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**Gulf Region**

# Supporting Material for Stock Assessment of NAFO Division 4TVn Southern Gulf of St. Lawrence Atlantic Herring (*Clupea harengus*) in 2022-2023

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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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## ABSTRACT

Atlantic Herring (*Clupea harengus*) in Northwest Atlantic Fisheries Organization (NAFO) Division 4T, referred to as the southern Gulf of St. Lawrence (sGSL), consists of two spawning components, spring spawners and fall spawners. This document presents the most recent information on trends in abundance, distribution, and harvest for the spring and fall spawning Herring components in NAFO Division 4T. This includes catch-at-age and catch-per-unit-effort (CPUE) indices, fisheries-independent acoustic indices, experimental gillnet survey indices, mesh selectivity, fishery-dependent acoustic indices and catches in the multi-species bottom trawl survey of the sGSL. The data and indices are reported for the sGSL for the spring spawners, and regionally-disaggregated (North, Middle, and South regions) for the fall spawners where applicable. This information is the basis of the assessment of spring and fall spawning 4TVn Atlantic Herring. Since the last assessment in 2022, we continued collecting data from our various data sources including commercial landings, telephone survey, port sampling, fishery-independent acoustic survey, industry acoustic survey of spawning grounds, experimental variable mesh size net and multispecies bottom-trawl survey. From these data sources, the calculations of catch-at-age matrices were improved by translating calculations from Statistical Analysis Software and Excel into R language. The translation process facilitates the future reproduction of calculations, and was an opportunity to address issues in the calculation of past biomass estimates. While the trends remained after this process, yearly estimates shifted slightly higher or lower depending on the region and the spawning component. In addition, the process fixed the abnormal retrospective pattern observed in the previous assessment which means a more accurate biomass estimates. The spring and fall populations still face a lot of uncertainties, especially regarding rising sea temperature, which may change spatial distribution of Atlantic Herring and affect other demographic metrics (i.e., recruitment). This document is meant to support the stock assessment of Atlantic Herring in 4TVn by presenting data sources and data changes between the 2022 and 2024 assessment, but does not include details on model methodology.

## INTRODUCTION

Atlantic Herring *(Clupea harengus)* in the southern Gulf of St. Lawrence (sGSL) are found in the area extending from the north shore of the Gaspé Peninsula to the northern tip of Cape Breton Island, including the Magdalen Islands. Adults overwinter off the north and east coast of Cape Breton in the Northwest Atlantic Fisheries Organization (NAFO) Divisions 4T and 4Vn (Claytor 2001; Simon and Stobo 1983; Figure 1). Studies in the early 1970s indicated that southern Gulf Herring also overwintered off the south coast of Newfoundland, but an exploratory fishery in 2006 did not detect any concentration (Wheeler et al. 2006). Herring is a pelagic species that schools particularly during feeding, spawning periods, and annual migrations. Eggs are attached to the sea floor and large females can produce up to 360,000 eggs (Messieh 1988). First spawning behaviour typically occurs at four years of age.

Herring in the sGSL are managed across seven Herring Fishing Areas (HFA) (16A-16G; Figure 1a). These HFAs cover the same region as NAFO Division 4T (Figure 1B). The Herring population in the sGSL consists of two spawning components: spring spawners and fall spawners. Spring spawning occurs primarily in April-May but extends to June 30 at depths < 10 m. Fall spawning occurs from mid-August to mid-October at depths of 5 to 20 m, but can occur as early as July 1. Both spawning behaviours are explained by the genetic differentiation between these stocks (Lamichhaney et al. 2017). Spring and fall Herring spawners within 4T are therefore considered distinct stocks and are assessed separately. Herring also show high spawning site fidelity (Winters and Wheeler 1985; McQuinn 1997; Brophy et al. 2006) and local stocks are targeted by the gillnet fishery which takes place on the spawning grounds. Fall spawning Herring in the sGSL are therefore assessed using regionally-disaggregated assessment models (North, Middle, South regions; Figure 1B).

The sGSL Herring are harvested by a gillnet fleet (referred to as “fixed” gear fleet) and a purse seine fleet (“mobile” gear fleet). The mobile gear fleet mainly consists of large vessels (> 19.8 m), but some small seiners (< 19.8 m) can also participate in the inshore fishery as part of the gillnet fleet. The fixed gear fishery is focused in NAFO Division 4T, whereas the mobile gear fishery occurs in 4T and historically, occasionally in 4Vn (Figure 1B). During the spring and fall fishing seasons, the mobile fleet is prohibited from fishing in areas set aside exclusively for the fixed-gear fleet (Claytor et al. 1998). In the spring fishing season, mobile gear fleets fish along the northern boundary of NAFO region 4Tf, which is referred to as the “Edge” fishery. In the fall fishing season, mobile gear fleets fish in the Chaleur Bay area. Both spring and fall spawning Herring are harvested in the spring and fall fishing seasons and must therefore be separated into the appropriate groups for assessment purposes.

Prior to 1967, sGSL Herring was mainly exploited by fixed gear and average landings from 1935 to 1966 were 34,000 tonnes (t). In the mid-1960s, a mobile gear fishery was introduced and average landings by both fleets were 166,000 t from 1967 to 1972. Since 1981, fishing effort was reduced in the mobile gear fleets and the fixed gear fleet has accounted for most of the catch of spring and fall spawners (Figures 2 and 3; McDermid et al. 2018).

A global allocation or Total Allowable Catch (TAC) was introduced in 1972 at 166,000 t, and reduced to 40,000 t in 1973. Separate TAC for the spring and fall spawners components began in 1985 (Table 1; Figure 3). The TAC was first allotted by fishing season (spring and fall) and later attributed to spring or fall spawners landings based on biological samples taken during the fishery. The percentage of spring and fall spawners in the catch varies according to season and gear type (Figure 3). As a result, landings during the spring and fall fishing seasons must be separated into the appropriate spring and fall spawners groups to determine if the TAC for these groups has been attained.

This document is meant to support the stock assessment of Atlantic Herring in 4TVn and only presents data sources and data changes between the 2022 and 2024 assessment. For details on the model, please refer to Turcotte et al. 2021 and Rolland et al. 2022.

## DATA SOURCES

For the spring spawning Herring assessment, data collected in NAFO Div. 4T is used to model the population at the scale of the sGSL. The spatial distribution of the data collected during the spring fishery does not permit, for now, use of a regionally-disaggregated model as for the fall spawning stock.

For the fall spawning Herring assessment, a regionally-disaggregated model is used to evaluate the population in three regions (North, Middle, and South) that encompass the entire NAFO Div. 4T. The regions are defined on the basis of traditional Herring spawning beds and fishing areas (Figure 1):

- North (Gaspé and Miscou; 4Tmnopq),
- Middle (Escuminac-Richibucto and west Prince Edward Island; 4Tkl), and
- South (east Prince Edward Island and Pictou; 4Tfghj).

The choice of three regions was dictated by geographic proximity of spawning beds and is the finest level of disaggregation that can presently be supported by the available data. The regionally-disaggregated models include inputs that are region-specific (e.g., catch-at-age, catch-per-unit-effort, experimental nets proportions-at-age (PAA), selectivity-at-age, biomass indices from hydroacoustic surveys on spawning grounds) and inputs that are common to the entire area (e.g., acoustic survey index, RV survey index).

## LANDINGS

Catch data were extracted from the Dockside Monitoring Program (DMP), logbooks, purchase slips and ZIFF (Zonal Interchange File Format) files collected by the Statistics Branch of Fisheries and Oceans Canada (DFO). Catch data to 1985 are available for each fishery (fixed and mobile) and fishing area. Beginning in 1986, the catch data are further reported by vessel and trip. The ZIFF files are based on information collected by the Dockside Monitoring Program (DMP). This program provides accurate, timely, and independent third-party verification of fish landings. Contracted companies are hired by the fishing industry to observe the offloading of fish and to record and report the landings information to DFO.

The fishery TACs within NAFO Div. 4T are set for the sGSL spring spawners and fall spawners components separately. In 2022 and 2023, the spring fishery was closed and the TAC for the fall fishery was 10,000 t (Table 1; Figure 2) for both years. Bait removals were not counted against the TAC.

The estimated spring landings fall bycatch of spring spawning Herring were 243 t in 2022 and 88 t in 2023. (Table 1; Figure 3). From a total of 331 t for both years, 6 t came from scientific work with fixed gear during the spring fishery in 2023 and 318 t from the fall fishery season with fixed gear (236 t in 2022 and 82 t in 2023; Table 1). The mobile fleet landed the remaining 7 t in 2022 and did not fish in 2023 (Table 2). Over the 1981 to 2023 period, most of the spring spawning Herring were estimated to have been landed in the fixed-gear fleet (Figure 2). In 2022 and 2023, the fixed-gear fleet was estimated to have landed 96% and 100%, respectively, of the total harvests of spring spawning Herring (Table 1; Figure 3A). For 2022 and 2023, only 2% of the spring spawning Herring was landed by the fixed gear fleet during the spring scientific fishing work, and 100% of the spring spawning Herring landed by the mobile fleet was landed in

the fall season (Table 1). This observation is due to the spring fishery closure, which only allowed spring spawners to be caught during the fall season (Figure 3BC).

The estimated landings of fall spawners in 2022 and 2023 were 9,380 t and 5,484 t, respectively (Table 1; Figure 3D). Over the 1978 to 2023 period, most of the fall spawning Herring have been landed in the fixed-gear fleet. In 2022 and 2023, the fixed-gear fleet was estimated to have landed 99% and 100% of the total harvests of fall spawning Herring, respectively (Figure 3). In 2022 and 2023, all of the fall spawning Herring captured in the fixed-gear fishery were landed during the fall fishing season (Figure 3E). In 2022, 100% of the fall spawners landed by the mobile fleet were landed in the fall fishing (Figure 3F).

The recent 2019 to 2023 mean proportion of the total catch caught by fixed gear was 51% (CI: [24; 77]) of the spring spawners and 96% [94;98] of the fall spawners (Table 1) with 100% of the fixed gear that had a mesh size of 2 5/8 (Figure 4). About 44% of the 2022-2023 fall fishery fixed gear catches occurred in Herring area 4Tmn (North; Figure 1; Table 2). The mobile gear (Edge) spring fishery was not active in both 2022 and 2023. The fall fishery 2022 mobile gear catches were 22.2 t and from 4Tmn (North; Figure 1; Table 2).

In 2022, 95% of the fall spawners' TAC was attained compared to 56% in 2023 (Table 1). Herring fishing area landings information can be found in Table 2.

## SPAWNING STOCK ASSIGNMENT

Gulf Region Science uses three methods to assign Herring samples to either spring or fall spawners based on gonad maturity stages (Cleary et al. 1982):

1. For immature Herring of maturity stages 1 and 2 (juveniles), the season of hatching is based on the size at capture and visual examination of otolith characteristics (Messieh 1972). The spawning component assignment for juvenile Herring is its hatching season (Cleary et al. 1982). Juveniles represent a small percentage of commercial catch, but are typically captured in higher proportions in the research survey samples.
2. Adult Herring with ripe or spent gonads are assigned their maturity stage by macroscopic laboratory examination of the gonads. The fish are assumed to belong to the spawning component of the season in which they were caught.
3. Adult Herring with unripe gonads are assigned their maturity stage by using a gonadosomatic index (GSI) based on a discriminant function model. The GSI is based on the length of the fish and its gonad weight. Once the maturity stage is determined by GSI, the spawning component is assigned by using a maturity schedule decision rule (a table cross-referencing maturity stage assigned by GSI and the date of capture to assign a spawning component; McQuinn 1989).

## TELEPHONE SURVEY

A telephone survey has been conducted annually since 1986 to collect information on the fixed-gear fishery and opinions on abundance trends (details in LeBlanc and Leblanc 1996). The sGSL was divided into eight telephone survey areas corresponding to the areas where the major fisheries occur (Table 3; Figure 1C). Active commercial license holders were asked a series of questions concerning the number, dimensions, and mesh size of nets used, the frequency of fishing and how the abundance in the current year compared to the previous year and the medium-term trend. A 2008 review of the consistency of the abundance relationship among years concluded that this index should not be used as a biomass index in the population model. The telephone survey responses inform the fishing effort calculation for the CPUE in the

gillnet fishery. Because of the spring fishery closure, this survey was only conducted for fall fishery in 2022 and 2023 (Table 3).

The 2022 fixed gear telephone survey contacted 202 fishermen randomly selected out of active commercial licence holders in the fall season. A total of 143 fishermen responded to the fall fishing season survey. The 2023 fixed gear telephone survey contacted 158 fishermen randomly selected out of active commercial licence holders. A total of 117 fishermen responded to the fall fishery survey. The distribution of respondents across the 8 telephone survey areas, mean net hauls, net lengths, and trend in the abundance from the previous year are shown in Table 3. Overall, fishermen felt that abundances in the 2022 and 2023 fall fishery were more similar than abundance in the previous years, except for the North region. In the Acadian peninsula (North) there was a sense that the 2023 abundance was significantly lower than previous years (Table 3). For abundances for the Middle and South region, respondents indicated a status quo (Table 3).

In the fall fishery, 2⅝" mesh is the most common. However, many fishers started using bigger mesh sizes (2¾") in 1992. By 2002, the proportion of 2⅝" mesh reverted to pre-1992 numbers. The proportion of 2⅝" mesh in 2022 and 2023 was 100% (Table 3).

## FISHERY SAMPLING

Commercial fishery catches are sampled dockside by DFO scientific personnel for the fixed and mobile fisheries, and at sea by fisheries observers in the mobile fishery. Sampling procedures are designed to obtain samples that are spatially and temporally representative of landings. The landings and samples by area used to calculate catch-at-age are shown in Table 2. The samples are used to determine the size, age, and spawning components (spring spawners or fall spawners) composition of the catch. Catch-at-age and weight-at-age matrices by spawning component (spring; fall) and type of gear (fixed and mobile) are presented in Tables 4-11 and Figures 5-8. Catch-per-unit-effort by age and spawning component (spring; fall) is presented in Tables 12-14 and Figures 9-14. Catchability is presented in Figures 15-18.

## FISHERY-INDEPENDENT ACOUSTIC SURVEY

Since 1991, an annual fishery-independent acoustic survey of early fall (September-October) concentrations of Herring has been conducted in the sGSL. The standard annual survey area occurs in the 4Tmno areas where both NAFO Div. 4T Herring spawning components aggregate in the fall. The survey uses a random stratified design of parallel transects within predefined strata. The survey is conducted at night and uses two vessels: an acoustic vessel to quantify the fish schools biomass using a hull-mounted 120 kHz split-beam transducer, and a fishing vessel to sample aggregates of fish with a pelagic (details in LeBlanc et al. 2015; see also LeBlanc and Dale 1996) or bottom trawl.

The acoustic survey covered 87.5% and 94.0% of the transects in 2022 and 2023, respectively (Appendix A Figure A1). All strata were covered in 2022 and 2023. The trawl samples are used to separate the estimated biomass by spawning component and age, determine species composition, and size distribution for the estimation of the target strength (LeBlanc and Dale 1996; LeBlanc et al. 2015). Catch-at-age matrix for the fishery-independent acoustic survey is presented in Table 15 and Figure 19.

## SPAWNING GROUND ACOUSTIC SURVEY

In 2015, a spawning ground acoustic survey that follows the design of the fishery-independent acoustic survey described above was initiated. This survey is the result of a partnership between DFO and fishery associations. The survey design uses random parallel transects

within predefined strata that cover the same spawning grounds as the experimental nets (Appendix B). Surveys are conducted by fishermen in the fall fishing season according to protocols developed by DFO. The survey is conducted at night, during the weekend fishery closures except in Herring fishing area 16C and 16E in 2015 to 2017 (Middle; Figure 1A), where this region didn't have weekend closures. The spawning ground acoustic survey is meant to provide a nightly estimate of spawning biomass among regions. It is analyzed in the same manner as the fishery-independent acoustic survey. The catches from the experimental nets are used to calibrate the spawning group specific target strength in order to obtain the nightly estimates of spawning biomass. FSCP index is presented in Figures 20-21 and the detailed results of the 2022-2023 surveys are available in Appendix B.

## EXPERIMENTAL NETS

As part of an industry partnership project between DFO and fishery associations, experimental gillnets consisting of multiple panels of varying mesh size were deployed weekly by fishermen during the fall fishing season. These modified gillnets catch a wider range of fish sizes and provide information on the relative selectivity of various mesh sizes. Each experimental gillnet had five panels, each with a different mesh size, from a set of seven possible mesh sizes, ranging from 2" to 2¾". Since 2015, all gillnets had panels with mesh sizes of 2'', 2¼'', 2½", 2⅝", and 2¾" in the fall. Harvesters in the fall fishing season participated in the study on the following spawning grounds (Figure 1A): Miscou Bank (North region; 16B), Gaspé (North; 16B), Escuminac (Middle; 16C), West PEI (Middle; 16E), Fisherman's Bank (South; 16G), and Pictou (South; 16F). The target fishing procedure was a one-hour soak and nets were set on the fishing grounds during the commercial fishery. Data from Pictou prior to 2015 were corrected for gillnet depth as nets in this region were 5 m (17 ft) deep compared with the standard 2.4 m (8 ft) used on other spawning grounds. A correction factor of 8/17 (in ft) was applied to the Pictou nets to address the difference in net depth size. Catches from the experimental nets were used to estimate the relative size-selectivity of gillnets of different mesh sizes (details in Surette et al. 2016) and to produce proportion-at-age, both of which are inputs to the fall spawners assessment model.

In spring, gillnets had panels with mesh size of 1¾'', 2'', 2¼'', 2½", 2⅝". The use of experimental gillnets standardized across regions in spring only started in 2022 and a selectivity index is not yet in place for the spring spawner population model. Data from the spring experimental nets are still used in the catch-at-age matrices for years of fishery closure (2022-2023). Selectivity-at-age matrices from the fall experimental nets are presented in Table 16 and Figures 22-24.

## MULTISPECIES BOTTOM-TRAWL SURVEY

The annual multi-species bottom trawl survey, conducted each September since 1971, provides information on the abundance and distribution of NAFO Div. 4T Herring throughout the sGSL in September (Savoie 2014). Total catch weights and numbers, representative length frequency and individual length-weight data has been recorded for each fish species in each survey set since 1971. Since 1994, additional sampling of Herring catches has been undertaken to disaggregate catches by spawning group and age (additional details in Hurlbut and Clay 1990). Herring were primarily caught near shore in waters < 30 fathoms, mostly off northeast P.E.I., west of Cape Breton, as well as in the Northumberland Strait, and Chaleur Bay (Appendix C, Figure C1). Catch-at-age matrix for the multispecies bottom-trawl survey is presented in Table 17 and Figure 25 and calculated biomass index is presented in Figures 26 and 27.

## ECOSYSTEM INFORMATION

Sea temperature in the sGSL was abnormally high in summer and fall 2023, especially in the North region in the Chaleur Bay (Galbraith et al. 2024). High water temperature may affect spatial distribution of Atlantic Herring, which tends to avoid areas with higher sea surface temperatures (Maravelias 1997; Maravelias et al. 2000; Nøttestad et al. 2007). It is likely that warmer waters are associated to the low presence of Atlantic Herring in the North region in fall 2023. Warmer water temperatures increase energetic demands which can limit growth, resulting in smaller size-at-age Atlantic Herring with lower egg production (Burbank et al. 2023). Low presence of Atlantic Herring in historical spawning sites may be expected as sea temperatures increase with climate changes (Garcia-Soto et al. 2021), especially in the fall season which is subject to high water temperatures after the summer.

# MODEL AND DATA PRESENTED

We used a Statistical Catch-at-Age model with time-varying catchability and time-varying mortality for age groups 2-6 years old and 7-11+ years old. The model is regionally-disaggregated for fall spawners (North, Middle, South), but not for the spring spawners due to limited data in some regions. For details on the model, please refer to Turcotte et al. 2021 and Rolland et al. 2022. This document is to support the Fisheries Science Advisory Report (FSAR) and thus, presents the results through figures and tables.

For spring spawner component, we present biomass estimates and abundances for start of the year (January 1st 2023) and start of the fishery season (April 1st 2023) in Tables 18-19 and Figure 28. Recruitment abundance and rate are presented in Figures 29-31. Natural mortality rate is presented in Figure 32 while fishing mortality rates are presented in Table 20 and Figure 33. Retrospective patterns are presented in Figure 34. Projections and risk analyses for different catch options are presented in Table 21 and Figures 35-38.

For the fall spawner component, we present biomass estimates and abundances for start of the year (January 1st 2023) and start of the fishery season (August 1st 2023) for North, Middle and South in Tables 22-29 and Figure 39. Recruitment abundance and rates are presented in Figures 40-42. Natural mortality rate is presented in Figure 44 while fishing mortality rates are presented for each region in Tables 30-33 and Figure 44. Retrospective patterns are presented in Figure 45. Projections and risk analyses for different catch options are presented in Table 34 and Figures 46-49.

# DATA CHANGES

## CATCH-AT-AGE MATRICES

Since 2020, the spawning biomass of Atlantic Herring in the sGSL (4TVn) has been assessed using a statistical Catch-at-age (SCA) model (Turcotte et al. 2021).

Prior to 2022, catch-at-age (CAA; see Tables 4;6;8 and 10 for examples), length-at-age and weight-at-age (WAA; see Tables 5;7;9 and 11 for examples) were estimated from automated code written in SAS (Statistical Analysis Software). In order to facilitate calculation and revise the methodology of the catch-at-age calculation, SAS code was translated in R language (R Core Team 2023). This improvement resulted in less than 2% change in value for length-at-age and less than 8% for weight-at-age. However, this revised methodology reassigned some samples in the proper fishing regions and spawning component, which slightly affected SSB estimates.

To run the model, catch-at age data is converted into proportion-at-age (i.e., proportion of fish that are of a certain age relative to total abundance) and number of fish-at-age by region and spawning component, which implies multiple adjustments depending on location and gear type (e.g., fixed gear vs mobile gear). Using the new CAA output from the R code, we automated this process by reproducing calculations that were previously conducted in pivot tables in Microsoft Excel. This automation identified calculations mismatches in proportion-at-age, which affected the SSB. After addressing the mismatches, population trends were left unchanged across spawning component and regions, but mean values shifted. For fall fishery, SSB from the automated code were ~30% higher in the North, ~20% lower in the Middle and ~7% lower in the South across the time series (Appendix D). For the Spring, SSB were ~14% higher across the time series (Appendix D). Some of these variations are due to the CAA translation from SAS to R, but most of them are associated to the calculations automatization and translation from Excel to R. Overall, the improvements on the code translate into more accurate biomass estimates and a diminution of retrospective patterns (-0.01 to -0.24; Figure 34), which were previously abnormal (< -0.22; Hurtado-Ferro et al. 2014).

## CATCH-PER-UNIT-EFFORT FOR SPRING SPAWNING COMPONENT

Since the closure of the 4T spring Atlantic Herring fishery in 2022, there are no commercial landings data available for 2022 and 2023 to calculate catch-per-unit-effort (CPUE) and catch-at-age matrices (CAA). To address this lack of data, a small-scale experimental commercial net program was set up in spring 2023 and will continue in 2024. The catches were also sampled by DFO port samplers to inform the catch-at-age index.

This small-scale fishery is different than a commercial fishery, as parameters are standardized across fishermen and regions. The CPUE index from commercial fishery is generally evaluated from the phone survey and logbooks, the latest often missing a lot of information. A CPUE index derived from the small-scale scientific fishery would be much more accurate as we determined effort *a priori*. Therefore, it is unclear if both CPUE indices (commercial fishery and scientific fishery) is truly comparable to each other. While both may be used in the biomass estimates, it is unclear if they should be used together or as separate indexes. Given this uncertainty, we decided to exclude the scientific CPUE index in the spring component model for now. A few years of the scientific fishery will be needed to understand the differences and relationship between the commercial index and the scientific index, which can be expected to inform the next stock assessment.

We tested whether the unavailability of values from the CPUE index for 2022 and 2023 likely impacted our biomass estimates for those years. To do so, the 2021 model (model with the latest value available) was rerun without the CPUE index (put as null from 1990 to 2021). The resulting difference in SSB was 2.82 kilotonnes (kt) on average [2.47;3.17] (~10% of 2023 biomass estimate), with a generally higher SSB observed for the model with the CPUE index (Figure 50). The confidence interval on the SSB estimates was generally wider for the model including the CPUE index (average difference : 22.72 kt [19.25;26.21]. Overall, the differences regarding the estimation of the SSB and the results suggest that SSB estimates computed without a CPUE index are still reliable.

## PROJECTIONS FOR FALL SPAWNING COMPONENT

Projections for the fall spawning component show a large confidence interval and a steep increase (Figures 47 and 49) reaching the USR without exceeding it for all catch options. The risk analysis predicts a probability of exceeding the USR of 46-52% in 2025 and 28-34% in 2026. While these projections appear optimistic, they are unrealistic and unsupported by current

recruitment and biomass estimates. Therefore stock advice would be better informed from 2023 SSB estimates than from the projections.

In our SCA model, projections are largely driven by recruitment i.e., number of fish at age 2 (Figure 40). Number of fish at age 2 is mostly estimated by the fishery-independent acoustic survey in the model. Since 2006, there have been close to no landings of age 2 fish in the Middle and the South region and very low in the North since 2011. Given the limited landings of age 2 fish in the recent years, our estimates of recruitment are very limited, especially in the Middle and South regions, and are optimized by the model. When looking at recent recruitments (Figures 40-42) or number of age 2 fish from the acoustic survey (Figure 19), numbers are not especially high, except for a slightly higher number of recruits in 2022, which represent only one stronger cohort. Additionally, age 3 fish seem to be slightly heavier in 2022 and 2023 than in previous years, which translates into higher biomass estimates in the projections.

Yet, SCA models are very sensitive to sudden increases in fish abundance, which paired with low estimates of mortality-at-ages 2-6 (Figure 43) can result in overoptimistic projections (Figures 47 and 49). In 2024-2029 projections, the optimistic increase is only responding to a stronger estimate of age 2 mostly based on the 2022 estimates, and not necessarily representative of the overall small abundance of recruits observed in the recent years. Additionally, confidence intervals are wide which reflect the relatively high uncertainty around these projections.

Indices of abundance and current biomass estimates do not show indication or support for the high one-year spike observed in the projections for 2024. Indeed, in 2022 and 2023, we observed low catches, low biomass in experimental net and multi-species survey, poor environmental conditions detrimental to larvae survival and adult reproductive output, which do not suggest any future increase in biomass. In summary, the model shows a high sensitivity to small increases in abundance and projections are likely overoptimistic.

Even if these projections were probable and SSB was meant to increase substantially as early as 2024, this stronger cohort would be at age 4 in 2024, meaning only one year into reproductive maturity. Younger, smaller fish are known to produce fewer eggs (Hixon et al. 2014), and extensively fishing (> the catch option presented) this cohort may not enable the population to sustain a higher SSB in the long-term as they would not be given multiple chances to reproduce as they grow. Looking back at the population trends, the only rapid increase that may resemble our projections are in 2008-2010 (Figure 39). Yet, that increase spanned over a least 2 years and was followed several years of high recruitment (Figure 40). Additionally, this sudden boom was followed by a rapid decline and was not sustained for more than a season (Figure 39).

Many avenues may improve our projections, and would follow a conservative approach. As a next step, sensitivity analyses will be performed to quantify the role of Age 2 estimates in these projections and focus our array of solutions to increase the precision of the projection calculations. Including environmental variables to estimate recruitment or considering other methods of modelling projections would likely help reduce this uncertainty.

In light of recent stock trends and unfavourable environmental conditions, caution should be taken when interpreting projections, as they are based on unrealistic estimates of natural mortality and recruitment, which result in an overoptimistic trend. Given these considerations, and the aforementioned historical trends in stock biomass estimates (i.e., 2010), stock advice would be better informed from 2023 SSB estimates than from the projections.

## CONCLUSION

Since the last assessment, we continued to collect data from our various data sources to inform our population models. We improved the calculations of catch-at-age matrices with translating previous SAS code and Excel sheets in the more versatile R language. These changes improved the accuracy of our estimates and our ability to reproduce the data in the long-term. These changes also decreased the magnitude of retrospective patterns, previously abnormal, which increase our confidence in our SSB estimates. Nevertheless, there are still uncertainties regarding the spring and fall populations, especially regarding rising sea temperature, which may change spatial distribution of Atlantic Herring and affect other demographic metrics (i.e., recruitment).

