and 2025 of 357 t and 929 t in Estuary (TACs: 473 t and 946 t), 187 t and 453 t in Sept-Iles (TACs: 342 t and 807 t), 366 t and 1,025 t in Anticosti (TACs: 488 t and 885 t), and 1,660 t and 1,024 t in Esquiman (TACs: 1,757 t and 1,171 t) (Table 3, Figure 23). As of January 5, 2026, the percentage of TAC reached was 98% in Estuary, 56% in Sept-Iles, 116% in Anticosti, and 87% in Esquiman.

Based on the new assessment units proposed by Bourdages et al. (2023), landings have been recalculated according to updated geographic boundaries of the stock assessment units. With the geolocation of the data used, it has been possible to produce representative landings for the proposed units from 1982 onward (Figure 24). The modifications affect only the Sept-Iles and Anticosti units (Figure 2). Discrepancies between landings by fishing management zone and assessment unit are presented in Table 4. Differences greater than 1% are observed in the

Sept-Iles and Anticosti areas for the years 1982 to 1984, 1993 to 2009, 2011, and 2025, due to fishing effort compiled in the sector southeast of Anticosti Island.

Landings by stock assessment unit are given by season in Figure 25. In general, the distribution of fishing effort among spring, summer, and autumn seasons remains relatively constant from year to year. However, in recent years, spring fishing effort has been limited in the Sept-Iles and Anticosti areas.

DISTRIBUTION OF FISHING EFFORT

The location of the fishing site, recorded by the fisher in the logbook, is used to determine the shrimp fishing area where the operations occurred. This location may be expressed as geographic coordinates (latitude and longitude) or as the identification of a fishing grid (a 10-minute by 10-minute square, Figure 26), depending on the form used by the fisher's fleet. Sometimes, this information is missing from the logbook. In these cases, the shrimp fishing area is assigned based on the Northwest Atlantic Fisheries Organization (NAFO) unit area (Figure 27), which must also be indicated in the logbook.

Spatial distributions of catches, fishing effort, and catch per unit effort (CPUE) by grid are shown in Figures 28 to 30. These distributions are presented in two ways: by decade (i.e., average annual per grid during the given period) and separately for 2023 to 2025.

Since 2012, the use of the Vessel Monitoring System (VMS) has been required as part of license conditions. Between 2012 and 2015, vessels were geolocated by satellite every 60 minutes during shrimp fishing trips. Since 2016, the interval has been reduced to 30 minutes. VMS data includes the commercial fishing vessel (CFV), position (latitude and longitude), and date and time; however, there is no indication as to the nature of the activity (shrimp fishing or not) or whether the trawl was in the water.

To exclude non-targeted fishing activities, we compared the dates and CFVs in VMS data with those in the logbooks. We retained all positions corresponding to within one day during which a shrimp catch was recorded in the logbook, excluding the possibility of activity directed toward another species during that interval.

To further exclude positions associated with transiting, remaining stationary at sea, or in port, we calculated vessel speed from the positions and intervals between recordings. Speeds between 1.8 and 2.6 knots were considered characteristic of shrimp trawling, as validated by the fishers. Shrimp fishing positions were then aggregated annually into one-minute longitude by one-minute latitude grids to produce precise mapping.

Using this method, the fishing effort retained from VMS data, representing active shrimp vessels, accounts for over 95% of the total effort declared by fishers in their logbooks.

Analysis of fishing locations recorded in logbooks (Figure 31) and captured by VMS (Figure 32) made it possible to map the spatial distribution of fishing effort in the GSL. The main fishing grounds in the four areas have remained relatively stable in recent years, generally corresponding to locations where high concentrations of shrimp have been observed in scientific surveys. However, some fishing grounds have recently been abandoned due to low shrimp abundance, notably the area east of the Manicouagan Peninsula in the Estuary zone, the northeast tip of the Gaspé Peninsula, southeast of Anticosti Island, and southwest of the Esquiman channel.

COMPILATION OF CATCHES AND FISHING EFFORT

Each observation recorded by fishers in their logbook corresponds to a catch and the effort made by a vessel during one fishing day at a given site. The first validation step is to eliminate missing or implausible data for key variables (vessel number, catch, effort, catch date, and

shrimp fishing area). After validation, the sum of the catches from observations does not always reflect the total landings, as some erroneous or incomplete data were excluded from the analyses. As a result, the sum of effort associated with valid observations does not represent the total effort deployed by the fleets to achieve the full landings.

Nonetheless, total fishing effort, known as nominal effort, corresponding to overall landings, can be estimated by calculating catch per unit effort from the subset of validated observations (Table 5, Figure 33). Similarly, monthly catch and effort can be estimated for each fishing area and year (Tables 6 and 7).

Total annual fishing effort of shrimp vessels has shown a marked decline over the years, falling from more than 100,000 hours between 1985 and 2017, to around 80,000 hours from 2018 to 2022, and dropping further to less than 15,000 hours in the past two years. This level is well below the historical average and represents the lowest effort observed since 1982 (Figure 34). This decrease in fishing effort is evident across all four fishing zones.

STANDARDIZATION OF CATCH PER UNIT EFFORT

Annual catch per unit effort (CPUE) is standardized to account for changes in fishing capacity and seasonal fishing patterns (Gavaris 1980). For this, multiple linear regressions were performed on the logarithm of CPUE, using as explanatory variables the vessel's length and engine power (to control for changes in fishing power), the month (to capture seasonal variations), and the year (to isolate the annual effect from other factors). These analyses were carried out separately for each fishing area using the GLM procedure of SAS software (SAS 1996).

Prior to statistical processing, variables were examined to ensure a sufficient number of observations in each category, thus guaranteeing the representativeness of fleet behavior. Vessel length (30 to 89 feet) was divided into six categories of 10 feet each, while engine power (100 to 999 horsepower) was split into nine categories of 100 horsepower. Because an observation corresponds to a single day (or less) of fishing, fishing effort in a given category is considered representative when it is associated with a substantial number of observations, and thus fishing days.

The criteria establishing the representativeness of fishing effort were previously defined by Savard (2011). These conditions are as follows:

- A vessel must have been active for at least three years and reported at least seven observations per year;
- Each length or power category must have existed for a minimum of three years and have at least seven annual observations;
- Only months during which activities were reported for at least three years and involved at least seven observations per year and per fishing area (five observations for the Estuary area) are included;
- An observation must correspond to more than one hour of effort and a catch of more than 50 kg;
- Finally, categories with less than 1% of total observations were excluded as they were considered unrepresentative of fleet behavior.

Validation of these models is performed by analyzing residuals according to predicted values and factor categories. All variance analyses are significant, as is the contribution of each category to the multiple regression. Based on the coefficient of determination (R^2), the model explains 52% of the variance for the Estuary, 50% for Sept-Iles, 62% for Anticosti, and 57% for Esquiman.

Standardized CPUE refers to that of a reference vessel in the 60–69 feet length class, with an engine power of 500–599 horsepower, and mainly operating in June. Since 1982, CPUE has shown significant temporal variation, following similar trends in all four areas. From 1982 to 1995, CPUEs were low (Table 8, Figure 35). They then increased, reaching a maximum around 2005, and remained high for several years. Between 2014–2015 and 2023, a strong CPUE decrease is seen in Sept-Iles, Anticosti, and Esquiman, before a rebound in 2024 and 2025. In the Estuary area, CPUE declined sharply between 2006 and 2010, remained stable from 2011 to 2018, increased up to 2022, then dropped slightly before stabilizing.

In 2025, CPUE in all four areas is similar to that observed in the early 2000s and remains higher than in the early 1990s.

SAMPLING OF COMMERCIAL CATCHES

Samples of commercial catches have been collected at landings since 1982, under the dockside sampling program (Table 9). These samples are sent to the laboratory, where species, maturity stage, and individual size (carapace length measured to the nearest 0.1 mm) are determined. Sex is identified based on features of the endopodite of the first pleopod (Rasmussen 1953), while the maturity stage of females is determined by the presence or absence of sternal spines (McCrary 1971) and the presence or absence of eggs.

Samples of commercial catches are grouped by area and month. Monthly size-frequency distributions are weighted according to monthly landings (Table 10), and numbers by length are calculated using the length-weight relationships estimated in the research survey (see “DFO Scientific Survey” section). Annual commercial catch numbers are obtained by summing monthly numbers by length class (Table 11). Finally, numbers per unit effort are determined by dividing numbers by length by fishing effort (Figures 36 and 37).

The mean carapace lengths of female shrimp caught during summer, by fishing area and year, are shown in Figure 38. The general trend in all four areas shows a gradual decrease in the average size of female shrimp caught over the years.

DFO SCIENTIFIC SURVEY

SURVEY DESCRIPTION

An ecosystem research survey has been conducted annually in August in the northern Gulf of St. Lawrence (nGSL) since 1990 to estimate the abundance of northern shrimp and groundfish species. The survey uses a shrimp trawl based on a random stratified sampling design. Fishing operations are conducted 24 hours a day. A description of the 2025 survey fishing and sampling protocol is provided in Chamberland et al. (2026a).

The stratification used for allocating fishing stations is shown in Figure 39. In the Gulf, the majority of the seabed (except for the Mécatina Trough) deeper than 37 m (20 fathoms) is covered by the survey. In the estuary, the survey covered depths greater than 183 m (100 fathoms) from 1990 to 2007. In 2008, strata were added to cover depths from 37 to 183 m in this area, to better sample the spatial distribution of northern shrimp. The survey area thus increased from 116,115 km² to 118,391 km².

In 2025, out of 180 planned stations, 159 were successfully fished: 53 in 4R, 68 in 4S, and 38 in 4T (Tables 12 and 13, Figure 40). All strata were sampled with a minimum of two stations, except strata 408, 414, 804, and 829, for which one station was successfully fished.

For each tow, the trawl catch was sorted by species or taxon. All shrimp catch was weighed, and a sample of about 2 kg was taken to determine the proportion of *P. borealis* among all shrimp species and to describe its biological characteristics. The maturity stages (male,

primiparous or multiparous female with or without maturing gonads, ovigerous female) were identified for each shrimp. Carapace length (cephalothorax) was measured using an electronic caliper to the nearest 0.1 mm. Individual mass was measured with a precision of 0.1 g following a stratified sampling (about ten individuals per sex per 1 mm length class) for each fishing area. In 2020 and 2021, the missions were conducted with a reduced scientific crew to comply with at-sea work protocols in the context of the Covid-19 pandemic. As a result, shrimp samples were frozen and processed in the laboratory in the fall. Only individual masses could not be measured in the laboratory after thawing, as the mass after thawing is not comparable to fresh mass.

The area sampled by the trawl was estimated from the tow duration, vessel speed, and the horizontal opening between the trawl wings. The catch of *P. borealis* from each tow was estimated from its proportion in the sample and standardized to an area of 1 km² considering the swept area (Figure 41). The results presented in this document are all expressed as equivalents of the CCGS Teleost vessel-gear combination with a Campelen trawl.

DISTRIBUTION

Geographic distribution of catches

The geographic distribution of catches in weight per tow (kg/15 min tow) was plotted for six-year periods (Figure 42). Catch interpolation was done on a grid covering the study area using distance-inverse weighting (R version 4.3.1, package Rgeos; R Development Core Team 2011). Isolines were then drawn for various biomass levels approximately corresponding to the 1st, 5th, 25th, 50th, 75th, 95th, and 99th percentiles of catches greater than 0.001 kg. The distribution of male and female catch rates for surveys from 2022 to 2025 is also shown in a “bubble” map (Figure 43).

The survey is considered to adequately cover the entire range of northern shrimp in the nGSL. The spatial distribution of northern shrimp shows the best catch rates in the Esquiman, Anticosti, and Laurentian channels, as well as to the west of Anticosti Island and into the estuary. Generally, younger shrimp are found in shallower waters, often at the heads of channels, whereas older individuals, which are females, are found in deeper waters. Northern shrimp is little or not present in the southern Gulf.

Area of occupancy

Three spatial distribution descriptors were chosen: design-weighted area of occupancy (DWAO), D95, and the Gini index.

Design-weighted area of occupancy

Design-weighted area of occupancy (DWAO) represents the surface of the study area with presence of shrimp (Smedbol et al. 2002).

D95

D95 corresponds to the area occupied by most of the population, where 95% of the shrimp biomass is concentrated. Calculation details are in Swain and Sinclair (1994).

Gini index

Gini index indicates the concentration of shrimp distribution. This index is calculated using the Lorenz curve (Myers and Cadigan 1995). The index ranges from 0 (perfectly even distribution) to 1 (highly concentrated distribution).

Northern shrimp is widely distributed throughout the nGSL. Before 2018, its distribution area remained relatively stable at about 95,000 km² out of a possible 116,115 km² (the study area)

(Table 14, Figure 44). Since then, it has decreased and now fluctuates around 90,000 km². Although the total distribution area has not changed much, the shrimp have become more concentrated between the beginning and end of the 2010s, as shown by an increased Gini index. Meanwhile, the area of highest shrimp concentration (D95) dropped from over 50,000 km² before 2010 to under 30,000 km² recently, a decline of over 40%. Since 2020, the Gini index and D95 have been relatively stable.

These spatial distribution indices are also presented by assessment unit (Figure 45). In the Estuary unit, D95 has declined significantly. Before 2017, 95% of the population was distributed over about 4,000 km² and subsequently, most of the stock was located over about 1,500 km². In Sept-Iles, the D95 decline was more gradual, from over 30,000 km² around 2010 to about 10,000 km² since 2018. In Anticosti, the decline has been less marked, from over 15,000 km² in the 2000s to about 10,000 km² since. In Esquiman, the reduction was smaller still, from over 10,000 km² to under 10,000 km² in the early 2010s.

BIOMASS ESTIMATION BY GEOSTATISTICS

Biomass (kg/km²) measured at all stations in the study area was kriged separately for males, females, and total catch. First, the coordinates of sampling stations, in latitude and longitude, were transformed to a cartesian coordinate system using the Lambert conformal conic projection with parallels 48°N and 50°N and the origin at 46.5°N and 70°W, using the R packages "sp" and "rgdal" (Pebesma 2013a, Bivand 2013).

First, a variogram was constructed for each survey year. To better describe the spatial structure, extreme values were sometimes removed (see Table 15 for thresholds). Values below 5 kg/km² were not used to estimate the variogram. From 1990 to 2012, annual variograms were built using the "VARIO" procedure in SAS. Since 2013, variograms have been produced using the R package "gstat" (Pebesma 2013b). Semivariances were calculated between all pairs of stations. The distance (h) was binned, and semivariances averaged over distance classes with 15 km intervals, up to a maximum distance of 225 km.

Second, the annual variogram was normalized, dividing semivariances by the variance of the data used. Then, a multiyear variogram was built using the mean of the last three variograms (the current year and two prior). The multiyear variogram is the mean semivariance for each distance *h*, weighted by the number of pairs at those distances. Using a multiyear variogram reduces spatial structural variability and yields a better fit.

From 1990 to 2012, the variogram parameters (nugget, sill, range) were set manually for best fit (Table 16). Although other variogram models were tested, the exponential model was selected for best fit. Since 2013, model parameters have been fit using the "fit.variogram" function in R's "gstat" package (Pebesma 2013a). To minimize least squares, fitting weighted the data by Nj/hj² to give more weight to the first variogram points (Figure 46).

Later, catch values were interpolated spatially by kriging across the study area, using all survey data, including outlying values. The multiyear variogram was re-fitted to represent the variance of the study area observations, multiplying nugget (C_0) and sill (C) by the variance of all data. Interpolation was done on a regular grid with nodes spaced 5 km apart in both directions. Point estimates used catches from the eight nearest stations within a maximum search radius of 200 km.

Kriging was performed with the "krige" function in "gstat" (Pebesma 2013a) and mean kriging estimates and estimation variance were calculated with a function developed by Sébastien Durand (DFO, Mont-Joli, pers. comm.).

Average biomass (kg/km²) of each fishing zone was calculated from the average of all point estimates in a zone. Total biomass for a given zone was obtained by multiplying mean biomass by zone area. Zone areas are: Estuary, 4,000 km² (1990–2007), 6,325 km² (since 2008); Sept-

Iles, 29,775 km² (1990–2007), 29,975 km² (since 2008); Anticosti, 46,400 km²; Esquiman, 32,350 km².

Maps of total biomass distribution are shown by decade or year in Figure 47, and for males and females in Figures 48 and 49.

Indices of total biomass (Figure 50) and of male and female biomass (Figure 51, Tables 17 and 18) in Sept-Iles, Anticosti, and Esquiman showed upward trends in the 1990s, followed by declines since 2003. Around 2023, estimated biomasses for these stocks reached historical lows, before showing a slight increase. For the Estuary, confidence intervals around biomass estimates and interannual variations are larger than in other areas. Biomass here trended lower from 2008 to 2020, then rose to a series maximum in 2022, before decreasing to near the historical average in 2024 and 2025.

Biomass estimates are generally more precise for females than males (Tables 19 and 20). Coefficients of variation are higher in the Estuary area.

ABUNDANCE ESTIMATION

Kriged biomass estimates were converted to abundance using length-mass relationships and length frequency distributions. Length frequencies from each sample were adjusted to total station catch and normalized to a swept area of 1 km². Frequencies (n/km²) were grouped in 0.5 mm length classes.

The mean frequency distribution (n/km²) by size class was estimated for each area, by sex. Mean distribution was estimated from all sampled stations in an area. The mean frequency distribution was then converted to mass using the length-mass relationship estimated for each area (Table 21 and Figure 52). The 1993 estimated length-mass relationship was used for 1990–2004; from 2005 onwards, the current year's estimate is used. The same relationship applies for both sexes. In 2020 and 2021, the individual length-mass step was not conducted, so 2019 values were used for those years.

Stock biomass estimated by kriging was split for each size class according to proportion by weight in the mean stock distribution. Abundance for each size class was obtained by dividing biomass by the mean class weight. Total stock abundance was then obtained by summing abundance across all size classes. The procedure was done separately for males and females. Since numbers are not kriged, no variance estimate is possible for abundance. The biomass coefficient of variation was thus used to estimate the 95% confidence interval for abundance.

Abundance of females was separated by maturity stage for years when individual staging was done, so primiparous and multiparous female abundance can be estimated for 1990–2000 and 2009–2021.

Population structures from the DFO survey, for males and females, are shown by zone in Figure 53. In 2025, abundances of small males are very low in all four zones, while large male abundance is at the series average in Estuary and Anticosti but below average in the other zones. Female abundance is very low in Sept-Iles and Esquiman, while in Estuary and Anticosti it is comparable to the average.

The allocation of additional stations in the shallow St. Lawrence Estuary since 2008 has had a major effect on the number of males and females recorded, particularly in the Estuary fishing area and, to a lesser extent, in Sept-Iles (Table 22, Figure 54). Since 2023, the Estuary stock assessment has been based on the expanded 2008 area.

A recruitment index can be obtained by estimating the abundance of juveniles with a cephalothorax length less than 12.5 mm. These individuals are about 15 months old (Daoud et al. 2010). Juvenile abundance estimates were obtained by summing abundance in the size

classes of the first mode. In general, juvenile abundance observed over the past five years was low in all four stocks (Figure 55, Table 23).

Shrimp size varies along an east-west gradient, with the smallest individuals in the Esquiman channel and the largest in the estuary (Figure 56).

Since 2005, individual mass data have been collected during the survey. Masses estimated for male shrimp of 14 and 20 mm, as well as females of 22 and 26 mm, appear to be increasing over the years (Figure 57). In general, shrimp have been heavier than average over the past four years compared to lighter than average from 2005 to 2010. These indices were not estimated in 2020 and 2021.

SURPLUS PRODUCTION MODEL

A surplus production model (SPM) was used to model the temporal dynamics of shrimp stocks. This model does not take into account population size or age structure and simplifies productivity processes (recruitment, growth, natural mortality, etc.) into two key parameters: r, representing the intrinsic rate of population growth, and K, corresponding to the carrying capacity of the environment. In summary, projected biomass for the following year is calculated as the current biomass plus stock productivity minus removals due to fishing.

The Schaefer SPM (Schaefer 1954) was formulated here within a Bayesian state-space framework (Meyer and Millar 1999), which allows simultaneous incorporation of process stochasticity as well as observation uncertainty. This approach is recognized as good practice in stock assessment (Aeberherd et al. 2018; Punt 2023).

Model fitting was performed using the free stock assessment platform JABBA (“Just Another Bayesian Biomass Assessment”; Winker et al. 2018, 2020). JABBA provides various tools for preparing data for fitting a generalized Bayesian state-space SPM, formatting model outputs, running diagnostics and generating graphical visualizations.

Detailed equations and the model fitting procedure are presented in Smith and Bourdages (2023).

DATA USED

SPM fitting requires at a minimum a time series of total catches (landings) and a time series of a biomass index representative of the exploitable stock component. For this purpose, data on annual landings by stock are available from 1982, while the total biomass estimates used are derived from annual DFO scientific surveys conducted each August.

For this model, only landings data from 1990 onward were used, for consistency with biomass index availability. The Estuary stock is a special case, only data since 2008 were used, to account for the expansion of the survey area covered. This change ensured inclusion of shallower strata, which are characterized by significant shrimp abundance.

The series of landings and biomass indices, compiled by year and by stock assessment unit, used for SPM fitting, are presented in Table 24. In addition, within the Bayesian modelling framework, prior distributions are assigned to each model parameter for each stock (Table 25). These parameters include: r, the intrinsic rate of natural population increase (incorporating growth, recruitment, and natural mortality processes); K, the system’s carrying capacity; B1/K, the biomass relative to K in the first year of the catch time series; and the variance components associated with process and observational errors.

DIAGNOSTICS

The consistency and stability of the model results were evaluated at different levels for each analyzed stock. None of the models showed convergence issues, and MCMC chains adequately explored the entire parameter space. The results of posterior distributions are shown in Table 26 and Figures 58, 66, 74 and 82. Estimates for r, K, B1/K, and q (catchability coefficient of the biomass index) for each stock appear plausible, given the biology of shrimp and the survey trawl methodology used to calculate biomass indices. The process variances (Figures 59, 67, 75 and 83) as well as the annual observation variances remain at levels considered reasonable and adequate for reliable SPM operation (Thorson et al. 2014; Winker et al. 2018).

The fit of model-estimated biomass trajectories was compared to those from the NGSL survey, as shown in Figures 60, 68, 76 and 84. The logarithms of residuals, calculated between observed and predicted biomass indices, were visually inspected for evidence of problematic temporal trends (Figures 61, 69, 77 and 85). The results show that the SPM fits the observed data well, with no significant temporal trend detected in the residuals.

Finally, retrospective analyses over four years were conducted to validate the stability of estimates and assess potential bias using Mohn's rho statistic. No significant retrospective pattern was observed (Figures 62, 70, 78 and 86).

MODEL FITTING

The SPM was applied to the data for each shrimp stock. Trends in estimated stock biomass and fishing mortality trajectories will be addressed in the "Precautionary Approach" section (Figures 63, 71, 79 and 87).

Over the last thirty years, shrimp productivity has experienced marked changes. An initial phase of increasing productivity supported stock growth, followed—over more than fifteen years—by a substantial decline, which significantly contributed to stock decline (Mormede et al. in prep.). These trends are only partially captured by the model process error.

As a result, the use of the SPM should remain heuristic for the estimation of biomass producing the maximum sustainable yield (MSY) or B_{MSY}, as well as the exploitation rate at MSY or F_{MSY}. B_{MSY} refers to a biomass level that has historically supported high productivity, while F_{MSY} corresponds to the approximate exploitation rate observed during periods of high stock abundance. It is important to note that the annual absolute values for biomass (B) and exploitation rate (F) estimated by the SPM do not reliably distinguish the respective effects of productivity changes and fishing on stock dynamics, and therefore should not be over-interpreted. Only the overall trajectories of these variables over the time series are informative. The relationship between relative biomass (B/B_{MSY}) and relative exploitation rate (F/F_{MSY}) provides a framework to guide fisheries management decisions with the goal of reducing overfishing risk.

Finally, it should be noted that this model is not designed to predict stock dynamic responses to fishing pressure over the medium or long term.

PRECAUTIONARY APPROACH

STOCK STATUS INDICATOR AND REFERENCE POINTS

In 2009, DFO implemented a fishery decision-making framework incorporating the precautionary approach for major exploited stocks managed by DFO (DFO 2006). The application of the precautionary approach (PA) policy must take into account all removals from

these stocks, regardless of the fishery type. For each stock, a PA framework is established, which includes:

- Reference points and stock status zones (healthy, cautious, and critical);
- Harvest control rules; and
- The necessity of considering uncertainty and risk in the development and implementation of decision rules.

For the EGSL shrimp, a first PA was adopted in 2012 (DFO 2011), with an update in 2023 (DFO 2023). The PA was revised due to changes in ecosystem conditions and the emergence of bias in the main stock status indicator. New limit, upper, and target reference points (LRP, USR, and TRP), as well as various scenarios for harvest control rules (HCR), were proposed and peer-reviewed in 2023. The reference points are based on the relative biomass trajectory compared to the biomass at maximum sustainable yield (B/B_{MSY}) and on the longest available data series.

Reference points were developed for each stock:

- Limit Reference Point (LRP): 0.4 (40%) of biomass at MSY (B_{MSY}).
- Upper Stock Reference (USR) proposed: 0.8 (80%) of B_{MSY}.
- Target Reference Point proposed (TRP): B_{MSY}.
- Removal Reference (RR) proposed: relative exploitation rate at MSY when the stock is in the healthy zone (F_{MSY}).

STOCK STATUS AND TRENDS

Biomass

After a period of growth in the 1990s up to the mid-2000s, the relative biomass estimates for Sept-Iles, Anticosti, and Esquiman have trended downward over the past two decades, reaching a historic low around 2023, the lowest values in the time series starting in 1990 (Figure 90). Since then, biomass estimates for these stocks have slightly increased. In 2025, the stock status indicators are at or below their LRP, with very high probability for Sept-Iles, neutral probability for Anticosti, and moderately high probability for Esquiman, placing them in the critical zone of the PA. The Estuary stock has remained in the healthy zone since 2008, with a very high probability in 2025.

Estuary stock

The time series for the Estuary stock only starts in 2008. From 2008 to 2018, relative biomass showed a slight decline and has since increased, reaching the highest value in the time series in 2025. Throughout this period, it remained in the healthy PA zone.

In 2025, biomass exceeded the proposed USR and was estimated at 1.57 times the B_{MSY}, therefore, the Estuary stock is in the healthy PA zone with a 96% probability. Despite great uncertainty around the biomass estimate, it is expected to decrease according to a one-year projection.

Sept-Iles stock

Relative biomass increased from 1990, peaking in 2003. Since 2004, it has declined, reaching a historic low in 2023, the lowest value since 1990. In 2025, biomass has slightly increased.

Since 2016, the biomass has been in the critical PA zone. In 2025, it was estimated at 0.11 of B_{MSY}, which is 28% of the LRP, thus, Sept-Iles is in the critical zone with 100% probability.

Anticosti stock

Relative biomass increased from 1990, peaking between 2004 and 2007. Since 2008, it has declined, reaching a historic low in 2023, the lowest value in the time series beginning in 1990. In 2024 and 2025, biomass slightly increased.

Since 2021, biomass has been in the critical PA zone. In 2025, it was estimated at 0.40 of B_{MSY}, equivalent to the LRP, thus, Anticosti is in the critical zone with a 50% probability. Juvenile abundance observed in 2020 and 2023 could explain the increased stock biomass in 2025 (Figure 55).

Esquiman stock

Relative biomass increased from 1990, peaking in 2006. Since 2007, it has declined, reaching a historic low in 2023, the lowest value since 1990. In 2025, biomass has slightly increased.

Since 2020, biomass has been in the critical PA zone. In 2025, it was estimated at 0.34 of B_{MSY}, or 86% of the LRP, so Esquiman is in the critical zone with 67% probability.

Exploitation Rate

Trajectories of relative exploitation rates for Sept-Iles, Anticosti, and Esquiman have followed the same trends over time (Figure 91). In the early 1990s, exploitation rates declined. In the late 1990s and early 2000s, exploitation rates were at their lowest. Starting in 2005, relative exploitation rates increased, reaching historical maxima in 2021 and 2022. This rising trend reversed in 2023. Relative exploitation rates have significantly declined since 2023 with reduced landings. In 2024 and 2025, they are the lowest recorded since 1990. The Estuary stock's relative exploitation rate was relatively stable before dropping significantly in 2018 and has remained low since.

Estuary stock

The relative exploitation rate increased in 2025 but remained lower than pre-2018 values.

Sept-Iles stock

The rate dropped sharply after 2022, reaching historically low levels since 2024.

Anticosti stock

Similarly, a sharp drop after 2022, maintaining historically low levels since 2024.

Esquiman stock

The exploitation rate has decreased since 2023, reaching its lowest historical value in 2025.

PROBABLE CAUSES OF STOCK DECLINE

The decline of EGSL shrimp stocks is attributable to a combination of environmental, biological, and human factors.

1. Unfavourable environmental conditions

Shrimp is a cold-water species. The Gulf of St. Lawrence is at the southern limit of its range and deep-water temperatures are approaching the upper limit of its thermal preference. With more than 15 years of deep-water warming and oxygen depletion, shrimp are now exposed to increasingly unfavourable environmental conditions. Deep-water temperatures have stabilized since 2023, but part of the shrimp population remains exposed to historically warm, oxygen-poor conditions.

Females are less tolerant of hypoxia than males and both sexes become more sensitive as temperatures rise. Between 2022 and 2024, at least 50% of female shrimp from Sept-Iles,

Anticosti, and Esquiman stocks were exposed to oxygen levels below lab-established critical thresholds and to temperatures above 6.3 °C, even reaching 7 °C in some areas. A recent laboratory study on the impact of warming, acidification, and hypoxia showed that shrimp survival and aerobic performance could decrease substantially when exposed to these combined factors (Guscelli et al. 2023). Prolonged exposure to suboptimal conditions could compromise shrimp growth, survival, and reproduction, thus limiting stock renewal. These conditions could continue to deteriorate in the long term, according to climate change models (Lavoie et al. 2020).

The combined effects of warming and oxygen depletion are causing the loss of suitable shrimp habitat, forcing the species into shallower and more restricted areas near the cold intermediate layer. This increases vulnerability to external pressures and has probably contributed to stock declines.

2. Increased predation pressure

Predation by redfish has been high over the past nine years (Isabel et al. 2026) and is considered an important factor in shrimp decline. In 2019, Atlantic redfish (*S. mentella*) biomass was estimated at 4.3 million tonnes in the EGSL versus less than 0.1 million tonnes before 2013 (Senay et al 2026). While redfish biomass has declined since 2020, estimated at 1.7 million tonnes in 2024, predation pressure is expected to remain historically high in coming years.

Other shrimp predators, such as Greenland halibut and cod, are currently at low abundance. Stomach fullness indices for Greenland halibut and cod in the northern Gulf were low, and the shrimp contribution to their diet has decreased compared to previous years.

3. Low productivity and recruitment

Low juvenile and male abundance in recent years, along with declining female size, indicate lower stock productivity.

4. Fishing pressure

The extent to which fishing has contributed to the EGSL shrimp stock decline is unknown. Even though fishing has been reduced in recent years, in combination with other factors, it increases stock vulnerability to fishing.

5. Low genetic adaptability

Studies show low genetic variability for thermal plasticity, which limits shrimp's capacity to adapt to rapid environmental changes (Leung et al. 2023).

In summary, prospects for these stocks depend on shrimp’s sensitivity and resilience to environmental change, predation pressure, and fishing pressure. Given current conditions, stock recovery seems unlikely in the short or medium term, even in the absence of fishing mortality. High predation pressure and unfavourable environmental conditions are not expected to improve significantly in the short or medium term and are hampering stock growth.

HARVEST CONTROL RULES

Four harvest control rules (HCRs) were developed in 2023 in accordance with PA principles, using the stock biomass indicator and the exploitation rate reference. Here, it was decided to develop “state-based rules”, where expected exploitation rates are a function of stock status (Kronlund et al. 2014).

The PA fisheries decision framework states that in the healthy zone, the exploitation rate must not exceed the established maximum, and management measures must respond to a

downward trend as soon as the stock approaches the cautious zone. The proposed maximum exploitation rate for all four HCR proposals is set at F_{MSY} when the stock is above the USR (Figure 92).

In the cautious zone, the framework states that the exploitation rate should increase gradually with stock status until reaching the established maximum. This approach should promote recovery, so the stock returns to the healthy zone. Management measures should promote short-term growth of the stock. If the stock is in the lower part of the cautious zone, the tolerance for avoidable decline risk must be very low. For the proposed HCRs, the exploitation rate decreases proportionately as stock status declines, reaching 0.5 (scenarios A and B), 0.25 (scenario C), or 0 (scenario D) of F_{MSY} when stock status reaches the LRP.

In the critical zone, the framework states that management measures should promote growth and that removals from all sources should be kept as low as possible until the stock leaves this zone. Proposed exploitation rates in the critical zone vary depending on the HCR. In scenario A, the rate is constant and must not exceed 0.5 of F_{MSY}. In scenario B, the rate declines gradually from 0.5 of F_{MSY} to zero as the stock reaches 0.2 of B_{MSY}. In scenario C, the rate declines from 0.25 of F_{MSY} to zero as B_{MSY} reaches 0. Finally, scenario D proposes that no directed fishing be allowed when the stock is in the critical zone.

The proposed HCRs set the exploitation rate based on the stock status indicator. This exploitation rate is then converted to a projected removal (a recommended catch limit). The projected removal in Figure 92 must be scaled for the fishery by multiplying by the stock-specific MSY. Final TAC determination is the responsibility of fisheries management (FM) and will not be addressed in this document. In addition, 2019 amendments to the Fisheries Act require that a rebuilding plan be implemented when a stock falls to or below its LRP (DFO 2021).

All four HCR proposals are simple and consistent with PA policy for FM since:

- The exploitation rate does not exceed the maximum reference in the healthy zone.
- In the cautious zone, HCRs reduce exploitation rate as the stock status indicator declines.
- In the critical zone, removals are kept to a minimum or at very low values.

Choosing one HCR over another is difficult to justify scientifically in the absence of quantitative tools able to evaluate HCR scenario performance. However, if any of the four HCRs had been used in recent years, projected removals would have been more cautious than assigned TACs.

Since the HCR proposals, a rebuilding plan has been developed for the Sept-Iles, Anticosti, and Esquiman stocks. This rebuilding plan was approved in autumn 2025 and HCR A was selected.

PROJECTED MAXIMUM REMOVAL

To determine projected removals for the coming year, a projection of the stock status indicator (B/B_{MSY}) must first be made for the upcoming year, following SPM fit using JABBA. The median projected value of the indicator determines relative exploitation rates (F/F_{MSY}) under HCR A. The predicted catch distribution for this scenario is then calculated for 2026. Model uncertainty is propagated in the projection using process error variance. Note that by its heuristic nature, the current SPM has not been used for projections beyond one year.

The PA advocates cautious management strategies that include scientific uncertainty. Simulation work shows that using a percentile below 0.5 (median) of the predicted catch distribution would maintain higher biomass in the short-term without significantly reducing long-term catches (Mildenberger et al. 2022). For stocks assessed with an SPM, the International Council for the Exploration of the Sea (ICES) recommends HCRs that take estimation uncertainty into account, suggesting the use of the 35th percentile of the predicted catch

distribution rather than the median (50th percentile) (ICES 2021, 2022). Moreover, it is suggested to review the SPM annually to update the projected removal recommendation.

According to the selected HCR (rule A), the projected maximum removals for 2026 are by stock: 1,261 t for Estuary, 917 t for Sept-Iles, 2,009 t for Anticosti, and 1,498 t for Esquiman (Table 27).

Future efforts will develop one or more population dynamics models that account for major changes in stock productivity and can make reliable projections. These works will likely lead to adjustments to PA components.

The elements of the PA, including the chosen HCR, will be implemented by FM. Similarly, the TAC will be determined by FM using the maximum projected removal estimate based on the selected PA HCR.

IMPACT OF FISHING ON THE ENVIRONMENT

IMPACT ON HABITAT

Since 2012, the use of VMS has allowed the precise localization of fishing grounds and the quantification of trawling's footprint on marine habitats (Figure 93). Between 2012 and 2022, the annual fishing effort averaged around 80,000 hours, resulting in a maximum footprint of about 6,600 km² on the seafloor each year, assuming no overlap of trawl paths (Table 28). Since 2023, fishing effort has significantly decreased, to an average of about 9,500 hours in 2024 and 2025, corresponding to a maximum trawled area of 780 km².

Since 2012, fishing efforts have been concentrated within a 23,600 km² zone, with variable intensity (Figure 93). The most intensively used area, where more than 100% of the surface has been trawled, covers 1,000 km² and concentrated 17% of total fishing effort. Furthermore, the extent of the trawled zone decreased from around 15,000 km² in 2012 to 5,000 km² in 2025. Fishing effort is now focused on more restricted areas corresponding to the highest concentrations of shrimp. This suggests a potential reduction in the overall impact of fishing on marine habitat.

Shrimp fishing effort in the GSL remains highly concentrated, with fishers exploiting essentially the same grounds year after year. In this ecosystem, which has experienced prolonged exploitation, Morits et al. (2016) suggest that a critical threshold of disturbance was crossed with the first passages of fishing gear decades ago. These would have caused irreversible impacts on the seafloor, notably by eliminating vulnerable taxa and structures providing essential three-dimensional habitats. It is therefore likely that benthic communities have since reached a disturbed equilibrium state, where current trawling disturbances are limited and do not inflict significant further impact.

Since December 15, 2017, fisheries management measures have been implemented in eleven coral and sponge conservation zones in the GSL, totaling an area of 8,571 km². In these zones, the use of fishing gear contacting the seabed (such as shrimp trawls) is strictly prohibited. This ban is aimed at protecting important benthic communities, especially cold-water corals and sponges which are fragile, structure-forming species with slow recovery. VMS data analysis confirms that these measures are respected by fishers, with no fishing effort detected in these areas since their implementation (Figure 93).

BYCATCHES

At DFO's request, shrimpers are required to allow an at-sea observer on board. The observer program aims to cover 5% of all shrimp fishing trips by the fleet. Observers record detailed information for each tow, including geographic position, tow duration, captured quantities by

species or taxon, and specimen lengths for certain target species. For this study, data from the at-sea observer program, collected between 2000 and 2025 during northern shrimp fishing in the Gulf of St. Lawrence, were used to estimate bycatches.

The methodology for analyzing bycatch data is detailed in Savard et al. (2013). Since 2000, a total of 25,730 tows have been sampled within the at-sea observer program. The geographic positions of observed tows from 2023 to 2025 are shown in Figure 94. To extrapolate results to the entire fleet's fishing effort, weighting factors were calculated as ∑shrimpers' effort / ∑observers' effort. These adjustments, shown in Tables 29 and 30, accurately reflect the total effort deployed.

In the absence of at-sea observers in the Estuary in 2020, Anticosti in 2024, and Esquiman in 2025, it was not possible to estimate bycatches for these years in those sectors. Therefore, total bycatches are underestimated for those periods.

Between 2000 and 2012, the annual average bycatch was about 500 t (Table 31 and Figure 95). From 2013, a rapid increase was observed, peaking at more than 1,500 tonnes in 2016 before subsequently decreasing. These annual variations are mainly due to increases and decreases in redfish bycatches. In 2023, bycatch amounted to 225 tonnes, a value likely similar in 2024 and 2025, thus marking the lowest levels in the time series.

Bycatch estimates are compared to total shrimp catch to obtain a ration of bycatch on the total catch (Table 31 and Figure 96). From 2000 to 2012, this ratio varied from 1% to 2%. From 2013 onwards, it increased, exceeding 4% between 2016 and 2023. This increase is mainly explained by a marked rise in small redfish bycatches. However, in 2024 and 2025, the ratio fell to 1.3% and 2.2%, respectively.

Geographic distributions of observed bycatches during shrimp fishing with an at-sea observer are shown for cod, redfish, Atlantic halibut, Greenland halibut, American plaice, witch flounder and capelin (Figures 97 to 103). For each 5-minute by 5-minute square, the annual mean catch (kg per tow) is given for 2024 and 2025. Length frequency distributions are also available for cod, redfish, Atlantic halibut, Greenland halibut, American plaice and witch flounder, as shown in the same figures.

The rise in bycatches starting in 2013 is mainly due to increased catches of small redfish, related to exceptional recruitment in the 2011–2013 cohorts (Senay et al. 2021). However, since 2018, redfish bycatches have been declining, explained by their growth: these individuals are now large enough to no longer pass through the Nordmore grid spacing (Figure 98). In 2019, Greenland halibut bycatch increased to 203 t, above the historic mean of under 100 t, then dropped to below-average levels (Figure 100). Most Greenland halibut bycatch comes from the Sept-Iles area and reflects the recruitment dynamics of one- and two-year-old cohorts (Chamberland et al. 2026a). Finally, witch flounder (*Glyptocephalus cynoglossus*) bycatch exceeded the mean between 2016 and 2023 (Figure 102), due to increased abundance in the nGSL, followed by a decrease in 2024 and 2025 (Chamberland et al. 2026a).

In 2025, the main bycatch species, in order of importance, were Greenland halibut, capelin, herring (*Clupea harengus*), American plaice (*Hippoglossoides platessoides*), redfish, and witch flounder (Tables 32 and 33). These species are commonly encountered during shrimp fishing and appear in over 70% of tows sampled. Fish bycatch was generally low, not exceeding 1 kg per species per tow.

Bycatches were also compared to biomass and abundance estimates from the annual DFO trawl survey in the nGSL for 2000–2025 (Chamberland et al. 2026a). For each species, estimated total bycatch represents less than 1% of the biomass estimates from the DFO survey (Table 34).

Catches of other shrimp species during commercial fishing were very low compared to northern shrimp. Two species, *Pasiphaea multidentata* (pink/multidentate shrimp) and *Pandalus montagui* (Aesop shrimp), frequently appeared in the bycatch. From 2000 to 2024, *P. multidentata* accounted for 0.08% of sampled catches at sea (Table 32), and 0.73% of landings (Table 35). For *P. montagui*, the proportions were 0.02% at sea and 0.18% in landings.

RESEARCH ACTIVITIES

Various scientific research projects are associated with elements of the Integrated Fisheries Management Plan (IFMP) for GSL shrimp or with the rebuilding plan for zones 8, 9, and 10.

Issues faced by the fishery informed the IFMP's objectives. Issues identified through consultations during IFMP development include:

- The sustainable exploitation of shrimp;
- The ecosystem impacts of fishing;
- Fisheries governance;
- The economic prosperity of the fishery.

The rebuilding plan also includes three goals targeting knowledge gaps in natural mortality, including:

- Continue to study shrimp predation by groundfish, particularly redfish. Accounting for redfish predation is essential to develop a complete understanding of natural mortality factors affecting shrimp stocks, thereby ensuring that the rebuilding plan is based on realistic ecosystem knowledge and supports sustainable shrimp management.
- Continue to examine the impact of environmental changes on shrimp. Environmental changes are causing shrimp to shift their distribution in the EGSL, influencing both the area of essential habitat and stock productivity. Understanding the availability of current and future essential habitats for different shrimp stocks is vital in a context of climate change and will facilitate adaptive management measures.
- Advance the stock assessment model to account for shifts in productivity regime.

The research projects have been developed to address these priorities. The scientific work on northern shrimp by Maurice-Lamontagne Institute researchers is funded in whole or in part by national DFO programs and listed in Appendix 1. These projects respond directly to the priority directions presented in scientific frameworks and are part of an Ecosystem Science strategic research program. These are complemented by initiatives funded by DFO's core program (research surveys, dockside and at-sea sampling, logbook and vessel monitoring system) directly supporting stock, ecosystem, and fishery monitoring.

CONCLUSION

The detailed assessment of EGSL northern shrimp stocks highlights a concerning situation for most stock assessment units. Over the past thirty years, shrimp productivity has undergone significant changes: an initial period of rising productivity underpinning stock growth, followed by more than fifteen years of substantial decline that has severely impacted stocks.

Analyses reveal marked declines in biomass and abundance since the mid-2000s, with historical lows around 2023 for Sept-Iles, Anticosti, and Esquiman, now classified in the critical zone under the precautionary approach. Only the Estuary stock is in the healthy zone.

The main drivers of this decline include deep-water warming, reduced dissolved oxygen, increased predation pressure, and low productivity characterized by reduced recruitment and

female size, along with loss of suitable habitat and an uncertain contribution from a now more targeted and constrained fishery. Despite recent stabilization in some ecosystem conditions and a slight recovery in biomass, pressures remain very high and prospects for rapid recovery are low.

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TABLES

Table 1. Importance of northern shrimp in the Greenland halibut and redfish diets, according on the period and length class considered. For each period / length class combination, the frequency of occurrence (Focc), the mass contribution (MC, in %), the partial fullness index (PFI) and the contribution to the TFI (% TFI) of the northern shrimp in the N stomachs available are provided.

Greenland halibut

Period	Length (cm)	N	% empty	F_{occ}	MC	PFI	TFI
Years 90	< 15	182	20.3	0.00	0.00	0.00	0.00
	[15-20[	1296	26.9	0.31	0.44	0.01	0.52
	[20-25[	440	43.4	0.00	0.00	0.00	0.00
	[25-30[	1310	49.2	1.30	4.16	0.03	4.40
	[30-35[	922	57.4	2.39	8.63	0.04	8.17
	[35-40[	1310	59.1	3.36	9.56	0.04	9.21
	[40-45[	1510	56.1	5.43	13.71	0.05	13.66
	[45-50[	741	55.7	7.42	16.09	0.06	15.89
	[50-55[	311	59.2	7.40	10.81	0.04	10.41
	[55-60[	96	51.0	8.33	3.97	0.04	4.08
	>= 60	28	57.1	7.14	3.96	0.04	4.41
Years 90	< 20	1478	26.1	0.27	0.41	0.00	0.43
	[20-30[	1750	47.7	0.97	3.32	0.02	3.06
	>= 30	4918	57.2	4.80	11.17	0.03	10.89
Years 2000	< 15	106	43.4	0.00	0.00	0.00	0.00
	[15-20[	1108	34.4	0.09	0.22	0.00	0.24
	[20-25[	503	43.9	0.99	3.17	0.02	2.95
	[25-30[	1311	50.9	1.75	5.56	0.04	5.75
	[30-35[	1234	47.7	2.92	10.48	0.04	10.21
	[35-40[	1576	46.6	6.28	19.92	0.08	19.96
	[40-45[	1362	45.9	9.99	20.66	0.09	20.79
	[45-50[	759	44.5	13.57	22.05	0.11	22.21
	[50-55[	291	48.1	11.34	13.57	0.07	14.13
	[55-60[	114	36.0	15.79	7.40	0.07	7.73
	>= 60	41	36.6	19.51	5.28	0.07	5.57
Years 2000	< 20	1214	35.2	0.08	0.21	0.00	0.22
	[20-30[	1814	49.0	1.54	5.11	0.03	4.95
	>= 30	5377	46.2	8.05	16.64	0.08	17.16
2015-2024	< 15	217	22.1	0.92	1.65	0.02	1.30
	[15-20[	920	36.6	0.00	0.00	0.00	0.00
	[20-25[	571	59.7	2.10	8.56	0.06	8.12
	[25-30[	904	65.5	2.77	10.94	0.06	10.59
	[30-35[	630	70.8	3.33	12.33	0.05	12.12
	[35-40[	969	67.5	4.95	14.35	0.05	15.10
	[40-45[	644	67.9	6.06	14.82	0.06	14.70
	[45-50[	356	53.9	9.83	10.11	0.07	10.67
	[50-55[	146	51.4	6.85	5.90	0.04	5.97
	[55-60[	74	44.6	4.05	0.90	0.01	0.96
	>= 60	92	45.7	2.17	0.83	0.01	0.95
2015-2024	< 20	1137	33.9	0.18	0.20	0.00	0.29
	[20-30[	1475	63.3	2.51	10.12	0.06	9.45
	>= 30	2911	64.5	5.43	8.46	0.05	11.39

Redfish

Period	Length (cm)	N	% empty	F_{occ}	MC	PFI	TFI
Years 90	< 10	164	39.0	0.61	1.10	0.04	2.14
	[10-15[	331	52.3	0.91	2.98	0.02	2.71
	[15-20[	579	60.6	0.17	0.51	0.00	0.74
	[20-25[	193	65.3	1.04	2.63	0.01	3.00
	[25-30[	399	69.9	1.50	9.89	0.04	10.19
	[30-35[	753	68.8	1.59	11.84	0.04	11.93
	[35-40[	648	47.2	7.56	15.45	0.12	14.94
	[40-45[	235	30.6	11.91	11.76	0.14	11.88
	>= 45	19	26.3	21.05	20.69	0.24	21.21
Years 90	< 20	1074	54.7	0.47	1.07	0.01	1.77
	[20-30[	592	68.4	1.35	8.70	0.03	8.17
	>= 30	1655	54.4	5.62	13.81	0.09	13.57
2015-2019	< 10	210	28.6	0.00	0.00	0.00	0.00
	[10-15[	500	30.8	0.20	4.47	0.03	5.56
	[15-20[	1077	38.3	0.19	0.86	0.00	0.86
	[20-25[	744	41.7	0.13	1.22	0.00	1.13
	[25-30[	387	48.8	5.43	26.01	0.12	25.68
	[30-35[	395	46.3	9.11	28.54	0.12	28.68
	[35-40[	344	42.4	3.78	15.10	0.10	14.28
	[40-45[	160	30.0	8.75	12.72	0.14	13.32
	>= 45	17	35.3	0.00	0.00	0.00	0.00
2015-2019	< 20	1787	35.1	0.17	1.70	0.01	2.44
	[20-30[	1131	44.1	1.95	18.40	0.04	14.58
	>= 30	916	41.8	6.88	15.64	0.11	17.54
2020-2024	< 10	287	27.5	0.00	0.00	0.00	0.00
	[10-15[	531	42.6	0.00	0.00	0.00	0.00
	[15-20[	392	39.3	0.26	6.17	0.01	4.63
	[20-25[	1368	40.6	0.37	9.48	0.02	10.69
	[25-30[	689	41.2	0.44	2.60	0.00	2.13
	[30-35[	229	42.4	6.11	14.00	0.07	13.36
	[35-40[	76	32.9	17.11	39.24	0.22	41.34
	[40-45[	15	26.7	13.33	28.08	0.25	27.15
	>= 45	1	0.0	0.00	0.00	0.00	0.00
2020-2024	< 20	1210	37.9	0.08	3.47	0.00	0.99
	[20-30[	2057	40.8	0.39	6.13	0.01	7.43
	>= 30	321	39.3	9.03	22.97	0.12	20.59

Table 2. Percentile of the cumulative distribution of male and female shrimp biomass per four-year period and per stock assessment unit as a function of depth (m), bottom water temperature and dissolved oxygen saturation.

Depth (m)

Northern gulf

Period	Male							Female						
	P5	P10	P25	P50	P75	P90	P95	P5	P10	P25	P50	P75	P90	P95
1990-1993	176	191	218	245	277	302	332	197	208	226	255	291	325	336
1994-1997	163	174	213	241	277	309	340	193	205	238	274	308	373	417
1998-2001	166	196	230	263	304	333	372	163	195	243	282	322	374	401
2002-2005	147	152	206	249	277	311	350	154	178	235	268	308	351	389
2006-2009	138	151	195	245	279	318	357	123	151	204	258	305	350	378
2010-2013	127	139	200	246	267	303	348	129	160	229	256	299	350	379
2014-2017	164	192	221	251	279	314	329	167	197	226	259	295	327	340
2018-2021	119	132	159	222	260	275	298	67	124	185	240	270	294	306
2022-2025	127	133	150	197	244	269	282	116	130	133	213	252	278	298

Estuary

Period	Male							Female						
	P5	P10	P25	P50	P75	P90	P95	P5	P10	P25	P50	P75	P90	P95
1990-1993	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1994-1997	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1998-2001	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2002-2005	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2008-2009	84	87	110	148	151	168	238	110	110	122	151	179	290	313
2010-2013	89	116	125	162	169	255	282	116	125	130	155	251	282	306
2014-2017	48	72	113	130	152	290	318	113	113	118	158	290	318	318
2018-2021	66	66	119	124	132	136	144	70	80	119	124	132	144	171
2022-2025	90	116	133	133	158	158	220	116	116	130	133	133	158	158

Sept-Iles

Period	Male							Female						
	P5	P10	P25	P50	P75	P90	P95	P5	P10	P25	P50	P75	P90	P95
1990-1993	175	176	202	233	289	334	336	181	202	222	260	311	335	355
1994-1997	155	170	214	256	303	345	399	181	202	244	303	345	399	437
1998-2001	167	196	240	287	321	359	401	162	194	255	306	344	393	428
2002-2005	135	147	179	263	301	346	389	147	172	248	300	338	387	423
2006-2009	140	157	175	248	295	361	389	147	168	222	286	326	378	389
2010-2013	139	139	177	244	273	349	382	165	228	238	273	348	380	392
2014-2017	198	221	232	254	304	331	355	185	213	236	283	321	340	382
2018-2021	155	155	193	233	266	291	322	155	181	224	250	285	315	328
2022-2025	123	131	155	181	234	283	332	129	137	150	190	243	280	312

Anticosti

Period	Male							Female						
	P5	P10	P25	P50	P75	P90	P95	P5	P10	P25	P50	P75	P90	P95
1990-1993	208	208	235	254	276	286	289	206	208	230	254	277	288	293
1994-1997	160	166	199	227	268	286	286	169	199	220	257	276	286	286
1998-2001	160	163	205	251	280	287	294	160	163	219	265	282	291	295
2002-2005	132	152	203	232	264	280	293	155	173	206	253	275	285	293
2006-2009	84	135	187	234	274	289	339	68	84	153	232	275	283	289
2010-2013	81	81	157	255	262	281	289	81	81	198	255	277	283	293

Period	Male							Female						
	P5	P10	P25	P50	P75	P90	P95	P5	P10	P25	P50	P75	P90	P95
2014-2017	171	196	220	236	271	285	290	182	197	226	252	271	285	290
2018-2021	146	154	161	220	245	270	272	67	67	179	243	267	272	279
2022-2025	149	158	177	223	254	279	282	177	204	223	244	267	279	282

Esquiman

Period	Male							Female						
	P5	P10	P25	P50	P75	P90	P95	P5	P10	P25	P50	P75	P90	P95
1990-1993	205	214	225	247	265	291	310	208	214	227	251	273	302	312
1994-1997	207	207	222	238	275	293	305	208	217	238	259	293	309	328
1998-2001	206	216	234	250	269	304	309	214	221	248	255	286	310	324
2002-2005	228	232	238	249	263	272	297	228	232	240	256	267	297	304
2006-2009	211	217	236	251	262	299	308	211	229	236	255	273	308	316
2010-2013	200	201	222	247	261	286	302	200	201	229	250	269	296	309
2014-2017	190	203	221	251	264	289	307	201	207	222	253	268	301	326
2018-2021	201	203	216	253	265	298	306	203	203	224	249	273	306	306
2022-2025	173	192	220	233	254	298	307	205	215	230	252	278	305	309

Bottom water temperature (ºC)

Northern gulf

Period	Male							Female						
	P5	P10	P25	P50	P75	P90	P95	P5	P10	P25	P50	P75	P90	P95
1990-1993	2.8	2.9	3.6	4.7	5.0	5.2	5.2	2.8	3.3	3.9	4.7	5.1	5.2	5.3
1994-1997	2.2	3.2	4.3	5.0	5.4	5.9	5.9	3.3	4.0	4.7	5.2	5.5	5.8	5.9
1998-2001	3.0	4.0	5.0	5.2	5.4	5.5	5.6	3.1	4.0	5.0	5.3	5.4	5.5	5.7
2002-2005	2.1	2.5	4.6	5.3	5.5	5.6	5.8	2.5	3.3	5.2	5.4	5.5	5.7	5.8
2006-2009	1.4	2.1	3.9	5.1	5.4	5.5	5.7	1.4	2.5	4.4	5.2	5.4	5.5	5.7
2010-2013	2.3	2.6	4.2	5.1	5.4	5.7	6.0	2.6	3.0	4.8	5.2	5.5	5.9	6.0
2014-2017	3.5	4.7	5.4	5.7	6.0	6.2	6.4	3.9	4.7	5.5	5.7	6.0	6.3	6.4
2018-2021	2.0	2.0	3.0	5.8	6.2	6.6	6.9	2.0	2.4	4.4	6.1	6.4	6.8	6.9
2022-2025	1.4	3.0	3.4	4.6	6.5	6.9	7.0	3.0	3.3	3.3	5.7	6.6	6.9	7.0

Estuary

Period	Male							Female						
	P5	P10	P25	P50	P75	P90	P95	P5	P10	P25	P50	P75	P90	P95
1990-1993	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1994-1997	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1998-2001	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2002-2005	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2008-2009	0.1	0.1	0.9	2.9	3.0	3.2	4.7	0.9	0.9	0.9	2.5	3.2	5.1	5.3
2010-2013	0.8	1.1	2.2	3.1	3.8	4.8	4.9	1.4	2.2	2.5	3.1	4.8	4.9	5.2
2014-2017	0.1	0.3	0.8	3.9	4.2	5.5	5.7	0.5	0.5	3.5	4.2	5.5	5.7	5.8
2018-2021	1.4	2.0	2.0	2.1	2.7	3.0	3.0	1.4	1.8	2.0	2.1	3.0	3.0	4.0
2022-2025	1.6	3.3	3.3	3.4	3.9	4.6	5.9	3.0	3.3	3.3	3.3	3.4	3.9	4.6

Sept-Iles

Period	Male							Female						
	P5	P10	P25	P50	P75	P90	P95	P5	P10	P25	P50	P75	P90	P95
1990-1993	2.1	2.8	3.2	4.0	5.0	5.2	5.2	2.8	3.1	3.6	4.8	5.1	5.2	5.3
1994-1997	2.0	2.2	4.0	4.8	5.2	5.4	5.6	2.9	3.5	4.7	5.2	5.4	5.5	5.6
1998-2001	2.9	4.0	4.9	5.2	5.3	5.4	5.4	3.1	3.8	5.0	5.2	5.3	5.4	5.4
2002-2005	2.1	2.1	4.4	5.3	5.4	5.5	5.6	2.1	2.9	5.2	5.4	5.5	5.5	5.6

Period	Male							Female						
	P5	P10	P25	P50	P75	P90	P95	P5	P10	P25	P50	P75	P90	P95
2006-2009	1.4	2.1	3.8	5.0	5.3	5.4	5.4	2.1	3.4	4.7	5.3	5.4	5.4	5.4
2010-2013	1.5	3.1	3.8	5.0	5.3	5.5	5.6	3.6	4.6	4.9	5.2	5.4	5.6	5.7
2014-2017	4.7	4.7	5.2	5.7	5.8	5.9	6.0	4.6	4.7	5.3	5.7	5.8	5.9	6.0
2018-2021	1.5	2.0	4.4	5.9	6.2	6.4	6.4	2.0	4.0	5.6	6.0	6.3	6.4	6.5
2022-2025	2.6	2.9	4.6	4.8	6.1	6.6	6.7	2.6	2.9	3.4	5.2	6.2	6.6	6.7

Anticosti

Period	Male							Female						
	P5	P10	P25	P50	P75	P90	P95	P5	P10	P25	P50	P75	P90	P95
1990-1993	2.2	3.5	4.1	4.8	5.0	5.2	5.2	2.1	3.5	4.2	4.7	5.0	5.2	5.4
1994-1997	0.9	2.2	4.1	5.2	5.4	5.8	5.9	2.0	4.0	4.4	5.2	5.5	5.8	5.8
1998-2001	1.6	3.3	4.6	5.4	5.4	5.6	5.6	2.3	3.5	4.8	5.4	5.5	5.7	5.7
2002-2005	2.5	2.5	2.5	4.6	5.5	5.7	5.8	2.5	3.0	4.6	5.5	5.6	5.8	5.9
2006-2009	-0.1	1.4	3.5	5.1	5.4	5.5	5.7	-0.1	1.4	2.6	5.2	5.5	5.6	5.7
2010-2013	2.6	2.6	2.6	5.0	5.3	6.0	6.1	1.0	2.6	3.0	5.3	5.9	6.0	6.3
2014-2017	3.8	4.9	5.5	5.9	6.2	6.4	6.4	3.8	5.0	5.5	6.0	6.2	6.4	6.4
2018-2021	3.0	3.0	3.9	5.3	6.2	6.8	6.9	2.4	2.4	4.4	6.2	6.6	6.9	7.0
2022-2025	2.7	3.2	4.5	6.2	6.8	6.9	6.9	4.1	5.9	6.2	6.5	6.8	6.9	7.0

Esquiman

Period	Male							Female						
	P5	P10	P25	P50	P75	P90	P95	P5	P10	P25	P50	P75	P90	P95
1990-1993	3.6	3.7	4.1	4.8	5.1	5.2	5.3	3.4	3.6	4.2	4.8	5.1	5.3	5.3
1994-1997	4.2	4.2	4.7	5.2	5.9	5.9	5.9	4.2	4.5	4.9	5.2	5.8	5.9	5.9
1998-2001	4.8	5.0	5.2	5.3	5.4	5.7	5.7	4.8	5.0	5.2	5.4	5.5	5.7	5.7
2002-2005	4.8	5.2	5.3	5.5	5.6	5.8	5.9	4.9	5.2	5.3	5.5	5.7	5.8	5.9
2006-2009	4.9	5.0	5.1	5.2	5.5	5.8	5.8	4.9	5.0	5.1	5.3	5.6	5.8	5.8
2010-2013	4.8	4.8	4.9	5.4	5.6	5.9	6.1	4.8	4.9	5.1	5.4	5.8	6.0	6.2
2014-2017	4.9	5.6	5.7	6.0	6.2	6.3	6.4	5.3	5.4	5.7	6.0	6.3	6.4	6.5
2018-2021	5.4	5.7	6.1	6.2	6.6	6.9	7.1	5.7	5.7	6.1	6.4	6.7	6.9	7.1
2022-2025	1.3	1.3	5.6	6.6	6.9	7.0	7.1	5.7	6.3	6.4	6.8	7.0	7.0	7.1

Dissolved oxygen saturation (%)

Northern gulf

Period	Male							Female						
	P5	P10	P25	P50	P75	P90	P95	P5	P10	P25	P50	P75	P90	P95
1990-1993	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1994-1997	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1998-2001	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2002-2005	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2006-2009	26	28	31	38	50	60	72	25	26	29	35	45	60	83
2010-2013	24	26	28	35	44	58	96	23	24	27	33	41	51	82
2014-2017	24	26	29	33	40	48	57	22	24	27	32	39	46	51
2018-2021	19	21	24	29	52	66	74	19	20	23	28	43	65	81
2018-2021	21	23	28	38	52	58	76	21	22	27	34	52	52	55

Estuary

Period	Male							Female						
	P5	P10	P25	P50	P75	P90	P95	P5	P10	P25	P50	P75	P90	P95
1990-1993	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1994-1997	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Period	Male							Female						
	P5	P10	P25	P50	P75	P90	P95	P5	P10	P25	P50	P75	P90	P95
1998-2001	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2002-2005	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2008-2009	28	42	42	43	68	78	80	22	26	42	50	67	68	68
2010-2013	22	24	30	42	53	69	82	20	22	24	42	53	55	68
2014-2017	22	25	37	43	81	88	90	21	22	22	37	47	84	84
2018-2021	48	48	52	58	66	81	81	41	48	52	58	66	78	78
2018-2021	22	32	43	48	52	52	68	32	43	45	52	52	52	55

Sept-Iles

Period	Male							Female						
	P5	P10	P25	P50	P75	P90	P95	P5	P10	P25	P50	P75	P90	P95
1990-1993	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1994-1997	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1998-2001	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2002-2005	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2006-2009	25	26	28	34	46	53	69	24	25	28	32	38	52	53
2010-2013	24	26	28	31	46	51	67	23	24	26	31	40	47	51
2014-2017	22	23	27	29	34	41	48	20	23	26	28	33	40	48
2018-2021	19	19	22	24	36	63	74	19	19	20	23	26	39	63
2018-2021	22	25	27	33	38	55	58	18	22	27	31	47	55	58

Anticosti

Period	Male							Female						
	P5	P10	P25	P50	P75	P90	P95	P5	P10	P25	P50	P75	P90	P95
1990-1993	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1994-1997	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1998-2001	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2002-2005	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2006-2009	30	31	37	44	53	83	84	29	31	34	42	83	85	91
2010-2013	26	27	30	41	63	96	96	26	26	29	38	52	96	96
2014-2017	29	31	35	39	42	48	61	24	28	33	37	42	47	57
2018-2021	20	22	24	33	48	61	61	20	21	24	25	49	93	93
2018-2021	20	21	26	33	51	56	62	20	20	26	29	33	41	53

Esquiman

Period	Male							Female						
	P5	P10	P25	P50	P75	P90	P95	P5	P10	P25	P50	P75	P90	P95
1990-1993	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1994-1997	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1998-2001	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2002-2005	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2006-2009	27	31	31	35	45	49	51	26	30	31	36	45	49	52
2010-2013	24	25	27	33	37	41	44	24	25	27	32	37	42	45
2014-2017	28	28	31	34	40	48	54	29	30	32	36	40	45	50
2018-2021	21	24	27	28	30	38	40	20	21	26	28	31	38	39
2018-2021	21	22	24	31	46	76	76	21	22	23	27	32	39	48

Table 3. Landing (L) and total of allowable catch (TAC) by shrimp fishing areas: Estuary (SFA 12); Sept-Iles (SFA 10), Anticosti (SFA 9) and Esquiman (SFA 8).

Year	Estuary		Sept-Iles		Anticosti		Esquiman		Total	
	L	**TAC**	L	**TAC**	L	**TAC**	L	**TAC**	L	**TAC**
1965	-	**-**	11	**-**	-	**-**	-	**-**	11	**-**
1966	-	**-**	95	**-**	-	**-**	-	**-**	95	**-**
1967	-	**-**	278	**-**	-	**-**	-	**-**	278	**-**
1968	-	**-**	271	**-**	-	**-**	-	**-**	271	**-**
1969	-	**-**	273	**-**	-	**-**	-	**-**	273	**-**
1970	-	**-**	413	**-**	-	**-**	159	**-**	572	**-**
1971	-	**-**	393	**-**	-	**-**	691	**-**	1084	**-**
1972	-	**-**	481	**-**	-	**-**	184	**-**	665	**-**
1973	-	**-**	1273	**-**	-	**-**	520	**-**	1793	**-**
1974	-	**-**	1743	**-**	980	**-**	594	**-**	3317	**-**
1975	-	**-**	2135	**-**	1025	**-**	1368	**-**	4528	**-**
1976	-	**-**	1841	**-**	1310	**-**	1494	**-**	4645	**-**
1977	-	**-**	2746	**-**	1185	**-**	1249	**-**	5180	**-**
1978	-	**-**	2526	**-**	1460	**-**	2166	**-**	6152	**-**
1979	-	**-**	3207	**-**	1108	**-**	3226	**-**	7541	**-**
1980	539	**-**	2978	**-**	1454	**-**	2441	**-**	7412	**-**
1981	27	**-**	3680	**-**	1385	**-**	3014	**-**	8106	**-**
1982	152	**500**	3774	**3800**	2464	**4400**	2111	**4200**	8501	**12900**
1983	158	**500**	3647	**3800**	2925	**5000**	2242	**6000**	8972	**15300**
1984	248	**500**	4383	**4800**	1336	**5000**	1578	**6000**	7545	**16300**
1985	164	**500**	4399	**4600**	2786	**3400**	1421	**6000**	8770	**14500**
1986	262	**500**	4216	**4600**	3340	**3500**	1592	**3500**	9410	**12100**
1987	523	**500**	5411	**5600**	3422	**3500**	2685	**3500**	12041	**13100**
1988	551	**500**	6047	**5600**	2844	**3500**	4335	**3500**	13777	**13100**
1989	629	**500**	6254	**5700**	4253	**4200**	4614	**4500**	15750	**14900**
1990	507	**500**	6839	**6400**	4723	**4200**	3303	**4700**	15372	**15800**
1991	505	**500**	6411	**6400**	4590	**5000**	4773	**4700**	16279	**16600**
1992	489	**500**	4957	**6400**	4162	**5000**	3149	**4700**	12757	**16600**
1993	496	**500**	5485	**6400**	4791	**5000**	4683	**4700**	15455	**16600**
1994	502	**500**	6165	**6400**	4854	**5000**	4689	**4700**	16210	**16600**
1995	486	**500**	6386	**6400**	4962	**5000**	4800	**4700**	16634	**16600**
1996	505	**500**	7014	**7040**	5469	**5500**	5123	**5170**	18111	**18210**
1997	549	**550**	7737	**7744**	6058	**6050**	5957	**5687**	20301	**20031**
1998	634	**633**	8981	**8966**	6932	**7004**	6554	**6584**	23101	**23187**
1999	646	**633**	9239	**8966**	7022	**7004**	6732	**6584**	23639	**23187**
2000	739	**709**	10160	**10042**	7941	**7844**	7396	**7374**	26236	**25969**
2001	832	**786**	10965	**11136**	5399	**8700**	7815	**8178**	25011	**28800**
2002	799	**786**	11493	**11136**	8638	**8700**	8250	**8178**	29180	**28800**
2003	796	**802**	11357	**11360**	8742	**8874**	6773	**6674**	27668	**27710**
2004	1033	**995**	15932	**15611**	10429	**10226**	8593	**8502**	35987	**35334**
2005	1001	**995**	12793	**15611**	8047	**10226**	8867	**9351**	30708	**36183**
2006	1029	**995**	15312	**15611**	8754	**10226**	8957	**9351**	34052	**36183**
2007	1022	**995**	15645	**15611**	10180	**10226**	9208	**9352**	36055	**36184**
2008	1017	**1020**	15972	**15995**	9635	**10478**	9110	**9409**	35734	**36902**
2009	993	**1018**	15873	**15970**	9644	**10461**	9473	**9567**	35983	**37016**
2010	906	**917**	15756	**15969**	10099	**10461**	9541	**9567**	36302	**36914**
2011	880	**916**	14376	**15172**	9831	**9938**	9177	**9091**	34264	**35117**
2012	956	**1053**	12516	**12896**	8267	**8447**	10244	**10452**	31983	**32848**
2013	1117	**1211**	14217	**14830**	7681	**7676**	9149	**9395**	32165	**33112**
2014	984	**1029**	12416	**12606**	8738	**8827**	8408	**8249**	30546	**30711**
2015	1075	**1183**	12415	**12606**	9171	**9511**	8220	**8249**	30882	**31549**
2016	1027	**1084**	12139	**12606**	8681	**9511**	7081	**7012**	28928	**30213**
2017	899	**921**	6939	**10715**	6935	**8084**	7024	**7012**	21797	**26732**
2018	214	**239**	4175	**4266**	6300	**6871**	5971	**5959**	16660	**17335**
2019	199	**239**	3999	**4266**	6861	**6871**	5981	**5959**	17040	**17335**
2020	570	**606**	5096	**5123**	6187	**6311**	5992	**5959**	17845	**17999**
2021	579	**606**	4970	**5123**	6245	**6311**	5535	**5959**	17329	**17999**
2022	496	**530**	3906	**5304**	3788	**5153**	4276	**4825**	12466	**15812**
2023	437	**473**	1481	**5304**	2078	**4525**	1677	**4222**	5673	**14524**
2024	357	**473**	187	**342**	366	**488**	1660	**1757**	2570	**3060**
2025	929	**946**	453	**807**	1025	**885**	1024	**1171**	3431	**3809**

2025 : as in January 5, 2026

Table 4. Landings (t) per shrimp fishing area according to their 1993 definition (SFA) and according to the new stock assessment units (SAU). Years with a difference of more than 1% are shown in bold.

Year	Estuary		Sept-Iles		Anticosti		Esquiman		Total	
	SFA	SAU	SFA	SAU	SFA	SAU	SFA	SAU	SFA	SAU
1982	152	152	**3774**	**3827**	**2464**	**2411**	2111	2111	8501	8501
1983	158	158	**3647**	**3702**	**2925**	**2870**	2242	2242	8972	8972
1984	248	248	**4383**	**4441**	**1336**	**1278**	1578	1578	7545	7545
1985	164	164	4399	4418	2786	2767	1421	1421	8770	8770
1986	262	262	4216	4241	3340	3315	1592	1592	9410	9410
1987	523	523	5411	5429	3422	3404	2685	2685	12041	12041
1988	551	551	6047	6047	2844	2844	4335	4335	13777	13777
1989	629	629	6254	6281	4253	4226	4614	4614	15750	15750
1990	507	507	6839	6839	4723	4723	3303	3303	15372	15372
1991	505	505	6411	6447	4590	4554	4773	4773	16279	16279
1992	489	489	4957	4973	4162	4146	3149	3149	12757	12757
1993	496	496	**5485**	**5653**	**4791**	**4623**	4683	4683	15455	15455
1994	502	502	**6165**	**7195**	**4854**	**3824**	4689	4689	16210	16210
1995	486	486	**6386**	**9176**	**4962**	**2172**	4800	4800	16634	16634
1996	505	505	**7014**	**11299**	**5469**	**1184**	5123	5123	18111	18111
1997	549	549	**7737**	**10551**	**6058**	**3244**	5957	5957	20301	20301
1998	634	634	**8981**	**10003**	**6932**	**5910**	6554	6554	23101	23101
1999	646	646	**9239**	**12484**	**7022**	**3777**	6732	6732	23639	23639
2000	739	739	**10160**	**13903**	**7941**	**4198**	7396	7396	26236	26236
2001	832	832	**10965**	**12708**	**5399**	**3656**	7815	7815	25011	25011
2002	799	799	**11493**	**16107**	**8638**	**4024**	8250	8250	29180	29180
2003	796	796	**11357**	**16645**	**8742**	**3454**	6773	6773	27668	27668
2004	1033	1033	**15932**	**20787**	**10429**	**5574**	8593	8593	35987	35987
2005	1001	1001	**12793**	**17658**	**8047**	**3182**	8867	8867	30708	30708
2006	1029	1029	**15312**	**19014**	**8754**	**5053**	8957	8957	34052	34052
2007	1022	1022	**15645**	**16464**	**10180**	**9361**	9208	9208	36055	36055
2008	1017	1017	**15972**	**16325**	**9635**	**9282**	9110	9110	35734	35734
2009	993	993	**15873**	**16074**	**9644**	**9443**	9473	9473	35983	35983
2010	906	906	15756	15768	10099	10087	9541	9541	36302	36302
2011	880	880	**14376**	**14646**	**9831**	**9561**	9177	9177	34264	34264
2012	956	956	12516	12596	8267	8187	10244	10244	31983	31983
2013	1117	1117	14217	14227	7681	7672	9149	9149	32165	32165
2014	984	984	12416	12440	8738	8714	8408	8408	30546	30546
2015	1075	1075	12415	12425	9171	9161	8220	8221	30882	30882
2016	1027	1027	12139	12140	8681	8680	7081	7081	28928	28928
2017	899	899	6939	6946	6935	6928	7024	7024	21797	21797
2018	214	214	4175	4189	6300	6285	5971	5971	16660	16660
2019	199	199	3999	4012	6861	6848	5981	5981	17040	17040
2020	570	570	5096	5101	6187	6182	5992	5992	17845	17845
2021	579	579	4970	4982	6245	6233	5535	5535	17329	17329
2022	496	496	3906	3909	3788	3784	4276	4276	12466	12466
2023	437	437	1481	1486	2078	2073	1677	1677	5673	5673
2024	357	357	187	187	366	366	1660	1660	2570	2570
2025	929	929	**453**	**460**	**1025**	**1019**	1024	1024	3431	3431

2025 : as in January 5, 2026

Table 5. Number of observations, catch (kg), effort (h), catch per unit of effort (kg/h) and its standard error (SE), percentage (%) of the landing corresponding to the observations, landings (t) and nominal effort (h) by year and stock assessment unit (SAU).