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# TABLES

*Table 1. Landings (in tonnes) of 4TVn Herring in the spring and fall fisheries by gear (fixed and mobile) and spawning group (SS=spring spawners and FS=fall spawners). TAC allocations and target catches are also provided, as TAC is higher than the targeted catch decision due to historical shares between regions.*

| Year | Spawning group | 4T catch | | | | Annual 4T catch | Annual 4Vn catch | Total catch 4TVn | TAC 4TVn | Target catch |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Spring fishery | | Fall fishery | | | | | | |
| | | Fixed | Mobile | Fixed | Mobile | | | | | |
| | SS | 6,287 | 20 | 293 | 589 | 7,189 | 822 | - | - | - |
| 1981 | FS | 1,212 | 1 | 10,932 | 2,599 | 14,744 | 2,594 | - | - | - |
| | Total | 7,499 | 21 | 11,225 | 3,188 | 21,933 | 3,416 | 25,349 | *19* | - |
| | SS | 5,692 | 57 | 292 | 574 | 6,615 | 834 | - | - | - |
| 1982 | FS | 230 | 5 | 12,691 | 2,003 | 14,929 | 2,674 | - | - | - |
| | Total | 5,922 | 62 | 12,983 | 2,577 | 21,544 | 3,508 | 25,052 | *18* | - |
| | SS | 7,655 | 17 | 423 | 1,466 | 9,561 | 1,307 | - | - | - |
| 1983 | FS | 865 | 2 | 13,415 | 2,023 | 16,305 | 2,672 | - | - | - |
| | Total | 8,52 | 19 | 13,838 | 3,489 | 25,866 | 3,979 | 29,845 | *25* | - |
| | SS | 4,434 | 3 | 303 | 895 | 5,635 | 1,376 | - | - | - |
| 1984 | FS | 847 | 1 | 15,672 | 1,384 | 17,904 | 2,549 | - | - | - |
| | Total | 5,281 | 4 | 15,975 | 2,279 | 23,539 | 3,925 | 27,464 | *22,5* | - |
| | SS | 6,72 | 0 | 1,287 | 2,154 | 10,161 | 1,082 | - | - | - |
| 1985 | FS | 498 | 0 | 22,42 | 4,867 | 27,785 | 2,388 | - | - | - |
| | Total | 7,218 | 0 | 23,707 | 7,021 | 37,946 | 3,47 | 41,416 | *36* | - |
| | SS | 7,154 | 0 | 3,181 | 6,773 | 17,108 | 2,782 | - | - | - |
| 1986 | FS | 1,397 | 0 | 36,71 | 4,143 | 42,25 | 1,568 | - | - | - |
| | Total | 8,551 | 0 | 39,891 | 10,916 | 59,358 | 4,35 | 63,708 | *47,6* | - |
| | SS | 10,419 | 0 | 2,538 | 9,46 | 22,417 | 1,446 | - | - | - |
| 1987 | FS | 1,34 | 0 | 49,585 | 4,273 | 55,198 | 917 | - | - | - |
| | Total | 11,759 | 0 | 52,123 | 13,733 | 77,615 | 2,363 | 79,978 | *77* | - |
| | SS | 9,166 | 0 | 2,843 | 12,036 | 24,045 | 1,766 | - | - | - |
| 1988 | FS | 3,719 | 0 | 38,367 | 5,496 | 47,582 | 806 | - | - | - |
| | Total | 12,885 | 0 | 41,21 | 17,532 | 71,627 | 2,572 | 74,199 | *83,1* | - |
| | SS | 9,062 | 0 | 1,691 | 8,778 | 19,531 | 1,302 | - | - | - |
| 1989 | FS | 2,032 | 0 | 32,157 | 5,492 | 39,681 | 815 | - | - | - |
| | Total | 11,094 | 0 | 33,848 | 14,27 | 59,212 | 2,117 | 61,329 | *91,1* | - |
| | SS | 4,083 | 1 | 2,146 | 6,756 | 12,986 | 3,088 | - | - | - |
| 1990 | FS | 818 | 0 | 59,138 | 3,551 | 63,507 | 1,623 | - | - | - |
| | Total | 4,901 | 1 | 61,284 | 10,307 | 76,493 | 4,711 | 81,204 | *91,1* | - |
| | SS | 12,073 | 5 | 178 | 3,319 | 15,575 | 1,902 | 17,477 | *21* | - |
| 1991 | FS | 817 | 13 | 26,965 | 4,741 | 32,536 | 2,888 | 35,424 | *70,1* | - |
| | Total | 12,89 | 18 | 27,143 | 8,06 | 48,111 | 4,79 | 52,901 | *91,1* | - |

| Year | Spawning group | 4T catch | | | | Annual 4T catch | Annual 4Vn catch | Total catch 4TVn | TAC 4TVn | Target catch |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Spring fishery | | Fall fishery | | | | | | |
| | | Fixed | Mobile | Fixed | Mobile | | | | | |
| | SS | 12,291 | 641 | 322 | 3,327 | 16,581 | 493 | 17,074 | *21* | - |
| 1992 | FS | 186 | 478 | 32,76 | 3,789 | 37,213 | 3,735 | 40,948 | *70,1* | - |
| | Total | 12,477 | 1,119 | 33,082 | 7,116 | 53,794 | 4,228 | 58,022 | *91,1* | - |
| | SS | 14,643 | 1,526 | 780 | 3,741 | 20,69 | 434 | 21,124 | *21* | - |
| 1993 | FS | 538 | 1,19 | 22,319 | 2,487 | 26,534 | 3,517 | 30,051 | *85* | - |
| | Total | 15,181 | 2,716 | 23,099 | 6,228 | 47,224 | 3,951 | 51,175 | *106* | - |
| | SS | 18,498 | 883 | 481 | 3,357 | 23,219 | 568 | 23,787 | *21* | - |
| 1994 | FS | 517 | 3,049 | 53,333 | 3,603 | 60,502 | 2,681 | 63,183 | *85* | - |
| | Total | 19,015 | 3,932 | 53,814 | 6,96 | 83,721 | 3,249 | 86,97 | *106* | - |
| | SS | 15,137 | 950 | 2,102 | 7,671 | 25,86 | 470 | 26,33 | *21* | - |
| 1995 | FS | 836 | 875 | 54,161 | 7,595 | 63,467 | 3,674 | 67,141 | *85* | - |
| | Total | 15,973 | 1,825 | 56,263 | 15,266 | 89,327 | 4,144 | 93,471 | *106* | - |
| | SS | 15,409 | 441 | 1,365 | 3,977 | 21,192 | 1,033 | 22,225 | *15,114* | - |
| 1996 | FS | 668 | 1,466 | 44,408 | 4,044 | 50,586 | 3,234 | 53,82 | *58,749* | - |
| | Total | 16,077 | 1,907 | 45,773 | 8,021 | 71,778 | 4,267 | 76,045 | *73,863* | - |
| | SS | 12,846 | 614 | 98 | 3,627 | 17,185 | 231 | 17,416 | *16,5* | - |
| 1997 | FS | 380 | 888 | 34,974 | 2,175 | 38,417 | 3,299 | 41,716 | *50* | - |
| | Total | 13,226 | 1,502 | 35,072 | 5,802 | 55,602 | 3,53 | 59,132 | *66,5* | - |
| | SS | 13,382 | 297 | 121 | 1,418 | 15,218 | 2 | 15,22 | *16,5* | - |
| 1998 | FS | 528 | 707 | 39,009 | 3,158 | 43,402 | 50 | 43,452 | *57,568* | - |
| | Total | 13,91 | 1,004 | 39,13 | 4,576 | 58,62 | 52 | 58,672 | *74,068* | - |
| | SS | 10,256 | 688 | 176 | 3,77 | 14,89 | 0 | 14,89 | *18,5* | - |
| 1999 | FS | 1,625 | 4,13 | 44,615 | 5,334 | 55,704 | 0 | 55,704 | *60,5* | - |
| | Total | 11,881 | 4,818 | 44,791 | 9,104 | 70,594 | 0 | 70,594 | *79* | - |
| | SS | 14,586 | 10 | 706 | 2,324 | 17,626 | 0 | 17,626 | *16,5* | - |
| 2000 | FS | 1,596 | 538 | 49,676 | 6,373 | 58,183 | 0 | 58,183 | *71* | - |
| | Total | 16,182 | 548 | 50,382 | 8,697 | 75,809 | 0 | 75,809 | *87,5* | - |
| | SS | 9,938 | 459 | 736 | 2,986 | 14,119 | 0 | 14,119 | *12,5* | - |
| 2001 | FS | 659 | 638 | 44,786 | 7,285 | 53,368 | 0 | 53,368 | *60,5* | - |
| | Total | 10,597 | 1,097 | 45,522 | 10,271 | 67,487 | 0 | 67,487 | *73* | - |
| | SS | 8,142 | 420 | 673 | 704 | 9,939 | 0 | 9,939 | *8* | - |
| 2002 | FS | 966 | 464 | 41,29 | 10,898 | 53,618 | 0 | 53,618 | *51,5* | - |
| | Total | 9,108 | 884 | 41,963 | 11,602 | 63,557 | 0 | 63,557 | *59,5* | - |
| | SS | 8,458 | 41 | 37 | 449 | 8,985 | 0 | 8,985 | *11* | - |
| 2003 | FS | 608 | 60 | 47,766 | 12,779 | 61,213 | 0 | 61,213 | *62* | - |
| | Total | 9,066 | 101 | 47,803 | 13,228 | 70,198 | 0 | 70,198 | *73* | - |
| | SS | 7,671 | 21 | 122 | 410 | 8,224 | 0 | 8,224 | *13,5* | - |
| 2004 | FS | 374 | 31 | 35,904 | 7,09 | 43,399 | 0 | 43,399 | *73* | - |
| | Total | 8,045 | 52 | 36,026 | 7,5 | 51,623 | 0 | 51,623 | *86,5* | - |

| Year | Spawning group | 4T catch | | | | Annual 4T catch | Annual 4Vn catch | Total catch 4TVn | TAC 4TVn | Target catch |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Spring fishery | | Fall fishery | | | | | | |
| | | Fixed | Mobile | Fixed | Mobile | | | | | |
| 2005 | SS | 3,571 | 0 | 14 | 1,084 | 4,669 | 0 | 4,669 | *11* | - |
| | FS | 925 | 0 | 51,715 | 7,756 | 60,396 | 0 | 60,396 | *70* | - |
| | Total | 4,496 | 0 | 51,729 | 8,84 | 65,065 | 0 | 65,065 | *81* | - |
| 2006 | SS | 1,409 | 0 | 293 | 745 | 2,447 | 0 | 2,447 | *9* | - |
| | FS | 1,257 | 0 | 47,63 | 4,409 | 53,296 | 0 | 53,296 | *68,8* | - |
| | Total | 2,666 | 0 | 47,923 | 5,154 | 55,743 | 0 | 55,743 | *77,8* | - |
| 2007 | SS | 1,734 | 0 | 10 | 2,414 | 4,158 | 0 | 4,158 | *5* | - |
| | FS | 496 | 0 | 43,161 | 4,426 | 48,083 | 0 | 48,083 | *68,8* | - |
| | Total | 2,23 | 0 | 43,171 | 6,84 | 52,241 | 0 | 52,241 | *73,8* | - |
| 2008 | SS | 1,503 | 0 | 35 | 1,473 | 3,011 | 0 | 3,011 | *2,5* | - |
| | FS | 187 | 0 | 38,831 | 2,738 | 41,756 | 0 | 41,756 | *68,8* | - |
| | Total | 1,69 | 0 | 38,866 | 4,211 | 44,767 | 0 | 44,767 | *71,3* | - |
| 2009 | SS | 1,256 | 0 | 70 | 519 | 1,845 | 0 | 1,845 | *2,5* | - |
| | FS | 94 | 0 | 44,78 | 1,939 | 46,813 | 0 | 46,813 | *65* | - |
| | Total | 1,35 | 0 | 44,85 | 2,458 | 48,658 | 0 | 48,658 | *67,5* | - |
| 2010 | SS | 769 | 5 | 2 | 595 | 1,371 | 0 | 1,371 | *2* | - |
| | FS | 386 | 297 | 42,458 | 4,154 | 47,295 | 0 | 47,295 | *65* | - |
| | Total | 1,155 | 302 | 42,46 | 4,749 | 48,666 | 0 | 48,666 | *67* | - |
| 2011 | SS | 833 | 0 | 21 | 664 | 1,518 | 0 | 1,518 | *2* | - |
| | FS | 210 | 0 | 36,882 | 1,372 | 38,464 | 0 | 38,464 | *65* | - |
| | Total | 1,043 | 0 | 36,903 | 2,036 | 39,982 | 0 | 39,982 | *67* | - |
| 2012 | SS | 265 | 5 | 68 | 262 | 600 | 0 | 600 | *2* | - |
| | FS | 152 | 223 | 31,82 | 381 | 32,576 | 0 | 32,576 | *43,5* | - |
| | Total | 417 | 228 | 31,888 | 643 | 33,176 | 0 | 33,176 | *45,5* | - |
| 2013 | SS | 874 | 180 | 1 | 649 | 1,704 | 0 | 1,704 | *2* | - |
| | FS | 24 | 3,025 | 29,911 | 1,409 | 34,369 | 0 | 34,369 | *43,5* | - |
| | Total | 898 | 3,205 | 29,912 | 2,058 | 36,073 | 0 | 36,073 | *45,5* | - |
| 2014 | SS | 634 | 56 | 132 | 429 | 1,25 | 0 | 1,25 | *2* | - |
| | FS | 71 | 1,886 | 25,786 | 1,471 | 29,214 | 0 | 29,214 | *35* | - |
| | Total | 705 | 1,941 | 25,918 | 1,901 | 30,464 | 0 | 30,464 | *37* | - |
| 2015 | SS | 578 | 43 | 3 | 565 | 1,19 | 0 | 1,19 | *2* | - |
| | FS | 7 | 1,39 | 25,964 | 777 | 28,138 | 0 | 28,138 | *40* | - |
| | Total | 586 | 1,433 | 25,967 | 1,343 | 29,328 | 0 | 29,328 | *42* | - |
| 2016 | SS | 745 | 29 | 45 | 147 | 966 | 0 | 966 | *2* | - |
| | FS | 82 | 776 | 23,195 | 624 | 24,677 | 0 | 24,677 | *35* | - |
| | Total | 827 | 805 | 23,24 | 771 | 25,643 | 0 | 25,643 | *37* | - |
| 2017 | SS | 928 | 4 | 215 | 42 | 1,189 | 0 | 1,189 | *2* | - |
| | FS | 18 | 86 | 20,381 | 38 | 20,523 | 0 | 20,523 | *35* | - |
| | Total | 946 | 90 | 20,595 | 81 | 21,712 | 0 | 21,712 | *37* | - |

| Year | Spawning group | 4T catch | | | | Annual 4T catch | Annual 4Vn catch | Total catch 4TVn | TAC 4TVn | Target catch |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Spring fishery | | Fall fishery | | | | | | |
| | | Fixed | Mobile | Fixed | Mobile | | | | | |
| | SS | 438 | 58 | 99 | 203 | 798 | 0 | 798 | *500* | 500 |
| 2018 | FS | 39 | 1,187 | 15,186 | 330 | 16,742 | 0 | 16,742 | *25,2* | 16 |
| | Total | 477 | 1,245 | 15,285 | 533 | 17,54 | 0 | 17,54 | *25,2* | 16,5 |
| | SS | 485 | 0 | 44 | 518 | 1,047 | 0 | 1,047 | *1,25* | 500 |
| 2019 | FS | 56 | 0 | 14,844 | 644 | 15,544 | 0 | 15,544 | *22,25* | 16 |
| | Total | 541 | 0 | 14,888 | 1,162 | 16,591 | 0 | 16,591 | *23,5* | 16,5 |
| | SS | 342 | 0 | 16 | 245 | 603 | 0 | 603 | *500* | - |
| 2020 | FS | 77 | 0 | 9,659 | 329 | 10,065 | 0 | 10,065 | *12* | - |
| | Total | 419 | 0 | 9,678 | 574 | 10,668 | 0 | 10,668 | *12,5* | - |
| | SS | 379 | 0 | 17 | 6 | 403 | 0 | 403 | *500* | - |
| 2021 | FS | 24 | 0 | 10,8 | 9 | 10,834 | 0 | 10,834 | *12* | - |
| | Total | 403 | 0 | 10,818 | 16 | 11,237 | 0 | 11,237 | *12,5* | - |
| | SS | 0 | 0 | 183 | 7 | 190 | 0 | 190 | *0* | - |
| 2022 | FS | 0 | 0 | 9,365 | 15 | 9,38 | 0 | 9,38 | *10* | - |
| | Total | 0 | 0 | 9,548 | 22 | 9,57 | 0 | 9,57 | *10* | - |
| | SS | 6 | 0 | 82 | 0 | 82 | 0 | 88 | *0* | - |
| 2023 | FS | 0 | 0 | 5,484 | 0 | 5,484 | 0 | 5,484 | *10* | - |
| | Total | 6 | 0 | 5,566 | 0 | 5,566 | 0 | 5,572 | *10* | - |

*Table 2. Commercial fishery samples collected, number of fish processed (N), landings, and % TAC landed by zone in the spring (April 1-June 30) and fall (July 1-December 31). These data are used to derive the 2022 and 2023 catch and weight-at-age matrices for 4T Herring.*

| Gear/ Region | Fishery | Zone | Samples | N | Landings (t) | % TAC landed |
|---|---|---|---|---|---|---|
| **a) 2022** | | | | | | |
| **Fixed Gear - Gillnets** | | | | | | |
| **Spring** | | | | | | |
| Gaspé (16A) May-June | | 4Topq | 0 | 0 | 0.02 | 0.4 |
| Chaleur (16B) April-May-June | | 4Tmn | 6 | 75 | 0.04 | 0.1 |
| East P.E.I. April-May-June | | 4Tgj | 0 | 0 | 0.00 | 0.0 |
| Northumberland Strait (16E) April-May-June | | 4Th | 4 | 56 | 0.00 | 0.0 |
| West P.E.I. (16E) April-May | | 4Tl | 2 | 65 | 0.00 | 0.0 |
| I. de la Madeleine (16D) April-May | | 4Tf | 0 | 0 | 0.00 | 0.0 |
| **Fall** | | | | | | |
| North | Gaspé (16A) July | 4Topq | 0 | 0 | 5.0 | 41.8 |
| North | Chaleur (16B) July-August | 4Tmn | 6 | 135 | 2665.5 | 66.0 |
| North | Chaleur (16B) September - October | 4Tmn | 14 | 338 | 2387.1 | |
| Middle | Escuminac-W P.E.I. (16CE) September | 4Tl | 4 | 98 | 351.1 | 15.6 |
| Middle | Escuminac-W P.E.I. (16CE) October | 4Tl | 2 | 48 | 77.2 | |
| South | I. de la Madeleine (16D) | 4Tf | 0 | 0 | 0 | 0.0 |
| South | Pictou (16F) July - September-October | 4Th | 6 | 136 | 3242.9 | 213.5 |
| South | East P.E.I. (16G) August - October | 4Tgj | 0 | 0 | 819.6 | 81.1 |
| Total Fixed gear | | 4T | 44 | 951 | 9548.6 | 95.5 |
| **Mobile Gear** | | | | | | |
| North | East of Grande-Anse (16B) September-November | 4Tmn | 2 | 59 | 22.2 | 3.1 |
| Total Mobile Gear | | 4T | 2 | 59 | 22.2 | 0.1 |
| **b) 2023** | | | | | | |
| **Fixed Gear - Gillnets** | | | | | | |
| **Spring** | | | | | | |
| Gaspé (16A) April-May | | 4Topq | 0 | 0 | 0.0 | 0 |
| Chaleur (16B) April-May | | 4Tmn | 9 | 118 | 0.2 | 0.1 |
| East P.E.I. April-May | | 4Tgj | 4 | 58 | 1.1 | 0.4 |
| Northumberland Strait (16E) April-May | | 4Th | 3 | 44 | 1.4 | 0.5 |
| West P.E.I. (16E) April-May-June | | 4Tl | 17 | 345 | 4.2 | 1.4 |
| I. de la Madeleine (16D) April-May | | 4Tf | 0 | 0 | 0.0 | 0 |

| Gear/ Region | Fishery | Zone | Samples | N | Landings (t) | % TAC landed |
|---|---|---|---|---|---|---|
| **Fall** | | | | | | |
| North | Gaspé (16A) July - Sept | 4Topq | 0 | 0 | 0.2 | 1.2 |
| North | Chaleur (16B) July-August | 4Tmn | 4 | 108 | 759.3 | 30.3 |
| North | Chaleur (16B) September - October | 4Tmn | 12 | 364 | 835.0 | |
| North | Escuminac-W P.E.I. (16CE) July - August - September | 4Tl | 6 | 172 | 1113.9 | 67.7 |
| Middle | Escuminac-W P.E.I. (16CE) October | 4Tl | 2 | 55 | 386.6 | |
| South | I. de la Madeleine (16D) September-October | 4Tf | 0 | 0 | 0.0 | 0.0 |
| South | Pictou (16F) July - September - October | 4Th | 4 | 93 | 1846.0 | 152.3 |
| South | East P.E.I. (16G) September - October | 4Tgj | 4 | 116 | 590.0 | 194.7 |
| Total fixed gear | | 4T | 65 | 1473 | 5537.9 | 55.4 |
| **Mobile Gear** | | | | | | |
| North | East of Grande-Anse (16B) November | 4Tmn | 0 | 0 | 0.0 | 0.0 |
| Total Mobile Gear | | 4T | 0 | 0 | 0.0 | 0.0 |

*Table 3. Comparison of 2022 and 2023 DMP and telephone survey results including number of respondents, mean net length (fathoms), numbers of nets set, percentage of nets of mesh size 2⅝" in the fall fishery, and a comparative index abundance from 2022 and 2023, respectively [scale 1 (poor) to 10 (excellent)].*

| Region | Telephone survey area | Source | Number of responses | Net length (fathom) | Number of nets set | % of 2⅝ mesh size | Comparison to previous year |
|---|---|---|---|---|---|---|---|
| **2022** | | | | | | | |
| **Fall fishery** | | | | | | | |
| | | DMP | 2 | 14.0 | - | - | - |
| South | 1 - Magdalen Islands | Phone | - | - | - | - | - |
| | | DMP | 37 | 14.0 | - | - | - |
| North | 2- Quebec | Phone | 34 | 14.4 | 7.7 | 100 | 5.1 |
| | | DMP | 65 | 14.5 | 8.2 | 100 | - |
| North | 3- Acadian Peninsula | Phone | 56 | 13.9 | 7.6 | 100 | 5.1 |
| | | DMP | 4 | 14.5 | 6.8 | 100 | - |
| Middle | 4- Escuminac | Phone | 11 | 14.1 | 8.9 | 100 | 5.6 |
| | | DMP | 1 | 14.0 | 7.2 | 100 | - |
| Middle | 5- Southeast NB | Phone | 2 | 13.8 | 8.8 | 100 | 6.0 |
| | | DMP | 75 | 16.1 | 6.2 | 100 | - |
| South | 6- Nova Scotia | Phone | 46 | 14.8 | 6.1 | 100 | 5.3 |
| | | DMP | 26 | 14.0 | 6.3 | 100 | - |
| South | 7- East P.E.I. | Phone | 11 | 13.2 | 7.4 | 100 | 5.3 |
| | | DMP | 17 | 14.2 | 6.6 | 100 | - |
| Middle | 8- West P.E.I. | Phone | 13 | 14.0 | 8.9 | 100 | 5.9 |
| **2023** | | | | | | | |
| **Fall fishery** | | | | | | | |
| | | DMP | 2 | 14.0 | - | - | - |
| South | 1 - Magdalen Islands | Phone | - | - | - | - | - |
| | | DMP | 17 | 14.0 | - | - | - |
| North | 2- Quebec | Phone | - | - | - | - | - |
| | | DMP | 83 | 14.9 | 8.1 | 100 | - |
| North | 3- Acadian Peninsula | Phone | 50 | 13.9 | 7.6 | 100 | 0.5 |
| | | DMP | 5 | 14.2 | 8.2 | 100 | - |
| Middle | 4- Escuminac | Phone | 2 | 12.5 | 8.9 | 100 | 5.0 |
| | | DMP | 1 | 14.0 | 9.0 | 100 | - |
| Middle | 5- Southeast NB | Phone | - | - | - | - | - |
| | | DMP | 81 | 17.8 | 4.8 | 100 | - |
| South | 6- Nova Scotia | Phone | 39 | 15.0 | 6.4 | 100 | 4.0 |
| | | DMP | 24 | 14.2 | 6.7 | 100 | - |
| South | 7- East P.E.I. | Phone | 2 | 13.0 | 7.2 | 100 | 5.0 |
| | | DMP | 24 | 12.9 | 8.1 | 100 | - |
| Middle | 8- West P.E.I. | Phone | 10 | 14.0 | 9.9 | 100 | 5.1 |

*Table 4. Spring spawner catch-at-age (thousands) for fixed gear in the 4T Herring fishery.*

| Year | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11+ | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1978 | 44 | 6026 | 25253 | 1042 | 2123 | 660 | 243 | 370 | 1561 | 752 | 38072 |
| 1979 | 112 | 7352 | 2544 | 17559 | 540 | 842 | 127 | 127 | 327 | 1421 | 31050 |
| 1980 | 217 | 9420 | 6744 | 2378 | 9068 | 1424 | 807 | 612 | 442 | 720 | 31831 |
| 1981 | 438 | 11843 | 7099 | 1941 | 1399 | 3051 | 415 | 422 | 171 | 882 | 27664 |
| 1982 | 216 | 23577 | 4191 | 988 | 421 | 299 | 315 | 143 | 88 | 618 | 30868 |
| 1983 | 155 | 13547 | 26209 | 2142 | 472 | 76 | 0 | 0 | 8 | 0 | 42608 |
| 1984 | 39 | 3377 | 12082 | 7529 | 409 | 59 | 14 | 7 | 4 | 0 | 23538 |
| 1985 | 39 | 4921 | 12686 | 13742 | 4629 | 614 | 100 | 32 | 71 | 0 | 36833 |
| 1986 | 11 | 2712 | 13905 | 12357 | 10348 | 2783 | 391 | 20 | 233 | 349 | 43109 |
| 1987 | 10 | 1232 | 6164 | 20071 | 11410 | 9674 | 4080 | 947 | 512 | 258 | 54357 |
| 1988 | 549 | 3536 | 6298 | 9353 | 14600 | 6944 | 5246 | 935 | 68 | 269 | 47859 |
| 1989 | 0 | 3941 | 15672 | 4836 | 4912 | 6957 | 4326 | 2598 | 1025 | 279 | 44546 |
| 1990 | 128 | 1925 | 7387 | 4109 | 2178 | 2532 | 3928 | 1827 | 733 | 306 | 25054 |
| 1991 | 0 | 6070 | 11715 | 14139 | 9142 | 3166 | 2897 | 4448 | 1640 | 1097 | 54314 |
| 1992 | 0 | 2160 | 30046 | 11543 | 7579 | 3460 | 1593 | 1956 | 1423 | 2263 | 62024 |
| 1993 | 8 | 231 | 5487 | 40373 | 18381 | 4900 | 2409 | 1375 | 708 | 2724 | 76596 |
| 1994 | 0 | 2061 | 5847 | 24642 | 48553 | 9048 | 3595 | 1221 | 438 | 1032 | 96438 |
| 1995 | 0 | 200 | 13344 | 10781 | 17781 | 28929 | 6408 | 1788 | 1156 | 2271 | 82660 |
| 1996 | 0 | 416 | 1682 | 48104 | 9122 | 14153 | 9414 | 3102 | 590 | 1087 | 87671 |
| 1997 | 2 | 107 | 5440 | 4068 | 37818 | 6961 | 4149 | 3938 | 1015 | 179 | 63678 |
| 1998 | 0 | 785 | 7743 | 15785 | 2264 | 29871 | 3421 | 2449 | 1966 | 875 | 65158 |
| 1999 | 89 | 1724 | 6599 | 9410 | 10297 | 2255 | 16045 | 2583 | 1342 | 1155 | 51499 |
| 2000 | 12 | 2141 | 11978 | 15975 | 15248 | 7568 | 4457 | 11675 | 2912 | 1756 | 73722 |
| 2001 | 0 | 910 | 11316 | 13082 | 9859 | 4920 | 3360 | 1387 | 6593 | 1735 | 53164 |
| 2002 | 1 | 2507 | 7039 | 18341 | 7620 | 3604 | 2072 | 1150 | 1051 | 1213 | 44600 |
| 2003 | 0 | 285 | 10767 | 11071 | 12831 | 3925 | 2483 | 998 | 686 | 759 | 43803 |
| 2004 | 21 | 1608 | 2606 | 15101 | 5400 | 8500 | 3223 | 1164 | 413 | 1005 | 39040 |

| Year | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11+ | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2005 | 0 | 72 | 3639 | 3209 | 5784 | 2561 | 2023 | 566 | 125 | 174 | 18153 |
| 2006 | 1 | 719 | 1299 | 4653 | 1652 | 528 | 285 | 387 | 28 | 73 | 9626 |
| 2007 | 1 | 864 | 2037 | 1563 | 2323 | 1738 | 803 | 196 | 149 | 110 | 9784 |
| 2008 | 71 | 177 | 2812 | 3111 | 1139 | 1261 | 269 | 52 | 23 | 12 | 8928 |
| 2009 | 23 | 411 | 1060 | 2445 | 3033 | 344 | 349 | 91 | 6 | 14 | 7775 |
| 2010 | 0 | 144 | 1107 | 860 | 1559 | 766 | 366 | 358 | 4 | 13 | 5177 |
| 2011 | 0 | 25 | 116 | 885 | 812 | 1102 | 512 | 782 | 287 | 5 | 4526 |
| 2012 | 0 | 153 | 400 | 400 | 609 | 671 | 340 | 225 | 186 | 84 | 3068 |
| 2013 | 0 | 16 | 303 | 963 | 1157 | 1492 | 1141 | 814 | 50 | 39 | 5973 |
| 2014 | 0 | 1 | 99 | 453 | 772 | 866 | 1076 | 558 | 221 | 67 | 4111 |
| 2015 | 0 | 0 | 103 | 157 | 783 | 1195 | 535 | 396 | 76 | 41 | 3287 |
| 2016 | 0 | 24 | 13 | 147 | 414 | 601 | 426 | 151 | 17 | 3 | 1797 |
| 2017 | 6 | 88 | 703 | 746 | 1977 | 1617 | 1207 | 276 | 49 | 3 | 6673 |
| 2018 | 0 | 10 | 57 | 832 | 648 | 940 | 346 | 107 | 4 | 0 | 2944 |
| 2019 | 0 | 13 | 261 | 604 | 1338 | 428 | 539 | 107 | 16 | 0 | 3306 |
| 2020 | 0 | 43 | 244 | 496 | 447 | 491 | 367 | 43 | 38 | 12 | 2183 |
| 2021 | 0 | 0 | 57 | 292 | 392 | 748 | 657 | 108 | 26 | 9 | 2290 |
| 2022 | 0 | 0 | 0 | 0 | 197 | 60 | 467 | 90 | 0 | 381 | 1195 |
| 2023 | 0 | 0 | 8 | 82 | 228 | 31 | 79 | 3 | 1 | 0 | 432 |