Estuary (SAU 12)

SAU	Year	n obs	∑catch	∑effort	CPUE	SE	%	Landings	Nominal effort
12	1982	108	120	1628	73.9	4.34	79.1	152	2058
12	1983	59	57	1093	52.0	4.18	36.0	158	3039
12	1984	217	207	3254	63.7	3.75	83.6	248	3895
12	1985	46	51	705	73.0	6.35	31.4	164	2246
12	1986	182	154	3058	50.5	2.43	58.9	262	5189
12	1987	268	319	5097	62.5	2.42	60.9	523	8369
12	1988	264	457	4327	105.5	6.49	82.9	551	5222
12	1989	314	506	5576	90.8	3.27	80.5	629	6929
12	1990	229	450	3592	125.3	5.88	88.7	507	4048
12	1991	161	495	2144	230.9	23.31	98.0	505	2187
12	1992	300	486	4463	108.9	7.41	99.4	489	4491
12	1993	183	486	3092	157.1	9.47	97.9	496	3158
12	1994	166	490	2247	217.9	21.10	97.6	502	2303
12	1995	144	478	1718	278.2	20.39	98.3	486	1748
12	1996	129	490	1528	320.7	26.38	97.0	505	1575
12	1997	163	535	1903	280.9	13.90	97.4	549	1954
12	1998	164	646	1760	366.8	22.24	101.8	634	1729
12	1999	143	647	1708	378.6	25.63	100.1	646	1707
12	2000	188	728	2022	360.2	18.90	98.5	739	2052
12	2001	246	822	3253	252.6	9.40	98.7	832	3294
12	2002	260	803	3667	219.1	8.21	100.6	799	3647
12	2003	197	797	1939	411.3	20.65	100.2	796	1935
12	2004	215	1033	2627	393.2	15.60	100.0	1033	2627
12	2005	225	1009	2498	404.0	13.15	100.8	1001	2478
12	2006	209	1036	2293	451.6	17.40	100.6	1029	2278
12	2007	232	1022	2745	372.2	13.43	100.0	1022	2746
12	2008	210	1016	2829	359.2	12.68	99.9	1017	2831
12	2009	257	994	3485	285.3	10.81	100.1	993	3480
12	2010	255	914	3563	256.5	9.34	100.9	906	3532
12	2011	277	879	4405	199.6	4.76	99.9	880	4408
12	2012	253	956	4240	225.4	6.40	100.0	956	4240
12	2013	333	1117	6269	178.2	3.72	100.0	1117	6269
12	2014	236	984	4293	229.1	5.98	100.0	984	4293
12	2015	235	1091	4254	256.3	9.13	101.4	1075	4194
12	2016	267	1027	5084	201.9	4.27	100.0	1027	5084
12	2017	274	899	5288	170.0	3.75	100.0	899	5288
12	2018	62	214	966	221.8	16.43	100.0	214	966
12	2019	47	199	637	312.6	31.09	100.0	199	637
12	2020	136	570	1818	313.6	13.84	100.0	570	1818
12	2021	138	579	1918	302.0	12.33	100.0	579	1918
12	2022	78	496	978	507.3	33.49	100.0	496	978
12	2023	153	459	1609	285.5	12.52	105.2	437	1530
12	2024	87	357	1301	274.7	14.93	100.0	357	1301
12	2025	183	887	2949	300.7	10.25	95.5	929	3089

2025 : as in January 5. 2026

Sept-Iles (SAU 10)

SAU	Year	n obs	∑catch	∑effort	CPUE	SE	%	Landings	Nominal effort
10	1982	2296	2603	32374	80.4	1.47	68.0	3827	47611
10	1983	1592	2100	22422	93.7	1.69	56.7	3702	39519
10	1984	3667	4065	52071	78.1	1.10	91.5	4441	56893
10	1985	3331	4323	50739	85.2	0.99	97.8	4418	51861
10	1986	2925	4203	43813	95.9	1.41	99.1	4241	44216
10	1987	3567	5167	56560	91.4	1.09	95.2	5429	59432
10	1988	4079	5401	65130	82.9	0.95	89.3	6047	72918
10	1989	3502	5350	56105	95.4	1.05	85.2	6281	65874
10	1990	2784	6043	45941	131.5	1.62	88.4	6839	51994
10	1991	3361	6241	53322	117.1	1.46	96.8	6447	55076
10	1992	3954	4939	65817	75.0	0.96	99.3	4973	66272
10	1993	4181	5455	74093	73.6	0.80	96.5	5653	76790
10	1994	4408	7251	82087	88.3	0.86	100.8	7195	81445
10	1995	3397	9282	64138	144.7	1.54	101.2	9176	63407
10	1996	3652	11398	68957	165.3	1.63	100.9	11299	68355
10	1997	3294	10631	60926	174.5	1.91	100.8	10551	60469
10	1998	2781	10133	49949	202.9	2.47	101.3	10003	49311
10	1999	3689	12407	67251	184.5	1.83	99.4	12484	67669
10	2000	3854	13695	71190	192.4	1.59	98.5	13903	72270
10	2001	3996	12493	75974	164.4	1.60	98.3	12708	77281
10	2002	4175	15960	78218	204.1	1.58	99.1	16107	78936
10	2003	3290	16333	59558	274.2	2.65	98.1	16645	60697
10	2004	3997	20485	71604	286.1	2.50	98.6	20787	72657
10	2005	3233	17169	57116	300.6	2.36	97.2	17658	58740
10	2006	3635	18887	63197	298.9	2.43	99.3	19014	63622
10	2007	2475	15005	43927	341.6	3.58	91.1	16464	48196
10	2008	2633	15999	46169	346.5	4.01	98.0	16325	47110
10	2009	2840	15739	49703	316.7	3.24	97.9	16074	50759
10	2010	2938	15674	54952	285.2	2.65	99.4	15768	55281
10	2011	3032	15183	55656	272.8	2.57	103.7	14646	53686
10	2012	2502	12601	44820	281.1	2.88	100.0	12596	44804
10	2013	3179	14574	56591	257.5	2.34	102.4	14227	55246
10	2014	2444	12195	42551	286.6	2.83	98.0	12440	43407
10	2015	2312	12260	41290	296.9	2.76	98.7	12425	41848
10	2016	3252	11942	59829	199.6	1.76	98.4	12140	60825
10	2017	2937	7190	54228	132.6	1.13	103.5	6946	52387
10	2018	1812	4249	33350	127.4	1.69	101.4	4189	32881
10	2019	1728	4041	25530	158.3	2.01	100.7	4012	25351
10	2020	1983	5083	25676	198.0	2.05	99.6	5101	25767
10	2021	1875	5127	26062	196.7	2.32	102.9	4982	25326
10	2022	1740	3897	26356	147.9	1.46	99.7	3909	26437
10	2023	1277	1468	19002	77.2	1.02	98.8	1486	19240
10	2024	99	187	1667	112.1	6.27	100.0	187	1667
10	2025	181	430	3473	123.9	4.57	93.6	460	3710

2025 : as in January 5. 2026

Anticosti (SAU 9)

SAU	Year	n obs	∑catch	∑effort	CPUE	SE	%	Landings	Nominal effort
9	1982	1676	2210	24369	90.7	0.96	91.7	2411	26578
9	1983	1830	2210	25239	87.6	1.07	77.0	2870	32775
9	1984	1408	1189	19249	61.8	0.86	93.1	1278	20682
9	1985	2258	2552	30270	84.3	0.76	92.2	2767	32815
9	1986	2943	3157	40375	78.2	0.70	95.2	3315	42393
9	1987	2327	3034	35843	84.7	0.85	89.1	3404	40207
9	1988	1624	2367	24137	98.1	1.14	83.2	2844	28999
9	1989	1876	3638	27310	133.2	1.51	86.1	4226	31718
9	1990	1983	4244	30474	139.3	1.80	89.9	4723	33917
9	1991	2255	4575	37359	122.5	1.08	100.5	4554	37187
9	1992	2383	4098	40435	101.3	0.79	98.8	4146	40915
9	1993	2345	4394	43087	102.0	0.64	95.0	4623	45334
9	1994	1728	3858	32111	120.2	0.96	100.9	3824	31826
9	1995	780	2199	15254	144.2	1.54	101.3	2172	15065
9	1996	507	1187	9503	124.9	1.78	100.2	1184	9483
9	1997	904	3241	18005	180.0	1.96	99.9	3244	18022
9	1998	1774	5960	34627	172.1	1.35	100.9	5910	34335
9	1999	1255	3700	24118	153.4	1.67	98.0	3777	24616
9	2000	1146	4060	21664	187.4	1.95	96.7	4198	22401
9	2001	1069	3491	21305	163.8	2.25	95.5	3656	22315
9	2002	1022	3948	19940	198.0	2.27	98.1	4024	20322
9	2003	559	3335	10459	318.9	4.93	96.6	3454	10831
9	2004	1008	5376	19571	274.7	2.71	96.4	5574	20293
9	2005	397	2986	7293	409.5	11.45	93.8	3182	7772
9	2006	693	4519	12307	367.2	7.65	89.4	5053	13759
9	2007	1486	8732	28022	311.6	3.07	93.3	9361	30041
9	2008	1390	8669	26395	328.4	3.35	93.4	9282	28260
9	2009	1474	9392	27302	344.0	3.79	99.5	9443	27452
9	2010	1707	9708	32033	303.1	3.09	96.2	10087	33282
9	2011	1507	9339	28637	326.1	3.43	97.7	9561	29318
9	2012	1464	7935	27593	287.6	3.18	96.9	8187	28470
9	2013	1122	7470	20437	365.5	4.48	97.4	7672	20988
9	2014	1190	8449	21535	392.4	5.05	97.0	8714	22210
9	2015	1499	8799	26826	328.0	3.38	96.1	9161	27929
9	2016	2056	8627	37806	228.2	2.08	99.4	8680	38038
9	2017	1871	6990	34745	201.2	2.11	100.9	6928	34440
9	2018	1659	6441	31016	207.7	2.36	102.5	6285	30266
9	2019	1842	6365	29376	216.7	2.15	93.0	6848	31604
9	2020	1952	6240	26460	235.8	2.69	100.9	6182	26215
9	2021	1876	5700	27523	207.1	2.52	91.4	6233	30100
9	2022	1665	3753	23462	160.0	1.76	99.2	3784	23658
9	2023	1348	2035	19737	103.1	1.30	98.2	2073	20107
9	2024	113	388	2059	188.4	8.65	106.0	366	1942
9	2025	219	827	4377	188.9	8.93	81.2	1019	5391

2025 : as in January 5. 2026

Esquiman (SAU 8)

SAU	Year	n obs	∑catch	∑effort	CPUE	SE	%	Landings	Nominal effort
8	1982	1281	1617	13095	123.5	1.93	76.6	2111	17093
8	1983	2038	1929	20289	95.1	1.64	86.0	2242	23584
8	1984	742	846	7902	107.1	3.14	53.6	1578	14733
8	1985	164	231	2796	82.7	1.78	16.3	1421	17189
8	1986	952	1060	10412	101.8	2.04	66.6	1592	15643
8	1987	948	1139	11312	100.7	1.41	42.4	2685	26665
8	1988	1029	1656	13405	123.5	2.04	38.2	4335	35101
8	1989	1468	2659	16708	159.1	2.52	57.6	4614	28997
8	1990	1918	3465	22220	155.9	2.40	104.9	3303	21184
8	1991	2440	4630	29256	158.3	1.83	97.0	4773	30158
8	1992	1775	3063	24622	124.4	1.36	97.3	3149	25314
8	1993	2307	4256	31074	137.0	1.18	90.9	4683	34190
8	1994	1764	4264	26917	158.4	1.77	90.9	4689	29601
8	1995	2198	4548	30429	149.5	1.42	94.8	4800	32114
8	1996	1647	4964	22288	222.7	2.92	96.9	5123	23003
8	1997	1558	5273	20994	251.2	3.02	88.5	5957	23716
8	1998	2088	6345	25383	250.0	2.55	96.8	6554	26218
8	1999	2107	6249	24804	252.0	2.81	92.8	6732	26719
8	2000	2189	6980	23690	294.6	3.62	94.4	7396	25101
8	2001	1937	6888	23970	287.4	2.95	88.1	7815	27196
8	2002	2336	7621	27017	282.1	2.34	92.4	8250	29248
8	2003	1817	6018	18111	332.3	3.32	88.9	6773	20382
8	2004	1858	7806	17232	453.0	4.62	90.8	8593	18969
8	2005	1681	7830	17152	456.5	5.38	88.3	8867	19424
8	2006	1608	8155	17062	478.0	6.18	91.0	8957	18740
8	2007	2068	8035	21910	366.7	3.97	87.3	9208	25110
8	2008	1783	8307	20972	396.1	4.91	91.2	9110	22998
8	2009	3263	9022	20344	443.5	4.34	95.2	9473	21362
8	2010	2952	8715	17872	487.6	5.15	91.3	9541	19566
8	2011	2951	8822	16139	546.7	5.84	96.1	9177	16788
8	2012	3086	9637	16950	568.5	5.88	94.1	10244	18017
8	2013	2911	9169	19008	482.4	5.46	100.2	9149	18966
8	2014	2382	7793	14849	524.8	5.18	92.7	8408	16020
8	2015	2597	7540	17159	439.4	4.04	91.7	8221	18708
8	2016	2698	6520	16247	401.3	4.23	92.1	7081	17644
8	2017	2790	6030	18676	322.9	3.65	85.9	7024	21753
8	2018	2102	5803	14506	400.1	5.46	97.2	5971	14926
8	2019	2397	5369	15487	346.7	3.56	89.8	5981	17253
8	2020	2288	5649	14802	381.7	3.86	94.3	5992	15700
8	2021	2504	5096	16206	314.5	3.67	92.1	5535	17599
8	2022	2598	3938	17824	221.0	2.28	92.1	4276	19354
8	2023	1265	1614	10022	161.1	2.78	96.3	1677	10411
8	2024	902	1085	5433	199.7	5.91	65.4	1660	8313
8	2025	278	625	1884	331.8	17.15	61.0	1024	3086

2025 : as in January 5, 2026

Table 6. Catch (t) per month, by year and by stock assessment unit (SAU).

Estuary (SAU 12)

SAU	Year	J	F	M	A	M	J	J	A	S	O	N	D
12	1982	0	0	0	50	19	3	24	3	51	2	0	0
12	1983	0	0	0	14	7	45	85	7	0	0	0	0
12	1984	0	0	0	18	36	47	51	5	20	58	10	3
12	1985	0	0	0	50	21	0	5	18	42	28	0	0
12	1986	0	0	18	17	18	5	28	62	70	45	0	0
12	1987	0	0	0	14	80	58	189	181	0	0	0	0
12	1988	0	0	0	347	80	86	39	0	0	0	0	0
12	1989	0	0	205	133	35	49	141	66	0	0	0	0
12	1990	0	0	212	125	171	0	0	0	0	0	0	0
12	1991	0	0	0	386	45	3	5	13	40	11	1	0
12	1992	0	0	0	314	99	17	7	15	13	10	14	0
12	1993	0	0	0	264	146	2	2	3	2	69	7	0
12	1994	0	0	50	390	34	2	2	3	6	8	7	0
12	1995	0	0	0	340	40	6	7	71	11	0	11	0
12	1996	0	0	0	404	20	6	6	15	40	11	3	0
12	1997	0	0	0	333	95	4	30	73	6	3	5	2
12	1998	0	0	0	265	151	23	72	40	38	43	2	0
12	1999	0	0	0	373	77	3	41	105	41	5	1	0
12	2000	0	0	0	448	79	6	1	77	71	54	3	0
12	2001	0	0	0	220	377	0	3	5	46	126	54	0
12	2002	0	0	0	188	278	0	1	86	208	26	11	0
12	2003	0	0	0	314	138	44	0	93	168	31	8	0
12	2004	0	0	0	213	299	52	0	90	237	129	13	0
12	2005	0	0	0	363	240	168	48	85	13	67	18	0
12	2006	0	0	0	418	128	209	12	49	150	18	46	0
12	2007	0	0	0	261	100	79	0	270	265	19	29	0
12	2008	0	0	0	106	475	57	100	100	114	30	37	0
12	2009	0	0	0	322	199	0	0	182	221	51	16	0
12	2010	0	0	0	497	118	0	0	78	117	80	16	0
12	2011	0	0	0	107	96	0	0	263	314	81	20	0
12	2012	0	0	0	15	304	61	214	79	160	103	18	0
12	2013	0	0	0	26	84	13	227	257	273	148	90	0
12	2014	0	0	0	0	270	133	23	224	248	76	11	0
12	2015	0	0	0	61	431	170	56	81	233	28	15	0
12	2016	0	0	0	37	276	89	99	120	166	197	43	0
12	2017	0	0	0	107	72	55	63	259	104	213	25	0
12	2018	0	0	0	110	29	0	27	0	0	42	6	0
12	2019	0	0	0	83	0	0	0	49	47	16	5	0
12	2020	0	0	0	0	2	45	114	187	190	6	26	0
12	2021	0	0	0	0	61	139	72	92	135	56	24	0
12	2022	0	0	0	0	0	115	96	77	91	107	10	0
12	2023	0	0	0	59	62	88	67	80	45	12	24	0
12	2024	0	0	0	87	66	17	0	56	28	70	34	0
12	2025	0	0	0	44	17	38	53	214	183	335	44	0

2025 : as in January 5, 2026

Sept-Iles (SAU 10)

SAU	Year	J	F	M	A	M	J	J	A	S	O	N	D
10	1982	0	0	86	830	1031	444	456	438	220	249	73	0
10	1983	0	0	0	701	1476	556	63	610	250	43	2	0
10	1984	0	0	17	790	1039	778	241	892	437	132	94	19
10	1985	0	0	143	1175	678	867	829	648	48	25	3	2
10	1986	0	0	91	1594	1093	638	690	29	86	20	0	0
10	1987	0	0	93	1330	1351	1030	28	56	1086	456	0	1
10	1988	0	0	78	999	1404	968	1321	349	728	199	0	0
10	1989	0	0	221	1555	1541	949	911	1	1103	0	0	0
10	1990	0	0	0	1310	1881	1676	1023	0	949	0	0	0
10	1991	0	0	0	1650	1439	900	676	771	597	373	40	1
10	1992	0	0	0	903	771	460	407	631	893	718	175	16
10	1993	0	0	0	931	964	283	852	872	1082	453	179	38
10	1994	0	0	181	890	1418	921	1268	895	1068	400	113	41
10	1995	0	0	0	2021	2113	1737	1877	1005	286	117	17	2
10	1996	0	0	0	3189	2455	2523	1955	741	320	82	31	4
10	1997	0	0	0	3405	2446	2200	1609	798	84	6	0	4
10	1998	0	0	0	2944	2670	885	1317	1084	806	244	51	1
10	1999	0	0	0	3687	2645	2548	1886	1030	541	80	44	23
10	2000	0	0	0	2997	2871	2226	2879	2003	448	350	128	1
10	2001	0	0	0	3532	1262	655	908	1646	2100	1265	1171	169
10	2002	0	0	0	2055	3259	3365	3142	2451	1301	317	178	39
10	2003	0	0	0	4448	3232	2368	3501	2044	889	98	39	25
10	2004	0	0	0	5497	3807	3651	2406	3019	2055	318	34	0
10	2005	0	0	0	4927	4506	3309	2849	667	534	757	108	0
10	2006	0	0	0	2049	4525	3055	2549	1798	3121	1395	387	137
10	2007	0	0	0	2193	4554	4074	3069	996	479	551	473	75
10	2008	0	0	25	4724	4045	2962	1486	1458	1036	303	204	82
10	2009	0	0	0	4028	4015	1241	1018	2571	2755	438	8	0
10	2010	0	0	0	4406	4053	768	1516	2085	1783	899	257	2
10	2011	0	0	0	4173	3324	681	1824	2196	1541	738	168	0
10	2012	0	0	0	4485	2256	681	2088	1702	1016	313	55	0
10	2013	0	0	0	4070	2240	855	2342	2602	1364	698	53	4
10	2014	0	0	0	4171	1736	541	2073	2203	1274	362	20	61
10	2015	0	0	0	3746	2572	735	1336	2023	1326	483	204	0
10	2016	0	0	0	2725	2056	629	661	1653	2008	1607	708	94
10	2017	0	0	0	639	608	408	767	821	1797	1293	555	57
10	2018	0	0	0	1033	300	363	603	640	646	483	118	2
10	2019	0	0	0	1172	329	251	545	719	670	167	159	0
10	2020	0	0	0	121	98	203	844	1020	1311	1104	400	0
10	2021	0	0	0	276	118	270	560	792	1038	1292	632	4
10	2022	0	0	0	112	49	349	379	681	969	994	377	0
10	2023	0	0	0	260	212	241	173	222	221	127	30	0
10	2024	0	0	0	7	3	0	0	16	112	33	15	0
10	2025	0	0	0	0	0	6	84	36	221	0	101	11

2025 : as in January 5, 2026

Anticosti (SAU 9)

SAU	Year	J	F	M	A	M	J	J	A	S	O	N	D
9	1982	0	0	0	14	169	661	519	499	459	84	5	0
9	1983	0	0	0	39	108	896	588	351	533	323	32	0
9	1984	0	0	0	0	283	231	298	93	174	181	18	0
9	1985	0	0	0	15	92	488	791	571	605	205	0	0
9	1986	0	0	0	2	101	795	764	1019	417	216	0	0
9	1987	0	0	0	12	574	600	1044	825	236	113	0	0
9	1988	0	0	0	27	83	484	393	1065	354	425	12	0
9	1989	0	0	0	1	187	1159	814	542	380	1083	59	0
9	1990	0	0	0	6	22	965	1372	1919	439	0	0	0
9	1991	0	0	0	24	369	1046	1516	762	493	306	39	1
9	1992	0	0	0	1	151	1335	1369	771	476	41	3	0
9	1993	0	0	0	0	269	1908	1555	661	171	44	14	0
9	1994	0	0	0	9	23	861	1558	1003	273	91	5	0
9	1995	0	0	0	0	3	564	964	486	148	8	0	0
9	1996	0	0	0	4	62	216	247	460	138	42	16	0
9	1997	0	0	0	8	12	1114	1810	209	91	0	0	0
9	1998	0	0	0	7	712	2286	1780	952	131	43	0	0
9	1999	0	0	0	14	74	664	1883	776	214	68	49	36
9	2000	0	0	0	4	194	1594	1416	561	361	49	19	0
9	2001	0	0	0	0	138	472	799	1506	687	28	27	0
9	2002	0	0	0	15	398	1212	1358	735	252	40	0	14
9	2003	0	0	0	21	445	1125	960	572	216	67	44	3
9	2004	0	0	0	5	506	226	3286	1098	367	86	0	0
9	2005	0	0	0	12	442	1568	122	257	565	209	7	0
9	2006	0	0	0	2	262	2026	1131	834	580	205	13	0
9	2007	0	0	0	0	1127	1920	2715	2082	1305	103	47	63
9	2008	0	0	0	0	1128	2727	3225	1627	495	80	0	0
9	2009	0	0	0	61	1233	4433	2537	821	133	84	143	0
9	2010	0	0	0	0	930	4741	3329	1015	47	24	0	0
9	2011	0	0	0	3	1076	5293	2462	549	153	22	4	0
9	2012	0	0	0	23	1849	3977	1581	421	190	70	78	0
9	2013	0	0	0	93	1677	4645	669	293	228	49	17	0
9	2014	0	0	0	63	2267	4656	1166	307	132	122	0	0
9	2015	0	0	0	197	1490	3887	2213	807	398	97	21	50
9	2016	0	0	0	36	647	3127	2511	1696	578	84	0	0
9	2017	0	0	0	0	626	2934	1657	1064	549	55	44	0
9	2018	0	0	0	15	2157	2054	958	674	334	73	19	0
9	2019	0	0	0	149	1577	2490	1517	723	281	111	0	0
9	2020	0	0	0	0	0	2166	1878	969	780	335	54	0
9	2021	0	0	0	0	354	2291	1595	1022	679	245	46	0
9	2022	0	0	0	0	109	629	1028	1224	577	212	0	6
9	2023	0	0	0	24	377	451	799	407	14	1	0	0
9	2024	0	0	0	0	33	196	65	34	14	24	0	0
9	2025	0	0	0	0	113	288	223	366	29	0	0	0

2025 : as in January 5, 2026

Esquiman (SAU 8)

SAU	Year	J	F	M	A	M	J	J	A	S	O	N	D
8	1982	0	0	0	242	832	138	193	277	129	299	0	0
8	1983	0	142	345	696	187	382	159	111	149	59	12	0
8	1984	0	8	9	572	273	244	84	122	101	140	23	0
8	1985	0	0	0	5	236	378	176	419	208	0	0	0
8	1986	0	0	0	527	203	97	296	215	146	98	9	0
8	1987	0	0	78	213	344	753	219	539	204	238	76	22
8	1988	0	0	0	379	1203	960	881	445	0	300	123	45
8	1989	0	0	0	121	1292	1178	376	624	424	253	331	14
8	1990	0	0	0	0	860	532	1048	339	308	215	0	0
8	1991	0	0	0	720	1498	1283	875	240	101	28	29	0
8	1992	0	0	0	0	634	1615	686	71	102	40	1	0
8	1993	0	0	0	2	1338	1172	1334	621	171	36	10	0
8	1994	0	0	0	0	455	1660	1895	411	199	68	0	0
8	1995	4	0	0	9	2651	1460	38	113	316	206	3	0
8	1996	0	0	0	0	1834	2073	815	262	91	48	0	0
8	1997	0	0	0	3	1448	2596	1133	322	170	204	64	16
8	1998	0	0	0	1023	2433	1080	567	204	548	360	201	137
8	1999	0	0	0	1760	2393	1578	412	99	213	82	130	64
8	2000	0	0	0	2427	1875	1136	815	890	198	53	1	0
8	2001	0	0	0	1810	1629	1828	839	218	592	900	0	0
8	2002	0	0	0	1595	1488	2637	1772	478	181	68	31	0
8	2003	0	0	0	6	2495	2806	441	534	218	83	182	7
8	2004	0	0	6	39	2398	4296	1050	348	285	171	0	0
8	2005	0	0	0	1	2289	2608	639	1534	1113	675	8	0
8	2006	0	0	0	505	2344	1938	944	1260	1248	652	65	0
8	2007	0	0	3	869	4230	1052	855	618	899	434	225	22
8	2008	0	0	0	1093	3452	1931	2107	430	40	7	50	0
8	2009	0	0	0	874	3727	1344	2610	418	402	88	10	0
8	2010	0	0	0	304	4426	3548	557	535	106	18	47	0
8	2011	0	0	0	125	6666	1996	172	113	7	58	40	0
8	2012	0	0	0	123	5630	2914	802	389	306	80	0	0
8	2013	0	0	0	66	3716	2947	1398	404	255	307	51	6
8	2014	0	0	0	0	4141	2179	811	877	336	57	6	0
8	2015	0	0	0	0	3695	2401	1018	935	171	0	0	0
8	2016	0	0	0	279	1234	3894	1347	70	89	63	99	8
8	2017	0	0	0	240	1166	1119	2794	976	449	264	15	0
8	2018	0	0	0	96	3442	1388	626	220	186	13	0	0
8	2019	0	0	0	0	3672	1444	515	309	42	0	0	0
8	2020	0	0	0	0	0	44	707	3121	1670	450	0	0
8	2021	0	0	0	0	0	491	2623	1637	658	101	24	0
8	2022	0	0	0	0	153	363	897	1484	990	383	6	0
8	2023	0	0	0	0	343	493	309	367	124	41	0	0
8	2024	0	0	0	310	821	192	213	40	84	0	0	0
8	2025	0	0	0	93	653	105	28	19	48	44	34	0

2025 : as in January 5, 2026

Table 7. Effort (h) per month, by year and by stock assessment unit (SAU).

Estuary (SAU 12)

SAU	Year	J	F	M	A	M	J	J	A	S	O	N	D
12	1982	0	0	0	423	284	54	334	39	876	47	0	0
12	1983	0	0	0	200	78	473	2010	278	0	0	0	0
12	1984	0	0	0	57	266	598	1036	117	430	1064	279	48
12	1985	0	0	0	331	323	0	67	341	672	512	0	0
12	1986	0	0	239	149	188	48	507	1051	1339	1668	0	0
12	1987	0	0	0	188	919	663	3290	3308	0	0	0	0
12	1988	0	0	5	2631	957	943	687	0	0	0	0	0
12	1989	0	0	1982	1669	587	512	1420	761	0	0	0	0
12	1990	0	0	1640	715	1693	0	0	0	0	0	0	0
12	1991	0	0	0	1097	262	51	124	173	308	157	14	0
12	1992	0	0	0	1716	1015	333	202	224	349	329	322	0
12	1993	0	0	0	1086	1110	14	29	86	47	691	94	0
12	1994	0	0	492	1035	364	57	50	110	42	93	60	0
12	1995	0	0	0	875	286	69	53	351	71	0	42	0
12	1996	0	0	0	959	80	69	63	127	222	45	10	0
12	1997	0	0	0	1056	317	42	114	348	43	11	16	6
12	1998	0	0	0	485	370	105	265	175	140	170	20	0
12	1999	0	0	0	604	269	32	227	360	180	26	9	0
12	2000	0	0	0	875	336	43	7	295	282	183	30	0
12	2001	0	0	0	731	1526	0	31	22	181	529	274	0
12	2002	0	0	0	891	1587	22	8	319	708	75	36	0
12	2003	0	0	0	524	319	146	0	308	497	120	21	0
12	2004	0	0	0	340	749	306	8	233	627	330	33	0
12	2005	0	0	0	819	547	334	158	273	51	243	54	0
12	2006	0	0	0	632	310	548	48	130	446	49	115	0
12	2007	0	0	0	371	290	248	0	757	889	103	88	0
12	2008	0	0	0	221	1299	109	227	335	465	88	88	0
12	2009	0	0	0	591	684	8	0	817	1062	259	59	0
12	2010	0	0	0	1500	686	0	0	274	640	358	73	0
12	2011	0	0	0	483	497	0	0	1321	1505	458	143	0
12	2012	0	0	0	74	1173	168	672	387	933	680	155	0
12	2013	0	0	0	138	507	88	1266	1465	1647	690	469	0
12	2014	0	0	0	0	916	567	143	937	1291	355	85	0
12	2015	0	0	0	195	1280	524	254	411	1233	178	120	0
12	2016	0	0	0	142	1423	567	441	452	843	1021	195	0
12	2017	0	0	0	426	395	308	433	1668	661	1222	176	0
12	2018	0	0	0	457	269	0	67	0	0	150	24	0
12	2019	0	0	0	380	0	0	0	126	67	47	18	0
12	2020	0	0	0	0	17	155	234	561	648	17	185	0
12	2021	0	0	0	0	163	528	239	317	358	194	121	0
12	2022	0	0	0	0	0	211	230	115	141	228	54	0
12	2023	0	0	0	145	254	219	204	291	203	90	125	0
12	2024	0	0	0	448	200	57	0	251	57	173	116	0
12	2025	0	0	0	400	59	103	101	650	585	1083	108	0

2025 : as in January 5, 2026

Sept-Iles (SAU 10)

SAU	Year	J	F	M	A	M	J	J	A	S	O	N	D
10	1982	0	0	284	4440	11944	7210	6518	7841	3916	4028	1430	0
10	1983	0	0	0	4258	13191	6865	1365	8191	4612	991	47	0
10	1984	0	0	20	4911	10253	10889	4818	13513	7572	2969	1600	347
10	1985	0	0	675	8557	11892	11263	10200	7569	980	612	101	12
10	1986	0	0	496	9135	13374	8912	9504	617	1665	513	0	0
10	1987	0	0	1098	11329	13939	11371	828	977	12950	6929	0	11
10	1988	0	0	709	8988	16241	13148	15584	4829	10116	3302	0	0
10	1989	0	0	1480	13865	16687	12175	10771	5	10891	0	0	0
10	1990	0	0	0	7845	14371	14732	6620	0	8425	0	0	0
10	1991	0	0	0	8625	14557	9285	6415	6404	5512	3858	406	14
10	1992	0	0	0	5533	10946	6762	5729	9936	12646	10535	3907	277
10	1993	0	0	0	7120	14807	3919	9978	11638	14707	10336	3870	415
10	1994	0	0	337	9514	19106	11507	11915	10527	10875	5374	1824	466
10	1995	0	0	0	10616	18827	13175	11519	6357	1862	881	148	21
10	1996	0	0	0	16317	16049	13812	13192	5273	2585	638	358	131
10	1997	0	0	0	15252	17227	14787	8577	4039	484	81	0	22
10	1998	0	0	0	11075	11730	4766	7413	7095	5110	1796	316	10
10	1999	0	0	0	13827	16242	14299	10171	6841	5051	708	335	193
10	2000	0	0	0	12861	16455	12085	13786	10583	2893	2643	957	9
10	2001	0	0	0	13896	8105	3768	4322	9016	15858	11504	9828	984
10	2002	0	0	0	11032	18173	16085	12672	11933	6553	1564	743	182
10	2003	0	0	0	11536	11722	11035	14168	7693	3791	473	179	100
10	2004	0	0	0	13406	15076	14200	10135	10633	7932	1104	171	0
10	2005	0	0	0	14390	15590	11084	9909	2412	1854	3049	451	0
10	2006	0	0	0	5045	15611	10877	7719	5803	11121	5706	1459	280
10	2007	0	0	0	4130	13592	12470	9130	3112	1722	2373	1535	132
10	2008	0	0	73	7131	13362	9746	5159	5397	4281	1338	456	167
10	2009	0	0	0	7565	15460	5220	3051	8984	9025	1417	37	0
10	2010	0	0	0	11980	14001	2994	5276	7842	7714	4371	1086	17
10	2011	0	0	0	12103	13007	2756	7320	9020	6384	2644	452	0
10	2012	0	0	0	13700	9473	2430	7267	5816	4236	1709	173	0
10	2013	0	0	0	13117	10202	3568	8928	9961	6622	2689	111	48
10	2014	0	0	0	12581	7272	2323	7664	7073	4905	1393	75	120
10	2015	0	0	0	9764	8991	2992	4941	7071	5572	1967	548	0
10	2016	0	0	0	9794	10226	3433	3598	8218	11139	9400	4463	553
10	2017	0	0	0	3544	4121	2908	5909	6433	12367	10958	5688	459
10	2018	0	0	0	7935	2643	2341	5371	6626	5780	1767	407	11
10	2019	0	0	0	7916	3479	1410	3570	4507	3244	737	487	0
10	2020	0	0	0	324	222	729	3677	5624	7336	5971	1884	0
10	2021	0	0	1	703	384	1293	2656	4359	5625	6419	3846	39
10	2022	0	0	0	773	253	2091	2612	4020	5963	7208	3517	0
10	2023	0	0	0	3019	2867	3225	2155	3052	2973	1625	324	0
10	2024	0	0	0	251	37	0	0	191	931	165	92	0
10	2025	0	0	0	0	0	16	925	263	1853	0	604	49

2025 : as in January 5, 2026

Anticosti (SAU 9)

SAU	Year	J	F	M	A	M	J	J	A	S	O	N	D
9	1982	0	0	0	96	1560	6821	5757	5276	5687	1324	56	0
9	1983	0	0	0	261	854	8167	7326	4497	6207	4785	677	0
9	1984	0	0	0	0	3096	2932	4986	1760	3126	4281	501	0
9	1985	0	0	0	175	1426	5619	8043	6627	7689	3235	0	0
9	1986	0	0	0	8	788	8028	8849	12517	7004	5198	0	0
9	1987	0	0	0	188	5653	6604	13095	10064	3128	1475	0	0
9	1988	0	0	0	247	969	4755	3665	11186	3662	4294	218	0
9	1989	0	0	0	33	1364	7599	5754	4729	3180	8489	570	0
9	1990	0	0	0	3	162	4131	10263	15492	3865	0	0	0
9	1991	0	0	0	97	2391	7361	12764	7171	4166	2851	379	7
9	1992	0	0	0	11	1645	12053	13777	7974	4847	565	44	0
9	1993	0	0	0	0	2605	17794	15037	7472	1630	617	179	0
9	1994	0	0	0	124	302	7163	12735	8551	2055	822	74	0
9	1995	0	0	0	0	62	3450	6782	3721	972	77	0	0
9	1996	0	0	0	19	397	1522	2074	3754	1217	363	138	0
9	1997	0	0	0	32	110	6049	9883	1260	688	0	0	0
9	1998	0	0	0	32	3463	12613	10715	6094	921	497	0	0
9	1999	0	0	0	71	596	3851	11032	5497	2006	671	616	275
9	2000	0	0	0	28	1017	8610	7114	2869	2264	366	132	0
9	2001	0	0	0	0	905	2138	3148	9690	6042	218	174	0
9	2002	0	0	0	90	1856	4719	6742	4817	1760	221	0	115
9	2003	0	0	0	97	1064	4165	2751	1639	637	286	168	25
9	2004	0	0	0	27	1581	840	11462	4313	1622	448	0	0
9	2005	0	0	0	9	838	2541	313	900	2291	859	21	0
9	2006	0	0	0	22	498	3686	3012	2855	2670	928	89	0
9	2007	0	0	0	0	3170	5184	8779	7969	4155	443	147	195
9	2008	0	0	0	0	3056	6558	9497	6518	2141	490	0	0
9	2009	0	0	0	240	3267	11388	8948	2946	295	218	150	0
9	2010	0	0	0	1	2069	14975	11976	3927	220	114	0	0
9	2011	0	0	0	19	2499	14640	9706	2025	262	107	59	0
9	2012	0	0	0	100	5588	13125	6093	1806	861	327	570	0
9	2013	0	0	0	478	4308	11388	2400	1178	972	196	69	0
9	2014	0	0	0	226	6289	11486	2479	924	439	367	0	0
9	2015	0	0	0	417	3936	10338	7775	3052	1324	587	166	334
9	2016	0	0	0	188	2761	10895	11908	8874	3109	304	0	0
9	2017	0	0	0	0	2205	12481	8984	6954	3044	443	329	0
9	2018	0	0	0	41	8780	9085	6000	4143	1768	314	136	0
9	2019	0	0	0	929	7198	10362	7654	3628	1358	476	0	0
9	2020	0	0	0	0	0	7313	8797	4848	3794	1232	231	0
9	2021	0	0	0	0	1471	10073	8084	5866	3016	1337	253	0
9	2022	0	0	0	0	482	3841	6488	7244	3829	1675	0	99
9	2023	0	0	0	297	3800	3911	7021	4929	137	12	0	0
9	2024	0	0	0	0	197	941	445	161	93	104	0	0
9	2025	0	0	0	0	552	1335	1297	2136	71	0	0	0

2025 : as in January 5, 2026

Esquiman (SAU 8)

SAU	Year	J	F	M	A	M	J	J	A	S	O	N	D
8	1982	0	0	0	1509	5781	1487	1557	2608	1382	2767	0	0
8	1983	0	835	2236	6240	1664	4107	2065	2124	2762	1277	272	0
8	1984	0	60	52	3558	2651	2386	781	1334	1455	2097	359	0
8	1985	0	0	0	105	2976	4583	2007	5140	2380	0	0	0
8	1986	0	0	0	2981	2307	1060	3368	2702	1901	1184	141	0
8	1987	0	0	685	2324	2926	6898	2671	5273	2413	2557	668	253
8	1988	0	0	0	2323	9413	8124	7428	3639	0	2831	914	429
8	1989	0	0	0	350	7698	6783	2616	3968	3185	1910	2392	96
8	1990	0	0	0	0	5311	2843	5389	2818	2846	1977	0	0
8	1991	0	0	0	2659	9839	7467	7021	1802	907	240	223	0
8	1992	0	0	0	0	4648	11777	6316	884	1192	488	8	0
8	1993	0	0	0	13	10057	7553	8839	5487	1746	359	134	0
8	1994	0	0	0	0	3589	9781	11505	2392	1699	635	0	0
8	1995	28	0	0	34	16989	9255	241	822	2572	2132	40	0
8	1996	0	0	0	0	6933	9020	4504	1830	427	288	0	0
8	1997	0	0	0	10	6003	9920	4078	1408	707	1118	404	67
8	1998	0	0	0	3810	9685	3551	2227	697	2286	1941	1371	650
8	1999	0	0	0	5994	10597	5343	1277	431	1262	511	910	394
8	2000	0	0	0	7610	7399	2701	2580	3577	985	239	11	0
8	2001	0	0	0	5715	6214	4734	2629	1009	2579	4316	0	0
8	2002	0	0	0	5088	5392	8005	7236	2192	792	433	110	0
8	2003	0	0	0	7	6961	8458	1438	1869	718	297	615	19
8	2004	0	0	15	159	5437	9416	1996	896	693	357	0	0
8	2005	0	0	0	1	4327	4641	1767	3549	3007	2111	22	0
8	2006	0	0	0	865	4385	2890	1650	3168	3694	1903	183	0
8	2007	0	0	3	1769	11775	2469	1579	1591	3107	1591	1047	180
8	2008	0	0	0	3173	9777	3277	4857	1396	240	36	242	0
8	2009	0	0	0	1799	8209	2761	5888	1202	1173	295	34	0
8	2010	0	0	0	905	8720	6426	1334	1623	419	42	97	0
8	2011	0	0	0	407	12450	2761	508	365	44	144	110	0
8	2012	0	0	0	367	9433	5005	1584	894	566	168	0	0
8	2013	0	0	0	242	6029	6014	3615	1378	599	905	166	18
8	2014	0	0	0	0	7910	3547	1365	2042	909	210	38	0
8	2015	0	0	0	0	7387	5557	2510	2745	509	0	0	0
8	2016	0	0	0	757	2587	9210	3674	218	279	273	584	61
8	2017	0	0	0	549	3139	2696	7886	4088	2014	1282	100	0
8	2018	0	0	0	396	6760	3951	2223	791	748	57	0	0
8	2019	0	0	0	0	9964	4412	1570	1124	184	0	0	0
8	2020	0	0	0	0	0	72	1548	8161	4418	1501	0	0
8	2021	0	0	0	0	0	1107	7701	5623	2461	600	108	0
8	2022	0	0	0	0	725	1466	3330	6512	5119	2135	67	0
8	2023	0	0	0	0	1523	2732	1949	2810	1063	334	0	0
8	2024	0	0	0	722	3931	1445	1379	366	470	0	0	0
8	2025	0	0	0	98	1850	443	118	197	363	11	7	0

2025 : as in January 5, 2026

Table 8. Standardised catch per unit of effort and its standard error, landings and standardised effort, by year and by stock assessment unit (SAU).

Estuary (SAU 12)

SAU	Year	CPUE std	SE	Landings (t)	Effort std
12	1982	71.55	5.52	152	2124
12	1983	52.90	4.83	158	2987
12	1984	65.96	3.56	248	3760
12	1985	70.20	7.14	164	2336
12	1986	56.46	3.25	262	4641
12	1987	65.97	3.41	523	7928
12	1988	90.67	4.53	551	6077
12	1989	86.59	4.61	629	7264
12	1990	135.96	8.45	507	3729
12	1991	140.01	8.41	505	3607
12	1992	75.03	3.69	489	6518
12	1993	143.34	8.67	496	3460
12	1994	121.29	7.68	502	4139
12	1995	196.86	12.82	486	2469
12	1996	224.10	15.12	505	2253
12	1997	240.94	14.98	549	2279
12	1998	369.10	22.76	634	1718
12	1999	367.83	24.08	646	1756
12	2000	343.61	19.55	739	2151
12	2001	270.82	14.38	832	3072
12	2002	212.05	10.92	799	3768
12	2003	413.25	22.86	796	1926
12	2004	430.09	22.97	1033	2402
12	2005	417.52	21.94	1001	2398
12	2006	487.06	25.15	1029	2113
12	2007	436.84	22.62	1022	2340
12	2008	417.72	22.27	1017	2435
12	2009	320.77	16.23	993	3095
12	2010	253.42	12.95	906	3575
12	2011	225.26	11.26	880	3907
12	2012	276.50	13.92	956	3456
12	2013	221.05	10.49	1117	5054
12	2014	294.21	14.77	984	3344
12	2015	298.13	14.93	1075	3606
12	2016	253.00	12.57	1027	4058
12	2017	212.17	10.36	899	4236
12	2018	242.74	20.83	214	883
12	2019	340.64	33.63	199	585
12	2020	393.03	24.88	570	1450
12	2021	325.65	19.41	579	1779
12	2022	656.45	50.39	496	756
12	2023	311.39	18.89	437	1403
12	2024	249.64	18.38	357	1431
12	2025	313.62	18.72	929	2962

Sept-Iles (SAU 10)

SAU	Year	CPUE std	SE	Landings (t)	Effort std
10	1982	89.30	1.27	3827	42862
10	1983	107.15	1.70	3702	34550
10	1984	86.99	0.95	4441	51054
10	1985	87.65	0.97	4418	50405
10	1986	95.53	1.11	4241	44397
10	1987	98.54	1.06	5429	55099
10	1988	88.53	0.91	6047	68302
10	1989	98.05	1.05	6281	64063
10	1990	143.28	1.64	6839	47733
10	1991	121.84	1.31	6447	52908
10	1992	80.84	0.83	4973	61509
10	1993	79.16	0.80	5653	71411
10	1994	94.48	0.93	7195	76150
10	1995	149.78	1.60	9176	61265
10	1996	165.52	1.72	11299	68263
10	1997	176.13	1.91	10551	59904
10	1998	204.41	2.43	10003	48938
10	1999	190.02	1.96	12484	65702
10	2000	210.17	2.19	13903	66151
10	2001	185.70	1.96	12708	68433
10	2002	223.01	2.22	16107	72226
10	2003	299.46	3.29	16645	55584
10	2004	310.04	3.16	20787	67044
10	2005	336.73	3.74	17658	52438
10	2006	353.18	3.80	19014	53836
10	2007	388.01	4.78	16464	42431
10	2008	384.57	4.64	16325	42451
10	2009	353.28	4.20	16074	45498
10	2010	315.80	3.72	15768	49932
10	2011	297.90	3.46	14646	49162
10	2012	290.98	3.62	12596	43288
10	2013	272.31	3.08	14227	52247
10	2014	303.12	3.83	12440	41041
10	2015	327.52	4.21	12425	37937
10	2016	231.88	2.63	12140	52357
10	2017	156.47	1.88	6946	44390
10	2018	129.61	1.86	4189	32320
10	2019	155.52	2.30	4012	25799
10	2020	227.57	3.33	5101	22413
10	2021	230.59	3.48	4982	21606
10	2022	180.51	2.72	3909	21657
10	2023	83.87	1.48	1486	17720
10	2024	107.21	6.52	187	1743
10	2025	163.23	8.15	460	2816

Anticosti (SAU 9)

SAU	Year	CPUE std	SE	Landings (t)	Effort std
9	1982	114.75	1.44	2411	21007
9	1983	112.23	1.34	2870	25572
9	1984	78.61	1.04	1278	16254
9	1985	107.48	1.15	2767	25744
9	1986	99.91	0.97	3315	33174
9	1987	107.34	1.14	3404	31710
9	1988	136.54	1.65	2844	20829
9	1989	179.28	2.01	4226	23570
9	1990	172.31	1.89	4723	27409
9	1991	151.65	1.58	4554	30032
9	1992	123.37	1.22	4146	33610
9	1993	122.39	1.21	4623	37771
9	1994	152.27	1.75	3824	25114
9	1995	180.59	2.92	2172	12026
9	1996	159.15	3.18	1184	7442
9	1997	220.02	3.36	3244	14744
9	1998	203.94	2.27	5910	28978
9	1999	188.88	2.53	3777	19996
9	2000	224.83	3.09	4198	18671
9	2001	202.32	2.88	3656	18071
9	2002	238.06	3.42	4024	16903
9	2003	374.02	7.18	3454	9234
9	2004	340.70	4.99	5574	16362
9	2005	460.84	10.37	3182	6906
9	2006	433.04	7.42	5053	11668
9	2007	382.07	4.74	9361	24502
9	2008	390.46	4.94	9282	23772
9	2009	385.70	4.74	9443	24484
9	2010	342.85	3.90	10087	29420
9	2011	367.08	4.41	9561	26047
9	2012	319.56	3.90	8187	25621
9	2013	397.01	5.46	7672	19323
9	2014	426.18	5.67	8714	20447
9	2015	375.06	4.57	9161	24425
9	2016	269.12	2.87	8680	32253
9	2017	225.75	2.53	6928	30691
9	2018	219.04	2.59	6285	28695
9	2019	235.43	2.66	6848	29086
9	2020	273.80	3.04	6182	22580
9	2021	241.07	2.71	6233	25857
9	2022	194.23	2.30	3784	19482
9	2023	113.24	1.46	2073	18302
9	2024	211.21	9.29	366	1732
9	2025	264.93	9.17	1019	3845

Esquiman (SAU 8)

SAU	Year	CPUE std	SE	Landings (t)	Effort std
8	1982	171.95	2.75	2111	12277
8	1983	102.35	1.46	2242	21905
8	1984	120.82	2.44	1578	13060
8	1985	128.19	4.94	1421	11086
8	1986	132.96	2.22	1592	11973
8	1987	139.28	2.44	2685	19278
8	1988	167.64	2.78	4335	25859
8	1989	234.17	3.36	4614	19704
8	1990	202.05	2.51	3303	16348
8	1991	190.29	2.11	4773	25082
8	1992	154.11	1.91	3149	20433
8	1993	184.37	2.10	4683	25400
8	1994	218.77	2.84	4689	21434
8	1995	204.61	2.43	4800	23460
8	1996	287.51	3.70	5123	17818
8	1997	329.51	4.37	5957	18078
8	1998	330.57	3.97	6554	19826
8	1999	304.65	3.63	6732	22097
8	2000	348.90	4.18	7396	21198
8	2001	357.14	4.44	7815	21882
8	2002	347.79	3.94	8250	23721
8	2003	426.93	5.31	6773	15864
8	2004	574.63	6.95	8593	14954
8	2005	648.34	8.40	8867	13677
8	2006	669.76	8.87	8957	13374
8	2007	466.15	5.59	9208	19754
8	2008	439.77	5.55	9110	20715
8	2009	513.08	5.13	9473	18463
8	2010	566.37	5.61	9541	16846
8	2011	607.75	6.25	9177	15100
8	2012	653.17	6.60	10244	15683
8	2013	558.71	5.66	9149	16375
8	2014	601.29	6.69	8408	13983
8	2015	512.72	5.41	8221	16033
8	2016	442.91	4.52	7081	15988
8	2017	408.39	4.46	7024	17199
8	2018	486.22	5.76	5971	12281
8	2019	414.43	4.65	5981	14433
8	2020	574.84	7.24	5992	10424
8	2021	421.00	4.94	5535	13146
8	2022	308.55	3.67	4276	13860
8	2023	197.24	3.02	1677	8502
8	2024	217.00	3.86	1660	7652
8	2025	361.02	11.21	1024	2836

Table 9. Number of samples of the commercial catches and number of samples per 1,000 tons of landing, by fishing area (SFA) and by year.

Year	Number of samples					N. samples / 1,000 tons			
	SFA					SFA			
	12	10	9	8	Total	12	10	9	8
1982	1	29	21	15	66	6.6	7.7	8.5	7.1
1983	7	27	49	27	110	44.3	7.4	16.8	12.0
1984	0	43	16	29	88	0.0	9.8	12.0	18.4
1985	0	56	52	40	148	0.0	12.7	18.7	28.1
1986	2	28	35	29	94	7.6	6.6	10.5	18.2
1987	1	21	28	39	89	1.9	3.9	8.2	14.5
1988	2	42	16	38	98	3.6	6.9	5.6	8.8
1989	0	39	25	39	103	0.0	6.2	5.9	8.5
1990	3	32	11	28	74	5.9	4.7	2.3	8.5
1991	0	26	16	26	68	0.0	4.1	3.5	5.4
1992	3	30	12	23	68	6.1	6.1	2.9	7.3
1993	4	34	21	29	88	8.1	6.2	4.4	6.2
1994	7	31	10	42	90	13.9	5.0	2.1	9.0
1995	11	50	36	46	143	22.6	7.8	7.3	9.6
1996	10	33	52	50	145	19.8	4.7	9.5	9.8
1997	9	38	49	44	140	16.4	4.9	8.1	7.4
1998	15	46	47	56	164	23.7	5.1	6.8	8.5
1999	16	39	36	49	140	24.8	4.2	5.1	7.3
2000	12	57	34	49	152	16.2	5.6	4.3	6.6
2001	11	60	37	37	145	13.2	5.5	6.9	4.7
2002	14	69	38	45	166	17.5	6.0	4.4	5.5
2003	14	74	36	48	172	17.6	6.5	4.1	7.1
2004	19	73	40	34	166	18.4	4.6	3.8	4.0
2005	16	66	34	48	164	16.0	5.2	4.2	5.4
2006	18	71	36	58	183	17.5	4.6	4.1	6.5
2007	23	64	36	56	179	22.5	4.1	3.5	6.1
2008	22	65	27	50	164	21.6	4.1	2.8	5.5
2009	22	56	33	26	137	22.2	3.5	3.4	2.7
2010	17	67	32	37	153	18.8	4.3	3.2	3.9
2011	21	61	33	40	155	23.9	4.2	3.4	4.4
2012	18	59	38	37	152	18.8	4.7	4.6	3.6
2013	26	64	30	50	170	23.3	4.5	3.9	5.5
2014	18	59	27	59	163	18.3	4.8	3.1	7.0
2015	28	55	39	52	174	26.0	4.4	4.3	6.3
2016	20	68	40	55	183	19.5	5.6	4.6	7.8
2017	27	60	38	54	179	30.0	8.6	5.5	7.7
2018	12	58	43	57	170	56.1	13.9	6.8	9.5
2019	8	56	43	49	156	40.2	14.0	6.3	8.2
2020	11	41	40	44	136	19.3	8.0	6.5	7.3
2021	21	50	25	33	129	36.3	10.1	4.0	6.0
2022	16	43	23	31	113	32.3	11.0	6.1	7.2
2023	18	44	38	41	141	41.2	29.7	18.3	24.4
2024	10	15	14	42	81	28.0	80.2	38.3	25.3
2025	17	13	21	29	80	18.3	28.7	20.5	28.3

Table 10. Weighting factors used to estimate the numbers at length by fishing area (SFA), by year and by month. The catch corresponds to the landing that is adjusted for the proportion (ratio) of P. borealis in the samples. The origin (month, year) of the samples used for the estimated is also indicated.

SFA	Year	Month	Landings (t)	Samples		Catch estimate (t)	From:		SFA	Year	Month	Landings (t)	Samples		Catch estimate (t)	From:	
				N individuals	Ratio *P. borealis*		Month	Year					N individuals	Ratio *P. borealis*		Month	Year
8	2023	1	0.0	-	-	-	-	-	9	2023	1	0.0	-	-	-	-	-
8	2023	2	0.0	-	-	-	-	-	9	2023	2	0.0	-	-	-	-	-
8	2023	3	0.0	-	-	-	-	-	9	2023	3	0.0	-	-	-	-	-
8	2023	4	0.0	-	-	-	-	-	9	2023	4	24.1	-	-	24	5	2023
8	2023	5	343.0	1311	0.997	342	5	2023	9	2023	5	376.7	1320	0.990	373	5	2023
8	2023	6	493.4	2084	0.958	473	6	2023	9	2023	6	451.4	1587	0.993	448	6	2023
8	2023	7	309.1	791	0.979	303	7	2023	9	2023	7	798.8	2957	0.994	794	7	2023
8	2023	8	366.5	4099	0.994	364	8	2023	9	2023	8	406.7	3999	0.994	404	8	2023
8	2023	9	124.1	806	0.973	121	9	2023	9	2023	9	13.8	532	0.998	14	9	2023
8	2023	10	40.8	1910	0.998	41	10	2023	9	2023	10	1.1	-	-	1	9	2023
8	2023	11	0.0	-	-	-	-	-	9	2023	11	0.0	-	-	-	-	-
8	2023	12	0.0	-	-	-	-	-	9	2023	12	0.0	-	-	-	-	-
8	2024	1	0.0	-	-	-	-	-	9	2024	1	0.0	-	-	-	-	-
8	2024	2	0.0	-	-	-	-	-	9	2024	2	0.0	-	-	-	-	-
8	2024	3	0.0	-	-	-	-	-	9	2024	3	0.0	-	-	-	-	-
8	2024	4	310.3	1632	0.998	310	4	2024	9	2024	4	0.0	-	-	-	-	-
8	2024	5	821.2	2917	0.995	817	5	2024	9	2024	5	33.1	261	1.000	33	5	2024
8	2024	6	192.1	3984	0.990	190	6	2024	9	2024	6	196.2	1671	0.997	196	6	2024
8	2024	7	212.7	1065	0.976	208	7	2024	9	2024	7	65.5	1044	1.000	66	7	2024
8	2024	8	39.8	523	0.992	39	8	2024	9	2024	8	33.6	263	0.979	33	8	2024
8	2024	9	84.4	790	1.000	84	9	2024	9	2024	9	13.8	268	1.000	14	9	2024
8	2024	10	0.0	260	0.998	0	10	2024	9	2024	10	23.7	263	1.000	24	10	2024
8	2024	11	0.0	-	-	-	-	-	9	2024	11	0.0	-	-	-	-	-
8	2024	12	0.0	-	-	-	-	-	9	2024	12	0.0	-	-	-	-	-
8	2025	1	0.0	-	-	-	-	-	9	2025	1	0.0	-	-	-	-	-
8	2025	2	0.0	-	-	-	-	-	9	2025	2	0.0	-	-	-	-	-
8	2025	3	0.0	-	-	-	-	-	9	2025	3	0.0	-	-	-	-	-
8	2025	4	93.1	528	1.000	93	4	2025	9	2025	4	0.0	-	-	-	-	-
8	2025	5	653.0	2636	1.000	653	5	2025	9	2025	5	112.9	529	1.000	113	5	2025
8	2025	6	104.8	1056	1.000	105	6	2025	9	2025	6	287.9	2650	1.000	288	6	2025
8	2025	7	28.3	1326	1.000	28	7	2025	9	2025	7	223.1	1612	1.000	223	7	2025
8	2025	8	19.1	-	-	-	-	2025	9	2025	8	365.8	794	1.000	366	8	2025
8	2025	9	47.5	1829	1.000	48	9	2025	9	2025	9	28.9	-	-	29	8	2025
8	2025	10	44.3	270	1.000	44	10	2025	9	2025	10	0.0	-	-	-	-	-
8	2025	11	33.6	-	-	34	10	2025	9	2025	11	0.0	-	-	-	-	-
8	2025	12	0.0	-	-	-	-	-	9	2025	12	0.0	-	-	-	-	-
10	2023	1	0.0	-	-	-	-	-	12	2023	1	0.0	-	-	-	-	-
10	2023	2	0.0	-	-	-	-	-	12	2023	2	0.0	-	-	-	-	-
10	2023	3	0.0	-	-	-	-	-	12	2023	3	0.0	-	-	-	-	-
10	2023	4	259.6	1477	0.997	259	4	2023	12	2023	4	58.6	-	-	58	5	2023

SFA	Year	Month	Landings (t)	Samples		Catch estimate (t)	From:	
				N individuals	Ratio *P. borealis*		Month	Year
10	2023	5	212.2	1874	0.981	208	5	2023
10	2023	6	241.1	1554	0.998	241	6	2023
10	2023	7	173.0	1055	1.000	173	7	2023
10	2023	8	222.2	1610	1.000	222	8	2023
10	2023	9	221.3	1869	0.996	221	9	2023
10	2023	10	126.5	1367	0.998	126	10	2023
10	2023	11	30.2	541	0.998	30	11	2023
10	2023	12	0.0	-	-	-	-	-
10	2024	1	0.0	-	-	-	-	-
10	2024	2	0.0	-	-	-	-	-
10	2024	3	0.0	-	-	-	-	-
10	2024	4	6.5	788	0.991	7	4	2024
10	2024	5	3.5	533	1.000	4	5	2024
10	2024	6	0.0	-	-	-	-	-
10	2024	7	0.0	-	-	-	-	-
10	2024	8	16.4	-	-	-	-	2024
10	2024	9	112.0	1600	0.999	112	9	2024
10	2024	10	33.3	533	1.000	33	10	2024
10	2024	11	15.2	261	0.996	15	11	2024
10	2024	12	0.0	-	-	-	-	-
10	2025	1	0.0	-	-	-	-	-
10	2025	2	0.0	-	-	-	-	-
10	2025	3	0.0	-	-	-	-	-
10	2025	4	0.0	-	-	-	-	-
10	2025	5	0.0	-	-	-	-	-
10	2025	6	5.9	262	1.000	6	6	2025
10	2025	7	84.5	781	1.000	85	7	2025
10	2025	8	36.0	523	1.000	36	8	2025
10	2025	9	221.0	807	1.000	221	9	2025
10	2025	10	0.0	-	-	-	-	-
10	2025	11	101.4	938	1.000	101	11	2025
10	2025	12	11.0	-	-	11	11	2025

SFA	Year	Month	Landings (t)	Samples		Catch estimate (t)	From:	
				N individuals	Ratio *P. borealis*		Month	Year
12	2023	5	62.1	546	0.992	62	5	2023
12	2023	6	88.0	778	1.000	88	6	2023
12	2023	7	66.7	1047	1.000	67	7	2023
12	2023	8	80.4	1032	1.000	80	8	2023
12	2023	9	44.9	789	0.997	45	9	2023
12	2023	10	12.0	-	-	-	-	2023
12	2023	11	24.2	542	0.997	24	11	2023
12	2023	12	0.0	-	-	-	-	-
12	2024	1	0.0	-	-	-	-	-
12	2024	2	0.0	-	-	-	-	-
12	2024	3	0.0	-	-	-	-	-
12	2024	4	86.8	973	0.995	86	4	2024
12	2024	5	65.7	741	0.842	55	5	2024
12	2024	6	17.2	-	-	-	-	2024
12	2024	7	0.0	-	-	-	-	-
12	2024	8	55.7	-	-	-	-	2024
12	2024	9	28.1	262	0.995	28	9	2024
12	2024	10	70.1	263	1.000	70	10	2024
12	2024	11	33.7	266	1.000	34	11	2024
12	2024	12	0.0	-	-	-	-	-
12	2025	1	0.0	-	-	-	-	-
12	2025	2	0.0	-	-	-	-	-
12	2025	3	0.0	-	-	-	-	-
12	2025	4	44.1	790	1.000	44	4	2025
12	2025	5	16.6	-	-	-	-	2025
12	2025	6	38.5	793	1.000	39	6	2025
12	2025	7	52.8	257	1.000	53	7	2025
12	2025	8	213.8	524	1.000	214	8	2025
12	2025	9	183.4	737	1.000	183	9	2025
12	2025	10	335.4	753	1.000	335	10	2025
12	2025	11	44.3	530	1.000	44	11	2025
12	2025	12	0.0	-	-	-	-	-

Table 11. Commercial catches (in million) by year and by stock assessment unit. M: males, Fp: primiparous females, Fm: multiparous females.

ESTUARY	M	Fp	Fm	Total	SEPT-ILES	M	Fp	Fm	Total
1982	13.810	2.877	3.781	20.468	1982	382.454	54.984	172.352	609.790
1983	26.289	3.431	2.544	32.264	1983	492.391	59.399	140.214	692.004
1984	0.000	0.000	0.000	0.000	1984	395.023	49.558	195.123	639.704
1985	0.000	0.000	0.000	0.000	1985	317.275	85.177	208.246	610.698
1986	21.938	8.919	5.831	36.688	1986	296.811	71.098	268.619	636.528
1987	44.606	18.122	10.868	73.596	1987	540.189	88.456	291.064	919.709
1988	32.501	5.390	38.175	76.066	1988	611.745	108.885	266.552	987.182
1989	0.000	0.000	0.000	0.000	1989	413.242	155.515	312.291	881.048
1990	42.164	3.427	27.547	73.138	1990	489.741	111.134	360.970	961.845
1991	0.000	0.000	0.000	0.000	1991	479.488	74.502	324.698	878.688
1992	9.007	3.212	43.143	55.362	1992	506.892	117.875	160.885	785.652
1993	10.958	1.634	39.891	52.483	1993	528.232	183.692	157.461	869.385
1994	7.258	1.315	42.147	50.720	1994	735.441	246.119	163.833	1145.393
1995	8.841	4.545	40.014	53.400	1995	796.412	375.627	217.983	1390.022
1996	4.008	5.719	42.654	52.381	1996	1002.831	481.259	222.295	1706.385
1997	14.492	8.706	39.940	63.138	1997	742.552	295.699	403.775	1442.026
1998	12.330	9.809	45.398	67.537	1998	584.845	238.596	431.223	1254.664
1999	16.816	12.252	43.409	72.477	1999	812.286	425.325	436.944	1674.555
2000	15.803	11.168	55.047	82.018	2000	1088.441	523.306	450.524	2062.271
2001	39.214	20.743	52.503	112.460	2001	785.358	383.384	619.741	1788.483
2002	47.258	24.542	43.305	115.105	2002	1158.326	965.264	352.855	2476.445
2003	26.298	15.553	55.632	97.483	2003	957.328	492.437	860.183	2309.948
2004	40.618	15.913	74.880	131.411	2004	1108.863	718.166	1062.266	2889.295
2005	28.445	20.273	77.973	126.691	2005	1057.991	554.415	925.020	2537.426
2006	37.710	15.056	80.901	133.667	2006	1092.221	610.038	998.339	2700.598
2007	35.852	18.826	69.653	124.331	2007	856.872	392.167	883.627	2132.666
2008	38.018	18.765	65.619	122.402	2008	922.938	410.505	946.225	2279.668
2009	60.341	20.336	57.893	138.570	2009	971.402	472.958	866.677	2311.037
2010	43.176	11.771	68.848	123.795	2010	1328.020	339.134	944.313	2611.467
2011	121.500	22.228	32.470	176.198	2011	1172.325	498.379	815.306	2486.010
2012	131.387	26.394	27.507	185.288	2012	925.740	394.077	649.761	1969.578
2013	99.123	45.321	28.471	172.915	2013	809.758	547.482	625.051	1982.291
2014	95.997	21.014	36.050	153.061	2014	804.447	263.255	675.408	1743.110
2015	94.990	24.230	45.106	164.326	2015	828.760	321.429	612.792	1762.981
2016	115.101	17.641	38.907	171.649	2016	808.686	297.611	670.564	1776.861
2017	92.407	21.636	31.196	145.239	2017	555.082	271.098	255.685	1081.865
2018	14.459	5.732	11.940	32.131	2018	400.690	103.831	196.984	701.505
2019	24.091	3.685	5.328	33.104	2019	421.229	105.656	159.805	686.690
2020	54.737	13.363	15.612	83.712	2020	419.299	158.969	199.848	778.116
2021	54.937	17.305	17.121	89.363	2021	542.427	117.657	213.370	873.454
2022	41.419	9.868	16.894	68.181	2022	341.309	135.524	142.539	619.372
2023	49.416	10.345	7.228	66.989	2023	106.071	53.125	67.660	226.856
2024	22.866	7.307	13.495	43.668	2024	11.199	5.686	6.937	23.822
2025	67.538	16.855	42.808	127.201	2025	24.005	8.796	22.391	55.192

ANTICOSTI	M	Fp	Fm	Total	ESQUIMAN	M	Fp	Fm	Total
1982	346.894	53.853	59.654	460.401	1982	215.494	49.492	91.256	356.242
1983	368.143	53.388	76.985	498.516	1983	211.836	37.744	91.569	341.149
1984	144.047	35.022	36.538	215.607	1984	145.034	15.548	85.188	245.770
1985	318.694	77.488	75.728	471.910	1985	151.263	37.713	46.998	235.974
1986	438.780	113.140	89.202	641.122	1986	120.028	31.896	89.989	241.913
1987	515.609	124.691	58.680	698.980	1987	493.482	42.252	68.388	604.122
1988	381.689	98.646	75.000	555.335	1988	656.010	119.059	102.189	877.258
1989	634.439	104.428	117.625	856.492	1989	577.423	124.473	156.918	858.814
1990	497.342	196.956	73.961	768.259	1990	387.892	86.158	98.432	572.482
1991	552.526	111.082	106.374	769.982	1991	566.116	76.143	201.903	844.162
1992	404.638	196.236	17.766	618.640	1992	420.695	102.085	73.050	595.830
1993	577.892	215.015	15.214	808.121	1993	698.478	165.560	86.799	950.837
1994	515.703	158.151	17.512	691.366	1994	619.192	252.478	37.161	908.831
1995	289.786	84.993	9.105	383.884	1995	667.011	241.624	130.032	1038.667
1996	106.031	56.738	12.490	175.259	1996	721.950	250.680	75.169	1047.799
1997	329.030	136.719	19.328	485.077	1997	707.757	323.718	80.087	1111.562
1998	498.547	288.998	60.565	848.110	1998	724.985	192.655	287.527	1205.167
1999	423.850	165.685	25.340	614.875	1999	708.691	284.968	292.935	1286.594
2000	426.889	194.263	54.220	675.372	2000	886.108	301.020	277.077	1464.205
2001	463.191	176.206	21.216	660.613	2001	1060.480	350.262	272.428	1683.170
2002	461.830	233.545	25.649	721.024	2002	1123.099	374.999	267.882	1765.980
2003	324.600	189.381	43.137	557.118	2003	828.636	407.720	150.125	1386.481
2004	446.221	274.629	138.472	859.322	2004	1032.415	373.664	329.243	1735.322
2005	315.108	137.483	83.664	536.255	2005	1296.428	406.121	305.433	2007.982
2006	530.951	185.549	117.480	833.980	2006	1412.644	290.958	441.743	2145.345
2007	928.825	530.558	248.720	1708.103	2007	1427.998	391.331	510.621	2329.950
2008	1151.961	487.045	183.780	1822.786	2008	1432.250	596.220	261.960	2290.430
2009	1118.382	562.194	177.064	1857.640	2009	1552.270	575.361	223.377	2351.008
2010	1395.281	492.239	182.595	2070.115	2010	1363.037	438.662	217.872	2019.571
2011	1135.029	508.259	129.514	1772.802	2011	1089.954	440.064	352.028	1882.046
2012	1132.530	368.286	131.413	1632.229	2012	1454.634	464.154	310.664	2229.452
2013	803.856	442.877	112.513	1359.246	2013	1010.409	509.918	272.639	1792.966
2014	1002.918	281.189	244.516	1528.623	2014	942.354	241.071	357.323	1540.748
2015	1287.439	449.897	164.467	1901.803	2015	850.000	474.481	263.078	1587.559
2016	1104.165	456.646	180.447	1741.258	2016	847.216	223.352	328.693	1399.261
2017	784.598	300.398	161.503	1246.499	2017	797.286	298.394	271.073	1366.753
2018	716.412	316.993	147.156	1180.561	2018	630.629	210.168	297.067	1137.864
2019	1063.361	310.186	184.077	1557.624	2019	707.578	218.549	312.602	1238.729
2020	659.285	307.872	138.045	1105.202	2020	634.789	265.257	246.953	1146.999
2021	730.816	391.141	132.923	1254.880	2021	648.721	227.490	218.413	1094.624
2022	375.779	229.623	88.645	694.047	2022	359.015	195.182	196.480	750.677
2023	228.913	125.741	48.349	403.003	2023	154.862	52.246	97.138	304.246
2024	61.317	16.064	5.630	83.011	2024	148.984	41.308	112.371	302.663
2025	89.802	67.641	25.373	182.816	2025	87.167	28.117	68.730	184.014

Table 12. Mean catch (kg/km²) and standard error by year, for males and females for the whole studied area from the nGSL survey (n: number of stations).

Year	N	Males		Females	
		Mean	Standard error	Mean	Standard error
1990	219	349.17	54.36	482.36	52.28
1991	250	265.82	50.53	412.06	50.09
1992	239	155.81	26.40	243.78	29.20
1993	214	203.54	32.87	184.91	22.54
1994	176	201.97	33.29	302.52	38.02
1995	182	339.35	47.62	408.28	44.58
1996	217	439.20	61.95	680.02	57.96
1997	185	602.86	92.43	715.33	82.08
1998	206	352.77	40.84	722.97	73.51
1999	224	472.82	64.43	659.18	62.95
2000	209	527.95	64.46	971.07	82.90
2001	183	572.65	100.28	631.87	67.30
2002	171	470.10	88.08	797.65	88.41
2003	164	1429.82	303.30	1339.34	135.13
2004	133	726.31	136.25	1177.82	144.64
2005	354	536.26	72.52	931.05	68.46
2006	192	477.51	73.83	942.67	111.71
2007	183	610.36	101.27	1141.59	158.19
2008	189	489.42	84.41	762.88	82.69
2009	164	586.99	89.54	686.90	78.53
2010	154	484.47	70.62	750.55	88.77
2011	156	357.29	54.43	637.67	74.19
2012	178	506.20	114.22	533.69	75.38
2013	141	390.40	80.87	661.56	99.84
2014	177	475.57	86.94	688.79	88.40
2015	182	415.61	66.81	611.87	77.04
2016	159	305.16	65.30	456.09	75.91
2017	163	198.28	36.84	297.75	51.08
2018	160	131.13	30.19	269.46	62.23
2019	124	301.63	68.16	381.46	69.53
2020	143	192.92	47.02	301.72	55.09
2021	144	168.13	40.40	233.38	43.01
2022	188	64.96	12.95	162.40	35.67
2023	107	70.23	14.89	163.96	38.37
2024	156	88.02	16.20	156.41	31.04
2025	151	113.27	22.98	268.36	49.38
2008+	201	488.34	80.51	842.41	90.62
2009+	177	594.42	83.94	758.18	83.23
2010+	166	518.46	79.86	778.54	89.04
2011+	166	408.66	59.41	669.28	77.29
2012+	188	517.62	109.33	550.83	74.19
2013+	152	384.16	75.31	722.18	103.66
2014+	185	490.24	84.08	706.65	87.51
2015+	190	414.40	65.07	604.02	74.68
2016+	167	351.33	68.84	517.99	82.87
2017+	170	203.19	35.72	301.18	49.65
2018+	168	175.65	46.16	314.67	73.05
2019+	128	305.93	66.83	415.89	75.65
2020+	147	195.19	45.84	309.42	54.38
2021+	151	279.76	75.35	369.68	82.78
2022+	196	150.67	56.27	388.36	159.46
2023+	107	70.23	14.89	163.96	38.37
2024+	164	118.91	21.32	307.23	97.06
2025+	159	156.87	43.49	335.52	65.54

+: From 2008, the sampling was increased with the addition of strata in shallow waters (37 to 183 m) in the Estuary.

Table 13. Mean catch (kg/km²) and standard error for males and females by year and stock assessment unit from the nGSL survey (n: number of stations).

Estuary (SAU 12)

Year	n	Males		Females	
		Mean	Standard error	Mean	Standard error
1990	12	156.25	77.65	233.61	82.82
1991	11	31.24	15.15	308.55	140.68
1992	11	83.54	64.96	187.46	120.92
1993	12	102.41	77.20	229.50	142.70
1994	8	119.91	83.71	398.97	271.60
1995	18	33.17	15.68	44.57	18.74
1996	17	134.76	53.69	663.28	244.99
1997	16	31.88	13.05	146.68	94.02
1998	16	34.63	18.54	158.71	62.10
1999	21	124.25	90.37	595.89	201.85
2000	17	54.87	20.71	440.12	129.51
2001	19	13.15	3.83	271.47	99.18
2002	12	10.37	6.37	125.36	81.22
2003	11	30.04	12.65	346.47	251.44
2004	9	140.28	109.56	722.38	367.21
2005	24	35.03	17.05	466.44	138.59
2006	12	5.88	2.02	208.70	76.78
2007	12	18.39	14.15	144.45	62.56
2008	10	17.15	6.47	379.29	159.29
2009	10	43.51	24.17	405.86	193.34
2010	12	77.14	42.62	240.66	137.05
2011	12	200.40	89.92	459.64	168.07
2012	11	168.99	104.58	541.06	296.08
2013	10	85.86	56.47	236.72	121.54
2014	8	119.40	54.11	890.30	385.24
2015	7	125.22	87.82	384.42	216.65
2016	8	36.36	15.19	172.74	70.07
2017	7	12.08	8.71	76.32	36.47
2018	9	2.58	1.55	25.35	16.73
2019	6	590.64	588.16	867.40	847.99
2020	6	0.44	0.20	1.39	0.59
2021	9	69.99	68.06	79.25	64.35
2022	9	123.39	104.63	99.57	96.70
2023	0				
2024	7	0.25	0.14	0.23	0.11
2025	8	9.42	8.51	80.35	68.32
2008+	21	276.83	141.95	1377.73	446.43
2009+	23	407.83	121.58	1113.27	320.00
2010+	24	515.89	328.56	689.18	259.33
2011+	22	659.27	231.84	779.10	272.71
2012+	20	439.15	174.31	715.64	248.12
2013+	20	209.10	63.28	939.43	368.62
2014+	15	497.78	171.42	1057.50	334.67
2015+	14	283.77	174.33	435.04	185.95
2016+	15	696.15	329.79	1024.49	447.92
2017+	14	164.73	75.91	228.77	111.45
2018+	17	503.02	357.29	587.02	430.42
2019+	10	530.09	366.59	1113.65	641.80
2020+	10	110.84	62.37	234.63	160.71
2021+	16	1166.43	582.22	1433.09	637.01
2022+	17	1084.13	605.53	2734.28	1741.92
2023+	0				
2024+	15	384.80	149.53	1732.50	964.02
2025+	16	494.58	374.27	841.76	450.45

+: From 2008, the sampling was increased with the addition of strata in shallow waters (37 to 183 m) in the Estuary.

Sept-Iles (SAU 10)

Year	n	Males		Females	
		Mean	Standard error	Mean	Standard error
1990	109	250.02	64.63	446.63	71.67
1991	104	389.97	113.65	581.86	108.93
1992	91	137.00	38.53	246.49	54.72
1993	79	239.98	59.12	250.39	47.85
1994	78	265.63	64.15	452.50	72.18
1995	78	418.73	74.10	566.88	73.59
1996	97	469.92	85.51	847.10	80.14
1997	80	661.98	116.41	855.78	95.40
1998	76	414.89	66.55	1084.45	157.35
1999	93	544.26	86.02	811.01	78.76
2000	79	738.29	116.70	1381.53	133.86
2001	85	845.00	193.25	898.26	114.81
2002	80	662.33	165.05	1285.13	154.84
2003	68	2278.93	667.17	1981.78	209.25
2004	57	964.01	227.77	1673.12	232.66
2005	132	747.11	148.46	1273.86	97.41
2006	73	485.19	112.55	1391.43	198.43
2007	77	810.96	210.36	1695.13	243.33
2008	68	741.01	193.44	1414.50	168.18
2009	71	572.19	154.24	825.31	133.43
2010	62	526.18	106.05	1088.68	147.32
2011	63	362.52	69.45	738.25	108.72
2012	71	738.17	233.24	652.70	80.98
2013	66	403.04	134.83	714.11	163.74
2014	70	531.60	153.60	990.66	161.38
2015	75	492.37	107.35	792.55	115.31
2016	65	354.24	116.49	622.34	151.39
2017	72	153.28	38.74	251.91	63.48
2018	57	100.95	37.32	201.75	59.93
2019	57	179.18	81.63	210.85	48.56
2020	62	266.87	98.79	344.87	81.06
2021	58	130.80	46.67	156.57	35.43
2022	71	21.38	7.29	59.52	19.66
2023	43	26.81	9.53	98.44	38.66
2024	65	37.95	12.57	183.34	62.39
2025	53	82.16	36.34	218.92	65.19
2008+	69	730.47	190.91	1394.00	166.98
2009+	71	572.19	154.24	825.31	133.43
2010+	62	526.18	106.05	1088.68	147.32
2011+	63	362.52	69.45	738.25	108.72
2012+	72	731.87	230.06	646.39	80.09
2013+	67	397.36	132.93	704.50	161.56
2014+	71	524.21	151.60	977.76	159.61
2015+	76	485.90	106.13	782.17	114.25
2016+	66	348.88	114.83	612.93	149.37
2017+	72	153.28	38.74	251.91	63.48
2018+	57	100.95	37.32	201.75	59.93
2019+	57	179.18	81.63	210.85	48.56
2020+	62	266.87	98.79	344.87	81.06
2021+	58	130.80	46.67	156.57	35.43
2022+	71	21.38	7.29	59.52	19.66
2023+	43	26.81	9.53	98.44	38.66
2024+	65	37.95	12.57	183.34	62.39
2025+	53	82.16	36.34	218.92	65.19

+: From 2008, the sampling was increased with the addition of strata in shallow waters (37 to 183 m) in the Estuary.

Anticosti (SAU 9)

Year	n	Males		Females	
		Mean	Standard error	Mean	Standard error
1990	49	719.24	172.10	654.66	139.56
1991	49	288.56	55.20	396.21	58.38
1992	51	337.91	92.14	364.23	63.10
1993	45	323.21	105.14	194.74	39.28
1994	35	208.54	59.23	177.39	35.63
1995	35	429.50	130.73	425.65	98.03
1996	40	713.58	204.90	942.27	181.26
1997	33	613.50	160.35	792.15	134.59
1998	50	409.08	69.90	720.06	94.08
1999	47	499.30	100.20	640.13	95.23
2000	49	481.13	106.21	1039.17	139.45
2001	9	232.03	69.16	308.58	73.37
2002	25	760.45	211.12	915.94	184.56
2003	26	1233.51	509.63	1099.03	307.85
2004	18	1003.89	507.07	1095.63	385.12
2005	67	738.65	184.28	1285.47	199.50
2006	41	545.59	170.79	852.34	199.96
2007	39	746.37	159.39	1408.11	508.91
2008	42	316.50	79.80	458.78	106.37
2009	33	885.98	208.88	708.48	151.84
2010	32	668.37	189.09	607.27	157.45
2011	29	150.86	54.72	386.88	128.60
2012	30	246.47	83.05	431.63	110.67
2013	24	298.58	108.30	686.08	209.73
2014	32	519.17	190.56	543.19	173.14
2015	40	504.72	183.58	680.73	204.82
2016	36	205.47	87.34	376.40	105.32
2017	35	350.60	122.64	492.16	160.60
2018	39	201.46	71.43	278.95	109.49
2019	24	338.41	136.20	356.04	112.88
2020	21	281.16	101.38	402.99	170.78
2021	34	219.47	128.12	302.19	122.02
2022	47	86.32	32.83	151.31	60.63
2023	26	88.50	31.60	108.80	38.24
2024	31	227.08	58.86	183.34	55.95
2025	35	240.37	71.76	478.54	151.75

Esquiman (SAU 8)

Year	n	Males		Females	
		Mean	Standard error	Mean	Standard error
1990	49	246.89	73.44	450.48	94.34
1991	86	132.72	36.35	229.00	41.98
1992	86	76.95	20.47	176.71	38.87
1993	78	113.17	24.20	106.06	20.23
1994	55	119.45	37.17	155.42	36.81
1995	51	264.14	85.29	282.15	79.76
1996	63	299.84	100.71	260.78	58.81
1997	56	675.28	236.46	631.91	215.63
1998	64	314.53	87.65	437.06	104.71
1999	63	463.80	172.20	470.35	162.91
2000	64	429.80	124.03	553.29	164.08
2001	70	437.61	105.14	447.79	92.32
2002	54	153.06	68.92	170.08	53.91
2003	59	798.67	221.02	889.93	221.41
2004	49	455.49	171.87	715.51	219.18
2005	131	312.11	78.31	489.47	102.90
2006	66	512.48	138.68	635.87	191.06
2007	55	362.25	106.21	395.21	106.46
2008	69	415.18	116.38	361.40	100.03
2009	50	519.38	133.70	532.32	135.96
2010	48	409.84	126.00	536.80	167.72
2011	52	502.29	132.68	696.77	158.63
2012	66	430.91	171.38	450.81	170.26
2013	41	498.07	161.40	666.24	181.72
2014	67	438.73	137.78	418.88	123.42
2015	60	294.12	88.82	366.66	116.09
2016	50	356.13	127.48	342.68	114.00
2017	49	182.21	62.05	257.86	81.58
2018	55	133.57	60.26	372.87	151.18
2019	37	419.53	142.57	581.99	157.46
2020	54	95.09	29.14	246.16	90.62
2021	43	198.42	63.85	314.82	93.94
2022	61	90.61	25.00	299.96	93.85
2023	38	106.88	33.31	275.83	93.56
2024	53	79.68	24.45	128.27	37.67
2025	55	77.47	21.83	209.60	67.91

Table 14. Spatial distribution indices: 1) DWAO, design-weighted area of occupation; 2) D95, minimum area containing 95% of individuals; and 3) Gini's index.

Northern gulf (area 116 115 km^2)

Year	DWAO (km^2)	D95 (km^2)	Gini
1990	66922	37650	0.768
1991	76544	45188	0.792
1992	69198	41655	0.763
1993	79738	45611	0.765
1994	92596	56248	0.710
1995	89824	57813	0.677
1996	86246	63705	0.731
1997	91775	61515	0.733
1998	81235	53532	0.707
1999	86423	57033	0.716
2000	94292	63077	0.668
2001	88823	64082	0.732
2002	86417	51192	0.715
2003	93816	53175	0.692
2004	89417	60130	0.688
2005	95338	54306	0.655
2006	93317	53765	0.708
2007	99255	53403	0.707
2008	94027	57528	0.647
2009	98719	52529	0.672
2010	98696	54108	0.704
2011	90733	48871	0.685
2012	92254	48785	0.751
2013	97829	39802	0.773
2014	94593	44122	0.747
2015	99204	41316	0.742
2016	98110	37690	0.795
2017	97695	33062	0.806
2018	90888	27036	0.844
2019	91845	35561	0.852
2020	90672	34946	0.820
2021	93347	26699	0.839
2022	81318	27219	0.877
2023	93834	36272	0.848
2024	92849	32551	0.827
2025	87796	29797	0.844

Estuary (area 6 537 km^2)

Year	DWAO (km^2)	D95 (km^2)	Gini
2008	6537	3736	0.678
2009	6537	3934	0.704
2010	5673	2890	0.761
2011	6537	4164	0.631
2012	6385	2749	0.667
2013	6537	3098	0.711
2014	6537	4299	0.520
2015	6537	3937	0.542
2016	6537	3477	0.789
2017	6171	2855	0.716
2018	5358	675	0.889
2019	4838	1610	0.876
2020	6199	1431	0.773
2021	6171	1387	0.774
2022	5917	1902	0.830
2023			
2024	4545	1111	0.888
2025	4704	1720	0.842

Sept-Iles (area 49 335 km^2)

Year	DWAO (km^2)	D95 (km^2)	Gini
1990	29336	14250	0.783
1991	36043	16167	0.838
1992	28436	16467	0.766
1993	39309	23022	0.740
1994	45187	29633	0.695
1995	48518	33780	0.596
1996	47490	36863	0.678
1997	47916	34855	0.632
1998	46877	29400	0.603
1999	46534	33443	0.598
2000	48519	35367	0.552
2001	46239	34567	0.654
2002	48357	28613	0.658
2003	47799	30635	0.605
2004	47638	32808	0.603
2005	47880	30905	0.535
2006	47059	31239	0.631
2007	48152	28153	0.644
2008	47649	31468	0.551
2009	47880	27317	0.639
2010	46250	33887	0.626
2011	47513	28451	0.615
2012	46601	27740	0.661
2013	48791	21166	0.754
2014	48519	26490	0.647
2015	46978	22108	0.644
2016	48856	19690	0.776
2017	44961	19113	0.772
2018	44293	12333	0.827
2019	44141	16375	0.803
2020	39701	14269	0.830
2021	43635	14577	0.787
2022	38297	18579	0.819
2023	44803	14911	0.824
2024	39401	11464	0.872
2025	39005	11934	0.866

Anticosti (area 26 616 km^2)

Year	DWAO (km^2)	D95 (km^2)	Gini
1990	18299	13580	0.709
1991	19411	12002	0.679
1992	20129	12387	0.708
1993	20191	9896	0.772
1994	22619	11810	0.665
1995	21161	12713	0.691
1996	17411	9646	0.723
1997	22746	16759	0.718
1998	15103	12812	0.679
1999	18188	11128	0.672
2000	20461	14186	0.676
2001	18909	14875	0.509
2002	17950	12356	0.634
2003	22978	13438	0.657
2004	19778	15733	0.694
2005	19321	13207	0.657
2006	21784	12957	0.656
2007	23141	14004	0.641
2008	19267	11344	0.643
2009	24711	15974	0.507
2010	23185	12861	0.627
2011	18705	9450	0.714
2012	20590	12137	0.573
2013	24594	8428	0.746
2014	21449	8426	0.790
2015	23123	8494	0.790
2016	23285	9455	0.773
2017	23634	8428	0.767
2018	24302	9307	0.683
2019	21543	8144	0.802
2020	25851	11331	0.713
2021	22224	5469	0.854
2022	19664	6908	0.832
2023	22248	11356	0.763
2024	26337	10943	0.709
2025	23872	9002	0.769

Esquiman (area 35 904 km^2)

Year	DWAO (km^2)	D95 (km^2)	Gini
1990	16134	10763	0.793
1991	16830	11604	0.750
1992	17248	10841	0.782
1993	16724	9819	0.801
1994	20930	11905	0.720
1995	16128	11997	0.773
1996	17086	11856	0.822
1997	17676	9705	0.852
1998	15612	10752	0.855
1999	18013	8940	0.888
2000	21052	11628	0.846
2001	19997	12188	0.814
2002	17266	10299	0.781
2003	18779	8507	0.786
2004	17841	9432	0.781
2005	24023	9235	0.809
2006	20344	9103	0.817
2007	23702	11452	0.812
2008	22852	13162	0.769
2009	21890	9376	0.800
2010	25864	7231	0.841
2011	20256	11901	0.715
2012	20804	6964	0.885
2013	20184	9520	0.779
2014	20366	7290	0.848
2015	24844	9012	0.845
2016	21710	7982	0.819
2017	25206	6912	0.828
2018	19212	6200	0.899
2019	23600	8032	0.838
2020	21198	9337	0.851
2021	23593	7640	0.825
2022	19717	7666	0.865
2023	22875	9557	0.843
2024	24844	10173	0.818
2025	22263	9842	0.844

Table 15. Catches (kg/km^2) above which the data were removed from the variogram estimation.

Year	Male	Female	Total
1990	3000	5000	10000
1991	2000	5000	10000
1992	2000	2000	3000
1993	3000	1500	4000
1994	1e99	2500	2000
1995	3000	1e99	4000
1996	5000	3500	8000
1997	1e99	10000	10000
1998	1e99	5000	1e99
1999	4000	3500	10000
2000	5000	3500	8000
2001	1e99	3000	5000
2002	9000	6000	10000
2003	6000	5000	10000
2004	4000	5000	8000
2005	8000	1e99	1e99
2006	5000	1e99	10000
2007	6000	7000	10000
2008	4000	4000	7000
2009	1e99	1e99	1e99
2010	7000	1e99	1e99
2011	3000	5000	7000
2012	8000	3500	10000
2013	1e99	3000	1e99
2014	2500	1e99	4000
2015	4000	4000	8000
2016	2500	3000	5000
2017	1e99	3000	1e99
2018	1e99	1e99	5000
2019	2000	3000	4000
2020	4000	3000	4000
2021	1500	1300	2700
2022	1100	1000	2000
2023	225	500	600
2024	1e99	4000	4000
2025	1e99	2000	2300

Table 16. Parameters of the variograms by sex used for kriging biomass. An exponential model was used each year.

Male

Year	Period	Parameters		
		Nugget (c_0)	Sill ($c_0 + c$)	Range (a_0)
1990	1990-1991-1992	0.50	1.05	35
1991	1990-1991-1992	0.50	1.05	35
1992	1990-1991-1992	0.50	1.05	35
1993	1991-1992-1993	0.20	1.05	30
1994	1992-1993-1994	0.20	1.05	30
1995	1993-1994-1995	0.20	1.00	20
1996	1994-1995-1996	0.20	1.00	20
1997	1995-1996-1997	0.20	0.95	18
1998	1996-1997-1998	0.20	0.90	20
1999	1997-1998-1999	0.40	0.90	20
2000	1998-1999-2000	0.40	0.90	20
2001	1999-2000-2001	0.40	0.90	17
2002	2000-2001-2002	0.30	1.00	25
2003	2001-2002-2003	0.20	1.00	25
2004	2002-2003-2004	0.20	1.00	25
2005	2003-2004-2005	0.30	1.00	30
2006	2004-2005-2006	0.30	1.00	25
2007	2005-2006-2007	0.30	1.00	25
2008	2006-2007-2008	0.30	1.00	20
2009	2007-2008-2009	0.25	1.00	25
2010	2008-2009-2010	0.30	1.00	25
2011	2009-2010-2011	0.40	1.00	30
2012	2010-2011-2012	0.30	1.00	22
2013	2011-2012-2013	0.00	0.96	15.68
2014	2012-2013-2014	0.00	0.96	15.65
2015	2013-2014-2015	0.00	0.92	15.09
2016	2014-2015-2016	0.00	0.92	12.25
2017	2015-2016-2017	0.00	0.92	11.21
2018	2016-2017-2018	0.50	0.97	43.61
2019	2017-2018-2019	0.67	6.30	2728
2020	2018-2019-2020	0.00	0.89	13.69
2021	2019-2020-2021	0.00	0.99	12.33
2022	2020-2021-2022	0.00	0.99	14.73
2023	2021-2022-2023	0.00	0.98	11.37
2024	2022-2023-2024	0.15	0.92	13.00
2025	2023-2024-2025	0.00	0.85	9.47

* Exponential model: (where h = distance) $\gamma(h) = c_0 + c\left[1 - exp\left(-\frac{h}{a_0}\right)\right]$

Female

Year	Period	Parameters		
		Nugget (c_0)	Sill ($c_0 + c$)	Range (a_0)
1990	1990-1991-1992	0.45	0.95	30
1991	1990-1991-1992	0.45	0.95	30
1992	1990-1991-1992	0.45	0.95	30
1993	1991-1992-1993	0.25	0.85	20
1994	1992-1993-1994	0.30	0.85	25
1995	1993-1994-1995	0.30	0.80	20
1996	1994-1995-1996	0.15	0.95	17
1997	1995-1996-1997	0.15	0.95	17
1998	1996-1997-1998	0.20	0.95	20
1999	1997-1998-1999	0.35	0.90	25
2000	1998-1999-2000	0.35	0.90	30
2001	1999-2000-2001	0.40	0.90	35
2002	2000-2001-2002	0.30	0.90	30
2003	2001-2002-2003	0.20	0.85	35
2004	2002-2003-2004	0.15	0.95	35
2005	2003-2004-2005	0.20	1.05	60
2006	2004-2005-2006	0.20	1.05	50
2007	2005-2006-2007	0.20	1.05	60
2008	2006-2007-2008	0.20	1.00	60
2009	2007-2008-2009	0.20	0.90	40
2010	2008-2009-2010	0.25	0.90	45
2011	2009-2010-2011	0.15	0.90	28
2012	2010-2011-2012	0.15	0.90	27
2013	2011-2012-2013	0.60	1.52	441.11
2014	2012-2013-2014	0.51	0.80	53.25
2015	2013-2014-2015	0.48	1.10	175.07
2016	2014-2015-2016	0.41	0.82	42.47
2017	2015-2016-2017	0.58	86.10	43661
2018	2016-2017-2018	0.59	0.95	97.79
2019	2017-2018-2019	0.52	0.88	78.89
2020	2018-2019-2020	0.20	0.84	19.48
2021	2019-2020-2021	0.05	0.90	16.20
2022	2020-2021-2022	0.00	0.98	16.88
2023	2021-2022-2023	0.00	1.04	14.70
2024	2022-2023-2024	0.00	0.89	13.37
2025	2023-2024-2025	0.00	0.84	13.64

* Exponential model: (where h = distance) $\gamma(h) = c_0 + c\left[1 - exp\left(-\frac{h}{a_0}\right)\right]$

Total (male et female)

Year	Period	Parameters		
		Nugget (c_0)	Sill ($c_0 + c$)	Range (a_0)
1990	1990-1991-1992	0.40	1.00	35
1991	1990-1991-1992	0.40	1.00	35
1992	1990-1991-1992	0.40	1.00	35
1993	1991-1992-1993	0.30	0.95	40
1994	1992-1993-1994	0.30	0.95	32
1995	1993-1994-1995	0.30	0.95	25
1996	1994-1995-1996	0.20	1.05	20
1997	1995-1996-1997	0.20	1.00	20
1998	1996-1997-1998	0.20	1.00	25
1999	1997-1998-1999	0.30	0.90	25
2000	1998-1999-2000	0.35	0.90	30
2001	1999-2000-2001	0.50	1.00	80
2002	2000-2001-2002	0.45	1.00	70
2003	2001-2002-2003	0.40	1.00	70
2004	2002-2003-2004	0.20	1.00	40
2005	2003-2004-2005	0.25	1.05	60
2006	2004-2005-2006	0.30	1.05	60
2007	2005-2006-2007	0.30	1.05	60
2008	2006-2007-2008	0.30	1.05	55
2009	2007-2008-2009	0.30	1.05	55
2010	2008-2009-2010	0.35	1.00	40
2011	2009-2010-2011	0.25	1.00	30
2012	2010-2011-2012	0.20	0.95	20
2013	2011-2012-2013	0.00	0.87	11.49
2014	2012-2013-2014	0.00	0.86	11.46
2015	2013-2014-2015	0.00	0.82	12.13
2016	2014-2015-2016	0.00	0.84	12.06
2017	2015-2016-2017	0.61	1.24	153.34
2018	2016-2017-2018	0.71	2.70	770.56
2019	2017-2018-2019	0.66	2.48	613.54
2020	2018-2019-2020	0.62	1.24	126.71
2021	2019-2020-2021	0.26	0.97	22.92
2022	2020-2021-2022	0.10	0.95	22.00
2023	2021-2022-2023	0.15	0.95	20.00
2024	2022-2023-2024	0.00	0.89	12.48
2025	2023-2024-2025	0.48	0.94	31.34

* Exponential model: (where h = distance) $\gamma(h) = c_0 + c\left[1 - exp\left(-\frac{h}{a_0}\right)\right]$

Table 17. Mean biomass (kg/km²) estimated by kriging, by year and stock assessment unit, for males (M) and females (F).

Year	Estuary		Sept-Iles		Anticosti		Esquiman	
	M	F	M	F	M	F	M	F
1990	188.6	310.4	257.3	435.8	608.2	597.4	235.5	404.4
1991	44.3	514.4	378.9	528.4	298.2	419.1	186.5	286.5
1992	100.1	365.0	153.1	248.1	388.2	399.5	92.9	203.5
1993	88.9	274.7	230.2	307.9	298.5	196.5	114.9	107.7
1994	102.6	426.1	276.5	446.9	202.7	184.4	176.5	196.9
1995	33.1	52.9	366.1	552.0	463.6	491.5	336.3	329.1
1996	116.6	598.7	440.5	785.9	799.5	1097.3	331.1	300.0
1997	69.7	375.4	600.2	788.0	551.0	632.1	751.1	697.1
1998	28.5	159.8	415.2	1171.4	324.1	608.5	368.6	482.9
1999	136.2	575.2	575.4	869.6	430.0	603.2	457.5	460.2
2000	141.1	702.3	738.3	1371.8	484.6	936.6	441.5	539.4
2001	22.2	439.9	887.6	879.8	410.0	563.7	454.7	454.9
2002	22.0	312.8	692.3	1223.1	821.4	957.7	198.2	218.4
2003	105.8	691.4	2061.7	2175.2	1249.1	1302.5	877.7	1003.8
2004	92.5	626.6	984.2	1685.4	788.1	1098.3	436.9	771.6
2005	44.5	554.1	688.6	1478.1	866.3	1446.0	599.5	857.8
2006	45.8	419.7	453.4	1337.3	522.2	858.2	717.5	851.6
2007	221.4	592.0	705.3	1704.5	811.4	1605.8	520.4	465.2
2008	23.6	617.7	638.9	1491.2	404.7	548.4	495.3	428.4
2009	49.0	356.0	726.5	954.0	818.2	678.8	549.9	539.6
2010	98.7	341.0	571.6	1157.0	653.1	618.3	450.1	570.8
2011	185.9	496.6	396.8	762.7	211.6	510.3	628.0	836.2
2012	160.7	658.3	835.0	730.4	345.3	612.5	455.2	510.4
2013	110.2	367.9	480.4	757.1	289.3	648.4	437.5	663.5
2014	149.8	1139.1	657.7	1188.3	509.3	608.0	484.6	482.5
2015	169.3	711.5	574.9	932.0	471.1	682.7	300.2	397.5
2016	65.4	276.9	352.2	605.6	251.5	436.4	399.7	384.2
2017	15.2	89.2	179.8	298.4	356.9	514.3	248.8	351.6
2018	9.9	54.1	113.2	209.5	241.6	384.5	128.2	409.3
2019	423.7	571.2	212.3	229.2	292.2	331.1	302.8	417.7
2020	21.4	68.1	268.0	339.3	297.8	429.4	103.0	251.9
2021	58.1	88.9	120.3	142.8	192.6	300.7	171.4	280.9
2022	137.0	119.5	23.8	65.6	107.4	188.3	85.0	279.6
2023	-	-	25.7	102.6	83.5	112.6	106.5	271.4
2024	23.3	141.5	40.6	196.9	196.3	162.6	85.6	134.4
2025	9.5	65.3	62.6	176.5	249.7	491.9	97.4	252.4
2008+	284.6	1405.4	637.8	1486.8	-	-	-	-
2009+	421.3	1157.2	725.7	953.8	-	-	-	-
2010+	540.0	709.0	570.9	1156.7	-	-	-	-
2011+	557.9	588.7	397.8	756.6	-	-	-	-
2012+	490.8	779.4	833.9	726.4	-	-	-	-
2013+	226.7	795.7	478.9	752.3	-	-	-	-
2014+	534.4	1098.0	655.3	1179.1	-	-	-	-
2015+	261.6	589.7	572.1	924.4	-	-	-	-
2016+	449.0	708.4	350.7	602.0	-	-	-	-
2017+	159.6	223.4	179.6	298.0	-	-	-	-
2018+	474.0	591.7	114.0	210.3	-	-	-	-
2019+	489.9	1065.9	215.0	239.2	-	-	-	-
2020+	121.0	253.5	267.9	339.6	-	-	-	-
2021+	832.7	993.8	118.1	141.3	-	-	-	-
2022+	1144.6	2965.6	24.0	67.5	-	-	-	-
2023+	-	-	25.7	102.6	-	-	-	-
2024+	332.0	1429.5	43.2	226.5	-	-	-	-
2025+	461.4	777.4	72.9	186.9	-	-	-	-

+: From 2008, the sampling was increased with the addition of strata in shallow waters (37 to 183 m) in the Estuary.

Table 18. Stock biomass (ton) estimated by kriging by year and stock assessment unit, for males (M) and females (F).

Year	Estuary		Sept-Iles		Anticosti		Esquiman	
	M	F	M	F	M	F	M	F
1990	755	1241	11837	20046	18459	18131	7577	13010
1991	177	2057	17430	24309	9051	12721	5999	9219
1992	400	1460	7041	11410	11782	12124	2989	6547
1993	356	1099	10587	14161	9060	5962	3697	3465
1994	410	1704	12719	20557	6152	5597	5678	6334
1995	133	212	16842	25392	14071	14916	10820	10590
1996	466	2395	20264	36151	24263	33302	10652	9652
1997	279	1501	27611	36246	16723	19185	24167	22428
1998	114	639	19097	53886	9836	18469	11858	15537
1999	545	2301	26469	39999	13049	18306	14721	14806
2000	564	2809	33963	63103	14706	28424	14204	17355
2001	89	1760	40831	40473	12443	17107	14631	14635
2002	88	1251	31848	56262	24929	29067	6378	7027
2003	423	2766	94838	100060	37909	39531	28240	32297
2004	370	2506	45274	77528	23919	33335	14059	24825
2005	178	2216	31674	67992	26292	43886	19290	27601
2006	183	1679	20856	61518	15850	26047	23085	27401
2007	885	2368	32443	78406	24627	48735	16743	14968
2008	94	2471	29389	68593	12283	16643	15936	13784
2009	196	1424	33418	43884	24832	20602	17694	17361
2010	395	1364	26291	53221	19821	18765	14481	18367
2011	744	1987	18251	35086	6423	15488	20206	26904
2012	643	2633	38411	33599	10478	18589	14647	16422
2013	441	1471	22096	34827	8779	19680	14075	21347
2014	599	4556	30256	54662	15457	18453	15591	15525
2015	677	2846	26444	42872	14297	20721	9659	12790
2016	262	1107	16201	27856	7633	13246	12861	12363
2017	61	357	8272	13727	10833	15609	8004	11312
2018	40	217	5208	9639	7334	11669	4125	13170
2019	1695	2285	9768	10542	8868	10050	9744	13440
2020	86	272	12328	15609	9037	13031	3313	8105
2021	233	355	5534	6567	5846	9126	5515	9039
2022	548	478	1094	3017	3259	5715	2734	8995
2023	-	-	1180	4719	2534	3418	3426	8732
2024	93	566	1869	9055	5957	4936	2754	4325
2025	38	261	2881	8119	7579	14930	3133	8120
2008+	1800	8889	29405	68541	-	-	-	-
2009+	2665	7319	33455	43971	-	-	-	-
2010+	3415	4484	26321	53322	-	-	-	-
2011+	3529	3724	18340	34880	-	-	-	-
2012+	3104	4930	38444	33486	-	-	-	-
2013+	1434	5033	22079	34682	-	-	-	-
2014+	3380	6945	30208	54356	-	-	-	-
2015+	1654	3730	26373	42617	-	-	-	-
2016+	2840	4480	16168	27751	-	-	-	-
2017+	1010	1413	8278	13737	-	-	-	-
2018+	2998	3742	5257	9697	-	-	-	-
2019+	3098	6742	9909	11025	-	-	-	-
2020+	765	1603	12349	15657	-	-	-	-
2021+	5267	6286	5442	6513	-	-	-	-
2022+	7239	18758	1107	3113	-	-	-	-
2023+	-	-	1183	4729	-	-	-	-
2024+	2100	9041	1994	10444	-	-	-	-
2025+	2918	4917	3362	8616	-	-	-	-

+: From 2008, the sampling was increased with the addition of strata in shallow waters (37 to 183 m) in the Estuary.

Table 19. Variance of the estimation of the kriged biomass, by year and stock assessment unit, for males (M) and females (F).

Year	Estuary		Sept-Iles		Anticosti		Esquiman	
	M	F	M	F	M	F	M	F
1990	4593	4834	3615	4125	30298	18519	4783	7247
1991	190	15114	10714	9163	2962	3078	1223	1512
1992	3381	10859	1281	2407	8219	3585	343	1145
1993	3482	12624	2231	1496	8077	1106	379	275
1994	4252	44887	2920	3596	2808	960	1037	991
1995	135	191	4026	3545	14279	6877	6985	5128
1996	1724	35077	6546	5519	43280	32951	7635	2555
1997	91	4508	10368	6873	32380	22822	44089	36271
1998	218	1728	3133	18357	4282	8150	4852	7237
1999	6043	27056	6650	5244	9753	8326	24560	20427
2000	292	9848	10735	12422	10118	16018	11181	16985
2001	11	6582	28630	8589	4875	6012	8763	5890
2002	28	4021	20317	15762	44766	30182	4066	2172
2003	126	39123	419374	32754	180197	50776	41553	32603
2004	7524	65553	51383	46500	270652	152207	21371	27648
2005	207	8972	24370	7493	40521	34146	6881	8161
2006	3	2762	9418	21272	29710	34120	15125	20112
2007	186	2686	32402	28209	18698	124659	9330	6366
2008	33	12784	31665	14479	5450	5785	12114	5645
2009	372	17218	19110	10789	40587	16550	14342	10705
2010	1352	10110	9222	13191	30759	15717	11546	14451
2011	5748	14016	4265	8322	2351	10133	14698	16218
2012	9148	55186	41273	3712	7272	10914	24948	18558
2013	2024	10692	13680	19405	10925	36768	20298	24563
2014	2597	103697	14748	16720	24189	20195	11697	10561
2015	4503	27811	6789	8047	21234	24624	4703	8574
2016	198	3195	9132	13854	5296	6689	11068	8249
2017	40	843	965	2631	10373	16842	2830	4844
2018	2	192	993	2547	3448	8263	2891	18179
2019	270150	490918	5288	1594	14218	8618	22442	23756
2020	0	0	5749	3782	8418	22042	560	5229
2021	3269	2542	1732	897	12328	10099	3289	6387
2022	6068	4710	35	236	627	1959	362	4669
2023	-	-	71	1167	809	1177	871	6853
2024	0	0	109	2356	2611	2135	471	1002
2025	44	2428	871	2405	3402	13111	313	2573
2008+	16392	102556	31059	14409	-	-	-	-
2009+	8170	40838	19100	10779	-	-	-	-
2010+	70574	31642	9219	13182	-	-	-	-
2011+	39732	39001	4269	8336	-	-	-	-
2012+	24374	36177	40232	3640	-	-	-	-
2013+	2488	103622	13418	19017	-	-	-	-
2014+	18238	72156	14388	16411	-	-	-	-
2015+	14305	19969	6672	7938	-	-	-	-
2016+	100642	153436	8896	13557	-	-	-	-
2017+	2926	7873	966	2630	-	-	-	-
2018+	81837	125609	993	2545	-	-	-	-
2019+	101218	269449	5283	1592	-	-	-	-
2020+	2462	15933	5747	3780	-	-	-	-
2021+	239515	245160	1616	841	-	-	-	-
2022+	189174	1401453	35	237	-	-	-	-
2023+	-	-	71	1167	-	-	-	-
2024+	15285	551914	109	2357	-	-	-	-
2025+	75592	89328	871	2403	-	-	-	-

+: From 2008, the sampling was increased with the addition of strata in shallow waters (37 to 183 m) in the Estuary.

Table 20. Coefficient of variation of the kriged biomass, by year and stock assessment unit, for males (M) and females (F).

Year	Estuary		Sept-Iles		Anticosti		Esquiman	
	M	F	M	F	M	F	M	F
1990	35.9	22.4	23.4	14.7	28.6	22.8	29.4	21.1
1991	31.1	23.9	27.3	18.1	18.2	13.2	18.8	13.6
1992	58.1	28.5	23.4	19.8	23.4	15.0	19.9	16.6
1993	66.4	40.9	20.5	12.6	30.1	16.9	16.9	15.4
1994	63.5	49.7	19.5	13.4	26.1	16.8	18.2	16.0
1995	35.1	26.1	17.3	10.8	25.8	16.9	24.9	21.8
1996	35.6	31.3	18.4	9.5	26.0	16.5	26.4	16.8
1997	13.7	17.9	17.0	10.5	32.7	23.9	28.0	27.3
1998	51.8	26.0	13.5	11.6	20.2	14.8	18.9	17.6
1999	57.1	28.6	14.2	8.3	23.0	15.1	34.3	31.1
2000	12.1	14.1	14.0	8.1	20.8	13.5	24.0	24.2
2001	15.1	18.4	19.1	10.5	17.0	13.8	20.6	16.9
2002	24.0	20.3	20.6	10.3	25.8	18.1	32.2	21.3
2003	10.6	28.6	31.4	8.3	34.0	17.3	23.2	18.0
2004	93.7	40.9	23.0	12.8	66.0	35.5	33.5	21.6
2005	32.3	17.1	22.7	5.9	23.2	12.8	13.8	10.5
2006	3.6	12.5	21.4	10.9	33.0	21.5	17.1	16.7
2007	6.2	8.8	25.5	9.9	16.9	22.0	18.6	17.2
2008	24.4	18.3	27.9	8.1	18.2	13.9	22.2	17.5
2009	39.4	36.9	19.0	10.9	24.6	19.0	21.8	19.2
2010	37.3	29.5	16.8	9.9	26.9	20.3	23.9	21.1
2011	40.8	23.8	16.5	12.0	22.9	19.7	19.3	15.2
2012	59.5	35.7	24.3	8.3	24.7	17.1	34.7	26.7
2013	40.8	28.1	24.3	18.4	36.1	29.6	32.6	23.6
2014	34.0	28.3	18.5	10.9	30.5	23.4	22.3	21.3
2015	39.6	23.4	14.3	9.6	30.9	23.0	22.8	23.3
2016	21.5	20.4	27.1	19.4	28.9	18.7	26.3	23.6
2017	41.8	32.6	17.3	17.2	28.5	25.2	21.4	19.8
2018	12.6	25.6	27.8	24.1	24.3	23.6	41.9	32.9
2019	122.7	122.7	34.2	17.4	40.8	28.0	49.5	36.9
2020	0.7	0.7	28.3	18.1	30.8	34.6	23.0	28.7
2021	98.4	56.7	34.6	21.0	57.6	33.4	33.5	28.4
2022	56.8	57.4	24.9	23.4	23.3	23.5	22.4	24.4
2023	NA	NA	32.9	33.3	34.1	30.5	27.7	30.5
2024	0.5	0.1	25.7	24.7	26.0	28.4	25.4	23.6
2025	70.0	75.5	47.1	27.8	23.4	23.3	18.2	20.1
2008+	45.0	22.8	27.6	8.1	-	-	-	-
2009+	21.5	17.5	19.0	10.9	-	-	-	-
2010+	49.2	25.1	16.8	9.9	-	-	-	-
2011+	35.7	33.5	16.4	12.1	-	-	-	-
2012+	31.8	24.4	24.1	8.3	-	-	-	-
2013+	22.0	40.5	24.2	18.3	-	-	-	-
2014+	25.3	24.5	18.3	10.9	-	-	-	-
2015+	45.7	24.0	14.3	9.6	-	-	-	-
2016+	70.7	55.3	26.9	19.3	-	-	-	-
2017+	33.9	39.7	17.3	17.2	-	-	-	-
2018+	60.3	59.9	27.6	24.0	-	-	-	-
2019+	64.9	48.7	33.8	16.7	-	-	-	-
2020+	41.0	49.8	28.3	18.1	-	-	-	-
2021+	58.8	49.8	34.1	20.5	-	-	-	-
2022+	38.0	39.9	24.7	22.8	-	-	-	-
2023+	NA	NA	32.9	33.3	-	-	-	-
2024+	37.2	52.0	24.2	21.4	-	-	-	-
2025+	59.6	38.4	40.5	26.2	-	-	-	-

+: From 2008, the sampling was increased with the addition of strata in shallow waters (37 to 183 m) in the Estuary.

Table 21. Parameters for the weight-length relationships by year and stock assessment unit. Length in mm and weight in g.

Year	Estuary		Sept-Iles		Anticosti		Esquiman	
	a	b	a	b	a	b	a	b
1993	0.000713	2.945	0.000658	2.978	0.000593	3.018	0.000939	2.864
2005	0.001175	2.777	0.000654	2.960	0.000659	2.957	0.000754	2.904
2006	0.000682	2.945	0.000694	2.934	0.000527	3.040	0.000933	2.849
2007	0.001071	2.800	0.000724	2.930	0.000735	2.918	0.000767	2.904
2008	0.000561	3.016	0.000704	2.934	0.000769	2.908	0.000820	2.887
2009	0.000628	2.977	0.000897	2.864	0.000800	2.893	0.000767	2.911
2010	0.000759	2.920	0.000716	2.931	0.000585	3.011	0.000706	2.953
2011	0.000760	2.911	0.000685	2.942	0.000616	3.001	0.000544	3.036
2012	0.000733	2.931	0.000725	2.936	0.000771	2.923	0.000814	2.908
2013	0.000624	2.979	0.000643	2.976	0.000561	3.028	0.000672	2.967
2014	0.000657	2.962	0.000854	2.880	0.000741	2.933	0.000663	2.969
2015	0.000804	2.914	0.000894	2.870	0.000651	2.975	0.000763	2.924
2016	0.000699	2.963	0.001016	2.831	0.000750	2.945	0.000991	2.832
2017	0.000897	2.884	0.000951	2.862	0.000687	2.986	0.000614	2.985
2018	0.001031	2.839	0.000973	2.853	0.000600	3.005	0.000596	3.003
2019	0.000494	3.068	0.000726	2.935	0.000631	2.983	0.000670	2.963
2022	0.000776	2.943	0.001116	2.819	0.001033	2.838	0.000898	2.870
2023			0.000787	2.931	0.000644	2.987	0.000700	2.958
2024	0.000905	2.876	0.000667	2.983	0.000756	2.938	0.000896	2.887
2025	0.000715	2.949	0.000742	2.948	0.000673	2.972	0.000877	2.888

Model : Weight = a Length ^{b}

Table 22. Stock abundance (in million) by year and stock assessment unit, for males (M) and females (F).

Year	Estuary		Sept-Iles		Anticosti		Esquiman	
	M	F	M	F	M	F	M	F
1990	156	115	2301	1882	4651	2019	1661	1394
1991	26	196	3974	2399	1857	1341	1210	971
1992	87	128	2262	1027	2817	1184	630	660
1993	85	92	2989	1351	2564	588	866	358
1994	87	163	3594	2219	1606	637	1470	715
1995	40	20	3787	2646	4164	1784	2680	1366
1996	86	226	4418	3694	5879	3731	3195	1204
1997	48	132	6182	3479	4663	1969	6496	2789
1998	30	54	4036	4961	2035	1829	3097	1804
1999	118	205	6443	3813	3287	1889	4111	1846
2000	114	257	7380	6353	4143	3004	4019	2136
2001	18	162	9237	4180	3131	1815	4609	1921
2002	20	125	7284	6133	7543	3337	1740	906
2003	219	271	18931	10924	11174	4801	8046	4298
2004	62	238	8957	8679	6599	4206	3739	3419
2005	29	222	6854	7466	5858	5625	4884	3913
2006	28	164	4191	6765	3949	3189	7164	3669
2007	141	226	6966	8111	7598	6459	5890	2243
2008	19	222	6583	7140	3910	2228	4936	2197
2009	43	133	8746	4785	9221	2801	5373	2528
2010	79	129	7082	6197	5413	2401	3634	2469
2011	178	231	4713	4205	1831	1932	5915	3403
2012	131	306	8699	3999	2758	2229	4310	2083
2013	143	158	4608	3944	2330	2410	3670	2741
2014	109	456	6699	5825	4781	2143	4067	1892
2015	138	274	5842	4552	4519	2657	2830	1619
2016	55	116	3773	3417	2215	1804	3244	1728
2017	12	39	1969	1704	3365	2028	1999	1488
2018	8	24	1427	1134	2668	1412	1259	1580
2019	293	224	2347	1168	2784	1306	2908	1738
2020	28	28	2837	1764	3324	1810	966	1056
2021	34	31	1363	748	1630	1182	1475	1261
2022	108	51	271	345	906	748	746	1166
2023	-	-	278	499	1253	406	1054	1019
2024	26	64	524	938	1874	606	737	493
2025	16	26	624	852	2238	1966	1004	978
2008+	456	831	6596	7134	-	-	-	-
2009+	1253	732	8755	4795	-	-	-	-
2010+	1073	467	7090	6208	-	-	-	-
2011+	1070	433	4736	4180	-	-	-	-
2012+	822	586	8709	3985	-	-	-	-
2013+	455	611	4606	3927	-	-	-	-
2014+	992	744	6691	5793	-	-	-	-
2015+	658	378	5826	4525	-	-	-	-
2016+	631	486	3765	3404	-	-	-	-
2017+	303	167	1970	1705	-	-	-	-
2018+	711	465	1441	1140	-	-	-	-
2019+	557	678	2381	1222	-	-	-	-
2020+	199	168	2842	1770	-	-	-	-
2021+	1141	626	1340	742	-	-	-	-
2022+	1335	1828	274	356	-	-	-	-
2023+	-	-	278	500	-	-	-	-
2024+	469	938	559	1082	-	-	-	-
2025+	624	510	729	904	-	-	-	-

+: From 2008, the sampling was increased with the addition of strata in shallow waters (37 to 183 m) in the Estuary.

Table 23. Abundance (in million) for juveniles (J), primiparous (Fp) and multiparous (Fm) females, by year and stock assessment unit.

Year	Estuary			Sept-Iles			Anticosti			Esquiman		
	J	Fp	Fm	J	Fp	Fm	J	Fp	Fm	J	Fp	Fm
1990	11	48	67	124	1004	878	73	1446	573	4	1157	237
1991	0	57	138	352	821	1578	86	782	559	70	535	436
1992	0	43	85	365	600	427	381	793	390	50	553	106
1993	1	78	14	111	1117	234	30	499	89	23	233	124
1994	0	130	33	168	1879	339	22	533	104	98	626	89
1995	12	14	5	249	2327	319	461	1616	168	30	1181	185
1996	1	132	94	299	2811	883	945	3189	542	637	878	326
1997	0	110	22	439	2866	613	75	1813	156	76	2062	727
1998	8	32	22	768	4076	884	128	1592	237	553	1564	240
1999	1	158	47	17	3299	514	23	1495	394	128	1283	562
2000	1	181	76	251	5460	893	682	2556	448	654	1611	525
2001	0	-	-	82	-	-	47	-	-	268	-	-
2002	0	-	-	89	-	-	464	-	-	25	-	-
2003	114	-	-	232	-	-	535	-	-	193	-	-
2004	0	-	-	88	-	-	61	-	-	17	-	-
2005	0	-	-	80	-	-	121	-	-	366	-	-
2006	0	-	-	57	-	-	243	-	-	101	-	-
2007	2	-	-	502	-	-	525	-	-	443	-	-
2008	2	-	-	135	-	-	358	-	-	58	-	-
2009	2	27	105	152	2372	2413	1268	1779	1022	127	1811	717
2010	0	60	69	67	4045	2152	83	1198	1203	146	1077	1392
2011	1	118	113	27	2478	1727	182	1332	600	533	2516	887
2012	2	258	48	200	2969	1029	43	1620	609	87	1591	492
2013	39	119	39	371	3135	809	170	1958	452	123	2331	410
2014	0	417	39	487	5479	346	488	1810	333	302	1613	279
2015	1	235	39	93	4118	435	198	2491	165	236	1172	447
2016	6	72	44	75	2324	1093	41	1417	387	11	1259	469
2017	0	26	13	39	1294	410	273	1518	510	65	922	566
2018	0	11	13	31	450	684	175	853	559	105	780	800
2019	0	84	141	212	642	526	99	744	562	363	1100	638
2020	4	8	20	90	898	867	423	1127	684	41	709	347
2021	0	8	24	24	481	267	6	827	355	39	730	532
2022	0	22	30	23	181	165	77	332	416	41	578	588
2023				10	230	269	415	258	148	42	463	556
2024	4	21	43	57	518	420	66	386	219	10	242	251
2025	1	10	16	31	390	462	111	1394	573	64	636	342
2008+	136	-	-	144	-	-	-	-	-	-	-	-
2009+	519	347	385	152	2377	2418	-	-	-	-	-	-
2010+	17	321	146	67	4052	2156	-	-	-	-	-	-
2011+	82	237	196	27	2463	1717	-	-	-	-	-	-
2012+	78	442	144	203	2958	1027	-	-	-	-	-	-
2013+	94	504	107	372	3122	805	-	-	-	-	-	-
2014+	20	708	36	489	5447	346	-	-	-	-	-	-
2015+	39	345	33	92	4093	432	-	-	-	-	-	-
2016+	13	366	120	75	2315	1088	-	-	-	-	-	-
2017+	30	115	51	39	1295	410	-	-	-	-	-	-
2018+	5	370	95	31	453	688	-	-	-	-	-	-
2019+	6	276	402	215	672	550	-	-	-	-	-	-
2020+	8	90	78	91	901	869	-	-	-	-	-	-
2021+	5	237	389	24	477	265	-	-	-	-	-	-
2022+	9	673	1155	23	186	170	-	-	-	-	-	-
2023+	-	-	-	10	231	269	-	-	-	-	-	-
2024+	76	616	323	60	598	484	-	-	-	-	-	-
2025+	9	192	318	37	414	490	-	-	-	-	-	-

+: From 2008, the sampling was increased with the addition of strata in shallow waters (37 to 183 m) in the Estuary.

Table 24. Input data for the production surplus model, namely landings (t) and biomass estimate (t) by year and stock assessment unit.

	Landings (t)				Biomass (t)			
Year	Estuary	Sept-Iles	Anticosti	Esquiman	Estuary	Sept-Iles	Anticosti	Esquiman
1990	-	6839	4723	3303	-	31876	36219	20358
1991	-	6447	4554	4773	-	43085	21921	15336
1992	-	4973	4146	3149	-	18721	23703	9490
1993	-	5653	4623	4683	-	25059	14946	9116
1994	-	7195	3824	4689	-	33280	11738	11988
1995	-	9176	2172	4800	-	42234	29705	21198
1996	-	11299	1184	5123	-	56384	57799	20525
1997	-	10551	3244	5957	-	63678	35615	46764
1998	-	10003	5910	6554	-	72954	27722	27492
1999	-	12484	3777	6732	-	66432	31433	33550
2000	-	13903	4198	7396	-	97237	43173	31272
2001	-	12708	3656	7815	-	80373	30051	29755
2002	-	16107	4024	8250	-	87112	53461	13395
2003	-	16645	3454	6773	-	194798	76818	60250
2004	-	20787	5574	8593	-	122603	57621	38719
2005	-	17658	3182	8867	-	99604	70071	46872
2006	-	19014	5053	8957	-	82834	42543	50305
2007	-	16464	9361	9208	-	111330	72908	31708
2008	1017	16325	9282	9110	10715	98095	28806	29685
2009	993	16074	9443	9473	9991	77477	46250	35140
2010	906	15768	10087	9541	7898	79200	38396	32947
2011	880	14646	9561	9177	7266	53564	21798	47211
2012	956	12596	8187	10244	7993	72193	28490	31079
2013	1117	14227	7672	9149	6764	57827	28870	35399
2014	984	12440	8714	8408	10940	84825	33538	31002
2015	1075	12425	9161	8221	5381	69468	34482	22056
2016	1027	12140	8680	7081	7486	44721	20736	25432
2017	899	6946	6928	7024	2420	21667	26617	18996
2018	214	4189	6285	5971	6924	14869	19170	17478
2019	199	4012	6848	5981	9742	20269	18904	23251
2020	570	5101	6182	5992	2315	27370	20946	11470
2021	579	4982	6233	5535	12949	12133	15382	14404
2022	496	3909	3784	4276	25504	4065	8924	11619
2023	437	1486	2073	1677	na	5930	5950	11996
2024	357	187	366	1660	11142	10905	10904	7079
2025	929	460	1019	1024	7373	11538	22538	11365

na : not available

Table 25. Prior distributions used in the surplus production model.

Parameter	Esquiman	Anticosti	Sept-Iles	Estuary
r mean	0.58	0.58	0.58	0.58
r log SD	0.53	0.53	0.53	0.53
K low	35323	34781	71689	3852
K high	211936	208689	430135	23114
B_1/K mean	0.2	0.2	0.2	0.5
B_1/K CV	0.25	0.25	0.25	0.25
σ_η^2 (igamma)	(0.001. 0.001)	(0.001. 0.001)	(0.001. 0.001)	(0.001. 0.001)
σ_{fix}^2(fixed.obsE)	0.2	0.2	0.2	0.2
$\sigma_{est,t}^2$ (sigma.est)	(0.001. 0.001)	(0.001. 0.001)	(0.001. 0.001)	(0.001. 0.001)
Catches CV	0.1	0.1	0.1	0.1

Table 26. Posterior distributions of the surplus production model parameters par assessment unit, median and confidence interval (I.C.).

Parameter	Median	I.C. low	I.C. high
Estuary			
K	8884	4600	18153
r	0.481	0.233	1.116
B_1/K	0.540	0.332	0.755
F_{MSY}	0.240	0.116	0.558
B_{MSY}	4442	2300	9076
MSY	1007	702	2717
B_{2025}/B_{MSY}	1.571	0.736	2.157
F_{2025}/F_{MSY}	0.593	0.178	1.539
q	1.690	0.603	3.639
σ_η^2	0.008	0.001	0.039
$\sigma_{\varepsilon,t}^2$	0.257	0.110	0.648
Sept-Iles			
K	139498	83298	249837
r	0.409	0.204	0.731
B_1/K	0.169	0.106	0.262
F_{MSY}	0.204	0.102	0.366
B_{MSY}	69749	41649	124919
MSY	14343	9430	19901
B_{2025}/B_{MSY}	0.113	0.063	0.205
F_{2025}/F_{MSY}	0.289	0.165	0.508
q	1.485	0.743	2.670
σ_η^2	0.033	0.003	0.044
$\sigma_{\varepsilon,t}^2$	0.035	0.002	0.117
Anticosti			
K	68536	44720	136254
r	0.404	0.221	0.644
B_1/K	0.248	0.168	0.332
F_{MSY}	0.202	0.111	0.322
B_{MSY}	34268	22360	68127
MSY	6927	5723	9512
B_{2025}/B_{MSY}	0.400	0.199	0.685
F_{2025}/F_{MSY}	0.369	0.196	0.702
q	1.140	0.710	1.652
σ_η^2	0.007	0.000	0.040
$\sigma_{\varepsilon,t}^2$	0.059	0.011	0.140
Esquiman			
K	87133	50164	171253
r	0.374	0.199	0.650
B_1/K	0.199	0.125	0.301
F_{MSY}	0.187	0.099	0.325
B_{MSY}	43566	25082	85627
MSY	8127	5760	11626
B_{2025}/B_{MSY}	0.342	0.164	0.654
F_{2025}/F_{MSY}	0.375	0.181	0.713
q	0.821	0.381	1.563
σ_η^2	0.026	0.003	0.043
$\sigma_{\varepsilon,t}^2$	0.043	0.001	0.125

Table 27. Projected maximum harvest for 2026 per stock according the harvest control rules.

Stock	Stock status 2025	B_{2026}/B_{MSY}	F_{2026}/F_{MSY}	Projected maximum harvest (t)
Estuary	Healthy zone	1.37	1.00	1,261
Sept-Iles	Critical zone	0.15	0.50	917
Anticosti	Critical zone	0.51	0.62	2,009
Esquiman	Critical zone	0.41	0.52	1,498

Table 28. Spatial distribution of fishing effort in hours and trawl surface according to VMS data according to the trawl footprint of the northern shrimp fishery. An intensity of 50% means that the area of a square of 1 degree longitude-latitude has been trawled at 50% in a year.

Fishing effort (hour)

Year	Footprint					
	Low		Medium		High	
	> 0 %	> 10 %	> 25 %	> 50 %	> 100 %	> 200 %
2012	82253	79975	73978	60924	35382	10896
2013	88311	85972	80739	70492	49650	19154
2014	72403	70231	64674	53821	33209	10759
2015	79748	77717	72357	59458	36327	10114
2016	111035	108708	104701	95944	72808	36853
2017	110974	109058	105673	97274	72763	33119
2018	77362	76007	72941	66110	45344	14533
2019	67563	66239	63371	54757	34643	9942
2020	65359	64141	61283	53022	30102	7081
2021	64033	62631	59249	52027	33858	13026
2022	63817	62650	60418	54634	32739	10831
2023	41478	40262	37806	32001	17351	5350
2024	8024	6753	4782	3056	1542	269
2025	10914	9534	7311	4616	1352	0
2012-2025	67377	63826	57650	40913	11776	744

Trawled surface (km^2)

Year	Footprint					
	Low		Medium		High	
	> 0 %	> 10 %	> 25 %	> 50 %	> 100 %	> 200 %
2012	6601	6417	5935	4884	2829	867
2013	7069	6882	6463	5643	3974	1533
2014	5820	5646	5200	4328	2672	866
2015	6493	6328	5891	4839	2953	822
2016	9100	8908	8578	7857	5959	3017
2017	9120	8962	8683	7992	5978	2722
2018	6315	6204	5954	5395	3698	1186
2019	5593	5484	5245	4529	2862	822
2020	5392	5291	5055	4374	2487	588
2021	5298	5182	4900	4300	2798	1079
2022	5248	5151	4967	4488	2678	876
2023	3387	3287	3085	2607	1404	425
2024	656	553	392	251	128	23
2025	905	790	606	382	111	0
2012-2025	5500	5211	4707	3341	960	60

Exploited surface of the area (km²)

Year	Footprint					
	Low		Medium		High	
	> 0 %	> 10 %	> 25 %	> 50 %	> 100 %	> 200 %
2012	14305	10437	7532	4666	1762	321
2013	13560	9413	6850	4611	2305	571
2014	12759	9036	6353	3962	1645	325
2015	13822	10070	7460	4567	1890	321
2016	14916	9647	7659	5679	3085	997
2017	13993	9566	7886	5999	3263	901
2018	10781	7568	6062	4574	2258	460
2019	10366	7445	6064	4131	1794	322
2020	10363	7524	6127	4300	1698	235
2021	10047	6998	5330	3685	1637	362
2022	9183	6507	5408	4124	1700	327
2023	8190	5071	3864	2584	886	149
2024	4300	1700	677	277	95	11
2025	5500	2245	1106	481	94	0
2012-2025	23643	10885	7810	4171	725	24

Table 29. Sum of the duration (hours) of fishing tows realised with an observer on board and total fishing effort (hours) of shrimpers by fishing area and by NAFO unit area for 2024 and 2025.

Fishing area	NAFO area	2024		2025	
		Hour (h)		Hour (h)	
		Observer	Fishery	Observer	Fishery
Estuary	4TP	9	93	-	623
Estuary	4TQ	151	1207	48	2466
Total Estuary		**159**	**1300**	**48**	**3089**
Sept-Iles	4SI	-	22	5	239
Sept-Iles	4SS	-	1	-	16
Sept-Iles	4SY	-	-	-	-
Sept-Iles	4SZ	36	1646	249	3401
Sept-Iles	4TK	-	-	-	-
Sept-Iles	4TN	-	-	-	-
Sept-Iles	4TO	-	-	-	-
Sept-Iles	4TQ	-	-	22	-
Total Sept-Iles		**36**	**1669**	**276**	**3656**
Anticosti	4SS	-	3	-	-
Anticosti	4SV	-	-	-	-
Anticosti	4SX	-	1922	90	5338
Anticosti	4SY	-	17	-	87
Anticosti	4TF	-	-	-	-
Anticosti	4TK	-	-	-	-
Total Anticosti		**0**	**1942**	**90**	**5425**
Esquiman	4R	-	-	-	-
Esquiman	4RA	65	1925	-	728
Esquiman	4RB	74	6399	-	2359
Esquiman	4RC	-	-	-	-
Esquiman	4SV	-	-	-	-
Total Esquiman		**139**	**8324**	**0**	**3086**

Table 30. Weighting factor (fleet fishing effort / fishing effort with an observer) by cell (combination of shrimp fishing area (SFA) and NAFO subdivisions) used to scale the at-sea observer results to the total fishing effort of the shrimper fleet.

SFA	Estuary	Sept-Iles				Anticosti			Esquiman
	12	10	10	10	10	9	9	9	8
NAFO	4Tp 4Tq	4To 4Tn 4Tk	4Tq 4Sz	4Si 4Sy	4Ss	4Tf 4Tk	4Ss	4Sx 4Sy 4Sv	4Sv 4Ra 4Rb 4Rc 4R
Year									
2000	21.17	13.68	19.90	13.25	17.04	0.05	-	74.31	29.55
2001	16.97	20.70	24.30	16.01	28.72	18.56	0.62	37.98	29.33
2002	12.38	15.13	7.69	36.25	55.98	-	0.08	49.26	26.54
2003	54.00	10.33	8.38	13.72	23.99	-	0.04	65.39	19.30
2004	19.69	20.83	18.41	6.28	20.60	-	0.05	44.57	36.28
2005	9.18	11.12	9.42	15.55	28.38	0.30	0.16	50.95	44.65
2006	18.94	10.41	13.24	11.75	38.06	-	0.05	52.93	26.08
2007	8.95	10.71	22.63	19.25	61.46	-	0.16	21.87	27.96
2008	9.13	15.13	19.77	16.54	30.58	-	-	18.15	34.87
2009	12.00	11.61	29.11	21.50	30.32	-	-	12.18	68.48
2010	12.59	18.18	16.44	15.08	28.07	-	-	16.25	24.23
2011	6.85	37.04	26.44	18.75	29.46	-	0.46	13.84	24.51
2012	15.24	11.01	19.11	38.95	24.25	-	0.96	20.69	16.79
2013	9.31	14.23	22.47	15.09	22.60	-	3.52	24.64	20.14
2014	14.83	7.38	22.37	18.84	21.56	-	-	24.47	30.96
2015	80.99	11.14	21.86	8.07	9.66	-	-	20.74	65.41
2016	43.35	5.98	24.54	21.02	2.18	-	-	15.08	20.97
2017	15.30	10.92	13.44	11.98	11.35	-	-	17.54	32.14
2018	9.41	31.15	14.66	13.66	34.17	-	-	29.35	22.00
2019	5.84	5.94	13.12	8.37	-	-	-	28.46	20.98
2020	-	-	13.35	5.38	-	-	-	15.17	86.11
2021	5.43	-	16.26	10.77	-	-	-	21.08	56.35
2022	13.37	-	18.35	5.40	-	-	-	16.74	56.59
2023	14.65	-	16.33	9.56	-	-	-	12.01	96.16
2024	8.16	-	45.08	-	-	-	-	-	59.88
2025	63.87	-	12.55	48.60	-	-	-	59.98	-

Table 31. Bycatch (t) and ratio (%) of the bycatch on the northern shrimp catch by year and by fishing area for all species combined.

SFA	Bycatch (t)					Ratio (%)				
	8	9	10	12	Total	8	9	10	12	Total
Year										
2000	80	208	226	20	534	1.08	2.62	2.23	2.71	2.04
2001	125	73	157	6	361	1.60	1.36	1.43	0.69	1.44
2002	316	122	239	9	687	3.83	1.41	2.08	1.19	2.35
2003	85	67	338	11	501	1.25	0.77	2.98	1.42	1.81
2004	165	126	415	8	713	1.92	1.21	2.61	0.73	1.98
2005	175	28	167	17	387	1.98	0.35	1.30	1.66	1.26
2006	42	107	185	8	343	0.47	1.23	1.21	0.82	1.01
2007	94	114	163	10	381	1.02	1.12	1.05	1.02	1.06
2008	86	115	208	43	452	0.95	1.19	1.30	4.18	1.27
2009	283	124	169	25	600	2.98	1.28	1.06	2.49	1.67
2010	111	176	177	41	504	1.16	1.74	1.12	4.53	1.39
2011	66	138	329	23	557	0.72	1.41	2.29	2.60	1.63
2012	69	147	262	12	491	0.68	1.78	2.09	1.25	1.54
2013	144	89	533	71	837	1.57	1.16	3.75	6.37	2.60
2014	192	308	587	22	1109	2.28	3.53	4.73	2.28	3.63
2015	128	353	427	51	959	1.56	3.85	3.44	4.72	3.11
2016	293	290	911	55	1549	4.14	3.34	7.51	5.35	5.36
2017	197	263	491	62	1013	2.80	3.79	7.08	6.90	4.65
2018	83	153	364	49	648	1.39	2.42	8.72	22.80	3.89
2019	81	217	336	42	676	1.35	3.16	8.41	21.07	3.97
2020	59	127	239	nd	-	0.98	2.05	4.69	-	2.38
2021	67	142	216	27	453	1.21	2.28	4.35	4.72	2.61
2022	173	110	112	11	406	4.05	2.90	2.88	2.16	3.26
2023	43	75	94	13	225	2.58	3.59	6.35	2.91	3.97
2024	21	nd	4	8	-	1.24	-	1.90	2.38	1.28
2025	nd	19	41	16	-	-	1.89	9.04	1.77	2.24
Mean 2000-2025	**26**	**284**	**148**	**127**	**574**	**1.74**	**1.92**	**3.25**	**4.74**	**2.35**

nd : no observer at sea data.

Table 32. Occurrence and total catch of sampled tows by observers (25,730 tows) for 98 taxa for the 2000-2025 period.

	Occurrence		Catch (kg)
Taxa	n tows	%	
Crevette nordique / Northern shrimp	25694	99.860	32205884
Flétan du Groenland / Greenland halibut	23361	90.793	129575
Capelan / Capelin	21168	82.270	156941
Sébastes / Redfishes	20645	80.237	257819
Hareng atlantique / Atlantic herring	18117	70.412	57900
Plie canadienne / American plaice	15316	59.526	29877
Plie grise / Witch flounder	14021	54.493	30977
Lussion blanc / White barracudina	12797	49.736	22847
Raie épineuse / Thorny skate	10366	40.288	14678
Myxine du nord / Atlantic hagfish	8448	32.833	9331
Grenadier du Grand Banc / Marlin-spike	7385	28.702	8032
Lycodes / Eelpouts	5527	21.481	7081
Morue franche / Atlantic cod	5310	20.637	12831
Motelle à quatre barbillons / Fourbeard rockling	3959	15.387	4512
Merlu argenté / Silver hake	3761	14.617	4454
Calmars / Squids	2786	10.828	3539
Sivade rose / Pink glass shrimp	2766	10.750	26826
Lançons / Sand lances	2340	9.094	3397
Merluche blanche / White hake	2246	8.729	2414
Octopodes / Octopoda	1780	6.918	1792
Agonidés / Poachers	1594	6.195	1664
Anthozoaires / Anthozoan	1575	6.121	1637
Mollasse atlantique / Atlantic soft pout	1496	5.814	1512
Raie lisse / Smooth skate	1487	5.779	1649
Étoiles de mer / Sea stars	1378	5.356	1402
Scyphozoaires / Scyphozoans	1354	5.262	2013
Saida / Arctic cod	950	3.692	1378
Crabe des neiges / Snow crab	841	3.269	873
Terrassier tacheté / Wrymouth	824	3.202	1034
Pennatula borealis / Sea pen	773	3.004	798
Flétan Atlantique / Atlantic halibut	662	2.573	6633
Raie à queue épineuse / Spinytail skate	599	2.328	711
Limaces / Seasnails	569	2.211	569
Sépioles / Bobtails	560	2.176	562
Poissons-lanternes / Lantern-fishes	492	1.912	497
Grosse poule de mer / Lumpfish	431	1.675	449
Chaboisseau / Sculpin	417	1.621	418
Mustèles / Rocklings	370	1.438	464
Crevette ésope / Striped pink shrimp	365	1.419	7504
Lompénies / Eelpouts	362	1.407	566
Poules de mer / Lumpfishes	356	1.384	364
Plie rouge / Winter flounder	335	1.302	566
Échinoides / Sea urchins	317	1.232	344
Crevettes / Shrimp-Like	270	1.049	3034
Hameçons / Hookear sculpins	267	1.038	277
Merluche à longues nageoires / Longfin hake	239	0.929	242
Maquereau bleu / Atlantic mackerel	226	0.878	311
Haches d'argent / Hatchetfishes	215	0.836	215
Faux-trigles / Sculpins	174	0.676	175
Quatre-lignes atlantique / Fourline snakeblenny	174	0.676	203
Loquette d'Amérique / Ocean pout	167	0.649	171
Raie tachetée / Winter skate	161	0.626	262

	Occurrence		Catch (kg)
Taxa	n tows	%	
Aiguillat noir / Black dogfish	141	0.548	2969
Ophiuridés / Brittle stars	140	0.544	153
Éperlan / Rainbow smelt	139	0.540	2291
Loup atlantique / Atlantic wolffish	138	0.536	150
Crabes lyre / Toad crabs	105	0.408	105
Ogac / Greenland cod	104	0.404	171
Porifères / Sponges	88	0.342	89
Gastérostéidés / Sticklebacks	84	0.326	84
Bivalves / Bivalves	84	0.326	84
Avocette ruban / Slender snipe eel	80	0.311	80
Baudroie d'Amérique / Monkfish	79	0.307	87
Aiguillat commun / Spiny dogfish	68	0.264	113
Limande à queue jaune / Yellowtail flounder	64	0.249	79
Loup tacheté / Spotted wolffish	56	0.218	62
Grande argentine / Atlantic argentine	52	0.202	2658
Aiglefin / Haddock	48	0.187	55
Grande lamproie marine / Sea lamprey	35	0.136	35
Alose savoureuse / American shad	31	0.120	34
Cyclothones / Lightfishes	26	0.101	26
Concombres de mer / Sea cucumbers	25	0.097	41
Goberge / Pollock	24	0.093	35
Crabe épineux du nord / Norway king crab	22	0.086	22
Gorgonocéphales / Basket stars	21	0.082	21
Poulamon atlantique / Atlantic tomcod	19	0.074	36
Serrivomer trapu / Stout sawpalate	19	0.074	19
Poutassou / Blue whiting	17	0.066	17
Tricorne arctique / Arctic staghorn sculpin	17	0.066	17
Chauliode très-lumineux / Manylight viperfish	13	0.051	13
Anguille américaine / American eel	12	0.047	12
Dragon-boa / Boa dragonfish	11	0.043	11
Anguille égorgée bécue / Slatjaw cutthroat eel	9	0.035	9
Loup à tête large / Northern wolffish	7	0.027	9
Stromatée à fossettes / Butterfish	7	0.027	7
Balaou / Atlantic saury	6	0.023	6
Crabe tourteau commun / Atlantic rock crab	6	0.023	7
Sigouine de roche / Rock gunnel	5	0.019	5
Saumon atlantique / Atlantic salmon	4	0.016	5
Baudroies / Anglers	4	0.016	4
Hémitriptère atlantique / Sea raven	4	0.016	4
Dragons-brochets / Scaleless dragonfishes	4	0.016	8
Cotte polaire / Polar sculpin	3	0.012	3
Unernak caméléon / Fish doctor	3	0.012	3
Bar d'amérique / Striped bass	2	0.008	3
Raie ronde / Round skate	2	0.008	2
Icèles / Sculpins	1	0.004	1
Choquemort / Mummichog	1	0.004	1

Table 33. Occurrence and bycatch means for the 2000-2023 period and for the years 2024 and 2025.

Taxa	Occurrence (%)			Bycatch (kg)		
	2000-2023	2024	2025	2000-2023	2024	2025
Flétan du Groenland / Greenland halibut	90.700	92.647	100.000	92070	9887	47334
Sébastes / Redfishes	81.675	82.353	96.154	190407	919	2166
Capelan / Capelin	81.043	82.353	94.872	135642	2324	6419
Hareng atlantique / Atlantic herring	70.166	83.824	91.026	44059	4168	2940
Plie canadienne / American plaice	60.035	50.000	80.769	20216	458	3030
Plie grise / Witch flounder	55.992	60.294	91.026	21375	5871	2029
Lussion blanc / White barracudina	49.804	8.824	35.897	13917	133	374
Raie épineuse / Thorny skate	40.883	36.765	38.462	6948	651	1987
Myxine du nord / Atlantic hagfish	33.116	5.882	17.949	2880	61	124
Grenadier du Grand Banc / Marlin-spike	29.957	0.000	10.256	1975	0	64
Lycodes / Eelpouts	20.876	50.000	19.231	3568	267	267
Morue franche / Atlantic cod	19.673	51.471	28.205	7960	268	1919
Merlu argenté / Silver hake	18.122	10.294	69.231	1607	58	410
Motelle à quatre barbillons / Fourbeard rockling	16.003	8.824	20.513	1029	10	119
Calmars / Squids	11.847	0.000	1.282	2560	0	60
Sivade rose / Pink glass shrimp	11.408	0.000	8.974	19878	0	59
Merluche blanche / White hake	8.773	1.471	1.282	732	3	21
Lançons / Sand lances	8.766	0.000	0.000	3383	0	0
Octopodes / Octopoda	7.838	0.000	15.385	61	0	8
Anthozoaires / Anthozoan	6.656	1.471	5.128	213	7	29
Scyphozoaires / Scyphozoans	6.372	0.000	1.282	837	0	8
Raie lisse / Smooth skate	6.052	1.471	3.846	413	2	8
Étoiles de mer / Sea stars	5.963	0.000	21.795	53	0	7
Mollasse atlantique / Atlantic soft pout	5.714	0.000	0.000	102	0	0
Agonidés / Poachers	5.644	17.647	10.256	1250	98	306
Terrassier tacheté / Wrymouth	3.921	0.000	1.282	261	0	6
Saida / Arctic cod	3.533	30.882	0.000	716	706	0
Pennatula borealis / Sea pen	3.449	0.000	0.000	561	0	0
Crabe des neiges / Snow crab	3.327	14.706	19.231	87	8	48
Sépioles / Bobtails	2.844	0.000	12.821	470	0	305
Flétan Atlantique / Atlantic halibut	2.578	27.941	14.103	5165	1481	4180
Raie à queue épineuse / Spinytail skate	2.219	0.000	0.000	299	0	0
Limaces / Seasnails	2.121	1.471	0.000	343	8	0
Poissons-lanternes / Lantern-fishes	2.078	0.000	0.000	396	0	0
Grosse poule de mer / Lumpfish	1.770	0.000	1.282	42	0	6
Crevette ésope / Striped pink shrimp	1.558	35.294	2.564	4265	3758	192
Mustèles / Rocklings	1.517	0.000	0.000	305	0	0
Chaboisseau / Sculpin	1.460	5.882	1.282	270	70	13
Poules de mer / Lumpfishes	1.300	0.000	1.282	263	0	13
Lompénies / Eelpouts	1.287	13.235	0.000	567	289	0
Plie rouge / Winter flounder	1.278	0.000	0.000	404	0	0
Échinoides / Sea urchins	1.224	0.000	0.000	221	0	0
Maquereau bleu / Atlantic mackerel	1.099	0.000	6.410	180	0	126
Crevettes / Shrimp-Like	1.097	22.059	7.692	1854	122	383
Merluche à longues nageoires / Longfin hake	1.092	0.000	0.000	227	0	0
Hameçons / Hookear sculpins	0.944	0.000	0.000	214	0	0
Haches d'argent / Hatchetfishes	0.840	0.000	0.000	137	0	0
Ophiuridés / Brittle stars	0.787	1.471	1.282	92	8	13
Loquette d'Amérique / Ocean pout	0.711	20.588	0.000	25	21	0
Faux-trigles / Sculpins	0.646	0.000	0.000	116	0	0
Quatre-lignes atlantique / Fourline snakeblenny	0.635	0.000	0.000	214	0	0
Raie tachetée / Winter skate	0.615	0.000	14.103	64	0	247

Taxa	Occurrence (%)			Bycatch (kg)		
	2000-2023	2024	2025	2000-2023	2024	2025
Éperlan / Rainbow smelt	0.588	0.000	0.000	1560	0	0
Aiguillat noir / Black dogfish	0.535	0.000	0.000	2562	0	0
Loup atlantique / Atlantic wolffish	0.472	0.000	0.000	92	0	0
Bivalves / Bivalves	0.435	1.471	0.000	57	8	0
Crabes lyre / Toad crabs	0.390	0.000	3.846	63	0	38
Porifères / Sponges	0.360	0.000	0.000	75	0	0
Ogac / Greenland cod	0.357	0.000	0.000	87	0	0
Baudroie d'Amérique / Monkfish	0.343	0.000	0.000	77	0	0
Gastérostéidés / Sticklebacks	0.337	0.000	0.000	60	0	0
Grande argentine / Atlantic argentine	0.333	0.000	0.000	2913	0	0
Avocette ruban / Slender snipe eel	0.314	0.000	0.000	54	0	0
Limande à queue jaune / Yellowtail flounder	0.291	0.000	0.000	76	0	0
Aiguillat commun / Spiny dogfish	0.248	0.000	0.000	162	0	0
Loup tacheté / Spotted wolffish	0.215	0.000	0.000	42	0	0
Aiglefin / Haddock	0.181	0.000	0.000	35	0	0
Alose savoureuse / American shad	0.170	0.000	0.000	26	0	0
Grande lamproie marine / Sea lamprey	0.138	1.471	0.000	33	60	0
Cyclothones / Lightfishes	0.098	0.000	0.000	16	0	0
Crabe épineux du nord / Norway king crab	0.095	0.000	0.000	14	0	0
Concombres de mer / Sea cucumbers	0.088	0.000	0.000	25	0	0
Goberge / Pollock	0.085	0.000	0.000	3	0	0
Gorgonocéphales / Basket stars	0.076	1.471	0.000	21	8	0
Poulamon atlantique / Atlantic tomcod	0.069	0.000	0.000	19	0	0
Poutassou / Blue whiting	0.069	0.000	0.000	13	0	0
Serrivomer trapu / Stout sawpalate	0.067	0.000	0.000	12	0	0
Tricorne arctique / Arctic staghorn sculpin	0.062	0.000	0.000	13	0	0
Dragon-boa / Boa dragonfish	0.051	0.000	0.000	5	0	0
Chauliode très-lumineux / Manylight viperfish	0.048	0.000	0.000	9	0	0
Anguille américaine / American eel	0.047	0.000	0.000	10	0	0
Stromatée à fossettes / Butterfish	0.042	0.000	0.000	4	0	0
Anguille égorgée bécue / Slatjaw cutthroat eel	0.036	0.000	0.000	7	0	0
Balaou / Atlantic saury	0.025	0.000	0.000	9	0	0
Loup à tête large / Northern wolffish	0.024	0.000	0.000	16	0	0
Crabe tourteau commun / Atlantic rock crab	0.024	0.000	0.000	6	0	0
Sigouine de roche / Rock gunnel	0.018	0.000	0.000	1	0	0
Baudroies / Anglers	0.016	0.000	0.000	3	0	0
Saumon atlantique / Atlantic salmon	0.015	0.000	0.000	6	0	0
Dragons-brochets / Scaleless dragonfishes	0.015	0.000	0.000	6	0	0
Hémitriptère atlantique / Sea raven	0.014	0.000	0.000	2	0	0
Cotte polaire / Polar sculpin	0.012	0.000	0.000	4	0	0
Unernak caméléon / Fish doctor	0.012	0.000	0.000	2	0	0
Raie ronde / Round skate	0.009	0.000	0.000	1	0	0
Bar d'amérique / Striped bass	0.007	0.000	0.000	1	0	0
Choquemort / Mummichog	0.004	0.000	0.000	1	0	0
Icèles / Sculpins	0.003	0.000	0.000	0	0	0

Table 34. DFO survey abundance and biomass estimates, bycatches in number and biomass from at-sea observers and ratio of the bycatch on the survey estimate.

Year	Survey		Bycatch		Ratio (%)	
	N (x1000)	Biomass (t)	N (x1000)	Biomass (t)	N	Biomass
Atlantic cod (< 30 cm)						
2000-2023	92457	11166	96.59	7.96	0.121	0.092
2024	48373	5796	3.54	0.27	0.007	0.005
2025	125250	12393	48.44	1.92	0.039	0.015
Redfish (< 20 cm)						
2000-2023	3741212	222081	8771.88	190.41	0.297	0.193
2024	226620	11493	15.55	0.92	0.007	0.008
2025	282017	16507	85.38	2.17	0.030	0.013
Greenland halibut (< 31 cm)						
2000-2023	241297	24250	1840.18	92.07	0.901	0.463
2024	92225	7671	257.35	9.89	0.279	0.129
2025	153431	12101	761.97	47.33	0.497	0.391
American plaice (< 30 cm)						
2000-2023	296791	16583	306.84	20.22	0.136	0.150
2024	200864	11782	3.00	0.46	0.001	0.004
2025	218642	11204	62.39	3.03	0.029	0.027
Witch flounder (< 30 cm)						
2000-2023	61242	3857	274.60	21.38	0.446	0.584
2024	58557	3898	0.00	5.87	0.000	0.151
2025	54185	4083	0.00	2.03	0.000	0.050
White hake (< 30 cm)						
2000-2023	-	421	-	0.73	-	0.249
2024	-	130	-	0.00	-	0.002
2025	-	182	-	0.02	-	0.012
Atlantic halibut						
2000-2023	-	15967	-	5.17	-	0.063
2024	-	26532	-	1.48	-	0.006
2025	-	30959	-	4.18	-	0.014
Fourbeard rockling						
2000-2023	-	1613	-	1.03	-	0.073
2024	-	839	-	0.01	-	0.001
2025	-	1206	-	0.12	-	0.010
Thorny skate (< 30 cm)						
2000-2023	-	1901	-	6.95	-	0.391
2024	-	1416	-	0.65	-	0.046
2025	-	2311	-	1.99	-	0.086
Smooth skate (< 30 cm)						
2000-2023	-	329	-	0.41	-	0.172
2024	-	129	-	0.00	-	0.001
2025	-	133	-	0.01	-	0.006

Year	Survey		Bycatch		Ratio (%)	
	N (x1000)	Biomass (t)	N (x1000)	Biomass (t)	N	Biomass
Atlantic hagfish						
2000-2023	-	5615	-	2.88	-	0.060
2024	-	1683	-	0.06	-	0.004
2025	-	3618	-	0.12	-	0.003
Marlin-spike						
2000-2023	-	2907	-	1.97	-	0.076
2024	-	1266	-	0.00	-	0.000
2025	-	1032	-	0.06	-	0.006
Lumpfish						
2000-2023	-	918	-	0.04	-	0.011
2024	-	15	-	0.00	-	0.000
2025	-	242	-	0.01	-	0.003
Atlantic soft pout						
2000-2023	-	109	-	0.10	-	0.135
2024	-	20	-	0.00	-	0.000
2025	-	19	-	0.00	-	0.000
Silver hake						
2000-2023	-	1104	-	2.21	-	0.218
2024	-	7560	-	0.06	-	0.001
2025	-	1886	-	0.41	-	0.022
Atlantic wolffish						
2000-2023	-	3159	-	0.07	-	0.003
2024	-	4282	-	0.00	-	0.000
2025	-	2947	-	0.00	-	0.000
Spotted wolffish						
2000-2023	-	615	-	0.02	-	0.004
2024	-	178	-	0.00	-	0.000
2025	-	10	-	0.00	-	0.000
Arctic cod						
2000-2023	-	36	-	0.55	-	7.107
2024	-	4	-	0.71	-	19.090
2025	-	21	-	0.00	-	0.000
Longfin hake						
2000-2023	-	1853	-	0.28	-	0.020
2024	-	1058	-	0.00	-	0.000
2025	-	753	-	0.00	-	0.000
Rocklings						
2000-2023	-	2	-	0.27	-	244.886
2024	-	0	-	0.00	-	
2025	-	0	-	0.00	-	
Sculpins						
2000-2023	-	711	-	0.10	-	0.014
2024	-	417	-	0.00	-	0.000
2025	-	882	-	0.00	-	0.000

Year	Survey		Bycatch		Ratio (%)	
	N (x1000)	Biomass (t)	N (x1000)	Biomass (t)	N	Biomass
Sculpins						
2000-2023	-	2744	-	0.20	-	0.009
2024	-	841	-	0.07	-	0.008
2025	-	687	-	0.01	-	0.002
Hookear sculpins						
2000-2023	-	41	-	0.24	-	0.666
2024	-	21	-	0.00	-	0.000
2025	-	42	-	0.00	-	0.000
Poachers						
2000-2023	-	133	-	1.20	-	0.958
2024	-	13	-	0.10	-	0.782
2025	-	67	-	0.31	-	0.455
Seasnails						
2000-2023	-	15	-	0.38	-	4.157
2024	-	3	-	0.01	-	0.323
2025	-	29	-	0.00	-	0.000
Lumpfishes						
2000-2023	-	14	-	0.22	-	61.541
2024	-	0	-	0.00	-	
2025	-	1	-	0.01	-	1.603
Eelpouts						
2000-2023	-	432	-	0.67	-	0.109
2024	-	104	-	0.29	-	0.279
2025	-	379	-	0.00	-	0.000
Wrymouth						
2000-2023	-	177	-	0.34	-	0.283
2024	-	106	-	0.00	-	0.000
2025	-	218	-	0.01	-	0.003
Eelpouts						
2000-2023	-	1554	-	3.30	-	0.202
2024	-	616	-	0.27	-	0.043
2025	-	1284	-	0.27	-	0.021

Table 35. Percentage (Pct) of Pandalus montagui and Pasiphaea multidentata in the shrimp samples at landing.

Year	Number of samples	Pct *P. montagui* (%)	Pct *P. multidentata* (%)
2000	152	0.130	1.001
2001	145	0.080	0.962
2002	166	0.098	0.380
2003	172	0.035	0.448
2004	166	0.046	0.414
2005	164	0.152	0.172
2006	183	0.248	0.461
2007	179	0.139	0.406
2008	164	0.267	0.932
2009	137	0.724	1.365
2010	153	0.276	1.397
2011	155	0.350	0.813
2012	152	0.380	0.770
2013	170	0.390	0.668
2014	163	0.078	0.943
2015	174	0.009	1.113
2016	183	0.092	1.070
2017	179	0.188	1.304
2018	170	0.014	1.025
2019	156	0.023	0.456
2020	136	0.016	0.525
2021	129	0.012	0.451
2022	113	0.008	0.462
2023	141	0.014	0.542
2024	81	0.598	0.089
2025	80	nd	nd
Moyenne	**155**	**0.175**	**0.727**

FIGURES

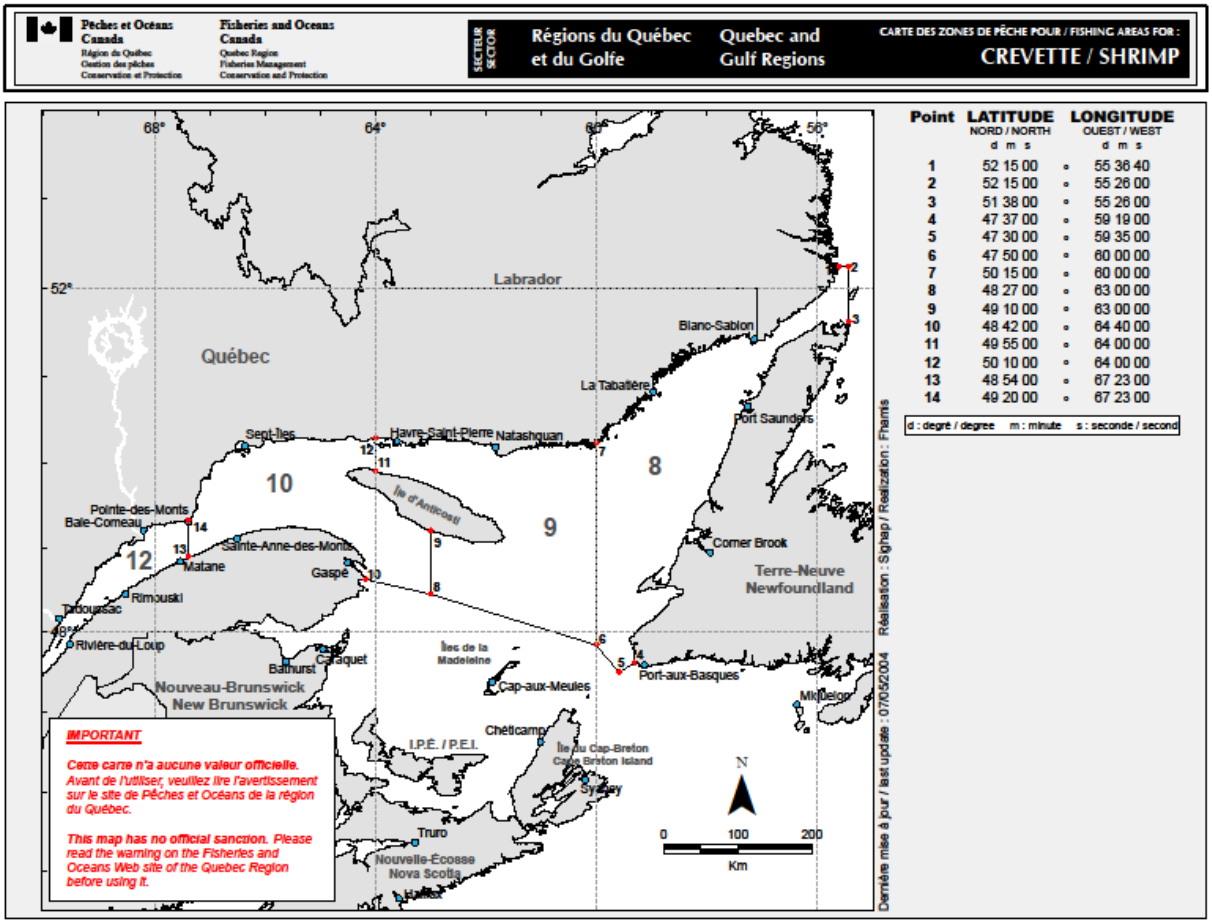


Figure 1. Shrimp fishing areas in the Estuary and Gulf of St. Lawrence: Estuary (SFA 12), Sept-Iles (SFA 10), Anticosti (SFA 9), and Esquiman (SFA 8).