*Table 5. Spring spawner weight-at-age (kg) for fixed gear in the 4T Herring fishery.*

| Year | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11+ |
|---|---|---|---|---|---|---|---|---|---|---|
| 1978 | 0.154 | 0.148 | 0.187 | 0.215 | 0.251 | 0.283 | 0.318 | 0.308 | 0.337 | 0.364 |
| 1979 | 0.161 | 0.163 | 0.198 | 0.226 | 0.243 | 0.313 | 0.335 | 0.352 | 0.326 | 0.360 |
| 1980 | 0.184 | 0.167 | 0.189 | 0.231 | 0.278 | 0.304 | 0.334 | 0.359 | 0.369 | 0.379 |
| 1981 | 0.156 | 0.178 | 0.232 | 0.267 | 0.318 | 0.343 | 0.350 | 0.374 | 0.411 | 0.419 |
| 1982 | 0.186 | 0.173 | 0.207 | 0.261 | 0.311 | 0.370 | 0.385 | 0.396 | 0.416 | 0.449 |
| 1983 | 0.170 | 0.148 | 0.206 | 0.236 | 0.258 | 0.343 | - | - | 0.361 | - |

| Year | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11+ |
|---|---|---|---|---|---|---|---|---|---|---|
| 1984 | 0.104 | 0.174 | 0.196 | 0.217 | 0.289 | 0.340 | 0.404 | 0.490 | 0.369 | - |
| 1985 | 0.213 | 0.169 | 0.198 | 0.229 | 0.266 | 0.315 | 0.315 | 0.329 | 0.432 | - |
| 1986 | 0.111 | 0.183 | 0.210 | 0.242 | 0.261 | 0.307 | 0.348 | 0.336 | 0.364 | 0.392 |
| 1987 | 0.091 | 0.192 | 0.196 | 0.218 | 0.249 | 0.267 | 0.280 | 0.317 | 0.310 | 0.377 |
| 1988 | 0.080 | 0.160 | 0.197 | 0.237 | 0.265 | 0.290 | 0.307 | 0.335 | 0.369 | 0.359 |
| 1989 | - | 0.165 | 0.202 | 0.229 | 0.257 | 0.291 | 0.301 | 0.314 | 0.328 | 0.300 |
| 1990 | 0.153 | 0.169 | 0.203 | 0.241 | 0.273 | 0.297 | 0.290 | 0.311 | 0.322 | 0.339 |
| 1991 | - | 0.146 | 0.182 | 0.219 | 0.246 | 0.260 | 0.292 | 0.303 | 0.320 | 0.319 |
| 1992 | - | 0.145 | 0.172 | 0.201 | 0.232 | 0.255 | 0.274 | 0.291 | 0.299 | 0.332 |
| 1993 | 0.135 | 0.127 | 0.164 | 0.186 | 0.207 | 0.244 | 0.252 | 0.268 | 0.294 | 0.292 |
| 1994 | - | 0.141 | 0.156 | 0.177 | 0.200 | 0.218 | 0.249 | 0.314 | 0.272 | 0.304 |
| 1995 | 0.116 | 0.182 | 0.160 | 0.179 | 0.202 | 0.222 | 0.245 | 0.271 | 0.301 | 0.322 |
| 1996 | - | 0.157 | 0.182 | 0.173 | 0.193 | 0.209 | 0.233 | 0.230 | 0.275 | 0.277 |
| 1997 | 0.133 | 0.131 | 0.162 | 0.183 | 0.200 | 0.213 | 0.233 | 0.246 | 0.246 | 0.303 |
| 1998 | - | 0.137 | 0.161 | 0.185 | 0.206 | 0.221 | 0.240 | 0.246 | 0.257 | 0.278 |
| 1999 | 0.121 | 0.120 | 0.149 | 0.176 | 0.204 | 0.220 | 0.230 | 0.244 | 0.254 | 0.269 |
| 2000 | 0.114 | 0.131 | 0.158 | 0.184 | 0.207 | 0.225 | 0.250 | 0.253 | 0.262 | 0.273 |
| 2001 | - | 0.135 | 0.158 | 0.182 | 0.198 | 0.223 | 0.236 | 0.257 | 0.260 | 0.270 |
| 2002 | 0.098 | 0.141 | 0.165 | 0.188 | 0.205 | 0.227 | 0.251 | 0.270 | 0.279 | 0.289 |
| 2003 | - | 0.143 | 0.160 | 0.184 | 0.202 | 0.223 | 0.233 | 0.253 | 0.260 | 0.280 |
| 2004 | 0.130 | 0.134 | 0.149 | 0.178 | 0.203 | 0.229 | 0.238 | 0.254 | 0.262 | 0.288 |
| 2005 | 0.075 | 0.134 | 0.152 | 0.172 | 0.201 | 0.221 | 0.252 | 0.253 | 0.269 | 0.308 |
| 2006 | 0.12 | 0.132 | 0.147 | 0.169 | 0.196 | 0.221 | 0.246 | 0.248 | 0.293 | 0.242 |
| 2007 | 0.108 | 0.139 | 0.152 | 0.169 | 0.185 | 0.194 | 0.212 | 0.253 | 0.246 | 0.234 |
| 2008 | 0.137 | 0.144 | 0.158 | 0.164 | 0.181 | 0.203 | 0.237 | 0.240 | 0.268 | 0.297 |
| 2009 | 0.118 | 0.144 | 0.155 | 0.165 | 0.173 | 0.205 | 0.209 | 0.253 | 0.223 | 0.206 |
| 2010 | - | 0.121 | 0.148 | 0.157 | 0.189 | 0.202 | 0.225 | 0.234 | 0.248 | 0.268 |

| Year | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11+ |
|---|---|---|---|---|---|---|---|---|---|---|
| 2011 | - | 0.112 | 0.144 | 0.170 | 0.179 | 0.199 | 0.217 | 0.229 | 0.250 | 0.233 |
| 2012 | - | 0.154 | 0.140 | 0.143 | 0.155 | 0.169 | 0.186 | 0.190 | 0.222 | 0.220 |
| 2013 | - | 0.119 | 0.134 | 0.147 | 0.160 | 0.181 | 0.187 | 0.203 | 0.217 | 0.224 |
| 2014 | - | 0.114 | 0.153 | 0.160 | 0.170 | 0.190 | 0.197 | 0.208 | 0.226 | 0.226 |
| 2015 | - | 0.095 | 0.133 | 0.144 | 0.163 | 0.176 | 0.188 | 0.208 | 0.188 | 0.231 |
| 2016 | - | 0.126 | 0.127 | 0.147 | 0.176 | 0.176 | 0.187 | 0.200 | 0.213 | 0.203 |
| 2017 | 0.125 | 0.148 | 0.138 | 0.150 | 0.176 | 0.177 | 0.186 | 0.185 | 0.197 | 0.212 |
| 2018 | - | 0.138 | 0.143 | 0.168 | 0.178 | 0.191 | 0.200 | 0.201 | 0.216 | 0.225 |
| 2019 | - | 0.114 | 0.136 | 0.140 | 0.158 | 0.167 | 0.187 | 0.186 | 0.218 | - |
| 2020 | - | 0.114 | 0.113 | 0.148 | 0.166 | 0.179 | 0.199 | 0.184 | 0.258 | 0.209 |
| 2021 | - | 0.126 | 0.142 | 0.153 | 0.160 | 0.179 | 0.182 | 0.187 | 0.193 | 0.209 |
| 2022 | - | 0.120 | 0.125 | 0.152 | 0.189 | 0.250 | 0.202 | 0.237 | - | 0.178 |
| 2023 | - | 0.126 | 0.149 | 0.160 | 0.220 | 0.180 | 0.210 | 0.189 | 0.215 | 0.215 |

*Table 6. Fall spawner catch-at-age (thousands) for fixed gear in the 4T Herring fishery, by region: a) North, b) Middle, c) South.*

| Year | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11+ | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **a) NORTH** | | | | | | | | | | | |
| 1978 | 0 | 216 | 3,414 | 2,450 | 510 | 432 | 2,709 | 50 | 81 | 1,189 | 11,050 |
| 1979 | 0 | 168 | 3,271 | 1,465 | 1,260 | 256 | 644 | 531 | 252 | 267 | 8,113 |
| 1980 | 26 | 3,056 | 1,471 | 1,648 | 233 | 1,154 | 129 | 110 | 147 | 0 | 7,974 |
| 1981 | 23 | 3,963 | 12,839 | 2,839 | 593 | 240 | 278 | 53 | 99 | 60 | 20,988 |
| 1982 | 0 | 1,726 | 5,625 | 11,797 | 1,746 | 331 | 202 | 64 | 40 | 62 | 21,593 |
| 1983 | 0 | 98 | 9,238 | 3,748 | 9,002 | 1,018 | 413 | 96 | 16 | 102 | 23,731 |
| 1984 | 0 | 453 | 7,434 | 6,808 | 3,462 | 3,133 | 556 | 113 | 108 | 71 | 22,140 |
| 1985 | 0 | 99 | 2,878 | 13,139 | 8,176 | 4,901 | 4,915 | 1,832 | 372 | 6 | 36,318 |
| 1986 | 0 | 617 | 9,919 | 9,734 | 21,934 | 15,361 | 7,286 | 3,326 | 447 | 770 | 69,393 |
| 1987 | 16 | 7,260 | 24,248 | 14,636 | 13,277 | 19,804 | 9,068 | 5,494 | 2,412 | 759 | 96,973 |
| 1988 | 0 | 152 | 14,470 | 24,858 | 9,543 | 8,464 | 7,752 | 4,121 | 1,998 | 1,953 | 73,312 |

| Year | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11+ | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1989 | 0 | 283 | 12,133 | 19,801 | 21,160 | 10,289 | 4,716 | 5,928 | 2,655 | 2,118 | 79,082 |
| 1990 | 14 | 2,351 | 13,755 | 12,558 | 19,492 | 20,685 | 7,816 | 5,478 | 5,759 | 4,141 | 92,049 |
| 1991 | 0 | 131 | 28,732 | 7,306 | 5,390 | 7,996 | 7,653 | 2,463 | 1,539 | 2,511 | 63,722 |
| 1992 | 0 | 11 | 6,153 | 37,343 | 10,677 | 6,225 | 6,775 | 5,961 | 2,872 | 5,423 | 81,439 |
| 1993 | 0 | 82 | 2,051 | 21,080 | 24,447 | 3,430 | 1,918 | 1,975 | 559 | 712 | 56,254 |
| 1994 | 0 | 0 | 6,553 | 10,533 | 31,557 | 47,626 | 9,076 | 7,049 | 3,228 | 5,404 | 121,028 |
| 1995 | 0 | 23 | 3,298 | 23,949 | 11,096 | 26,765 | 28,407 | 4,969 | 3,188 | 3,483 | 105,177 |
| 1996 | 0 | 0 | 12,767 | 15,443 | 20,775 | 4,565 | 8,681 | 9,465 | 1,341 | 1,561 | 74,598 |
| 1997 | 0 | 367 | 8,897 | 30,662 | 9,453 | 8,423 | 1,621 | 2,817 | 2,524 | 732 | 65,496 |
| 1998 | 0 | 37 | 8,752 | 23,986 | 22,898 | 5,734 | 5,461 | 787 | 1,272 | 2,305 | 71,232 |
| 1999 | 0 | 175 | 19,794 | 23,825 | 29,631 | 10,527 | 2,083 | 1,327 | 362 | 517 | 88,242 |
| 2000 | 0 | 266 | 17,184 | 56,056 | 14,915 | 6,279 | 3,445 | 668 | 493 | 224 | 99,531 |
| 2001 | 0 | 516 | 22,863 | 28,903 | 29,781 | 4,552 | 2,051 | 561 | 175 | 228 | 89,628 |
| 2002 | 1 | 212 | 21,279 | 23,278 | 16,324 | 8,777 | 2,292 | 682 | 471 | 187 | 73,503 |
| 2003 | 0 | 235 | 11,578 | 24,362 | 16,356 | 11,533 | 13,769 | 3,447 | 1,512 | 948 | 83,741 |
| 2004 | 0 | 1 | 23,784 | 17,748 | 8,619 | 5,219 | 4,049 | 2,776 | 638 | 433 | 63,268 |
| 2005 | 0 | 1 | 5,034 | 56,213 | 22,400 | 8,627 | 4,759 | 2,861 | 2,025 | 184 | 102,103 |
| 2006 | 0 | 5 | 6,092 | 37,842 | 36,714 | 5,458 | 1,549 | 2,922 | 1,127 | 602 | 92,313 |
| 2007 | 0 | 32 | 5,160 | 15,268 | 34,716 | 23,879 | 5,096 | 951 | 887 | 561 | 86,550 |
| 2008 | 0 | 403 | 18,423 | 11,717 | 18,718 | 15,180 | 14,670 | 1,778 | 598 | 865 | 82,352 |
| 2009 | 0 | 532 | 22,607 | 38,575 | 10,619 | 10,493 | 6,117 | 1,701 | 302 | 253 | 91,200 |
| 2010 | 0 | 0 | 3,121 | 26,685 | 23,029 | 7,969 | 5,320 | 4,186 | 1,708 | 199 | 72,217 |
| 2011 | 0 | 0 | 1,657 | 6,387 | 26,763 | 24,243 | 2,750 | 3,140 | 2,850 | 773 | 68,564 |
| 2012 | 0 | 8 | 156 | 8,609 | 17,648 | 26,305 | 11,746 | 2,365 | 2,749 | 954 | 70,539 |
| 2013 | 0 | 0 | 1,053 | 9,007 | 29,030 | 20,828 | 10,692 | 2,295 | 183 | 102 | 73,191 |
| 2014 | 0 | 0 | 91 | 4,454 | 9,817 | 24,496 | 11,276 | 7,629 | 100 | 60 | 57,924 |
| 2015 | 0 | 0 | 91 | 2,684 | 19,072 | 14,182 | 17,093 | 5,314 | 844 | 225 | 59,506 |

| Year | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11+ | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2016 | 0 | 23 | 1,288 | 5,314 | 14,491 | 17,913 | 12,473 | 3,986 | 1,870 | 318 | 57,678 |
| 2017 | 0 | 0 | 553 | 5,261 | 7,935 | 14,281 | 16,572 | 5,793 | 2,069 | 364 | 52,829 |
| 2018 | 0 | 0 | 0 | 849 | 10,205 | 12,361 | 9,637 | 4,674 | 1,679 | 201 | 39,606 |
| 2019 | 0 | 0 | 38 | 503 | 8,527 | 15,957 | 5,548 | 3,849 | 1,235 | 404 | 36,061 |
| 2020 | 0 | 0 | 153 | 579 | 2,079 | 10,049 | 8,069 | 5,047 | 1,298 | 192 | 27,466 |
| 2021 | 0 | 0 | 162 | 2,498 | 2,571 | 3,424 | 8,110 | 4,140 | 1,508 | 261 | 22,674 |
| 2022 | 0 | 2 | 137 | 664 | 4,538 | 3,795 | 3,731 | 5,327 | 3,760 | 972 | 22,927 |
| 2023 | 0 | 54 | 286 | 1,224 | 1,046 | 2,649 | 930 | 859 | 649 | 273 | 7,970 |
| **b) MIDDLE** | | | | | | | | | | | |
| 1978 | 0 | 38 | 601 | 749 | 220 | 442 | 2,005 | 9 | 59 | 1,139 | 5,262 |
| 1979 | 0 | 144 | 3,673 | 2,048 | 831 | 205 | 100 | 209 | 18 | 161 | 7,389 |
| 1980 | 0 | 424 | 964 | 2,283 | 579 | 271 | 225 | 282 | 107 | 96 | 5,232 |
| 1981 | 0 | 974 | 6,224 | 1,910 | 1,150 | 460 | 629 | 31 | 83 | 238 | 11,699 |
| 1982 | 0 | 29 | 1,653 | 1,559 | 210 | 139 | 116 | 0 | 0 | 31 | 3,737 |
| 1983 | 0 | 255 | 3,998 | 1,482 | 1,578 | 351 | 130 | 0 | 0 | 0 | 7,794 |
| 1984 | 0 | 41 | 1,908 | 2,723 | 937 | 1,001 | 315 | 77 | 11 | 6 | 7,019 |
| 1985 | 0 | 11 | 235 | 1,370 | 1,010 | 562 | 536 | 200 | 41 | 1 | 3,964 |
| 1986 | 0 | 47 | 1,600 | 1,328 | 2,455 | 1,120 | 435 | 200 | 27 | 46 | 7,257 |
| 1987 | 0 | 298 | 934 | 1,761 | 1,532 | 3,059 | 289 | 267 | 298 | 19 | 8,457 |
| 1988 | 0 | 817 | 3,091 | 2,817 | 2,473 | 1,135 | 1,189 | 886 | 15 | 0 | 12,424 |
| 1989 | 0 | 16 | 772 | 1,431 | 1,274 | 694 | 428 | 378 | 171 | 139 | 5,303 |
| 1990 | 0 | 219 | 1,923 | 1,390 | 1,508 | 2,655 | 548 | 382 | 298 | 64 | 8,987 |
| 1991 | 0 | 17 | 5,973 | 1,617 | 1,332 | 1,749 | 2,066 | 1,271 | 585 | 1,335 | 15,945 |
| 1992 | 0 | 12 | 3,880 | 9,415 | 1,284 | 534 | 304 | 220 | 106 | 249 | 16,004 |
| 1993 | 0 | 0 | 350 | 6,612 | 8,298 | 1,417 | 597 | 415 | 470 | 716 | 18,875 |
| 1994 | 0 | 0 | 850 | 1,373 | 6,908 | 9,293 | 1,134 | 359 | 439 | 741 | 21,099 |
| 1995 | 0 | 0 | 214 | 10,010 | 3,408 | 12,249 | 10,646 | 1,363 | 243 | 4,272 | 42,404 |

| Year | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11+ | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1996 | 0 | 0 | 3,414 | 2,107 | 12,096 | 1,046 | 3,144 | 3,605 | 833 | 869 | 27,113 |
| 1997 | 0 | 285 | 4,835 | 10,979 | 1,980 | 4,125 | 782 | 938 | 1,026 | 639 | 25,588 |
| 1998 | 0 | 23 | 5,113 | 4,301 | 8,730 | 1,761 | 3,286 | 596 | 1,293 | 2,229 | 27,332 |
| 1999 | 0 | 0 | 9,709 | 12,903 | 5,104 | 3,222 | 1,303 | 2,854 | 278 | 1,330 | 36,703 |
| 2000 | 0 | 13 | 11,054 | 21,136 | 7,789 | 2,516 | 1,394 | 414 | 369 | 165 | 44,850 |
| 2001 | 0 | 383 | 5,519 | 13,581 | 9,633 | 2,919 | 630 | 208 | 0 | 293 | 33,166 |
| 2002 | 0 | 275 | 9,081 | 8,110 | 7,171 | 6,936 | 1,245 | 171 | 145 | 216 | 33,352 |
| 2003 | 0 | 123 | 5,648 | 11,842 | 5,541 | 3,737 | 3,739 | 839 | 110 | 156 | 31,736 |
| 2004 | 0 | 15 | 5,579 | 10,122 | 7,144 | 5,096 | 4,523 | 2,652 | 920 | 175 | 36,226 |
| 2005 | 0 | 0 | 2,355 | 14,518 | 11,757 | 3,536 | 3,046 | 2,099 | 895 | 66 | 38,272 |
| 2006 | 0 | 0 | 1,697 | 7,740 | 13,789 | 5,094 | 2,598 | 1,949 | 1,544 | 523 | 34,934 |
| 2007 | 0 | 193 | 1,197 | 3,429 | 9,509 | 9,811 | 3,736 | 1,509 | 733 | 454 | 30,571 |
| 2008 | 0 | 1,426 | 12,175 | 2,575 | 4,491 | 5,326 | 8,514 | 1,536 | 1,451 | 332 | 37,825 |
| 2009 | 0 | 101 | 8,185 | 14,543 | 3,368 | 7,438 | 3,578 | 1,245 | 530 | 245 | 39,232 |
| 2010 | 0 | 8 | 1,529 | 11,467 | 17,000 | 4,954 | 4,333 | 2,473 | 1,154 | 644 | 43,562 |
| 2011 | 0 | 0 | 405 | 2,089 | 12,157 | 15,610 | 2,973 | 2,237 | 2,101 | 631 | 38,202 |
| 2012 | 0 | 7 | 147 | 1,935 | 8,679 | 11,646 | 8,142 | 925 | 526 | 443 | 32,450 |
| 2013 | 0 | 7 | 590 | 1,125 | 7,042 | 10,527 | 6,451 | 2,488 | 201 | 43 | 28,474 |
| 2014 | 0 | 0 | 41 | 4,663 | 1,923 | 8,176 | 6,541 | 1,529 | 487 | 0 | 23,362 |
| 2015 | 0 | 0 | 165 | 1,052 | 10,058 | 4,474 | 7,592 | 2,986 | 1,060 | 0 | 27,388 |
| 2016 | 0 | 18 | 279 | 1,227 | 7,869 | 6,459 | 3,603 | 1,610 | 570 | 0 | 21,634 |
| 2017 | 0 | 25 | 128 | 1,032 | 3,573 | 6,650 | 8,169 | 4,645 | 638 | 23 | 24,883 |
| 2018 | 0 | 0 | 76 | 712 | 2,951 | 7,465 | 5,674 | 557 | 302 | 0 | 17,737 |
| 2019 | 0 | 0 | 103 | 187 | 1,689 | 5,691 | 2,695 | 3,532 | 1,081 | 216 | 15,194 |
| 2020 | 0 | 0 | 29 | 265 | 460 | 2,674 | 3,059 | 1,900 | 1,185 | 685 | 10,256 |
| 2021 | 0 | 6 | 80 | 758 | 917 | 1,175 | 3,145 | 1,736 | 437 | 205 | 8,460 |
| 2022 | 0 | 2 | 24 | 56 | 270 | 231 | 403 | 545 | 288 | 89 | 1,909 |

| Year | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11+ | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2023 | 0 | 37 | 271 | 1,040 | 1,450 | 1,525 | 1,145 | 870 | 559 | 225 | 7,123 |
| **c) SOUTH** | | | | | | | | | | | |
| 1978 | 41 | 1,988 | 1,390 | 632 | 154 | 75 | 119 | 22 | 0 | 13 | 4,434 |
| 1979 | 16 | 267 | 4,634 | 2,198 | 773 | 263 | 292 | 175 | 52 | 205 | 9,785 |
| 1980 | 38 | 4,404 | 1,939 | 2,352 | 294 | 923 | 129 | 164 | 154 | 77 | 10,474 |
| 1981 | 42 | 1,158 | 5,336 | 2,185 | 1,049 | 531 | 310 | 88 | 99 | 24 | 10,822 |
| 1982 | 0 | 353 | 7,029 | 3,634 | 3,226 | 2,345 | 819 | 332 | 81 | 37 | 17,857 |
| 1983 | 0 | 467 | 7,485 | 5,047 | 3,237 | 1,011 | 1,266 | 477 | 47 | 161 | 19,198 |
| 1984 | 0 | 397 | 15,010 | 5,562 | 4,586 | 2,288 | 703 | 381 | 110 | 23 | 29,060 |
| 1985 | 0 | 89 | 3,442 | 15,465 | 6,385 | 3,221 | 2,234 | 509 | 333 | 29 | 31,706 |
| 1986 | 383 | 871 | 20,436 | 5,746 | 12,066 | 3,350 | 1,635 | 487 | 106 | 164 | 45,245 |
| 1987 | 0 | 1,083 | 11,141 | 12,821 | 6,139 | 14,100 | 6,213 | 4,292 | 1,851 | 1,323 | 58,964 |
| 1988 | 0 | 377 | 4,361 | 16,703 | 9,665 | 4,750 | 6,641 | 3,036 | 985 | 665 | 47,183 |
| 1989 | 0 | 33 | 1,355 | 2,076 | 8,332 | 4,204 | 1,803 | 2,446 | 622 | 300 | 21,171 |
| 1990 | 0 | 875 | 6,772 | 6,732 | 7,712 | 36,015 | 9,853 | 4,322 | 4,591 | 2,472 | 79,345 |
| 1991 | 0 | 11 | 4,956 | 1,670 | 1,339 | 1,201 | 3,899 | 1,365 | 840 | 1,190 | 16,471 |
| 1992 | 0 | 0 | 1,335 | 7,461 | 1,081 | 631 | 1,510 | 3,338 | 1,241 | 1,316 | 17,913 |
| 1993 | 0 | 0 | 302 | 3,227 | 3,902 | 982 | 405 | 586 | 485 | 1,123 | 11,013 |
| 1994 | 0 | 0 | 1,463 | 310 | 10,000 | 13,800 | 1,873 | 2,460 | 5,256 | 8,730 | 43,892 |
| 1995 | 0 | 1 | 341 | 7,908 | 2,733 | 12,171 | 10,382 | 2,759 | 3,036 | 7,345 | 46,676 |
| 1996 | 0 | 4 | 3,477 | 2,082 | 13,644 | 4,899 | 11,411 | 10,891 | 2,781 | 8,448 | 57,638 |
| 1997 | 0 | 454 | 3,780 | 22,567 | 2,027 | 8,585 | 1,488 | 3,105 | 2,920 | 2,597 | 47,522 |
| 1998 | 0 | 0 | 9,390 | 4,415 | 15,711 | 3,964 | 8,891 | 1,751 | 3,429 | 4,223 | 51,773 |
| 1999 | 0 | 89 | 8,880 | 32,161 | 4,365 | 9,706 | 1,899 | 3,102 | 1,152 | 1,593 | 62,949 |
| 2000 | 0 | 77 | 8,101 | 31,645 | 18,887 | 3,076 | 3,685 | 715 | 1,148 | 717 | 68,049 |
| 2001 | 0 | 56 | 1,816 | 22,486 | 21,033 | 13,536 | 1,991 | 1,593 | 433 | 824 | 63,768 |
| 2002 | 0 | 0 | 18,025 | 7,625 | 17,279 | 14,378 | 4,329 | 1,101 | 928 | 552 | 64,218 |

| Year | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11+ | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2003 | 0 | 61 | 5,076 | 41,894 | 6,513 | 13,669 | 8,690 | 1,700 | 262 | 381 | 78,245 |
| 2004 | 0 | 0 | 4,823 | 11,134 | 24,501 | 4,842 | 4,452 | 2,175 | 600 | 312 | 52,839 |
| 2005 | 0 | 3 | 424 | 12,345 | 20,406 | 31,839 | 6,051 | 6,169 | 1,732 | 385 | 79,354 |
| 2006 | 0 | 51 | 2,825 | 7,738 | 20,291 | 20,875 | 15,511 | 5,119 | 2,721 | 760 | 75,890 |
| 2007 | 0 | 492 | 206 | 9,238 | 13,512 | 24,751 | 15,373 | 4,948 | 2,939 | 938 | 72,397 |
| 2008 | 0 | 292 | 4,858 | 1,774 | 6,585 | 12,063 | 15,009 | 6,873 | 3,646 | 2,818 | 53,919 |
| 2009 | 0 | 411 | 2,398 | 20,655 | 10,345 | 20,618 | 6,815 | 3,615 | 5,240 | 2,610 | 72,706 |
| 2010 | 0 | 0 | 2,080 | 8,755 | 32,103 | 8,352 | 10,398 | 6,809 | 3,819 | 2,439 | 74,755 |
| 2011 | 0 | 1 | 312 | 7,530 | 7,478 | 25,275 | 8,102 | 4,030 | 2,350 | 4,185 | 59,262 |
| 2012 | 0 | 0 | 24 | 1,139 | 12,787 | 14,800 | 15,466 | 1,741 | 498 | 1,641 | 48,097 |
| 2013 | 0 | 15 | 341 | 1,024 | 9,165 | 19,571 | 7,271 | 3,448 | 110 | 108 | 41,053 |
| 2014 | 0 | 0 | 173 | 2,842 | 2,276 | 8,974 | 15,939 | 3,502 | 1,700 | 57 | 35,464 |
| 2015 | 0 | 0 | 0 | 1,224 | 8,409 | 4,406 | 12,483 | 3,358 | 1,923 | 208 | 32,011 |
| 2016 | 0 | 10 | 305 | 3,417 | 10,631 | 5,817 | 4,280 | 1,938 | 548 | 38 | 26,985 |
| 2017 | 0 | 0 | 368 | 337 | 3,865 | 7,831 | 2,963 | 1,216 | 208 | 18 | 16,807 |
| 2018 | 0 | 0 | 25 | 875 | 4,046 | 3,837 | 4,573 | 856 | 326 | 77 | 14,615 |
| 2019 | 0 | 0 | 54 | 80 | 3,369 | 8,388 | 3,536 | 2,599 | 826 | 352 | 19,204 |
| 2020 | 0 | 0 | 0 | 199 | 612 | 1,759 | 1,980 | 979 | 585 | 21 | 6,135 |
| 2021 | 0 | 0 | 39 | 477 | 3,374 | 2,678 | 6,285 | 2,678 | 341 | 446 | 16,319 |
| 2022 | 0 | 0 | 56 | 746 | 4,290 | 4,820 | 1,661 | 3,279 | 1,714 | 1,396 | 17,962 |
| 2023 | 0 | 156 | 712 | 1,326 | 879 | 3,027 | 2,582 | 1,652 | 1,208 | 218 | 11,761 |