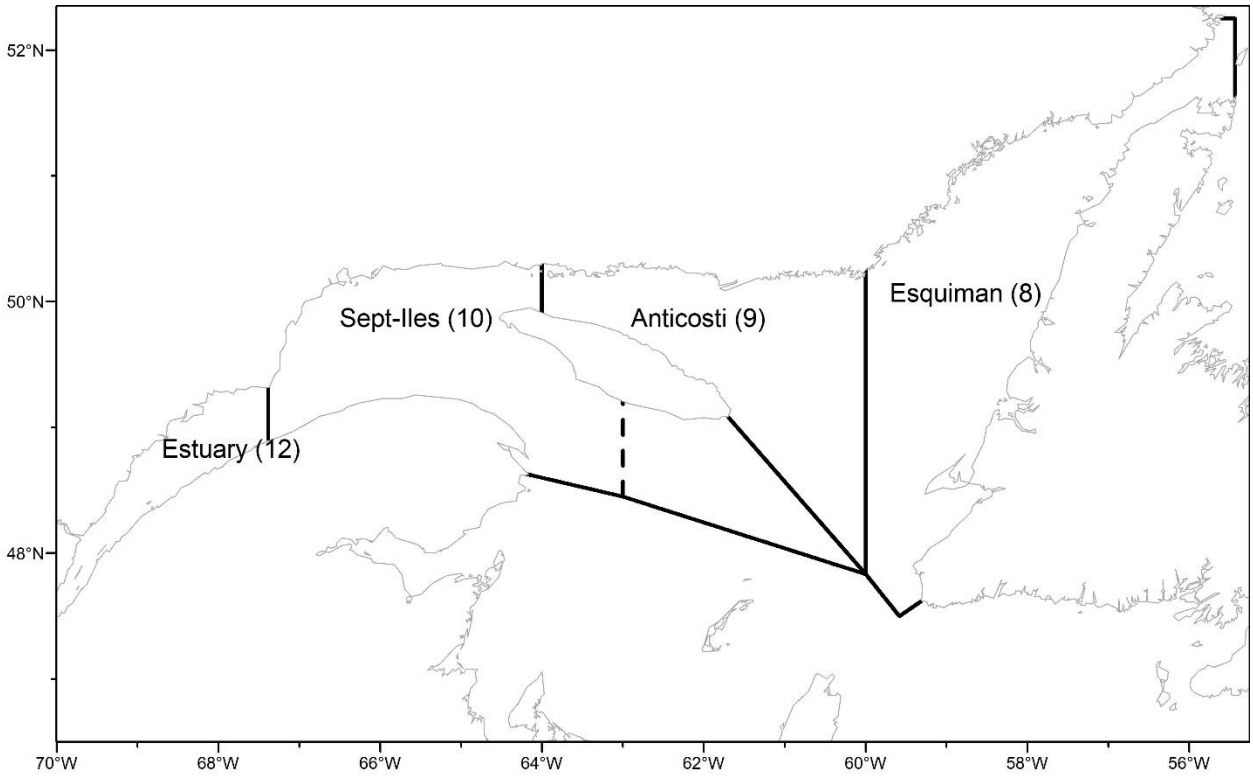


Figure 2. Delineation of the stock assessment units as defined in 2023. The dashed line south of Anticosti Island represents the boundary between the Sept-Iles and Anticosti shrimp fishing management areas.

	PRINTEMPS / SPRING		ÉTÉ / SUMMER			AUTOMNE / FALL			HIVER / WINTER			
	A	M	J	J	A	S	O	N	D	J	F	M
Age												
0	ÉCLOSION / HATCHING		Larves / Larvae			Post-larves / Post-larvae						
1	Juvéniles / Juveniles											
2	Mâles / Males					REPRODUCTION		Mâles / Males				
3	Mâles / Males					REPRODUCTION		Mâles / Males				
4	Mâles / Males					REPRODUCTION		CHANGEMENT DE SEXE / SEX CHANGE				
5	Femelles primipares / Primiparous females					PONTE / SPAWNING		Femelles oeuvées / Berried females				
6	ÉCLOSION / HATCHING		Femelles multipares / Multiparous females			PONTE / SPAWNING		Femelles oeuvées / Berried females				
7	ÉCLOSION / HATCHING											

Figure 3. Life cycle of northern shrimp in the Gulf of St. Lawrence.

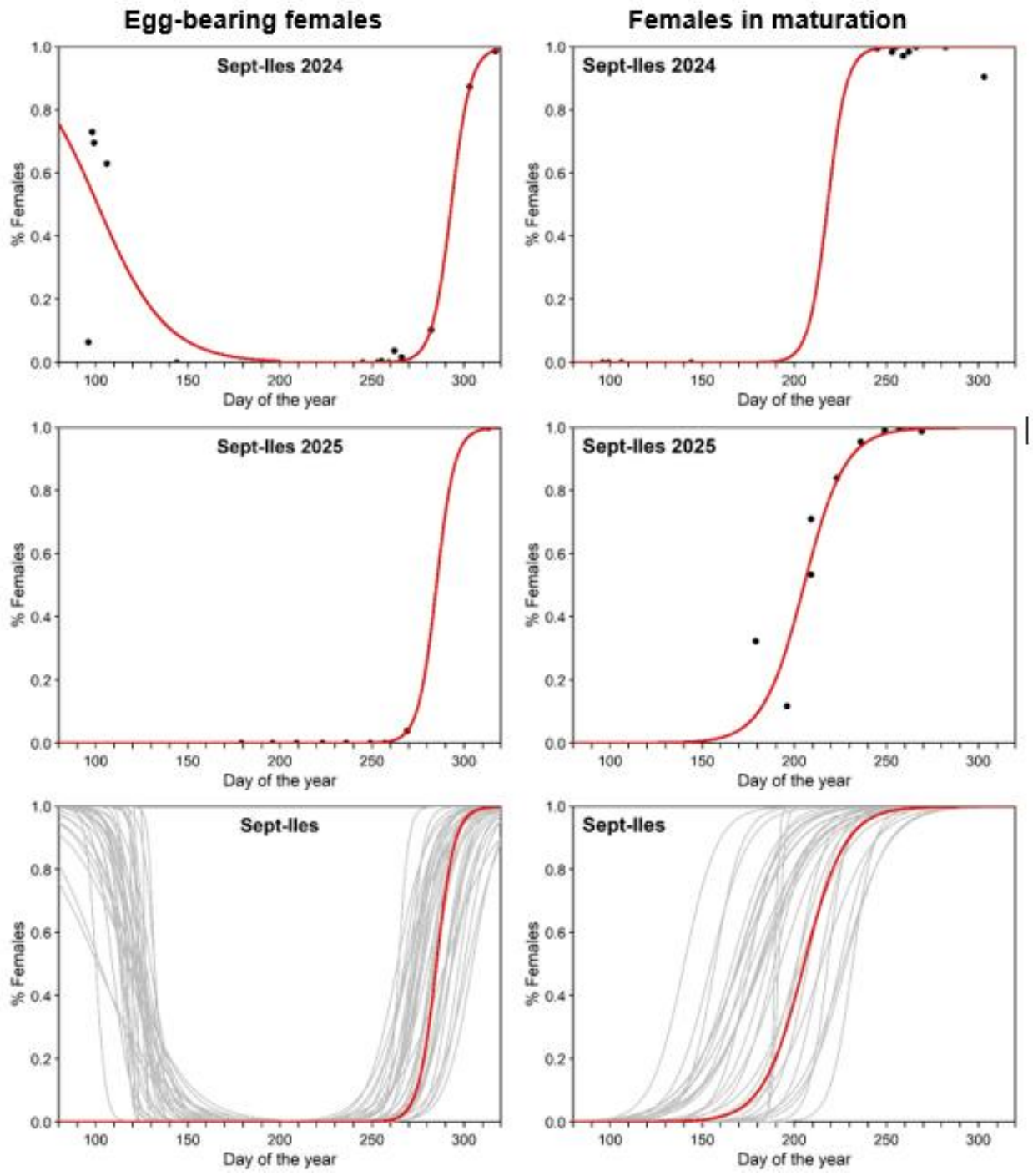


Figure 4. Proportion of egg-bearing females and females in maturation in the catch of females depending on the day of the year for the samples collected in 2024 and 2025 in the area of Sept-Iles. The bottom panel shows the years 1990-2024 in gray and 2025 in red.

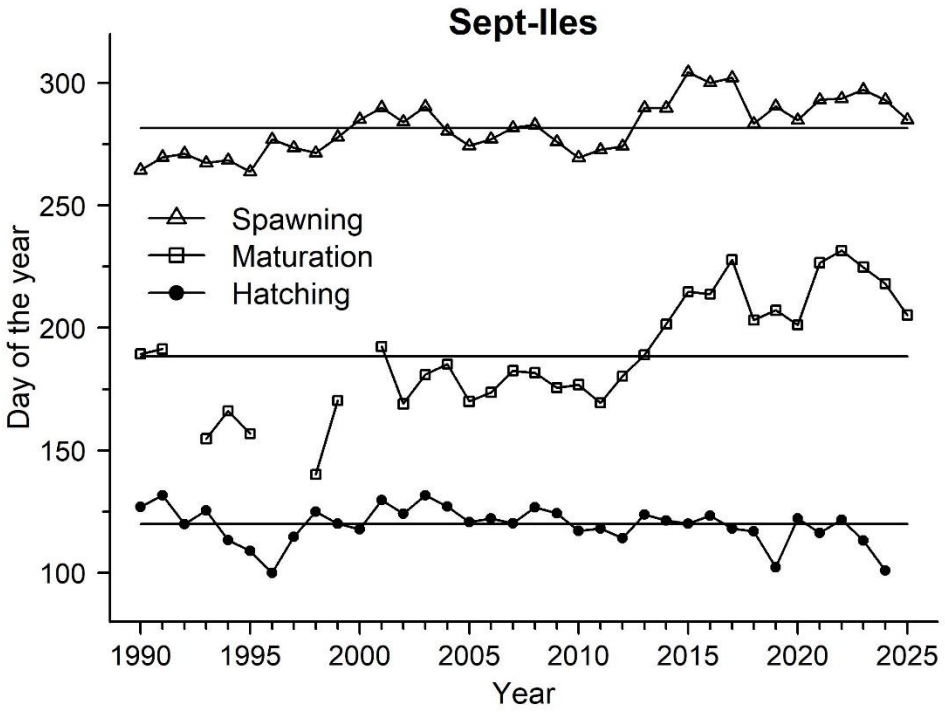


Figure 5. Day of the year where 50% of female shrimp were maturing (maturation), where 50% had spawn there eggs (spawning) and where 50% of females had released larvae (hatching) from samples collected in the area of Sept-Iles from 1990 to 2025. The solid horizontal lines represent the average for the 1990-2024 period.

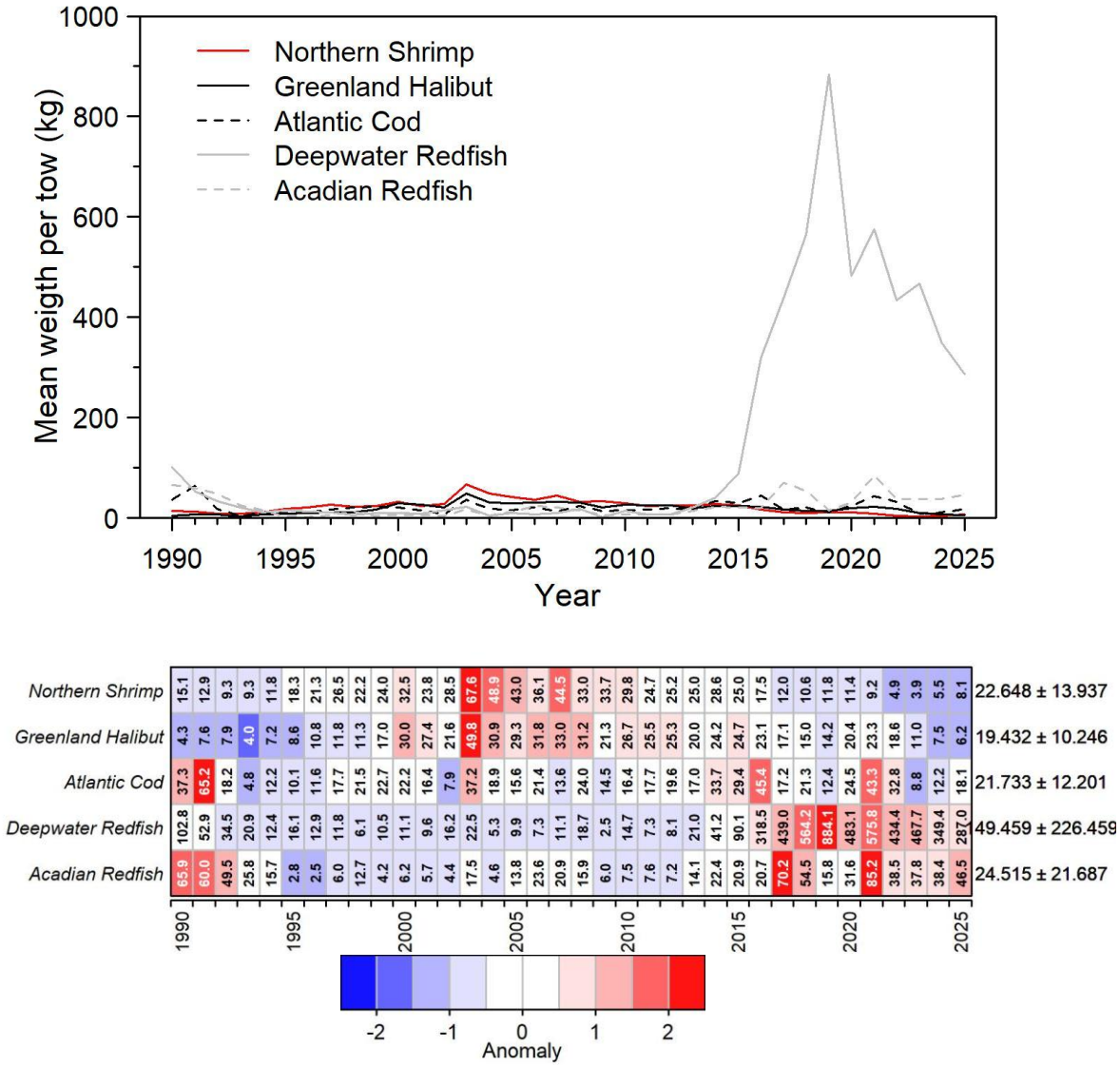


Figure 6. Biomass (kg per tow) of the main predators of northern shrimp in the northern Gulf of St. Lawrence. The color code represents the value of the anomaly, which is the difference between the weight the CPUE and the average of the time series divided by the standard deviation of that average for each species.

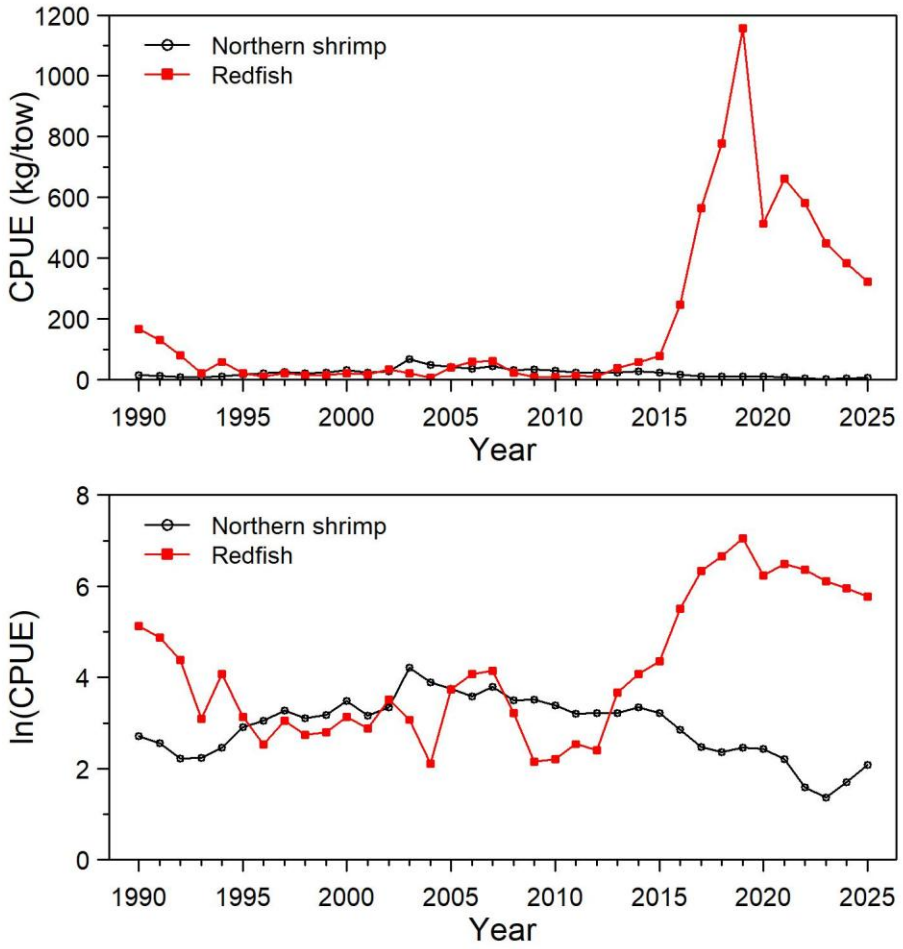


Figure 7. Mean weights per 15 minutes tow observed during the survey in August in the northern gulf for northern shrimp and redfish.

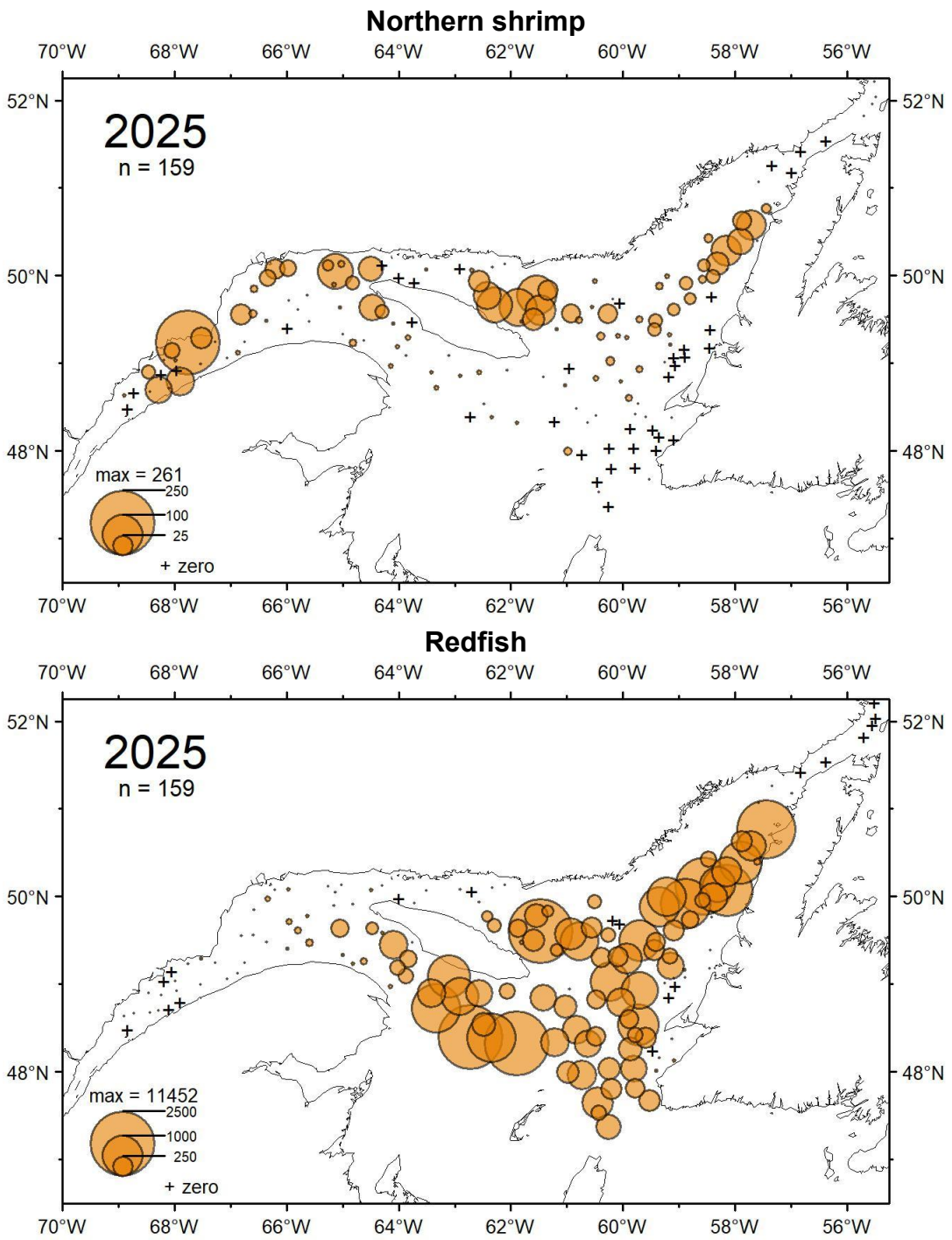


Figure 8. Northern shrimp and redfish catch rates (kg/15 minutes tow) distribution during the survey in August 2025 in the northern gulf of St. Lawrence.

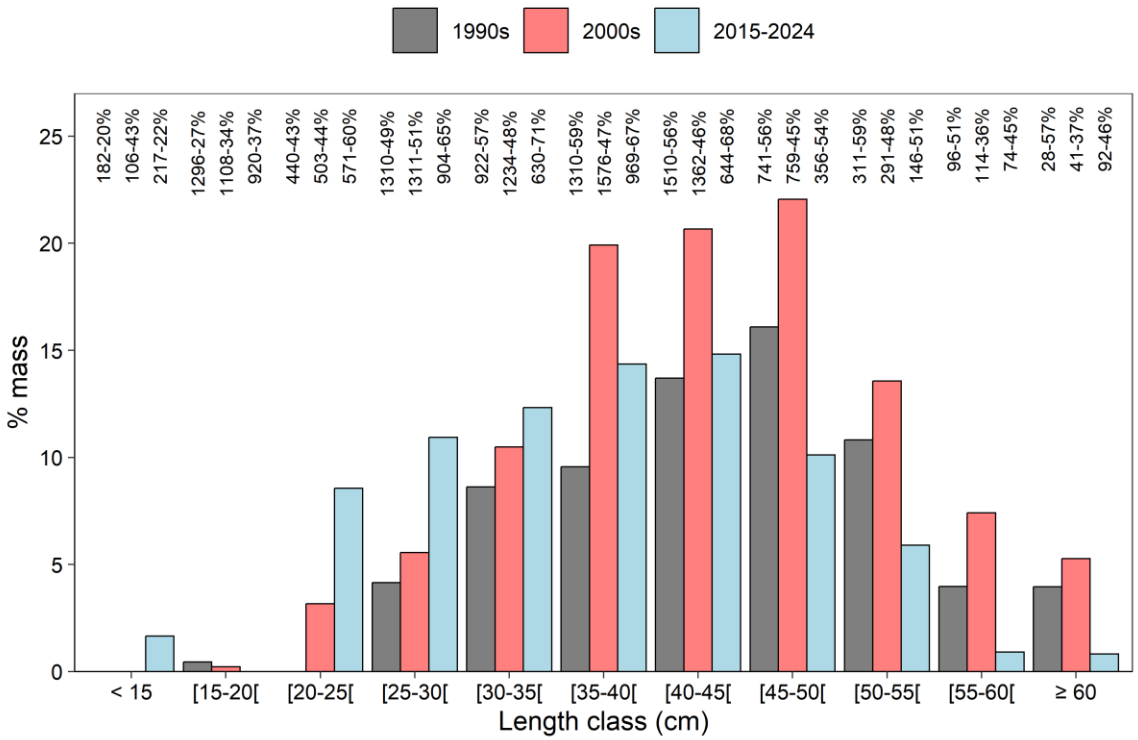


Figure 9. Mean mass contribution (% mass) of northern shrimp to the Greenland halibut diet, according to the period and length class considered. The values above the bars correspond to the number of stomachs used for the analysis with the percentage of those being empty

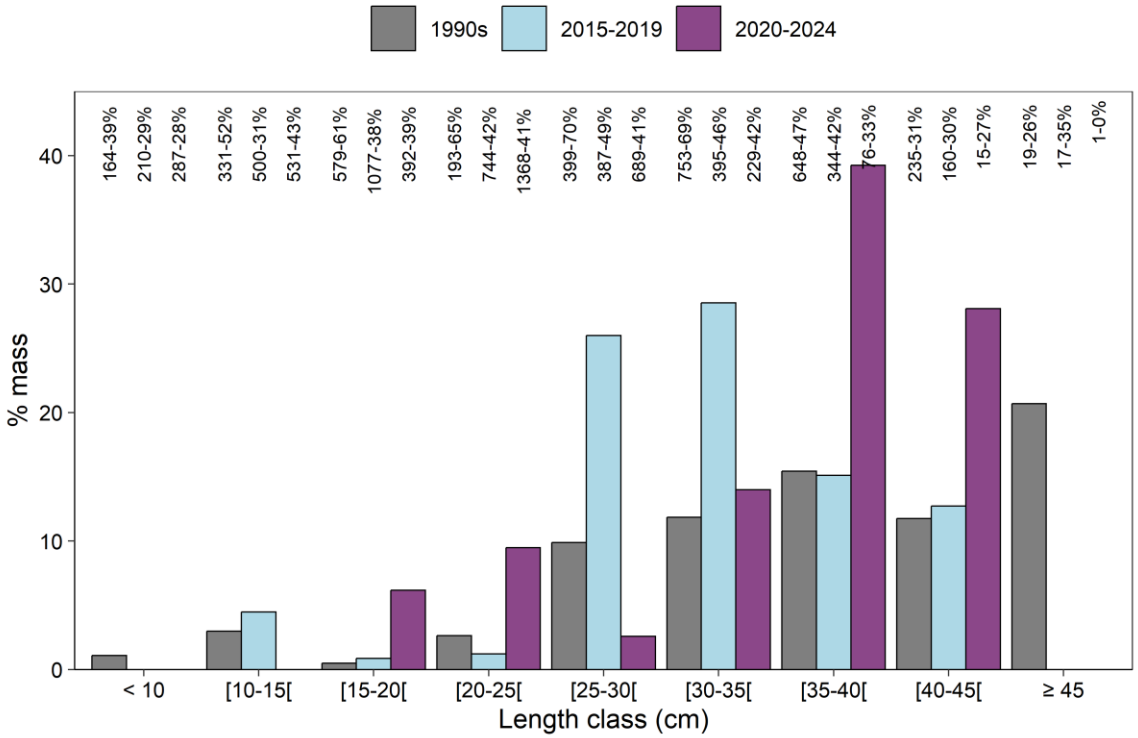


Figure 10. Mean mass contribution (% mass) of northern shrimp to the redfish diet, according to the period and length class considered. The values above the bars correspond to the number of stomachs used for the analysis with the percentage of those being empty.

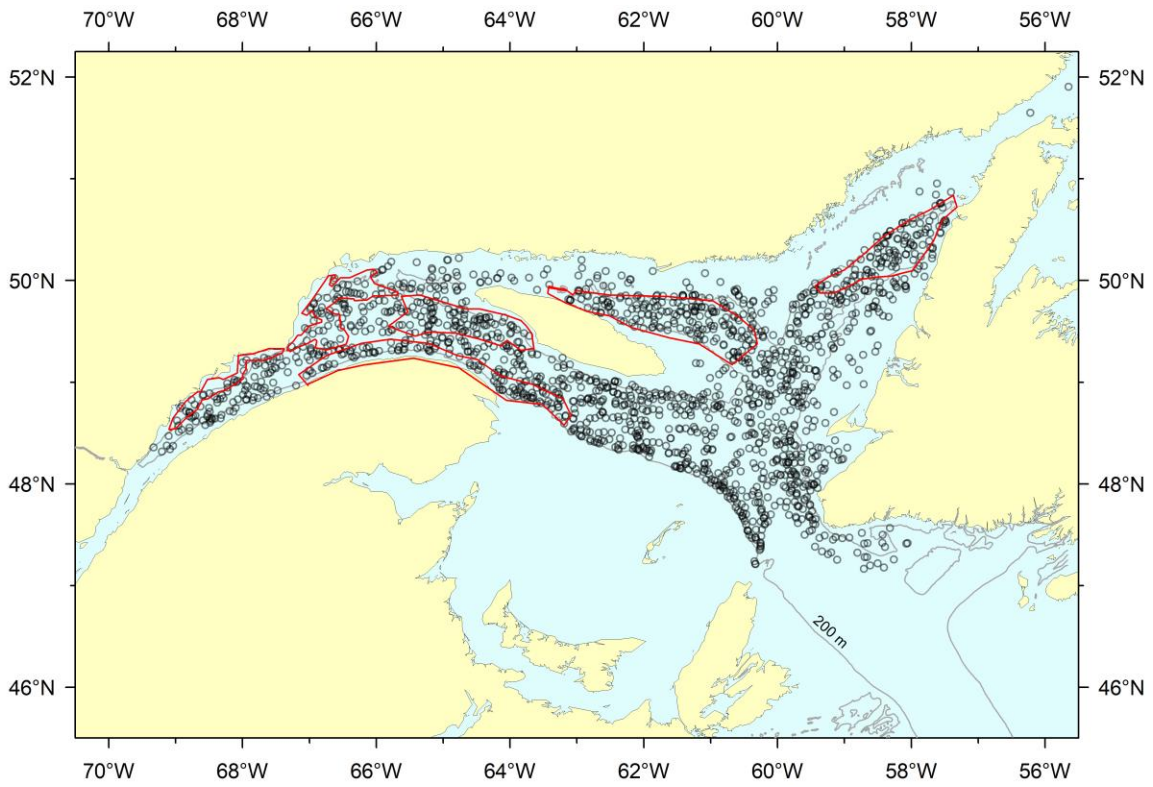


Figure 11. Fishing sets where redfish stomachs were collected for the period 1993-2024. A total of 10,743 stomachs were used for the analysis. The geographic location of each of them allowed the spatial analysis of the redfish diet. Red polygons represent the contours of the commercially fished northern shrimp fishing areas calculated from VMS data.

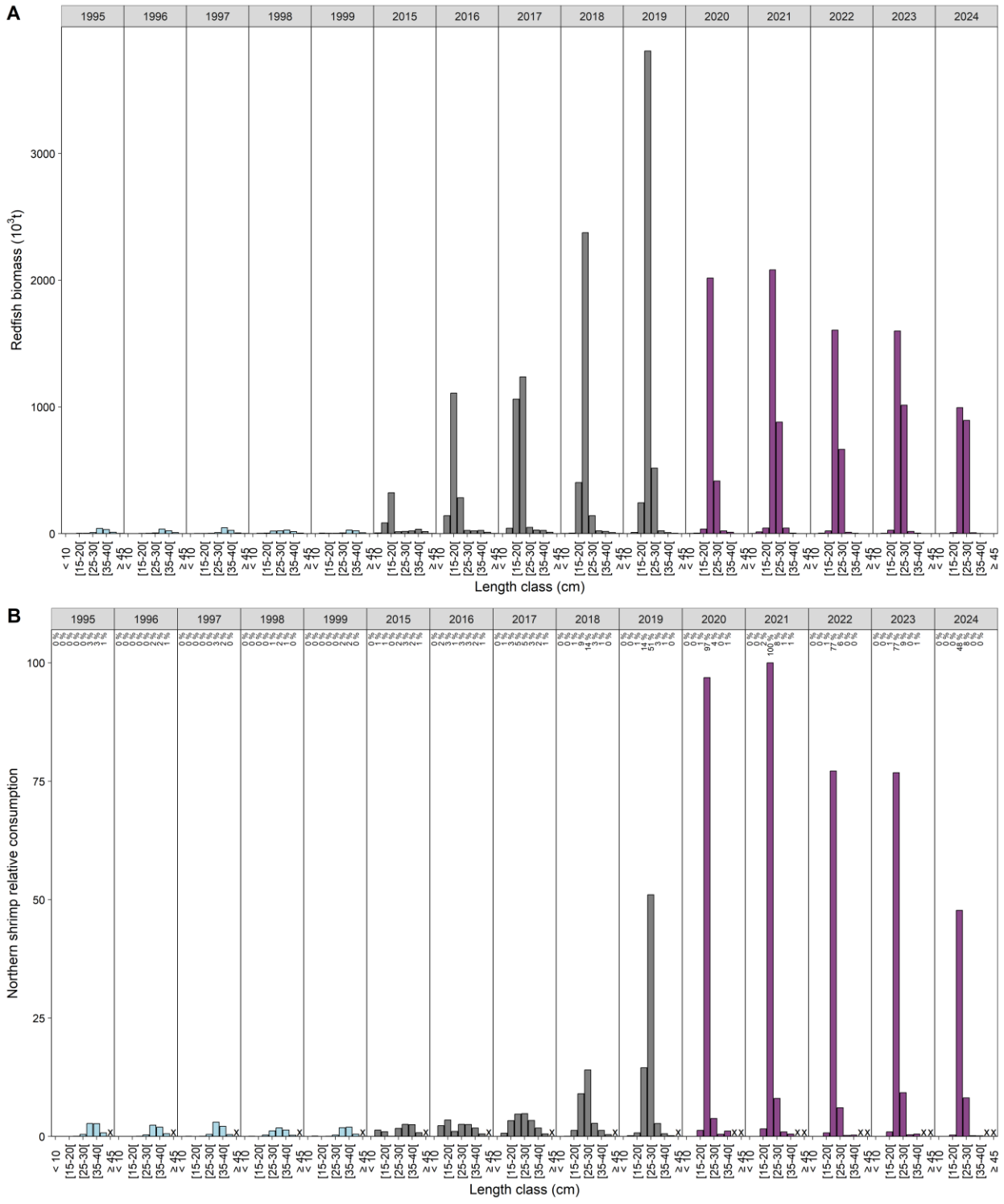


Figure 12. Estimated a) annual redfish biomass and b) relative redfish consumption of northern shrimp by length class for the following periods: 1995-1999, 2015-2019 and 2020-2024 in the nGLS. The values provided in the upper part of the panels are the relative consumption for a given year. An "x" symbol denotes < 20 stomachs collected for a given length class.

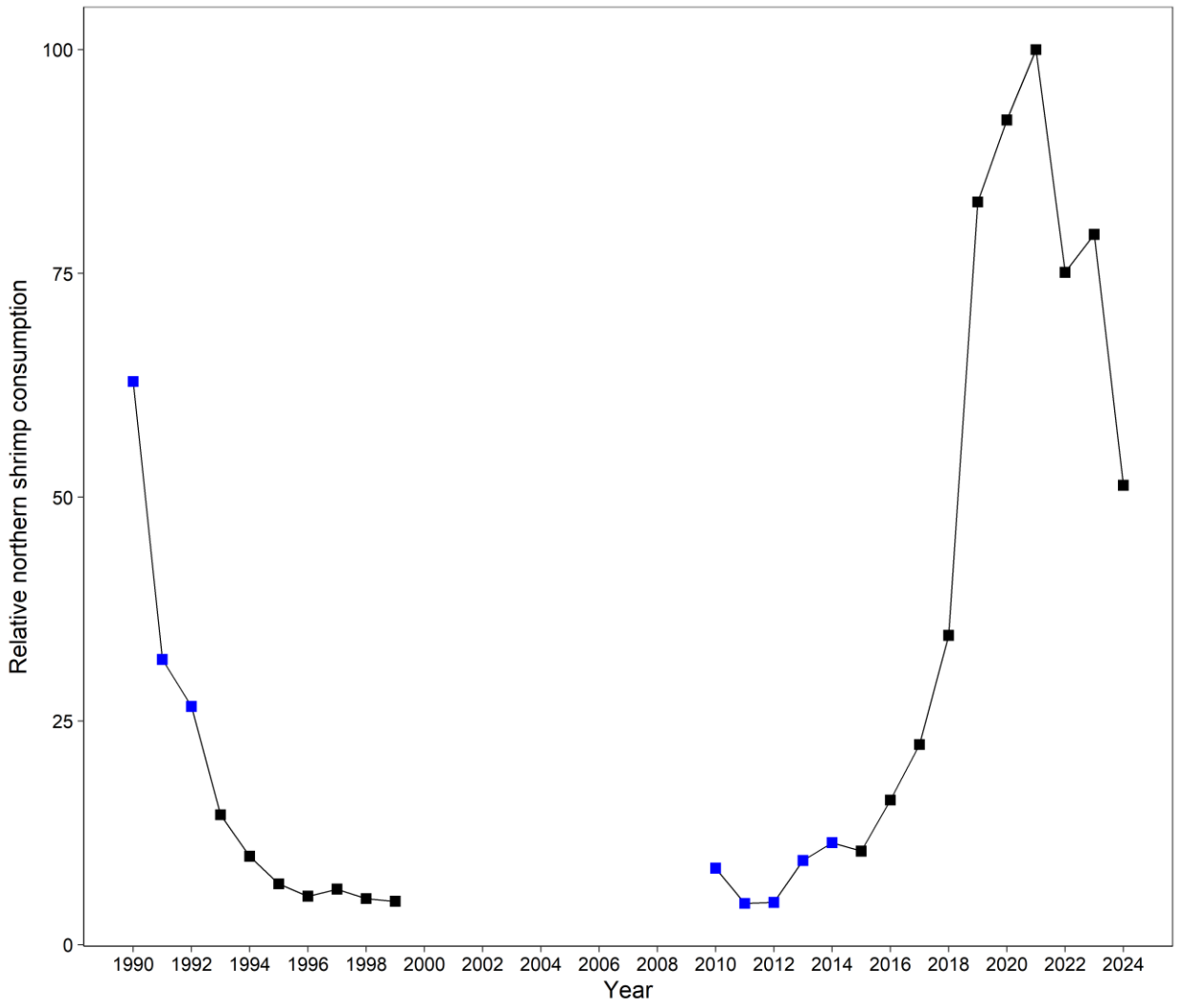


Figure 13. Annual relative consumption estimated of northern shrimp by redfish. For the dots in blue, shrimp relative consumption was estimated from consumption data for the closest period since no stomach contents were available.

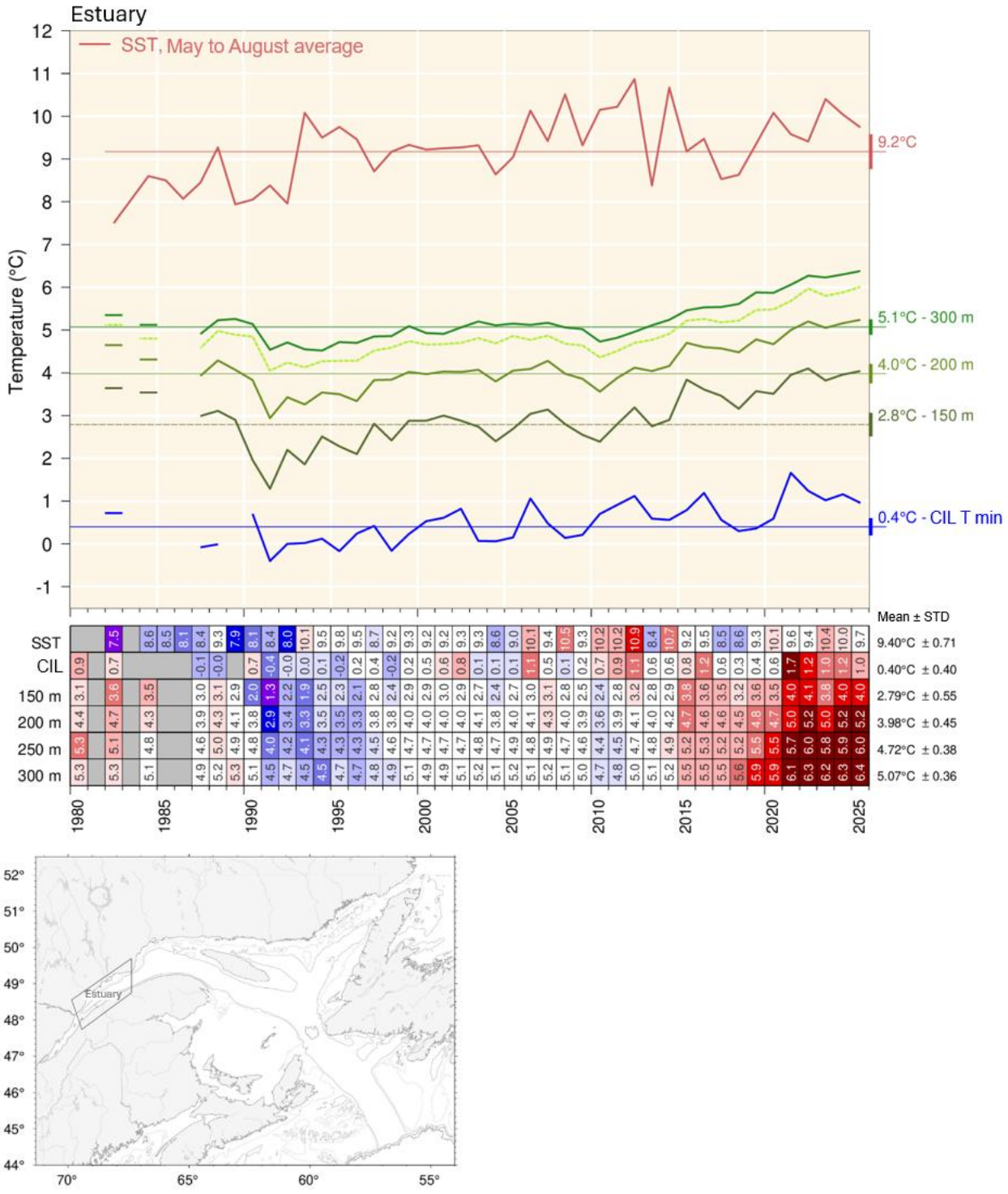


Figure 14. Water temperatures in the Gulf by bio-region. Average surface temperature for the months of May to August (1982–2025) (red lines). Average temperature per layer, at 150, 200, 250 and 300 m (green lines). Index of the minimum temperature of the cold intermediate layer adjusted to July 15 (blue line).

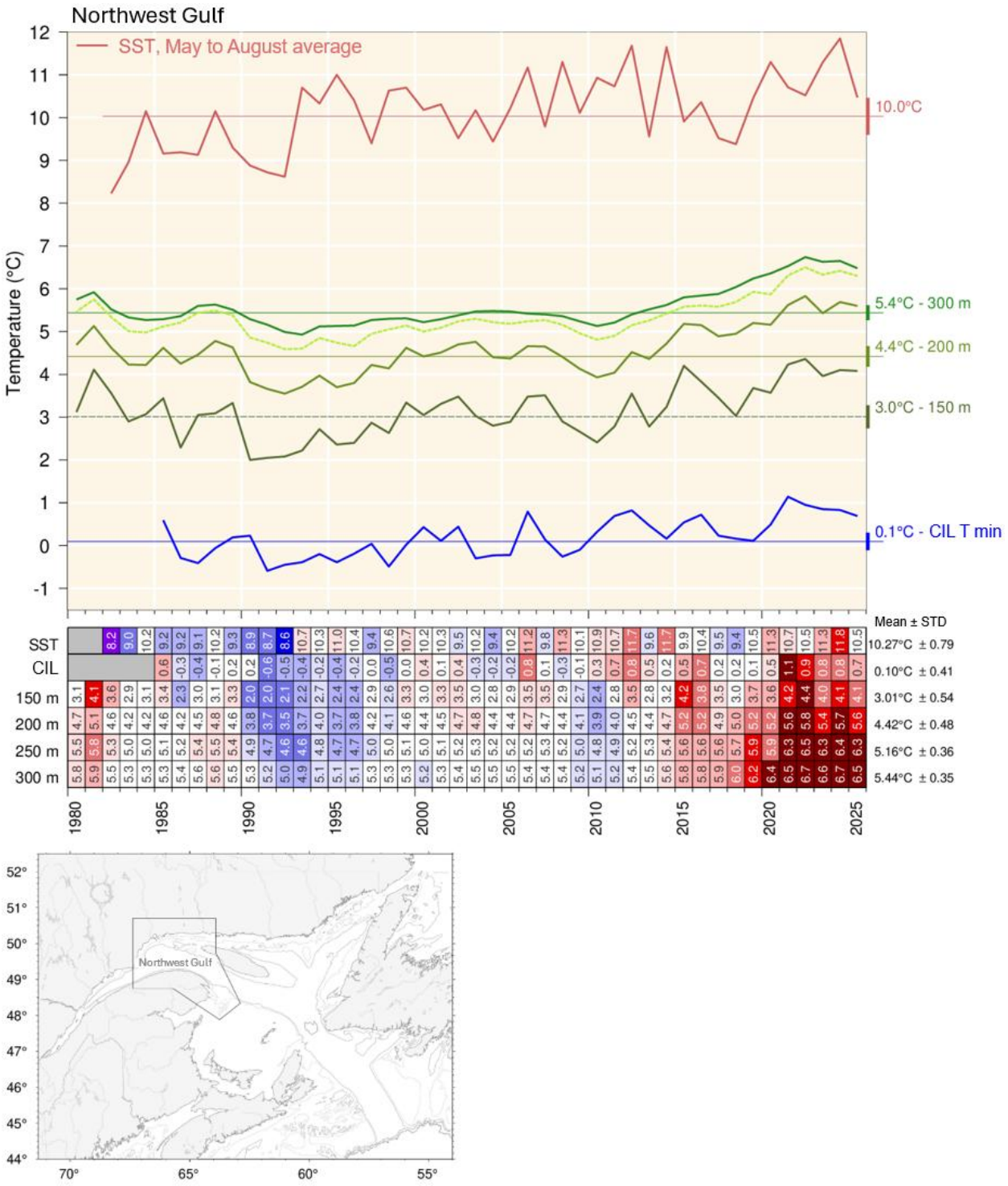


Figure 14. Continued.

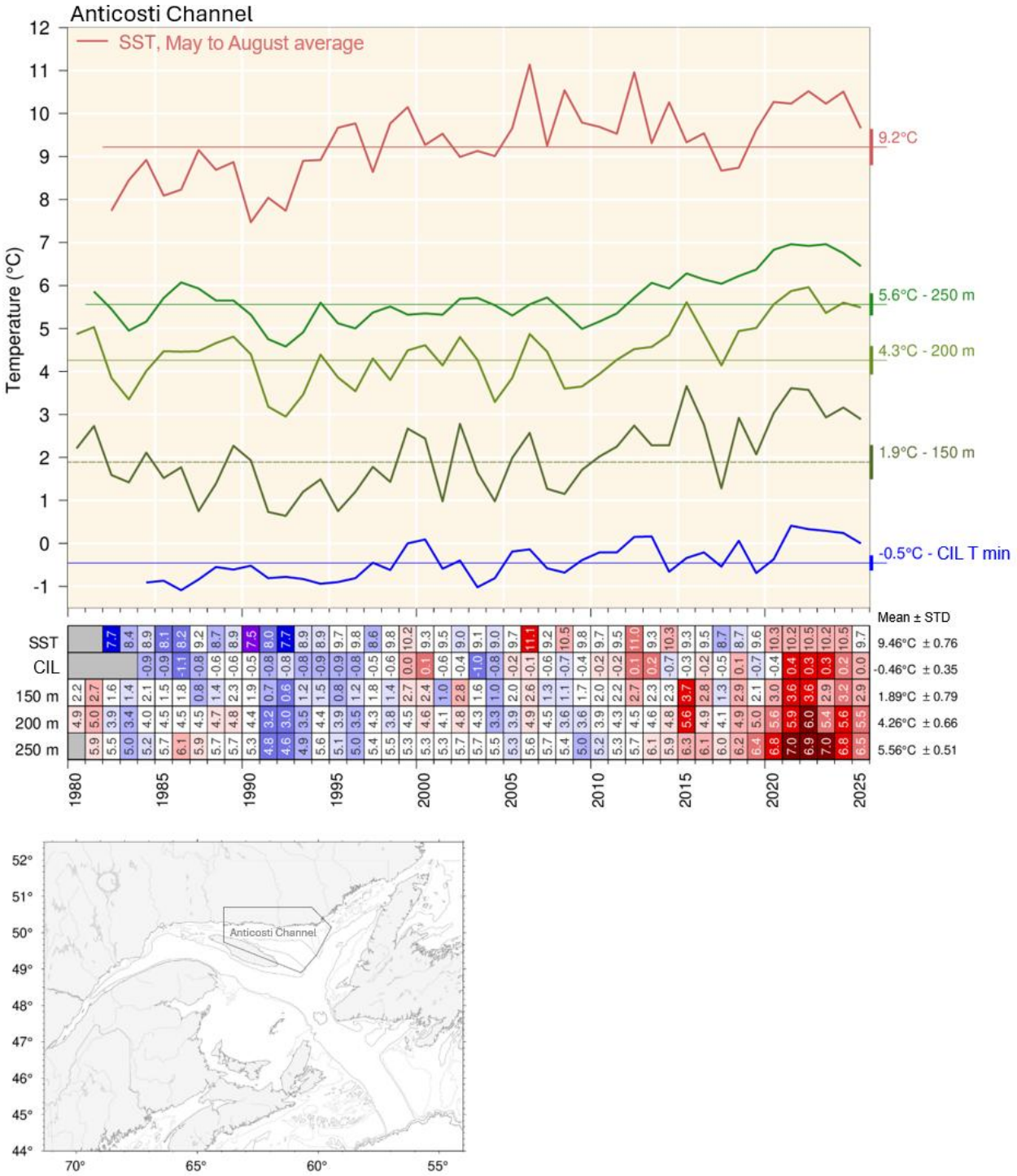


Figure 14. Continued.

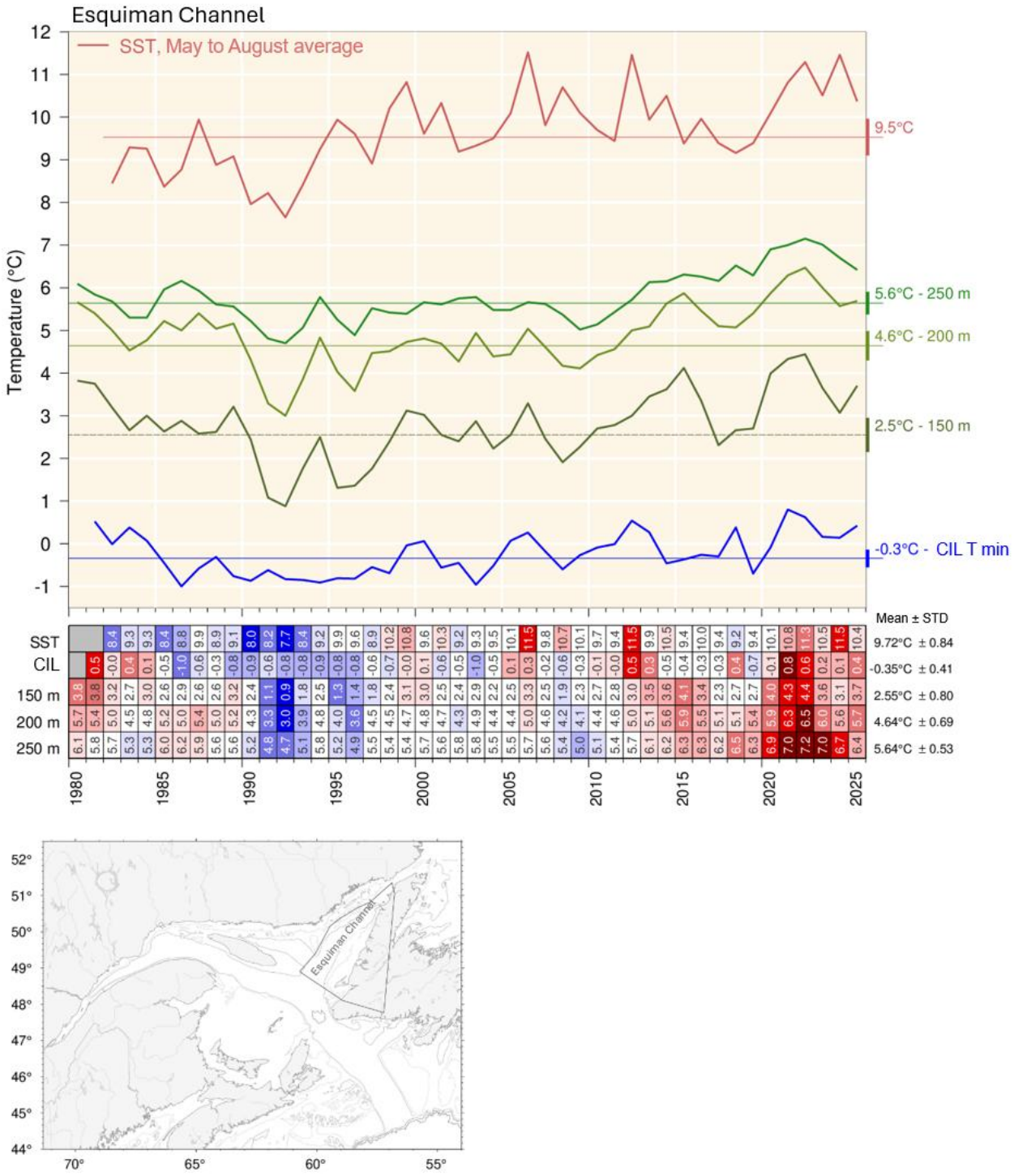


Figure 14. Continued.

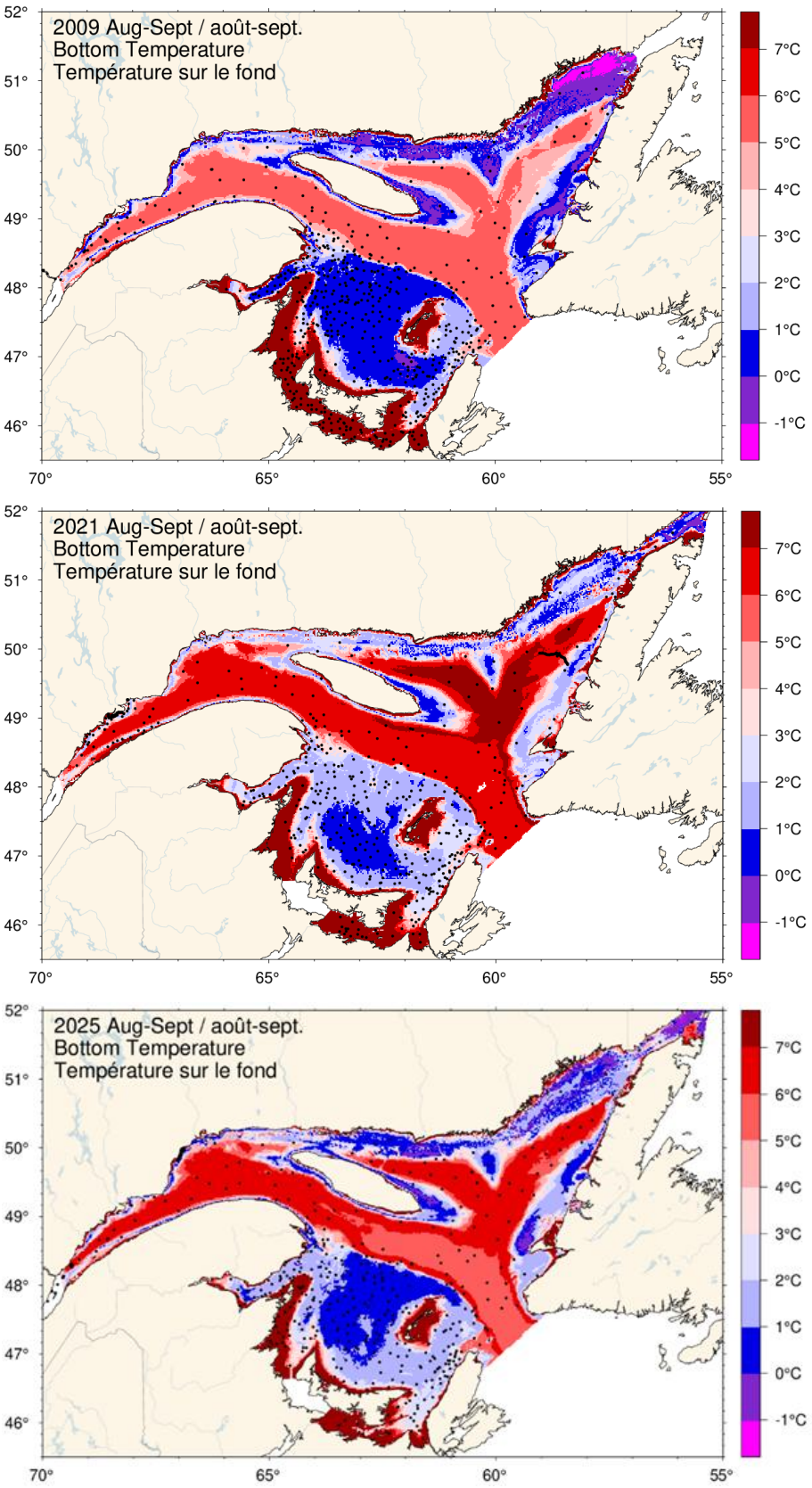


Figure 15. Bottom temperature observed in August-September in 2009, 2021 and 2025.

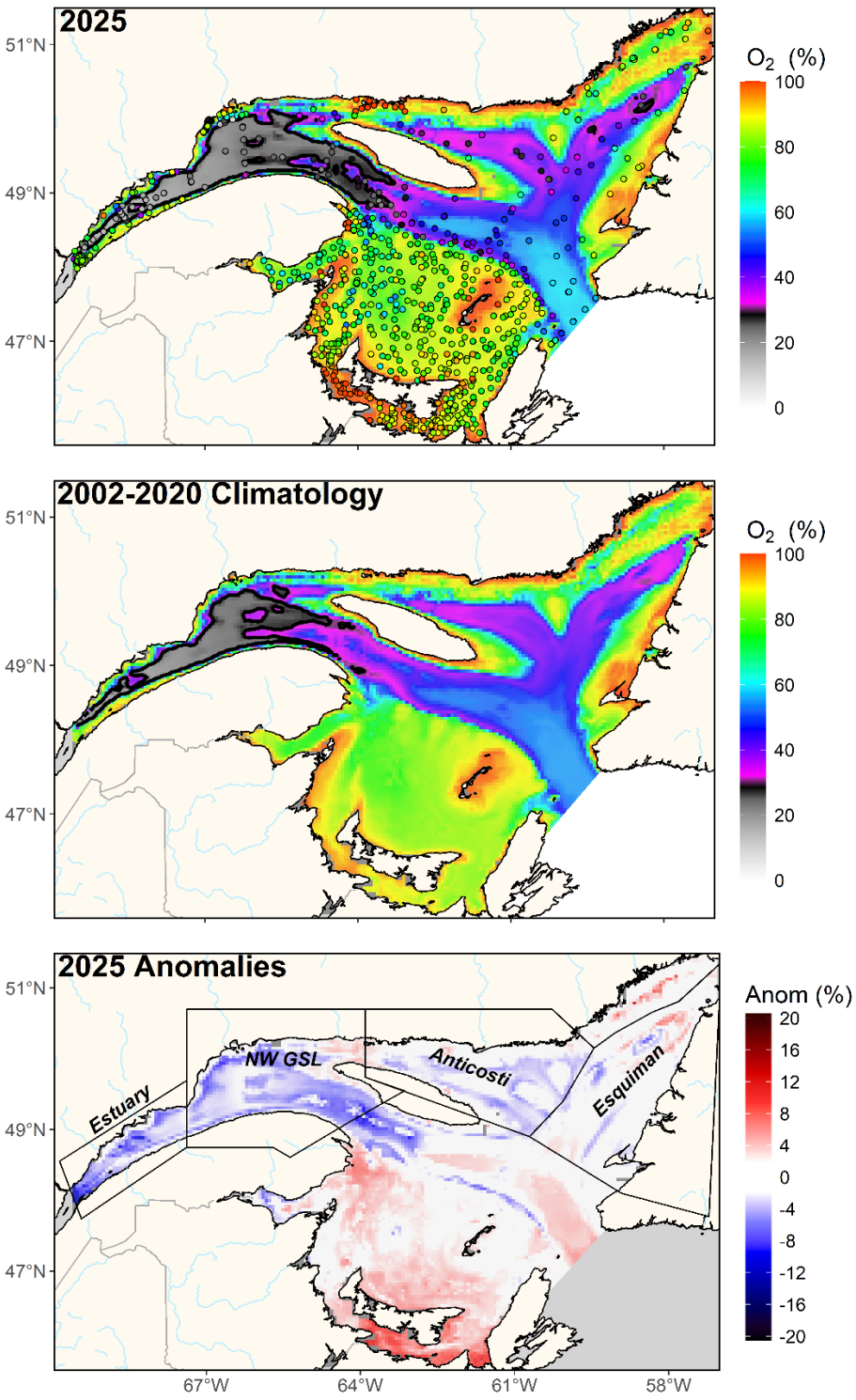


Figure 16. Mean annual bottom dissolved oxygen saturation in near-bottom water of the Estuary and Gulf of St. Lawrence in 2025 (top panel). The climatology (2002–2020; middle panel) and the anomalies (bottom panel) are also shown. Black contour lines identify areas associated with hypoxic waters (<30%). In the bottom panel, blue indicates below-normal levels (negative anomalies), red indicates above-normal levels (positive anomalies), and white represents normal levels. Open circles indicate the locations of the 2025 stations.

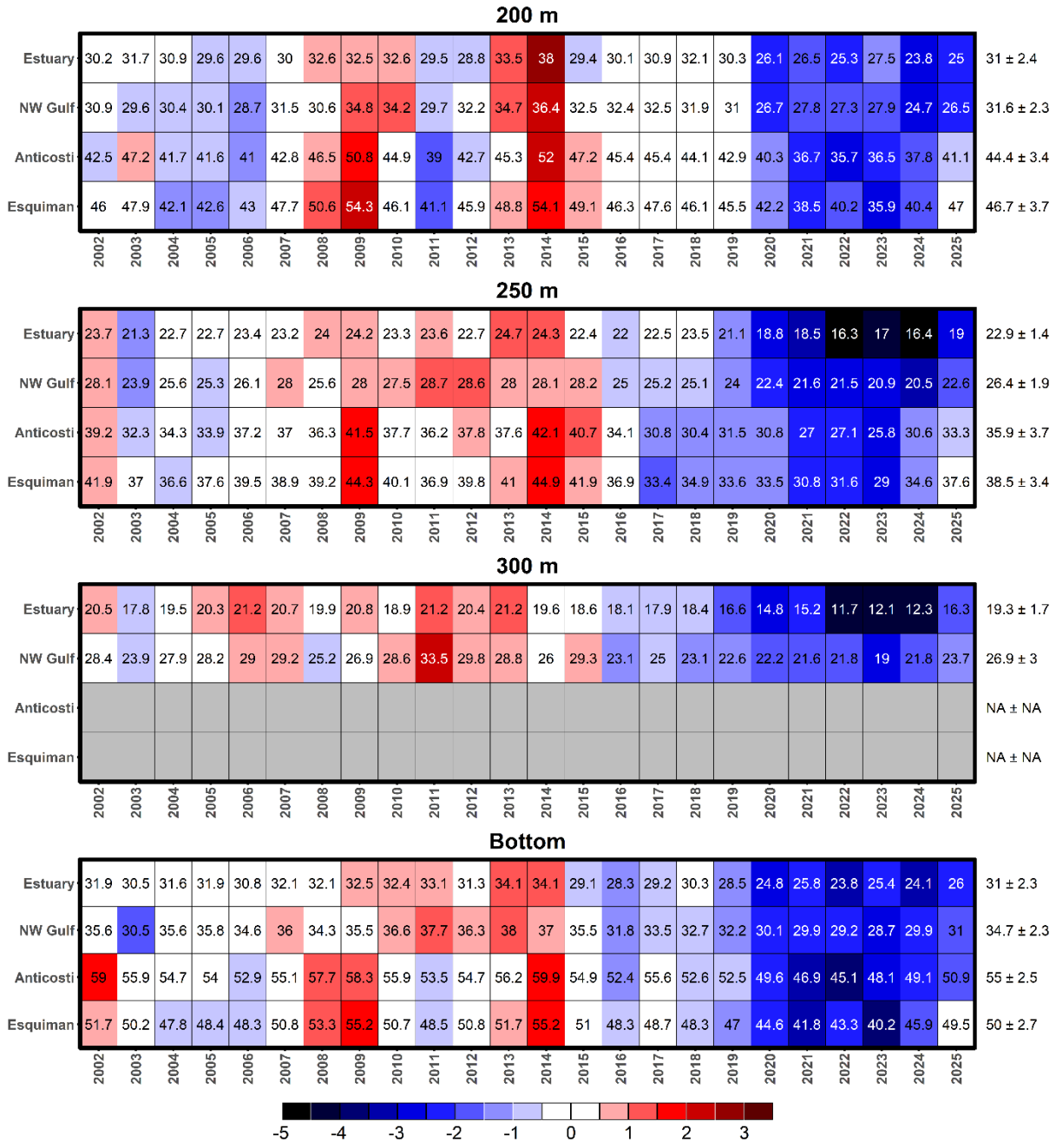


Figure 17. Annual mean dissolved oxygen saturation (%) in the deep layer at 200 m, 250 m, and 300 m, as well as at the bottom (for locations deeper than 100 m). The numbers on the right indicate the climatological means and standard deviations for the 2002–2020 period, and the numbers in the cells correspond to the oxygen saturation levels. Blue colors indicate below-normal levels (negative anomalies), red indicates above-normal levels (positive anomalies), and white cells represent normal levels.

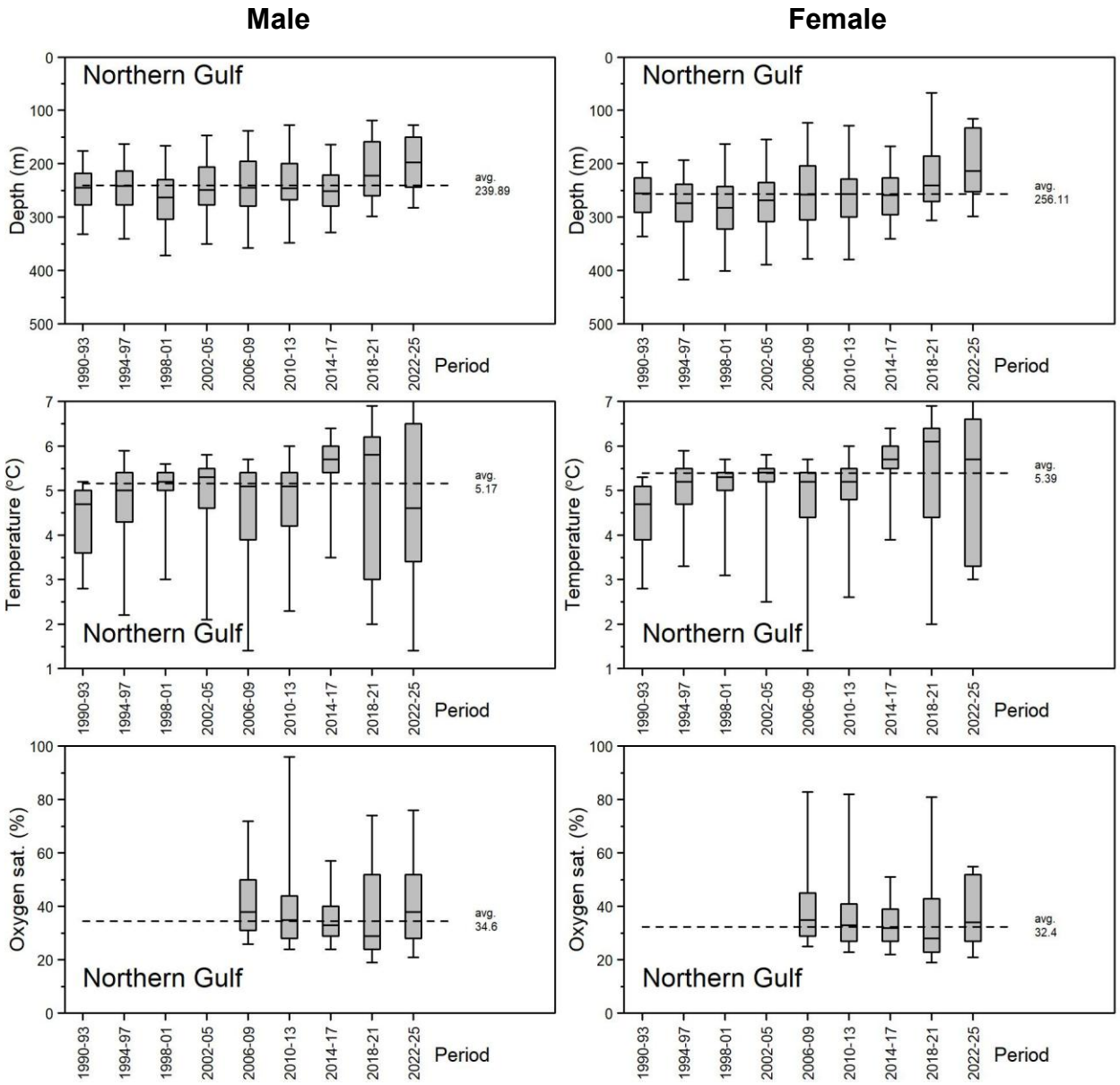


Figure 18. Biomass distributions of northern shrimp male and female as function of depth, bottom water temperature and saturation of dissolved oxygen per 4 years period observed in the August DFO survey in the Estuary and northern Gulf.

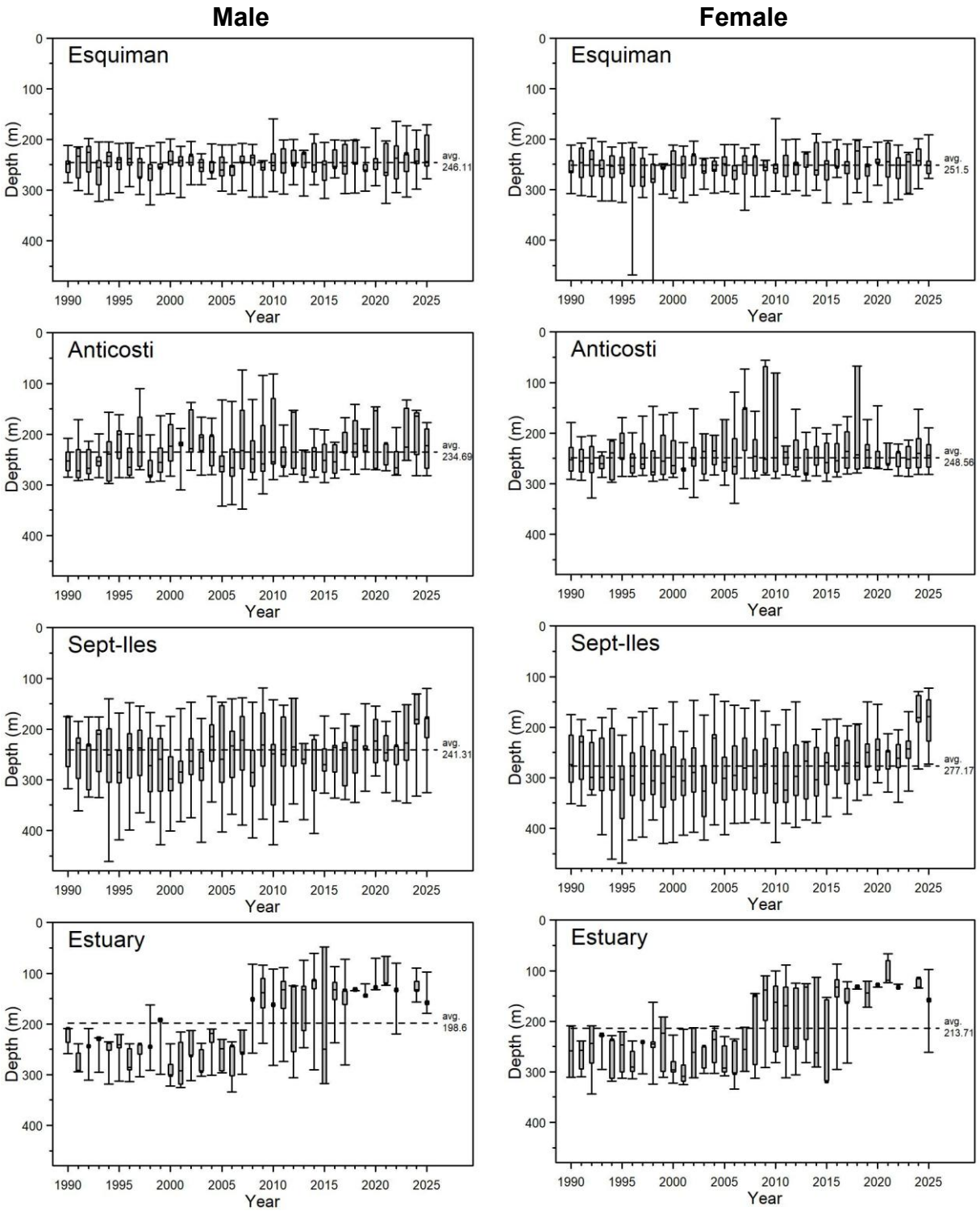


Figure 19. Biomass distributions of northern shrimp male and female as function of depth per year observed in the August DFO survey in the four stock assessment units.

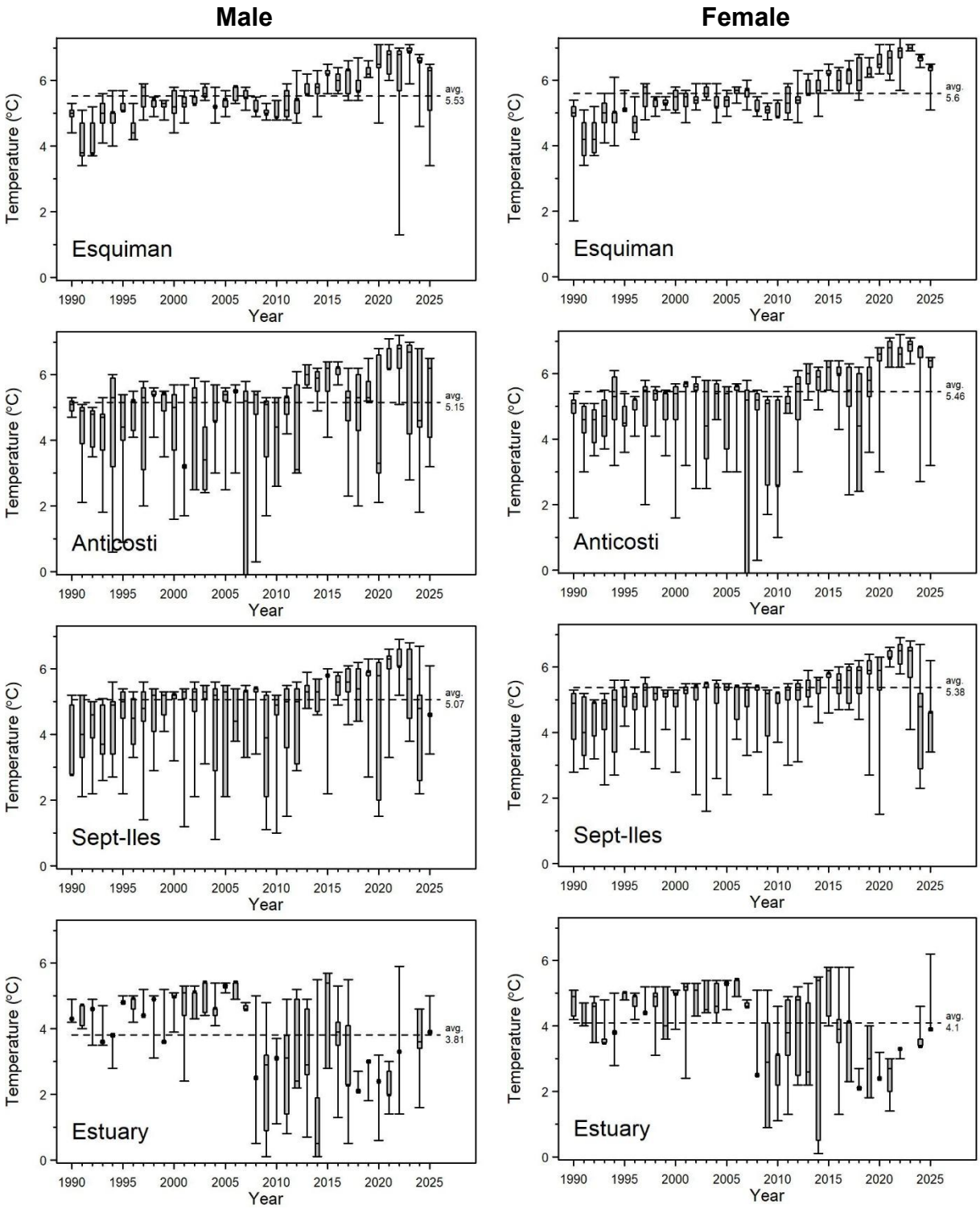


Figure 20. Biomass distributions of northern shrimp male and female as function of bottom temperature per year observed in the August DFO survey in the four stock assessment units..

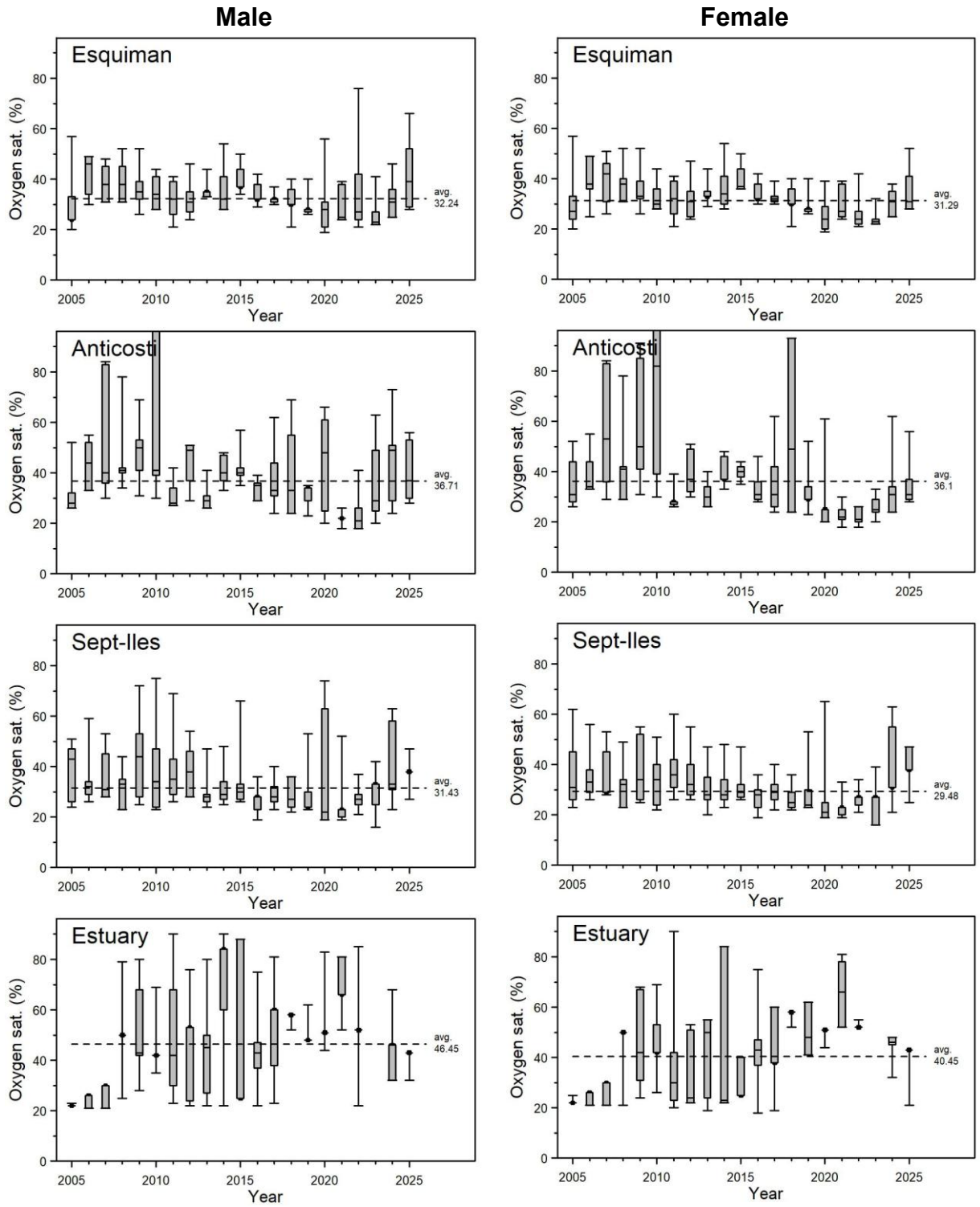


Figure 21. Biomass distributions of northern shrimp male and female as function of saturation of dissolved oxygen per year observed in the August DFO survey in the four stock assessment units.

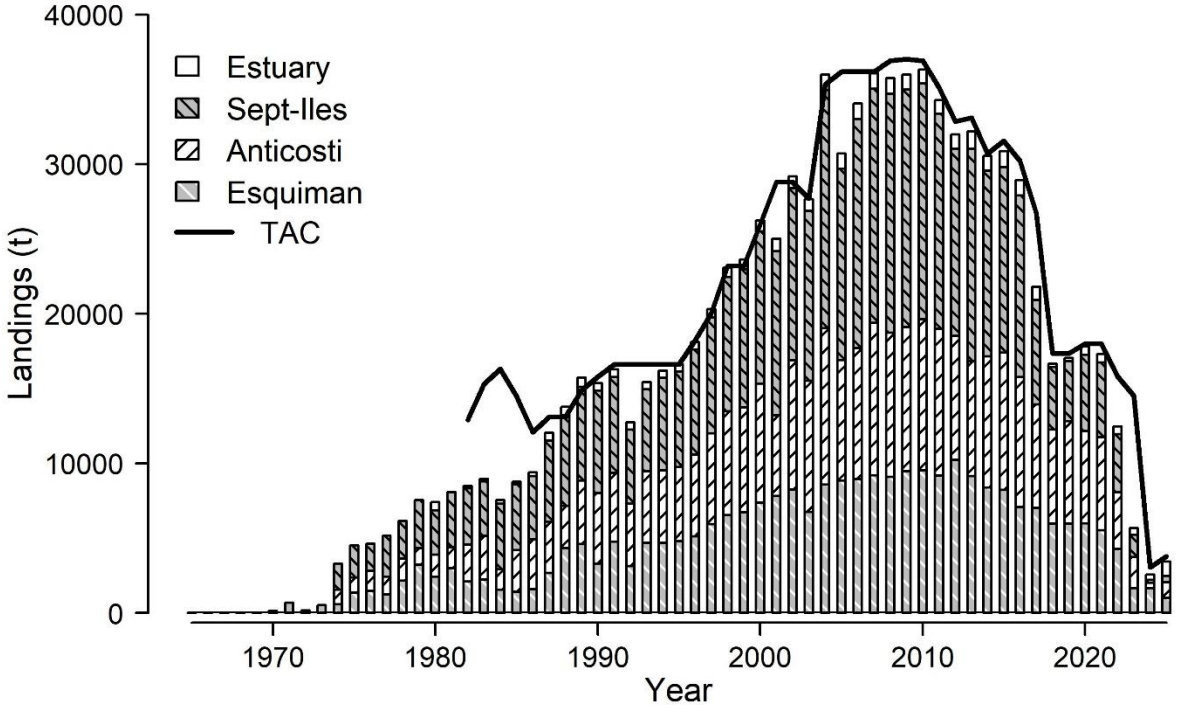


Figure 22. Landing by shrimp fishing area and total allowable catches (TAC) in the Estuary and Gulf of St. Lawrence.

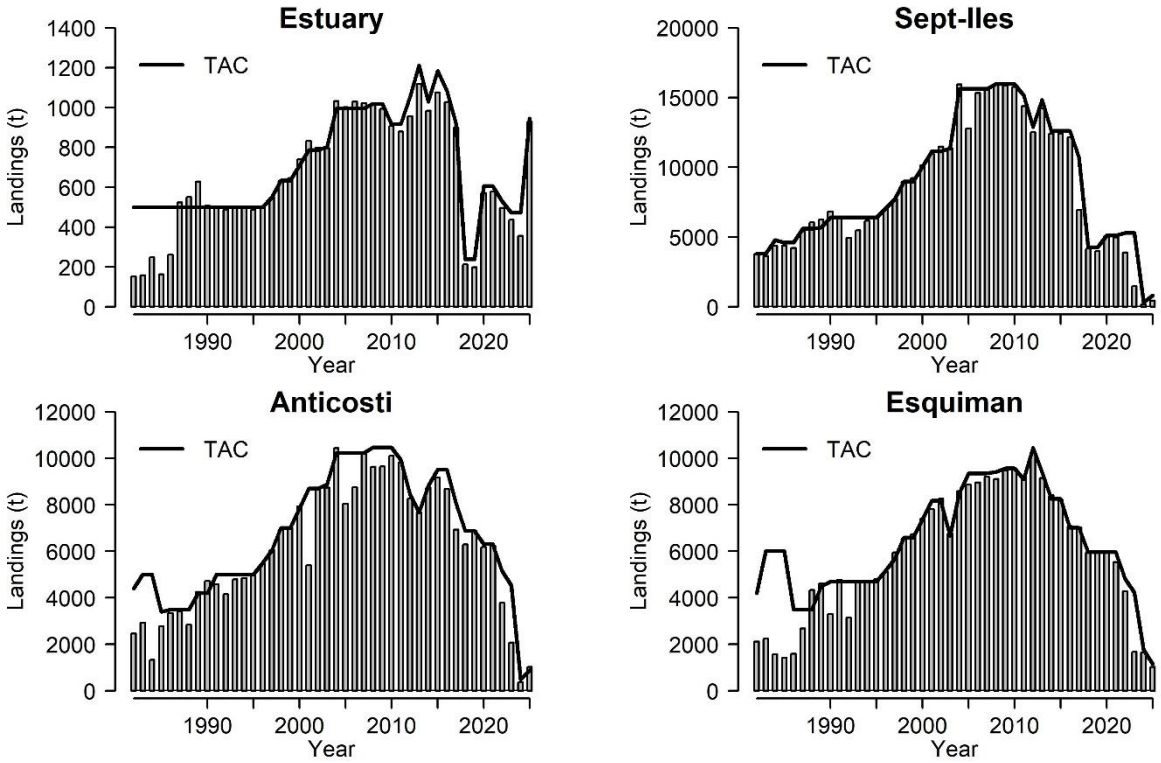


Figure 23. Landing and total allowable catches (TAC) by shrimp fishing area.

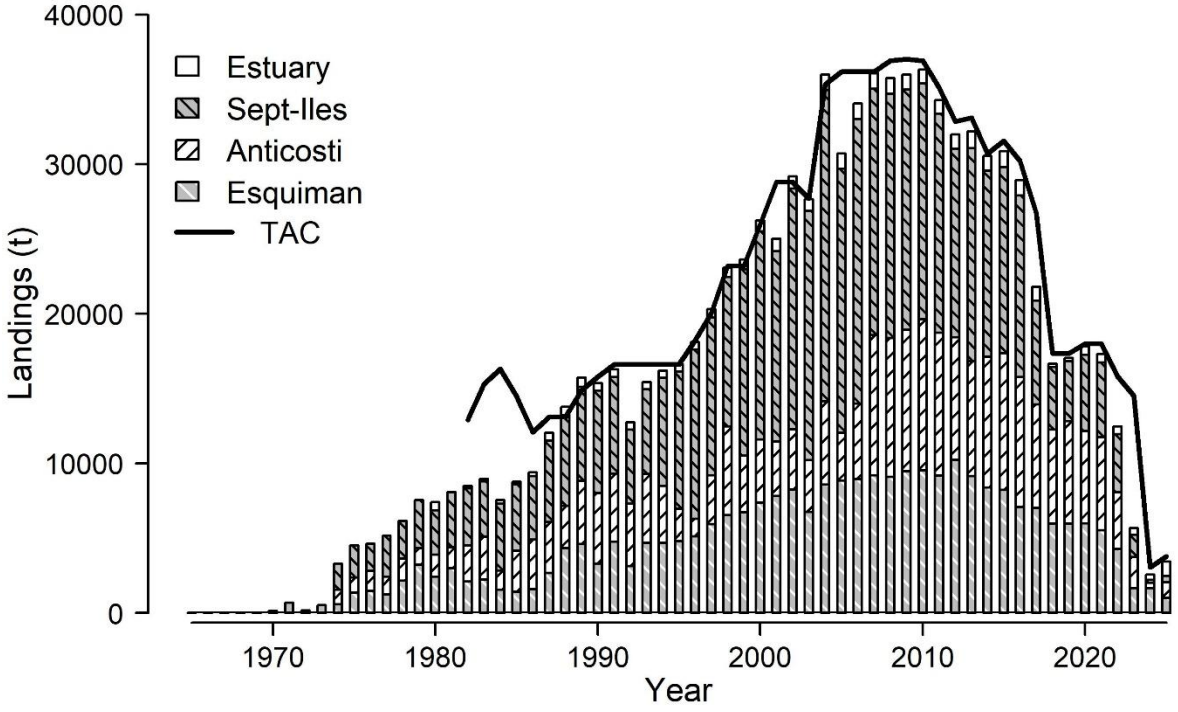


Figure 24. Landing per stock assessment unit and total allowable catches (TAC) in the Estuary and Gulf of St. Lawrence.

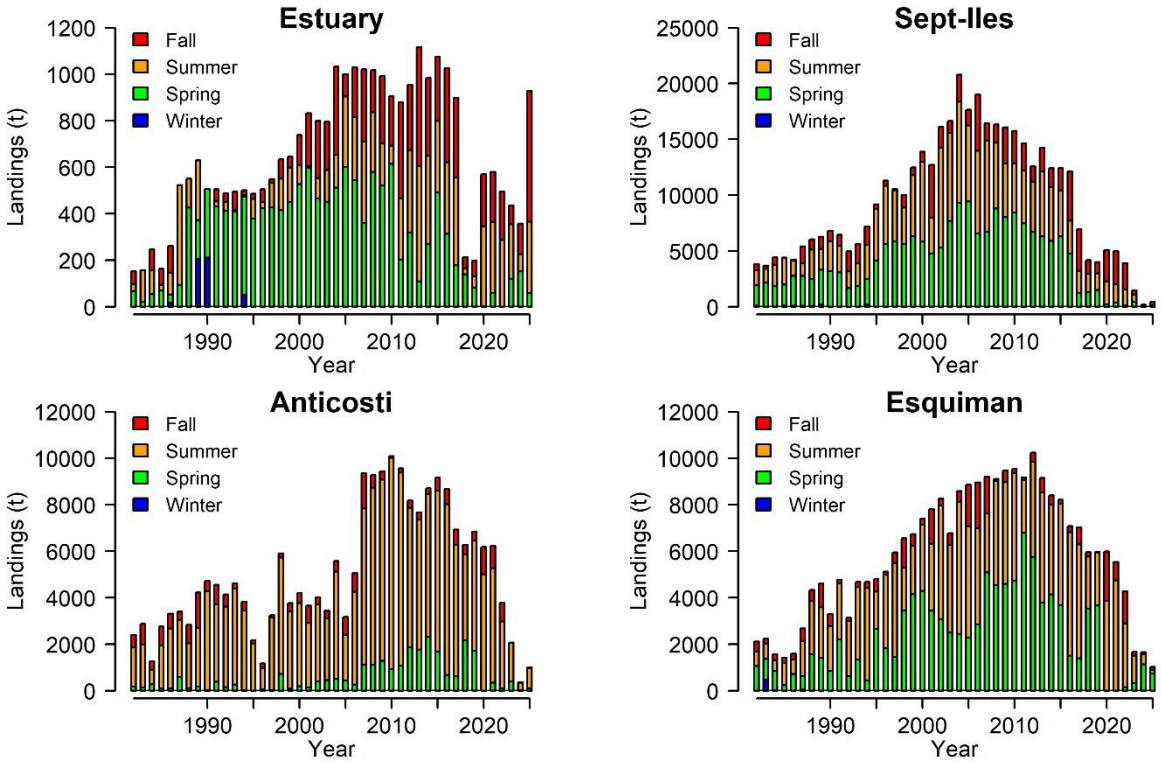


Figure 25. Seasonal landing by stock assessment unit.

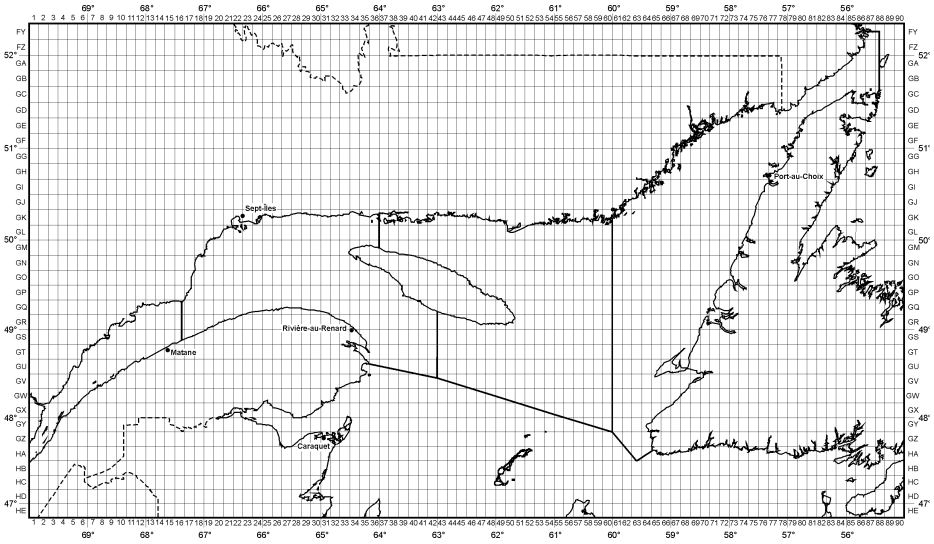


Figure 26. Statistical squares used to list the fishing effort the Estuary and Gulf of St. Lawrence.

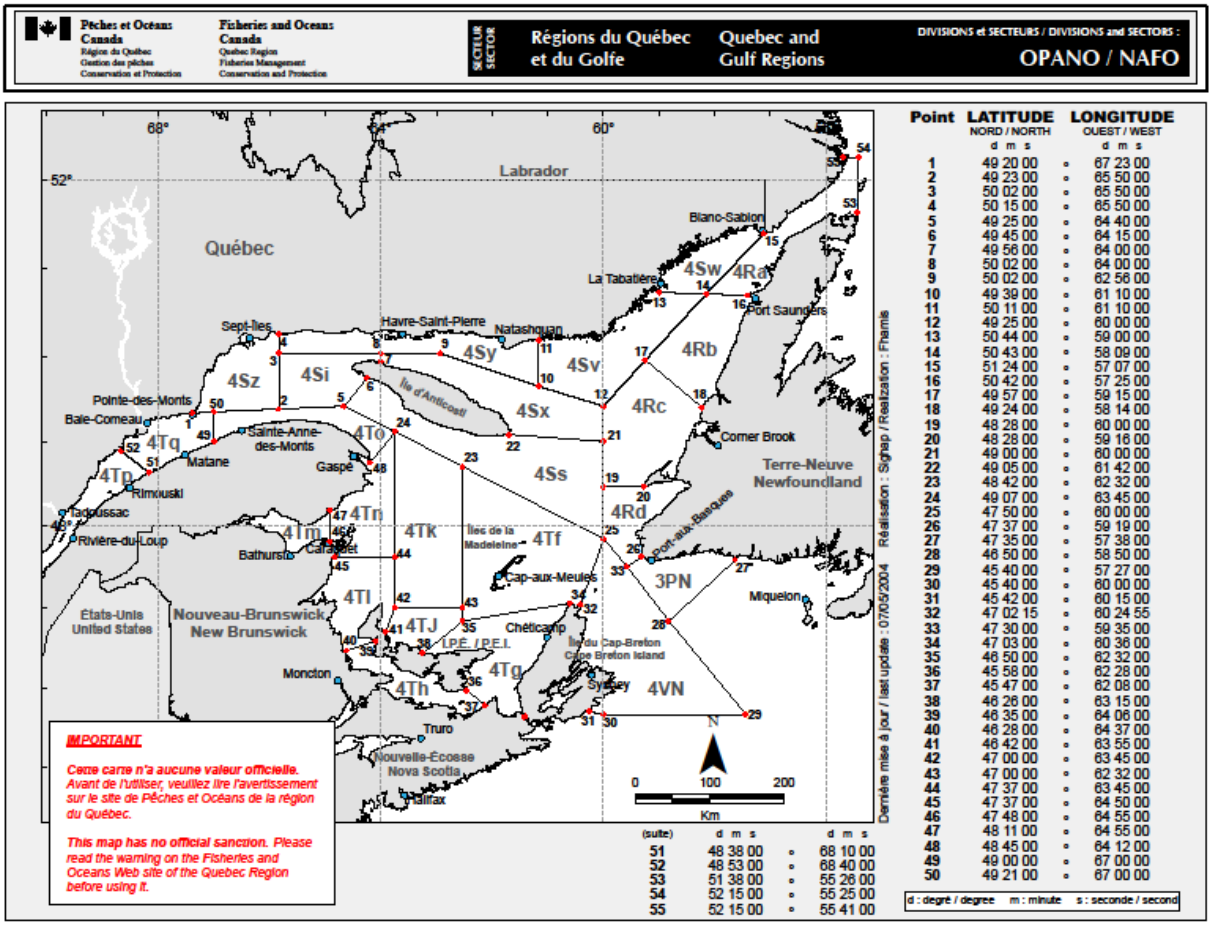


Figure 27. NAFO unit areas in the Estuary and Gulf of St. Lawrence.

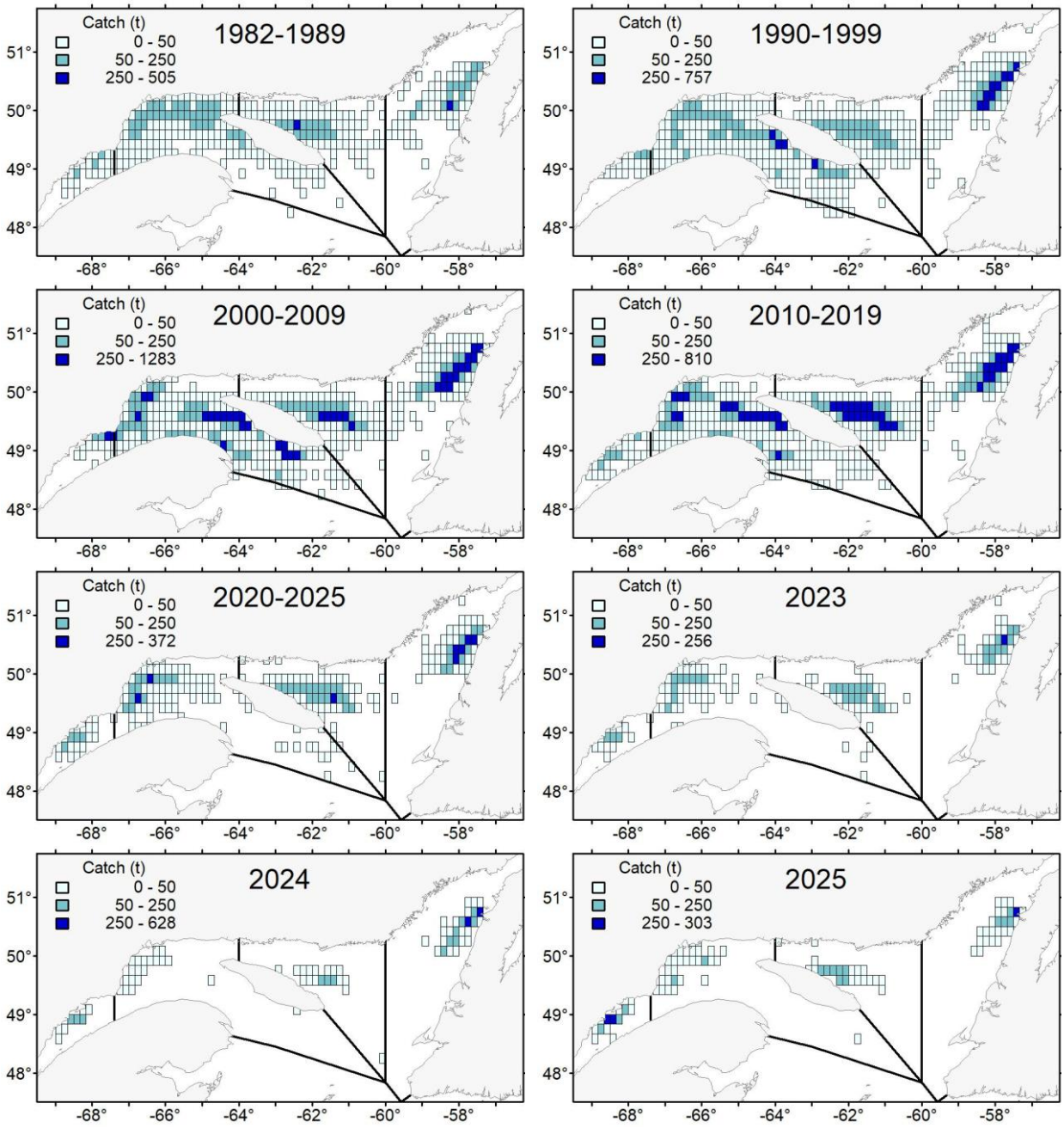


Figure 28. Catches (t) by statistical square by decade (annual mean) and from 2023 to 2025.

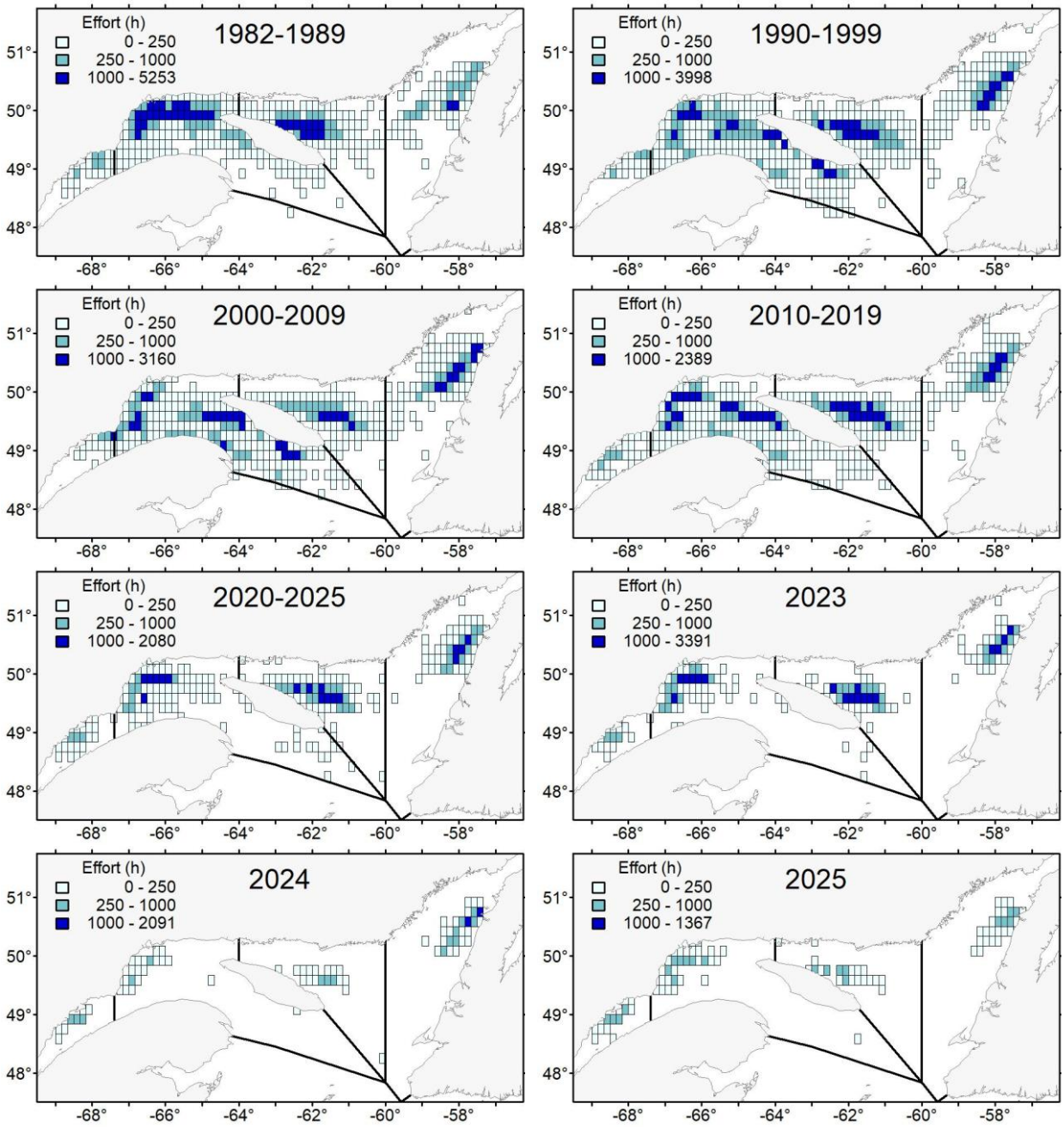


Figure 29. Fishing effort (hours) by statistical square by decade (annual mean) and from 2023 to 2025.

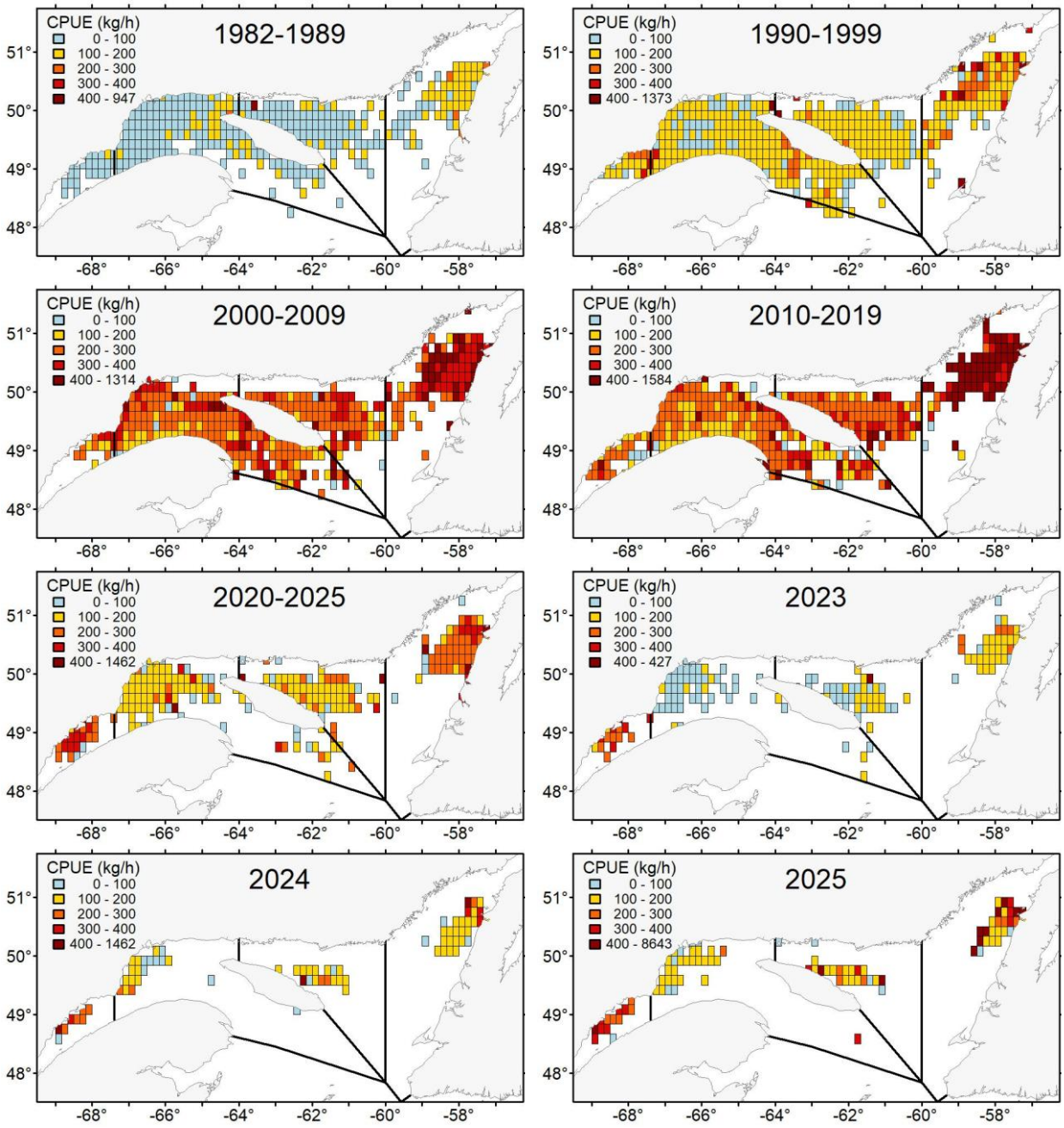


Figure 30. Catch per unit of effort (kg/hour) by statistical square by decade (annual mean) and from 2023 to 2025.

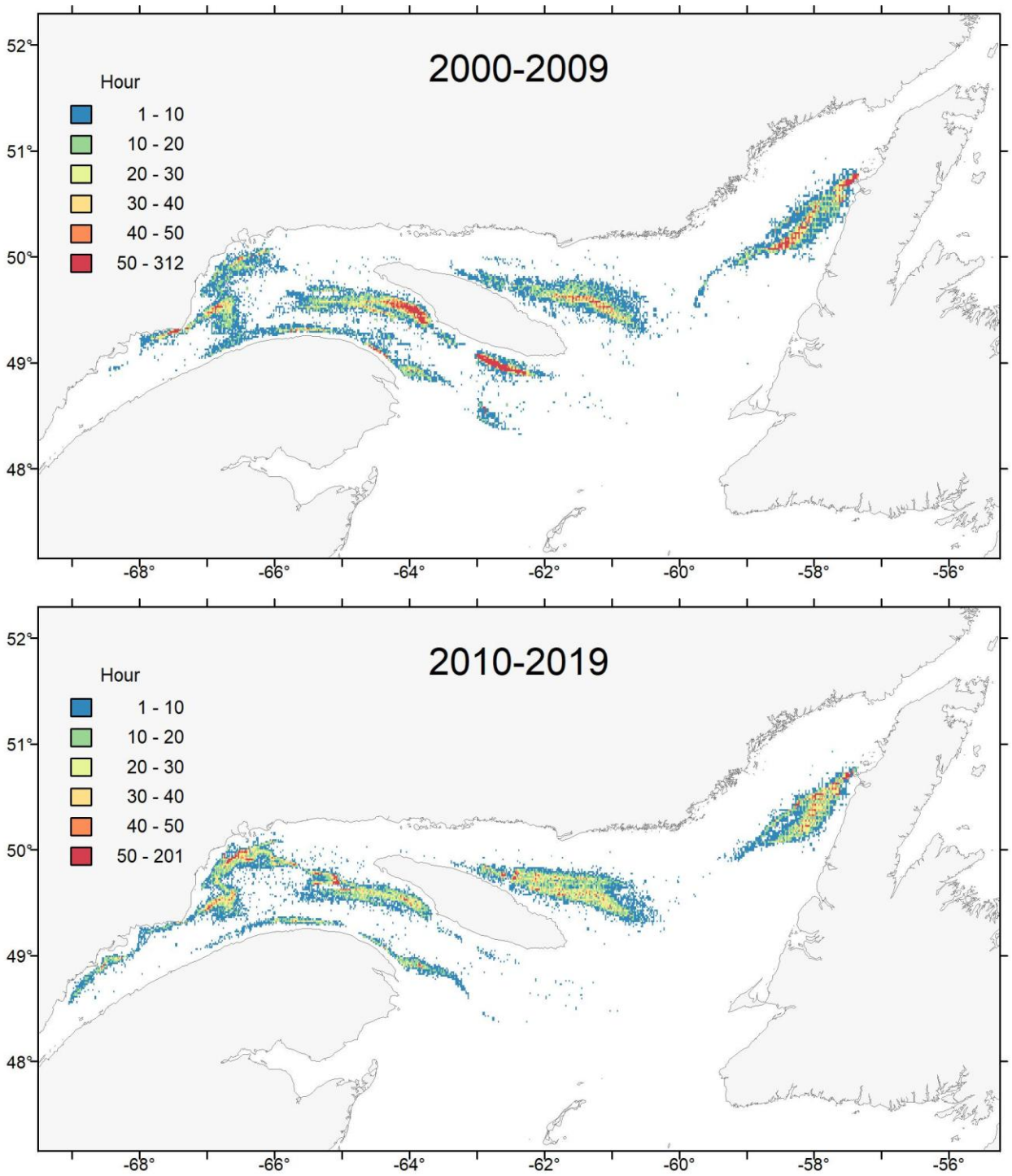


Figure 31. Average distribution of annual shrimp fishing effort in the Gulf of St. Lawrence by decade for the periods 2000 to 2009, 2010 to 2019 and 2020 to 2025 (number of hours per square of 1 minute) from logbook data.

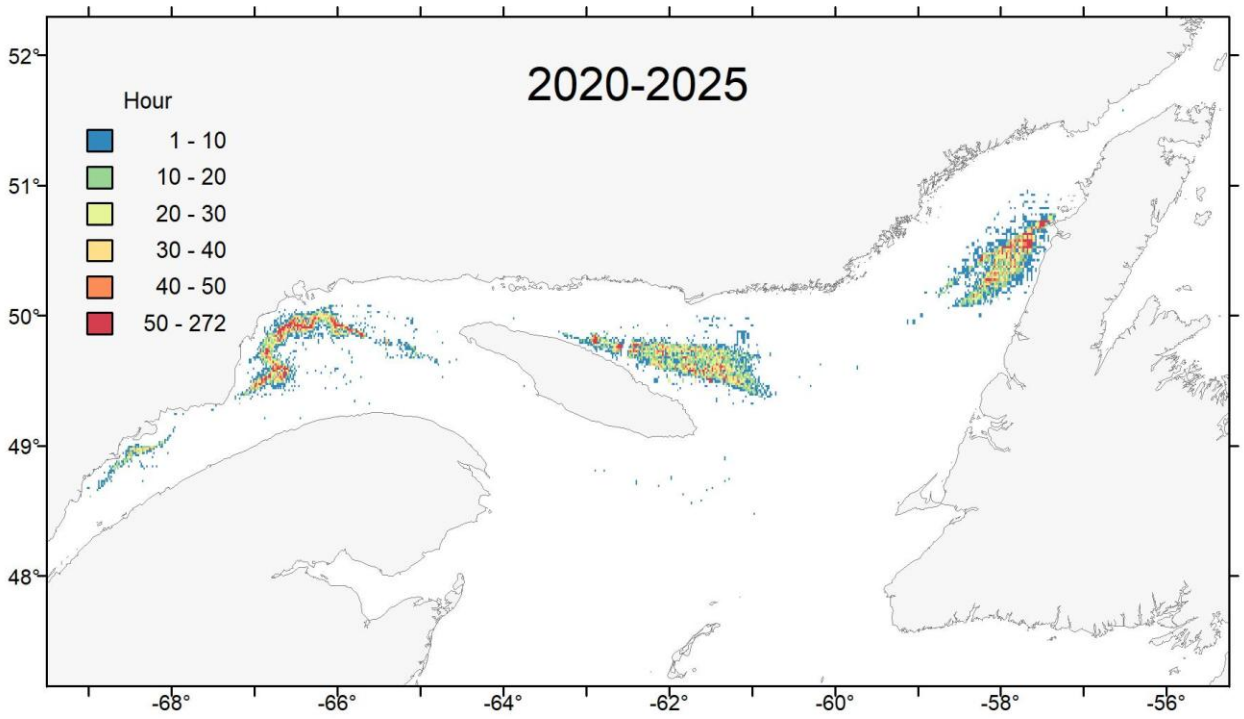


Figure 31. Continued.

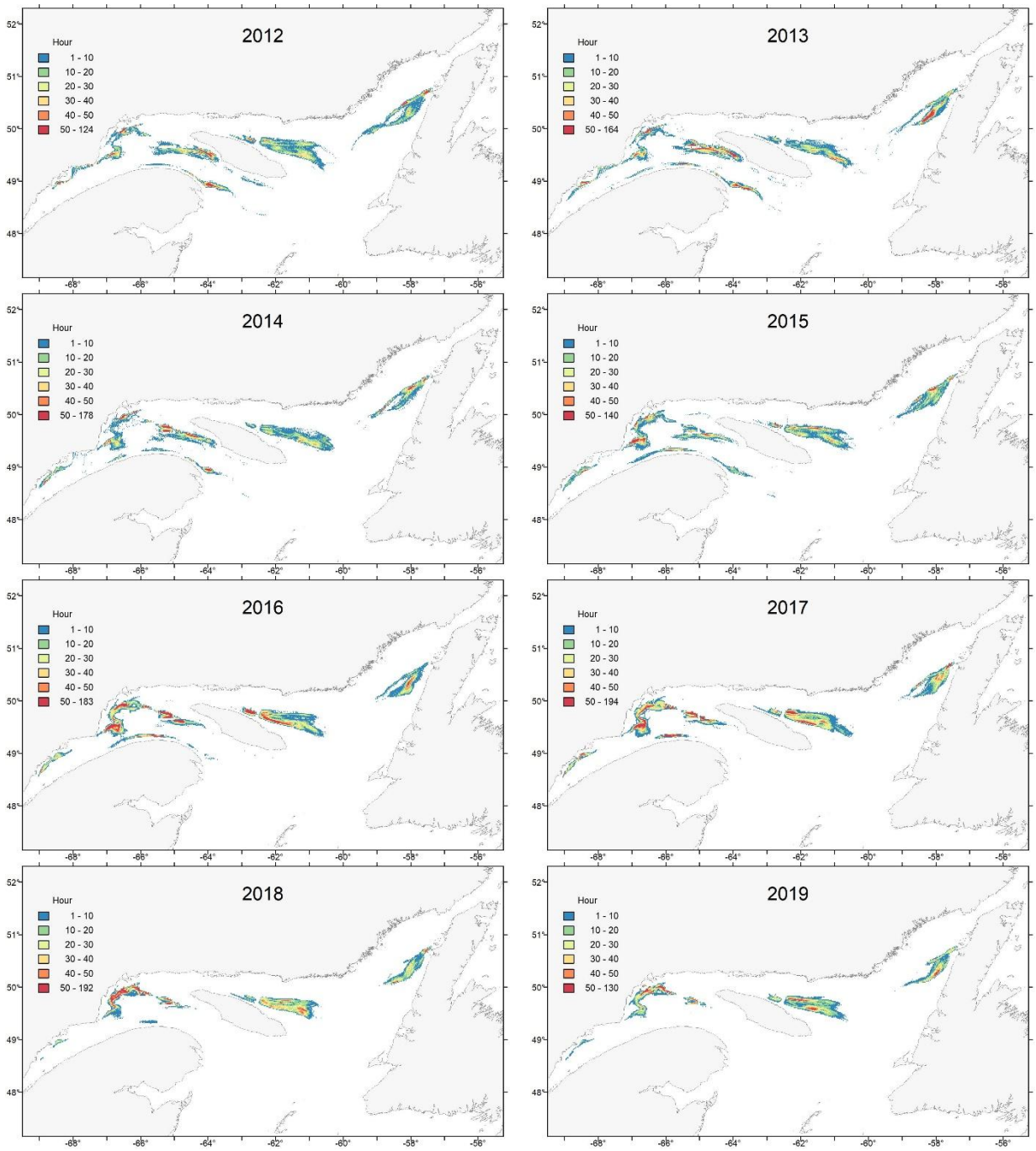


Figure 32. Distribution of shrimp fishing effort in the Gulf of St. Lawrence from 2012 to 2025 based on Vessel Monitoring System (VMS) data, number of hours in a directed shrimp fishery per 1 minute square.

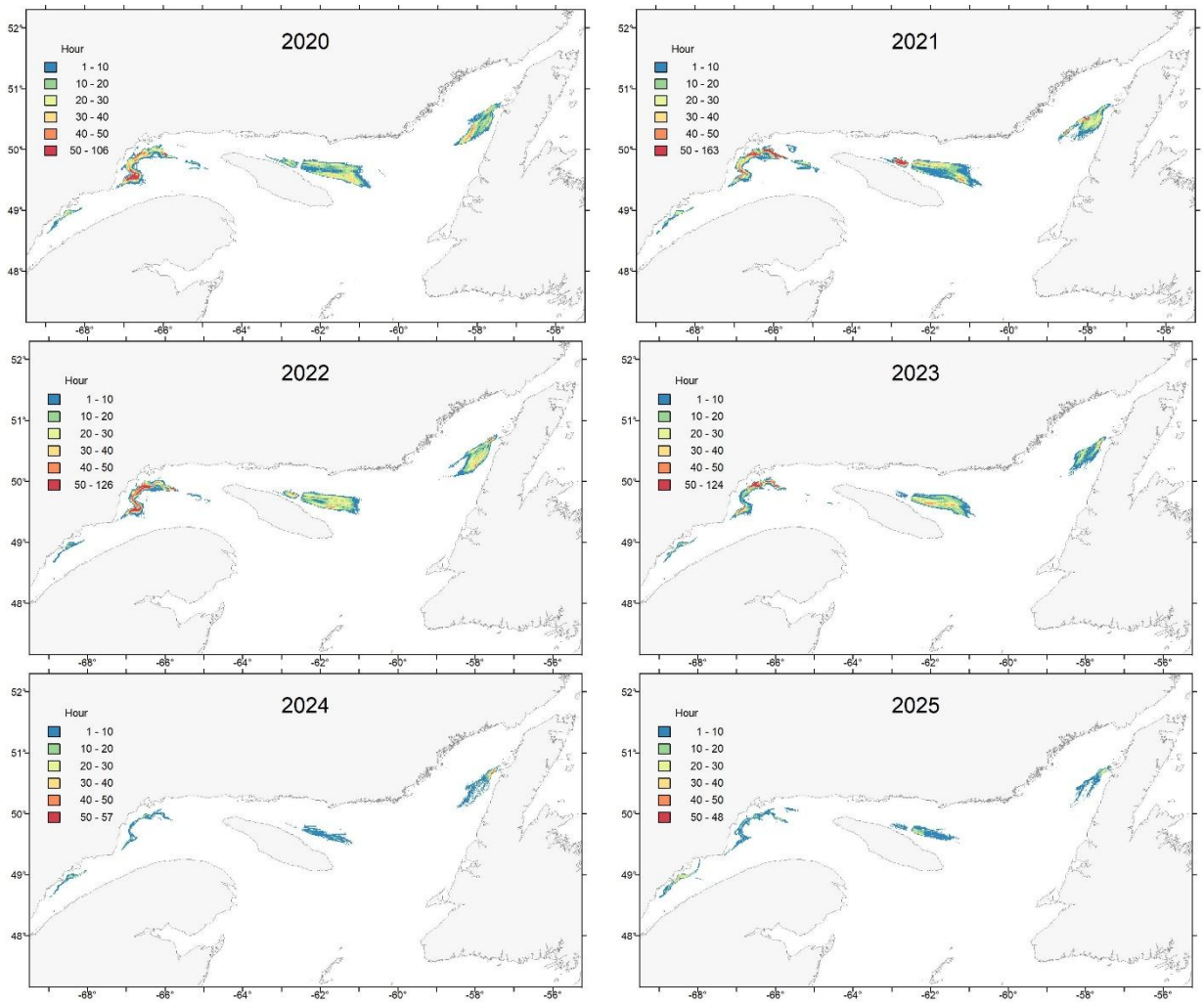


Figure 32. Continued.

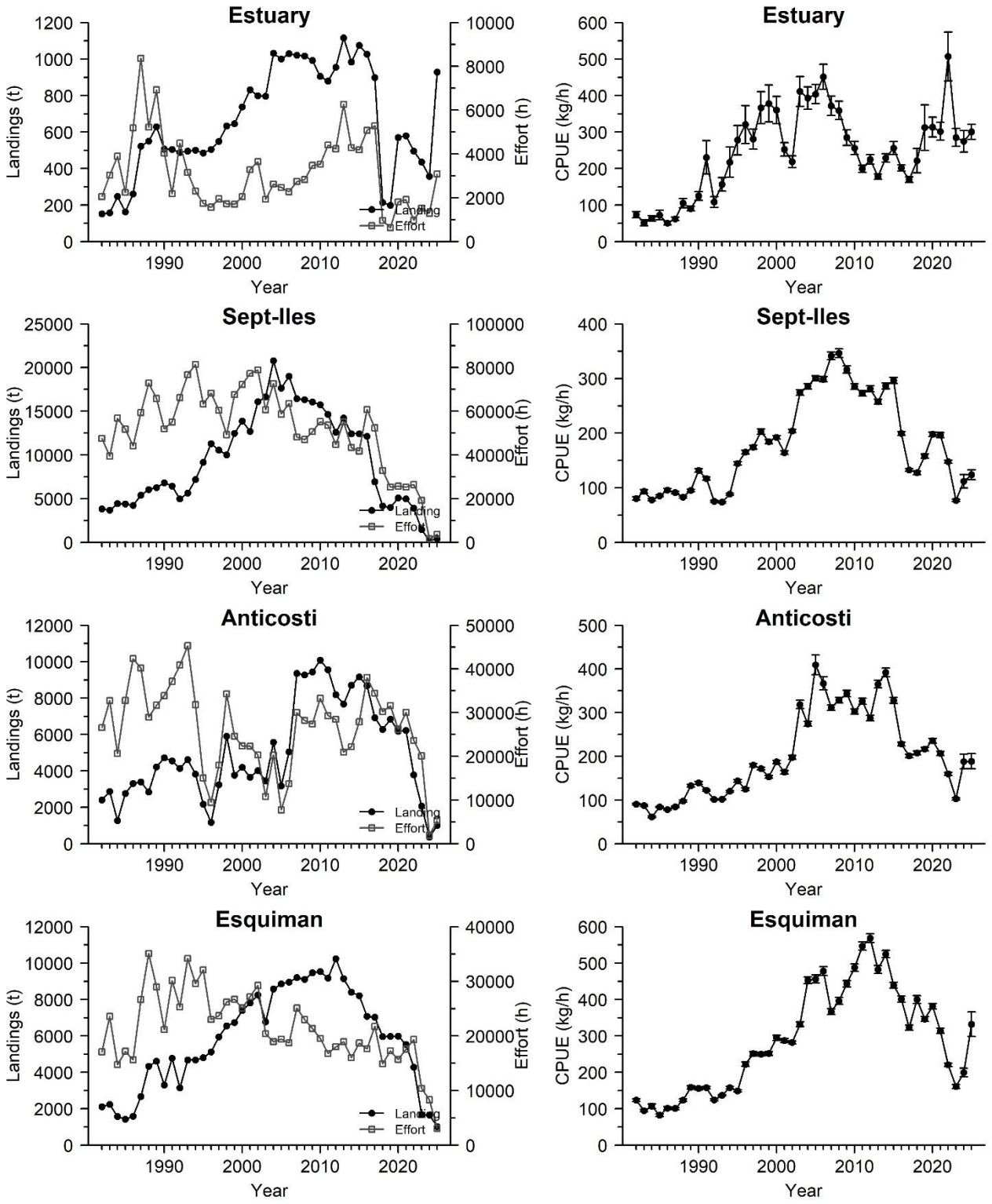


Figure 33. Landing, nominal effort and catch per unit of effort ± confidence interval (95%), by year and by stock assessment unit.

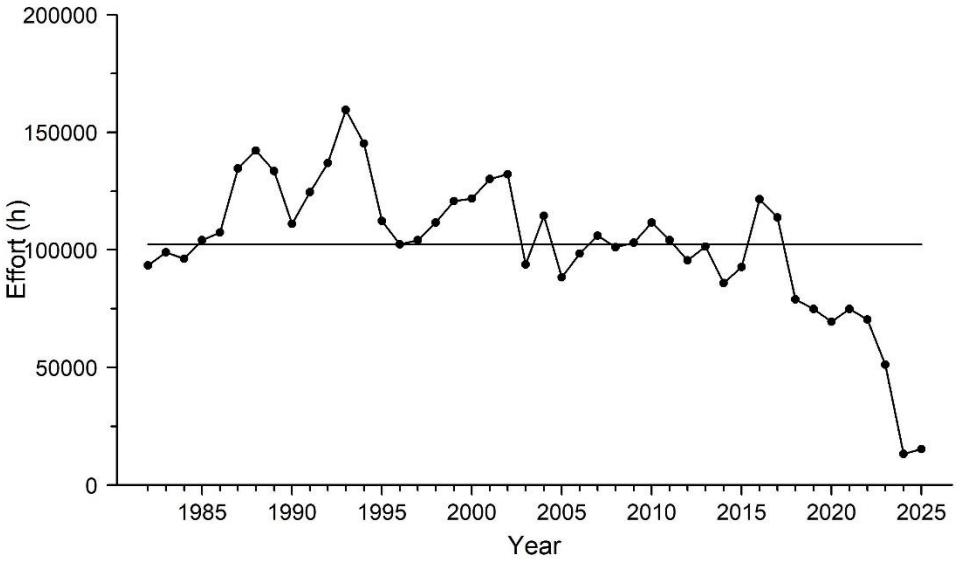


Figure 34. Total effort of fishing by year for the Estuary and Gulf of St. Lawrence. The full line indicates the mean of the series.

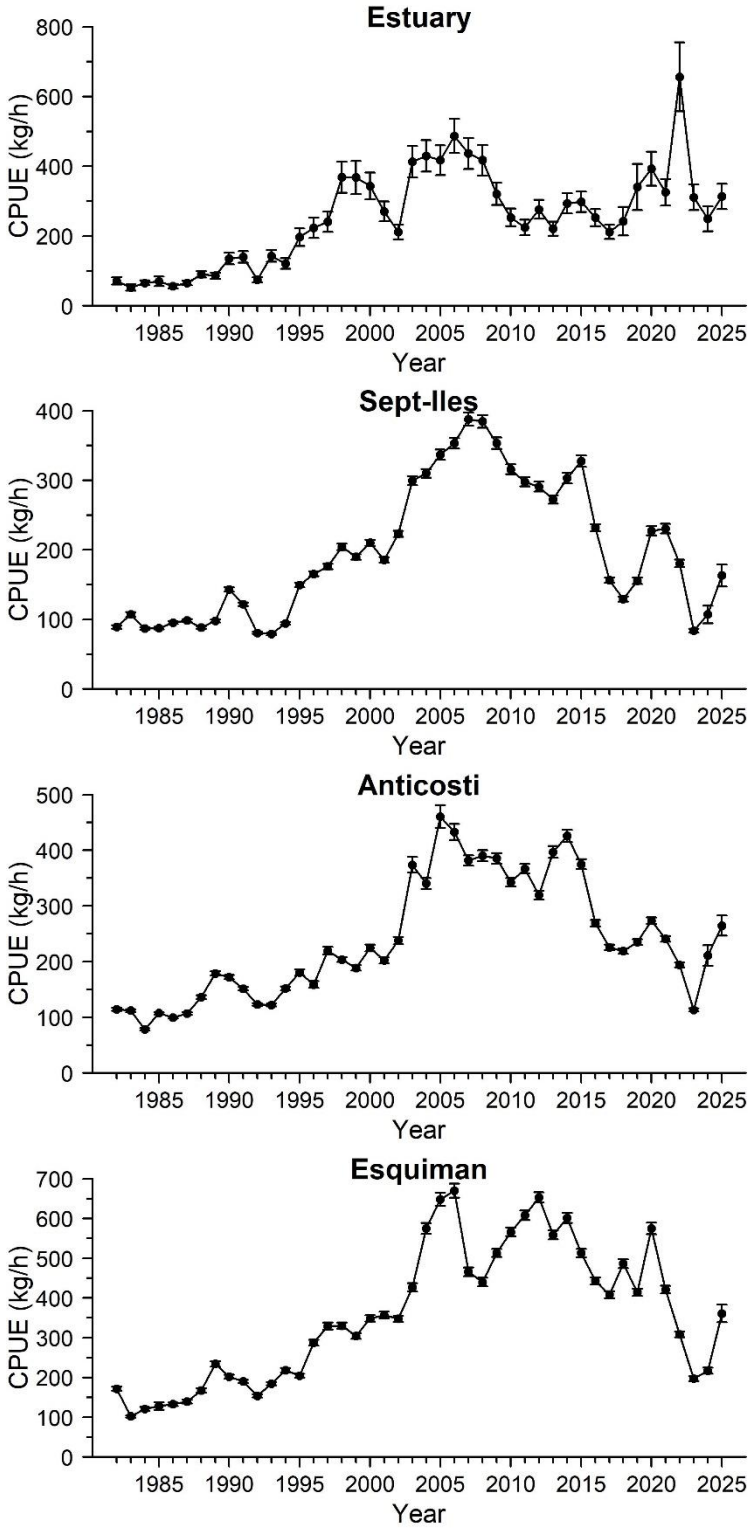


Figure 35. Standardized catch per unit of effort ± confidence interval (95 %) by stock assessment unit and by year.

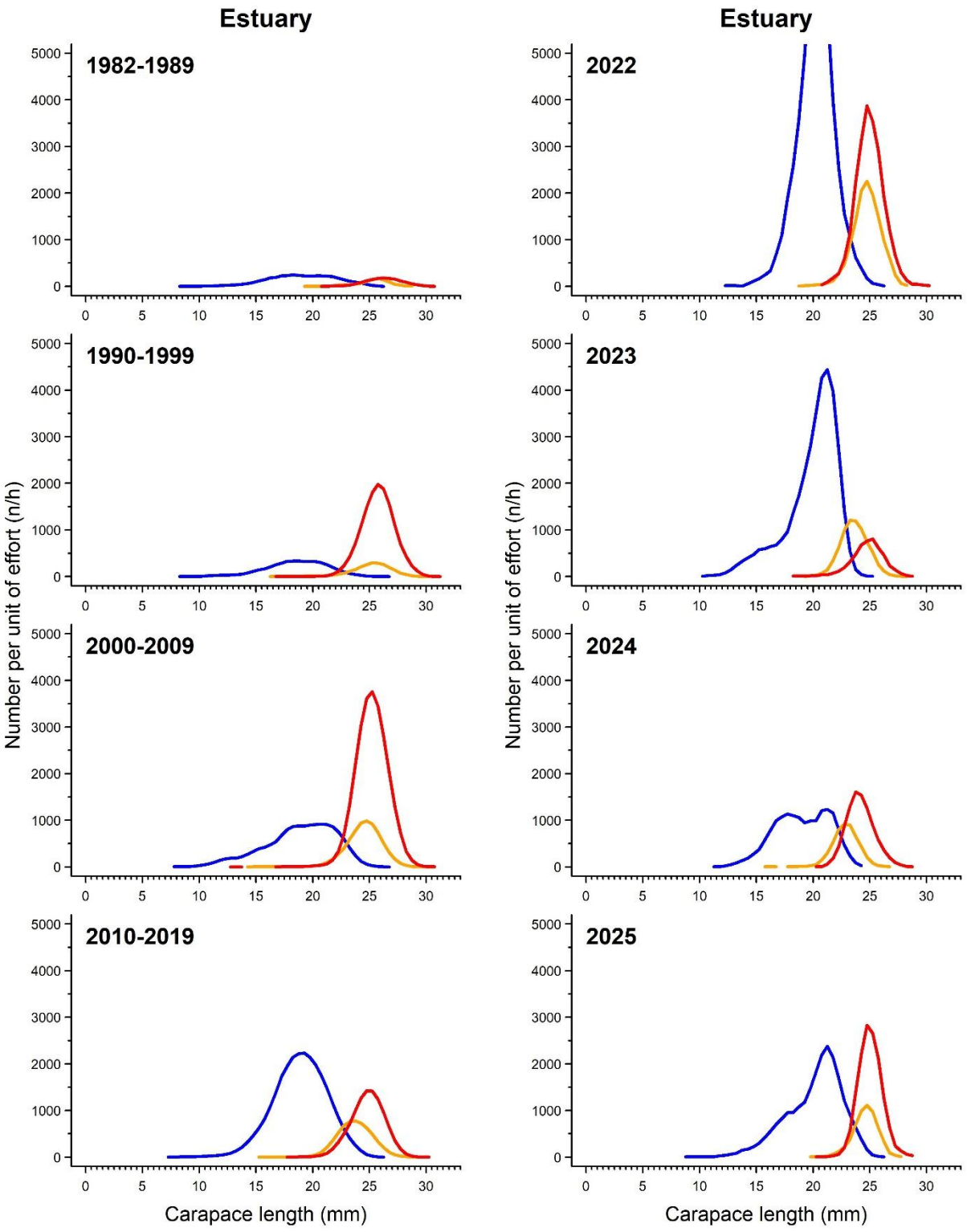


Figure 36. Number per unit of effort by carapace length class (0.5 mm) by stock assessment unit for the fishing season per 10 years period and for 2022 to 2025. Males in blue, primiparous females in orange and multiparous females in red.

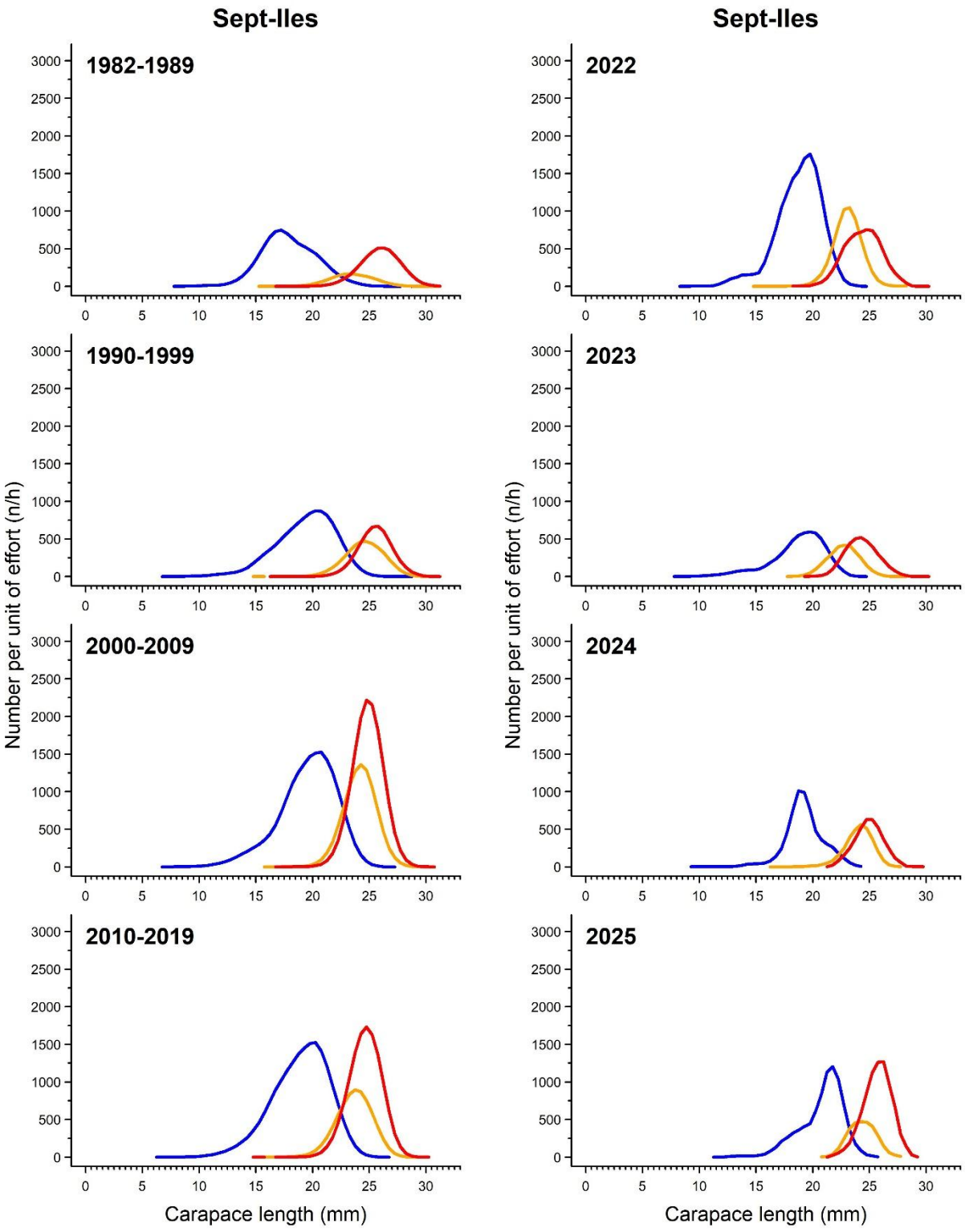


Figure 36. Continued.

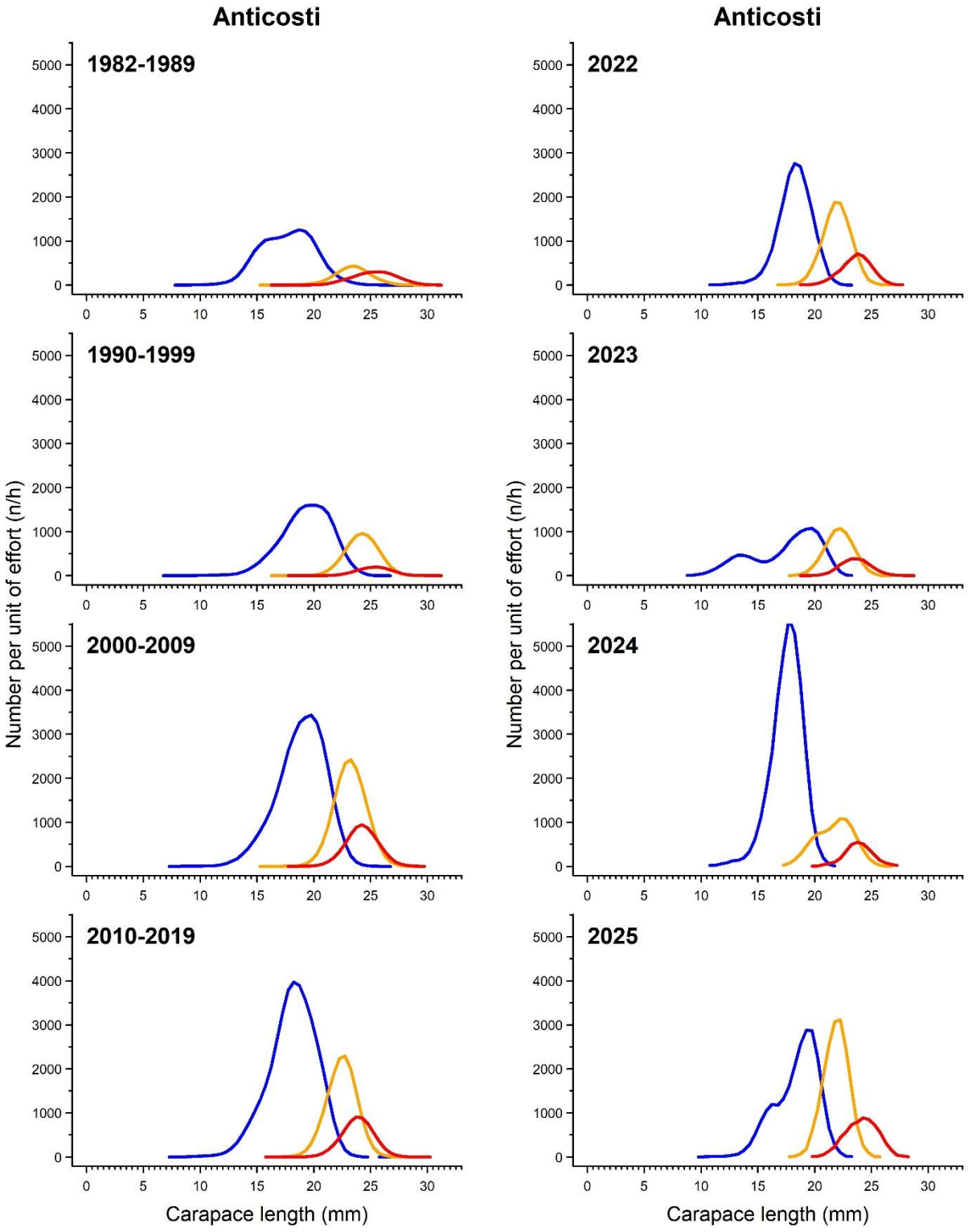


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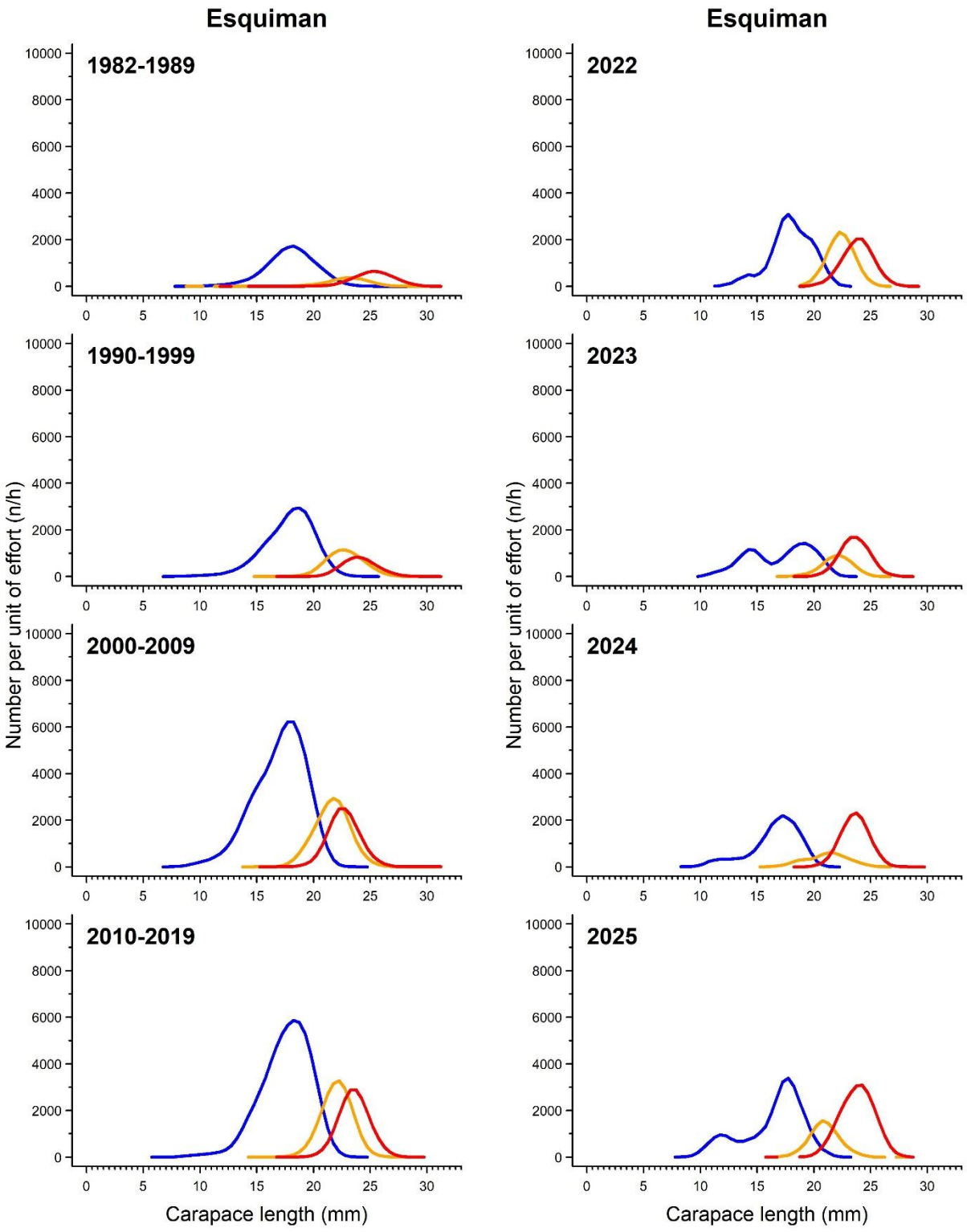


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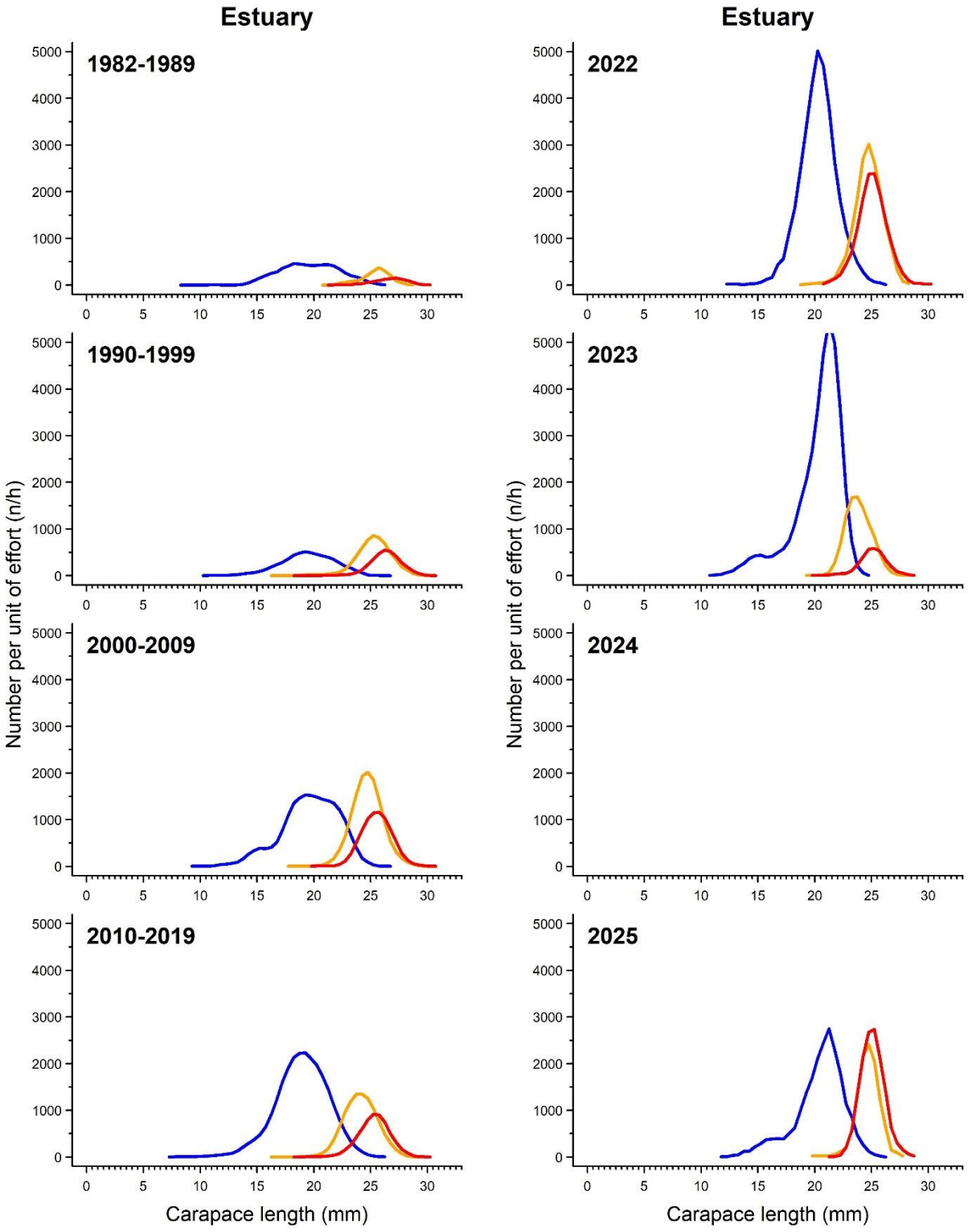


Figure 37. Number per unit of effort by carapace length class (0.5 mm) by stock assessment unit for the summer season (June, July and August) per 10 years period and for 2022 to 2025. Males in blue, primiparous females in orange and multiparous females in red.

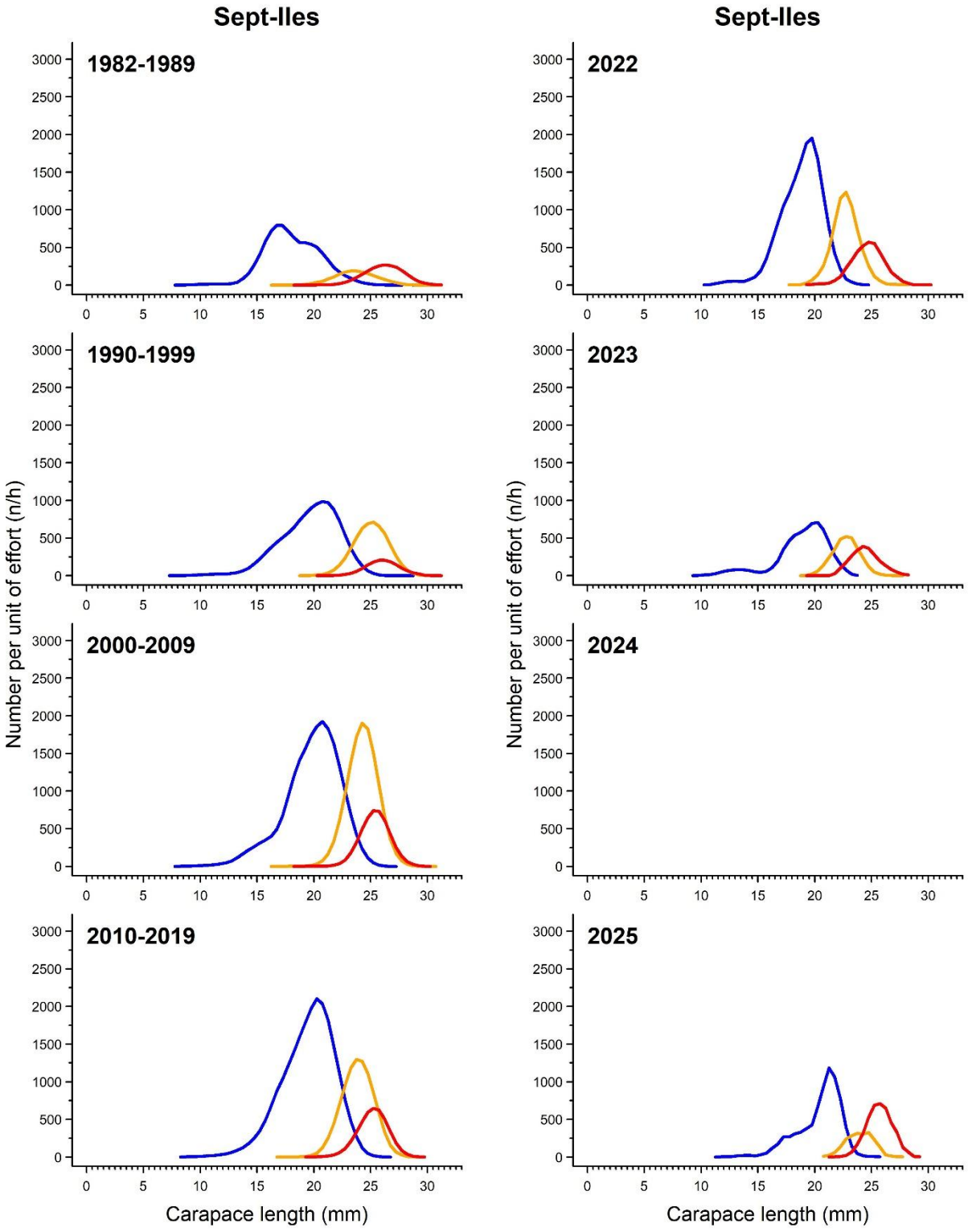


Figure 37. Continued.