*Table 7. Fall spawner weight-at-age (kg) for fixed gear in the 4T Herring fishery, by region: a) North, b) Middle, c) South.*

| Year | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11+ |
|---|---|---|---|---|---|---|---|---|---|---|
| **a) NORTH** | | | | | | | | | | |
| 1978 | - | 0.200 | 0.259 | 0.296 | 0.339 | 0.347 | 0.379 | 0.416 | 0.396 | 0.447 |
| 1979 | - | 0.215 | 0.266 | 0.307 | 0.332 | 0.384 | 0.401 | 0.417 | 0.434 | 0.452 |
| 1980 | 0.212 | 0.205 | 0.239 | 0.296 | 0.308 | 0.289 | 0.319 | 0.362 | 0.376 | - |
| 1981 | 0.208 | 0.220 | 0.255 | 0.307 | 0.349 | 0.404 | 0.419 | 0.452 | 0.466 | 0.487 |
| 1982 | - | 0.226 | 0.271 | 0.304 | 0.344 | 0.384 | 0.425 | 0.425 | 0.439 | 0.447 |
| 1983 | - | 0.198 | 0.250 | 0.291 | 0.325 | 0.364 | 0.404 | 0.391 | 0.505 | 0.460 |
| 1984 | - | 0.232 | 0.255 | 0.295 | 0.340 | 0.356 | 0.398 | 0.434 | 0.391 | 0.507 |
| 1985 | - | 0.224 | 0.230 | 0.297 | 0.343 | 0.373 | 0.391 | 0.414 | 0.454 | 0.563 |
| 1986 | - | 0.216 | 0.265 | 0.303 | 0.333 | 0.376 | 0.396 | 0.407 | 0.446 | 0.452 |
| 1987 | 0.174 | 0.237 | 0.252 | 0.289 | 0.323 | 0.355 | 0.380 | 0.400 | 0.415 | 0.437 |
| 1988 | - | 0.212 | 0.260 | 0.285 | 0.311 | 0.341 | 0.367 | 0.393 | 0.389 | 0.421 |
| 1989 | - | 0.223 | 0.256 | 0.295 | 0.327 | 0.352 | 0.377 | 0.391 | 0.420 | 0.427 |
| 1990 | 0.148 | 0.198 | 0.248 | 0.287 | 0.325 | 0.350 | 0.368 | 0.388 | 0.408 | 0.435 |
| 1991 | - | 0.196 | 0.230 | 0.263 | 0.299 | 0.330 | 0.350 | 0.364 | 0.362 | 0.398 |
| 1992 | - | 0.200 | 0.229 | 0.258 | 0.283 | 0.312 | 0.345 | 0.355 | 0.363 | 0.409 |
| 1993 | - | 0.172 | 0.219 | 0.239 | 0.265 | 0.291 | 0.330 | 0.347 | 0.326 | 0.360 |
| 1994 | - | - | 0.209 | 0.237 | 0.257 | 0.288 | 0.315 | 0.348 | 0.353 | 0.400 |
| 1995 | - | 0.187 | 0.205 | 0.227 | 0.247 | 0.282 | 0.302 | 0.333 | 0.361 | 0.386 |
| 1996 | - | - | 0.221 | 0.244 | 0.258 | 0.281 | 0.306 | 0.329 | 0.376 | 0.426 |
| 1997 | - | 0.191 | 0.206 | 0.236 | 0.260 | 0.275 | 0.308 | 0.337 | 0.351 | 0.403 |
| 1998 | - | 0.149 | 0.209 | 0.232 | 0.258 | 0.286 | 0.293 | 0.330 | 0.355 | 0.362 |
| 1999 | - | 0.166 | 0.212 | 0.237 | 0.250 | 0.279 | 0.301 | 0.327 | 0.370 | 0.362 |
| 2000 | - | 0.177 | 0.214 | 0.235 | 0.260 | 0.275 | 0.304 | 0.317 | 0.334 | 0.387 |
| 2001 | - | 0.172 | 0.211 | 0.237 | 0.255 | 0.282 | 0.305 | 0.330 | 0.347 | 0.371 |
| 2002 | 0.030 | 0.181 | 0.220 | 0.240 | 0.264 | 0.282 | 0.296 | 0.327 | 0.332 | 0.362 |

| Year | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11+ |
|---|---|---|---|---|---|---|---|---|---|---|
| 2003 | - | 0.158 | 0.209 | 0.238 | 0.255 | 0.278 | 0.296 | 0.313 | 0.333 | 0.351 |
| 2004 | - | 0.149 | 0.200 | 0.218 | 0.252 | 0.263 | 0.285 | 0.308 | 0.329 | 0.349 |
| 2005 | - | 0.188 | 0.196 | 0.225 | 0.240 | 0.260 | 0.285 | 0.296 | 0.296 | 0.313 |
| 2006 | - | 0.158 | 0.202 | 0.220 | 0.241 | 0.258 | 0.285 | 0.300 | 0.303 | 0.323 |
| 2007 | - | 0.156 | 0.197 | 0.204 | 0.225 | 0.242 | 0.254 | 0.290 | 0.292 | 0.317 |
| 2008 | - | 0.159 | 0.190 | 0.214 | 0.228 | 0.244 | 0.259 | 0.264 | 0.294 | 0.319 |
| 2009 | - | 0.156 | 0.190 | 0.202 | 0.233 | 0.251 | 0.261 | 0.258 | 0.282 | 0.279 |
| 2010 | - | - | 0.179 | 0.206 | 0.217 | 0.238 | 0.250 | 0.261 | 0.279 | 0.295 |
| 2011 | - | - | 0.184 | 0.197 | 0.216 | 0.222 | 0.258 | 0.263 | 0.265 | 0.298 |
| 2012 | - | 0.126 | 0.158 | 0.183 | 0.204 | 0.214 | 0.225 | 0.251 | 0.250 | 0.290 |
| 2013 | - | - | 0.171 | 0.195 | 0.205 | 0.215 | 0.231 | 0.242 | 0.286 | 0.285 |
| 2014 | - | 0.115 | 0.202 | 0.213 | 0.220 | 0.230 | 0.241 | 0.243 | 0.292 | 0.301 |
| 2015 | - | 0.105 | 0.173 | 0.200 | 0.212 | 0.227 | 0.229 | 0.241 | 0.225 | 0.268 |
| 2016 | - | 0.158 | 0.176 | 0.198 | 0.212 | 0.215 | 0.223 | 0.236 | 0.239 | 0.241 |
| 2017 | - | - | 0.182 | 0.190 | 0.205 | 0.221 | 0.227 | 0.238 | 0.254 | 0.270 |
| 2018 | - | - | 0.111 | 0.201 | 0.203 | 0.210 | 0.226 | 0.232 | 0.247 | 0.271 |
| 2019 | - | - | 0.168 | 0.198 | 0.203 | 0.215 | 0.222 | 0.229 | 0.239 | 0.258 |
| 2020 | - | - | 0.165 | 0.183 | 0.206 | 0.215 | 0.225 | 0.229 | 0.244 | 0.267 |
| 2021 | - | - | 0.196 | 0.207 | 0.221 | 0.229 | 0.240 | 0.248 | 0.250 | 0.293 |
| 2022 | - | 0.154 | 0.178 | 0.193 | 0.205 | 0.207 | 0.220 | 0.231 | 0.235 | 0.246 |
| 2023 | - | 0.134 | 0.164 | 0.181 | 0.194 | 0.211 | 0.212 | 0.225 | 0.232 | 0.229 |
| **b) MIDDLE** | | | | | | | | | | |
| 1978 | - | 0.200 | 0.259 | 0.261 | 0.305 | 0.279 | 0.363 | 0.416 | 0.313 | 0.410 |
| 1979 | - | 0.183 | 0.224 | 0.269 | 0.278 | 0.315 | 0.369 | 0.420 | 0.419 | 0.458 |
| 1980 | - | 0.244 | 0.249 | 0.353 | 0.384 | 0.354 | 0.390 | 0.546 | 0.504 | 0.510 |
| 1981 | - | 0.220 | 0.255 | 0.294 | 0.344 | 0.360 | 0.393 | 0.501 | 0.473 | 0.439 |
| 1982 | - | 0.247 | 0.270 | 0.305 | 0.330 | 0.424 | 0.449 | - | - | 0.499 |

| Year | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11+ |
|---|---|---|---|---|---|---|---|---|---|---|
| 1983 | - | 0.183 | 0.217 | 0.263 | 0.302 | 0.340 | 0.430 | - | - | - |
| 1984 | - | 0.224 | 0.227 | 0.253 | 0.301 | 0.344 | 0.397 | 0.433 | 0.484 | 0.54 |
| 1985 | - | 0.224 | 0.259 | 0.302 | 0.331 | 0.369 | 0.391 | 0.414 | 0.454 | 0.563 |
| 1986 | - | 0.194 | 0.209 | 0.244 | 0.276 | 0.347 | 0.397 | 0.407 | 0.446 | 0.453 |
| 1987 | - | 0.249 | 0.230 | 0.261 | 0.229 | 0.326 | 0.296 | 0.361 | 0.249 | 0.402 |
| 1988 | - | 0.234 | 0.282 | 0.305 | 0.357 | 0.362 | 0.413 | 0.439 | 0.366 | 0.420 |
| 1989 | - | 0.224 | 0.249 | 0.278 | 0.324 | 0.336 | 0.336 | 0.384 | 0.410 | 0.419 |
| 1990 | - | 0.194 | 0.236 | 0.284 | 0.324 | 0.342 | 0.355 | 0.365 | 0.404 | 0.431 |
| 1991 | - | 0.185 | 0.233 | 0.262 | 0.272 | 0.348 | 0.348 | 0.364 | 0.395 | 0.406 |
| 1992 | - | 0.199 | 0.219 | 0.241 | 0.269 | 0.285 | 0.328 | 0.348 | 0.358 | 0.412 |
| 1993 | - | - | 0.218 | 0.242 | 0.263 | 0.263 | 0.321 | 0.341 | 0.354 | 0.387 |
| 1994 | - | - | 0.213 | 0.243 | 0.270 | 0.294 | 0.309 | 0.328 | 0.399 | 0.427 |
| 1995 | - | - | 0.222 | 0.244 | 0.255 | 0.280 | 0.286 | 0.341 | 0.358 | 0.385 |
| 1996 | - | - | 0.226 | 0.250 | 0.261 | 0.304 | 0.310 | 0.318 | 0.393 | 0.432 |
| 1997 | - | 0.174 | 0.206 | 0.235 | 0.247 | 0.256 | 0.295 | 0.320 | 0.314 | 0.387 |
| 1998 | - | 0.176 | 0.219 | 0.234 | 0.265 | 0.286 | 0.279 | 0.336 | 0.343 | 0.388 |
| 1999 | - | - | 0.210 | 0.237 | 0.245 | 0.275 | 0.296 | 0.283 | 0.351 | 0.362 |
| 2000 | - | 0.111 | 0.214 | 0.234 | 0.260 | 0.273 | 0.300 | 0.318 | 0.311 | 0.366 |
| 2001 | - | 0.168 | 0.205 | 0.233 | 0.254 | 0.277 | 0.290 | 0.303 | - | 0.308 |
| 2002 | - | 0.191 | 0.219 | 0.244 | 0.257 | 0.288 | 0.293 | 0.330 | 0.330 | 0.314 |
| 2003 | - | 0.170 | 0.209 | 0.234 | 0.260 | 0.275 | 0.301 | 0.312 | 0.359 | 0.390 |
| 2004 | - | 0.146 | 0.208 | 0.229 | 0.248 | 0.268 | 0.286 | 0.310 | 0.305 | 0.362 |
| 2005 | - | - | 0.200 | 0.227 | 0.240 | 0.266 | 0.285 | 0.303 | 0.309 | 0.430 |
| 2006 | - | - | 0.197 | 0.224 | 0.245 | 0.260 | 0.279 | 0.297 | 0.310 | 0.317 |
| 2007 | - | 0.155 | 0.196 | 0.211 | 0.228 | 0.244 | 0.257 | 0.275 | 0.281 | 0.310 |
| 2008 | - | 0.120 | 0.169 | 0.206 | 0.220 | 0.236 | 0.242 | 0.252 | 0.272 | 0.300 |
| 2009 | - | 0.156 | 0.180 | 0.201 | 0.234 | 0.239 | 0.260 | 0.270 | 0.268 | 0.287 |

| Year | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11+ |
|---|---|---|---|---|---|---|---|---|---|---|
| 2010 | - | 0.139 | 0.176 | 0.201 | 0.213 | 0.228 | 0.246 | 0.255 | 0.274 | 0.269 |
| 2011 | - | 0.104 | 0.175 | 0.197 | 0.215 | 0.226 | 0.231 | 0.264 | 0.266 | 0.283 |
| 2012 | - | 0.115 | 0.153 | 0.181 | 0.199 | 0.212 | 0.218 | 0.241 | 0.262 | 0.280 |
| 2013 | - | 0.131 | 0.156 | 0.194 | 0.197 | 0.213 | 0.227 | 0.232 | 0.251 | 0.284 |
| 2014 | - | - | 0.168 | 0.196 | 0.207 | 0.215 | 0.229 | 0.237 | 0.242 | 0.254 |
| 2015 | - | - | 0.195 | 0.216 | 0.211 | 0.227 | 0.229 | 0.245 | 0.247 | - |
| 2016 | - | 0.129 | 0.182 | 0.220 | 0.226 | 0.232 | 0.240 | 0.247 | 0.259 | - |
| 2017 | - | 0.134 | 0.174 | 0.200 | 0.212 | 0.213 | 0.225 | 0.234 | 0.251 | 0.289 |
| 2018 | - | - | 0.178 | 0.190 | 0.209 | 0.222 | 0.227 | 0.226 | 0.232 | - |
| 2019 | - | - | 0.172 | 0.179 | 0.201 | 0.209 | 0.222 | 0.225 | 0.238 | 0.248 |
| 2020 | - | - | 0.159 | 0.192 | 0.202 | 0.215 | 0.227 | 0.237 | 0.248 | 0.258 |
| 2021 | - | 0.159 | 0.166 | 0.199 | 0.210 | 0.219 | 0.229 | 0.234 | 0.251 | 0.261 |
| 2022 | - | 0.155 | 0.168 | 0.187 | 0.207 | 0.207 | 0.219 | 0.227 | 0.235 | 0.251 |
| 2023 | - | 0.152 | 0.169 | 0.182 | 0.203 | 0.213 | 0.220 | 0.230 | 0.232 | 0.238 |
| **c) SOUTH** | | | | | | | | | | |
| 1978 | 0.077 | 0.133 | 0.192 | 0.228 | 0.236 | 0.295 | 0.318 | 0.331 | - | 0.338 |
| 1979 | 0.132 | 0.186 | 0.243 | 0.277 | 0.314 | 0.357 | 0.387 | 0.417 | 0.430 | 0.358 |
| 1980 | 0.212 | 0.205 | 0.245 | 0.297 | 0.315 | 0.324 | 0.340 | 0.358 | 0.397 | 0.351 |
| 1981 | 0.156 | 0.220 | 0.271 | 0.329 | 0.381 | 0.416 | 0.422 | 0.448 | 0.469 | 0.488 |
| 1982 | - | 0.210 | 0.263 | 0.297 | 0.330 | 0.371 | 0.360 | 0.391 | 0.357 | 0.404 |
| 1983 | - | 0.195 | 0.245 | 0.278 | 0.299 | 0.333 | 0.359 | 0.368 | 0.398 | 0.418 |
| 1984 | - | 0.212 | 0.242 | 0.282 | 0.304 | 0.339 | 0.400 | 0.405 | 0.406 | 0.496 |
| 1985 | - | 0.197 | 0.248 | 0.281 | 0.314 | 0.346 | 0.368 | 0.404 | 0.417 | 0.445 |
| 1986 | 0.175 | 0.189 | 0.240 | 0.277 | 0.311 | 0.343 | 0.361 | 0.385 | 0.427 | 0.348 |
| 1987 | - | 0.230 | 0.241 | 0.276 | 0.312 | 0.333 | 0.361 | 0.378 | 0.385 | 0.429 |
| 1988 | - | 0.226 | 0.246 | 0.287 | 0.322 | 0.352 | 0.381 | 0.403 | 0.416 | 0.446 |
| 1989 | - | 0.171 | 0.234 | 0.262 | 0.312 | 0.331 | 0.373 | 0.390 | 0.391 | 0.440 |

| Year | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11+ |
|---|---|---|---|---|---|---|---|---|---|---|
| 1990 | - | 0.192 | 0.240 | 0.277 | 0.325 | 0.347 | 0.372 | 0.398 | 0.410 | 0.428 |
| 1991 | - | 0.176 | 0.235 | 0.262 | 0.292 | 0.335 | 0.356 | 0.369 | 0.392 | 0.420 |
| 1992 | - | - | 0.215 | 0.252 | 0.280 | 0.287 | 0.338 | 0.344 | 0.368 | 0.388 |
| 1993 | - | - | 0.224 | 0.245 | 0.262 | 0.268 | 0.323 | 0.357 | 0.366 | 0.411 |
| 1994 | - | - | 0.212 | 0.222 | 0.258 | 0.284 | 0.322 | 0.331 | 0.360 | 0.376 |
| 1995 | 0.103 | 0.135 | 0.215 | 0.227 | 0.258 | 0.275 | 0.298 | 0.335 | 0.356 | 0.383 |
| 1996 | - | 0.172 | 0.217 | 0.244 | 0.254 | 0.278 | 0.306 | 0.322 | 0.347 | 0.386 |
| 1997 | - | 0.165 | 0.203 | 0.232 | 0.271 | 0.279 | 0.320 | 0.323 | 0.342 | 0.399 |
| 1998 | - | - | 0.211 | 0.237 | 0.257 | 0.283 | 0.296 | 0.319 | 0.331 | 0.369 |
| 1999 | - | 0.161 | 0.209 | 0.236 | 0.253 | 0.269 | 0.300 | 0.306 | 0.344 | 0.346 |
| 2000 | - | 0.150 | 0.203 | 0.227 | 0.256 | 0.281 | 0.300 | 0.326 | 0.329 | 0.360 |
| 2001 | - | 0.160 | 0.209 | 0.230 | 0.248 | 0.270 | 0.291 | 0.306 | 0.336 | 0.301 |
| 2002 | - | - | 0.212 | 0.229 | 0.245 | 0.266 | 0.282 | 0.297 | 0.308 | 0.333 |
| 2003 | - | 0.169 | 0.203 | 0.227 | 0.247 | 0.259 | 0.278 | 0.302 | 0.306 | 0.327 |
| 2004 | - | - | 0.206 | 0.224 | 0.237 | 0.254 | 0.282 | 0.282 | 0.303 | 0.308 |
| 2005 | - | 0.188 | 0.194 | 0.219 | 0.234 | 0.245 | 0.257 | 0.272 | 0.286 | 0.307 |
| 2006 | - | 0.169 | 0.190 | 0.215 | 0.231 | 0.249 | 0.257 | 0.276 | 0.279 | 0.299 |
| 2007 | - | 0.146 | 0.163 | 0.200 | 0.218 | 0.234 | 0.242 | 0.250 | 0.258 | 0.265 |
| 2008 | 0.093 | 0.138 | 0.160 | 0.206 | 0.214 | 0.227 | 0.237 | 0.248 | 0.257 | 0.271 |
| 2009 | - | 0.143 | 0.186 | 0.201 | 0.228 | 0.246 | 0.260 | 0.274 | 0.268 | 0.267 |
| 2010 | - | 0.107 | 0.161 | 0.205 | 0.214 | 0.241 | 0.257 | 0.264 | 0.281 | 0.296 |
| 2011 | - | 0.111 | 0.146 | 0.176 | 0.204 | 0.217 | 0.249 | 0.257 | 0.258 | 0.269 |
| 2012 | - | - | 0.150 | 0.170 | 0.193 | 0.216 | 0.221 | 0.239 | 0.272 | 0.265 |
| 2013 | - | 0.137 | 0.146 | 0.179 | 0.194 | 0.210 | 0.220 | 0.226 | 0.254 | 0.259 |
| 2014 | - | - | 0.157 | 0.175 | 0.200 | 0.201 | 0.213 | 0.237 | 0.231 | 0.276 |
| 2015 | - | 0.151 | 0.165 | 0.170 | 0.195 | 0.194 | 0.210 | 0.232 | 0.218 | 0.256 |
| 2016 | - | 0.120 | 0.161 | 0.208 | 0.206 | 0.214 | 0.220 | 0.237 | 0.236 | 0.261 |

| Year | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11+ |
|---|---|---|---|---|---|---|---|---|---|---|
| 2017 | - | 0.126 | 0.168 | 0.171 | 0.201 | 0.208 | 0.214 | 0.222 | 0.248 | 0.240 |
| 2018 | - | - | 0.129 | 0.156 | 0.171 | 0.189 | 0.199 | 0.216 | 0.229 | 0.246 |
| 2019 | - | - | 0.164 | 0.171 | 0.189 | 0.196 | 0.205 | 0.210 | 0.220 | 0.225 |
| 2020 | - | - | - | 0.191 | 0.192 | 0.210 | 0.218 | 0.232 | 0.240 | 0.250 |
| 2021 | - | - | 0.160 | 0.188 | 0.207 | 0.215 | 0.222 | 0.235 | 0.250 | 0.244 |
| 2022 | - | - | 0.174 | 0.195 | 0.200 | 0.216 | 0.215 | 0.227 | 0.228 | 0.221 |
| 2023 | - | 0.132 | 0.154 | 0.164 | 0.184 | 0.209 | 0.215 | 0.220 | 0.227 | 0.222 |

*Table 8. Spring spawner catch-at-age (thousands) for mobile gear in the 4T Herring fishery.*

| Year | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11+ | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1978 | 14,933 | 3,664 | 24,366 | 3,053 | 4,619 | 1,293 | 734 | 565 | 2,877 | 599 | 58,094 |
| 1979 | 14,535 | 4,553 | 4,800 | 25,926 | 4,014 | 6,971 | 2,139 | 1,638 | 1,501 | 12,300 | 90,020 |
| 1980 | 11,101 | 10,404 | 1,790 | 1,878 | 11,154 | 8,852 | 4,207 | 2,229 | 751 | 286 | 53,389 |
| 1981 | 362 | 1,105 | 939 | 9 | 881 | 347 | 699 | 264 | 417 | 7 | 5,031 |
| 1982 | 2,343 | 3,816 | 400 | 53 | 10 | 89 | 165 | 210 | 2 | 19 | 7,109 |
| 1983 | 1,349 | 8,017 | 3,838 | 449 | 1 | 65 | 71 | 89 | 0 | 0 | 13,878 |
| 1984 | 619 | 1,831 | 4,190 | 2,901 | 291 | 0 | 71 | 41 | 0 | 0 | 9,943 |
| 1985 | 1,132 | 4,581 | 2,451 | 3,085 | 1,153 | 77 | 0 | 0 | 0 | 294 | 13,372 |
| 1986 | 4,194 | 3,982 | 9,552 | 7,647 | 7,410 | 3,070 | 212 | 514 | 0 | 60 | 36,641 |
| 1987 | 1,476 | 1,977 | 2,944 | 10,494 | 7,260 | 7,060 | 3,696 | 0 | 0 | 93 | 35,001 |
| 1988 | 6,285 | 2,123 | 1,545 | 2,729 | 11,772 | 9,514 | 5,400 | 2,434 | 0 | 2,156 | 46,666 |
| 1989 | 425 | 2,982 | 4,949 | 1,644 | 4,682 | 10,289 | 4,223 | 2,285 | 430 | 118 | 32,401 |
| 1990 | 5,182 | 6,250 | 7,301 | 4,236 | 2,645 | 1,504 | 5,841 | 2,964 | 737 | 318 | 37,024 |
| 1991 | 1,825 | 9,393 | 3,064 | 2,640 | 1,271 | 654 | 1,000 | 890 | 653 | 1,307 | 22,730 |
| 1992 | 860 | 2,808 | 7,350 | 3,461 | 2,489 | 707 | 448 | 790 | 527 | 453 | 19,896 |
| 1993 | 3,094 | 2,374 | 6,698 | 5,404 | 2,662 | 1,577 | 974 | 1,309 | 902 | 2,288 | 27,316 |
| 1994 | 52 | 4,057 | 2,255 | 3,477 | 5,930 | 2,435 | 1,349 | 647 | 166 | 1,251 | 21,620 |
| 1995 | 1,418 | 1,588 | 17,082 | 5,809 | 4,899 | 7,749 | 1,675 | 1,024 | 280 | 1,708 | 43,231 |

| Year | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11+ | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1996 | 385 | 2,942 | 919 | 11,291 | 3,589 | 2,107 | 1,965 | 370 | 388 | 138 | 24,101 |
| 1997 | 419 | 1,405 | 3,457 | 1,246 | 7,719 | 911 | 1,610 | 1,444 | 146 | 466 | 18,906 |
| 1998 | 298 | 796 | 1,930 | 1,524 | 213 | 1,767 | 461 | 337 | 373 | 254 | 7,959 |
| 1999 | 1,769 | 2,840 | 4,853 | 3,057 | 1,516 | 934 | 2,951 | 988 | 480 | 580 | 20,234 |
| 2000 | 1,314 | 3,254 | 3,739 | 1,485 | 891 | 354 | 305 | 491 | 70 | 92 | 12,290 |
| 2001 | 4,258 | 3,721 | 4,853 | 2,521 | 1,130 | 1,157 | 448 | 195 | 288 | 148 | 19,276 |
| 2002 | 744 | 3,135 | 1,060 | 729 | 195 | 554 | 109 | 42 | 7 | 42 | 6,671 |
| 2003 | 209 | 654 | 869 | 327 | 279 | 270 | 9 | 5 | 40 | 22 | 2,709 |
| 2004 | 487 | 825 | 433 | 360 | 135 | 234 | 17 | 10 | 1 | 17 | 2,621 |
| 2005 | 1,816 | 1,864 | 2,571 | 259 | 336 | 52 | 0 | 71 | 0 | 0 | 7,340 |
| 2006 | 236 | 898 | 521 | 1,824 | 620 | 138 | 24 | 6 | 5 | 0 | 4,333 |
| 2007 | 3,651 | 3,605 | 2,396 | 1,786 | 2,368 | 700 | 256 | 15 | 0 | 113 | 15,414 |
| 2008 | 3,474 | 1,887 | 765 | 1,209 | 587 | 775 | 137 | 93 | 16 | 28 | 9,239 |
| 2009 | 441 | 1,670 | 227 | 171 | 172 | 441 | 17 | 0 | 173 | 38 | 3,358 |
| 2010 | 116 | 406 | 941 | 506 | 713 | 634 | 74 | 8 | 0 | 1 | 3,398 |
| 2011 | 629 | 814 | 669 | 682 | 577 | 576 | 73 | 106 | 356 | 23 | 4,524 |
| 2012 | 17 | 404 | 454 | 279 | 237 | 169 | 9 | 33 | 0 | 21 | 1,624 |
| 2013 | 124 | 271 | 891 | 1,136 | 697 | 623 | 282 | 41 | 0 | 18 | 4,085 |
| 2014 | 460 | 199 | 537 | 391 | 896 | 489 | 260 | 16 | 36 | 47 | 3,328 |
| 2015 | 564 | 560 | 206 | 270 | 554 | 864 | 457 | 190 | 22 | 17 | 3,704 |
| 2016 | 271 | 495 | 138 | 91 | 41 | 114 | 38 | 86 | 0 | 0 | 1,274 |
| 2017 | 102 | 102 | 140 | 18 | 2 | 5 | 1 | 0 | 0 | 0 | 427 |
| 2018 | 0 | 58 | 325 | 660 | 128 | 176 | 268 | 101 | 0 | 0 | 1,715 |
| 2019 | 0 | 43 | 687 | 542 | 1,469 | 258 | 100 | 49 | 0 | 0 | 3,147 |
| 2020 | 11 | 363 | 422 | 302 | 263 | 389 | 52 | 6 | 5 | 4 | 1,823 |
| 2021 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2022 | 0 | 3 | 10 | 7 | 8 | 6 | 4 | 2 | 0 | 0 | 41 |

*Table 9. Spring spawner weight-at-age (kg) for mobile gear in the 4T Herring fishery.*

| Year | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11+ |
|---|---|---|---|---|---|---|---|---|---|---|
| 1978 | 0.131 | 0.182 | 0.262 | 0.248 | 0.281 | 0.301 | 0.308 | 0.352 | 0.381 | 0.389 |
| 1979 | 0.173 | 0.193 | 0.212 | 0.261 | 0.259 | 0.303 | 0.305 | 0.340 | 0.342 | 0.364 |
| 1980 | 0.158 | 0.165 | 0.217 | 0.262 | 0.273 | 0.258 | 0.264 | 0.275 | 0.364 | 0.341 |
| 1981 | 0.158 | 0.203 | 0.274 | 0.272 | 0.425 | 0.306 | 0.284 | 0.290 | 0.316 | 0.417 |
| 1982 | 0.133 | 0.225 | 0.266 | 0.253 | 0.315 | 0.463 | 0.308 | 0.339 | 0.436 | 0.450 |
| 1983 | 0.145 | 0.188 | 0.231 | 0.278 | 0.270 | 0.315 | 0.243 | 0.411 | 0.000 | 0.000 |
| 1984 | 0.121 | 0.192 | 0.229 | 0.262 | 0.291 | 0.299 | 0.380 | 0.351 | 0.375 | 0.000 |
| 1985 | 0.137 | 0.221 | 0.244 | 0.297 | 0.313 | 0.384 | 0.000 | 0.000 | 0.000 | 0.384 |
| 1986 | 0.144 | 0.196 | 0.249 | 0.283 | 0.315 | 0.339 | 0.349 | 0.315 | 0.000 | 0.392 |
| 1987 | 0.156 | 0.189 | 0.251 | 0.304 | 0.332 | 0.359 | 0.375 | 0.000 | 0.000 | 0.527 |
| 1988 | 0.115 | 0.176 | 0.251 | 0.301 | 0.337 | 0.339 | 0.393 | 0.412 | 0.000 | 0.442 |
| 1989 | 0.141 | 0.212 | 0.258 | 0.270 | 0.312 | 0.343 | 0.363 | 0.385 | 0.411 | 0.466 |
| 1990 | 0.173 | 0.197 | 0.246 | 0.280 | 0.294 | 0.333 | 0.342 | 0.352 | 0.409 | 0.363 |
| 1991 | 0.143 | 0.181 | 0.215 | 0.248 | 0.264 | 0.322 | 0.334 | 0.357 | 0.349 | 0.401 |
| 1992 | 0.117 | 0.148 | 0.200 | 0.241 | 0.272 | 0.292 | 0.323 | 0.327 | 0.338 | 0.385 |
| 1993 | 0.109 | 0.152 | 0.179 | 0.195 | 0.235 | 0.252 | 0.290 | 0.281 | 0.311 | 0.347 |
| 1994 | 0.145 | 0.156 | 0.188 | 0.207 | 0.234 | 0.258 | 0.269 | 0.274 | 0.316 | 0.330 |
| 1995 | 0.105 | 0.146 | 0.182 | 0.202 | 0.226 | 0.247 | 0.278 | 0.303 | 0.314 | 0.315 |
| 1996 | 0.116 | 0.169 | 0.205 | 0.224 | 0.233 | 0.246 | 0.276 | 0.324 | 0.300 | 0.378 |
| 1997 | 0.124 | 0.155 | 0.192 | 0.209 | 0.249 | 0.271 | 0.287 | 0.308 | 0.329 | 0.326 |
| 1998 | 0.109 | 0.145 | 0.171 | 0.217 | 0.203 | 0.248 | 0.263 | 0.279 | 0.296 | 0.402 |
| 1999 | 0.118 | 0.156 | 0.187 | 0.232 | 0.265 | 0.277 | 0.294 | 0.309 | 0.317 | 0.319 |
| 2000 | 0.131 | 0.159 | 0.186 | 0.219 | 0.247 | 0.277 | 0.292 | 0.294 | 0.284 | 0.332 |
| 2001 | 0.118 | 0.149 | 0.190 | 0.209 | 0.242 | 0.256 | 0.296 | 0.327 | 0.330 | 0.323 |
| 2002 | 0.106 | 0.149 | 0.176 | 0.206 | 0.213 | 0.251 | 0.281 | 0.288 | 0.287 | 0.329 |
| 2003 | 0.099 | 0.141 | 0.177 | 0.199 | 0.238 | 0.251 | 0.282 | 0.291 | 0.295 | 0.330 |
| 2004 | 0.110 | 0.146 | 0.162 | 0.209 | 0.231 | 0.251 | 0.300 | 0.314 | 0.290 | 0.367 |

| Year | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11+ |
|---|---|---|---|---|---|---|---|---|---|---|
| 2005 | 0.120 | 0.145 | 0.163 | 0.188 | 0.210 | 0.197 | 0.000 | 0.261 | 0.000 | 0.000 |
| 2006 | 0.110 | 0.145 | 0.171 | 0.179 | 0.203 | 0.234 | 0.300 | 0.350 | 0.286 | 0.000 |
| 2007 | 0.118 | 0.145 | 0.177 | 0.181 | 0.197 | 0.191 | 0.213 | 0.300 | 0.000 | 0.198 |
| 2008 | 0.128 | 0.141 | 0.182 | 0.199 | 0.207 | 0.222 | 0.245 | 0.230 | 0.349 | 0.253 |
| 2009 | 0.116 | 0.139 | 0.191 | 0.195 | 0.210 | 0.172 | 0.236 | 0.000 | 0.201 | 0.212 |
| 2010 | 0.109 | 0.134 | 0.162 | 0.167 | 0.200 | 0.211 | 0.241 | 0.255 | 0.000 | 0.269 |
| 2011 | 0.083 | 0.122 | 0.124 | 0.174 | 0.169 | 0.199 | 0.210 | 0.191 | 0.164 | 0.192 |
| 2012 | 0.083 | 0.123 | 0.151 | 0.177 | 0.184 | 0.219 | 0.242 | 0.215 | 0.000 | 0.236 |
| 2013 | 0.100 | 0.128 | 0.149 | 0.171 | 0.182 | 0.202 | 0.218 | 0.227 | 0.000 | 0.286 |
| 2014 | 0.097 | 0.124 | 0.149 | 0.171 | 0.181 | 0.180 | 0.206 | 0.248 | 0.210 | 0.207 |
| 2015 | 0.105 | 0.116 | 0.140 | 0.158 | 0.183 | 0.194 | 0.188 | 0.249 | 0.268 | 0.281 |
| 2016 | 0.104 | 0.123 | 0.142 | 0.156 | 0.160 | 0.185 | 0.211 | 0.195 | 0.000 | 0.000 |
| 2017 | 0.108 | 0.126 | 0.130 | 0.137 | 0.178 | 0.151 | 0.194 | 0.240 | 0.000 | 0.000 |
| 2018 | 0.000 | 0.125 | 0.128 | 0.153 | 0.154 | 0.176 | 0.167 | 0.170 | 0.000 | 0.000 |
| 2019 | 0.000 | 0.135 | 0.140 | 0.154 | 0.174 | 0.183 | 0.197 | 0.230 | 0.306 | 0.000 |
| 2020 | 0.104 | 0.130 | 0.133 | 0.157 | 0.176 | 0.190 | 0.191 | 0.224 | 0.252 | 0.238 |
| 2021 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| 2022 | 0.000 | 0.150 | 0.158 | 0.164 | 0.170 | 0.167 | 0.192 | 0.204 | 0.000 | 0.000 |

*Table 10. Fall spawner catch-at-age (thousands) for mobile gear in the 4T Herring fishery, by region: a) North, b) Middle, c) South.*

| Year | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11+ | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **a) NORTH** | | | | | | | | | | | |
| 1978 | 0 | 216 | 3,414 | 2,450 | 510 | 432 | 2,709 | 50 | 81 | 1,189 | 11,050 |
| 1979 | 0 | 168 | 3,271 | 1,465 | 1,260 | 256 | 644 | 531 | 252 | 267 | 8,113 |
| 1980 | 26 | 3,056 | 1,471 | 1,648 | 233 | 1,154 | 129 | 110 | 147 | 0 | 7,974 |
| 1981 | 23 | 3,963 | 12,839 | 2,839 | 593 | 240 | 278 | 53 | 99 | 60 | 20,988 |
| 1982 | 0 | 1,726 | 5,625 | 11,797 | 1,746 | 331 | 202 | 64 | 40 | 62 | 21,593 |
| 1983 | 0 | 98 | 9,238 | 3,748 | 9,002 | 1,018 | 413 | 96 | 16 | 102 | 23,731 |

| Year | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11+ | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1984 | 0 | 453 | 7,434 | 6,808 | 3,462 | 3,133 | 556 | 113 | 108 | 71 | 22,140 |
| 1985 | 0 | 99 | 2,878 | 13,139 | 8,176 | 4,901 | 4,915 | 1,832 | 372 | 6 | 36,318 |
| 1986 | 0 | 617 | 9,919 | 9,734 | 21,934 | 15,361 | 7,286 | 3,326 | 447 | 770 | 69,393 |
| 1987 | 16 | 7,260 | 24,248 | 14,636 | 13,277 | 19,804 | 9,068 | 5,494 | 2,412 | 759 | 96,973 |
| 1988 | 0 | 152 | 14,470 | 24,858 | 9,543 | 8,464 | 7,752 | 4,121 | 1,998 | 1,953 | 73,312 |
| 1989 | 0 | 283 | 12,133 | 19,801 | 21,160 | 10,289 | 4,716 | 5,928 | 2,655 | 2,118 | 79,082 |
| 1990 | 14 | 2,351 | 13,755 | 12,558 | 19,492 | 20,685 | 7,816 | 5,478 | 5,759 | 4,141 | 92,049 |
| 1991 | 0 | 131 | 28,732 | 7,306 | 5,390 | 7,996 | 7,653 | 2,463 | 1,539 | 2,511 | 63,722 |
| 1992 | 0 | 11 | 6,153 | 37,343 | 10,677 | 6,225 | 6,775 | 5,961 | 2,872 | 5,423 | 81,439 |
| 1993 | 0 | 82 | 2,051 | 21,080 | 24,447 | 3,430 | 1,918 | 1,975 | 559 | 712 | 56,254 |
| 1994 | 0 | 0 | 6,553 | 10,533 | 31,557 | 47,626 | 9,076 | 7,049 | 3,228 | 5,404 | 121,028 |
| 1995 | 0 | 23 | 3,298 | 23,949 | 11,096 | 26,765 | 28,407 | 4,969 | 3,188 | 3,483 | 105,177 |
| 1996 | 0 | 0 | 12,767 | 15,443 | 20,775 | 4,565 | 8,681 | 9,465 | 1,341 | 1,561 | 74,598 |
| 1997 | 0 | 367 | 8,897 | 30,662 | 9,453 | 8,423 | 1,621 | 2,817 | 2,524 | 732 | 65,496 |
| 1998 | 0 | 37 | 8,752 | 23,986 | 22,898 | 5,734 | 5,461 | 787 | 1,272 | 2,305 | 71,232 |
| 1999 | 0 | 175 | 19,794 | 23,825 | 29,631 | 10,527 | 2,083 | 1,327 | 362 | 517 | 88,242 |
| 2000 | 0 | 266 | 17,184 | 56,056 | 14,915 | 6,279 | 3,445 | 668 | 493 | 224 | 99,531 |
| 2001 | 0 | 516 | 22,863 | 28,903 | 29,781 | 4,552 | 2,051 | 561 | 175 | 228 | 89,628 |
| 2002 | 1 | 212 | 21,279 | 23,278 | 16,324 | 8,777 | 2,292 | 682 | 471 | 187 | 73,503 |
| 2003 | 0 | 235 | 11,578 | 24,362 | 16,356 | 11,533 | 13,769 | 3,447 | 1,512 | 948 | 83,741 |
| 2004 | 0 | 1 | 23,784 | 17,748 | 8,619 | 5,219 | 4,049 | 2,776 | 638 | 433 | 63,268 |
| 2005 | 0 | 1 | 5,034 | 56,213 | 22,400 | 8,627 | 4,759 | 2,861 | 2,025 | 184 | 102,103 |
| 2006 | 0 | 5 | 6,092 | 37,842 | 36,714 | 5,458 | 1,549 | 2,922 | 1,127 | 602 | 92,313 |
| 2007 | 0 | 32 | 5,160 | 15,268 | 34,716 | 23,879 | 5,096 | 951 | 887 | 561 | 86,550 |
| 2008 | 0 | 403 | 18,423 | 11,717 | 18,718 | 15,180 | 14,670 | 1,778 | 598 | 865 | 82,352 |
| 2009 | 0 | 532 | 22,607 | 38,575 | 10,619 | 10,493 | 6,117 | 1,701 | 302 | 253 | 91,200 |
| 2010 | 0 | 0 | 3,121 | 26,685 | 23,029 | 7,969 | 5,320 | 4,186 | 1,708 | 199 | 72,217 |

| Year | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11+ | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2011 | 0 | 0 | 1,657 | 6,387 | 26,763 | 24,243 | 2,750 | 3,140 | 2,850 | 773 | 68,564 |
| 2012 | 0 | 8 | 156 | 8,609 | 17,648 | 26,305 | 11,746 | 2,365 | 2,749 | 954 | 70,539 |
| 2013 | 0 | 0 | 1,053 | 9,007 | 29,030 | 20,828 | 10,692 | 2,295 | 183 | 102 | 73,191 |
| 2014 | 0 | 0 | 91 | 4,454 | 9,817 | 24,496 | 11,276 | 7,629 | 100 | 60 | 57,924 |
| 2015 | 0 | 0 | 91 | 2,684 | 19,072 | 14,182 | 17,093 | 5,314 | 844 | 225 | 59,506 |
| 2016 | 0 | 23 | 1,288 | 5,314 | 14,491 | 17,913 | 12,473 | 3,986 | 1,870 | 318 | 57,678 |
| 2017 | 0 | 0 | 553 | 5,261 | 7,935 | 14,281 | 16,572 | 5,793 | 2,069 | 364 | 52,829 |
| 2018 | 0 | 0 | 0 | 849 | 10,205 | 12,361 | 9,637 | 4,674 | 1,679 | 201 | 39,606 |
| 2019 | 0 | 0 | 38 | 503 | 8,527 | 15,957 | 5,548 | 3,849 | 1,235 | 404 | 36,061 |
| 2020 | 0 | 0 | 153 | 579 | 2,079 | 10,049 | 8,069 | 5,047 | 1,298 | 192 | 27,466 |
| 2021 | 0 | 0 | 162 | 2,498 | 2,571 | 3,424 | 8,110 | 4,140 | 1,508 | 261 | 22,674 |
| 2022 | 0 | 2 | 137 | 664 | 4,538 | 3,795 | 3,731 | 5,327 | 3,760 | 972 | 22,927 |
| 2023 | 0 | 54 | 286 | 1,224 | 1,046 | 2,649 | 930 | 859 | 649 | 273 | 7,970 |
| **b) MIDDLE** | | | | | | | | | | | |
| 1978 | 0 | 38 | 601 | 749 | 220 | 442 | 2,005 | 9 | 59 | 1,139 | 5,262 |
| 1979 | 0 | 144 | 3,673 | 2,048 | 831 | 205 | 100 | 209 | 18 | 161 | 7,389 |
| 1980 | 0 | 424 | 964 | 2,283 | 579 | 271 | 225 | 282 | 107 | 96 | 5,232 |
| 1981 | 0 | 974 | 6,224 | 1,910 | 1,150 | 460 | 629 | 31 | 83 | 238 | 11,699 |
| 1982 | 0 | 29 | 1,653 | 1,559 | 210 | 139 | 116 | 0 | 0 | 31 | 3,737 |
| 1983 | 0 | 255 | 3,998 | 1,482 | 1,578 | 351 | 130 | 0 | 0 | 0 | 7,794 |
| 1984 | 0 | 41 | 1,908 | 2,723 | 937 | 1,001 | 315 | 77 | 11 | 6 | 7,019 |
| 1985 | 0 | 11 | 235 | 1,370 | 1,010 | 562 | 536 | 200 | 41 | 1 | 3,964 |
| 1986 | 0 | 47 | 1,600 | 1,328 | 2,455 | 1,120 | 435 | 200 | 27 | 46 | 7,257 |
| 1987 | 0 | 298 | 934 | 1,761 | 1,532 | 3,059 | 289 | 267 | 298 | 19 | 8,457 |
| 1988 | 0 | 817 | 3,091 | 2,817 | 2,473 | 1,135 | 1,189 | 886 | 15 | 0 | 12,424 |
| 1989 | 0 | 16 | 772 | 1,431 | 1,274 | 694 | 428 | 378 | 171 | 139 | 5,303 |
| 1990 | 0 | 219 | 1,923 | 1,390 | 1,508 | 2,655 | 548 | 382 | 298 | 64 | 8,987 |

| Year | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11+ | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1991 | 0 | 17 | 5,973 | 1,617 | 1,332 | 1,749 | 2,066 | 1,271 | 585 | 1,335 | 15,945 |
| 1992 | 0 | 12 | 3,880 | 9,415 | 1,284 | 534 | 304 | 220 | 106 | 249 | 16,004 |
| 1993 | 0 | 0 | 350 | 6,612 | 8,298 | 1,417 | 597 | 415 | 470 | 716 | 18,875 |
| 1994 | 0 | 0 | 850 | 1,373 | 6,908 | 9,293 | 1,134 | 359 | 439 | 741 | 21,099 |
| 1995 | 0 | 0 | 214 | 10,010 | 3,408 | 12,249 | 10,646 | 1,363 | 243 | 4,272 | 42,404 |
| 1996 | 0 | 0 | 3,414 | 2,107 | 12,096 | 1,046 | 3,144 | 3,605 | 833 | 869 | 27,113 |
| 1997 | 0 | 285 | 4,835 | 10,979 | 1,980 | 4,125 | 782 | 938 | 1,026 | 639 | 25,588 |
| 1998 | 0 | 23 | 5,113 | 4,301 | 8,730 | 1,761 | 3,286 | 596 | 1,293 | 2,229 | 27,332 |
| 1999 | 0 | 0 | 9,709 | 12,903 | 5,104 | 3,222 | 1,303 | 2,854 | 278 | 1,330 | 36,703 |
| 2000 | 0 | 13 | 11,054 | 21,136 | 7,789 | 2,516 | 1,394 | 414 | 369 | 165 | 44,850 |
| 2001 | 0 | 383 | 5,519 | 13,581 | 9,633 | 2,919 | 630 | 208 | 0 | 293 | 33,166 |
| 2002 | 0 | 275 | 9,081 | 8,110 | 7,171 | 6,936 | 1,245 | 171 | 145 | 216 | 33,352 |
| 2003 | 0 | 123 | 5,648 | 11,842 | 5,541 | 3,737 | 3,739 | 839 | 110 | 156 | 31,736 |
| 2004 | 0 | 15 | 5,579 | 10,122 | 7,144 | 5,096 | 4,523 | 2,652 | 920 | 175 | 36,226 |
| 2005 | 0 | 0 | 2,355 | 14,518 | 11,757 | 3,536 | 3,046 | 2,099 | 895 | 66 | 38,272 |
| 2006 | 0 | 0 | 1,697 | 7,740 | 13,789 | 5,094 | 2,598 | 1,949 | 1,544 | 523 | 34,934 |
| 2007 | 0 | 193 | 1,197 | 3,429 | 9,509 | 9,811 | 3,736 | 1,509 | 733 | 454 | 30,571 |
| 2008 | 0 | 1,426 | 12,175 | 2,575 | 4,491 | 5,326 | 8,514 | 1,536 | 1,451 | 332 | 37,825 |
| 2009 | 0 | 101 | 8,185 | 14,543 | 3,368 | 7,438 | 3,578 | 1,245 | 530 | 245 | 39,232 |
| 2010 | 0 | 8 | 1,529 | 11,467 | 17,000 | 4,954 | 4,333 | 2,473 | 1,154 | 644 | 43,562 |
| 2011 | 0 | 0 | 405 | 2,089 | 12,157 | 15,610 | 2,973 | 2,237 | 2,101 | 631 | 38,202 |
| 2012 | 0 | 7 | 147 | 1,935 | 8,679 | 11,646 | 8,142 | 925 | 526 | 443 | 32,450 |
| 2013 | 0 | 7 | 590 | 1,125 | 7,042 | 10,527 | 6,451 | 2,488 | 201 | 43 | 28,474 |
| 2014 | 0 | 0 | 41 | 4,663 | 1,923 | 8,176 | 6,541 | 1,529 | 487 | 0 | 23,362 |
| 2015 | 0 | 0 | 165 | 1,052 | 10,058 | 4,474 | 7,592 | 2,986 | 1,060 | 0 | 27,388 |
| 2016 | 0 | 18 | 279 | 1,227 | 7,869 | 6,459 | 3,603 | 1,610 | 570 | 0 | 21,634 |
| 2017 | 0 | 25 | 128 | 1,032 | 3,573 | 6,650 | 8,169 | 4,645 | 638 | 23 | 24,883 |

| Year | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11+ | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2018 | 0 | 0 | 76 | 712 | 2,951 | 7,465 | 5,674 | 557 | 302 | 0 | 17,737 |
| 2019 | 0 | 0 | 103 | 187 | 1,689 | 5,691 | 2,695 | 3,532 | 1,081 | 216 | 15,194 |
| 2020 | 0 | 0 | 29 | 265 | 460 | 2,674 | 3,059 | 1,900 | 1,185 | 685 | 10,256 |
| 2021 | 0 | 6 | 80 | 758 | 917 | 1,175 | 3,145 | 1,736 | 437 | 205 | 8,460 |
| 2022 | 0 | 2 | 24 | 56 | 270 | 231 | 403 | 545 | 288 | 89 | 1,909 |
| 2023 | 0 | 37 | 271 | 1,040 | 1,450 | 1,525 | 1,145 | 870 | 559 | 225 | 7,123 |
| **c) SOUTH** | | | | | | | | | | | |
| 1978 | 41 | 1,988 | 1,390 | 632 | 154 | 75 | 119 | 22 | 0 | 13 | 4,434 |
| 1979 | 16 | 267 | 4,634 | 2,198 | 773 | 263 | 292 | 175 | 52 | 205 | 9,785 |
| 1980 | 38 | 4,404 | 1,939 | 2,352 | 294 | 923 | 129 | 164 | 154 | 77 | 10,474 |
| 1981 | 42 | 1,158 | 5,336 | 2,185 | 1,049 | 531 | 310 | 88 | 99 | 24 | 10,822 |
| 1982 | 0 | 353 | 7,029 | 3,634 | 3,226 | 2,345 | 819 | 332 | 81 | 37 | 17,857 |
| 1983 | 0 | 467 | 7,485 | 5,047 | 3,237 | 1,011 | 1,266 | 477 | 47 | 161 | 19,198 |
| 1984 | 0 | 397 | 15,010 | 5,562 | 4,586 | 2,288 | 703 | 381 | 110 | 23 | 29,060 |
| 1985 | 0 | 89 | 3,442 | 15,465 | 6,385 | 3,221 | 2,234 | 509 | 333 | 29 | 31,706 |
| 1986 | 383 | 871 | 20,436 | 5,746 | 12,066 | 3,350 | 1,635 | 487 | 106 | 164 | 45,245 |
| 1987 | 0 | 1,083 | 11,141 | 12,821 | 6,139 | 14,100 | 6,213 | 4,292 | 1,851 | 1,323 | 58,964 |
| 1988 | 0 | 377 | 4,361 | 16,703 | 9,665 | 4,750 | 6,641 | 3,036 | 985 | 665 | 47,183 |
| 1989 | 0 | 33 | 1,355 | 2,076 | 8,332 | 4,204 | 1,803 | 2,446 | 622 | 300 | 21,171 |
| 1990 | 0 | 875 | 6,772 | 6,732 | 7,712 | 36,015 | 9,853 | 4,322 | 4,591 | 2,472 | 79,345 |
| 1991 | 0 | 11 | 4,956 | 1,670 | 1,339 | 1,201 | 3,899 | 1,365 | 840 | 1,190 | 16,471 |
| 1992 | 0 | 0 | 1,335 | 7,461 | 1,081 | 631 | 1,510 | 3,338 | 1,241 | 1,316 | 17,913 |
| 1993 | 0 | 0 | 302 | 3,227 | 3,902 | 982 | 405 | 586 | 485 | 1,123 | 11,013 |
| 1994 | 0 | 0 | 1,463 | 310 | 10,000 | 13,800 | 1,873 | 2,460 | 5,256 | 8,730 | 43,892 |
| 1995 | 0 | 1 | 341 | 7,908 | 2,733 | 12,171 | 10,382 | 2,759 | 3,036 | 7,345 | 46,676 |
| 1996 | 0 | 4 | 3,477 | 2,082 | 13,644 | 4,899 | 11,411 | 10,891 | 2,781 | 8,448 | 57,638 |
| 1997 | 0 | 454 | 3,780 | 22,567 | 2,027 | 8,585 | 1,488 | 3,105 | 2,920 | 2,597 | 47,522 |

| Year | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11+ | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1998 | 0 | 0 | 9,390 | 4,415 | 15,711 | 3,964 | 8,891 | 1,751 | 3,429 | 4,223 | 51,773 |
| 1999 | 0 | 89 | 8,880 | 32,161 | 4,365 | 9,706 | 1,899 | 3,102 | 1,152 | 1,593 | 62,949 |
| 2000 | 0 | 77 | 8,101 | 31,645 | 18,887 | 3,076 | 3,685 | 715 | 1,148 | 717 | 68,049 |
| 2001 | 0 | 56 | 1,816 | 22,486 | 21,033 | 13,536 | 1,991 | 1,593 | 433 | 824 | 63,768 |
| 2002 | 0 | 0 | 18,025 | 7,625 | 17,279 | 14,378 | 4,329 | 1,101 | 928 | 552 | 64,218 |
| 2003 | 0 | 61 | 5,076 | 41,894 | 6,513 | 13,669 | 8,690 | 1,700 | 262 | 381 | 78,245 |
| 2004 | 0 | 0 | 4,823 | 11,134 | 24,501 | 4,842 | 4,452 | 2,175 | 600 | 312 | 52,839 |
| 2005 | 0 | 3 | 424 | 12,345 | 20,406 | 31,839 | 6,051 | 6,169 | 1,732 | 385 | 79,354 |
| 2006 | 0 | 51 | 2,825 | 7,738 | 20,291 | 20,875 | 15,511 | 5,119 | 2,721 | 760 | 75,890 |
| 2007 | 0 | 492 | 206 | 9,238 | 13,512 | 24,751 | 15,373 | 4,948 | 2,939 | 938 | 72,397 |
| 2008 | 0 | 292 | 4,858 | 1,774 | 6,585 | 12,063 | 15,009 | 6,873 | 3,646 | 2,818 | 53,919 |
| 2009 | 0 | 411 | 2,398 | 20,655 | 10,345 | 20,618 | 6,815 | 3,615 | 5,240 | 2,610 | 72,706 |
| 2010 | 0 | 0 | 2,080 | 8,755 | 32,103 | 8,352 | 10,398 | 6,809 | 3,819 | 2,439 | 74,755 |
| 2011 | 0 | 1 | 312 | 7,530 | 7,478 | 25,275 | 8,102 | 4,030 | 2,350 | 4,185 | 59,262 |
| 2012 | 0 | 0 | 24 | 1,139 | 12,787 | 14,800 | 15,466 | 1,741 | 498 | 1,641 | 48,097 |
| 2013 | 0 | 15 | 341 | 1,024 | 9,165 | 19,571 | 7,271 | 3,448 | 110 | 108 | 41,053 |
| 2014 | 0 | 0 | 173 | 2,842 | 2,276 | 8,974 | 15,939 | 3,502 | 1,700 | 57 | 35,464 |
| 2015 | 0 | 0 | 0 | 1,224 | 8,409 | 4,406 | 12,483 | 3,358 | 1,923 | 208 | 32,011 |
| 2016 | 0 | 10 | 305 | 3,417 | 10,631 | 5,817 | 4,280 | 1,938 | 548 | 38 | 26,985 |
| 2017 | 0 | 0 | 368 | 337 | 3,865 | 7,831 | 2,963 | 1,216 | 208 | 18 | 16,807 |
| 2018 | 0 | 0 | 25 | 875 | 4,046 | 3,837 | 4,573 | 856 | 326 | 77 | 14,615 |
| 2019 | 0 | 0 | 54 | 80 | 3,369 | 8,388 | 3,536 | 2,599 | 826 | 352 | 19,204 |
| 2020 | 0 | 0 | 0 | 199 | 612 | 1,759 | 1,980 | 979 | 585 | 21 | 6,135 |
| 2021 | 0 | 0 | 39 | 477 | 3,374 | 2,678 | 6,285 | 2,678 | 341 | 446 | 16,319 |
| 2022 | 0 | 0 | 56 | 746 | 4,290 | 4,820 | 1,661 | 3,279 | 1,714 | 1,396 | 17,962 |
| 2023 | 0 | 156 | 712 | 1,326 | 879 | 3,027 | 2,582 | 1,652 | 1,208 | 218 | 11,761 |

*Table 11. Fall spawner weight-at-age (kg) for mobile gear in the 4T Herring fishery.*

| Year | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11+ |
|---|---|---|---|---|---|---|---|---|---|---|
| 1978 | 0.100 | 0.149 | 0.214 | 0.253 | 0.278 | 0.293 | 0.331 | 0.332 | 0.316 | 0.388 |
| 1979 | 0.123 | 0.180 | 0.232 | 0.266 | 0.293 | 0.291 | 0.340 | 0.365 | 0.355 | 0.380 |
| 1980 | 0.108 | 0.139 | 0.174 | 0.224 | 0.245 | 0.290 | 0.338 | 0.379 | 0.388 | 0.423 |
| 1981 | 0.111 | 0.181 | 0.226 | 0.256 | 0.314 | 0.366 | 0.234 | 0.261 | 0.470 | - |
| 1982 | 0.095 | 0.168 | 0.221 | 0.259 | 0.279 | 0.374 | 0.334 | 0.355 | 0.455 | 0.434 |
| 1983 | 0.103 | 0.170 | 0.213 | 0.246 | 0.283 | 0.316 | 0.375 | 0.349 | 0.222 | 0.456 |
| 1984 | 0.096 | 0.146 | 0.208 | 0.248 | 0.279 | 0.305 | 0.329 | 0.373 | 0.392 | 0.433 |
| 1985 | 0.090 | 0.190 | 0.215 | 0.258 | 0.281 | 0.311 | 0.327 | 0.382 | 0.419 | - |
| 1986 | 0.116 | 0.158 | 0.207 | 0.252 | 0.276 | 0.306 | 0.328 | 0.335 | 0.362 | 0.404 |
| 1987 | 0.111 | 0.172 | 0.218 | 0.250 | 0.284 | 0.319 | 0.341 | 0.351 | 0.391 | 0.393 |
| 1988 | 0.095 | 0.157 | 0.220 | 0.261 | 0.307 | 0.327 | 0.341 | 0.341 | 0.414 | 0.382 |
| 1989 | 0.099 | 0.159 | 0.213 | 0.250 | 0.279 | 0.319 | 0.323 | 0.327 | 0.360 | 0.377 |
| 1990 | 0.105 | 0.171 | 0.213 | 0.236 | 0.288 | 0.310 | 0.323 | 0.329 | 0.338 | 0.386 |
| 1991 | - | 0.149 | 0.191 | 0.221 | 0.263 | 0.279 | 0.307 | 0.310 | 0.327 | 0.380 |
| 1992 | 0.071 | 0.128 | 0.171 | 0.211 | 0.237 | 0.261 | 0.282 | 0.290 | 0.301 | 0.335 |
| 1993 | 0.076 | 0.128 | 0.156 | 0.199 | 0.225 | 0.258 | 0.279 | 0.310 | 0.323 | 0.354 |
| 1994 | 0.086 | 0.134 | 0.159 | 0.174 | 0.204 | 0.222 | 0.262 | 0.274 | 0.302 | 0.336 |
| 1995 | 0.072 | 0.118 | 0.163 | 0.177 | 0.198 | 0.224 | 0.239 | 0.271 | 0.310 | 0.341 |
| 1996 | 0.089 | 0.133 | 0.165 | 0.183 | 0.209 | 0.222 | 0.248 | 0.269 | 0.291 | 0.331 |
| 1997 | 0.082 | 0.141 | 0.165 | 0.191 | 0.224 | 0.226 | 0.241 | 0.262 | 0.296 | 0.339 |
| 1998 | 0.076 | 0.126 | 0.165 | 0.187 | 0.224 | 0.248 | 0.244 | 0.303 | 0.300 | 0.387 |
| 1999 | 0.072 | 0.128 | 0.155 | 0.189 | 0.214 | 0.248 | 0.271 | 0.289 | 0.317 | 0.356 |
| 2000 | 0.077 | 0.131 | 0.162 | 0.185 | 0.208 | 0.231 | 0.262 | 0.263 | 0.275 | 0.318 |
| 2001 | 0.078 | 0.127 | 0.156 | 0.184 | 0.200 | 0.215 | 0.240 | 0.251 | 0.237 | 0.295 |
| 2002 | 0.084 | 0.148 | 0.188 | 0.222 | 0.245 | 0.272 | 0.290 | 0.321 | 0.329 | 0.360 |
| 2003 | 0.081 | 0.138 | 0.169 | 0.197 | 0.219 | 0.240 | 0.260 | 0.276 | 0.318 | 0.310 |
| 2004 | 0.080 | 0.131 | 0.160 | 0.181 | 0.204 | 0.224 | 0.248 | 0.265 | 0.278 | 0.290 |

| Year | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11+ |
|---|---|---|---|---|---|---|---|---|---|---|
| 2005 | 0.078 | 0.125 | 0.151 | 0.177 | 0.202 | 0.228 | 0.282 | 0.284 | 0.301 | 0.349 |
| 2006 | 0.079 | 0.132 | 0.164 | 0.181 | 0.206 | 0.215 | 0.228 | 0.264 | 0.301 | 0.345 |
| 2007 | 0.086 | 0.127 | 0.152 | 0.165 | 0.184 | 0.202 | 0.215 | 0.226 | 0.258 | 0.205 |
| 2008 | 0.093 | 0.133 | 0.153 | 0.159 | 0.179 | 0.184 | 0.197 | 0.210 | 0.218 | - |
| 2009 | 0.092 | 0.123 | 0.146 | 0.166 | 0.179 | 0.195 | 0.220 | 0.231 | - | - |
| 2010 | 0.094 | 0.118 | 0.137 | 0.155 | 0.166 | 0.176 | 0.198 | 0.194 | 0.205 | 0.309 |
| 2011 | 0.069 | 0.104 | 0.123 | 0.141 | 0.153 | 0.168 | 0.179 | 0.200 | 0.186 | 0.234 |
| 2012 | 0.076 | 0.107 | 0.125 | 0.142 | 0.162 | 0.163 | 0.206 | 0.228 | 0.219 | 0.245 |
| 2013 | 0.077 | 0.111 | 0.130 | 0.149 | 0.167 | 0.185 | 0.206 | 0.215 | 0.234 | 0.253 |
| 2014 | 0.066 | 0.110 | 0.136 | 0.150 | 0.169 | 0.186 | 0.204 | 0.222 | 0.225 | - |
| 2015 | 0.102 | 0.102 | 0.125 | 0.148 | 0.164 | 0.190 | 0.194 | 0.205 | 0.214 | 0.231 |
| 2016 | 0.096 | 0.115 | 0.125 | 0.167 | 0.165 | 0.171 | 0.186 | 0.194 | 0.186 | 0.196 |
| 2017 | 0.071 | 0.103 | 0.128 | 0.172 | 0.197 | 0.220 | 0.254 | 0.250 | - | - |
| 2018 | 0.097 | 0.097 | 0.107 | 0.131 | 0.151 | 0.168 | 0.198 | 0.191 | 0.224 | 0.232 |
| 2019 | - | 0.107 | 0.115 | 0.135 | 0.159 | 0.173 | 0.178 | 0.200 | 0.241 | 0.234 |
| 2020 | 0.087 | 0.099 | 0.125 | 0.139 | 0.163 | 0.181 | 0.178 | 0.183 | 0.196 | 0.220 |
| 2021 | - | - | - | - | - | - | - | - | - | - |
| 2022 | - | 0.130 | 0.143 | 0.169 | 0.187 | 0.214 | 0.215 | 0.232 | 0.229 | 0.244 |