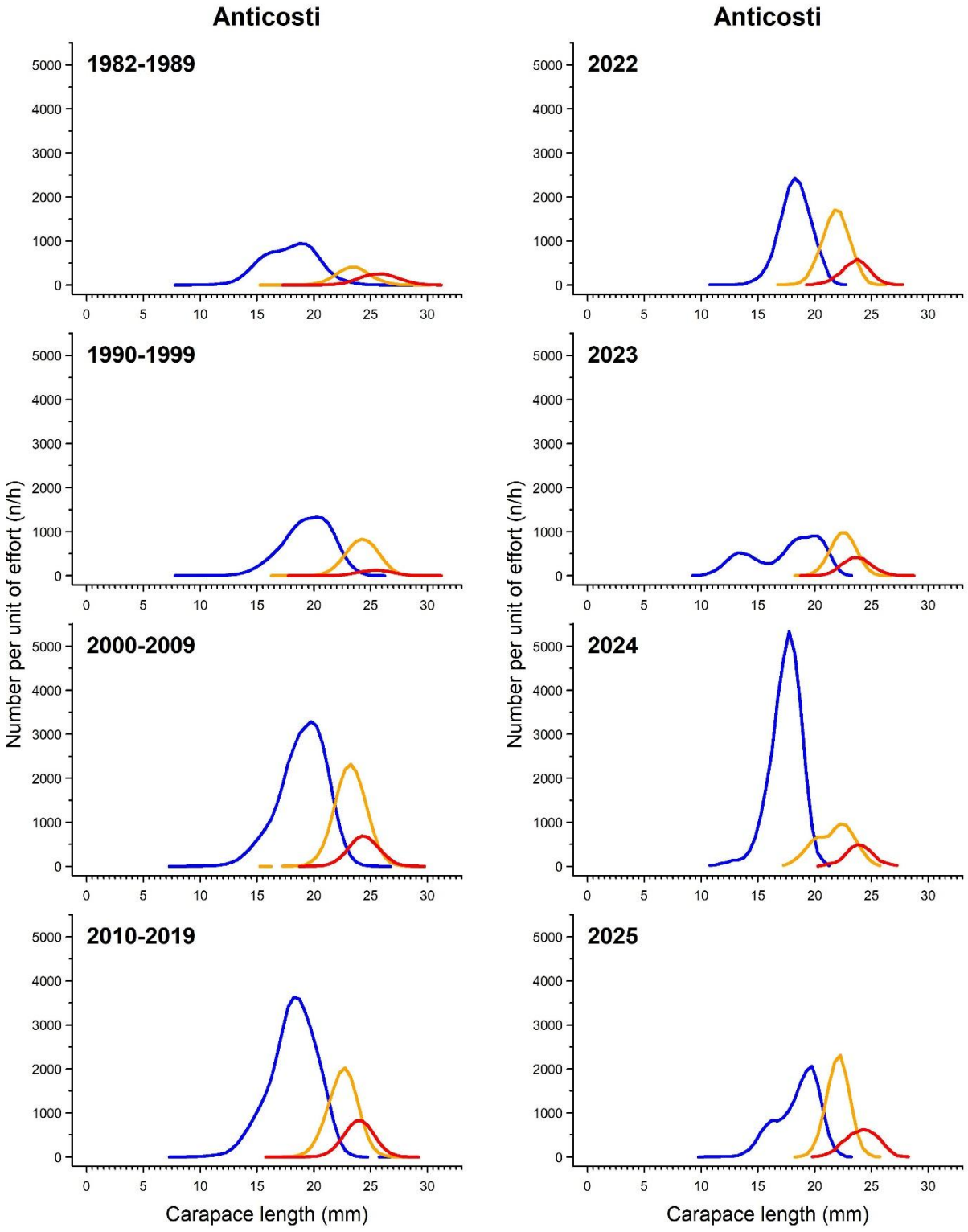


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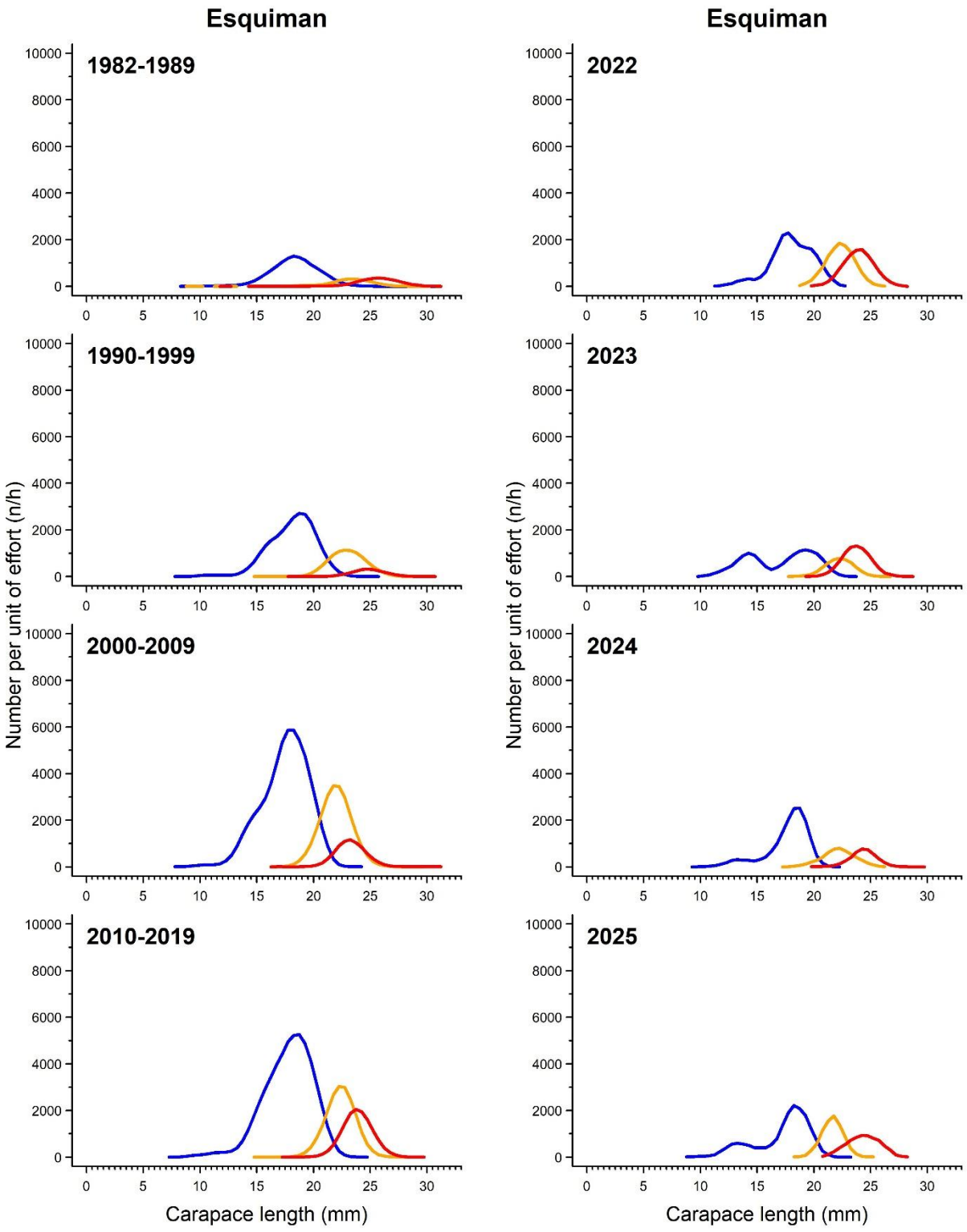


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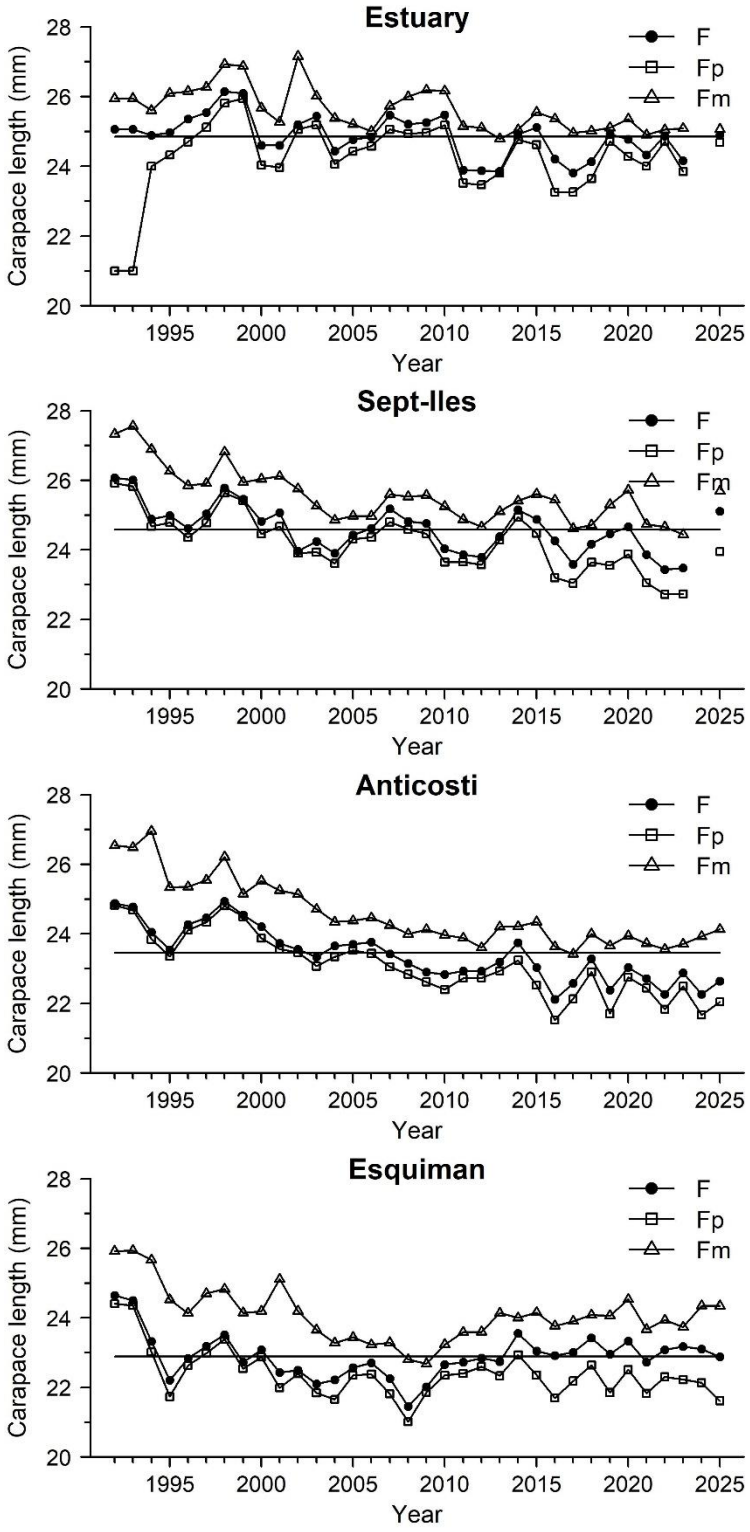


Figure 38. Average carapace length of female shrimps harvested in the summer by stock assessment unit and year (F: female, Fp: primiparous female and Fm: female multiparous). The solid horizontal line represents the 1992-2023 mean.

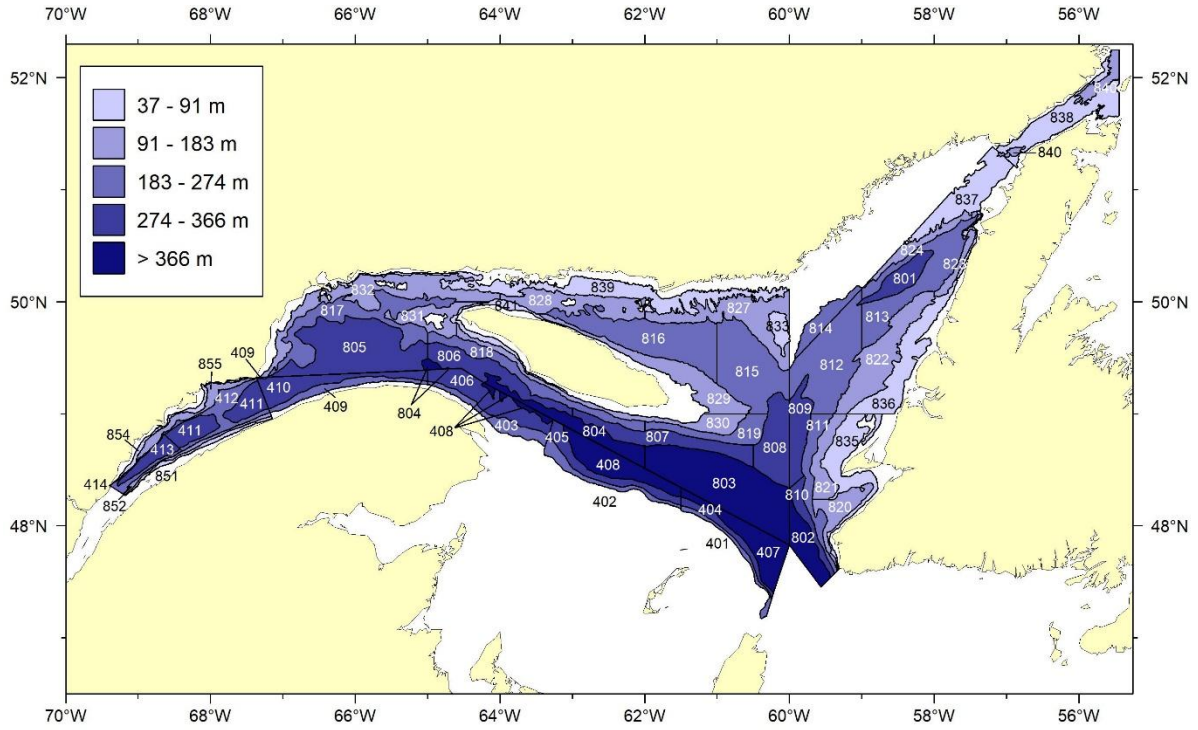


Figure 39. Stratification used for the allocation of fishing stations of the survey in the northern Gulf of St. Lawrence. The strata 851, 852, 854 and 855 were added in 2008.

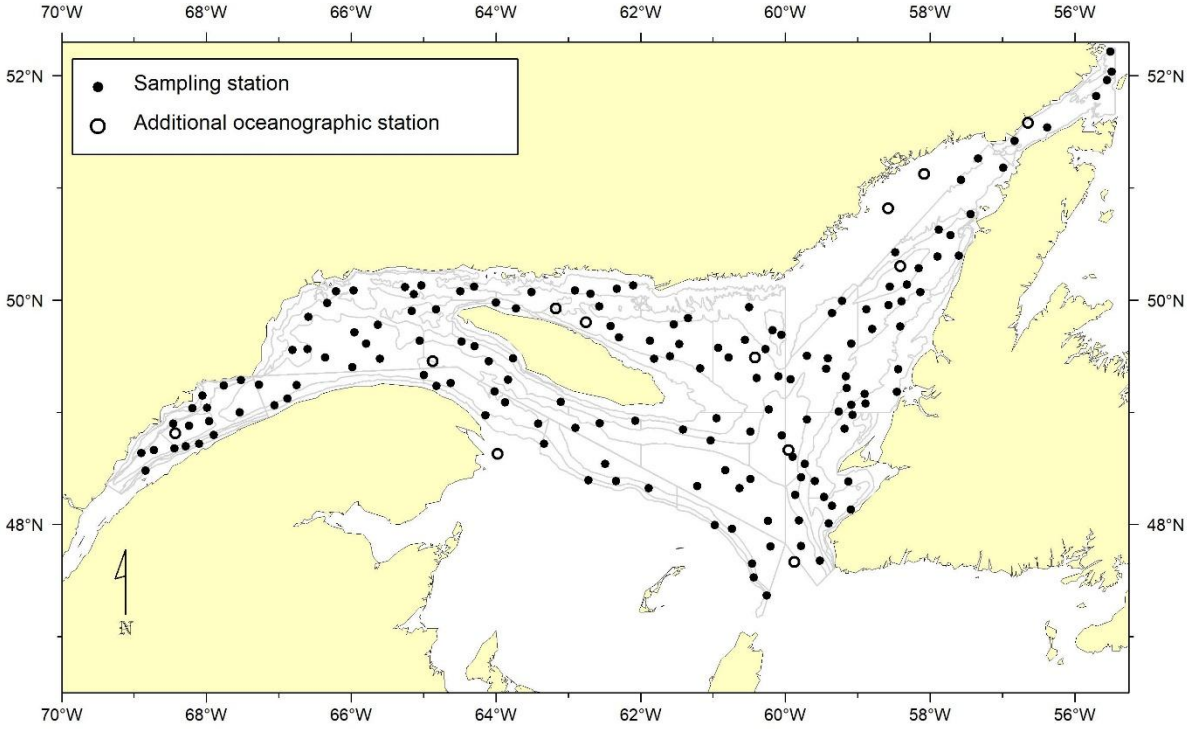


Figure 40. Locations of successful sampling stations (trawl and oceanography) and additional oceanographic stations for the 2025 survey.

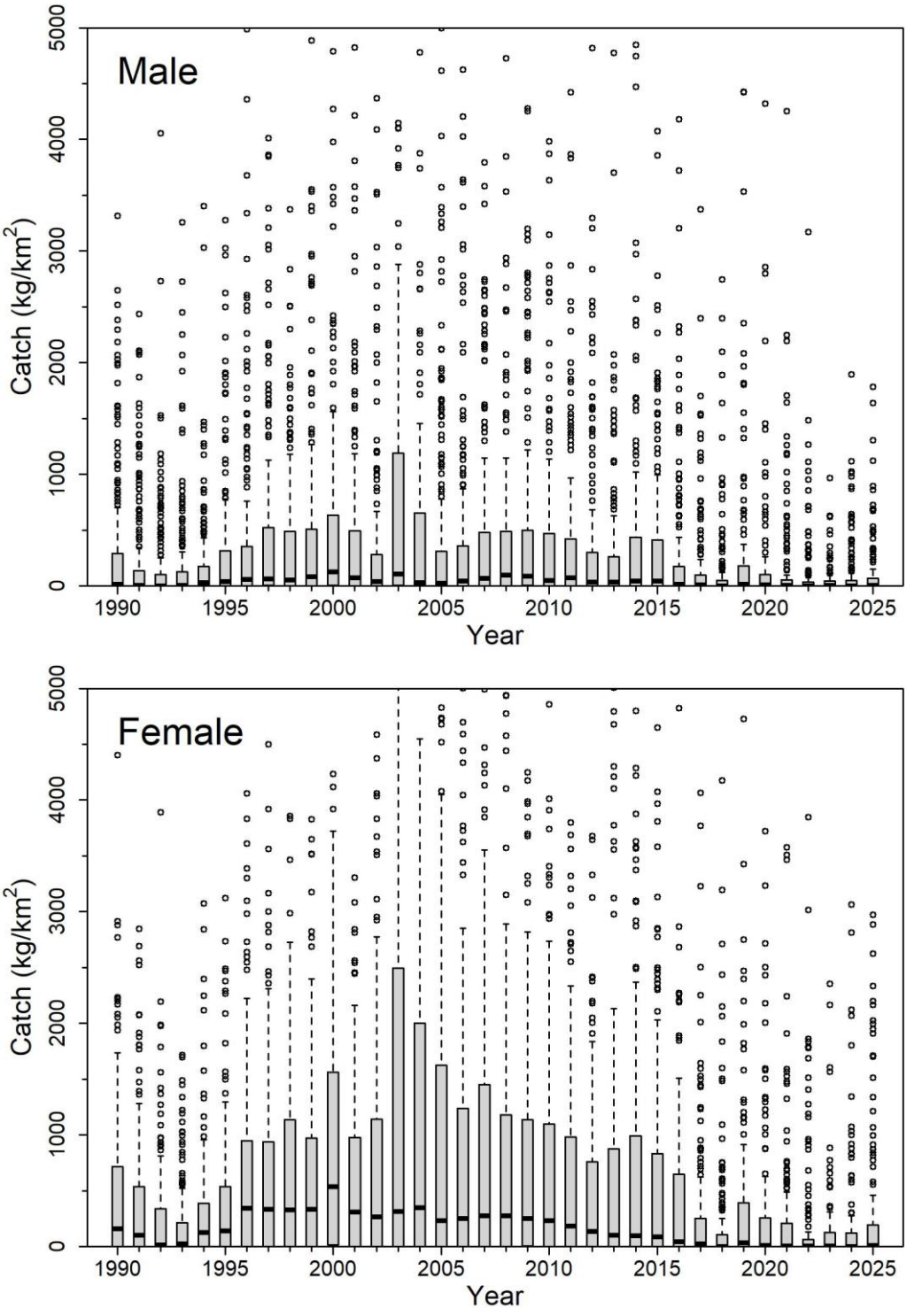


Figure 41. *Boxplot of male and female shrimp catches (kg/km²) obtained from the surveys conducted from 1990 to 2025. The lower, middle, and upper horizontal lines of the boxplots represent the 25th, 50th (median), and 75th percentiles, respectively. The upper whisker extends from the box to the highest value not exceeding 1.5 times the interquartile range. The lower whisker follows the same principle, but with lower values. The dots correspond to captures judged to be aberrant.*

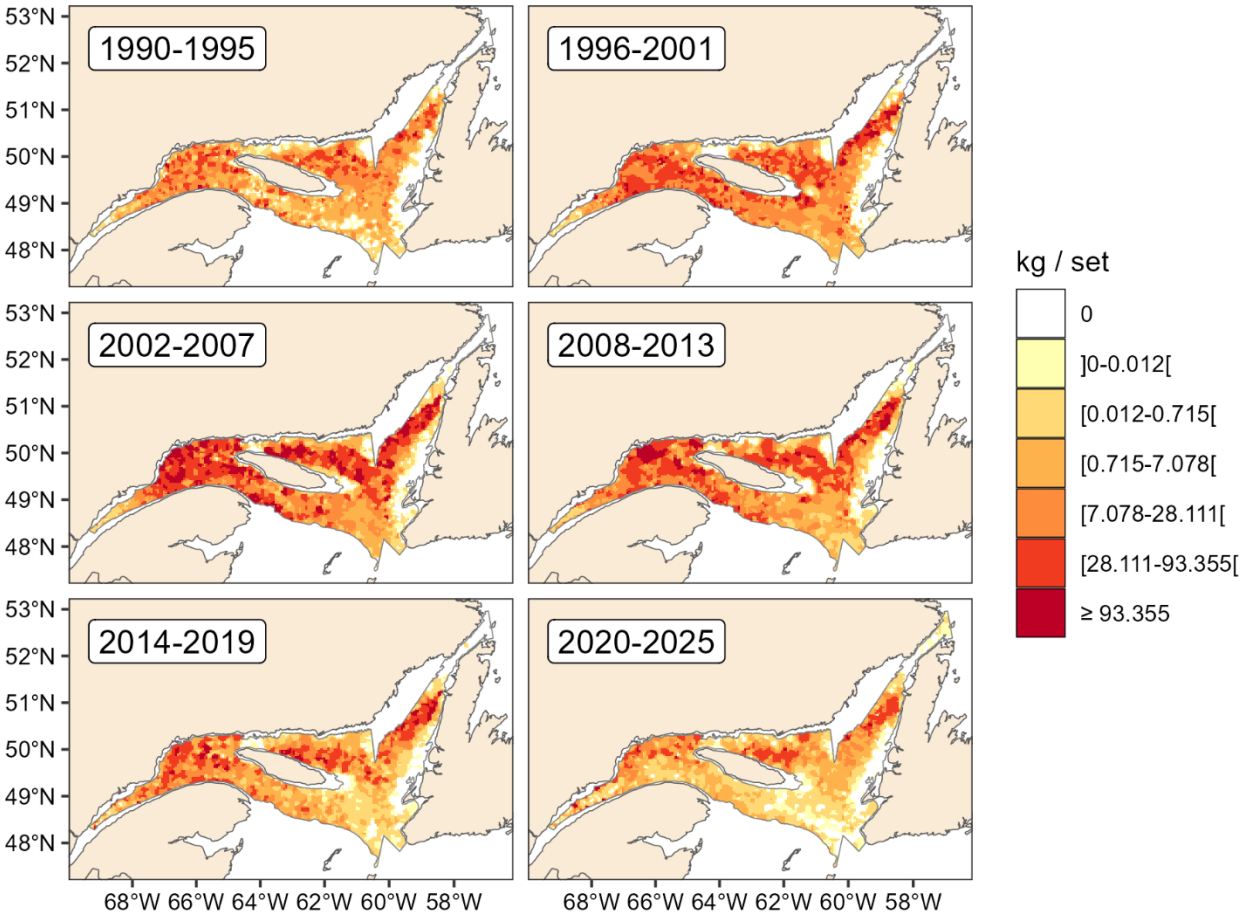


Figure 42. Northern shrimp catch rates (kg/15 minutes tow) distribution.

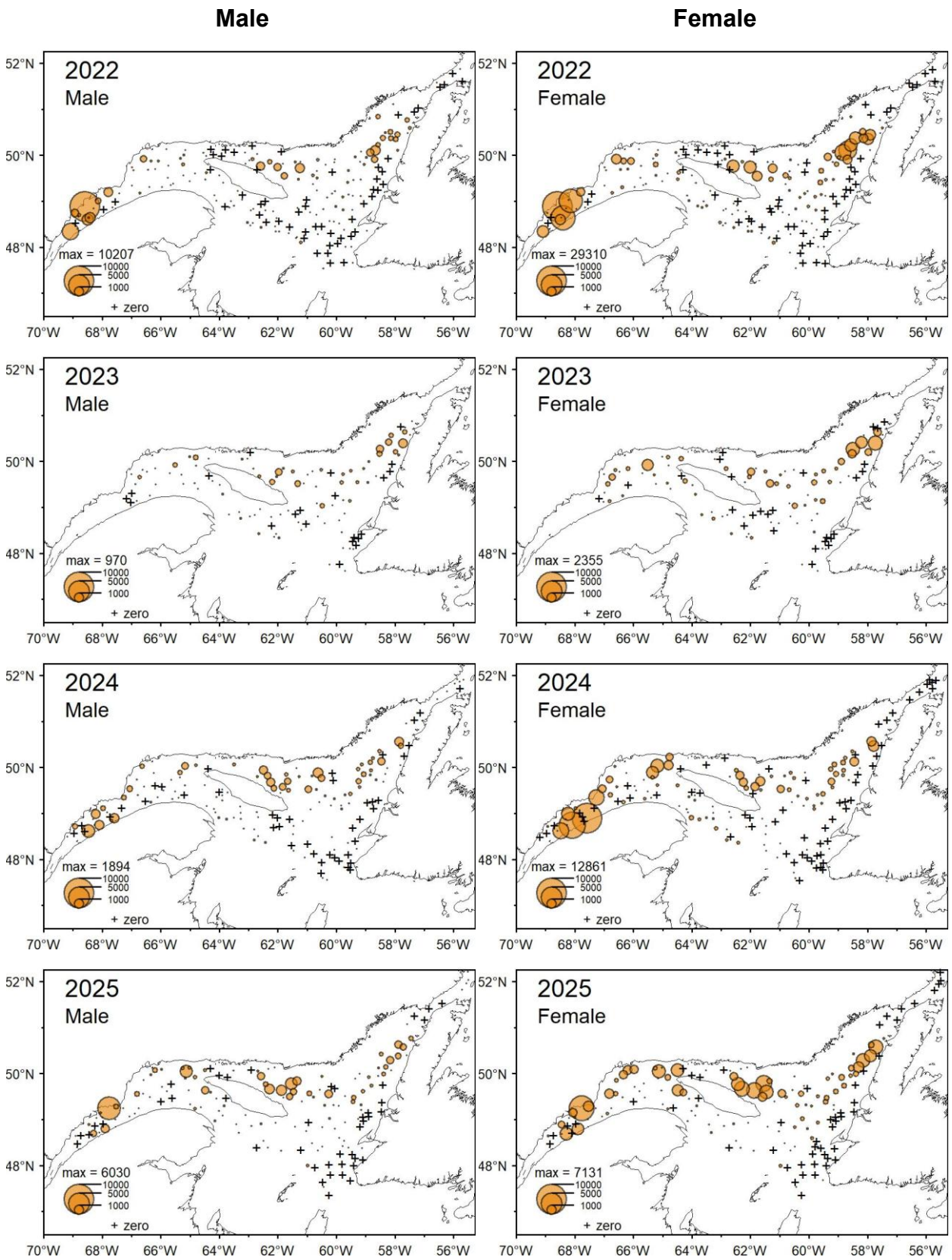


Figure 43. Shrimp catch rates (kg/15 minutes tow) distribution for male and female from 2022 to 2025.

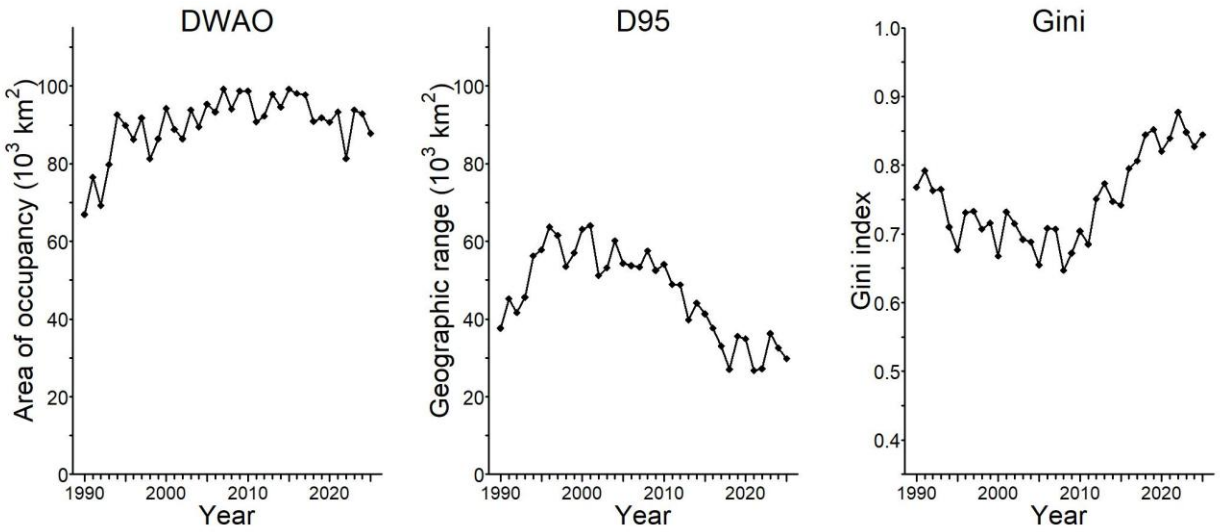
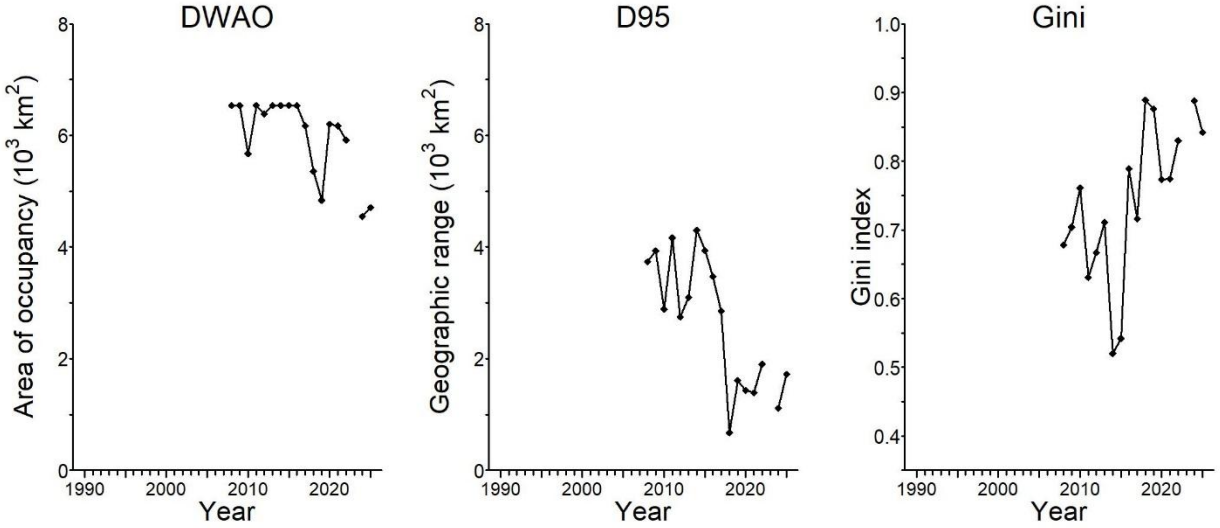


Figure 44. Spatial distribution indices: 1) DWAO, design-weighted area of occupation; 2) D95, minimum area containing 95% of the biomass; and 3) Gini's index. The total area of the study area is of 116,115 km^2.

Estuary (Area of the study zone: 6 537 km^2)



Sept-Iles (Area of the study zone: 49 335 km^2)

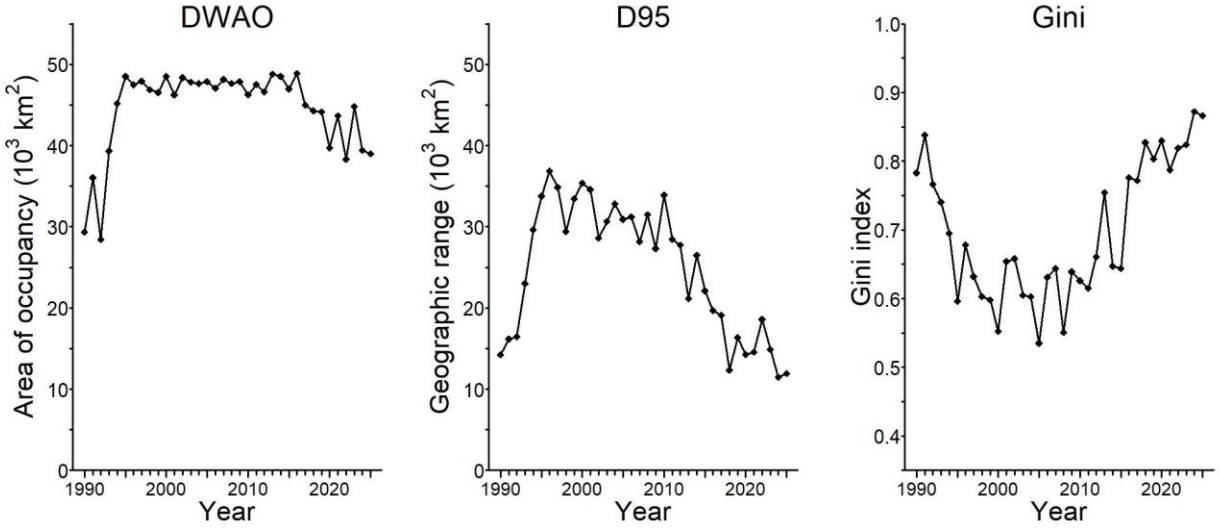
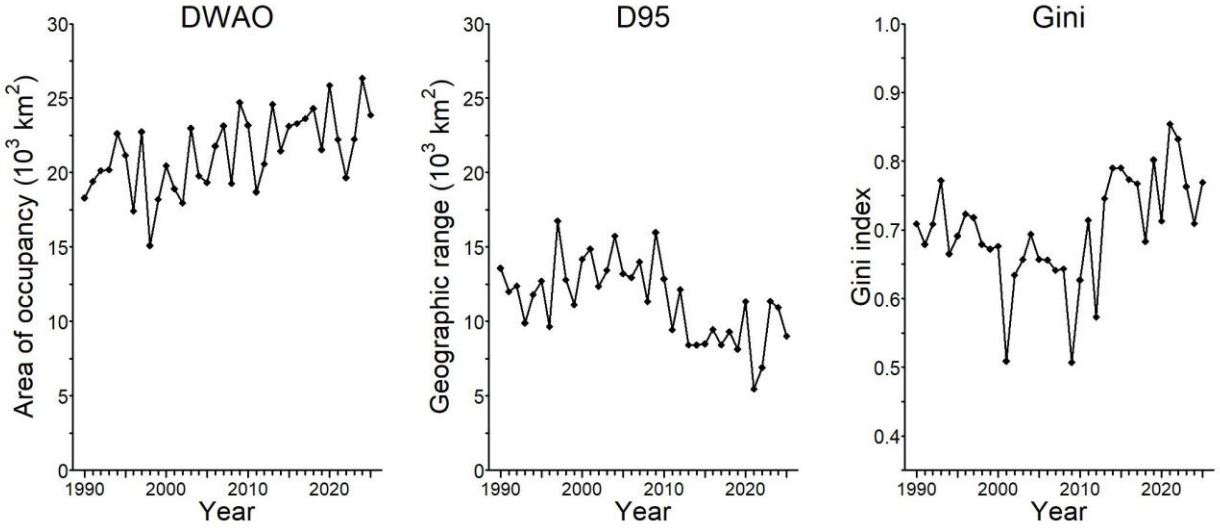


Figure 45. Spatial distribution indices per stock assessment unit: 1) DWAO, design-weighted area of occupation; 2) D95, minimum area containing 95% of individuals; and 3) Gini's index.

Anticosti (Area of the study zone: 26 616 km^2)



Esquiman (Area of the study zone: 35 904 km^2)

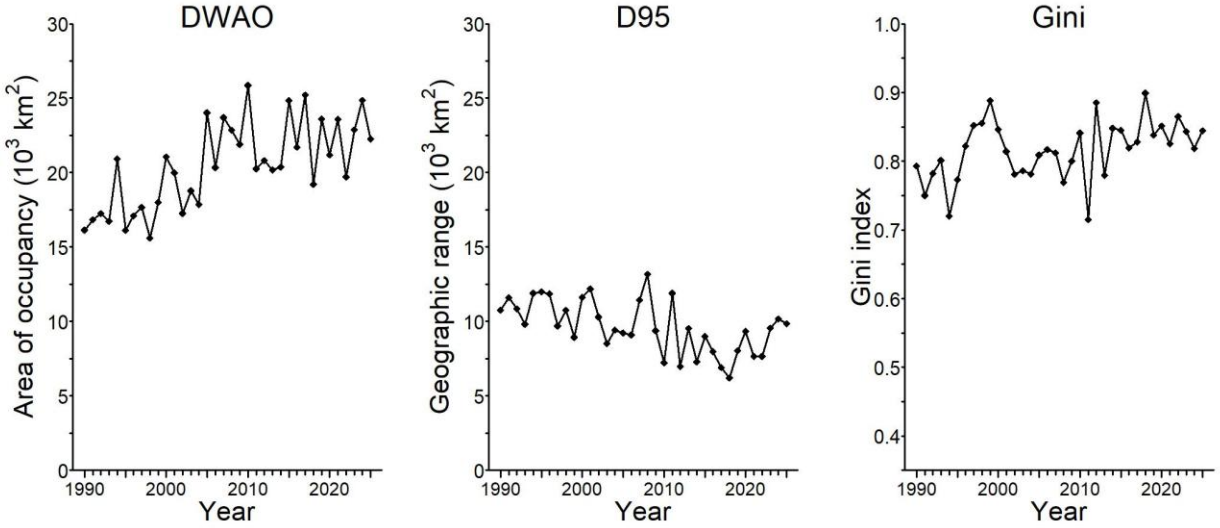


Figure 45. Continued.

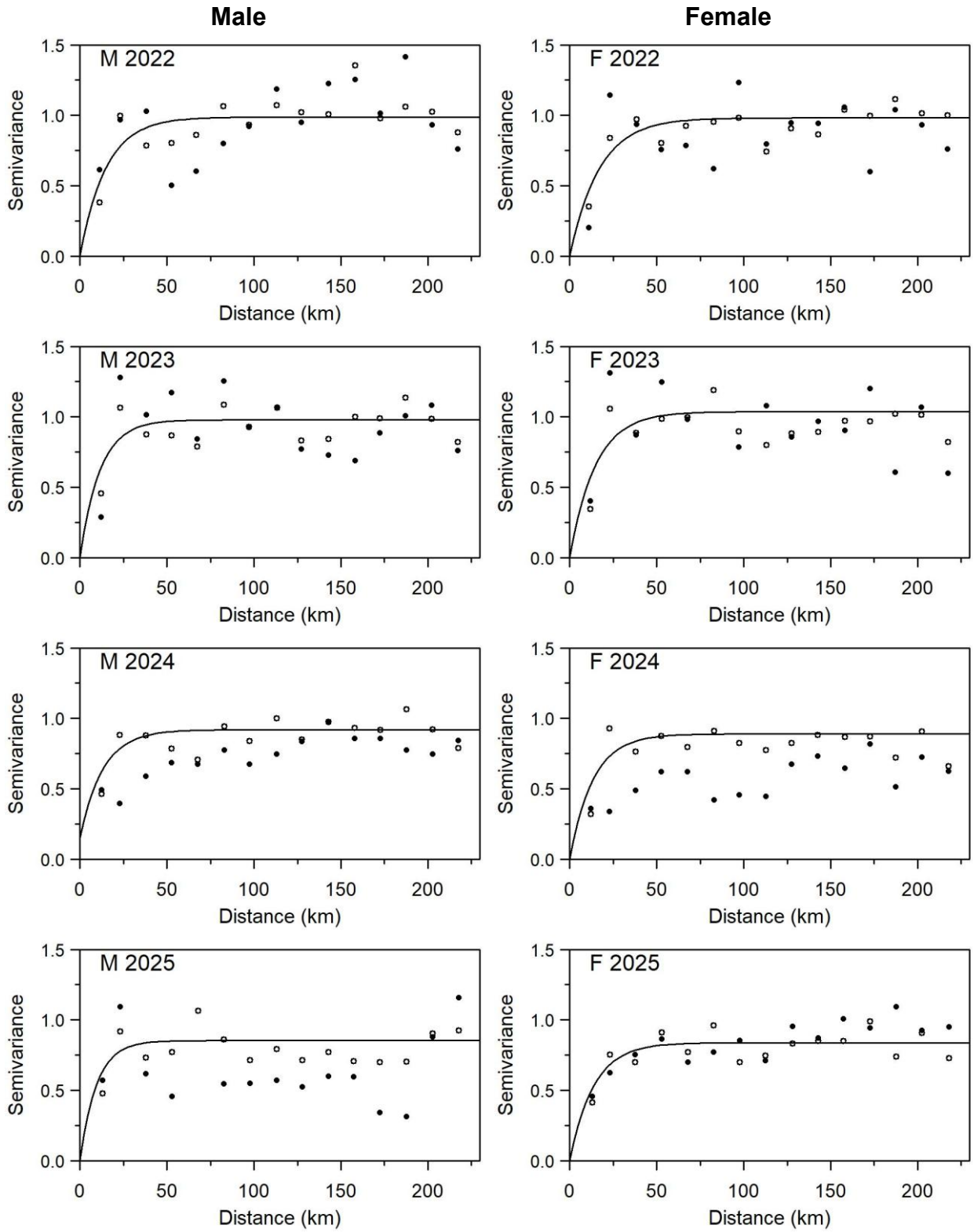


Figure 46. Isotropic variograms of the biomasses (kg/km²) for the years 2018 to 2021. Filled circles: current year. Open circles: mean over three years. Curve: variogram adjusted on the 3 year mean.

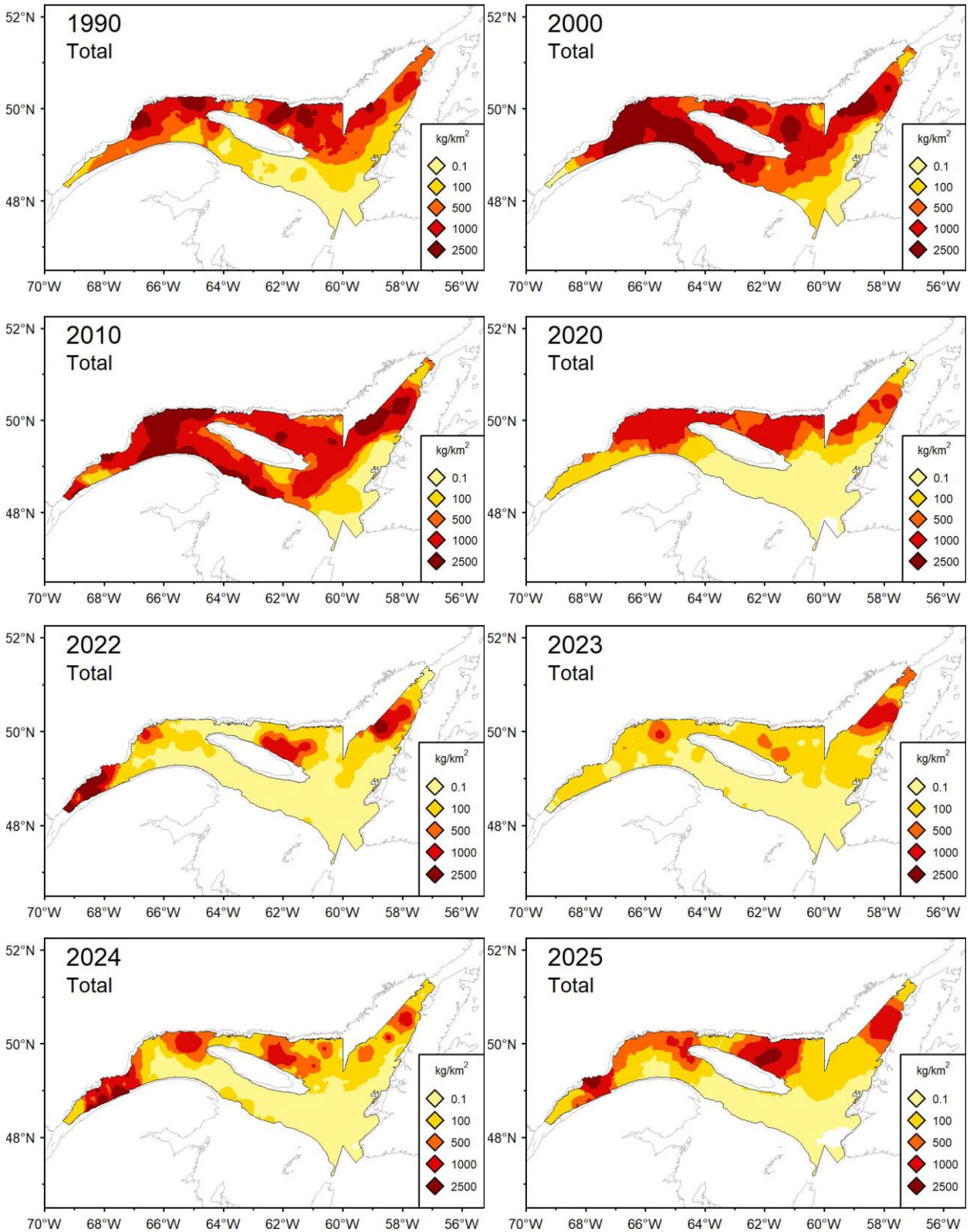


Figure 47. Distribution of the biomass (kg/km²) obtained by kriging for years 1990, 2000, 2010, 2020, 2022 to 2025.

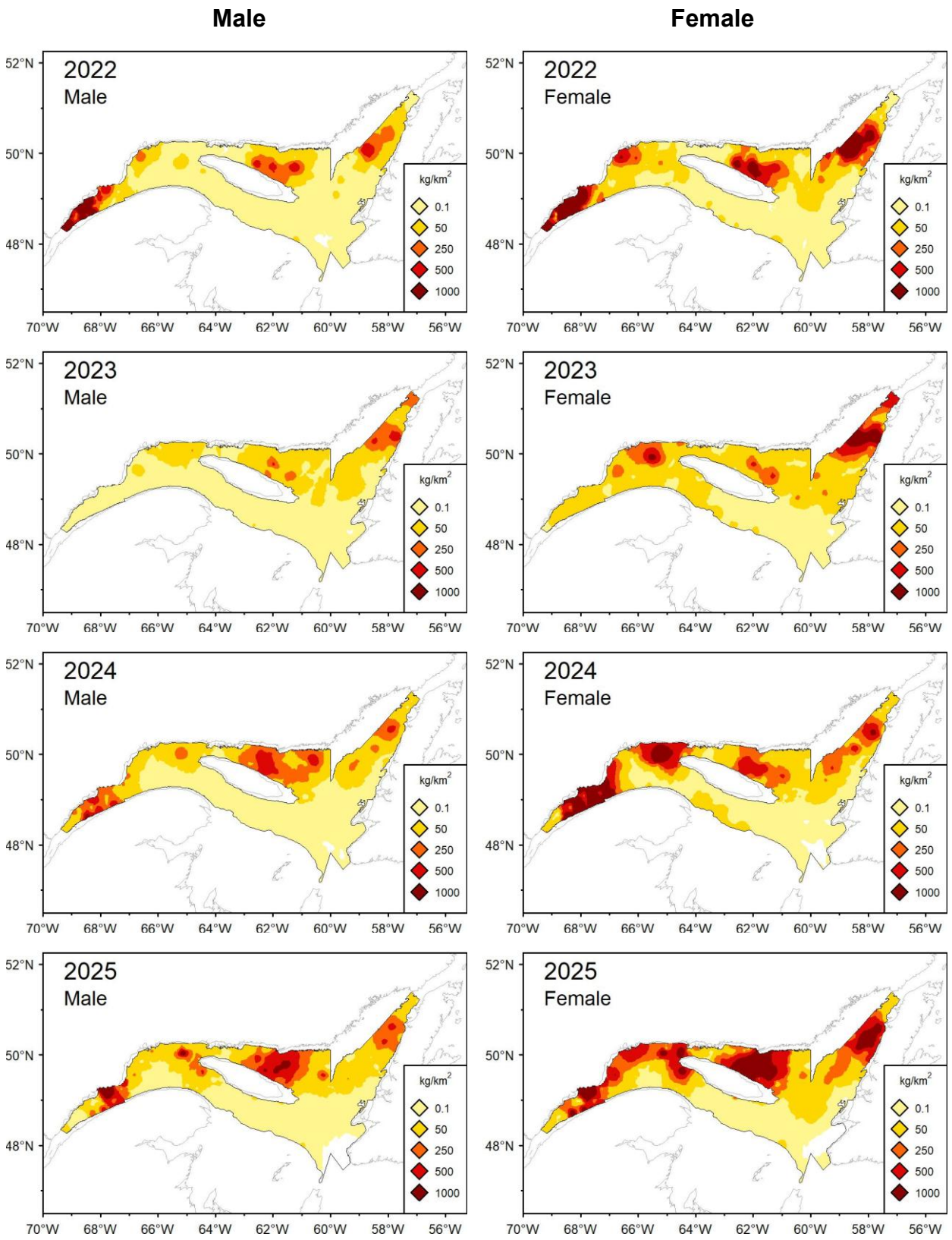
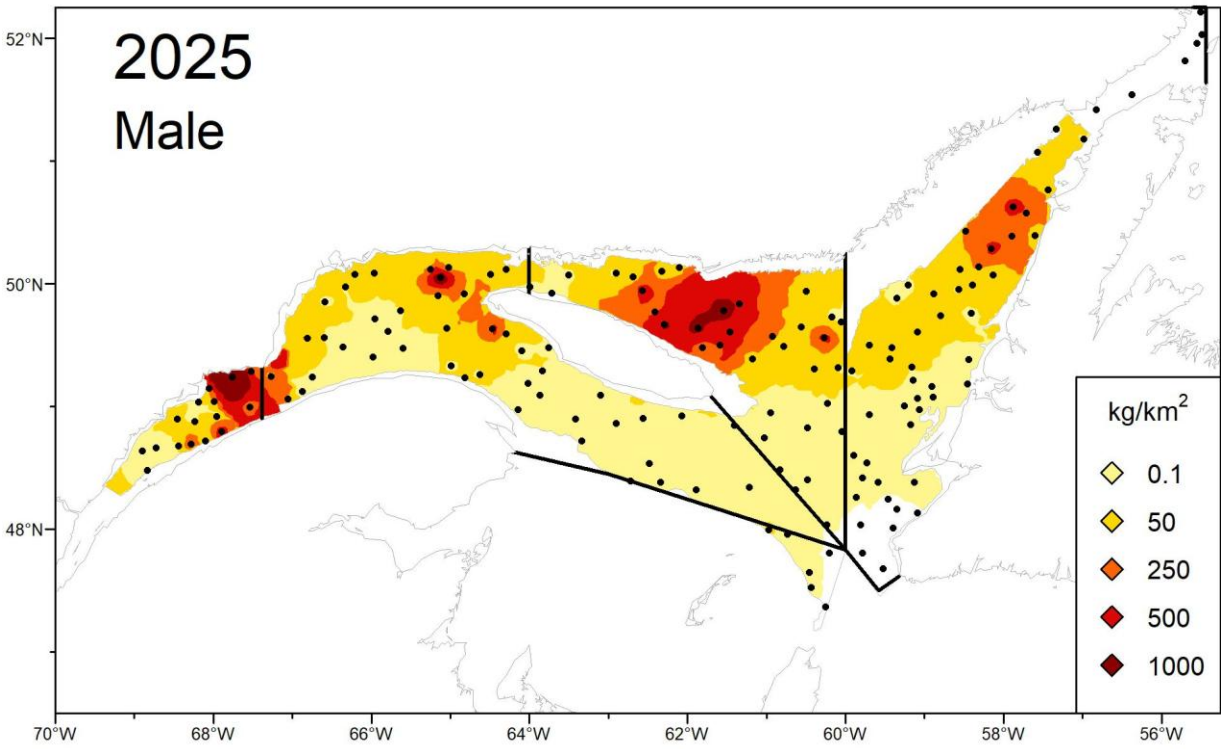


Figure 48. Distribution of the biomass (kg/km²) obtained by kriging from 2022 to 2025 for males and females.



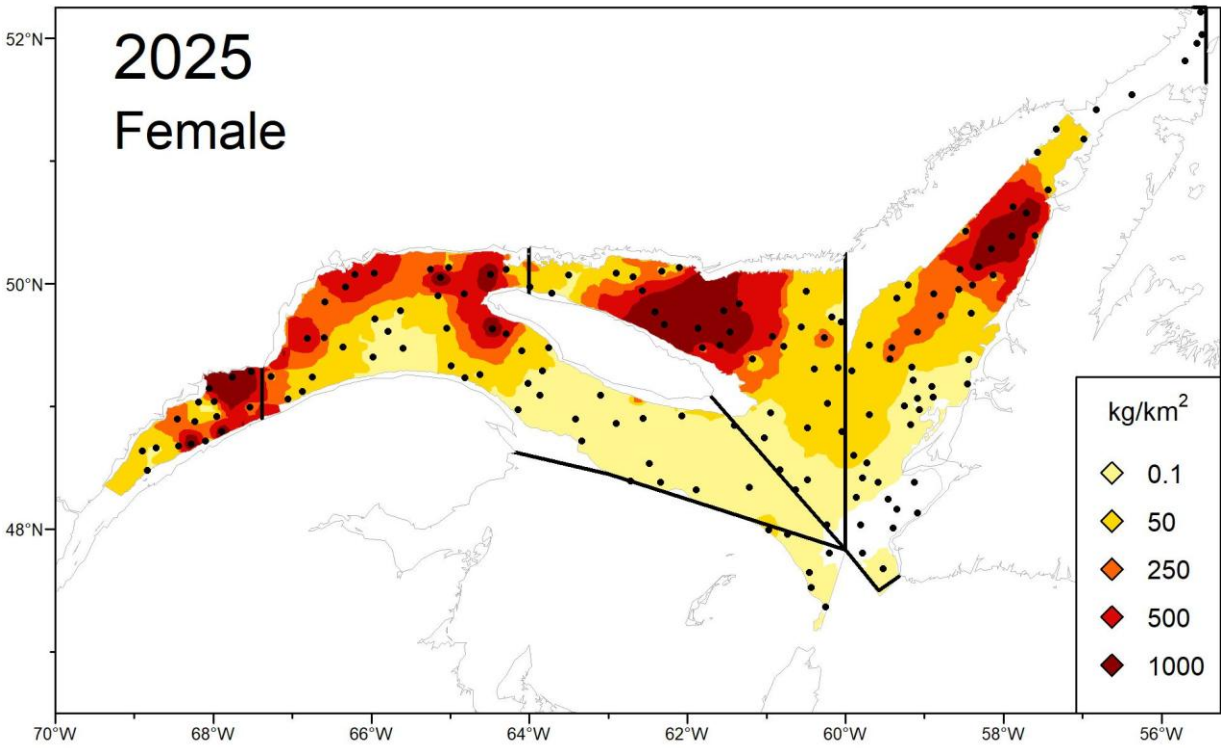


Figure 49. Distribution of the biomass (kg/km²) obtained by kriging in 2025 for males and females. The dots represent the sampled tows

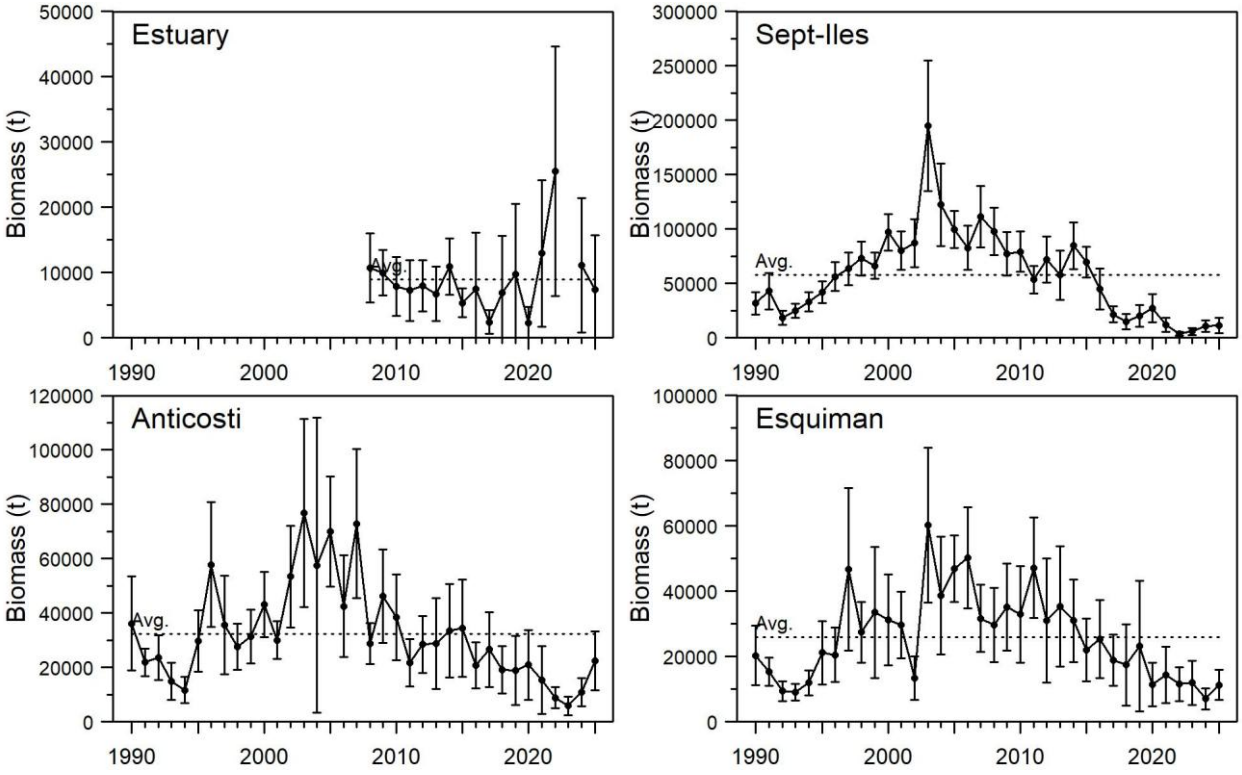


Figure 50. Biomass (in ton) by stock assessment unit and by year. Error bars indicate the 95% confidence interval.

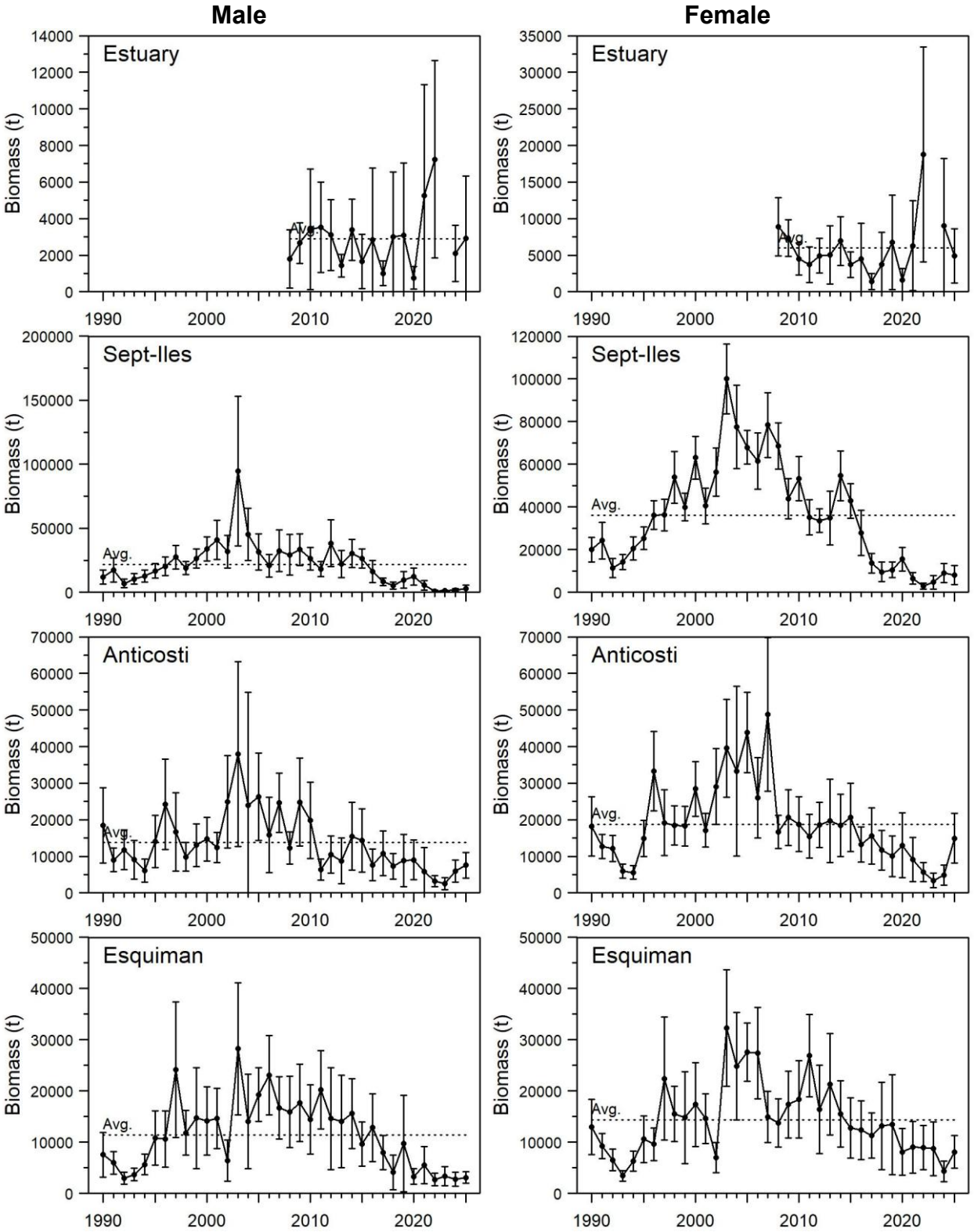


Figure 51. Biomass (in ton) by stock assessment unit and by year, for males and females. Error bars indicate the 95% confidence interval.

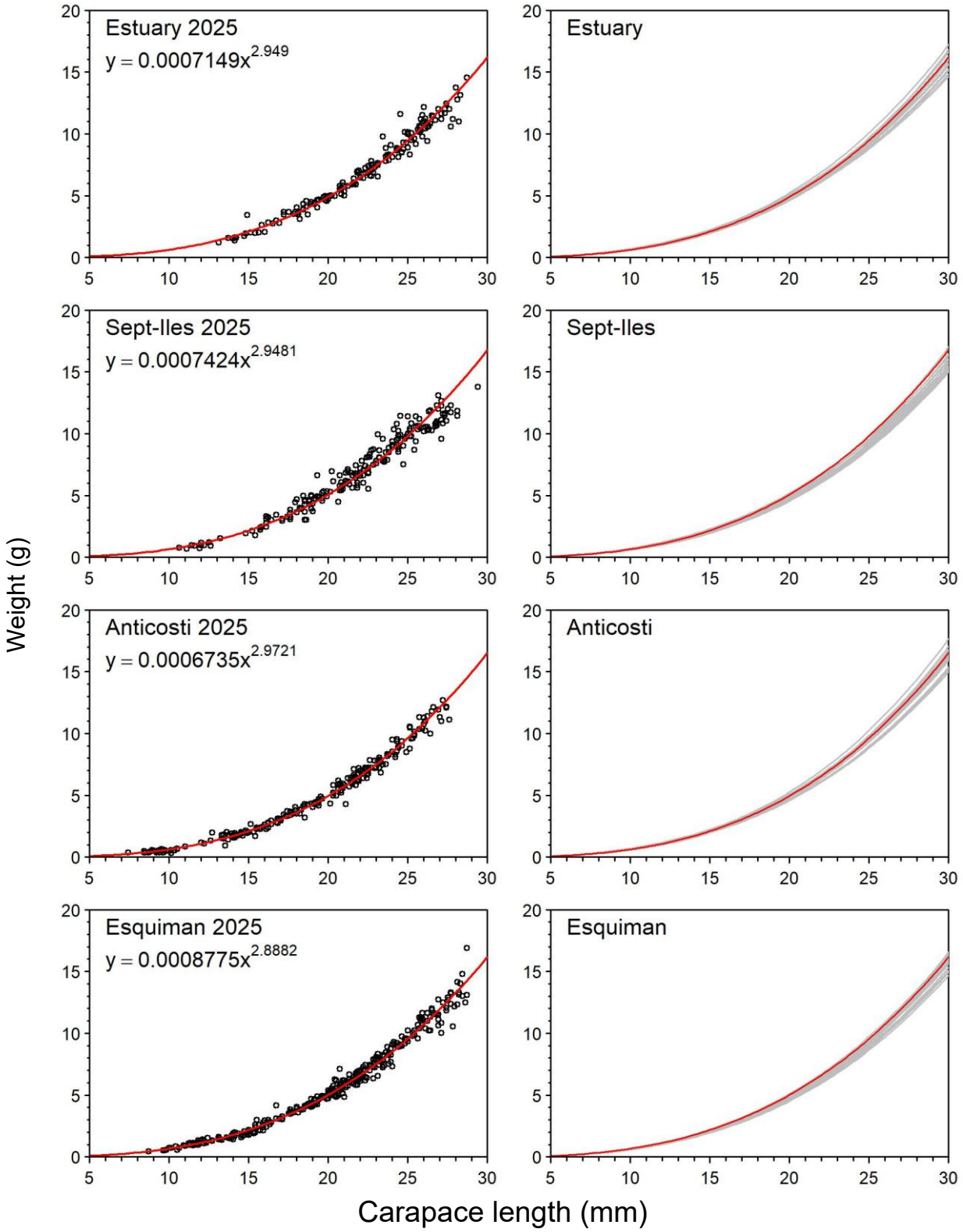


Figure 52. Weight-length relationships by stock assessment unit. The panels on the left represent the data for 2025 and in the panels on the right, the red line represents the year 2025 and the gray lines the years 1993, 2005 to 2019 and 2022 to 2024.

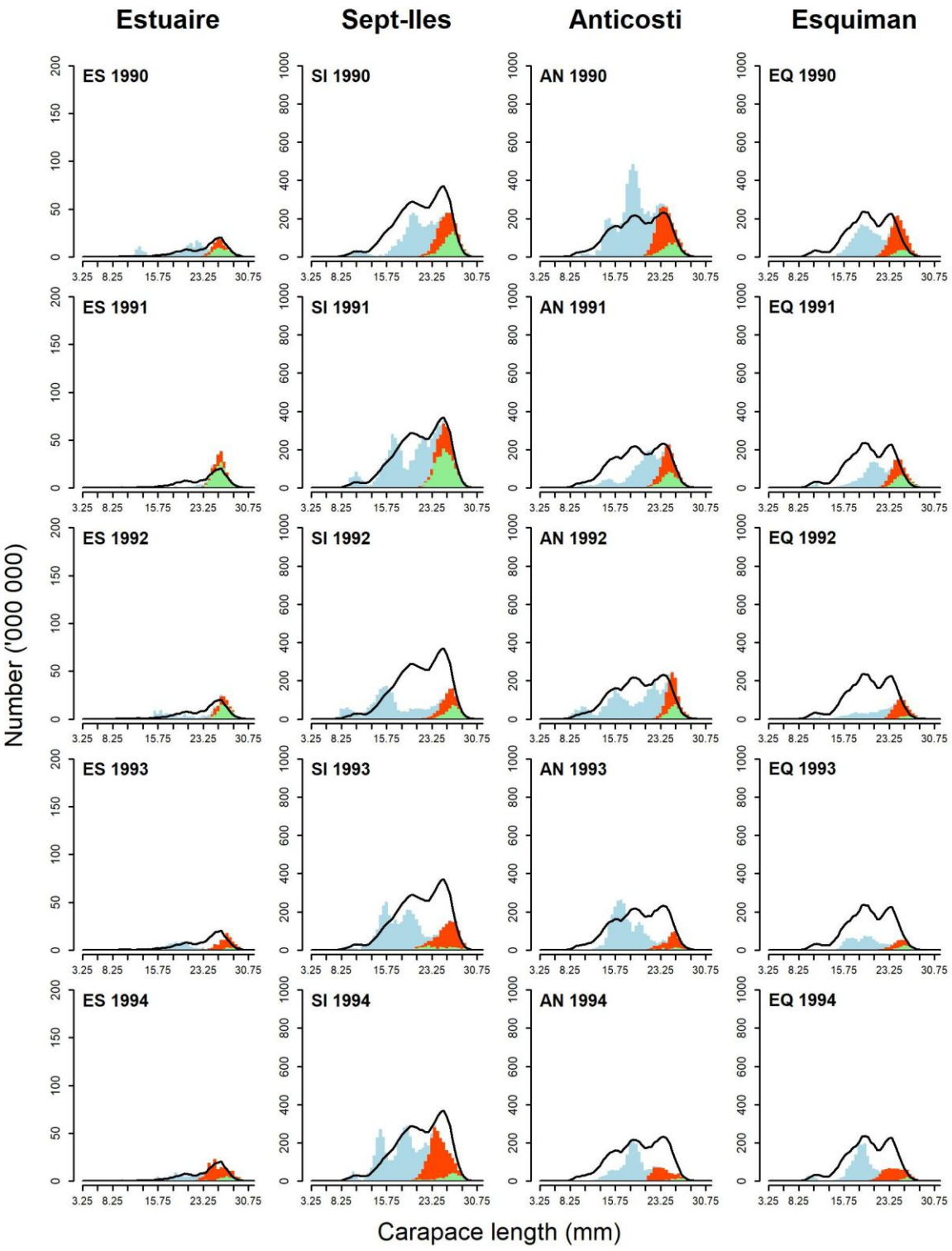


Figure 53. Abundance (in million) by carapace length class (classes of 0.5 mm) by stock assessment unit for males (in blue), primiparous females (in red), multiparous females (in green) and females (in pink, 2001 to 2008 period). The straight line indicates the average for 1990-2024 or 2008-2024 if a + is placed beside the area. The + placed beside the area shows the results obtained when adding strata in shallow waters (37-183 m) of the estuary.

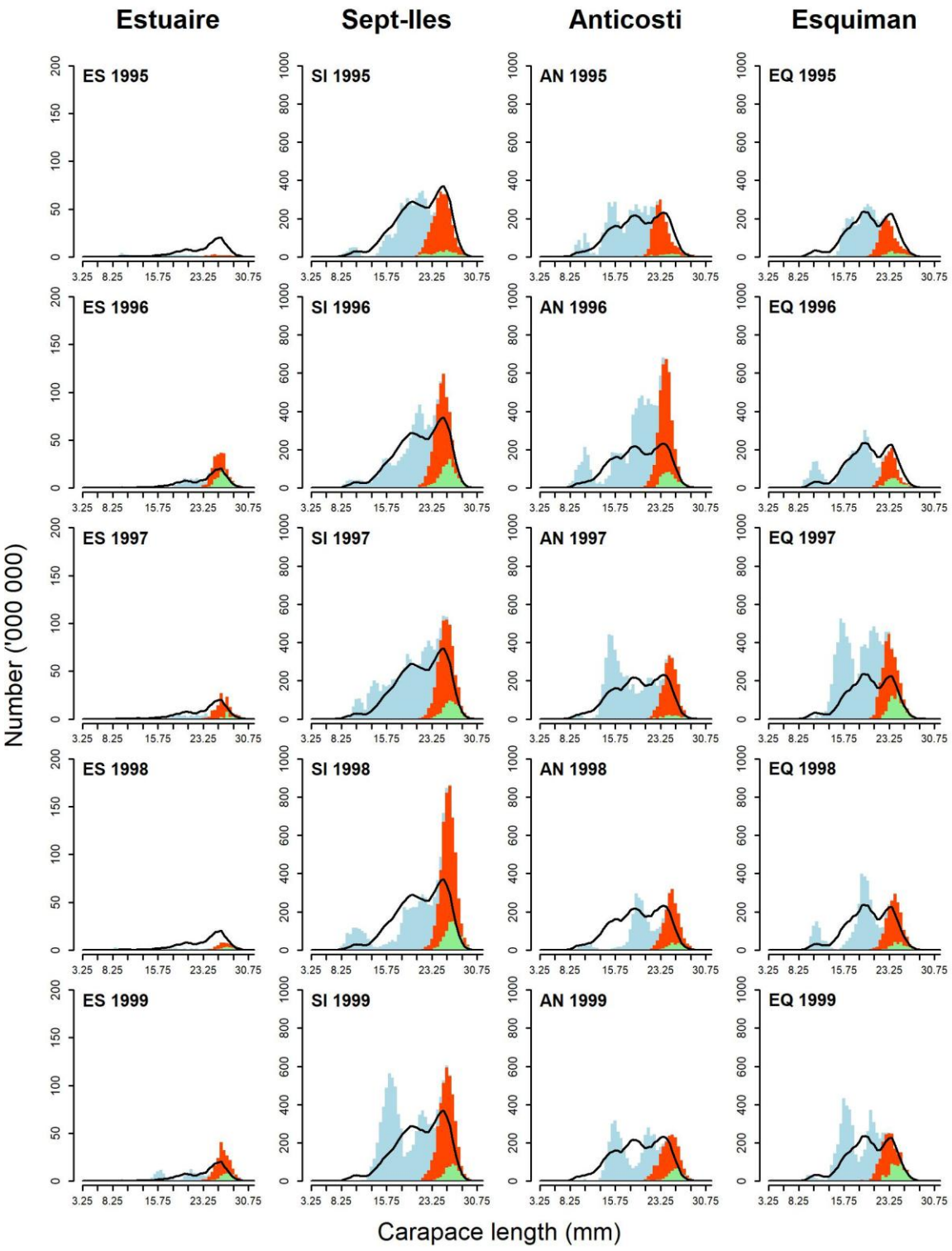


Figure 53. Continued.

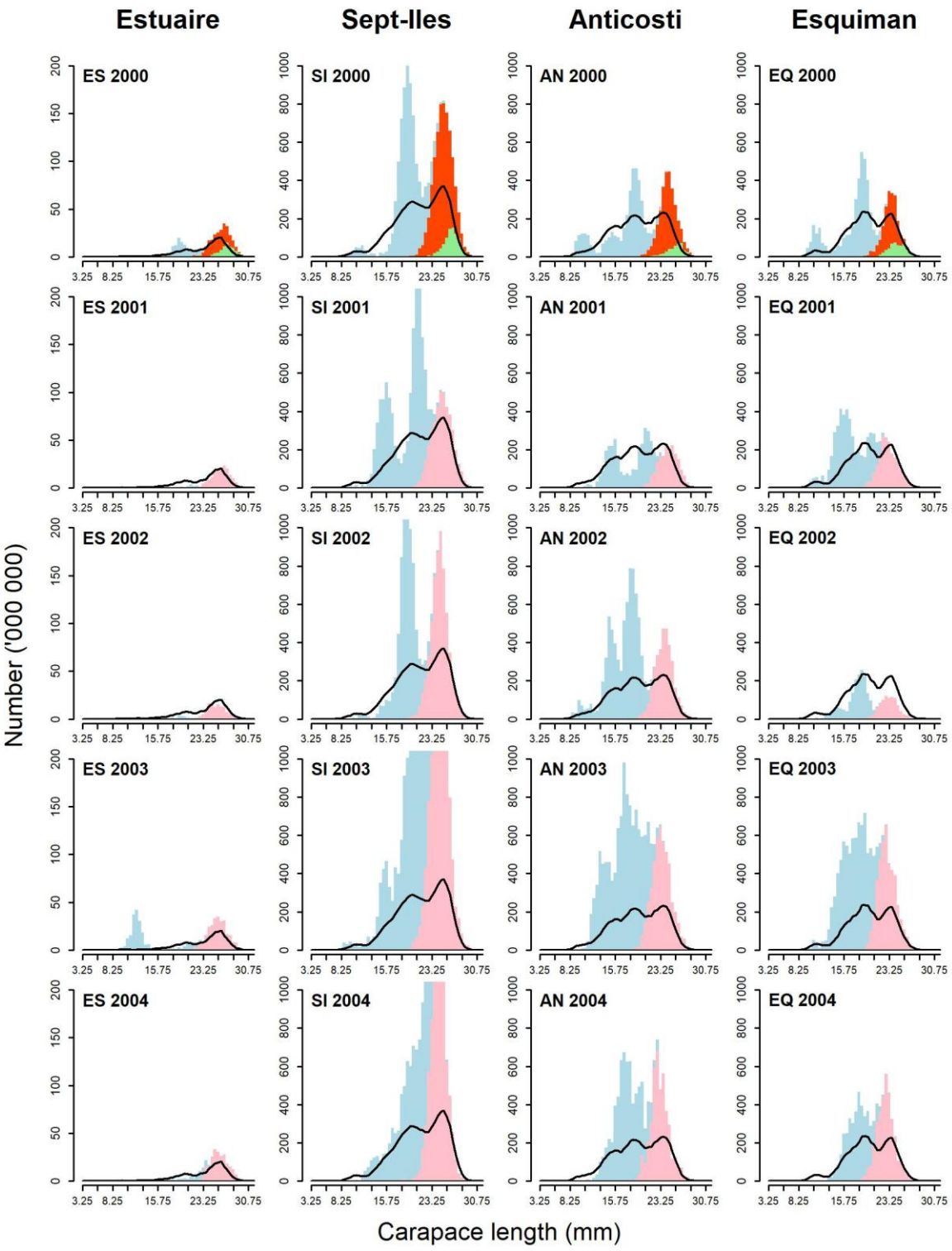


Figure 53. Continued.

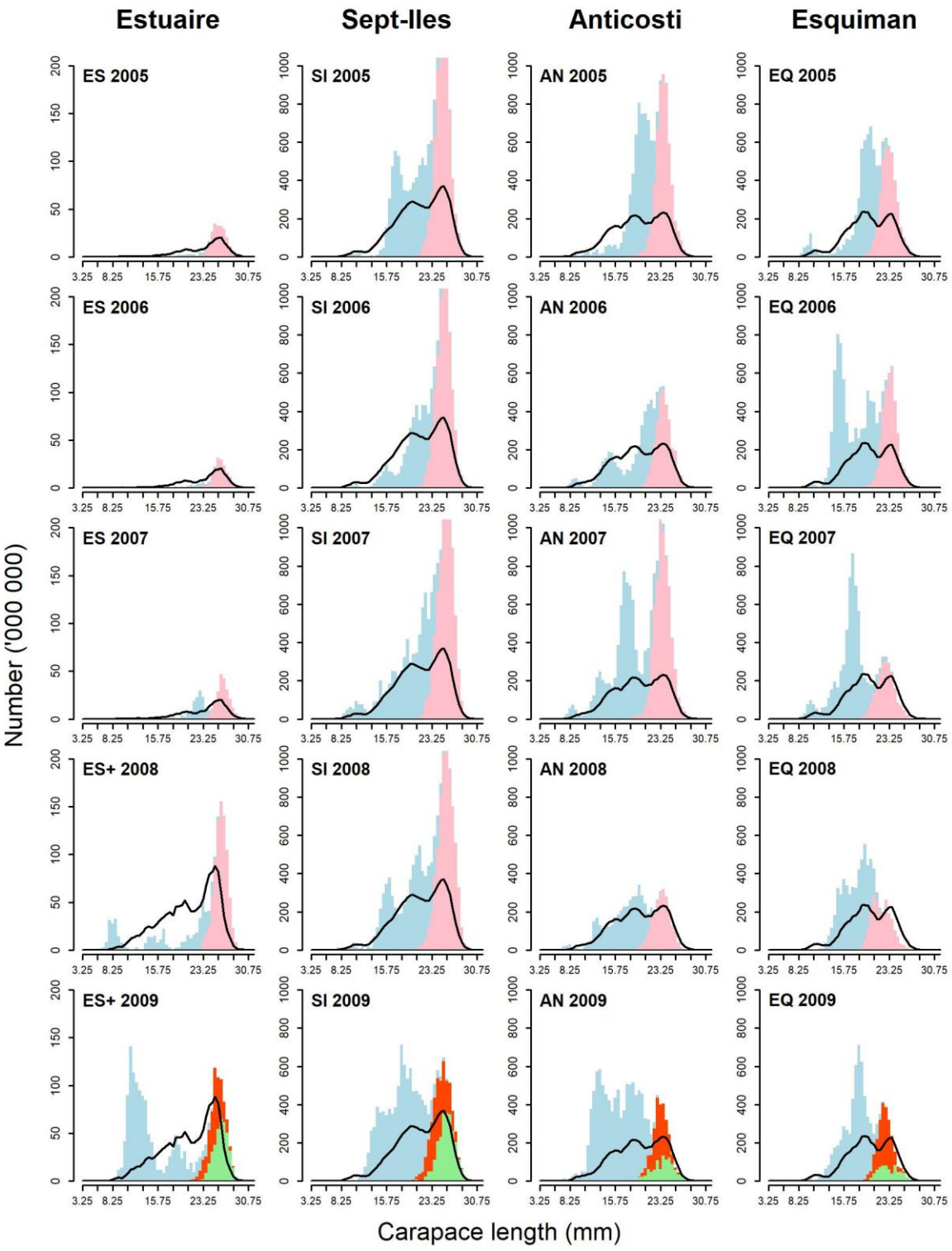


Figure 53. Continued.

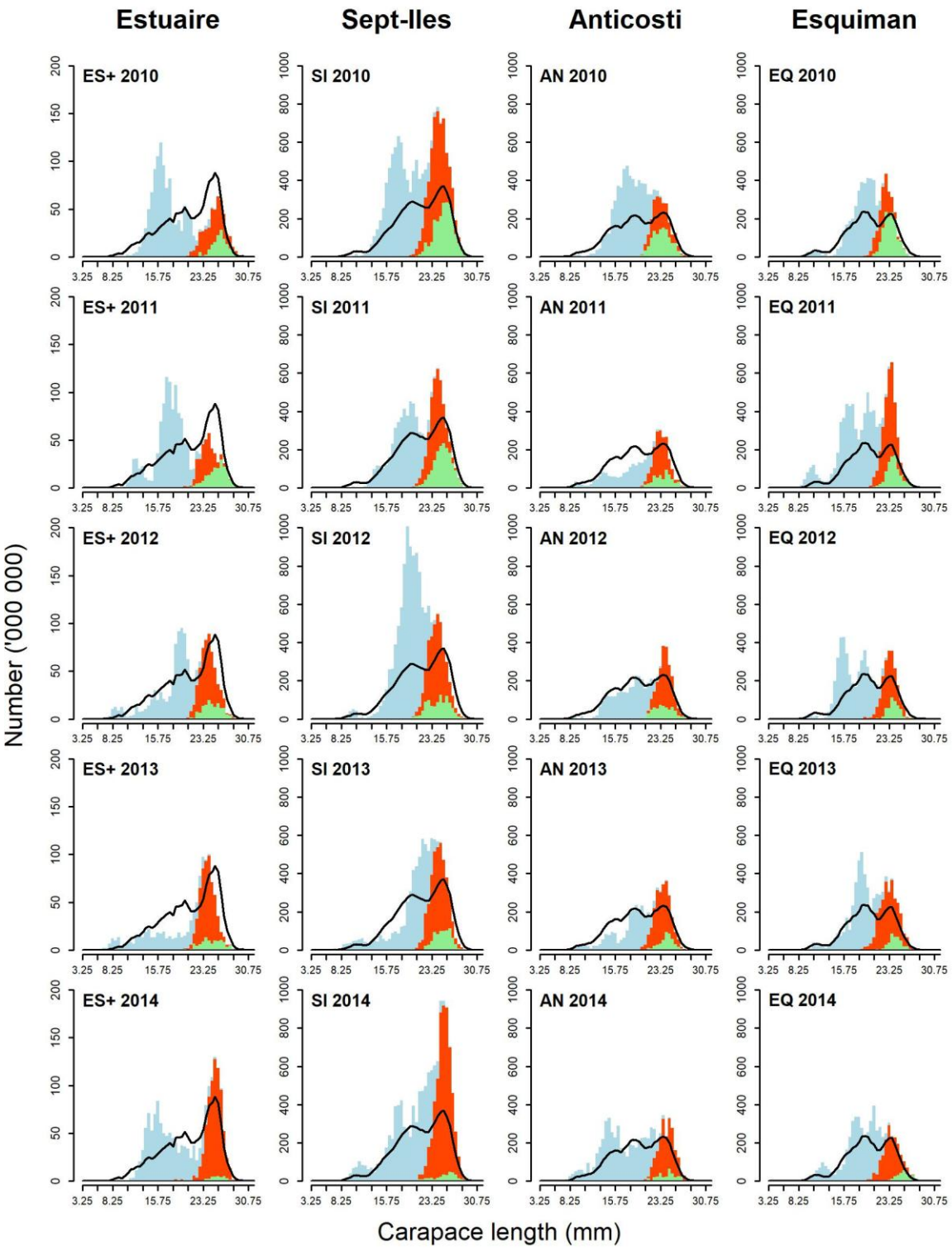


Figure 53. Continued.