*Table 12. Percent of fishing days with no gillnet catch derived from the telephone survey for main fishing areas in the spring and fall fishery.*

| Year | Spring fishing season (%) | Fall fishing season (%) |
|---|---|---|
| 2006 | 46.7 | 16.7 |
| 2007 | 40.0 | 28.8 |
| 2008 | 49.4 | 28.8 |
| 2009 | 23.2 | 17.5 |
| 2010 | 34.1 | 19.9 |
| 2011 | 26.2 | 27.3 |
| 2012 | 43.1 | 24.2 |
| 2013 | 36.3 | 22.8 |
| 2014 | 29.6 | 31.5 |
| 2015 | 16.2 | 40.9 |
| 2016 | 27.8 | 23.9 |
| 2017 | 39.8 | 40.5 |
| 2018 | 37.2 | 40.7 |
| 2019 | 25.5 | 30.3 |
| 2020 | 24.3 | 37.3 |
| 2021 | 24.3 | 37.3 |
| 2022 | - | 47.6 |
| 2023 | - | 43.4 |

*Table 13. Spring spawner fixed gear catch-per-unit-effort values (number per net-haul) for FO area 4T.*

| Year | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
|---|---|---|---|---|---|---|---|---|
| 1990 | 114.7 | 63.8 | 33.8 | 39.3 | 61.0 | 28.4 | 11.4 | 4.8 |
| 1991 | 160.7 | 193.9 | 125.4 | 43.4 | 39.7 | 61.0 | 22.5 | 15.0 |
| 1992 | 464.3 | 178.4 | 117.1 | 53.5 | 24.6 | 30.2 | 22.0 | 35.0 |
| 1993 | 59.5 | 438.0 | 199.4 | 53.2 | 26.1 | 14.9 | 7.7 | 29.6 |
| 1994 | 47.1 | 198.4 | 390.9 | 72.8 | 28.9 | 9.8 | 3.5 | 8.3 |
| 1995 | 137.2 | 110.9 | 182.8 | 297.4 | 65.9 | 18.4 | 11.9 | 23.4 |
| 1996 | 15.2 | 435.2 | 82.5 | 128.0 | 85.2 | 28.1 | 5.3 | 9.8 |
| 1997 | 71.7 | 53.6 | 498.4 | 91.7 | 54.7 | 51.9 | 13.4 | 2.4 |
| 1998 | 81.9 | 167.0 | 23.9 | 315.9 | 36.2 | 25.9 | 20.8 | 9.3 |
| 1999 | 66.1 | 94.2 | 103.1 | 22.6 | 160.6 | 25.9 | 13.4 | 11.6 |
| 2000 | 111.8 | 149.1 | 142.3 | 70.7 | 41.6 | 109.0 | 27.2 | 16.4 |
| 2001 | 98.6 | 114.0 | 85.9 | 42.9 | 29.3 | 12.1 | 57.4 | 15.1 |
| 2002 | 58.3 | 152.0 | 63.1 | 29.9 | 17.2 | 9.5 | 8.7 | 10.1 |
| 2003 | 131.7 | 135.5 | 157.0 | 48.0 | 30.4 | 12.2 | 8.4 | 9.3 |
| 2004 | 22.5 | 130.4 | 46.6 | 73.4 | 27.8 | 10.1 | 3.6 | 8.7 |
| 2005 | 64.1 | 56.5 | 101.9 | 45.1 | 35.6 | 10.0 | 2.2 | 3.1 |
| 2006 | 52.7 | 189.0 | 67.1 | 21.4 | 11.6 | 15.7 | 1.1 | 3.0 |
| 2007 | 93.3 | 71.6 | 106.4 | 79.6 | 36.8 | 9.0 | 6.8 | 5.0 |
| 2008 | 139.2 | 154.1 | 56.4 | 62.4 | 13.3 | 2.6 | 1.2 | 0.6 |
| 2009 | 84.9 | 196.0 | 243.1 | 27.6 | 28.0 | 7.3 | 0.4 | 1.1 |
| 2010 | 39.8 | 31.0 | 56.1 | 27.6 | 13.2 | 12.9 | 0.1 | 0.5 |
| 2011 | 6.4 | 48.8 | 44.8 | 60.8 | 28.2 | 43.1 | 15.9 | 0.3 |
| 2012 | 43.9 | 43.8 | 66.8 | 73.6 | 37.3 | 24.7 | 20.4 | 9.2 |
| 2013 | 33.4 | 106.2 | 127.6 | 164.6 | 125.9 | 89.8 | 5.5 | 4.3 |
| 2014 | 12.7 | 58.2 | 99.2 | 111.3 | 138.3 | 71.8 | 28.4 | 8.6 |
| 2015 | 12.9 | 19.5 | 97.8 | 149.2 | 66.8 | 49.5 | 9.5 | 5.1 |
| 2016 | 3.0 | 34.2 | 95.9 | 139.4 | 98.9 | 35.1 | 4.0 | 0.6 |

| Year | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
|---|---|---|---|---|---|---|---|---|
| 2017 | 46.4 | 49.2 | 130.4 | 106.6 | 79.6 | 18.2 | 3.2 | 0.2 |
| 2018 | 4.8 | 70.4 | 54.8 | 79.5 | 29.3 | 9.1 | 0.3 | 0.0 |
| 2019 | 30.6 | 70.8 | 156.8 | 50.1 | 63.2 | 12.5 | 1.8 | 0.0 |
| 2020 | 30.9 | 62.8 | 56.6 | 62.2 | 46.5 | 5.4 | 4.8 | 1.6 |
| 2021 | 15.9 | 81.2 | 109.0 | 207.9 | 182.5 | 30.0 | 7.3 | 2.5 |

*Table 14. Fall spawner fixed gear catch-per-unit-effort values (number per net-haul) by region: a) North, b) Middle, and c) South.*

| Year | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
|---|---|---|---|---|---|---|---|---|
| **a) NORTH** | | | | | | | | |
| 1986 | 40.0 | 39.3 | 88.5 | 62.0 | 29.4 | 13.4 | 1.8 | 3.1 |
| 1987 | 161.0 | 97.2 | 88.1 | 131.5 | 60.2 | 36.5 | 16.0 | 5.0 |
| 1988 | 69.7 | 119.8 | 46.0 | 40.8 | 37.4 | 19.9 | 9.6 | 9.4 |
| 1989 | 146.6 | 239.3 | 255.7 | 124.3 | 57.0 | 71.6 | 32.1 | 25.6 |
| 1990 | 68.0 | 62.1 | 96.4 | 102.3 | 38.6 | 27.1 | 28.5 | 20.5 |
| 1991 | 472.5 | 120.1 | 88.6 | 131.5 | 125.8 | 40.5 | 25.3 | 41.3 |
| 1992 | 64.6 | 391.8 | 112.0 | 65.3 | 71.1 | 62.5 | 30.1 | 56.9 |
| 1993 | 28.9 | 296.7 | 344.1 | 48.3 | 27.0 | 27.8 | 7.9 | 10.0 |
| 1994 | 41.0 | 65.8 | 197.3 | 297.7 | 56.7 | 44.1 | 20.2 | 33.8 |
| 1995 | 17.2 | 124.8 | 57.8 | 139.5 | 148.1 | 25.9 | 16.6 | 18.2 |
| 1996 | 75.7 | 91.6 | 123.2 | 27.1 | 51.5 | 56.1 | 8.0 | 9.3 |
| 1997 | 86.3 | 297.3 | 91.7 | 81.7 | 15.7 | 27.3 | 24.5 | 7.1 |
| 1998 | 49.9 | 136.8 | 130.6 | 32.7 | 31.1 | 4.5 | 7.3 | 13.1 |
| 1999 | 104.2 | 125.4 | 156.0 | 55.4 | 11.0 | 7.0 | 1.9 | 2.7 |
| 2000 | 157.1 | 512.4 | 136.3 | 57.4 | 31.5 | 6.1 | 4.5 | 2.0 |
| 2001 | 135.0 | 170.6 | 175.8 | 26.9 | 12.1 | 3.3 | 1.0 | 1.3 |
| 2002 | 179.1 | 195.9 | 137.4 | 73.9 | 19.3 | 5.7 | 4.0 | 1.6 |
| 2003 | 73.2 | 154.1 | 103.4 | 72.9 | 87.1 | 21.8 | 9.6 | 6.0 |
| 2004 | 176.6 | 131.8 | 64.0 | 38.7 | 30.1 | 20.6 | 4.7 | 3.2 |

| Year | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
|---|---|---|---|---|---|---|---|---|
| 2005 | 44.1 | 492.9 | 196.4 | 75.6 | 41.7 | 25.1 | 17.8 | 1.6 |
| 2006 | 15.2 | 94.3 | 91.5 | 13.6 | 3.9 | 7.3 | 2.8 | 1.5 |
| 2007 | 16.1 | 47.6 | 108.2 | 74.5 | 15.9 | 3.0 | 2.8 | 1.7 |
| 2008 | 65.0 | 41.3 | 66.0 | 53.6 | 51.8 | 6.3 | 2.1 | 3.1 |
| 2009 | 109.0 | 186.0 | 51.2 | 50.6 | 29.5 | 8.2 | 1.5 | 1.2 |
| 2010 | 15.9 | 135.6 | 117.1 | 40.5 | 27.0 | 21.3 | 8.7 | 1.0 |
| 2011 | 8.0 | 31.0 | 129.7 | 117.5 | 13.3 | 15.2 | 13.8 | 3.7 |
| 2012 | 0.9 | 47.0 | 96.3 | 143.5 | 64.1 | 12.9 | 15.0 | 5.2 |
| 2013 | 9.2 | 78.3 | 252.5 | 181.1 | 93.0 | 20.0 | 1.6 | 0.9 |
| 2014 | 1.5 | 74.7 | 164.6 | 410.7 | 189.1 | 127.9 | 1.7 | 1.0 |
| 2015 | 2.1 | 61.2 | 434.7 | 323.3 | 389.6 | 121.1 | 19.2 | 5.1 |
| 2016 | 19.4 | 79.8 | 217.7 | 269.1 | 187.4 | 59.9 | 28.1 | 4.8 |
| 2017 | 7.5 | 70.9 | 107.0 | 192.6 | 223.4 | 78.1 | 27.9 | 4.9 |
| 2018 | 0.0 | 19.2 | 230.9 | 279.7 | 218.1 | 105.8 | 38.0 | 4.6 |
| 2019 | 1.0 | 13.3 | 225.2 | 421.5 | 146.5 | 101.7 | 32.6 | 10.7 |
| 2020 | 7.5 | 28.5 | 102.3 | 494.4 | 397.0 | 248.3 | 63.8 | 9.4 |
| 2021 | 7.1 | 109.5 | 112.8 | 150.2 | 355.6 | 181.6 | 66.1 | 11.4 |
| 2022 | 2.5 | 12.3 | 83.9 | 70.1 | 69.0 | 98.5 | 69.5 | 18.0 |
| 2023 | 10.0 | 42.9 | 36.6 | 92.8 | 32.6 | 30.1 | 22.7 | 9.6 |
| **b) MIDDLE** | | | | | | | | |
| 1986 | 66.1 | 54.9 | 101.5 | 46.3 | 18.0 | 8.3 | 1.1 | 1.9 |
| 1987 | 42.3 | 79.7 | 69.4 | 138.6 | 13.1 | 12.1 | 13.5 | 0.8 |
| 1988 | 39.3 | 35.8 | 31.4 | 14.4 | 15.1 | 11.3 | 0.2 | 0.0 |
| 1989 | 13.3 | 24.7 | 22.0 | 12.0 | 7.4 | 6.5 | 3.0 | 2.4 |
| 1990 | 26.9 | 19.4 | 21.1 | 37.1 | 7.7 | 5.3 | 4.2 | 0.9 |
| 1991 | 97.9 | 26.5 | 21.8 | 28.7 | 33.9 | 20.8 | 9.6 | 21.9 |
| 1992 | 67.8 | 164.5 | 22.4 | 9.3 | 5.3 | 3.8 | 1.9 | 4.4 |

| Year | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
|---|---|---|---|---|---|---|---|---|
| 1993 | 5.4 | 102.6 | 128.8 | 22.0 | 9.3 | 6.4 | 7.3 | 11.1 |
| 1994 | 9.1 | 14.7 | 73.8 | 99.3 | 12.1 | 3.8 | 4.7 | 7.9 |
| 1995 | 1.6 | 75.6 | 25.7 | 92.5 | 80.4 | 10.3 | 1.8 | 32.3 |
| 1996 | 35.0 | 21.6 | 124.2 | 10.7 | 32.3 | 37.0 | 8.5 | 8.9 |
| 1997 | 77.7 | 176.4 | 31.8 | 66.3 | 12.6 | 15.1 | 16.5 | 10.3 |
| 1998 | 20.3 | 17.1 | 34.6 | 7.0 | 13.0 | 2.4 | 5.1 | 8.8 |
| 1999 | 59.8 | 79.5 | 31.5 | 19.9 | 8.0 | 17.6 | 1.7 | 8.2 |
| 2000 | 40.2 | 76.9 | 28.4 | 9.2 | 5.1 | 1.5 | 1.3 | 0.6 |
| 2001 | 60.1 | 147.9 | 104.9 | 31.8 | 6.9 | 2.3 | 0.0 | 3.2 |
| 2002 | 74.1 | 66.2 | 58.5 | 56.6 | 10.2 | 1.4 | 1.2 | 1.8 |
| 2003 | 45.5 | 95.4 | 44.6 | 30.1 | 30.1 | 6.8 | 0.9 | 1.3 |
| 2004 | 66.9 | 121.3 | 85.6 | 61.1 | 54.2 | 31.8 | 11.0 | 2.1 |
| 2005 | 27.0 | 166.4 | 134.8 | 40.5 | 34.9 | 24.1 | 10.3 | 0.8 |
| 2006 | 25.5 | 116.1 | 206.9 | 76.4 | 39.0 | 29.3 | 23.2 | 7.8 |
| 2007 | 27.2 | 77.9 | 216.1 | 223.0 | 84.9 | 34.3 | 16.7 | 10.3 |
| 2008 | 173.4 | 36.7 | 63.9 | 75.8 | 121.2 | 21.9 | 20.7 | 4.7 |
| 2009 | 86.7 | 154.1 | 35.7 | 78.8 | 37.9 | 13.2 | 5.6 | 2.6 |
| 2010 | 7.3 | 54.4 | 80.7 | 23.5 | 20.6 | 11.7 | 5.5 | 3.1 |
| 2011 | 2.3 | 12.0 | 69.7 | 89.5 | 17.0 | 12.8 | 12.0 | 3.6 |
| 2012 | 1.3 | 16.8 | 75.3 | 101.1 | 70.7 | 8.0 | 4.6 | 3.8 |
| 2013 | 9.1 | 17.3 | 108.5 | 162.2 | 99.4 | 38.3 | 3.1 | 0.7 |
| 2014 | 0.3 | 35.3 | 14.6 | 61.9 | 49.5 | 11.6 | 3.7 | 0.0 |
| 2015 | 3.8 | 24.4 | 233.7 | 104.0 | 176.4 | 69.4 | 24.6 | 0.0 |
| 2016 | 9.3 | 40.8 | 262.0 | 215.0 | 119.9 | 53.6 | 19.0 | 0.0 |
| 2017 | 1.2 | 9.4 | 32.6 | 60.6 | 74.5 | 42.4 | 5.8 | 0.2 |
| 2018 | 2.2 | 20.6 | 85.3 | 215.7 | 164.0 | 16.1 | 8.7 | 0.0 |
| 2019 | 2.3 | 4.2 | 38.3 | 129.0 | 61.1 | 80.1 | 24.5 | 4.9 |

| Year | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
|---|---|---|---|---|---|---|---|---|
| 2020 | 1.1 | 10.4 | 18.1 | 105.0 | 120.1 | 74.6 | 46.5 | 26.9 |
| 2021 | 4.7 | 44.7 | 54.1 | 69.3 | 185.5 | 102.4 | 25.8 | 12.1 |
| 2022 | 5.7 | 13.2 | 64.0 | 54.8 | 95.5 | 129.2 | 68.2 | 21.1 |
| 2023 | 13.0 | 49.8 | 69.4 | 73.0 | 54.8 | 41.6 | 26.8 | 10.8 |
| **c) SOUTH** | | | | | | | | |
| 1986 | 481.5 | 135.4 | 284.2 | 78.9 | 38.5 | 11.5 | 2.5 | 3.9 |
| 1987 | 138.9 | 159.9 | 76.5 | 175.8 | 77.5 | 53.5 | 23.1 | 16.5 |
| 1988 | 55.9 | 214.3 | 124.0 | 60.9 | 85.2 | 38.9 | 12.6 | 8.5 |
| 1989 | 118.2 | 181.1 | 726.8 | 366.7 | 157.3 | 213.3 | 54.3 | 26.2 |
| 1990 | 118.8 | 118.1 | 135.3 | 631.9 | 172.9 | 75.8 | 80.6 | 43.4 |
| 1991 | 433.8 | 146.2 | 117.2 | 105.1 | 341.3 | 119.5 | 73.5 | 104.2 |
| 1992 | 133.0 | 743.3 | 107.7 | 62.8 | 150.5 | 332.6 | 123.7 | 131.1 |
| 1993 | 32.9 | 350.9 | 424.3 | 106.8 | 44.0 | 63.8 | 52.7 | 122.1 |
| 1994 | 37.9 | 8.0 | 259.2 | 357.7 | 48.5 | 63.8 | 136.2 | 226.3 |
| 1995 | 4.5 | 105.5 | 36.5 | 162.4 | 138.5 | 36.8 | 40.5 | 98.0 |
| 1996 | 51.3 | 30.7 | 201.2 | 72.2 | 168.2 | 160.6 | 41.0 | 124.6 |
| 1997 | 138.8 | 828.6 | 74.4 | 315.2 | 54.6 | 114.0 | 107.2 | 95.4 |
| 1998 | 80.5 | 37.8 | 134.7 | 34.0 | 76.2 | 15.0 | 29.4 | 36.2 |
| 1999 | 171.1 | 619.6 | 84.1 | 187.0 | 36.6 | 59.8 | 22.2 | 30.7 |
| 2000 | 143.0 | 558.7 | 333.4 | 54.3 | 65.1 | 12.6 | 20.3 | 12.7 |
| 2001 | 43.8 | 541.9 | 506.9 | 326.2 | 48.0 | 38.4 | 10.4 | 19.9 |
| 2002 | 415.8 | 175.9 | 398.6 | 331.6 | 99.9 | 25.4 | 21.4 | 12.7 |
| 2003 | 105.9 | 874.3 | 135.9 | 285.3 | 181.4 | 35.5 | 5.5 | 8.0 |
| 2004 | 115.6 | 266.8 | 587.2 | 116.1 | 106.7 | 52.1 | 14.4 | 7.5 |
| 2005 | 8.9 | 257.6 | 425.7 | 664.2 | 126.2 | 128.7 | 36.1 | 8.0 |
| 2006 | 79.8 | 218.6 | 573.2 | 589.7 | 438.1 | 144.6 | 76.9 | 21.5 |
| 2007 | 7.9 | 354.5 | 518.5 | 949.9 | 590.0 | 189.9 | 112.8 | 36.0 |

| Year | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
|---|---|---|---|---|---|---|---|---|
| 2008 | 131.7 | 48.1 | 178.6 | 327.1 | 407.0 | 186.4 | 98.9 | 76.4 |
| 2009 | 57.1 | 491.9 | 246.4 | 491.0 | 162.3 | 86.1 | 124.8 | 62.2 |
| 2010 | 50.2 | 211.1 | 774.1 | 201.4 | 250.7 | 164.2 | 92.1 | 58.8 |
| 2011 | 7.6 | 184.4 | 183.1 | 618.9 | 198.4 | 98.7 | 57.6 | 102.5 |
| 2012 | 0.3 | 13.0 | 145.6 | 168.5 | 176.1 | 19.8 | 5.7 | 18.7 |
| 2013 | 8.5 | 25.5 | 228.6 | 488.1 | 181.3 | 86.0 | 2.7 | 2.7 |
| 2014 | 3.6 | 59.4 | 47.5 | 187.4 | 332.8 | 73.1 | 35.5 | 1.2 |
| 2015 | 0.0 | 15.3 | 104.9 | 55.0 | 155.7 | 41.9 | 24.0 | 2.6 |
| 2016 | 4.3 | 48.6 | 151.3 | 82.8 | 60.9 | 27.6 | 7.8 | 0.5 |
| 2017 | 8.6 | 7.9 | 90.8 | 183.9 | 69.6 | 28.5 | 4.9 | 0.4 |
| 2018 | 0.5 | 16.9 | 78.3 | 74.3 | 88.5 | 16.6 | 6.3 | 1.5 |
| 2019 | 2.8 | 4.2 | 175.5 | 437.0 | 184.2 | 135.4 | 43.1 | 18.4 |
| 2020 | 0.0 | 21.7 | 66.5 | 191.4 | 215.4 | 106.5 | 63.6 | 2.3 |
| 2021 | 2.1 | 25.5 | 180.8 | 143.5 | 336.8 | 143.5 | 18.3 | 23.9 |
| 2022 | 2.7 | 35.8 | 205.7 | 231.1 | 79.6 | 157.2 | 82.2 | 66.9 |
| 2023 | 35.4 | 65.9 | 43.7 | 150.4 | 128.3 | 82.1 | 60.0 | 10.8 |

*Table 15. Spring spawner and fall spawner catch-at-age from the fishery-independent acoustic survey in FO area 4Tmno.*

| Year | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|
| **Spring spawners** | | | | | | | | | |
| 1994 | 2,547 | 231,932 | 100,062 | 109,616 | 104,269 | 28,072 | 6,411 | 7,225 | 1,024 |
| 1995 | 47,469 | 7,752 | 77,135 | 21,658 | 25,178 | 21,111 | 5,125 | 777 | 74 |
| 1996 | 329,351 | 141,503 | 16,356 | 185,039 | 48,168 | 28,919 | 30,631 | 8,004 | 3,670 |
| 1997 | 152,556 | 77,939 | 79,058 | 11,239 | 84,989 | 5,522 | 12,954 | 14,803 | 2,649 |
| 1998 | 156,804 | 30,320 | 31,992 | 19,717 | 5,617 | 38,122 | 6,424 | 5,439 | 3,585 |
| 1999 | 242,522 | 109,075 | 56,091 | 19,839 | 6,280 | 3,669 | 18,022 | 2,749 | 1,380 |
| 2000 | 29,470 | 27,667 | 25,372 | 10,178 | 10,278 | 1,905 | 9,706 | 2,278 | 174 |
| 2001 | 90,893 | 14,967 | 8,109 | 5,734 | 3,180 | 1,844 | 2,784 | 500 | 440 |

| Year | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|
| 2002 | 93,284 | 27,633 | 8,130 | 11,464 | 3,494 | 5,131 | 1,684 | 271 | 123 |
| 2003 | 246,068 | 41,734 | 57,655 | 26,041 | 17,349 | 5,255 | 1,878 | 4,847 | 3,520 |
| 2004 | 234,172 | 62,441 | 9,350 | 10,956 | 556 | 0 | 0 | 0 | 0 |
| 2005 | 164,552 | 158,638 | 36,213 | 1,838 | 2,708 | 426 | 1 | 0 | 0 |
| 2006 | 100,682 | 39,313 | 24,601 | 26,314 | 2,909 | 885 | 572 | 257 | 338 |
| 2007 | 49,662 | 39,444 | 8,005 | 12,403 | 8,158 | 1,172 | 1,456 | 0 | 0 |
| 2008 | 71,227 | 25,129 | 7,599 | 9,225 | 5,760 | 3,091 | 2,294 | 532 | 0 |
| 2009 | 47,324 | 39,979 | 16,155 | 7,852 | 2,439 | 1,225 | 1,774 | 0 | 0 |
| 2010 | 37,879 | 67,721 | 73,493 | 8,786 | 8,471 | 8,815 | 2,434 | 1,518 | 0 |
| 2011 | 20,722 | 39,956 | 14,879 | 16,260 | 10,975 | 4,134 | 107 | 3,540 | 105 |
| 2012 | 14,698 | 108,634 | 29,893 | 9,947 | 7,664 | 2,497 | 1,244 | 260 | 379 |
| 2013 | 604 | 8,851 | 21,555 | 21,928 | 13,612 | 4,517 | 1,456 | 0 | 0 |
| 2014 | 24,060 | 16,243 | 12,988 | 7,263 | 6,592 | 7,212 | 667 | 0 | 872 |
| 2015 | 57,318 | 66,879 | 30,345 | 26,148 | 8,972 | 22,891 | 16,167 | 1,244 | 1,713 |
| 2016 | 6,910 | 45,251 | 12,587 | 7,921 | 6,040 | 2,515 | 1,261 | 2,222 | 0 |
| 2017 | 977 | 21,838 | 45,743 | 9,670 | 7,939 | 15,162 | 900 | 0 | 0 |
| 2018 | 518 | 2,936 | 11,737 | 20,955 | 4,220 | 5,134 | 3,251 | 4,081 | 287 |
| 2019 | 121 | 5,731 | 11,451 | 8,947 | 11,241 | 5,955 | 1,975 | 1,027 | 12 |
| 2020 | 98 | 9,066 | 7,900 | 10,749 | 5,941 | 13,653 | 6,531 | 2,279 | 209 |
| 2021 | 69 | 4,462 | 29,259 | 6,812 | 6,191 | 14,206 | 11,485 | 4,029 | 3,024 |
| 2022 | 955 | 12,905 | 4,913 | 12,924 | 2,854 | 3,135 | 3,901 | 2,237 | 0 |
| 2023 | 6,354 | 14,841 | 15,046 | 4,169 | 10,412 | 1,974 | 2,003 | 680 | 140 |
| **Fall spawners** | | | | | | | | | |
| 1994 | 2,158 | 4,438 | 201,347 | 61,950 | 33,097 | 17,261 | 2,309 | 0 | 12 |
| 1995 | 13,019 | 23,465 | 12,113 | 53,151 | 11,242 | 20,084 | 27,317 | 2,837 | 1,218 |
| 1996 | 276,352 | 252,600 | 203,213 | 33,859 | 120,271 | 32,486 | 27,044 | 11,945 | 3,001 |
| 1997 | 234,213 | 383,380 | 238,803 | 115,428 | 16,302 | 45,772 | 15,375 | 14,488 | 6,536 |

| Year | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|
| 1998 | 73,764 | 198,120 | 111,466 | 55,624 | 39,510 | 9,352 | 27,411 | 3,700 | 6,706 |
| 1999 | 60,379 | 324,816 | 231,524 | 103,099 | 69,007 | 82,061 | 34,685 | 30,956 | 11,048 |
| 2000 | 110,711 | 162,188 | 221,369 | 191,640 | 83,573 | 29,020 | 31,824 | 21,602 | 9,898 |
| 2001 | 130,505 | 430,408 | 119,004 | 55,366 | 38,313 | 11,522 | 14,404 | 10,217 | 3,448 |
| 2002 | 265,717 | 65,241 | 75,329 | 58,917 | 69,959 | 46,732 | 11,739 | 2,050 | 4,002 |
| 2003 | 57,266 | 418,557 | 236,961 | 221,302 | 85,137 | 135,133 | 133,898 | 56,417 | 21,343 |
| 2004 | 61,445 | 92,759 | 104,325 | 41,494 | 36,813 | 47,659 | 14,412 | 17,158 | 5,750 |
| 2005 | 63,739 | 161,176 | 312,191 | 157,578 | 66,904 | 30,826 | 8,659 | 13,351 | 6,933 |
| 2006 | 650,350 | 192,891 | 96,550 | 134,036 | 187,251 | 88,039 | 40,815 | 38,326 | 13,275 |
| 2007 | 146,879 | 306,699 | 71,436 | 34,344 | 42,814 | 34,105 | 3,974 | 1,952 | 1,419 |
| 2008 | 163,628 | 155,365 | 98,999 | 20,089 | 11,055 | 10,438 | 7,404 | 2,007 | 467 |
| 2009 | 102,959 | 169,914 | 96,966 | 50,111 | 6,429 | 2,552 | 1,186 | 421 | 160 |
| 2010 | 36,511 | 153,069 | 248,431 | 270,698 | 132,928 | 6,743 | 7,316 | 1,353 | 213 |
| 2011 | 29,023 | 42,605 | 88,110 | 68,702 | 51,739 | 22,614 | 4,811 | 2,910 | 1,078 |
| 2012 | 306 | 295,095 | 159,558 | 122,679 | 69,179 | 29,584 | 3,985 | 4,273 | 191 |
| 2013 | 4,293 | 19,530 | 173,691 | 70,667 | 99,171 | 41,761 | 10,859 | 7,683 | 11,321 |
| 2014 | 141,494 | 74,428 | 22,540 | 101,232 | 54,411 | 47,750 | 29,964 | 8,753 | 1,712 |
| 2015 | 9,286 | 475,924 | 140,252 | 51,570 | 218,422 | 46,387 | 28,011 | 15,334 | 1,606 |
| 2016 | 30,861 | 45,012 | 186,763 | 49,395 | 64,463 | 59,738 | 27,587 | 6,224 | 0 |
| 2017 | 20,902 | 41,151 | 64,915 | 148,495 | 61,294 | 18,119 | 30,775 | 1,596 | 642 |
| 2018 | 26,033 | 19,047 | 19,463 | 9,213 | 34,181 | 19,088 | 3,859 | 1,351 | 1,948 |
| 2019 | 1,740 | 25,628 | 23,653 | 7,543 | 11,636 | 16,265 | 5,023 | 308 | 749 |
| 2020 | 34,493 | 52,083 | 43,604 | 29,954 | 5,786 | 7,494 | 17,243 | 2,715 | 2,381 |
| 2021 | 46,115 | 58,467 | 23,210 | 28,444 | 12,497 | 6,936 | 14,642 | 12,386 | 2,240 |
| 2022 | 63,824 | 133,111 | 22,953 | 8,794 | 6,397 | 4,095 | 2,993 | 5,093 | 2,872 |
| 2023 | 19,933 | 32,346 | 31,943 | 17,388 | 3,178 | 481 | 2,316 | 916 | 2,767 |