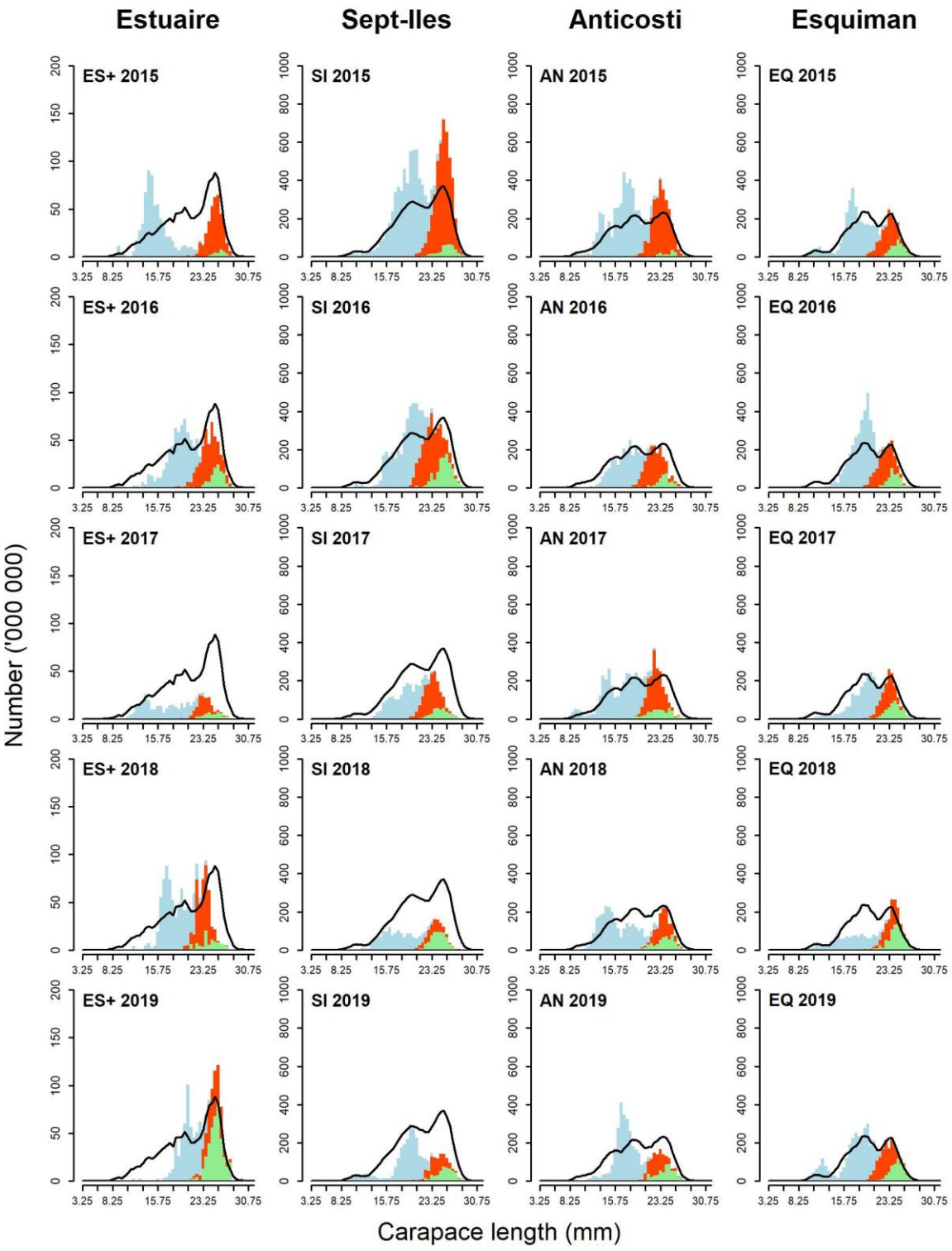


Figure 53. Continued.

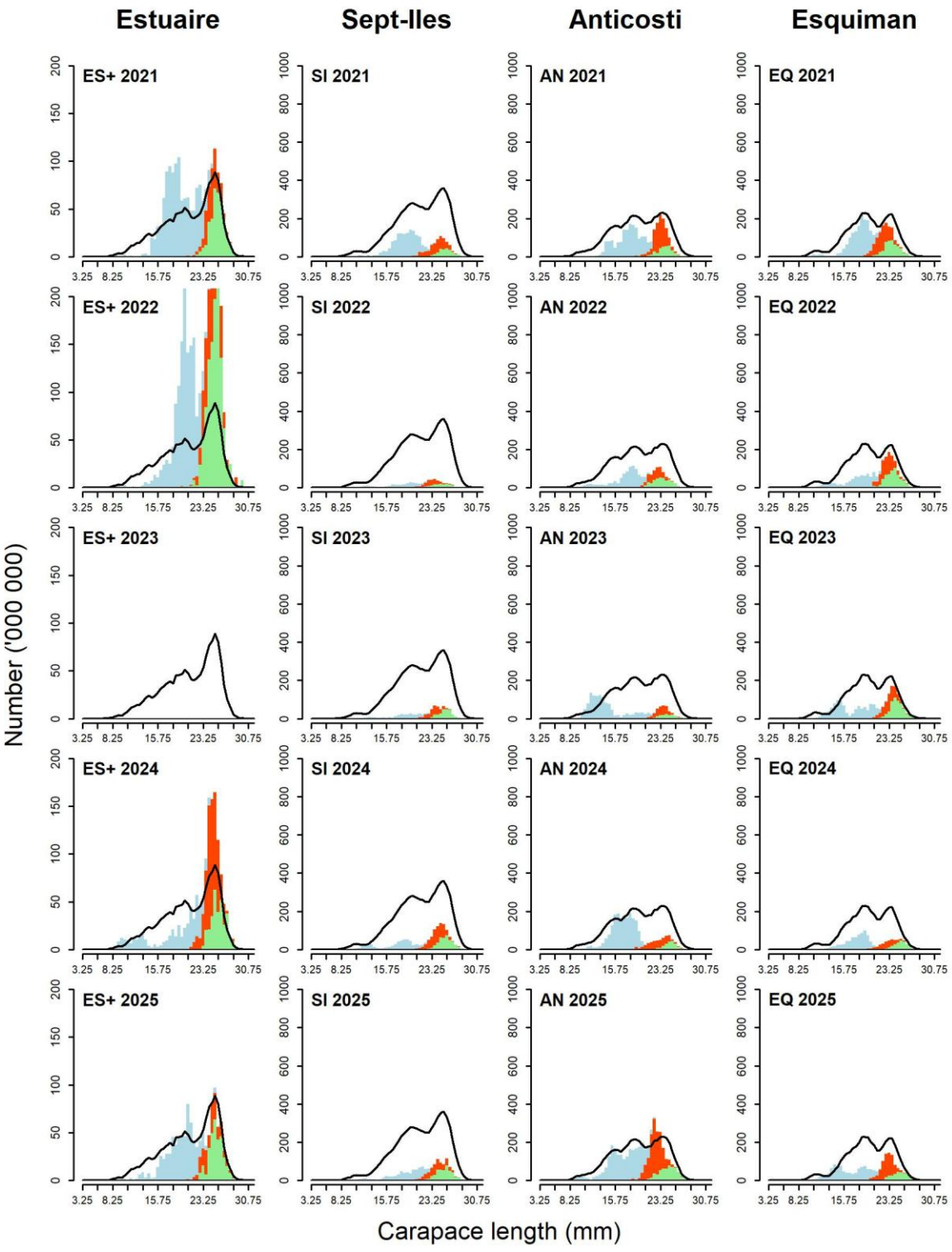


Figure 53. Continued.

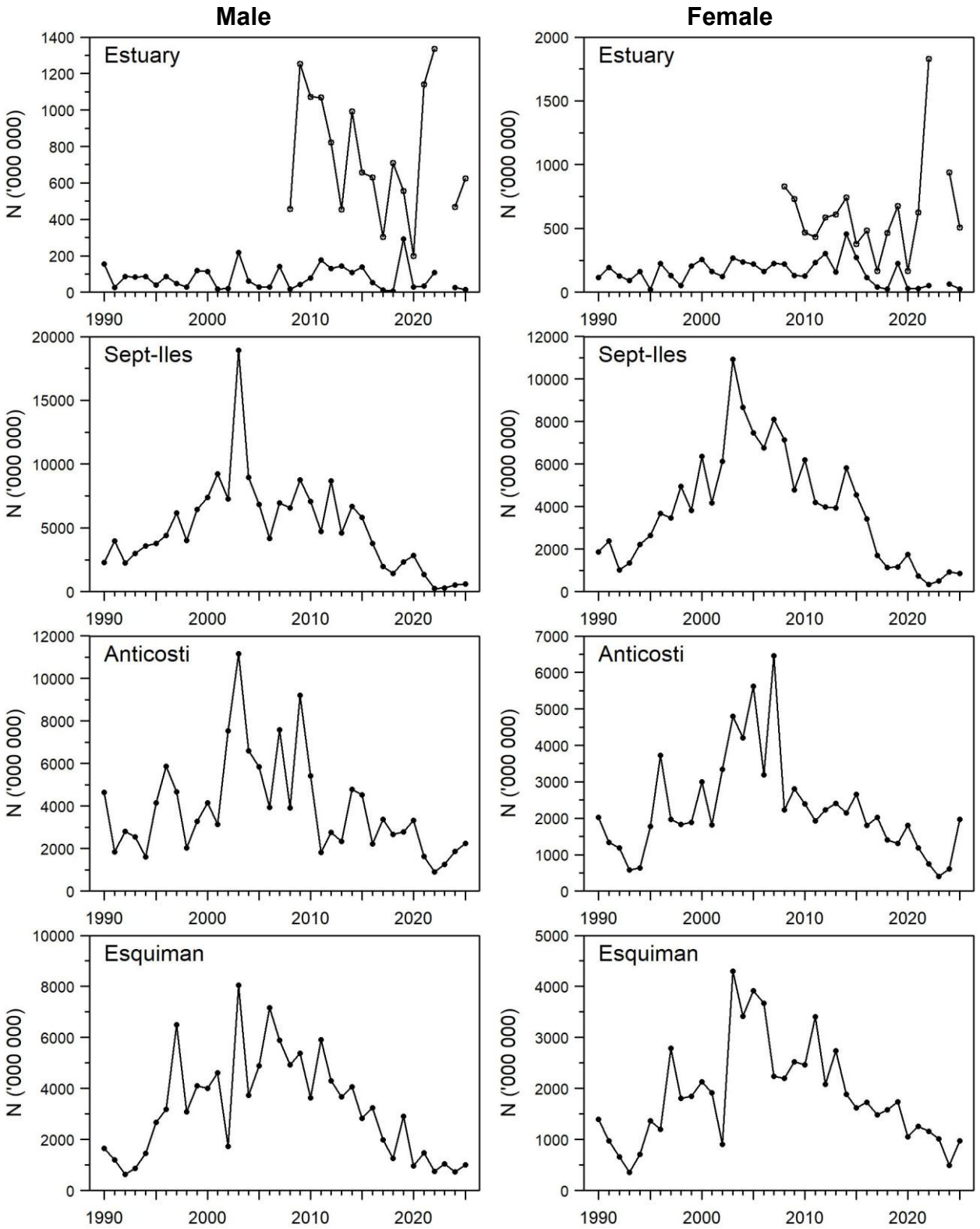


Figure 54. Abundance (in million) by stock assessment unit and by year, for males and females. The open circles from 2008 to 2025 show the results obtained when adding strata in shallow waters (37-183 m) of the estuary.

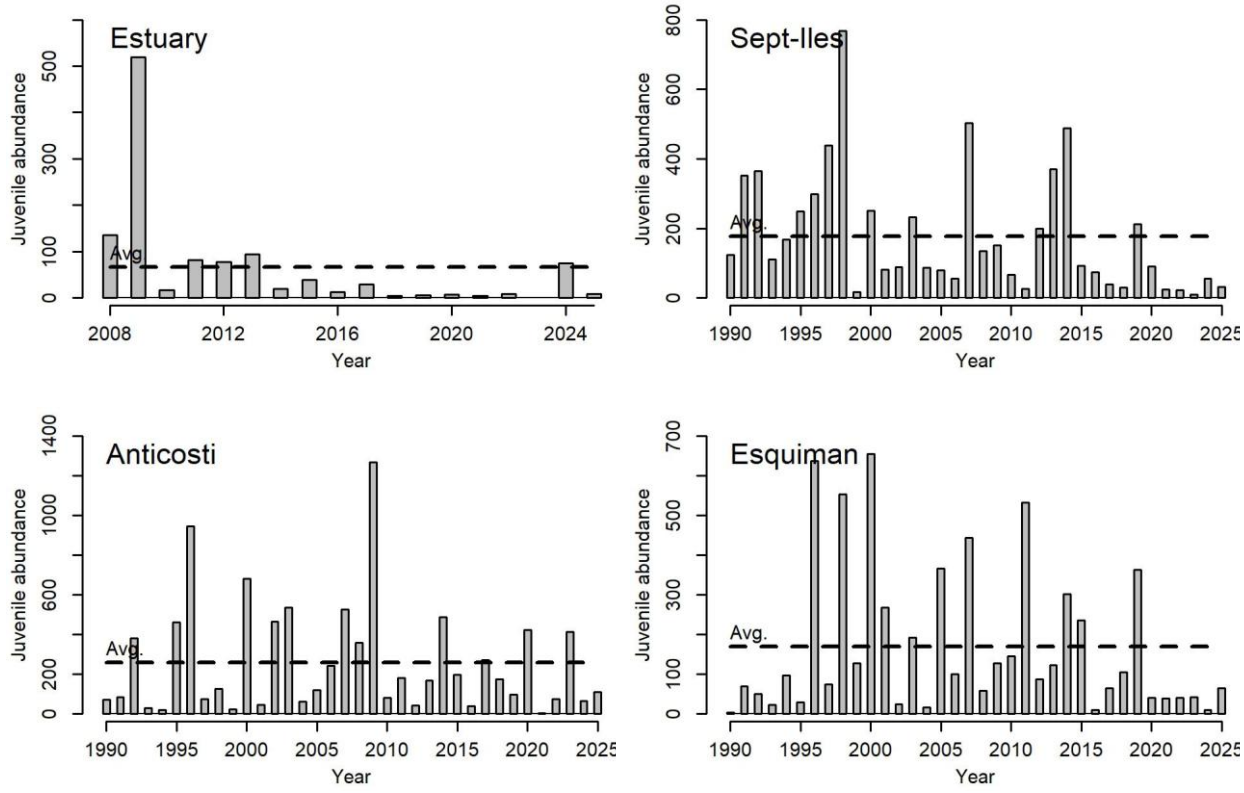


Figure 55. Juvenile abundance (in million) by stock assessment unit and by year. Results for Estuary were obtained with adding strata in shallow waters (37-183 m). The dashed horizontal line corresponds to the average of the 2008-2024 or 1990-2024 series, depending on the assessment unit.

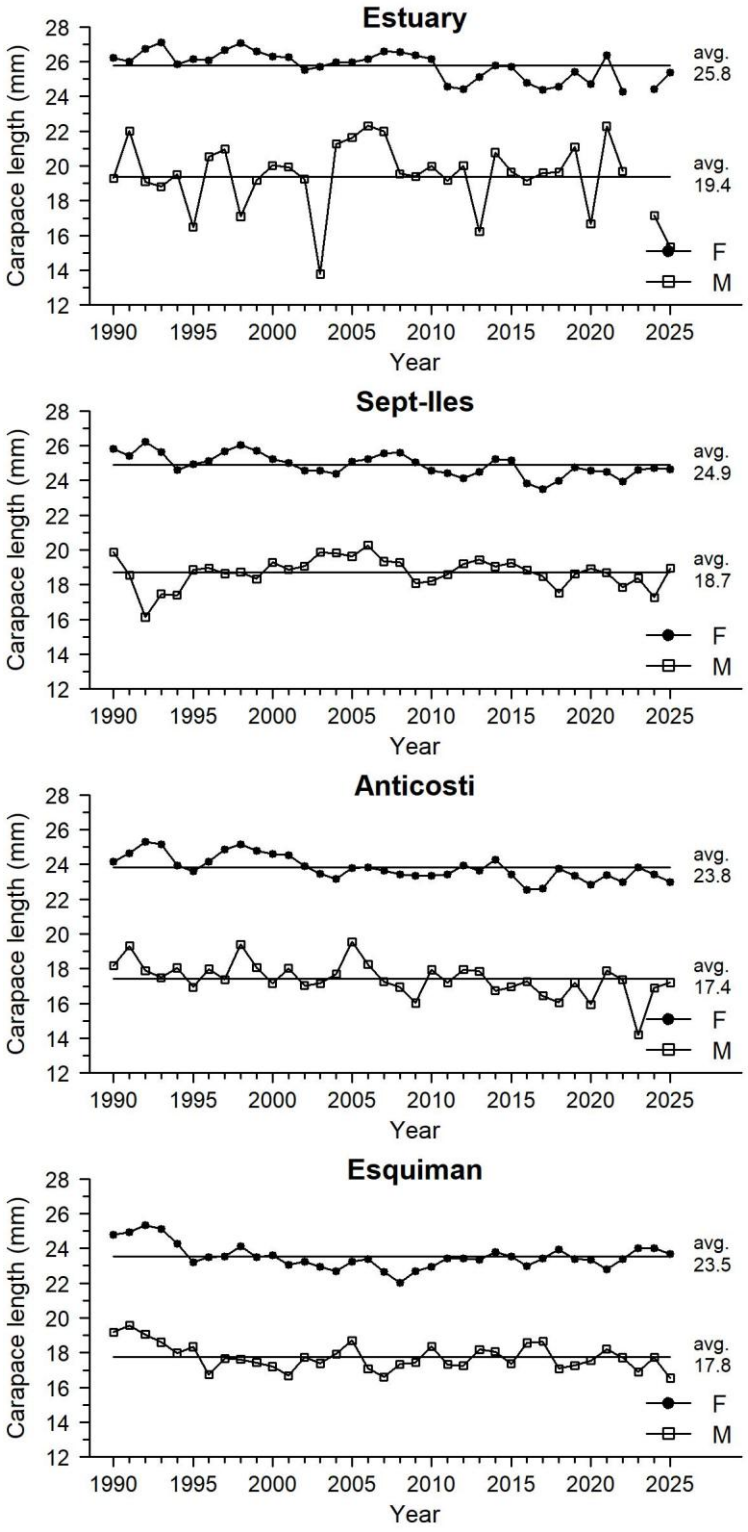


Figure 56. Mean carapace length of male and female shrimp by stock assessment unit in the DFO survey.

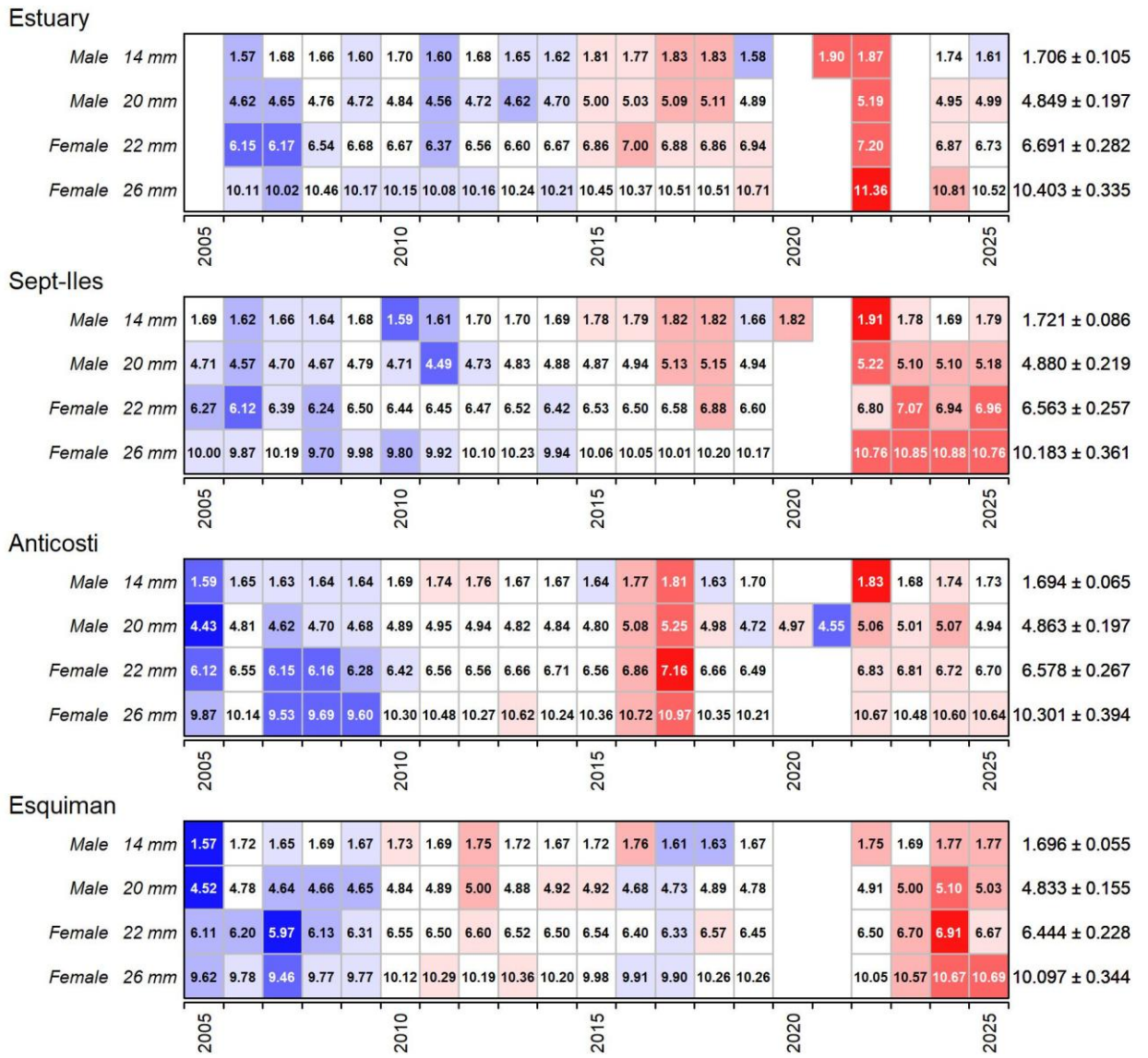


Figure 57. Weight (g) of male (14 and 20 mm) and female (22 and 26 mm) shrimp observed during the DFO August survey. The color code represents the value of the anomaly, which is the difference between the weight the CPUE and the average of the time series divided by the standard deviation of that average for each species.

Estuary

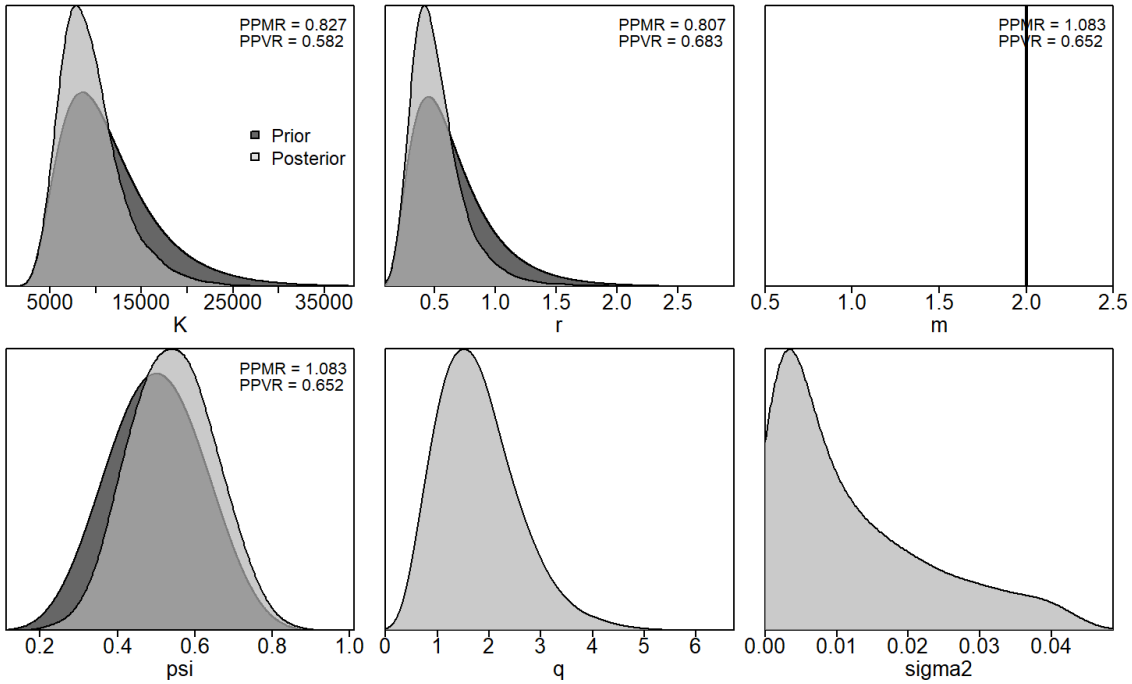


Figure 58. Prior distributions (dark grey) and posterior distributions (light grey) of the parameters used in the base model for Estuary. The parameters examined include carrying capacity (K), intrinsic rate of increase (r), biomass as a proportion of carrying capacity in the first year of the time series (B_1/K), the biomass index catchability coefficient (q), the process error variance σ_η^2 (sigma2) and the observation error variance $\sigma_{\varepsilon,t}^2$ (sigma2_obs). Posterior distributions were plotted using generic kernel densities.

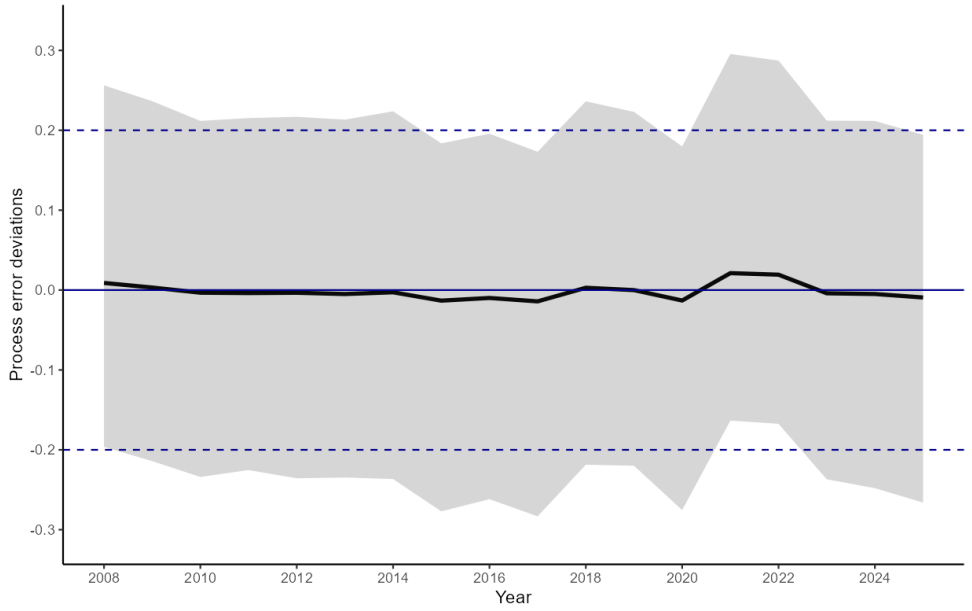


Figure 59. Process error deviation in the Estuary model. The black line represents the median value of the posterior distribution, while the 95% CI is shown in grey. The solid blue line represents the trend for biomass generated by the deterministic portion of the model, while the dashed blue lines are provided to make the graph easier to read.

Estuary

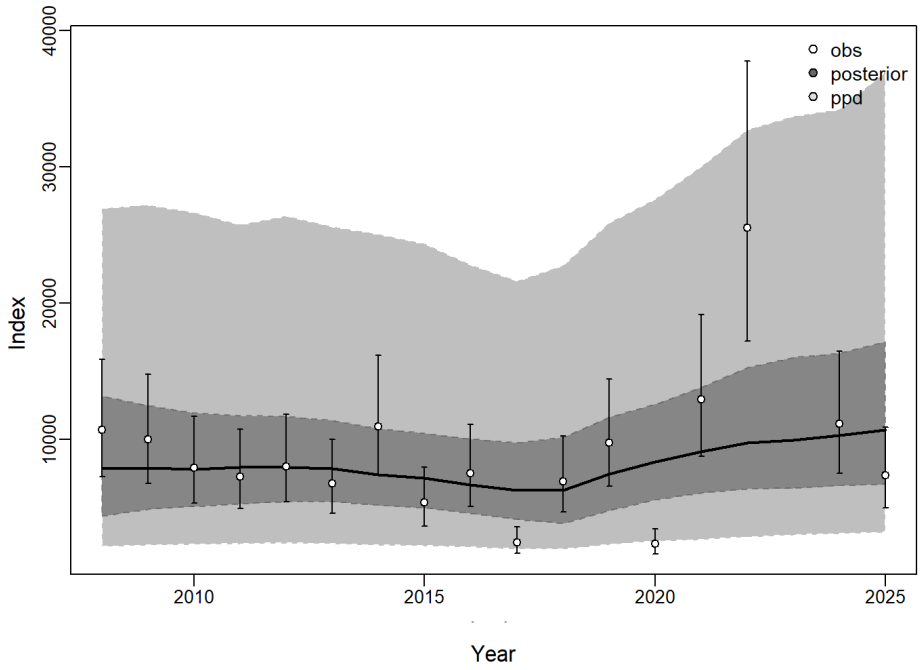


Figure 60. Total biomass index values observed for the Estuary stock (white dots and associated error bars) and the trajectory estimated by the base model (black line). The shaded areas represent the posterior distribution of the predicted values (dark grey) and the predictive posterior distribution (PPD) (light grey).

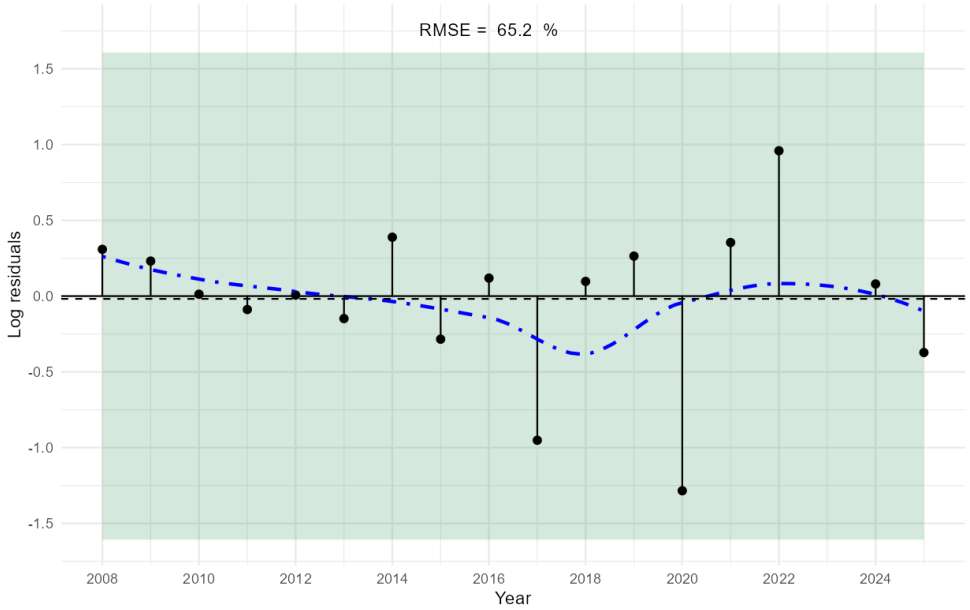


Figure 61. Residual diagnostics for the base model for the Estuary stock, plotted on a log scale of biomass index values. The dot-dash blue line represents the LOESS-smoothed residuals, while the green background represents the results of the Wald-Wolfowitz test. The RMSE corresponds to the mean absolute error in percentage terms.

Estuary

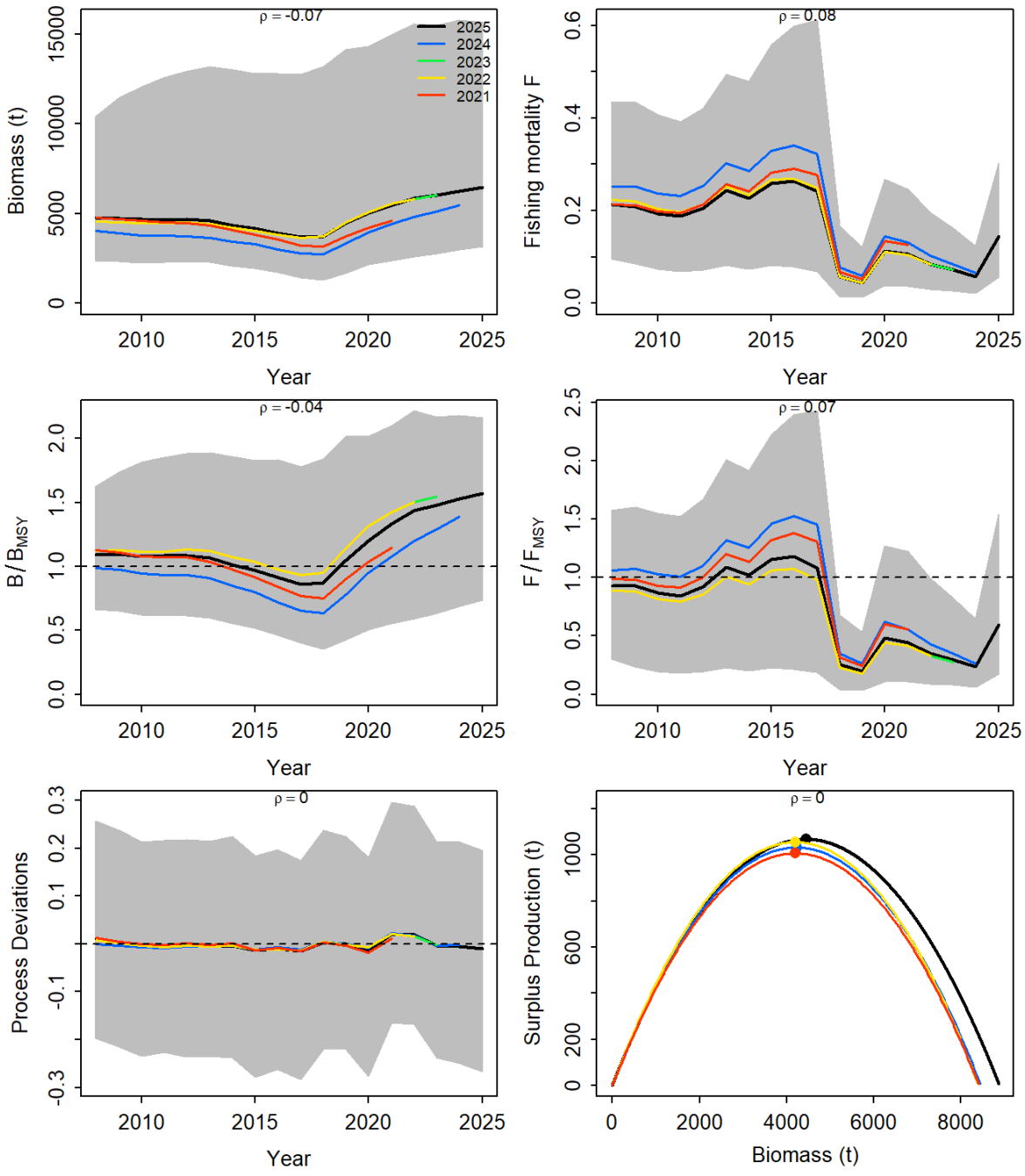


Figure 62. Retrospective analysis for the Estuary stock (2021–2025). The mean Mohn's rho values are shown on each graph.

Estuary

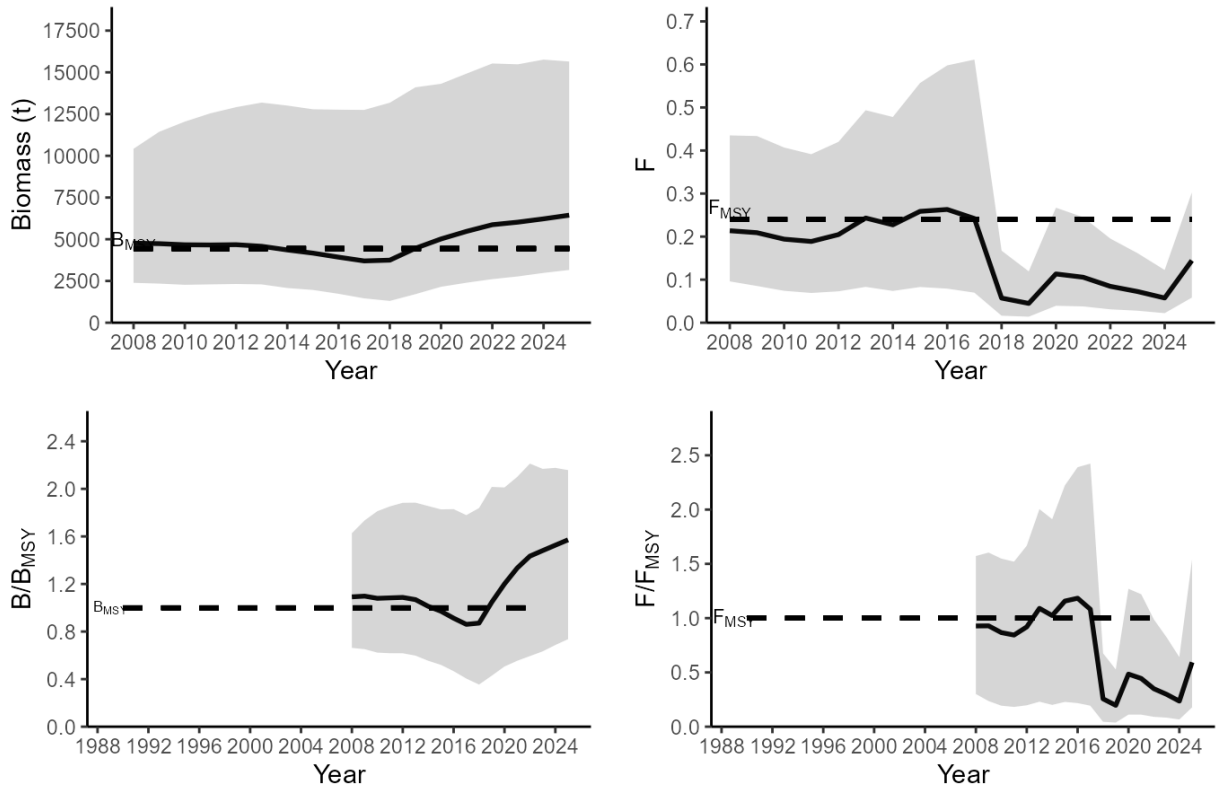


Figure 63. Estimated trajectories for Estuary stock biomass (B_t) and fishing mortality (F_t), scaled to the maximum sustainable yield (B/B_{MSY} and F/F_{MSY}). The shaded area represents the 95% confidence interval.

Estuary

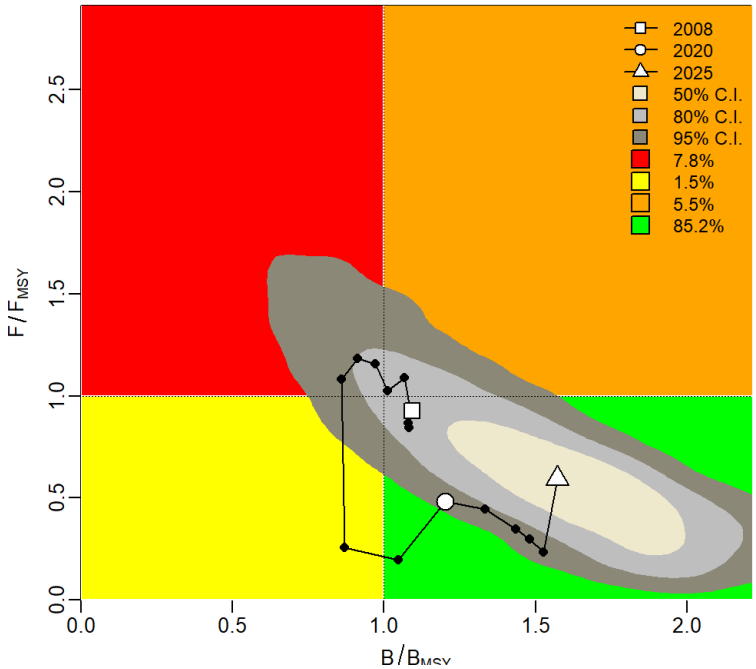


Figure 64. Kobe-type plot for the base case scenario for the Estuary stock. The black line shows the estimated trajectory (1990–2025) between F/F_{MSY} and B/B_{MSY}. The grey shaded areas show the confidence intervals for the terminal year (50%, 80% and 95%). The probabilities of the terminal year being located in one of the quadrants are indicated in the legend.

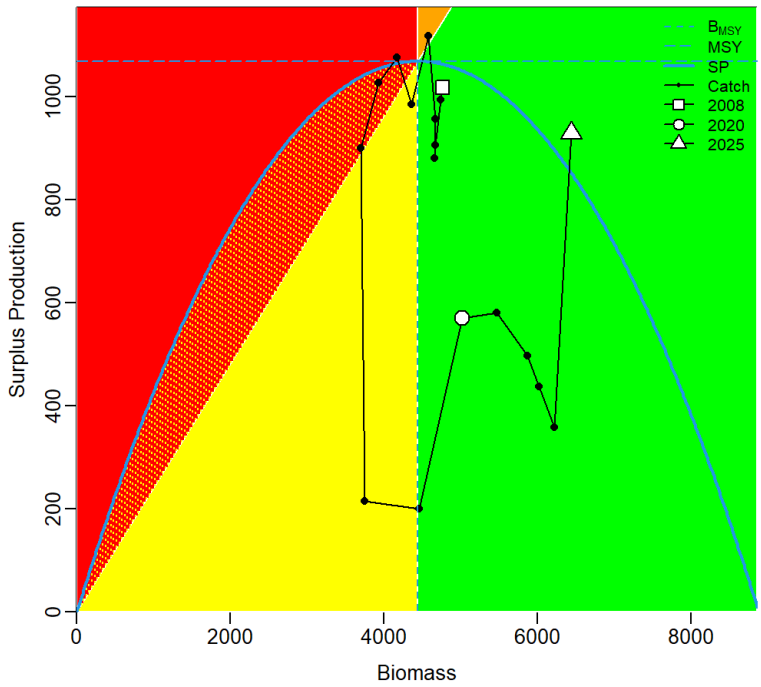


Figure 65. SP-phase-type plot showing the estimated surplus production curve (blue line) and the catch trajectory (black line) as a function of biomass for the base case scenario for the Estuary stock. The blue dashed lines show the estimated values for maximum sustainable yield.

Sept-Iles

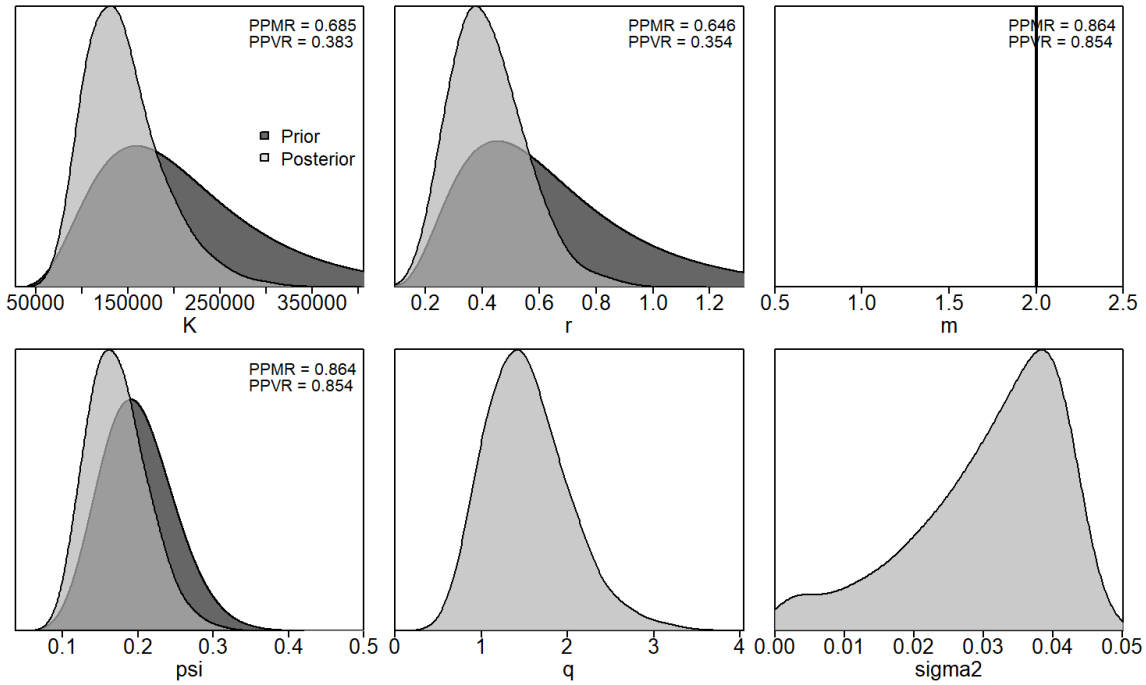


Figure 66. Prior distributions (dark grey) and posterior distributions (light grey) of the parameters used in the base model for Sept-Iles. The parameters examined include carrying capacity (K), intrinsic rate of increase (r), biomass as a proportion of carrying capacity in the first year of the time series (B_1/K), the biomass index catchability coefficient (q), the process error variance σ_η^2 (sigma2) and the observation error variance $\sigma_{\varepsilon,t}^2$ (sigma2_obs). Posterior distributions were plotted using generic kernel densities.

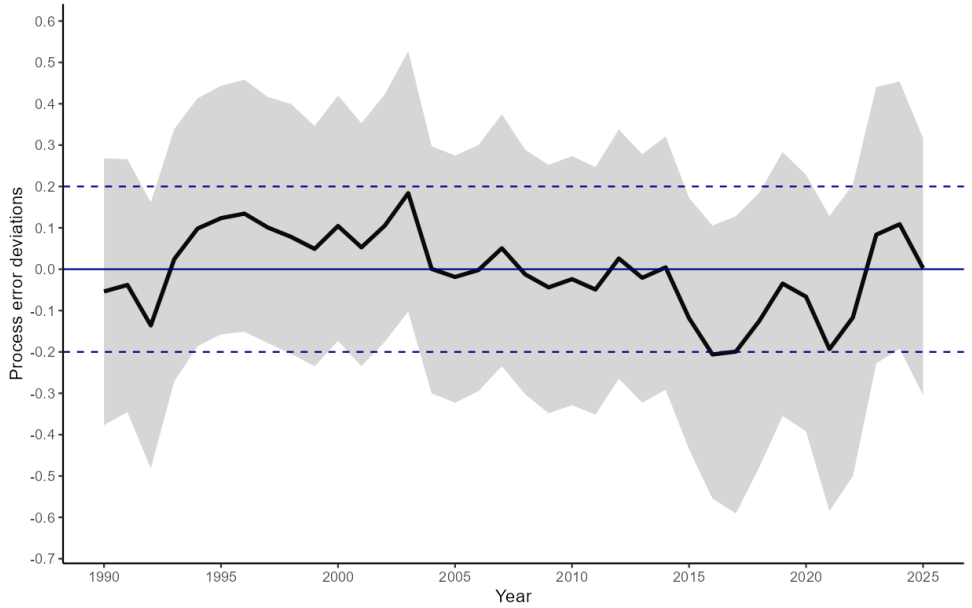


Figure 67. Process error deviation in the Sept-Iles model. The black line represents the median value of the posterior distribution, while the 95% CI is shown in grey. The solid blue line represents the trend for biomass generated by the deterministic portion of the model, while the dashed blue lines are provided to make the graph easier to read..

Sept-Iles

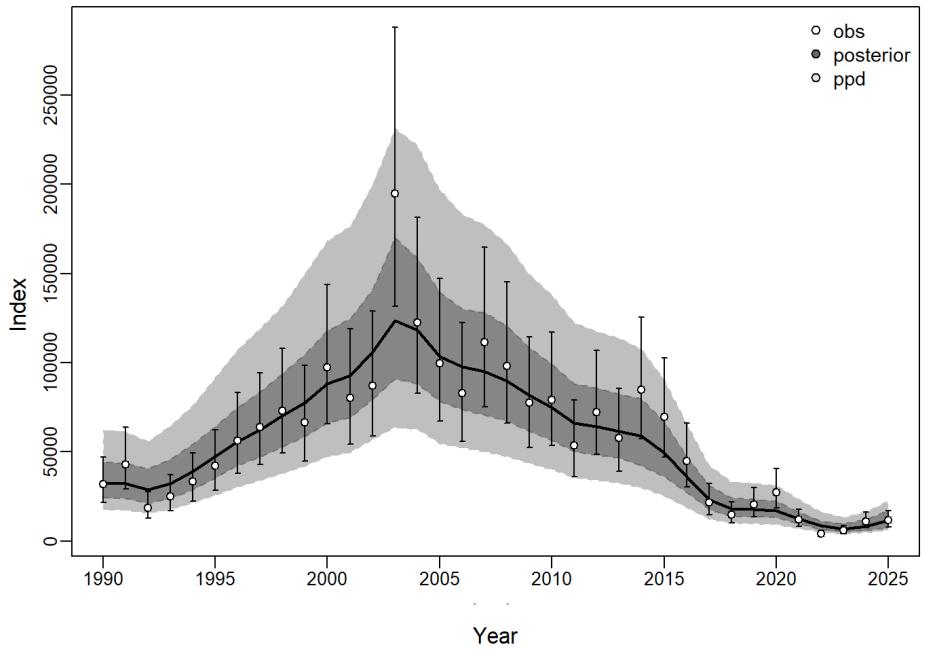


Figure 68. Total biomass index values observed for the Sept-Iles stock (white dots and associated error bars) and the trajectory estimated by the base model (black line). The shaded areas represent the posterior distribution of the predicted values (dark grey) and the predictive posterior distribution (PPD) (light grey).

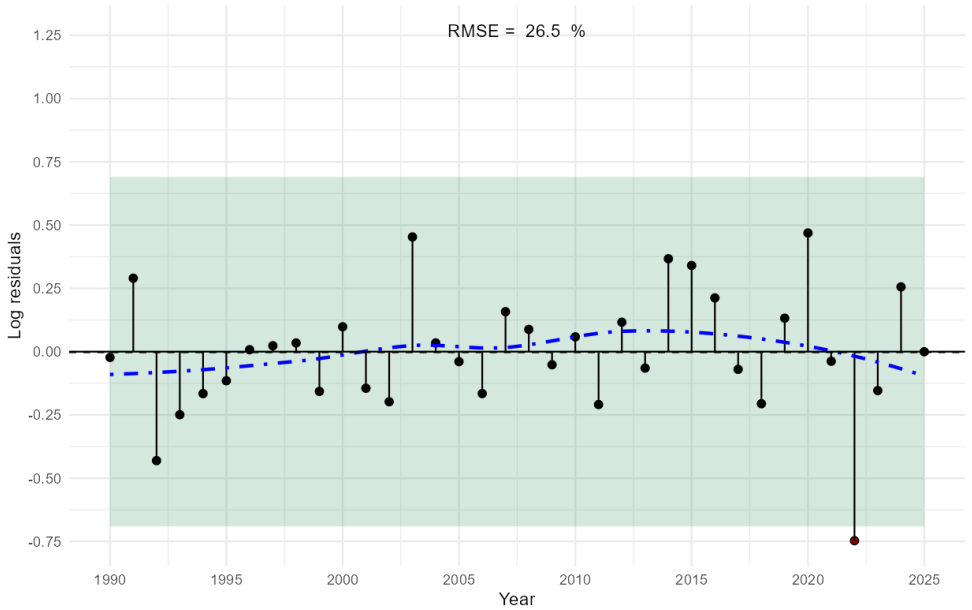


Figure 69. Residual diagnostics for the base model for the Sept-Iles stock, plotted on a log scale of biomass index values. The dot-dash blue line represents the LOESS-smoothed residuals, while the green background represents the results of the Wald-Wolfowitz test. The RMSE corresponds to the mean absolute error in percentage terms.

Sept-Iles

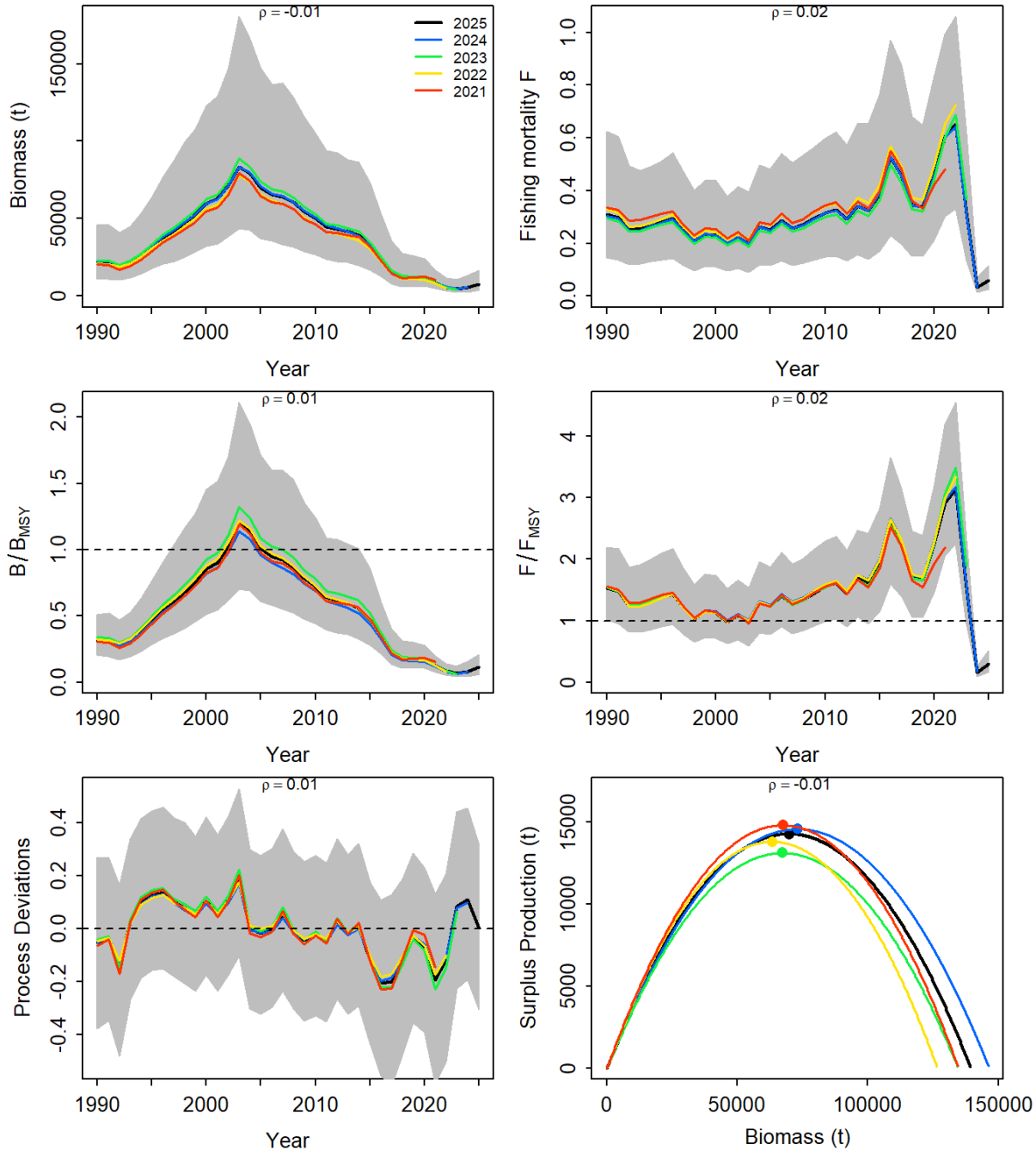


Figure 70. Retrospective analysis for the Sept-Iles stock (2021–2025). The mean Mohn's rho values are shown on each graph.

Sept-Iles

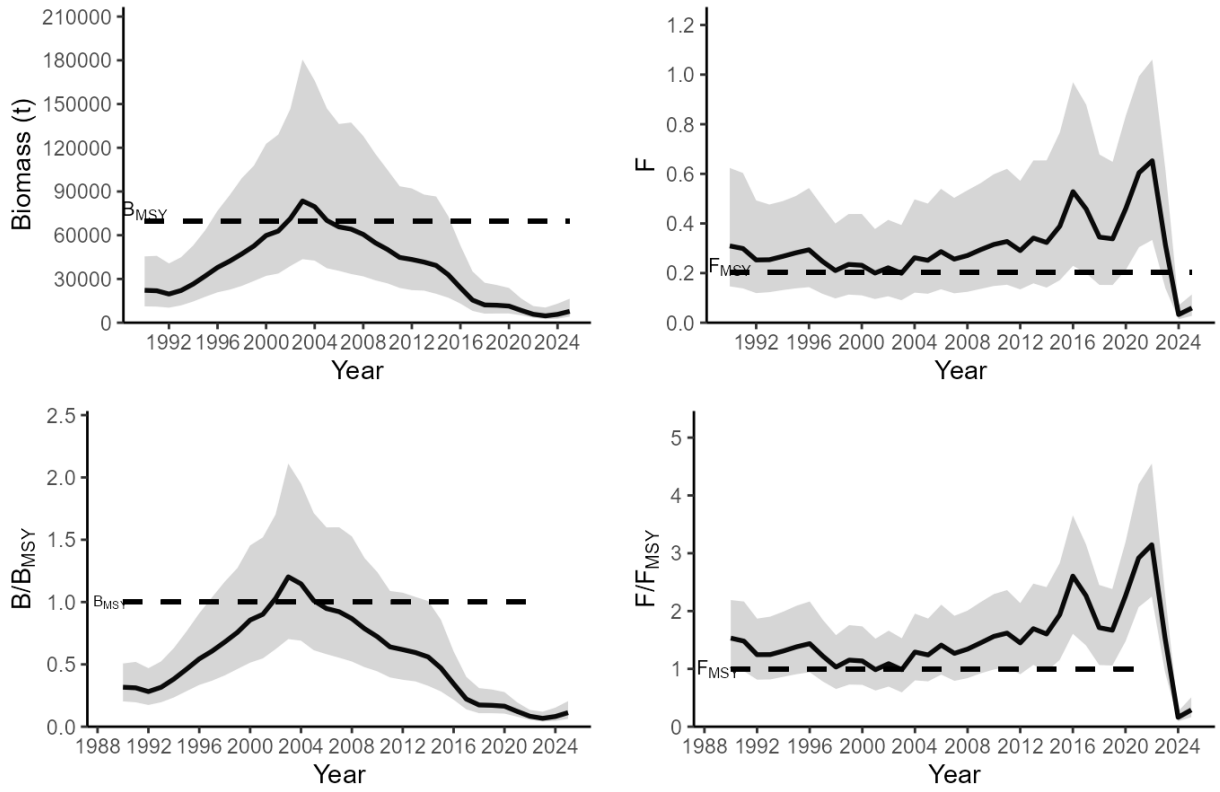


Figure 71. Estimated trajectories for Sept-Iles stock biomass (B_t) and fishing mortality (F_t), scaled to the maximum sustainable yield (B/B_{MSY} and F/F_{MSY}). The shaded area represents the 95% confidence interval.

Sept-Iles

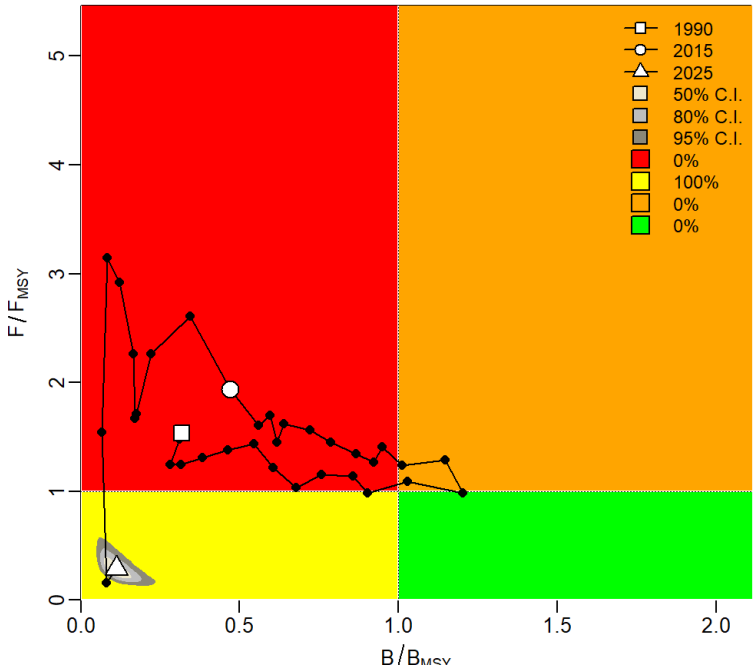


Figure 72. Kobe-type plot for the base case scenario for the Sept-Iles stock. The black line shows the estimated trajectory (1990–2025) between F/F_{MSY} and B/B_{MSY}. The grey shaded areas show the confidence intervals for the terminal year (50%, 80% and 95%). The probabilities of the terminal year being located in one of the quadrants are indicated in the legend.

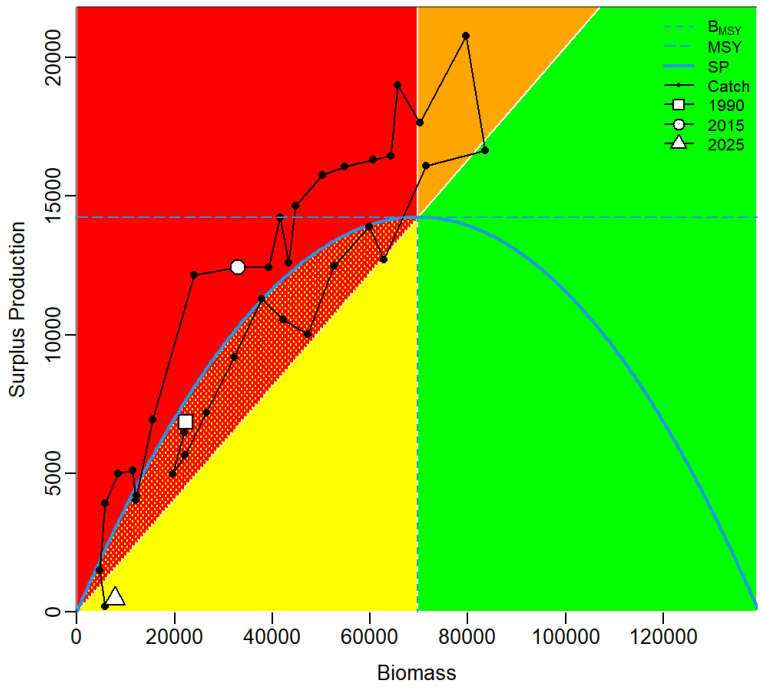


Figure 73. SP-phase-type plot showing the estimated surplus production curve (blue line) and the catch trajectory (black line) as a function of biomass for the base case scenario for the Sept-Iles stock. The blue dashed lines show the estimated values for maximum sustainable yield.

Anticosti

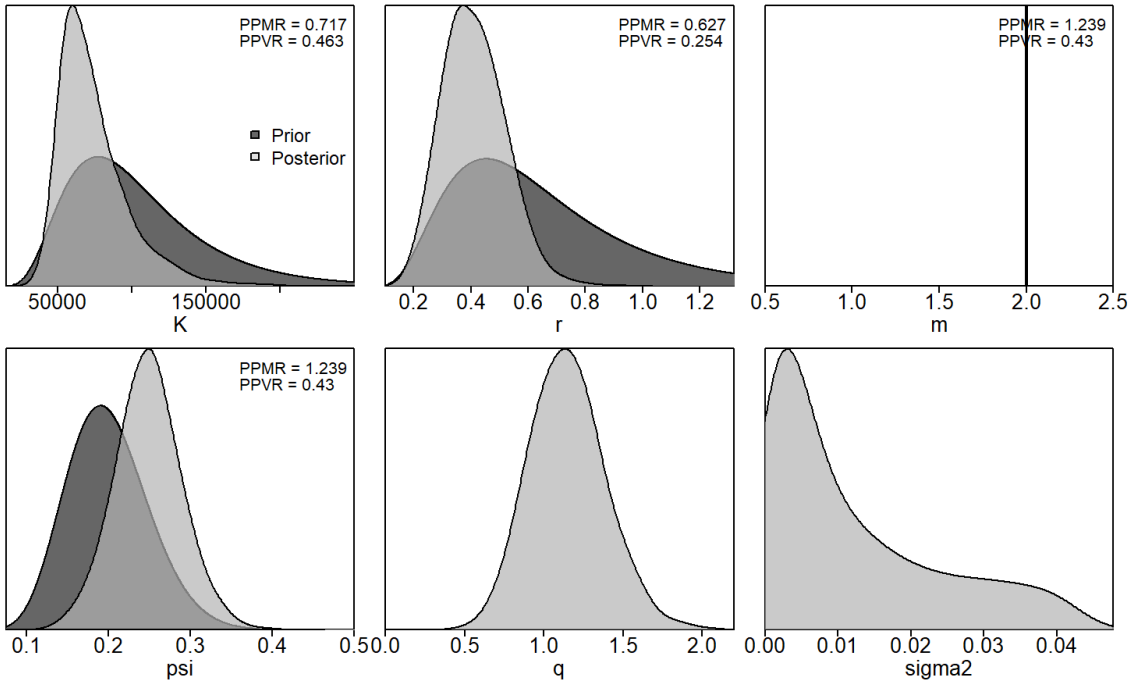


Figure 74. Prior distributions (dark grey) and posterior distributions (light grey) of the parameters used in the base model for Anticosti. The parameters examined include carrying capacity (K), intrinsic rate of increase (r), biomass as a proportion of carrying capacity in the first year of the time series (B_1/K), the biomass index catchability coefficient (q), the process error variance σ_η^2 (sigma2) and the observation error variance $\sigma_{\varepsilon,t}^2$ (sigma2_obs). Posterior distributions were plotted using generic kernel densities.

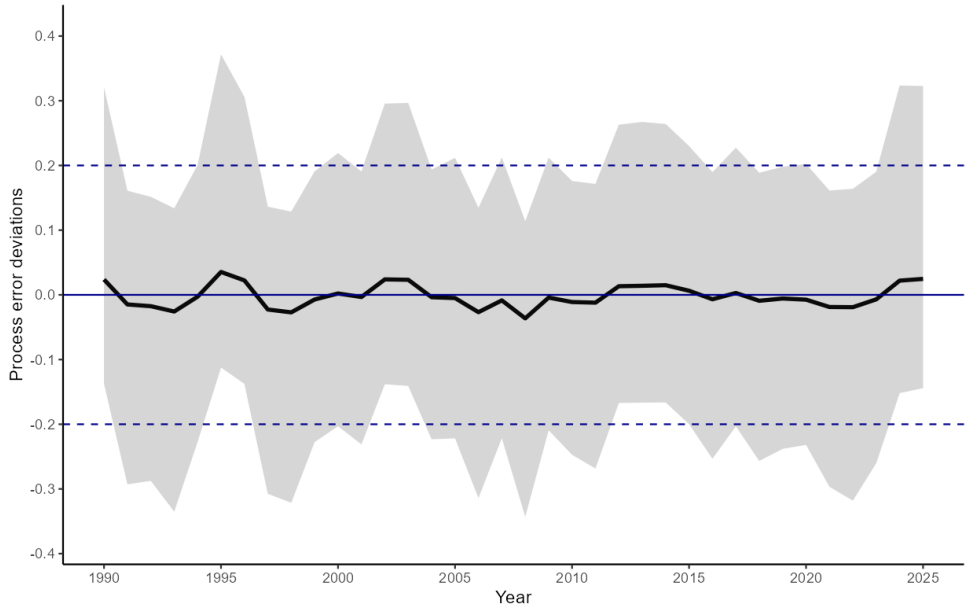


Figure 75. Process error deviation in the Anticosti model. The black line represents the median value of the posterior distribution, while the 95% CI is shown in grey. The solid blue line represents the trend for biomass generated by the deterministic portion of the model, while the dashed blue lines are provided to make the graph easier to read.

Anticosti

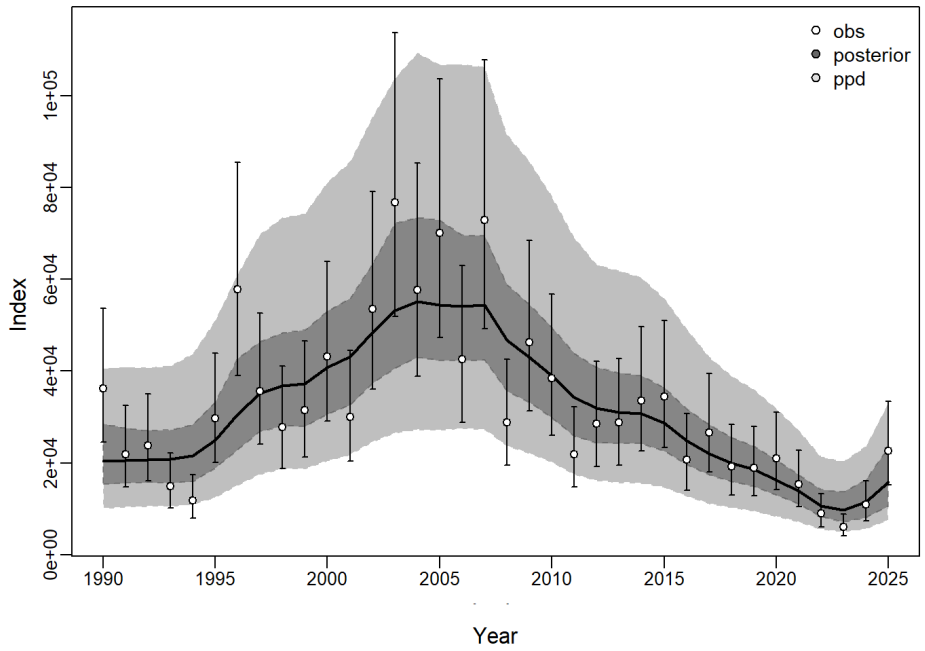


Figure 76. Total biomass index values observed for the Anticosti stock (white dots and associated error bars) and the trajectory estimated by the base model (black line). The shaded areas represent the posterior distribution of the predicted values (dark grey) and the predictive posterior distribution (PPD) (light grey).

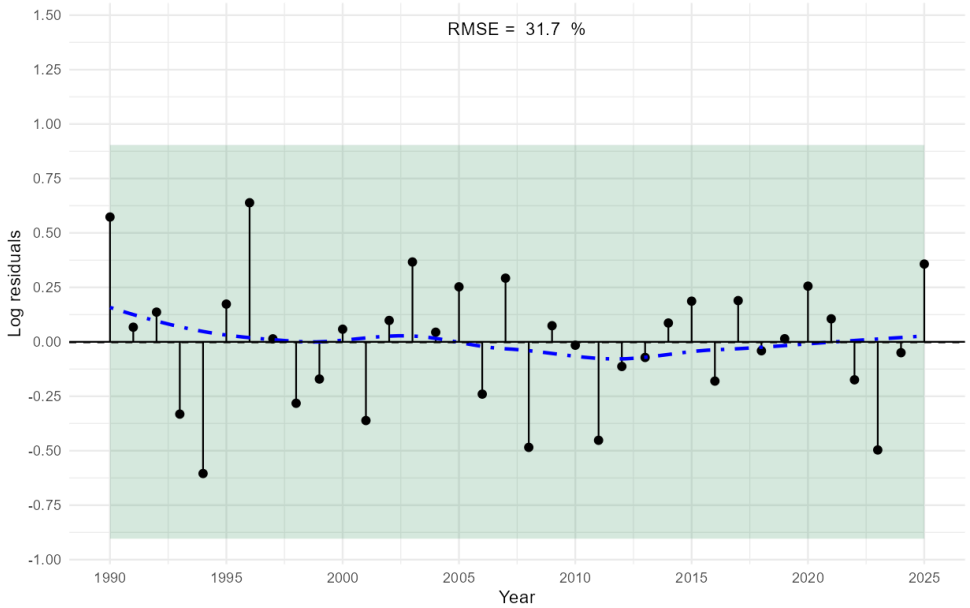


Figure 77. Residual diagnostics for the base model for the Anticosti stock, plotted on a log scale of biomass index values. The dot-dash blue line represents the LOESS-smoothed residuals, while the green background represents the results of the Wald-Wolfowitz test. The RMSE corresponds to the mean absolute error in percentage terms.

Anticosti

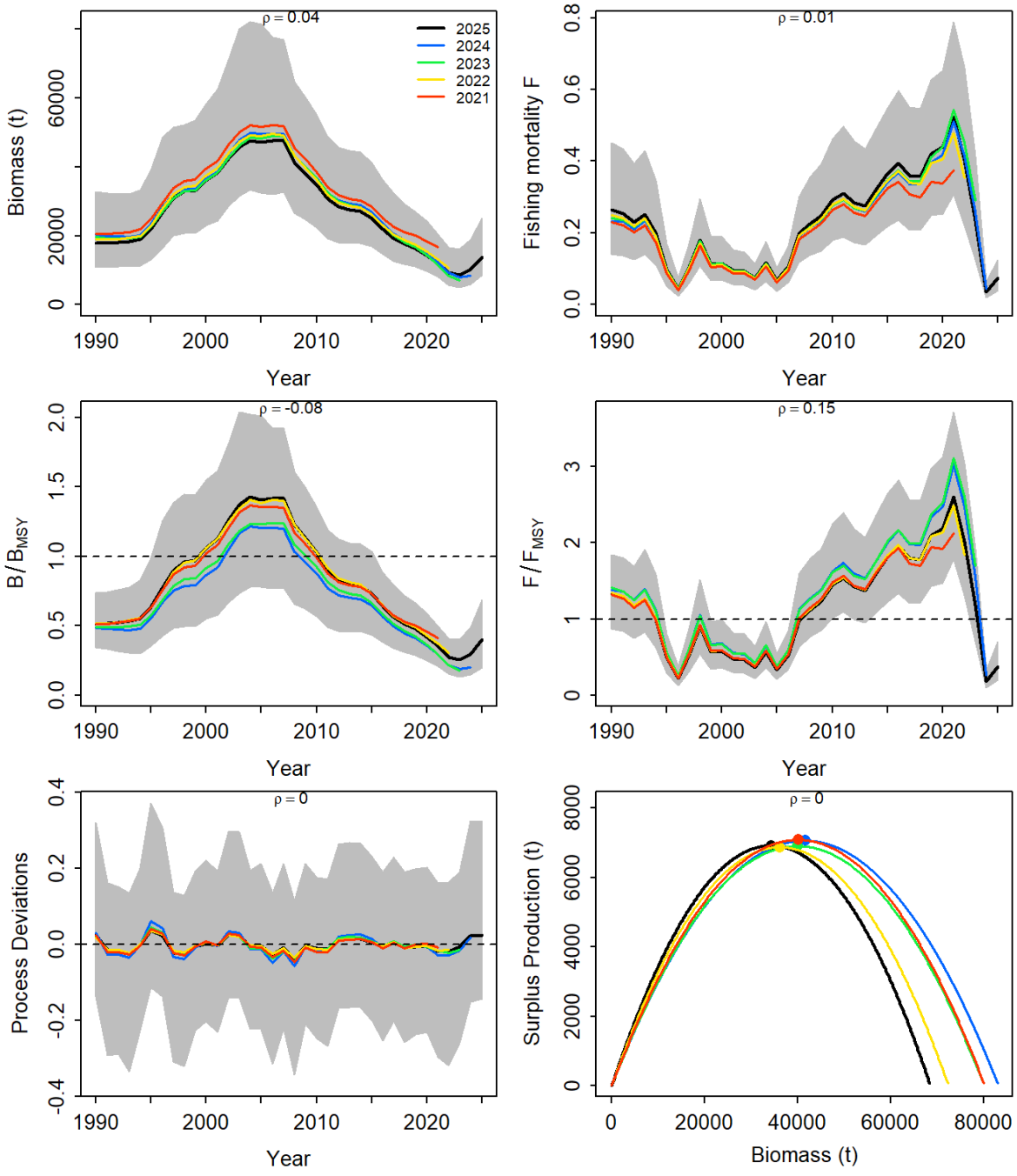


Figure 78. Retrospective analysis for the Anticosti stock (2021–2025). The mean Mohn's rho values are shown on each graph.

Anticosti

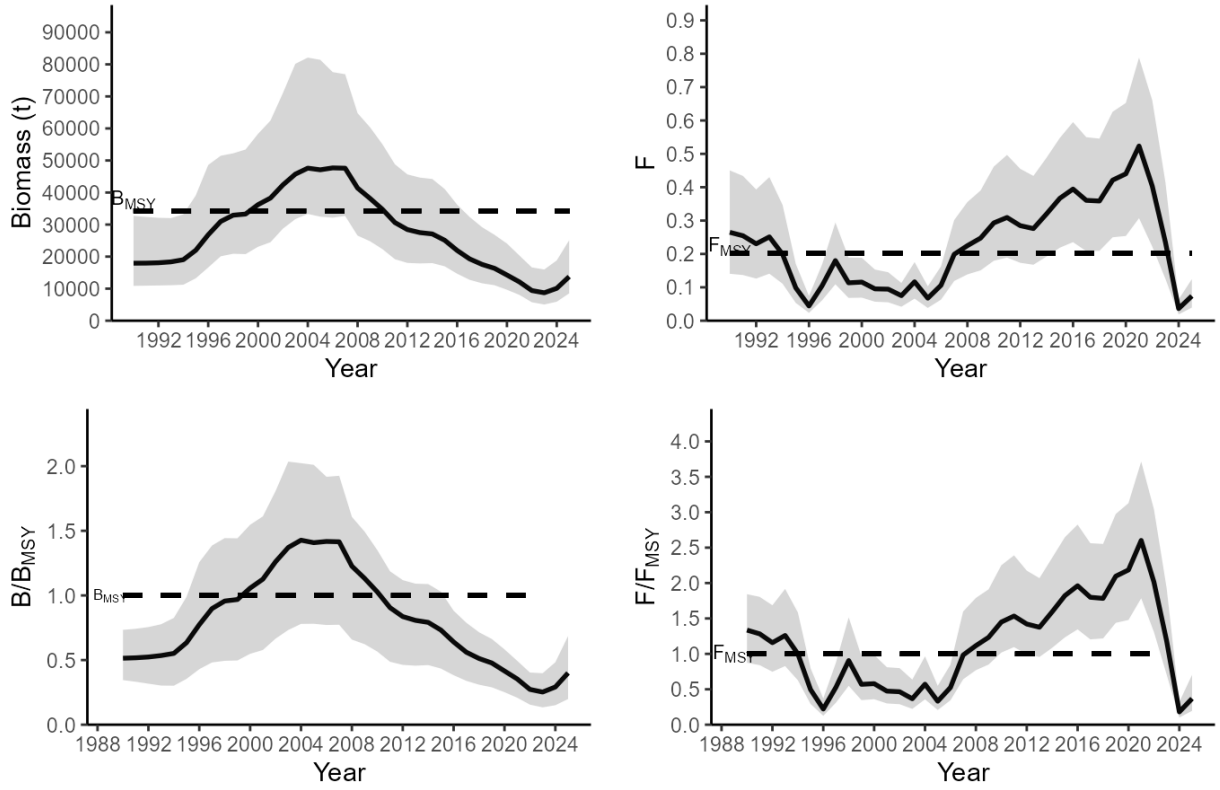


Figure 79. Estimated trajectories for Anticosti stock biomass (B_t) and fishing mortality (F_t), scaled to the maximum sustainable yield (B/B_{MSY} and F/F_{MSY}). The shaded area represents the 95% confidence interval.