*Table 16. Relative selectivity-at-age for 2⅝" and 2¾" mesh calculated from the experimental netting survey and commercial gillnet fishery.*

| Year | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **2 5/8 inches** | | | | | | | | | | | | | | |
| 1985 | 0.243 | 0.310 | 0.567 | 0.813 | 0.924 | 0.933 | 0.911 | 0.777 | 0.790 | 0.571 | 0.483 | 0.432 | 0.410 | 0.398 |
| 1986 | 0.150 | 0.329 | 0.594 | 0.831 | 0.943 | 0.930 | 0.918 | 0.834 | 0.519 | 0.768 | 0.531 | 0.455 | 0.449 | 0.439 |
| 1987 | 0.382 | 0.464 | 0.579 | 0.802 | 0.940 | 0.945 | 0.893 | 0.830 | 0.767 | 0.670 | 0.554 | 0.382 | 0.382 | 0.382 |
| 1988 | 0.170 | 0.329 | 0.642 | 0.825 | 0.922 | 0.945 | 0.902 | 0.876 | 0.778 | 0.723 | 0.662 | 0.483 | 0.434 | 0.406 |
| 1989 | 0.265 | 0.380 | 0.632 | 0.875 | 0.960 | 0.961 | 0.855 | 0.829 | 0.735 | 0.773 | 0.553 | 0.582 | 0.508 | 0.406 |
| 1990 | 0.014 | 0.290 | 0.587 | 0.814 | 0.933 | 0.934 | 0.854 | 0.751 | 0.757 | 0.695 | 0.645 | 0.594 | 0.520 | 0.418 |
| 1991 | 0.196 | 0.354 | 0.492 | 0.738 | 0.903 | 0.934 | 0.925 | 0.898 | 0.785 | 0.741 | 0.664 | 0.519 | 0.416 | 0.403 |
| 1992 | 0.217 | 0.234 | 0.445 | 0.695 | 0.926 | 0.877 | 0.915 | 0.860 | 0.808 | 0.760 | 0.678 | 0.541 | 0.415 | 0.382 |
| 1993 | 0.140 | 0.140 | 0.417 | 0.614 | 0.822 | 0.932 | 0.909 | 0.866 | 0.830 | 0.769 | 0.703 | 0.711 | 0.629 | 0.382 |
| 1994 | 0.035 | 0.050 | 0.309 | 0.606 | 0.769 | 0.912 | 0.952 | 0.918 | 0.852 | 0.807 | 0.669 | 0.535 | 0.724 | 0.481 |
| 1995 | 0.105 | 0.401 | 0.384 | 0.512 | 0.662 | 0.849 | 0.934 | 0.914 | 0.862 | 0.805 | 0.835 | 0.688 | 0.572 | 0.427 |
| 1996 | 0.063 | 0.177 | 0.380 | 0.592 | 0.674 | 0.801 | 0.911 | 0.955 | 0.862 | 0.773 | 0.705 | 0.744 | 0.568 | 0.639 |
| 1997 | 0.024 | 0.086 | 0.295 | 0.538 | 0.713 | 0.851 | 0.931 | 0.951 | 0.959 | 0.832 | 0.685 | 0.625 | 0.701 | 0.463 |
| 1998 | 0.028 | 0.123 | 0.346 | 0.504 | 0.704 | 0.856 | 0.928 | 0.945 | 0.941 | 0.929 | 0.751 | 0.732 | 0.682 | 0.566 |
| 1999 | 0.056 | 0.074 | 0.301 | 0.515 | 0.613 | 0.800 | 0.889 | 0.950 | 0.929 | 0.920 | 0.755 | 0.596 | 0.682 | 0.435 |
| 2000 | 0.007 | 0.088 | 0.310 | 0.478 | 0.670 | 0.804 | 0.909 | 0.950 | 0.958 | 0.901 | 0.833 | 0.799 | 0.709 | 0.461 |
| 2001 | 0.007 | 0.059 | 0.277 | 0.457 | 0.610 | 0.775 | 0.881 | 0.953 | 0.943 | 0.951 | 0.897 | 0.797 | 0.570 | 0.494 |
| 2002 | 0.001 | 0.118 | 0.265 | 0.427 | 0.567 | 0.714 | 0.844 | 0.931 | 0.942 | 0.935 | 0.944 | 0.876 | 0.748 | 0.721 |
| 2003 | 0.042 | 0.200 | 0.270 | 0.410 | 0.569 | 0.710 | 0.816 | 0.901 | 0.931 | 0.959 | 0.914 | 0.926 | 0.692 | 0.383 |
| 2004 | 0.005 | 0.088 | 0.255 | 0.402 | 0.559 | 0.683 | 0.828 | 0.902 | 0.938 | 0.936 | 0.899 | 0.837 | 0.573 | 0.504 |
| 2005 | 0.000 | 0.051 | 0.220 | 0.407 | 0.519 | 0.623 | 0.783 | 0.862 | 0.908 | 0.917 | 0.930 | 0.847 | 0.583 | 0.504 |
| 2006 | 0.364 | 0.112 | 0.229 | 0.377 | 0.539 | 0.639 | 0.753 | 0.881 | 0.919 | 0.956 | 0.912 | 0.726 | 0.916 | 0.720 |
| 2007 | 0.017 | 0.042 | 0.263 | 0.375 | 0.536 | 0.669 | 0.750 | 0.826 | 0.901 | 0.888 | 0.899 | 0.969 | 0.656 | 0.349 |
| 2008 | 0.013 | 0.030 | 0.168 | 0.360 | 0.506 | 0.635 | 0.731 | 0.782 | 0.870 | 0.898 | 0.929 | 0.954 | 0.806 | 0.800 |
| 2009 | 0.019 | 0.072 | 0.198 | 0.297 | 0.493 | 0.633 | 0.738 | 0.818 | 0.843 | 0.873 | 0.940 | 0.940 | 0.957 | 0.811 |

| Year | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2010 | 0.001 | 0.023 | 0.135 | 0.303 | 0.365 | 0.569 | 0.637 | 0.725 | 0.799 | 0.793 | 0.891 | 0.955 | 0.970 | 0.771 |
| 2011 | 0.000 | 0.020 | 0.087 | 0.252 | 0.407 | 0.447 | 0.653 | 0.709 | 0.793 | 0.852 | 0.844 | 0.915 | 0.900 | 0.728 |
| 2012 | 0.000 | 0.050 | 0.081 | 0.193 | 0.325 | 0.466 | 0.519 | 0.694 | 0.804 | 0.885 | 0.931 | 0.864 | 0.653 | 0.606 |
| 2013 | 0.003 | 0.027 | 0.084 | 0.237 | 0.320 | 0.421 | 0.528 | 0.580 | 0.738 | 0.904 | 0.840 | 0.970 | 0.959 | 0.951 |
| 2014 | 0.003 | 0.044 | 0.154 | 0.244 | 0.335 | 0.381 | 0.470 | 0.559 | 0.607 | 0.978 | 0.961 | 0.938 | 0.888 | 0.823 |
| 2015 | 0.006 | 0.060 | 0.132 | 0.276 | 0.319 | 0.442 | 0.494 | 0.584 | 0.644 | 0.782 | 0.788 | 0.731 | 0.697 | 0.678 |
| 2016 | 0.002 | 0.060 | 0.183 | 0.331 | 0.423 | 0.489 | 0.564 | 0.630 | 0.681 | 0.785 | 0.893 | 0.804 | 0.592 | 0.574 |
| 2017 | 0.004 | 0.249 | 0.194 | 0.290 | 0.423 | 0.503 | 0.576 | 0.651 | 0.759 | 0.772 | 0.821 | 0.748 | 0.646 | 0.551 |
| 2018 | 0.003 | 0.024 | 0.112 | 0.283 | 0.388 | 0.480 | 0.547 | 0.606 | 0.695 | 0.768 | 0.849 | 0.919 | 0.905 | 0.896 |
| 2019 | 0.008 | 0.014 | 0.082 | 0.182 | 0.329 | 0.430 | 0.529 | 0.584 | 0.661 | 0.747 | 0.828 | 0.904 | 0.885 | 0.885 |
| 2020 | 0.000 | 0.030 | 0.089 | 0.200 | 0.375 | 0.451 | 0.541 | 0.606 | 0.678 | 0.745 | 0.959 | 0.897 | 0.892 | 0.889 |
| 2021 | 0.004 | 0.029 | 0.158 | 0.284 | 0.382 | 0.519 | 0.602 | 0.663 | 0.753 | 0.795 | 0.836 | 0.739 | 0.829 | 0.826 |
| 2022 | 0.008 | 0.032 | 0.194 | 0.313 | 0.438 | 0.485 | 0.593 | 0.676 | 0.718 | 0.750 | 0.741 | 0.843 | 0.881 | 0.551 |
| 2023 | 0.002 | 0.034 | 0.142 | 0.290 | 0.451 | 0.574 | 0.615 | 0.729 | 0.734 | 0.791 | 0.717 | 0.804 | 0.874 | 0.753 |
| **2 ¾ inches** | | | | | | | | | | | | | | |
| 1985 | 0.113 | 0.154 | 0.329 | 0.583 | 0.744 | 0.932 | 0.962 | 0.946 | 0.956 | 0.834 | 0.761 | 0.716 | 0.695 | 0.684 |
| 1986 | 0.059 | 0.160 | 0.353 | 0.609 | 0.792 | 0.934 | 0.965 | 0.949 | 0.802 | 0.959 | 0.813 | 0.743 | 0.736 | 0.726 |
| 1987 | 0.063 | 0.245 | 0.340 | 0.562 | 0.795 | 0.892 | 0.960 | 0.940 | 0.900 | 0.894 | 0.821 | 0.667 | 0.667 | 0.667 |
| 1988 | 0.068 | 0.159 | 0.397 | 0.592 | 0.759 | 0.890 | 0.919 | 0.985 | 0.928 | 0.940 | 0.903 | 0.765 | 0.719 | 0.691 |
| 1989 | 0.117 | 0.187 | 0.390 | 0.674 | 0.808 | 0.938 | 0.965 | 0.957 | 0.927 | 0.951 | 0.824 | 0.859 | 0.788 | 0.692 |
| 1990 | 0.004 | 0.149 | 0.348 | 0.576 | 0.844 | 0.943 | 0.959 | 0.935 | 0.942 | 0.906 | 0.872 | 0.858 | 0.794 | 0.700 |
| 1991 | 0.080 | 0.173 | 0.271 | 0.486 | 0.696 | 0.927 | 0.954 | 0.960 | 0.956 | 0.928 | 0.890 | 0.793 | 0.702 | 0.689 |
| 1992 | 0.092 | 0.102 | 0.232 | 0.442 | 0.709 | 0.716 | 0.947 | 0.963 | 0.959 | 0.946 | 0.896 | 0.812 | 0.701 | 0.667 |
| 1993 | 0.053 | 0.053 | 0.213 | 0.369 | 0.580 | 0.758 | 0.869 | 0.968 | 0.961 | 0.920 | 0.905 | 0.917 | 0.880 | 0.667 |
| 1994 | 0.011 | 0.017 | 0.145 | 0.364 | 0.517 | 0.714 | 0.890 | 0.957 | 0.958 | 0.948 | 0.906 | 0.811 | 0.904 | 0.764 |
| 1995 | 0.053 | 0.202 | 0.194 | 0.284 | 0.431 | 0.632 | 0.760 | 0.897 | 0.966 | 0.948 | 0.970 | 0.900 | 0.842 | 0.713 |
| 1996 | 0.021 | 0.072 | 0.194 | 0.349 | 0.425 | 0.567 | 0.747 | 0.868 | 0.955 | 0.928 | 0.910 | 0.918 | 0.814 | 0.897 |

| Year | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1997 | 0.007 | 0.030 | 0.139 | 0.309 | 0.458 | 0.620 | 0.750 | 0.843 | 0.924 | 0.932 | 0.900 | 0.871 | 0.927 | 0.751 |
| 1998 | 0.008 | 0.048 | 0.169 | 0.280 | 0.455 | 0.637 | 0.754 | 0.858 | 0.929 | 0.945 | 0.921 | 0.904 | 0.914 | 0.837 |
| 1999 | 0.018 | 0.025 | 0.142 | 0.287 | 0.374 | 0.564 | 0.667 | 0.868 | 0.908 | 0.942 | 0.938 | 0.854 | 0.875 | 0.722 |
| 2000 | 0.002 | 0.032 | 0.148 | 0.260 | 0.420 | 0.565 | 0.716 | 0.814 | 0.910 | 0.944 | 0.976 | 0.956 | 0.907 | 0.743 |
| 2001 | 0.002 | 0.020 | 0.128 | 0.244 | 0.364 | 0.527 | 0.663 | 0.803 | 0.905 | 0.904 | 0.942 | 0.936 | 0.823 | 0.763 |
| 2002 | 0.000 | 0.050 | 0.121 | 0.223 | 0.329 | 0.464 | 0.613 | 0.750 | 0.780 | 0.939 | 0.928 | 0.976 | 0.956 | 0.942 |
| 2003 | 0.013 | 0.092 | 0.125 | 0.212 | 0.332 | 0.460 | 0.583 | 0.705 | 0.811 | 0.909 | 0.973 | 0.973 | 0.897 | 0.667 |
| 2004 | 0.001 | 0.033 | 0.115 | 0.207 | 0.324 | 0.438 | 0.596 | 0.705 | 0.804 | 0.891 | 0.934 | 0.894 | 0.845 | 0.782 |
| 2005 | 0.000 | 0.018 | 0.099 | 0.211 | 0.293 | 0.380 | 0.548 | 0.651 | 0.730 | 0.836 | 0.900 | 0.806 | 0.828 | 0.770 |
| 2006 | 0.001 | 0.042 | 0.102 | 0.190 | 0.311 | 0.396 | 0.512 | 0.680 | 0.746 | 0.820 | 0.862 | 0.949 | 0.965 | 0.945 |
| 2007 | 0.005 | 0.014 | 0.120 | 0.189 | 0.308 | 0.423 | 0.507 | 0.608 | 0.719 | 0.754 | 0.790 | 0.926 | 0.901 | 0.171 |
| 2008 | 0.004 | 0.011 | 0.070 | 0.182 | 0.286 | 0.394 | 0.488 | 0.543 | 0.659 | 0.718 | 0.813 | 0.930 | 0.956 | 0.949 |
| 2009 | 0.005 | 0.026 | 0.086 | 0.141 | 0.278 | 0.395 | 0.497 | 0.598 | 0.622 | 0.667 | 0.839 | 0.854 | 0.936 | 0.985 |
| 2010 | 0.000 | 0.007 | 0.056 | 0.145 | 0.184 | 0.342 | 0.406 | 0.489 | 0.572 | 0.583 | 0.745 | 0.872 | 0.917 | 0.968 |
| 2011 | 0.000 | 0.008 | 0.032 | 0.119 | 0.214 | 0.240 | 0.424 | 0.475 | 0.566 | 0.674 | 0.705 | 0.865 | 0.939 | 0.941 |
| 2012 | 0.000 | 0.019 | 0.029 | 0.082 | 0.158 | 0.254 | 0.292 | 0.456 | 0.574 | 0.699 | 0.835 | 0.796 | 0.891 | 0.860 |
| 2013 | 0.001 | 0.008 | 0.032 | 0.108 | 0.155 | 0.220 | 0.296 | 0.337 | 0.495 | 0.683 | 0.591 | 0.952 | 0.969 | 0.981 |
| 2014 | 0.001 | 0.014 | 0.061 | 0.111 | 0.163 | 0.192 | 0.254 | 0.322 | 0.362 | 0.926 | 0.798 | 0.937 | 0.944 | 0.950 |
| 2015 | 0.001 | 0.021 | 0.051 | 0.128 | 0.153 | 0.236 | 0.272 | 0.343 | 0.396 | 0.562 | 0.949 | 0.937 | 0.926 | 0.918 |
| 2016 | 0.001 | 0.022 | 0.081 | 0.162 | 0.223 | 0.271 | 0.329 | 0.384 | 0.430 | 0.561 | 0.738 | 0.603 | 0.855 | 0.846 |
| 2017 | 0.001 | 0.116 | 0.089 | 0.139 | 0.225 | 0.282 | 0.337 | 0.403 | 0.522 | 0.578 | 0.953 | 0.918 | 0.862 | 0.806 |
| 2018 | 0.001 | 0.007 | 0.042 | 0.136 | 0.199 | 0.263 | 0.311 | 0.359 | 0.440 | 0.520 | 0.642 | 0.981 | 0.989 | 0.995 |
| 2019 | 0.002 | 0.004 | 0.031 | 0.079 | 0.160 | 0.227 | 0.300 | 0.343 | 0.410 | 0.496 | 0.578 | 0.663 | 1.000 | 1.000 |
| 2020 | 0.000 | 0.009 | 0.032 | 0.086 | 0.191 | 0.240 | 0.308 | 0.363 | 0.427 | 0.498 | 0.788 | 0.995 | 0.997 | 0.998 |
| 2021 | 0.001 | 0.009 | 0.068 | 0.132 | 0.193 | 0.293 | 0.361 | 0.416 | 0.508 | 0.557 | 0.658 | 0.468 | 0.989 | 0.988 |
| 2022 | 0.002 | 0.010 | 0.086 | 0.150 | 0.230 | 0.265 | 0.356 | 0.426 | 0.472 | 0.509 | 0.506 | 0.634 | 0.672 | 0.830 |
| 2023 | 0.000 | 0.011 | 0.058 | 0.137 | 0.241 | 0.332 | 0.372 | 0.475 | 0.483 | 0.553 | 0.463 | 0.568 | 0.909 | 0.958 |

*Table 17. Multi-species bottom trawl survey fall spawning Herring stratified mean numbers per tow at age.*

| Year | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11+ |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1994 | 0.43 | 1.46 | 3.89 | 48.32 | 12.34 | 17.06 | 17.80 | 4.69 | 2.93 | 8.36 | 6.67 |
| 1995 | 2.69 | 3.17 | 27.91 | 15.75 | 51.73 | 11.28 | 18.52 | 14.96 | 2.19 | 3.18 | 7.79 |
| 1996 | 4.44 | 1.12 | 0.60 | 2.06 | 0.72 | 3.37 | 1.44 | 2.18 | 1.27 | 0.48 | 1.36 |
| 1997 | 10.84 | 10.57 | 8.20 | 8.55 | 28.58 | 11.46 | 22.60 | 6.04 | 5.60 | 2.78 | 4.36 |
| 1998 | 2.40 | 4.17 | 2.55 | 15.72 | 5.85 | 9.14 | 3.36 | 5.97 | 1.38 | 1.63 | 2.62 |
| 1999 | 42.60 | 60.15 | 12.94 | 8.52 | 5.53 | 1.71 | 2.21 | 1.27 | 1.06 | 0.65 | 0.89 |
| 2000 | 14.21 | 12.43 | 17.18 | 32.82 | 20.53 | 8.25 | 1.56 | 3.12 | 0.98 | 0.74 | 0.18 |
| 2001 | 0.53 | 8.69 | 41.15 | 22.70 | 22.64 | 16.55 | 7.62 | 3.18 | 2.44 | 0.98 | 1.90 |
| 2002 | 1.82 | 36.29 | 39.48 | 102.42 | 26.97 | 21.96 | 15.86 | 4.12 | 2.41 | 0.61 | 0.63 |
| 2003 | 5.68 | 2.32 | 6.43 | 25.38 | 33.44 | 8.37 | 4.48 | 3.14 | 0.47 | 0.19 | 0.26 |
| 2004 | 6.51 | 4.57 | 16.84 | 26.49 | 17.57 | 17.97 | 12.22 | 8.09 | 4.03 | 0.90 | 0.82 |
| 2005 | 7.06 | 1.18 | 6.61 | 32.64 | 48.92 | 22.29 | 9.75 | 7.79 | 4.14 | 3.45 | 1.54 |
| 2006 | 37.10 | 11.55 | 2.23 | 7.79 | 6.02 | 9.66 | 4.73 | 2.61 | 0.24 | 0.11 | 0.27 |
| 2007 | 31.69 | 146.87 | 110.27 | 10.97 | 18.69 | 12.61 | 14.99 | 5.95 | 3.58 | 1.08 | 1.07 |
| 2008 | 23.84 | 15.63 | 24.81 | 18.50 | 3.37 | 6.36 | 6.54 | 4.09 | 3.09 | 1.10 | 1.11 |
| 2009 | 2.26 | 16.36 | 25.53 | 25.27 | 20.78 | 5.18 | 2.96 | 1.56 | 1.62 | 0.06 | 0.44 |
| 2010 | 3.16 | 38.96 | 46.17 | 71.07 | 50.75 | 49.98 | 6.44 | 6.53 | 4.77 | 3.50 | 2.83 |
| 2011 | 3.89 | 70.08 | 10.82 | 58.62 | 66.92 | 34.08 | 17.12 | 8.01 | 5.01 | 1.69 | 1.43 |
| 2012 | 0.16 | 50.47 | 243.65 | 59.90 | 159.89 | 131.15 | 63.86 | 29.16 | 5.07 | 1.37 | 0.38 |
| 2013 | 1.54 | 5.61 | 15.38 | 66.46 | 23.06 | 24.28 | 16.18 | 8.30 | 1.01 | 0.31 | 0.21 |
| 2014 | 4.14 | 21.58 | 10.55 | 20.35 | 87.41 | 15.48 | 11.74 | 7.77 | 0.39 | 0.09 | 0.01 |
| 2015 | 4.07 | 29.33 | 68.04 | 20.07 | 16.37 | 33.13 | 11.28 | 14.45 | 5.81 | 1.43 | 0.22 |
| 2016 | 7.58 | 8.87 | 13.64 | 21.29 | 10.41 | 20.79 | 11.18 | 2.07 | 1.42 | 0.30 | 0.08 |
| 2017 | 2.13 | 15.30 | 12.18 | 14.45 | 9.81 | 6.30 | 10.11 | 2.20 | 0.50 | 0.03 | 0.00 |
| 2018 | 2.34 | 23.91 | 6.36 | 3.59 | 5.42 | 8.26 | 3.11 | 2.29 | 0.70 | 0.49 | 0.02 |
| 2019 | 4.38 | 3.26 | 2.60 | 2.05 | 0.68 | 0.81 | 0.75 | 0.38 | 0.10 | 0.06 | 0.00 |
| 2020 | 0.06 | 6.71 | 0.58 | 0.51 | 0.26 | 0.18 | 0.19 | 0.23 | 0.08 | 0.02 | 0.03 |

| Year | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11+ |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2021 | 12.80 | 9.36 | 10.93 | 9.47 | 13.03 | 9.70 | 3.45 | 6.70 | 2.85 | 1.35 | 0.08 |
| 2022 | 11.03 | 56.32 | 32.01 | 12.24 | 5.23 | 2.64 | 1.14 | 0.57 | 0.60 | 0.35 | 0.05 |
| 2023 | 21.21 | 4.06 | 2.39 | 2.10 | 1.27 | 0.47 | 0.32 | 0.28 | 0.18 | 0.10 | 0.01 |

*Table 18. Maximum likelihood estimates (MLEs) of January 1 spring spawner biomass (t).*

| Year | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11+ | 4+ |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1978 | 15,974 | 12,149 | 47,501 | 12,818 | 12,483 | 6,096 | 2,990 | 3,021 | 3,131 | 7,743 | 95,783 |
| 1979 | 29,819 | 14,292 | 9,393 | 28,395 | 7,270 | 7,388 | 3,641 | 1,884 | 1,760 | 6,181 | 65,912 |
| 1980 | 27,314 | 18,693 | 9,311 | 5,069 | 13,229 | 3,191 | 3,356 | 1,636 | 921 | 3,531 | 40,244 |
| 1981 | 63,104 | 20,432 | 11,677 | 5,006 | 2,782 | 6,418 | 1,529 | 1,554 | 757 | 2,157 | 31,881 |
| 1982 | 73,125 | 50,817 | 15,268 | 8,793 | 3,741 | 2,075 | 4,365 | 1,066 | 1,138 | 1,848 | 38,294 |
| 1983 | 61,390 | 62,826 | 40,379 | 11,637 | 5,956 | 2,699 | 1,069 | 3,009 | 722 | 2,003 | 67,473 |
| 1984 | 48,343 | 55,614 | 53,969 | 30,538 | 9,036 | 4,510 | 1,843 | 640 | 1,876 | 1,649 | 104,062 |
| 1985 | 28,287 | 59,164 | 48,751 | 47,636 | 25,274 | 7,501 | 3,205 | 1,186 | 549 | 2,186 | 136,290 |
| 1986 | 19,190 | 29,640 | 60,452 | 42,254 | 40,393 | 21,625 | 5,133 | 1,929 | 721 | 1,846 | 174,354 |
| 1987 | 31,944 | 19,583 | 27,001 | 47,980 | 34,382 | 31,564 | 13,796 | 2,983 | 1,123 | 1,502 | 160,331 |
| 1988 | 25,046 | 26,465 | 17,031 | 21,060 | 36,859 | 25,558 | 19,360 | 8,351 | 1,691 | 1,501 | 131,410 |
| 1989 | 49,028 | 32,089 | 22,215 | 12,553 | 15,666 | 27,035 | 14,618 | 10,877 | 4,584 | 1,713 | 109,262 |
| 1990 | 163,487 | 51,018 | 32,577 | 18,573 | 9,649 | 11,400 | 15,325 | 8,193 | 6,058 | 3,289 | 105,065 |
| 1991 | 64,226 | 123,657 | 45,205 | 26,020 | 13,243 | 6,478 | 6,338 | 8,105 | 4,379 | 5,158 | 114,925 |
| 1992 | 31,511 | 50,592 | 95,169 | 33,981 | 17,483 | 8,123 | 3,470 | 3,330 | 4,241 | 4,870 | 170,666 |
| 1993 | 91,009 | 30,978 | 42,029 | 72,796 | 23,961 | 11,713 | 4,690 | 1,957 | 1,867 | 4,946 | 163,959 |
| 1994 | 18,243 | 96,735 | 27,901 | 33,672 | 51,679 | 15,703 | 6,492 | 2,707 | 1,052 | 3,678 | 142,884 |
| 1995 | 20,670 | 14,569 | 91,885 | 22,294 | 24,043 | 35,122 | 8,803 | 3,560 | 1,486 | 2,397 | 189,590 |
| 1996 | 23,043 | 25,308 | 12,610 | 71,614 | 15,831 | 15,741 | 18,312 | 4,336 | 1,801 | 1,820 | 142,065 |
| 1997 | 27,951 | 23,189 | 24,304 | 9,982 | 50,613 | 10,436 | 8,296 | 9,472 | 2,101 | 1,811 | 117,016 |
| 1998 | 24,234 | 23,521 | 20,073 | 17,781 | 6,581 | 33,735 | 5,686 | 4,466 | 4,929 | 2,016 | 95,267 |
| 1999 | 35,271 | 22,514 | 18,995 | 14,699 | 11,722 | 4,166 | 17,986 | 3,075 | 2,311 | 3,520 | 76,473 |

| Year | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11+ | 4+ |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2000 | 19,710 | 29,908 | 18,333 | 13,462 | 9,079 | 6,563 | 2,228 | 9,250 | 1,532 | 2,846 | 63,293 |
| 2001 | 24,208 | 14,404 | 22,637 | 11,854 | 6,956 | 4,183 | 2,818 | 939 | 3,848 | 1,733 | 54,969 |
| 2002 | 11,081 | 19,448 | 10,173 | 14,138 | 5,968 | 3,107 | 1,759 | 1,170 | 375 | 2,238 | 38,929 |
| 2003 | 23,792 | 9,536 | 14,201 | 6,393 | 7,277 | 2,769 | 1,344 | 742 | 487 | 1,065 | 34,279 |
| 2004 | 19,333 | 20,914 | 6,924 | 8,403 | 3,064 | 3,083 | 1,101 | 518 | 276 | 566 | 23,935 |
| 2005 | 29,478 | 15,860 | 15,823 | 3,976 | 3,821 | 1,189 | 1,140 | 385 | 183 | 292 | 26,810 |
| 2006 | 30,466 | 21,232 | 11,379 | 10,214 | 2,365 | 1,874 | 475 | 386 | 132 | 133 | 26,957 |
| 2007 | 33,241 | 24,622 | 15,328 | 7,518 | 6,446 | 1,314 | 913 | 231 | 168 | 110 | 32,028 |
| 2008 | 50,644 | 24,349 | 18,071 | 9,992 | 4,524 | 3,437 | 620 | 372 | 98 | 108 | 37,221 |
| 2009 | 27,961 | 33,183 | 17,046 | 11,405 | 5,747 | 2,427 | 1,811 | 340 | 170 | 91 | 39,038 |
| 2010 | 29,594 | 18,412 | 21,286 | 10,528 | 6,971 | 3,382 | 1,508 | 1,059 | 189 | 145 | 45,068 |
| 2011 | 12,728 | 19,890 | 11,565 | 14,080 | 6,416 | 4,326 | 2,185 | 944 | 587 | 173 | 40,275 |
| 2012 | 10,050 | 12,790 | 14,538 | 7,959 | 8,902 | 4,056 | 2,376 | 1,154 | 506 | 398 | 39,889 |
| 2013 | 11,866 | 10,152 | 11,151 | 10,971 | 5,966 | 5,965 | 2,361 | 1,322 | 633 | 525 | 38,895 |
| 2014 | 13,959 | 9,969 | 9,205 | 8,382 | 7,922 | 4,151 | 3,269 | 1,242 | 697 | 560 | 35,427 |
| 2015 | 28,725 | 11,665 | 8,098 | 6,947 | 6,185 | 5,612 | 2,054 | 1,641 | 589 | 624 | 31,750 |
| 2016 | 16,070 | 24,142 | 9,972 | 6,289 | 5,215 | 4,350 | 2,447 | 876 | 698 | 462 | 30,309 |
| 2017 | 14,522 | 15,226 | 19,838 | 8,111 | 5,056 | 3,951 | 1,837 | 989 | 360 | 466 | 40,607 |
| 2018 | 13,134 | 12,183 | 12,207 | 16,129 | 6,321 | 3,855 | 1,578 | 718 | 401 | 320 | 41,529 |
| 2019 | 15,671 | 11,590 | 9,843 | 9,007 | 12,515 | 4,714 | 1,646 | 684 | 315 | 307 | 39,032 |
| 2020 | 10,977 | 13,417 | 8,884 | 7,516 | 7,118 | 9,067 | 2,270 | 736 | 358 | 287 | 36,237 |
| 2021 | 6,289 | 9,218 | 10,733 | 6,633 | 5,529 | 5,315 | 4,814 | 1,187 | 374 | 338 | 34,923 |
| 2022 | 8,690 | 6,102 | 7,735 | 8,252 | 5,507 | 4,705 | 3,107 | 2,910 | 669 | 337 | 33,222 |
| 2023 | 14,548 | 7,145 | 4,975 | 5,965 | 7,011 | 4,074 | 2,867 | 1,696 | 1,675 | 591 | 28,854 |