Anticosti

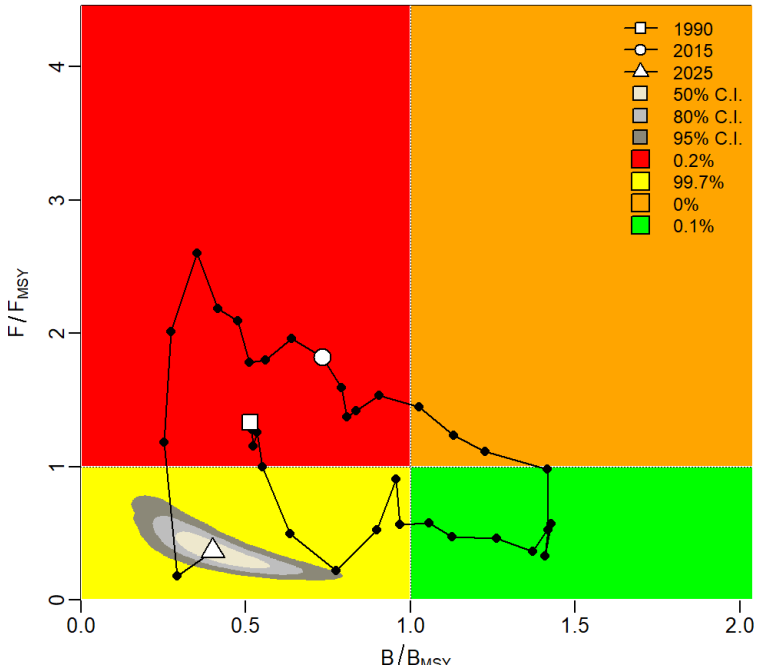


Figure 80. Kobe-type plot for the base case scenario for the Anticosti stock. The black line shows the estimated trajectory (1990–2025) between F/F_{MSY} and B/B_{MSY}. The grey shaded areas show the confidence intervals for the terminal year (50%, 80% and 95%). The probabilities of the terminal year being located in one of the quadrants are indicated in the legend.

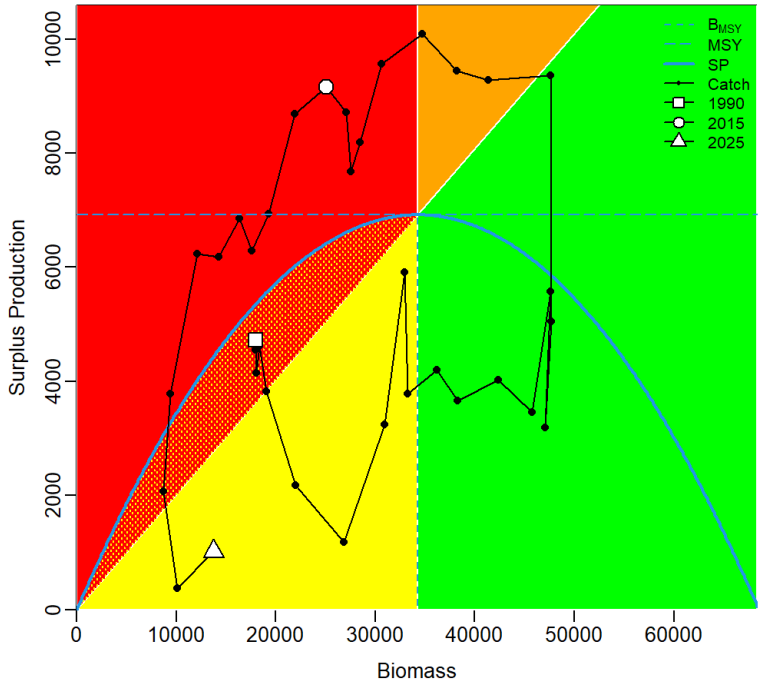


Figure 81. SP-phase-type plot showing the estimated surplus production curve (blue line) and the catch trajectory (black line) as a function of biomass for the base case scenario for the Anticosti stock. The blue dashed lines show the estimated values for maximum sustainable yield.

Esquiman

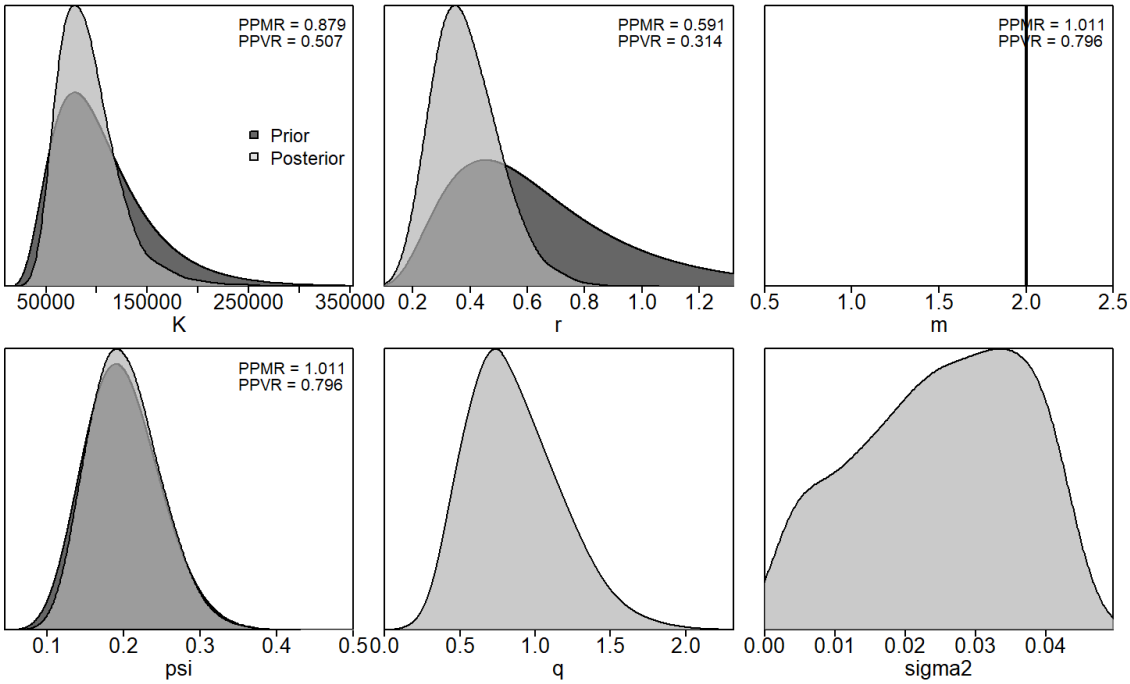


Figure 82. Prior distributions (dark grey) and posterior distributions (light grey) of the parameters used in the base model for Esquiman. The parameters examined include carrying capacity (K), intrinsic rate of increase (r), biomass as a proportion of carrying capacity in the first year of the time series (B_1/K), the biomass index catchability coefficient (q), the process error variance σ_η^2 (sigma2) and the observation error variance $\sigma_{\varepsilon,t}^2$ (sigma2_obs). Posterior distributions were plotted using generic kernel densities.

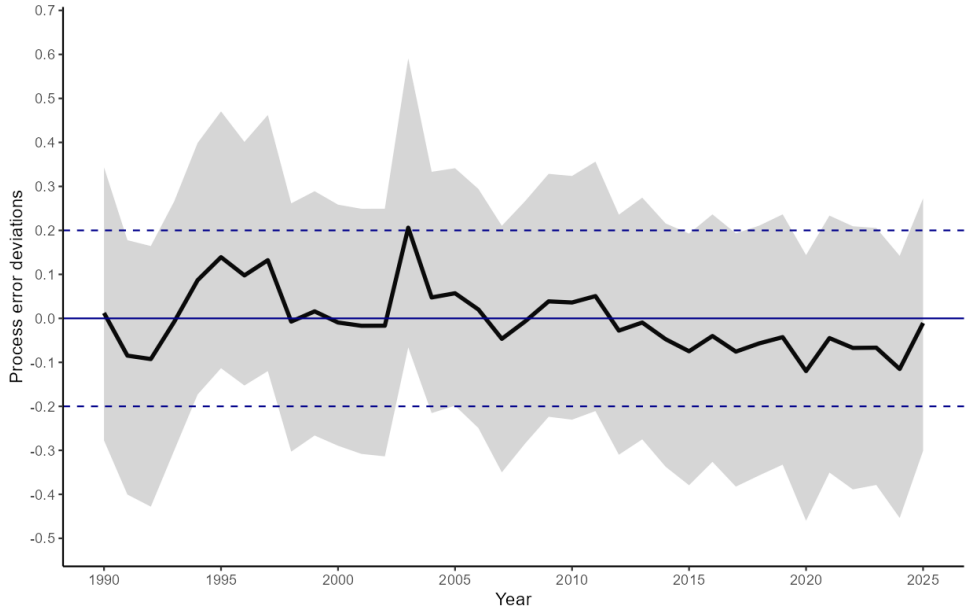


Figure 83. Process error deviation in the Esquiman model. The black line represents the median value of the posterior distribution, while the 95% CI is shown in grey. The solid blue line represents the trend for biomass generated by the deterministic portion of the model, while the dashed blue lines are provided to make the graph easier to read.

Esquiman

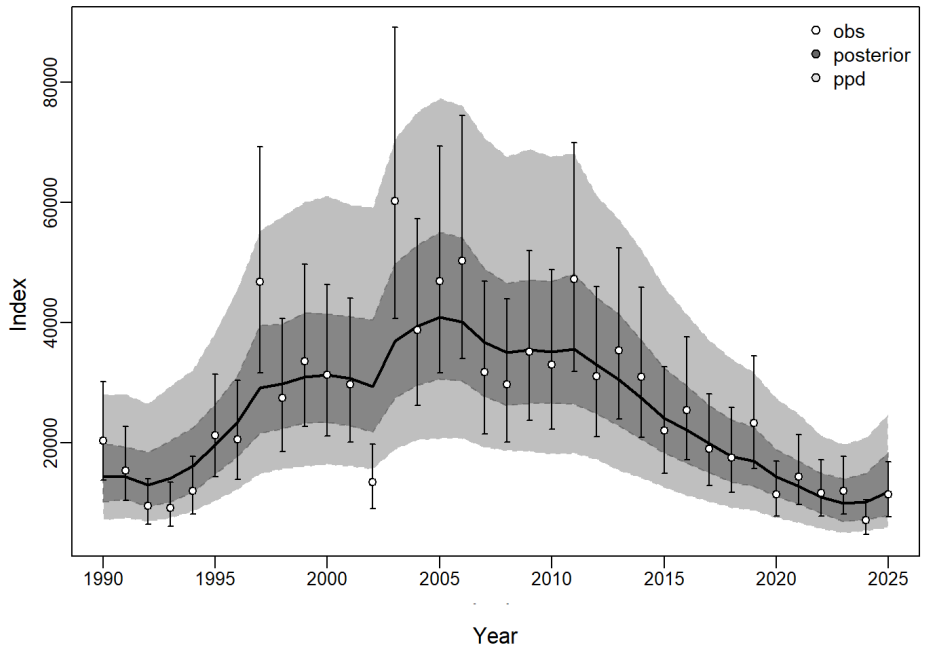


Figure 84. Total biomass index values observed for the Esquiman stock (white dots and associated error bars) and the trajectory estimated by the base model (black line). The shaded areas represent the posterior distribution of the predicted values (dark grey) and the predictive posterior distribution (PPD) (light grey).

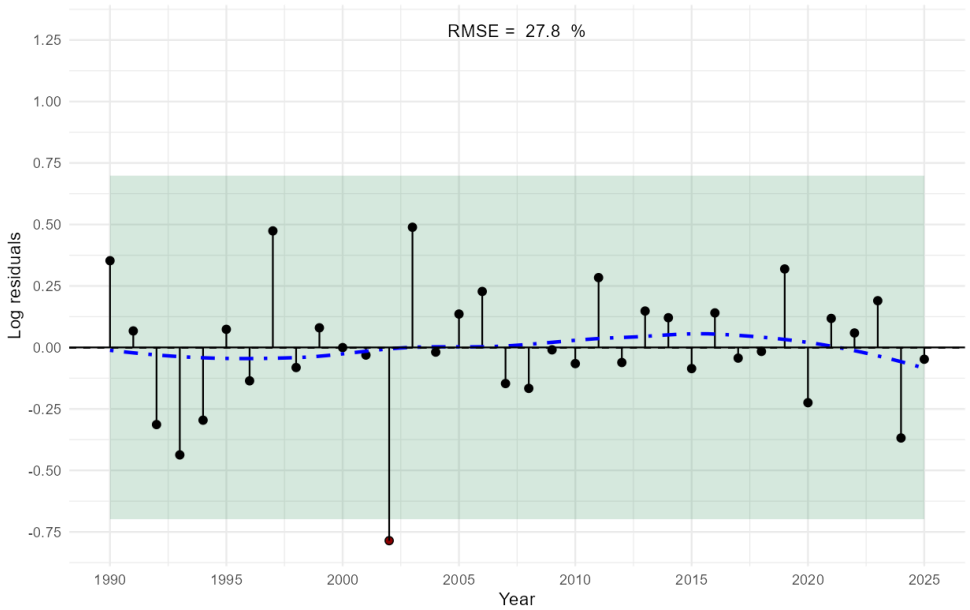


Figure 85. Residual diagnostics for the base model for the Esquiman stock, plotted on a log scale of biomass index values. The dot-dash blue line represents the LOESS-smoothed residuals, while the green background represents the results of the Wald-Wolfowitz test. The RMSE corresponds to the mean absolute error in percentage terms.

Esquiman

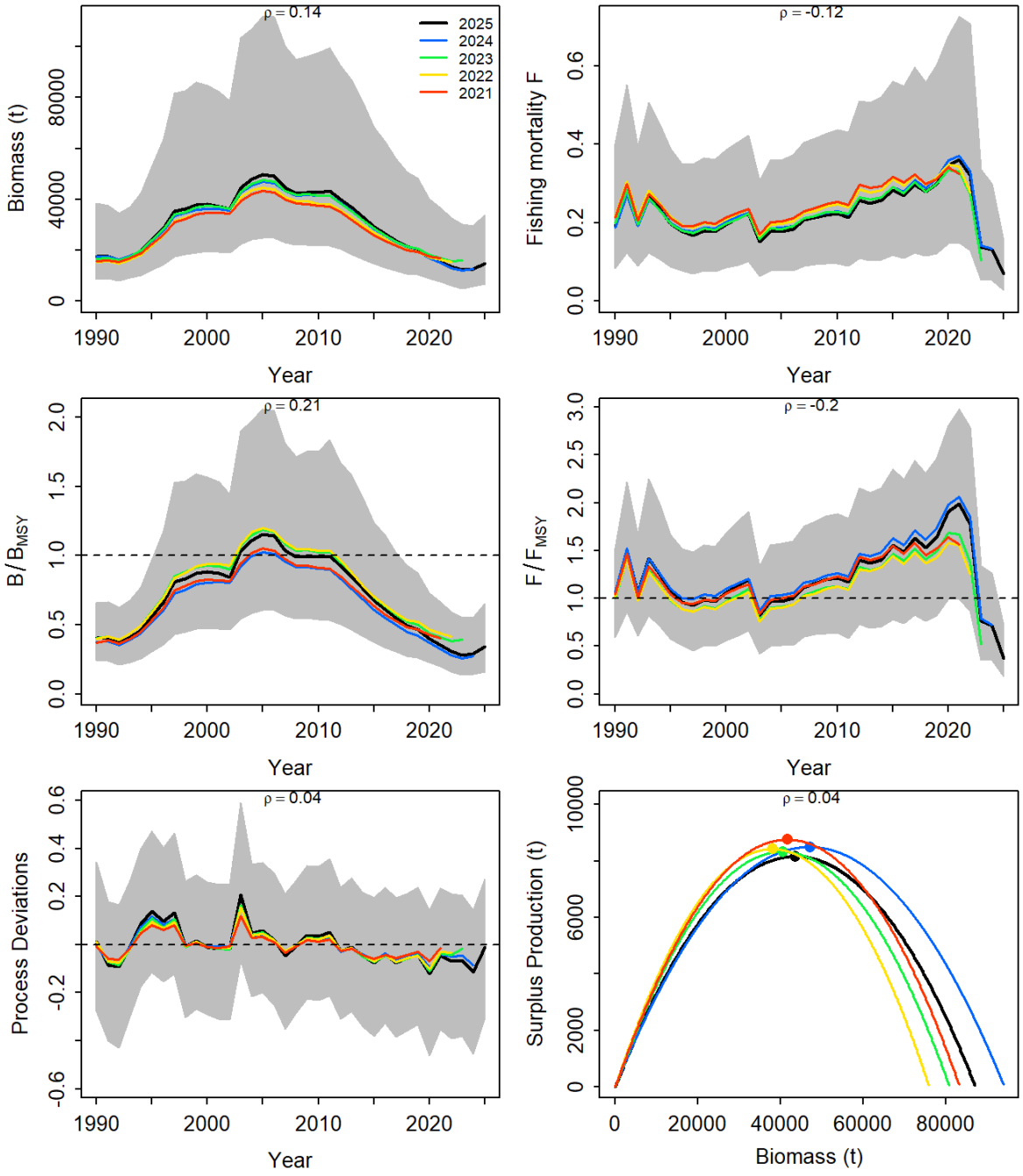


Figure 86. Retrospective analysis for the Esquiman stock (2021–2025). The mean Mohn's rho values are shown on each graph.

Esquiman

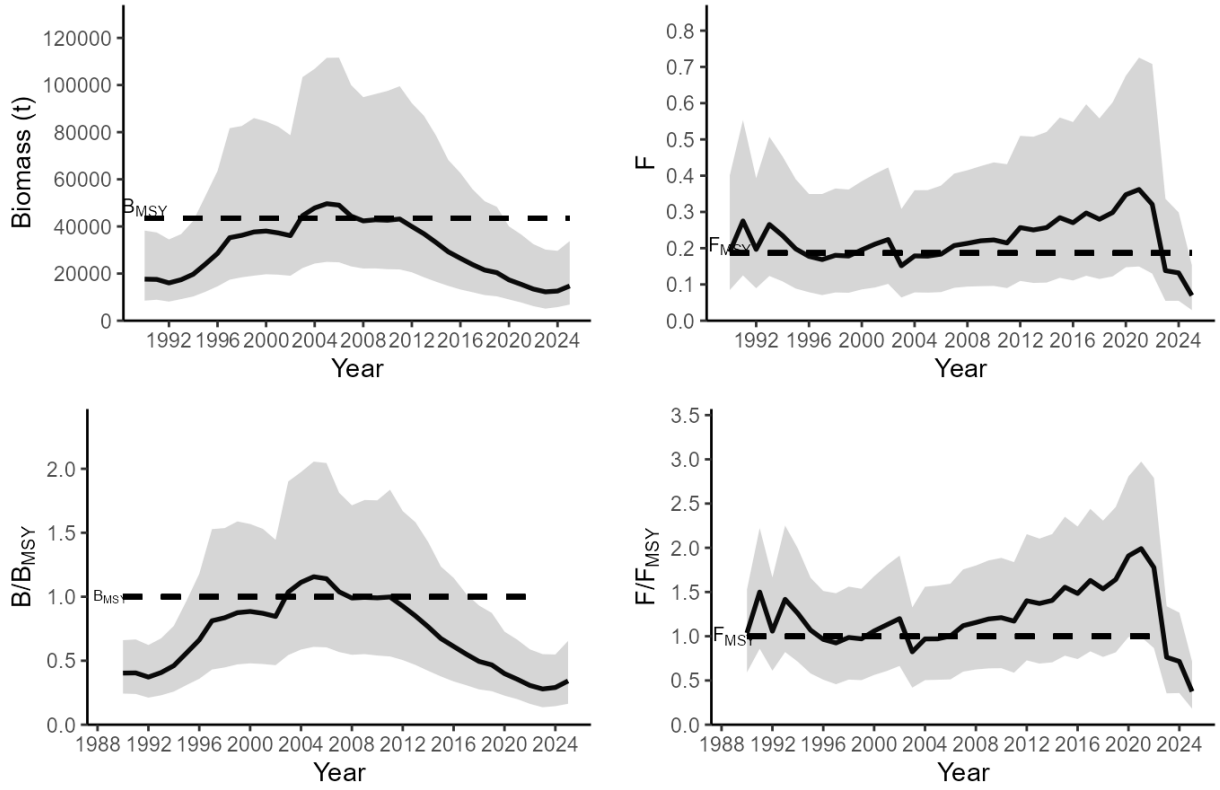


Figure 87. Estimated trajectories for Esquiman stock biomass (B_t) and fishing mortality (F_t), scaled to the maximum sustainable yield (B/B_{MSY} and F/F_{MSY}). The shaded area represents the 95% confidence interval.

Esquiman

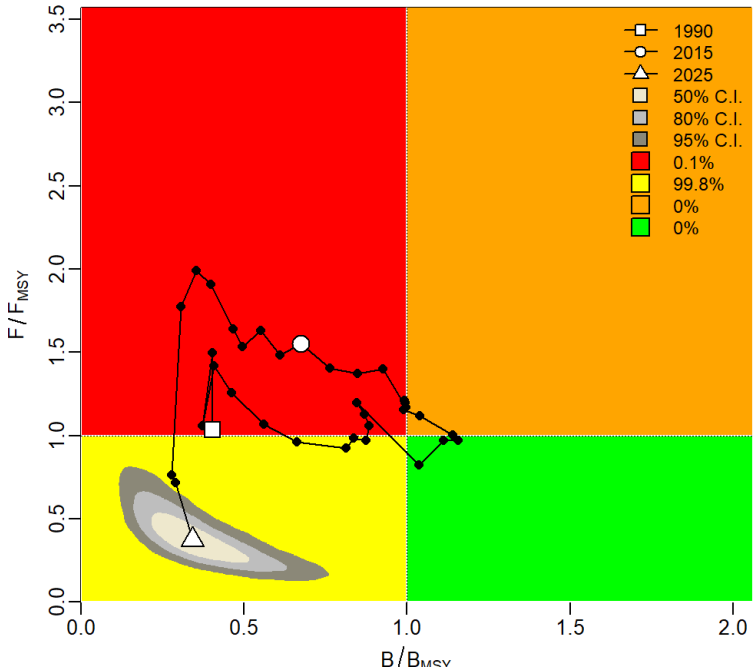


Figure 88. Kobe-type plot for the base case scenario for the Esquiman stock. The black line shows the estimated trajectory (1990–2025) between F/F_{MSY} and B/B_{MSY}. The grey shaded areas show the confidence intervals for the terminal year (50%, 80% and 95%). The probabilities of the terminal year being located in one of the quadrants are indicated in the legend.

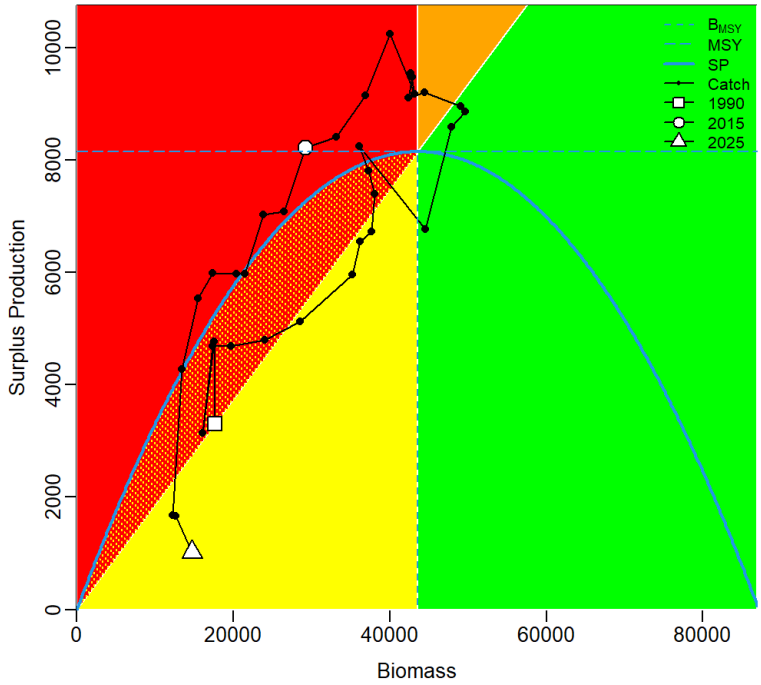


Figure 89. SP-phase-type plot showing the estimated surplus production curve (blue line) and the catch trajectory (black line) as a function of biomass for the base case scenario for the Esquiman stock. The blue dashed lines show the estimated values for maximum sustainable yield.

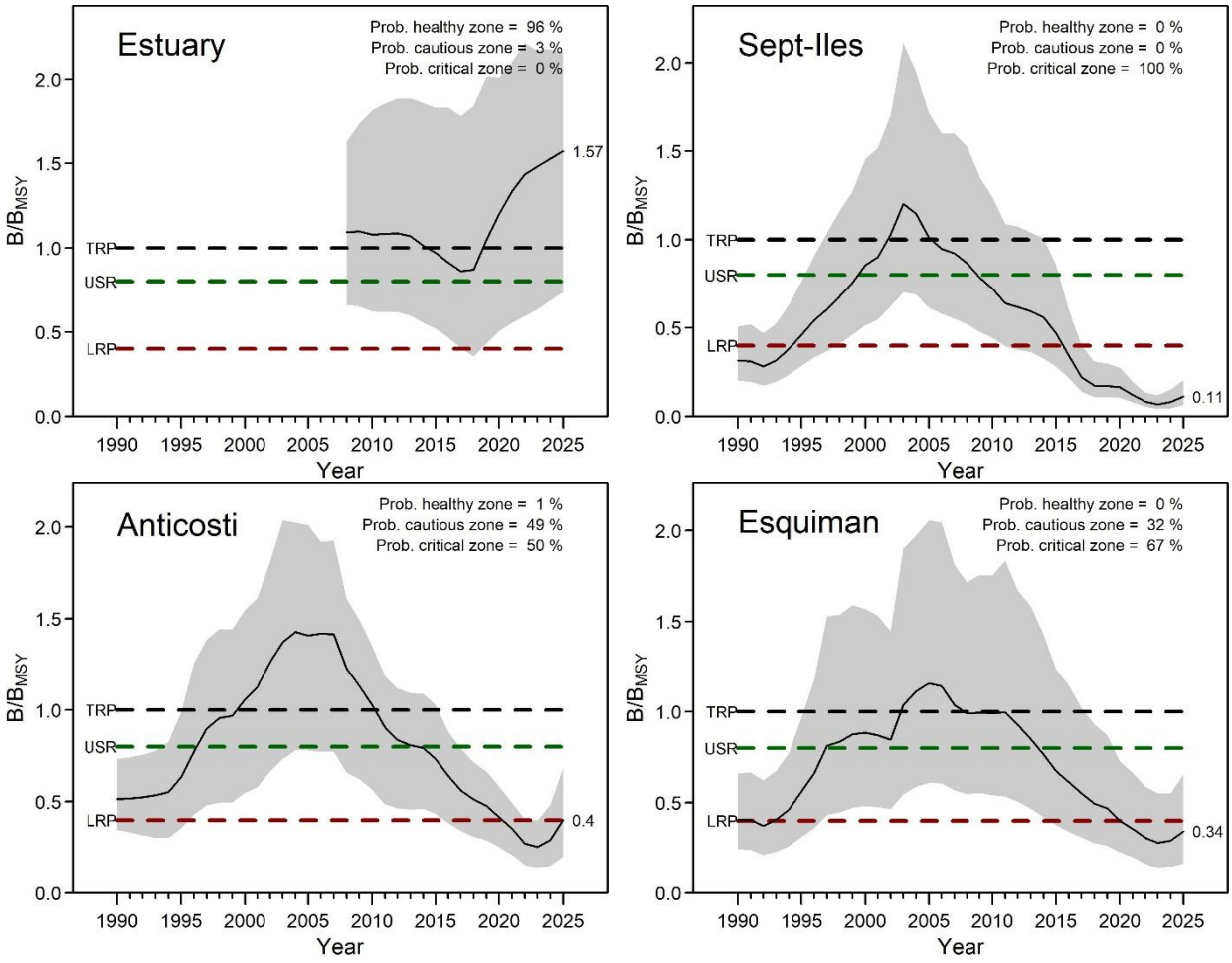


Figure 90. Trajectory of stock status indicators based on biomass relative to the biomass at maximum sustainable yield (B/B_{MSY}) and relative to the PA reference points. The 2025 indicator value is shown in the figure, along with the probabilities of being within the PA zones in 2025.

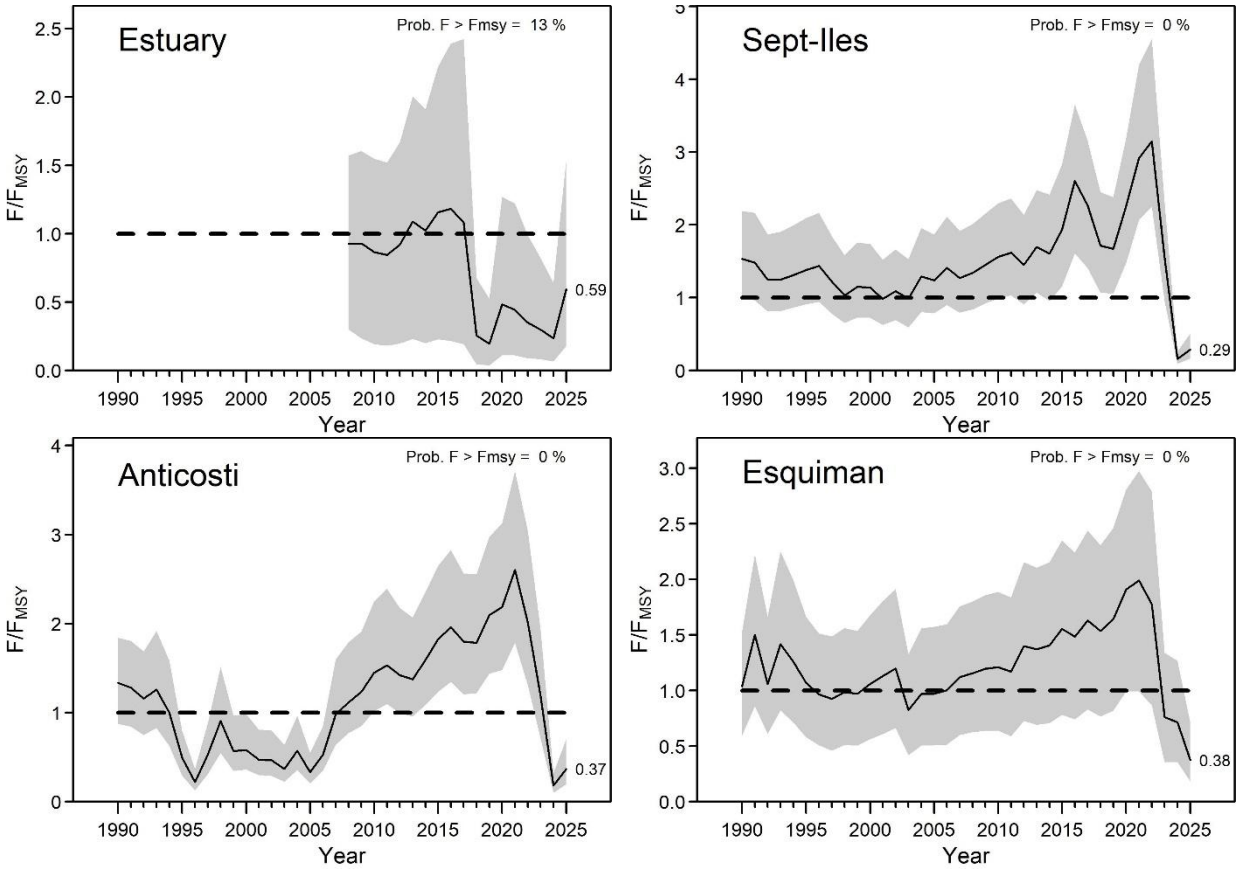


Figure 91. Trajectory of relative exploitation rates (F/F_{MSY}) and relative to the PA reference point. The 2025 indicator value is shown in the figure, as well as the probability of being above F_{MSY}.

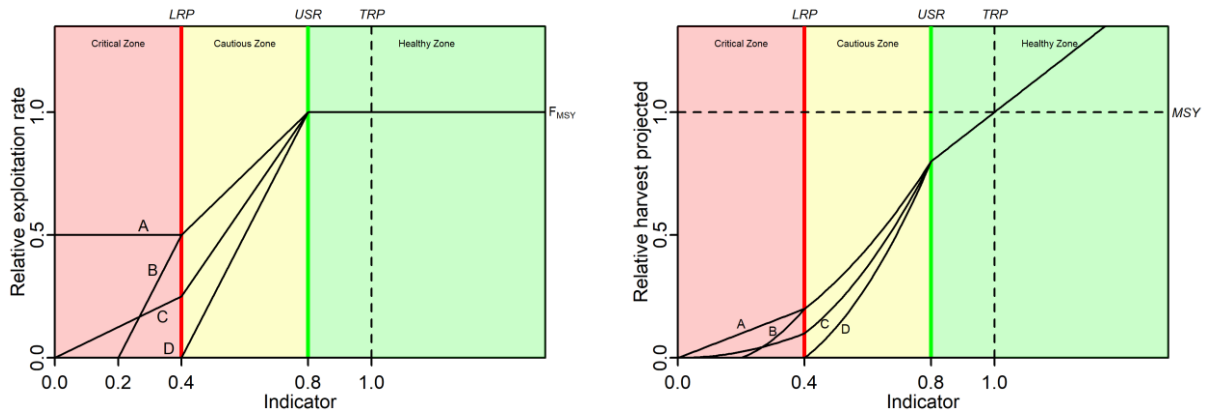


Figure 92. Four proposed harvest control rules (HCRs) showing the relative exploitation rate (F/F_{MSY}, left) and the projected relative catch (right) as a function of the stock status indicator (B/B_{MSY}). The reference points are shown on the graphs as vertical lines that define the three PA zones.

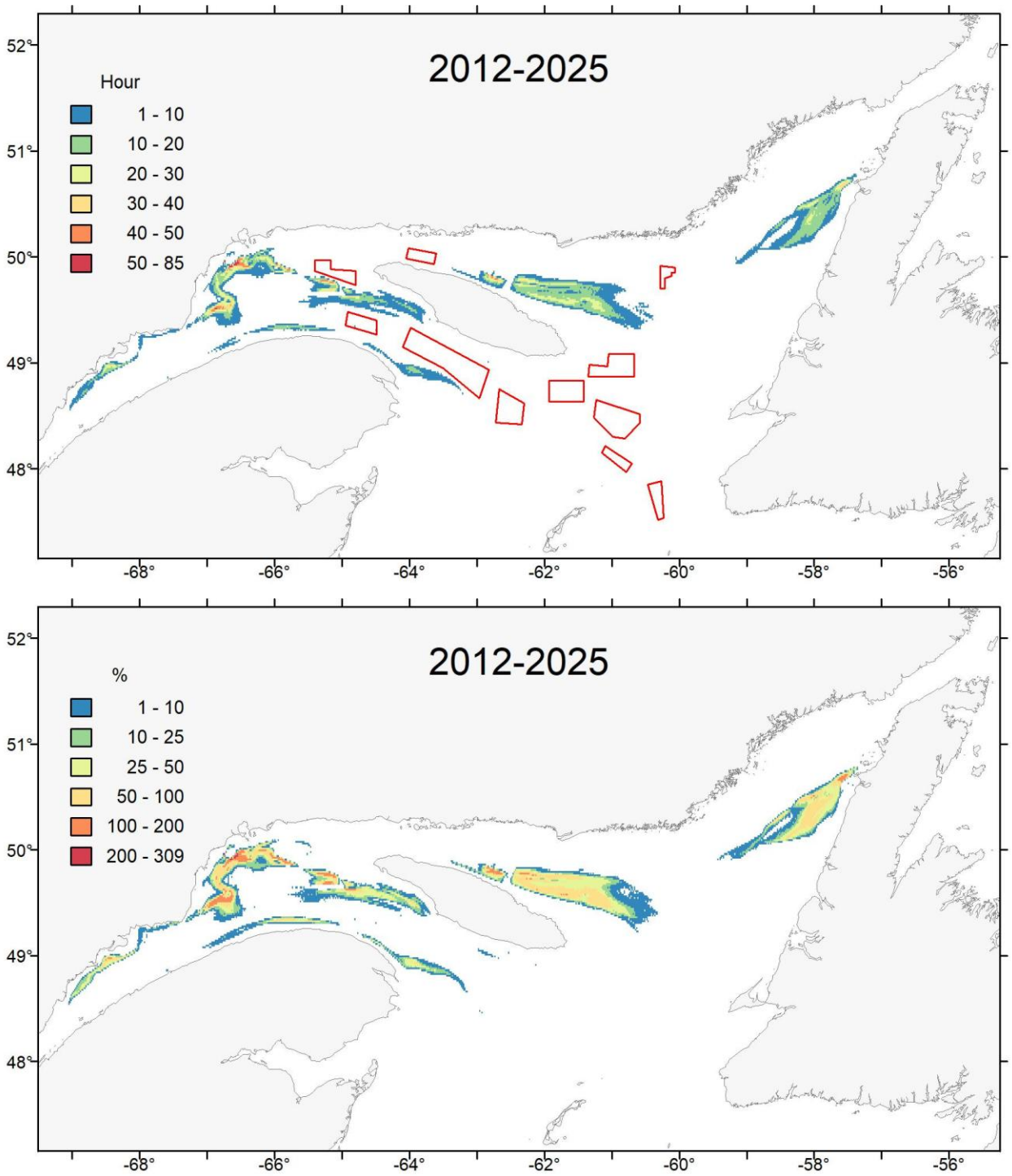


Figure 93. Average annual fishing effort distribution for shrimp boats in the Estuary and Gulf of St. Lawrence from 2012 to 2025 (number of hours per square of 1 minute, upper panel) and bottom trawl footprint (percent recovery) according to system data Vessel Monitoring System (VMS) (bottom panel). The red polygons represent the 11 areas for the conservation of corals and sponges in the Estuary and Gulf of St. Lawrence.

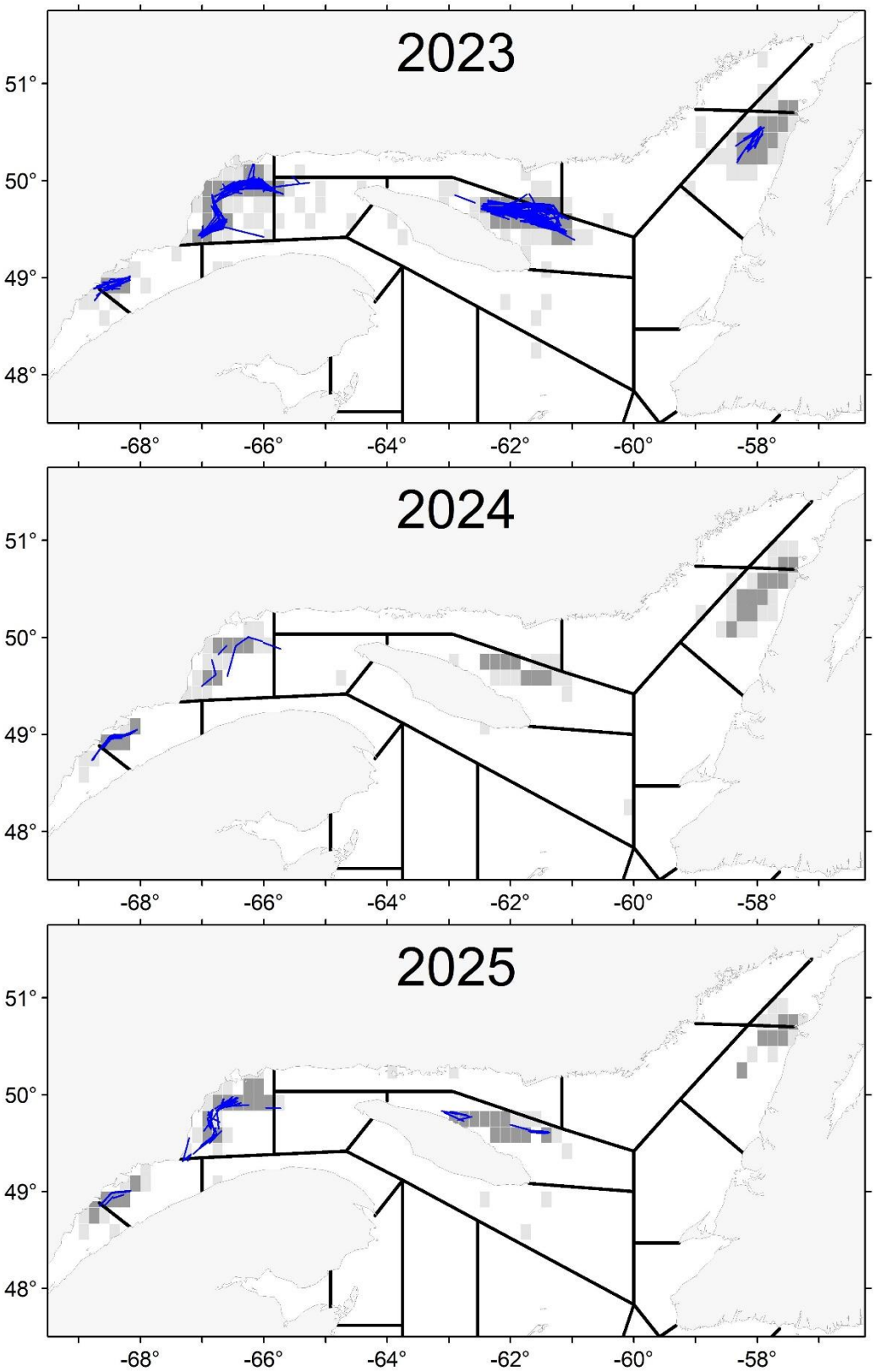


Figure 94. Geographic distribution of annual fishing effort by statistical square (gray squares: pale < 100h, dark > 100h) and fishing tows (blue lines) realised with an observer on board in 2023 to 2025. The NAFO unit areas are also shown.

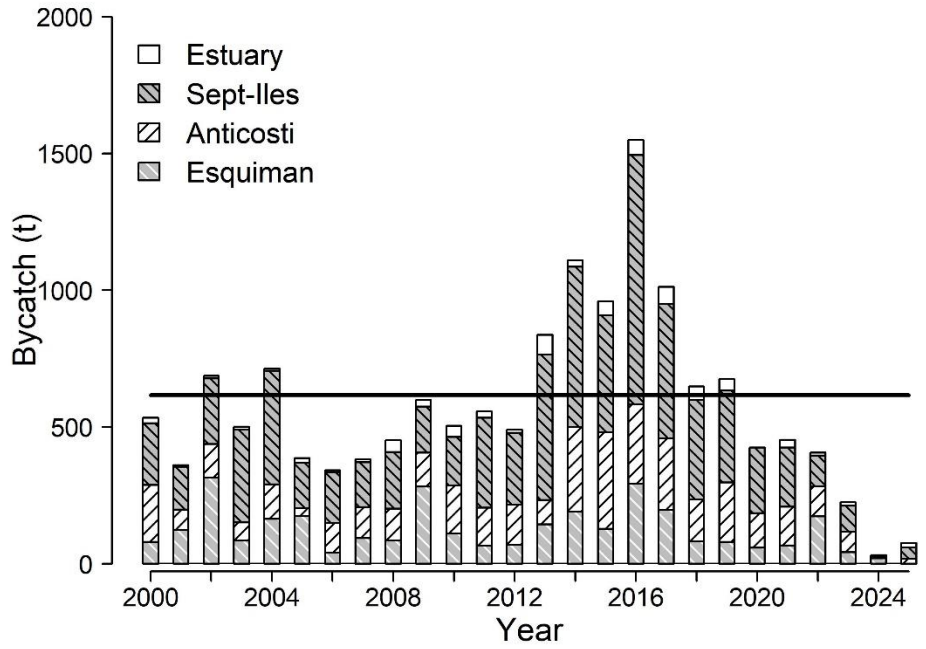


Figure 95. Bycatches for all species by year and by fishing area estimate by at-sea observers. Solid line indicates the average for the years 2000-2023.

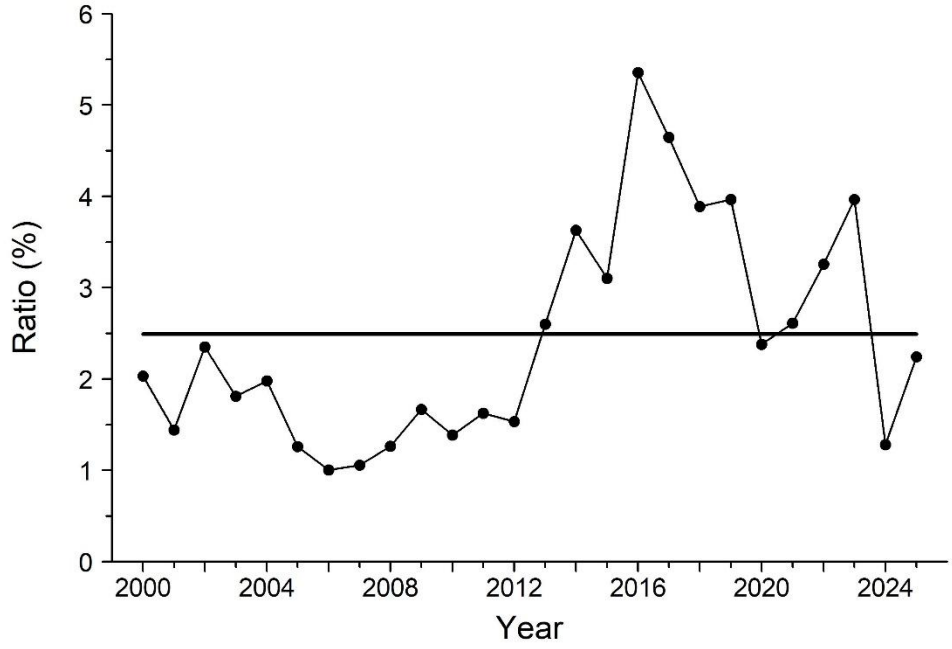


Figure 96. Ratio (%) of the bycatch of all species on the northern shrimp catch by year and by fishing area. Solid line indicates the average for the years 2000-2013.

Atlantic cod

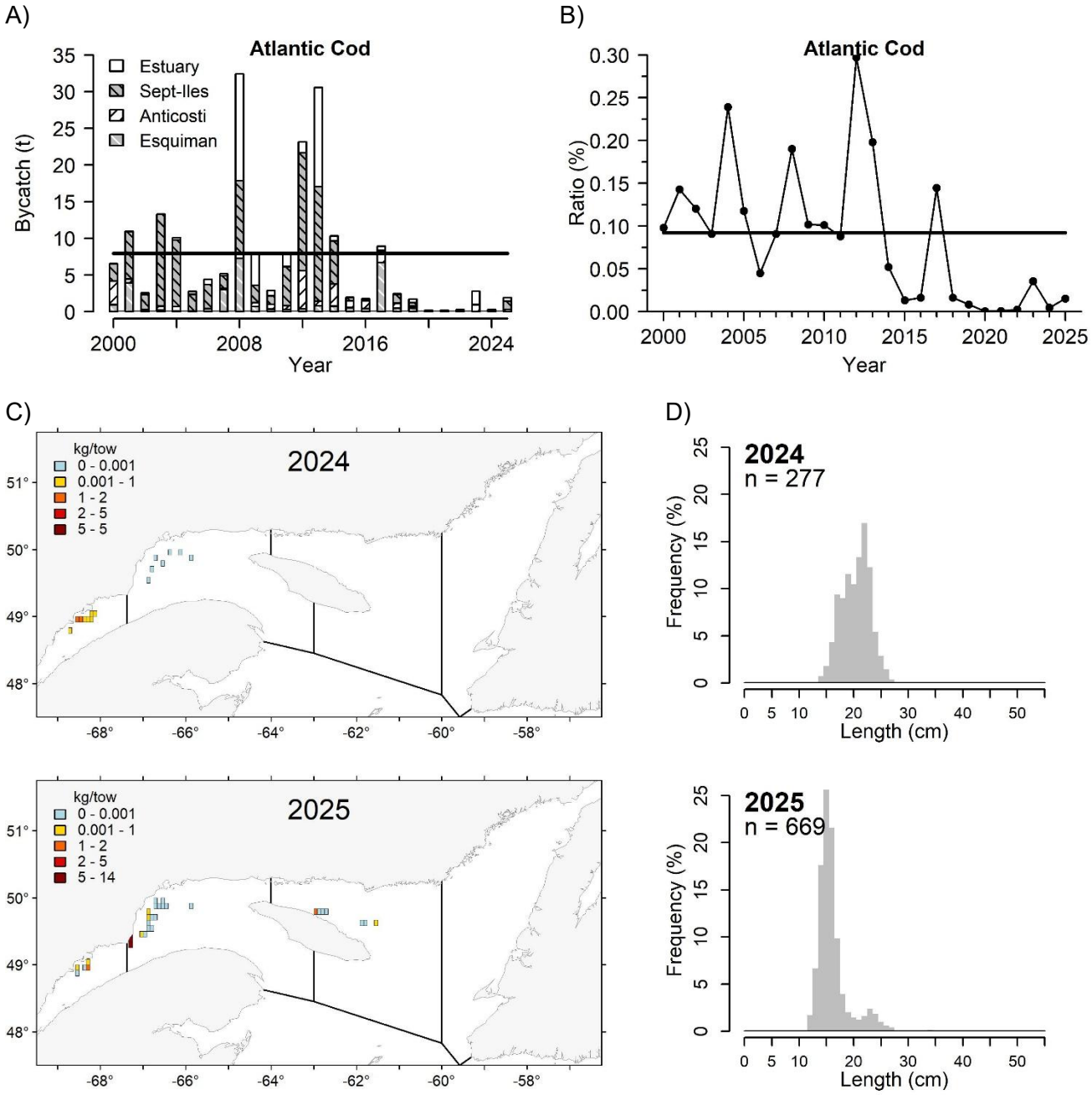


Figure 97. Bycatches of Atlantic cod estimate by year and by fishing area from the at-sea observers program. A) Bycatches and B) ratio (%) of the bycatch on the biomass estimate from DFO survey (solid line indicates the average for the years 2000-2023). C) Geographical distribution of catches per averaged by statistical squares of 5 minutes. D) Length frequency distributions of fishes sampled (number (n) of specimens that were measured is shown).

Redfishes

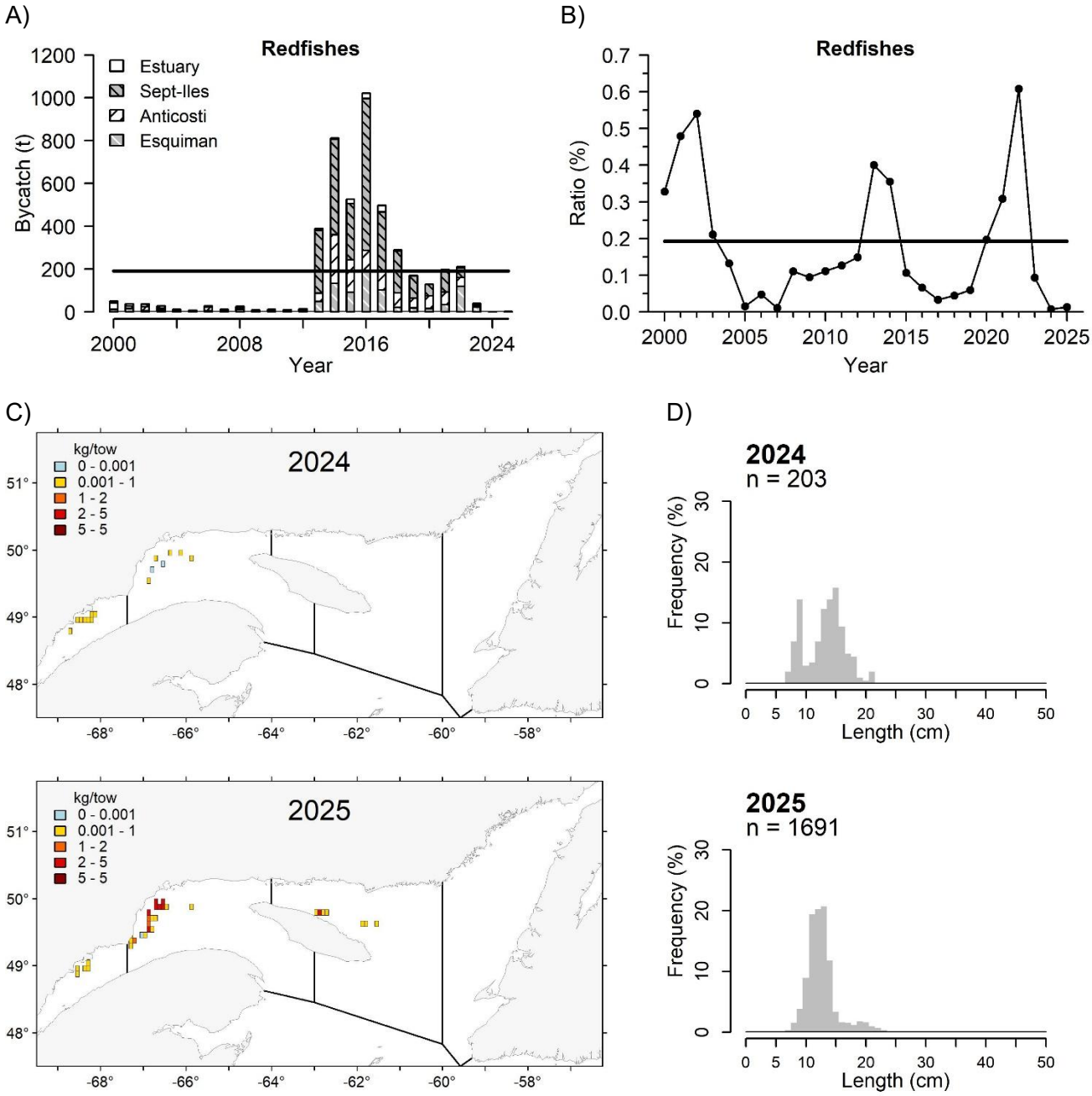


Figure 98. Bycatches of redfishes estimate by year and by fishing area from the at-sea observers program. A) Bycatches and B) ratio (%) of the bycatch on the biomass estimate from DFO survey (solid line indicates the average for the years 2000-2023). C) Geographical distribution of catches per averaged by statistical squares of 5 minutes. D) Length frequency distributions of fishes sampled (number (n) of specimens that were measured is shown).

Atlantic Halibut

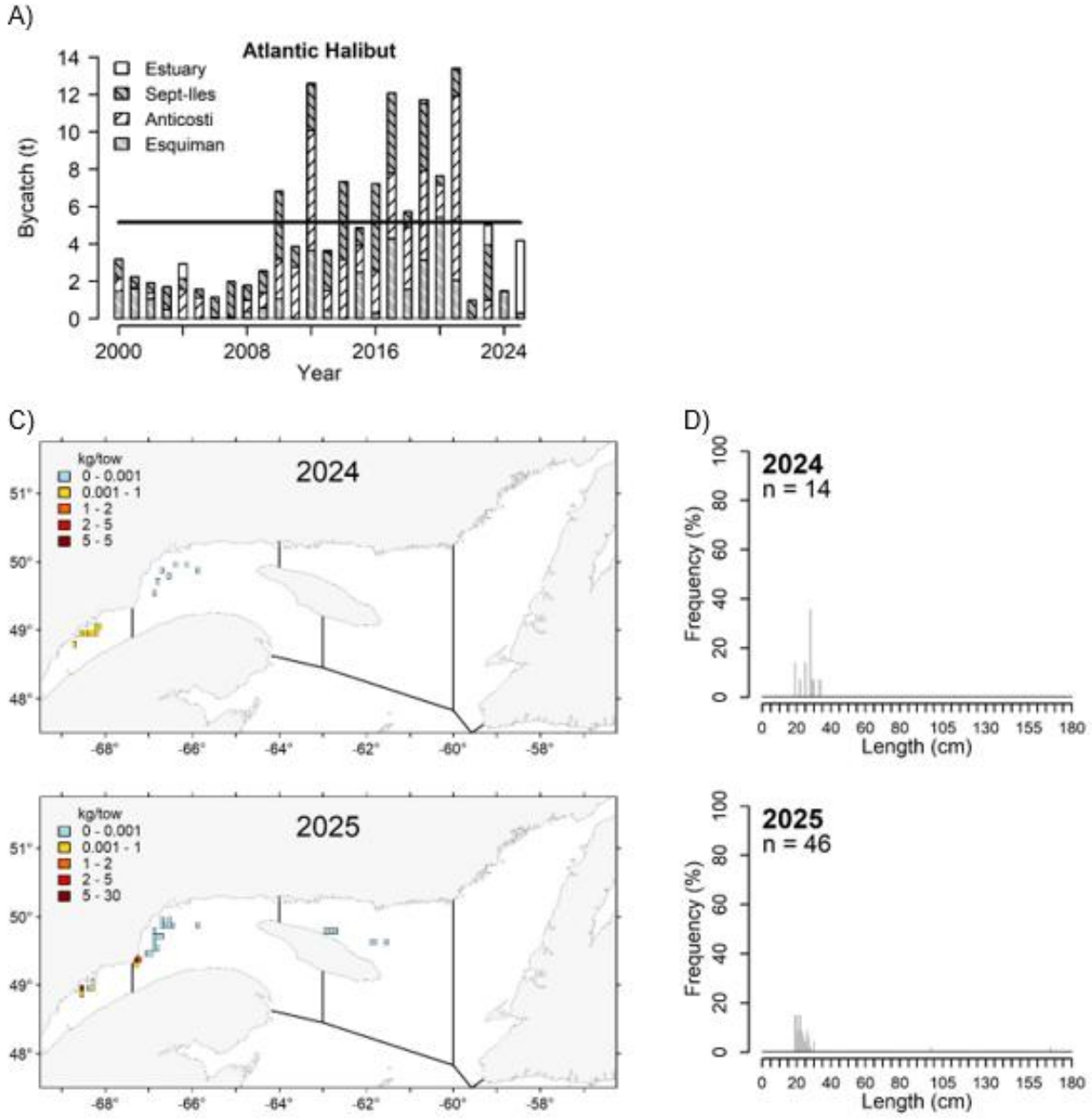


Figure 99. Bycatches of Atlantic halibut estimate by year and by fishing area from the at-sea observers program. A) Bycatches (solid line indicates the average for the years 2000-2023). C) Geographical distribution of catches per averaged by statistical squares of 5 minutes. D) Length frequency distributions of fishes sampled (number (n) of specimens that were measured is shown).

Greenland Halibut

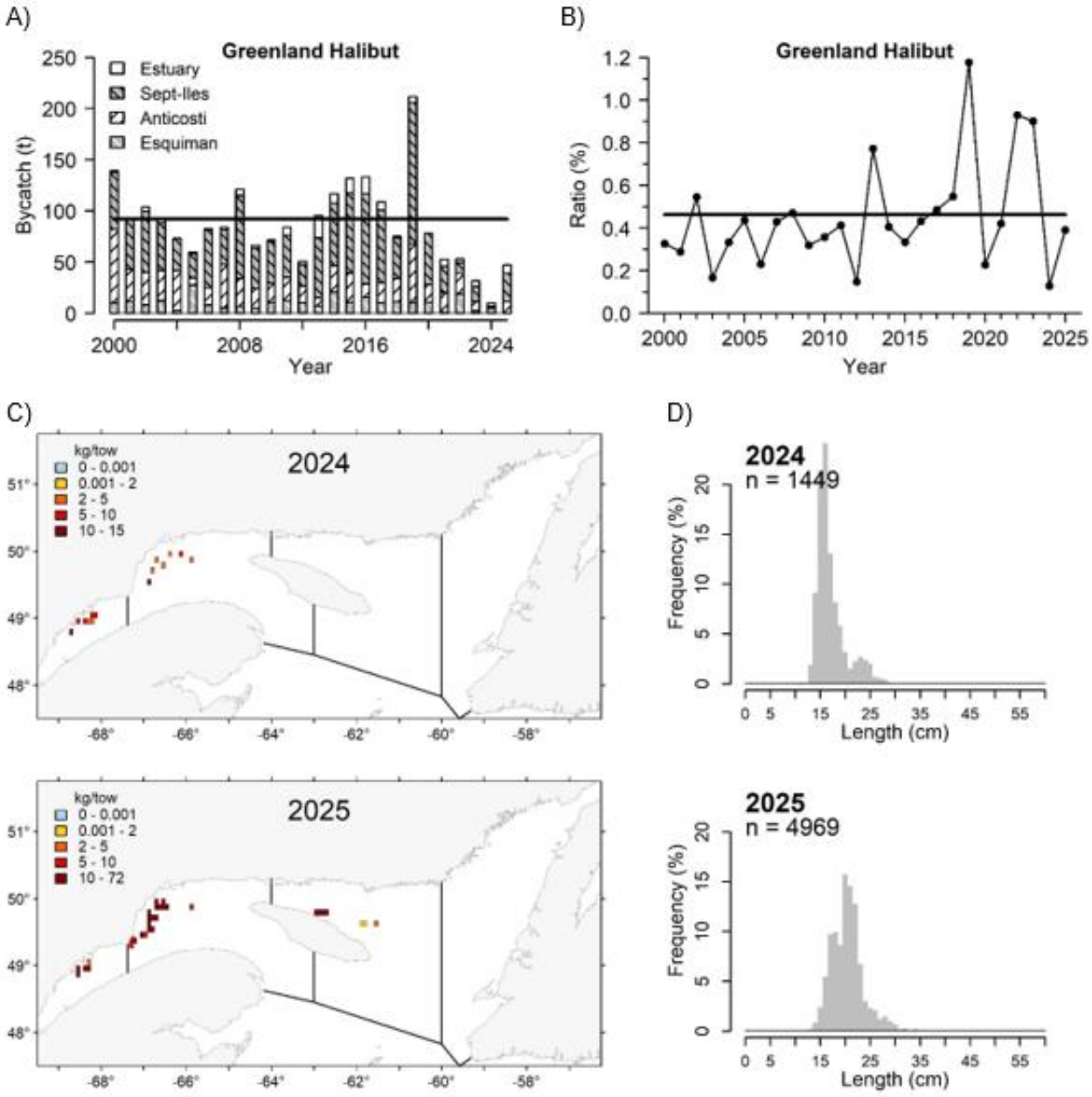


Figure 100. Bycatches of Greenland halibut estimate by year and by fishing area from the at-sea observers program. A) Bycatches and B) ratio (%) of the bycatch on the biomass estimate from DFO survey (solid line indicates the average for the years 2000-2023). C) Geographical distribution of catches per averaged by statistical squares of 5 minutes. D) Length frequency distributions of fishes sampled (number (n) of specimens that were measured is shown).

American Plaice

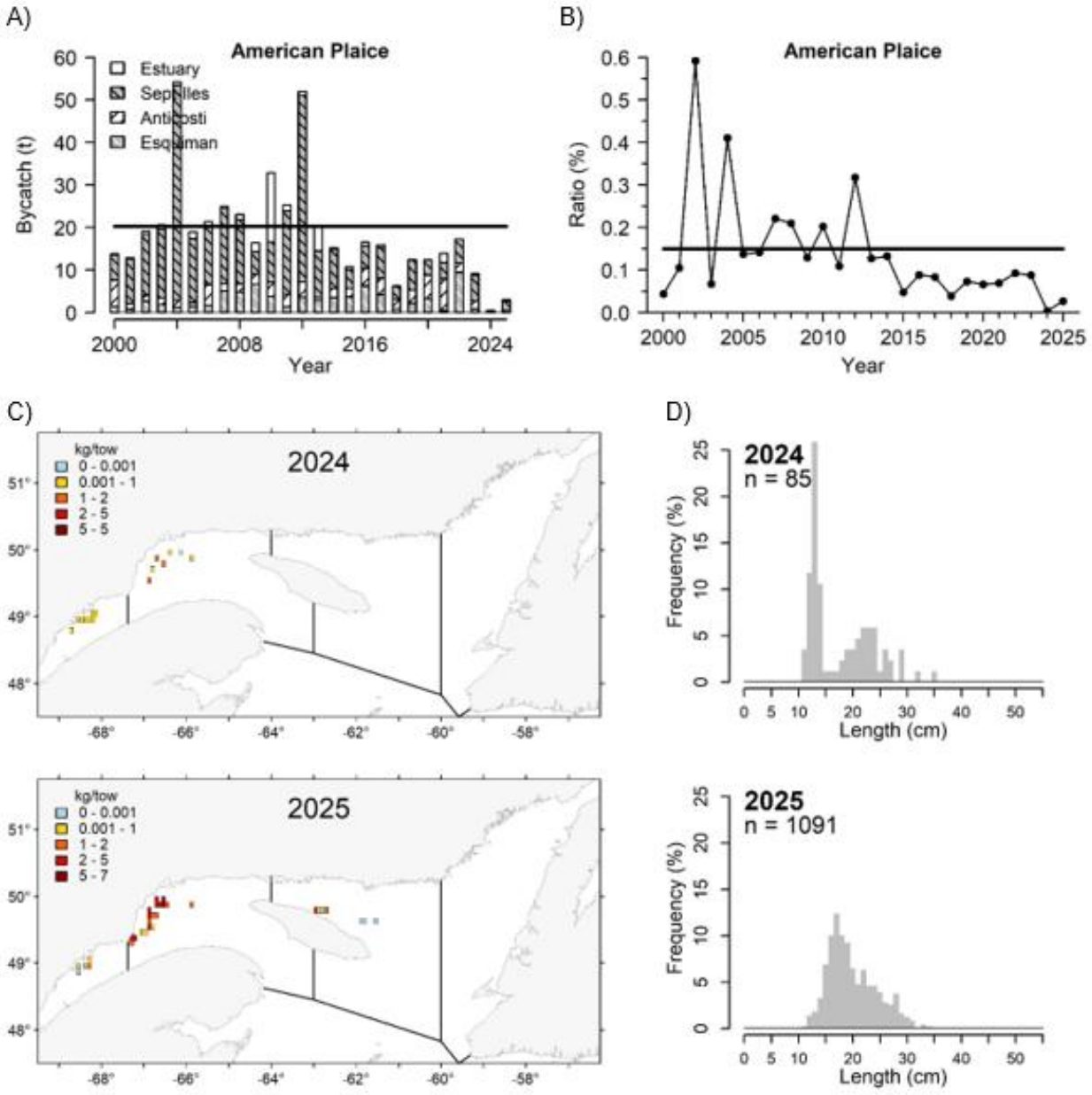


Figure 101. Bycatches of American plaice estimate by year and by fishing area from the at-sea observers program. A) Bycatches and B) ratio (%) of the bycatch on the biomass estimate from DFO survey (solid line indicates the average for the years 2000-2023). C) Geographical distribution of catches per averaged by statistical squares of 5 minutes. D) Length frequency distributions of fishes sampled (number (n) of specimens that were measured is shown).

Witch Flounder

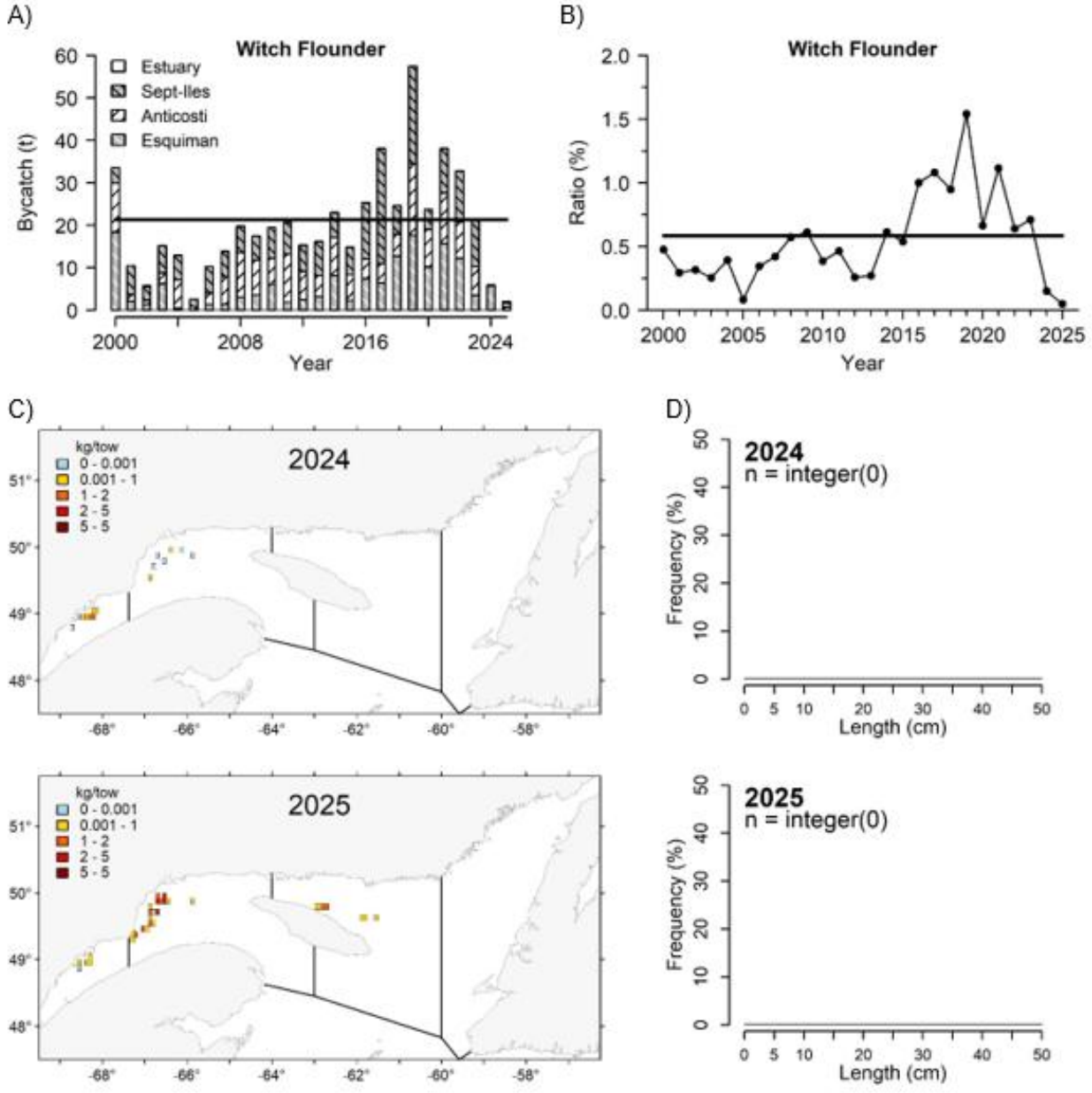


Figure 102. Bycatches of witch flounder estimate by year and by fishing area from the at-sea observers program. A) Bycatches and B) ratio (%) of the bycatch on the biomass estimate from DFO survey (solid line indicates the average for the years 2000-2023). C) Geographical distribution of catches per averaged by statistical squares of 5 minutes. D) Length frequency distributions of fishes sampled (number (n) of specimens that were measured is shown).

Capelin

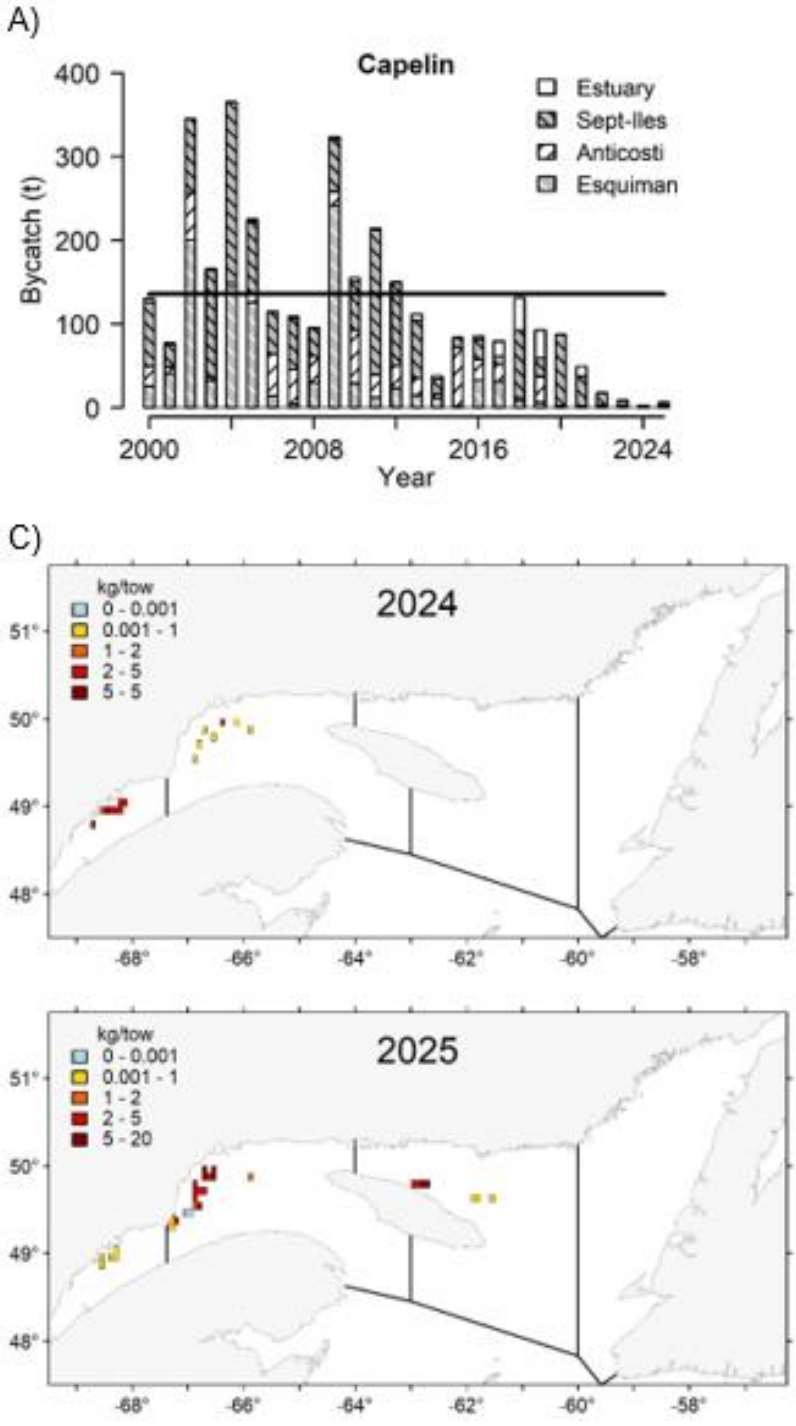


Figure 103. Bycatches of capelin estimate by year and by fishing area from the at-sea observers program. A) Bycatches (solid line indicates the average for the years 2000-2023). C) Geographical distribution of catches per averaged by statistical squares of 5 minutes.

APPENDIX

APPENDIX 1. DFO STRATEGIC RESEARCH PLAN FOR NORTHERN SHRIMP IN THE ESTUARY AND GULF OF ST. LAWRENCE

The various scientific research projects can be associated with different elements of the Integrated Fisheries Management Plan (IFMP) for Gulf of St. Lawrence shrimp or with the recovery plan for stocks in Areas 8, 9, and 10.

The issues facing the fishery have helped define the objectives of the IFMP. The issues identified through consultations conducted during the development of the IFMP are as follows:

- Sustainable exploitation of shrimp;
- Impacts of fishing on the ecosystem;
- Governance of the fishery;
- Economic prosperity of the fishery.

The recovery plan also includes three objectives aimed at addressing knowledge gaps related to natural mortality, including:

- Continuing to study shrimp predation by groundfish, particularly redfish. Accounting for redfish predation is crucial to obtaining a complete picture of the factors influencing the natural mortality of shrimp stocks. This will ensure that the recovery plan is based on a realistic understanding of the ecosystem, thereby supporting the sustainable management of shrimp.
- Continuing to study the impact of environmental changes on shrimp. Environmental changes are causing shrimp to shift their distribution within the EGSL, thereby influencing the extent of their essential habitat and the productivity of the stocks. Understanding the availability of current and future essential habitats for the different shrimp stocks is essential in a context of climate change and will allow management measures to be adjusted accordingly.
- Advancing the stock assessment model to account for the shift in productivity regime.

The research projects were developed to provide solutions to these issues. Scientific projects on northern shrimp conducted by researchers at the Maurice Lamontagne Institute are funded, in whole or in part, by national DFO programs. They directly address the priority directions presented in scientific frameworks and are part of the Ecosystem Sciences strategic research program. These projects are complemented by initiatives funded through DFO's core program (research surveys, dockside and at-sea sampling, logbooks, and the vessel monitoring system) directly related to monitoring stock status, the ecosystem, and the fishery.

Theme A. Productivity of shrimp and its sustainable exploitation

To properly manage fisheries, it is essential to have a solid understanding of the productivity of exploited populations. Changes in the productivity and resilience of key species can have serious consequences for the dynamics of entire ecosystems and for the sustainability of fisheries. These changes may be triggered by various biological, physical, and environmental factors, as well as by human activities.

Sub-theme A1. Abundance of shrimp stocks in the Estuary and Gulf

- Assessment of shrimp stock status by continuing monitoring activities to calculate stock status indicators and determine appropriate fishing removals in accordance with the precautionary approach. DFO Core Program

Sub-theme A2. Trophic relationships between shrimp and its predators

- Study of the diets of major groundfish species. DFO Core Program
- “How many is too many?” Deciphering the role of density-dependent population cycles of redfish (*Sebastes mentella* and *S. fasciatus*) on their predator–prey interactions with northern shrimp in a context of climate change. Competitive Scientific Research Fund (CSRF), DFO 2025–2028 Caroline Senay, Daniel Small and collaborators

Sub-theme A3. Environmental factors influencing shrimp productivity

- Assessment of the physical, chemical, and biological oceanographic environment of the Gulf of St. Lawrence by continuing the Atlantic Zone Monitoring Program (AZMP) to detect, track, and forecast changes in marine productivity and ecosystem conditions. DFO Core Program
- REDTANKS: Understanding the environmental needs and shrimp consumption of redfish (*Sebastes* spp.) through tank experiments. Results Fund, DFO, 2019–2022 Denis Chabot, Caroline Senay, Geneviève Parent and collaborators
- PANOMICS: Integrating genomics into current and future spatial management of northern shrimp (*Pandalus borealis*) along the Canadian coast. Genomics Research and Development Initiative, DFO, 2019–2022 Geneviève Parent and collaborators
- Future habitats and functions of demersal species in the Gulf: Availability of current and future essential habitats for three demersal stocks (northern shrimp, Greenland halibut, and cod) in the Estuary and Gulf of St. Lawrence, and anticipated changes in ecosystem functions provided by offshore species in a context of climate change. C-68 Project, DFO 2025–2029 Marie-Julie Roux, Diane Lavoie and collaborators

Theme B. Impacts of Fishing on the Ecosystem

Fisheries management decisions must take into account the targeted species, non-target species, and the ecosystems to which they belong, as well as the impact of fishing on these ecosystems. This forms the basis of an ecosystem approach to fisheries management which, together with a precautionary approach, is central to DFO’s new sustainable development framework. In accordance with the Code of Conduct for Responsible Fisheries of the Food and Agriculture Organization of the United Nations (FAO), DFO promotes responsible fishing practices aimed at reducing bycatch and mitigating habitat impacts wherever biologically justifiable and economically feasible.

Sub-theme B1. Vulnerable Benthic Habitat and Communities

- Monitoring the footprint of shrimp trawling in the Gulf of St. Lawrence using the vessel monitoring system (VMS). DFO Core Program

Sub-theme B2. Non-target Species in the Fishery

- Assessment of the importance of bycatch in the shrimp fishery through analysis of at-sea monitoring data collected by the observer program. DFO Core Program