*Table 19. Maximum likelihood estimates (MLEs) of January 1 spring spawner abundance (number in thousands).*

| Year | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11+ | 4+ |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1978 | 141,366 | 85,556 | 223,116 | 55,368 | 48,685 | 21,058 | 10,072 | 9,084 | 8,547 | 20,939 | 396,870 |
| 1979 | 168,565 | 94,710 | 51,443 | 120,777 | 29,314 | 25,707 | 12,108 | 5,791 | 5,223 | 16,954 | 267,317 |
| 1980 | 183,071 | 110,218 | 50,520 | 22,518 | 50,705 | 12,245 | 11,587 | 5,457 | 2,610 | 9,995 | 165,637 |
| 1981 | 432,515 | 120,683 | 58,829 | 21,967 | 9,376 | 21,002 | 5,352 | 5,064 | 2,385 | 5,509 | 129,484 |
| 1982 | 581,743 | 302,303 | 78,098 | 35,327 | 12,984 | 5,532 | 12,515 | 3,189 | 3,017 | 4,704 | 155,367 |
| 1983 | 461,925 | 420,239 | 207,923 | 51,217 | 22,936 | 8,420 | 3,464 | 7,837 | 1,997 | 4,835 | 308,629 |
| 1984 | 509,942 | 341,401 | 295,721 | 139,508 | 34,020 | 15,216 | 5,179 | 2,131 | 4,821 | 4,202 | 500,798 |
| 1985 | 236,318 | 386,695 | 252,989 | 214,289 | 100,615 | 24,522 | 9,802 | 3,336 | 1,373 | 5,812 | 612,738 |
| 1986 | 153,028 | 181,506 | 288,418 | 183,395 | 154,408 | 72,446 | 15,309 | 6,119 | 2,083 | 4,486 | 726,664 |
| 1987 | 212,394 | 118,252 | 133,667 | 202,703 | 127,624 | 107,324 | 42,527 | 8,986 | 3,592 | 3,856 | 630,279 |
| 1988 | 287,225 | 164,791 | 85,753 | 90,775 | 135,761 | 85,334 | 59,115 | 23,424 | 4,950 | 4,102 | 489,213 |
| 1989 | 401,541 | 222,685 | 117,418 | 56,292 | 58,565 | 87,406 | 44,991 | 31,167 | 12,350 | 4,772 | 412,962 |
| 1990 | 935,815 | 311,085 | 159,849 | 78,269 | 36,940 | 38,360 | 47,698 | 24,552 | 17,008 | 9,343 | 412,018 |
| 1991 | 452,935 | 729,110 | 238,675 | 116,159 | 52,034 | 23,352 | 20,673 | 25,632 | 13,186 | 14,150 | 503,861 |
| 1992 | 304,747 | 349,393 | 552,985 | 170,502 | 75,228 | 31,879 | 12,499 | 11,029 | 13,666 | 14,573 | 882,360 |
| 1993 | 979,649 | 234,150 | 264,836 | 399,537 | 113,884 | 48,062 | 17,889 | 6,996 | 6,170 | 15,796 | 873,170 |
| 1994 | 128,654 | 753,978 | 177,599 | 190,774 | 264,480 | 71,865 | 25,960 | 9,636 | 3,766 | 11,824 | 755,903 |
| 1995 | 248,139 | 98,908 | 570,357 | 126,889 | 124,127 | 163,204 | 36,850 | 13,270 | 4,923 | 7,964 | 1,047,584 |
| 1996 | 229,284 | 190,574 | 74,616 | 403,916 | 81,019 | 74,742 | 78,291 | 17,618 | 6,340 | 6,156 | 742,697 |
| 1997 | 240,540 | 174,222 | 142,462 | 52,650 | 259,290 | 49,298 | 36,038 | 37,633 | 8,463 | 6,002 | 591,836 |
| 1998 | 253,490 | 177,922 | 126,967 | 98,510 | 33,405 | 156,690 | 24,614 | 17,943 | 18,727 | 7,197 | 484,053 |
| 1999 | 333,376 | 180,254 | 124,394 | 83,613 | 58,814 | 18,867 | 77,862 | 12,192 | 8,882 | 12,831 | 397,456 |
| 2000 | 158,312 | 225,718 | 119,508 | 76,576 | 45,580 | 29,929 | 9,092 | 37,374 | 5,848 | 10,412 | 334,318 |
| 2001 | 228,809 | 104,148 | 143,638 | 67,624 | 35,746 | 19,082 | 11,992 | 3,620 | 14,862 | 6,464 | 303,029 |
| 2002 | 121,366 | 148,687 | 65,335 | 79,560 | 30,545 | 14,385 | 7,309 | 4,563 | 1,376 | 8,102 | 211,174 |
| 2003 | 284,254 | 77,976 | 92,634 | 36,511 | 37,205 | 12,914 | 5,809 | 2,934 | 1,830 | 3,799 | 193,635 |

| Year | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11+ | 4+ |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2004 | 199,518 | 178,901 | 47,327 | 49,458 | 15,800 | 14,295 | 4,761 | 2,127 | 1,073 | 2,058 | 136,900 |
| 2005 | 264,381 | 125,176 | 107,639 | 24,560 | 20,142 | 5,610 | 4,741 | 1,567 | 699 | 1,028 | 165,984 |
| 2006 | 315,059 | 164,335 | 76,266 | 62,356 | 12,765 | 8,829 | 2,022 | 1,536 | 483 | 520 | 164,778 |
| 2007 | 309,223 | 195,567 | 101,044 | 45,784 | 35,554 | 6,713 | 4,192 | 913 | 678 | 438 | 195,315 |
| 2008 | 410,405 | 189,195 | 118,031 | 58,916 | 24,787 | 17,133 | 2,876 | 1,670 | 352 | 423 | 224,188 |
| 2009 | 253,956 | 247,451 | 113,113 | 69,078 | 32,936 | 12,894 | 8,607 | 1,381 | 786 | 361 | 239,156 |
| 2010 | 285,935 | 149,329 | 144,803 | 65,391 | 38,902 | 17,801 | 7,324 | 4,765 | 756 | 624 | 280,364 |
| 2011 | 192,855 | 172,657 | 89,859 | 86,380 | 38,284 | 22,116 | 10,343 | 4,178 | 2,695 | 777 | 254,634 |
| 2012 | 149,325 | 122,511 | 109,311 | 56,408 | 53,240 | 22,927 | 12,297 | 5,649 | 2,263 | 1,874 | 263,968 |
| 2013 | 131,550 | 98,655 | 80,806 | 71,797 | 36,716 | 34,166 | 12,708 | 6,756 | 3,091 | 2,259 | 248,299 |
| 2014 | 157,912 | 89,328 | 66,750 | 54,179 | 47,208 | 23,413 | 16,949 | 6,184 | 3,259 | 2,570 | 220,513 |
| 2015 | 298,290 | 109,843 | 61,962 | 45,973 | 36,750 | 31,262 | 10,967 | 7,821 | 2,834 | 2,663 | 200,232 |
| 2016 | 177,960 | 212,327 | 77,970 | 43,673 | 31,917 | 24,914 | 13,143 | 4,542 | 3,217 | 2,254 | 201,630 |
| 2017 | 144,349 | 128,057 | 152,597 | 55,860 | 31,078 | 22,472 | 10,091 | 5,288 | 1,822 | 2,192 | 281,398 |
| 2018 | 137,965 | 103,685 | 91,710 | 108,467 | 39,070 | 21,193 | 8,711 | 3,850 | 2,003 | 1,515 | 276,519 |
| 2019 | 162,902 | 98,803 | 74,122 | 65,267 | 76,452 | 27,124 | 8,733 | 3,556 | 1,565 | 1,427 | 258,244 |
| 2020 | 116,037 | 114,868 | 69,519 | 51,868 | 45,136 | 51,900 | 12,256 | 3,900 | 1,580 | 1,326 | 237,484 |
| 2021 | 71,218 | 80,298 | 79,388 | 47,892 | 35,486 | 30,546 | 26,323 | 6,174 | 1,959 | 1,457 | 229,224 |
| 2022 | 90,424 | 48,625 | 54,778 | 54,041 | 32,451 | 23,871 | 16,351 | 14,026 | 3,283 | 1,814 | 200,615 |
| 2023 | 156,429 | 62,077 | 33,366 | 37,542 | 36,941 | 22,093 | 12,696 | 8,674 | 7,432 | 2,700 | 161,443 |

*Table 20. Maximum likelihood estimates of the instantaneous rate of fishing mortality (F) of spring spawners by age. F6-8 is the January 1 abundance-weighted average F for ages 6 to 8 years.*

| Year | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11+ | F6-8 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1978 | 0.027 | 0.135 | 0.240 | 0.262 | 0.265 | 0.265 | 0.265 | 0.265 | 0.265 | 0.265 | 0.265 |
| 1979 | 0.051 | 0.254 | 0.452 | 0.494 | 0.499 | 0.499 | 0.499 | 0.499 | 0.499 | 0.499 | 0.499 |
| 1980 | 0.053 | 0.264 | 0.469 | 0.512 | 0.517 | 0.518 | 0.518 | 0.518 | 0.518 | 0.518 | 0.517 |
| 1981 | 0.019 | 0.096 | 0.171 | 0.187 | 0.189 | 0.189 | 0.189 | 0.189 | 0.189 | 0.189 | 0.189 |
| 1982 | 0.012 | 0.061 | 0.109 | 0.119 | 0.120 | 0.120 | 0.120 | 0.120 | 0.120 | 0.120 | 0.120 |
| 1983 | 0.012 | 0.061 | 0.109 | 0.119 | 0.120 | 0.120 | 0.120 | 0.120 | 0.120 | 0.120 | 0.120 |
| 1984 | 0.006 | 0.029 | 0.051 | 0.056 | 0.056 | 0.057 | 0.057 | 0.057 | 0.057 | 0.057 | 0.056 |
| 1985 | 0.007 | 0.037 | 0.065 | 0.071 | 0.072 | 0.072 | 0.072 | 0.072 | 0.072 | 0.072 | 0.072 |
| 1986 | 0.012 | 0.060 | 0.107 | 0.117 | 0.118 | 0.118 | 0.118 | 0.118 | 0.118 | 0.118 | 0.118 |
| 1987 | 0.017 | 0.084 | 0.150 | 0.164 | 0.166 | 0.166 | 0.166 | 0.166 | 0.166 | 0.166 | 0.166 |
| 1988 | 0.021 | 0.105 | 0.187 | 0.205 | 0.207 | 0.207 | 0.207 | 0.207 | 0.207 | 0.207 | 0.207 |
| 1989 | 0.019 | 0.095 | 0.169 | 0.185 | 0.187 | 0.187 | 0.187 | 0.187 | 0.187 | 0.187 | 0.187 |
| 1990 | 0.004 | 0.019 | 0.074 | 0.163 | 0.213 | 0.227 | 0.230 | 0.230 | 0.230 | 0.230 | 0.224 |
| 1991 | 0.005 | 0.021 | 0.081 | 0.179 | 0.235 | 0.250 | 0.253 | 0.254 | 0.254 | 0.254 | 0.243 |
| 1992 | 0.004 | 0.017 | 0.065 | 0.144 | 0.188 | 0.200 | 0.203 | 0.203 | 0.203 | 0.203 | 0.193 |
| 1993 | 0.004 | 0.018 | 0.070 | 0.155 | 0.202 | 0.216 | 0.218 | 0.219 | 0.219 | 0.219 | 0.208 |
| 1994 | 0.004 | 0.020 | 0.078 | 0.171 | 0.224 | 0.239 | 0.242 | 0.242 | 0.242 | 0.242 | 0.228 |
| 1995 | 0.005 | 0.023 | 0.086 | 0.189 | 0.248 | 0.264 | 0.267 | 0.268 | 0.268 | 0.268 | 0.258 |
| 1996 | 0.004 | 0.021 | 0.078 | 0.173 | 0.227 | 0.241 | 0.244 | 0.245 | 0.245 | 0.245 | 0.237 |
| 1997 | 0.004 | 0.019 | 0.071 | 0.157 | 0.206 | 0.219 | 0.222 | 0.223 | 0.223 | 0.223 | 0.210 |
| 1998 | 0.005 | 0.021 | 0.081 | 0.179 | 0.235 | 0.250 | 0.253 | 0.254 | 0.254 | 0.254 | 0.248 |
| 1999 | 0.006 | 0.027 | 0.101 | 0.222 | 0.291 | 0.310 | 0.314 | 0.315 | 0.315 | 0.315 | 0.305 |
| 2000 | 0.009 | 0.042 | 0.160 | 0.352 | 0.461 | 0.491 | 0.497 | 0.498 | 0.498 | 0.498 | 0.475 |
| 2001 | 0.009 | 0.045 | 0.169 | 0.373 | 0.489 | 0.520 | 0.527 | 0.528 | 0.528 | 0.528 | 0.504 |
| 2002 | 0.008 | 0.039 | 0.148 | 0.326 | 0.427 | 0.454 | 0.460 | 0.461 | 0.461 | 0.461 | 0.439 |
| 2003 | 0.010 | 0.046 | 0.174 | 0.384 | 0.503 | 0.536 | 0.542 | 0.544 | 0.544 | 0.544 | 0.515 |

| Year | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11+ | F6-8 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2004 | 0.011 | 0.053 | 0.201 | 0.443 | 0.580 | 0.618 | 0.626 | 0.627 | 0.628 | 0.628 | 0.602 |
| 2005 | 0.012 | 0.032 | 0.082 | 0.191 | 0.361 | 0.530 | 0.637 | 0.686 | 0.705 | 0.712 | 0.435 |
| 2006 | 0.006 | 0.015 | 0.039 | 0.090 | 0.171 | 0.252 | 0.302 | 0.326 | 0.335 | 0.338 | 0.213 |
| 2007 | 0.008 | 0.022 | 0.056 | 0.130 | 0.247 | 0.362 | 0.435 | 0.469 | 0.482 | 0.487 | 0.280 |
| 2008 | 0.005 | 0.013 | 0.035 | 0.081 | 0.153 | 0.224 | 0.269 | 0.290 | 0.298 | 0.301 | 0.187 |
| 2009 | 0.003 | 0.008 | 0.020 | 0.046 | 0.087 | 0.128 | 0.154 | 0.166 | 0.170 | 0.172 | 0.107 |
| 2010 | 0.002 | 0.005 | 0.014 | 0.033 | 0.062 | 0.091 | 0.110 | 0.118 | 0.122 | 0.123 | 0.076 |
| 2011 | 0.002 | 0.005 | 0.014 | 0.032 | 0.061 | 0.090 | 0.108 | 0.116 | 0.119 | 0.120 | 0.077 |
| 2012 | 0.001 | 0.003 | 0.007 | 0.016 | 0.030 | 0.044 | 0.053 | 0.057 | 0.059 | 0.059 | 0.037 |
| 2013 | 0.002 | 0.006 | 0.015 | 0.034 | 0.065 | 0.095 | 0.115 | 0.123 | 0.127 | 0.128 | 0.085 |
| 2014 | 0.002 | 0.004 | 0.012 | 0.027 | 0.051 | 0.075 | 0.090 | 0.096 | 0.099 | 0.100 | 0.065 |
| 2015 | 0.002 | 0.004 | 0.011 | 0.027 | 0.050 | 0.074 | 0.089 | 0.096 | 0.098 | 0.099 | 0.065 |
| 2016 | 0.001 | 0.002 | 0.005 | 0.012 | 0.023 | 0.033 | 0.040 | 0.043 | 0.044 | 0.044 | 0.030 |
| 2017 | 0.002 | 0.005 | 0.012 | 0.028 | 0.054 | 0.079 | 0.095 | 0.102 | 0.105 | 0.106 | 0.069 |
| 2018 | 0.001 | 0.003 | 0.007 | 0.017 | 0.032 | 0.047 | 0.057 | 0.061 | 0.063 | 0.063 | 0.040 |
| 2019 | 0.001 | 0.003 | 0.009 | 0.021 | 0.039 | 0.058 | 0.069 | 0.075 | 0.077 | 0.077 | 0.046 |
| 2020 | 0.001 | 0.002 | 0.005 | 0.012 | 0.023 | 0.034 | 0.041 | 0.044 | 0.045 | 0.045 | 0.030 |
| 2021 | 0.000 | 0.001 | 0.003 | 0.008 | 0.015 | 0.023 | 0.027 | 0.029 | 0.030 | 0.030 | 0.021 |
| 2022 | 0.000 | 0.001 | 0.002 | 0.005 | 0.009 | 0.013 | 0.015 | 0.016 | 0.017 | 0.017 | 0.011 |
| 2023 | 0.000 | 0.000 | 0.001 | 0.002 | 0.004 | 0.005 | 0.006 | 0.007 | 0.007 | 0.007 | 0.005 |

*Table 21. Risk analysis table of annual catch options (between 0 and 500 t) for 2024, 2025, 2026 and 2029, with predicted resulting SSB (kt) in 2025, 2026 and 2029, resulting probabilities (%) of SSB being greater than the LRP, resulting probabilities of increases in SSB by 5%, and resulting abundance weighted fishing mortality rate (F6-8) for the spring spawner component of Atlantic Herring from the southern Gulf of St. Lawrence.*

| Year | | 0 t | 100 t | 250 t | 50 t |
|---|---|---|---|---|---|
| SSB(kt) | 2025 | 29.7 | 29.6 | 29.5 | 29.3 |
| | 2026 | 33.1 | 32.9 | 32.7 | 32.4 |
| | 2029 | 39.8 | 39.5 | 39.2 | 38.6 |
| SSB>LRP 40%$BMSY_{proxy}$(%) | 2025 | 3.3 | 3.3 | 3.2 | 3.2 |
| | 2026 | 5.6 | 5.5 | 5.5 | 5.2 |
| | 2029 | 15.3 | 15.1 | 14.6 | 14.0 |
| 5% increase in SSB(%) | 2025 | 72.3 | 72.0 | 71.4 | 70.7 |
| | 2026 | 58.6 | 58.3 | 57.9 | 57.3 |
| | 2029 | 49.1 | 49.0 | 49.0 | 48.7 |
| F6-8 | 2024 | 0.0 | 0.0 | 0.0 | 0.0 |
| | 2025 | 0.0 | 0.0 | 0.0 | 0.0 |

*Table 22. SCA maximum likelihood estimates of August 1 biomass (t) of fall spawners in the North region of the southern Gulf of St. Lawrence.*

| Year | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11+ | 4+ |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1978 | 17,555 | 9,457 | 7,954 | 7,216 | 3,469 | 2,859 | 3,810 | 894 | 487 | 2,710 | 29,398 |
| 1979 | 25,575 | 12,086 | 8,011 | 2,966 | 1,726 | 701 | 746 | 896 | 229 | 675 | 15,949 |
| 1980 | 15,505 | 29,257 | 8,704 | 3,984 | 1,058 | 564 | 255 | 268 | 315 | 338 | 15,487 |
| 1981 | 47,906 | 25,227 | 30,439 | 5,981 | 2,100 | 551 | 324 | 151 | 149 | 351 | 40,045 |
| 1982 | 23,126 | 40,560 | 30,766 | 26,866 | 4,060 | 1,244 | 352 | 206 | 97 | 301 | 63,892 |
| 1983 | 14,347 | 35,042 | 38,187 | 25,498 | 18,342 | 2,551 | 850 | 220 | 142 | 253 | 86,043 |
| 1984 | 20,374 | 22,453 | 44,202 | 35,475 | 19,447 | 13,177 | 2,005 | 653 | 159 | 321 | 115,438 |
| 1985 | 23,161 | 28,822 | 26,004 | 41,865 | 28,285 | 14,831 | 10,806 | 1,601 | 515 | 375 | 124,282 |
| 1986 | 22,638 | 37,393 | 34,792 | 23,076 | 31,449 | 20,357 | 11,288 | 7,975 | 1,173 | 615 | 130,725 |
| 1987 | 22,179 | 36,596 | 48,104 | 30,167 | 16,384 | 19,674 | 13,599 | 7,413 | 5,175 | 1,123 | 141,640 |
| 1988 | 15,123 | 23,756 | 43,323 | 40,973 | 18,075 | 9,021 | 11,740 | 7,869 | 4,251 | 3,599 | 138,850 |
| 1989 | 46,476 | 21,611 | 26,787 | 34,724 | 27,011 | 11,026 | 5,862 | 7,408 | 5,001 | 4,836 | 122,653 |
| 1990 | 31,990 | 66,956 | 26,685 | 24,613 | 21,858 | 15,803 | 6,897 | 3,579 | 4,513 | 5,944 | 109,890 |
| 1991 | 11,346 | 33,424 | 76,936 | 21,952 | 13,848 | 11,168 | 8,539 | 3,643 | 1,844 | 5,354 | 143,284 |
| 1992 | 14,195 | 11,281 | 35,318 | 64,861 | 13,941 | 8,210 | 6,866 | 5,128 | 2,159 | 4,183 | 140,666 |
| 1993 | 6,438 | 20,664 | 12,117 | 32,160 | 42,906 | 8,534 | 5,086 | 4,182 | 2,979 | 3,652 | 111,616 |

| Year | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11+ | 4+ |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1994 | 12,903 | 8,042 | 27,365 | 12,384 | 23,780 | 29,371 | 5,875 | 3,502 | 2,747 | 4,444 | 109,468 |
| 1995 | 9,037 | 16,817 | 10,310 | 24,437 | 7,025 | 11,854 | 14,126 | 2,836 | 1,672 | 3,334 | 75,593 |
| 1996 | 11,560 | 13,462 | 21,907 | 9,722 | 10,990 | 2,627 | 4,228 | 4,952 | 1,008 | 1,740 | 57,174 |
| 1997 | 17,494 | 16,014 | 17,888 | 19,507 | 4,680 | 4,491 | 1,001 | 1,558 | 1,811 | 941 | 51,877 |
| 1998 | 12,792 | 26,786 | 19,542 | 16,097 | 9,883 | 2,084 | 1,808 | 414 | 619 | 1,053 | 51,501 |
| 1999 | 10,601 | 18,713 | 37,203 | 16,656 | 8,255 | 4,393 | 813 | 725 | 160 | 617 | 68,822 |
| 2000 | 8,909 | 17,531 | 25,483 | 33,914 | 7,921 | 3,322 | 1,588 | 282 | 255 | 261 | 73,025 |
| 2001 | 8,660 | 13,347 | 25,142 | 23,869 | 17,825 | 3,582 | 1,345 | 617 | 116 | 199 | 72,695 |
| 2002 | 26,081 | 15,190 | 19,152 | 24,274 | 14,171 | 9,318 | 1,642 | 627 | 277 | 144 | 69,606 |
| 2003 | 19,342 | 37,895 | 20,856 | 19,090 | 14,714 | 7,775 | 4,475 | 780 | 297 | 193 | 68,178 |
| 2004 | 17,937 | 28,966 | 47,563 | 17,375 | 9,353 | 6,275 | 2,835 | 1,632 | 287 | 175 | 85,496 |
| 2005 | 10,205 | 22,842 | 36,116 | 45,241 | 11,940 | 5,750 | 3,249 | 1,422 | 800 | 216 | 104,734 |
| 2006 | 30,076 | 15,470 | 29,782 | 35,490 | 30,725 | 7,348 | 2,748 | 1,578 | 670 | 472 | 108,813 |
| 2007 | 51,954 | 43,620 | 20,596 | 31,987 | 30,715 | 18,658 | 2,850 | 1,019 | 558 | 404 | 106,787 |
| 2008 | 50,153 | 73,695 | 59,526 | 22,301 | 26,991 | 20,557 | 7,870 | 1,132 | 402 | 371 | 139,151 |
| 2009 | 50,172 | 62,182 | 97,082 | 65,985 | 20,671 | 20,916 | 9,854 | 3,475 | 506 | 313 | 218,801 |
| 2010 | 28,292 | 59,584 | 72,480 | 103,963 | 58,772 | 16,156 | 10,019 | 4,552 | 1,601 | 378 | 267,922 |
| 2011 | 31,813 | 29,097 | 70,229 | 79,274 | 97,575 | 49,600 | 7,639 | 4,599 | 2,036 | 930 | 311,881 |
| 2012 | 15,319 | 45,930 | 32,561 | 79,594 | 82,563 | 88,488 | 21,662 | 3,295 | 1,915 | 1,257 | 311,334 |
| 2013 | 16,841 | 21,021 | 61,270 | 40,519 | 83,921 | 78,109 | 33,143 | 8,021 | 1,242 | 1,133 | 307,357 |
| 2014 | 18,627 | 22,556 | 26,959 | 75,917 | 46,238 | 81,638 | 29,684 | 12,232 | 2,966 | 898 | 276,533 |
| 2015 | 19,250 | 27,367 | 27,885 | 33,218 | 84,147 | 44,559 | 31,880 | 11,434 | 4,352 | 1,434 | 238,907 |
| 2016 | 5,835 | 20,345 | 39,350 | 34,449 | 36,817 | 77,868 | 17,593 | 12,475 | 4,383 | 2,141 | 225,076 |
| 2017 | 3,814 | 7,189 | 25,178 | 49,996 | 38,919 | 34,290 | 32,857 | 7,207 | 5,253 | 2,799 | 196,500 |
| 2018 | 8,399 | 4,707 | 7,728 | 29,839 | 51,886 | 35,381 | 15,224 | 14,535 | 3,209 | 3,608 | 161,411 |
| 2019 | 4,054 | 9,921 | 5,626 | 9,043 | 29,072 | 48,412 | 16,395 | 6,863 | 6,604 | 3,011 | 125,026 |
| 2020 | 6,387 | 4,690 | 11,603 | 6,723 | 11,433 | 27,847 | 24,046 | 7,972 | 3,285 | 4,639 | 97,548 |

| Year | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11+ | 4+ |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2021 | 6,518 | 6,984 | 6,901 | 15,114 | 8,414 | 11,827 | 15,066 | 12,644 | 4,131 | 4,185 | 78,281 |
| 2022 | 15,327 | 10,052 | 9,313 | 9,016 | 17,262 | 8,502 | 6,194 | 7,765 | 6,433 | 4,062 | 68,549 |
| 2023 | 13,723 | 22,993 | 13,207 | 11,659 | 8,156 | 15,097 | 4,071 | 2,965 | 3,678 | 4,803 | 63,636 |

*Table 23. SCA maximum likelihood estimates of January 1 abundance (number in thousands) of fall spawners in the North region of the southern Gulf of St. Lawrence.*

| Year | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11+ | 4+ |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1978 | 81,927 | 55,126 | 36,700 | 29,460 | 11,805 | 10,215 | 11,286 | 2,807 | 1,656 | 6,756 | 110,685 |
| 1979 | 250,096 | 63,246 | 36,379 | 11,384 | 6,169 | 2,378 | 2,269 | 2,507 | 623 | 1,868 | 63,578 |
| 1980 | 215,323 | 193,809 | 43,899 | 14,858 | 3,528 | 1,861 | 792 | 755 | 834 | 829 | 67,357 |
| 1981 | 294,479 | 167,456 | 140,974 | 23,142 | 6,625 | 1,547 | 901 | 383 | 366 | 806 | 174,744 |
| 1982 | 343,571 | 230,060 | 129,370 | 97,887 | 12,679 | 3,408 | 875 | 509 | 217 | 662 | 245,607 |
| 1983 | 200,124 | 268,482 | 178,328 | 92,809 | 59,134 | 7,317 | 2,165 | 556 | 323 | 558 | 341,190 |
| 1984 | 255,024 | 156,434 | 208,944 | 133,049 | 63,052 | 39,184 | 5,348 | 1,582 | 406 | 644 | 452,210 |
| 1985 | 366,763 | 199,367 | 121,884 | 157,665 | 93,505 | 43,481 | 29,822 | 4,070 | 1,204 | 799 | 452,430 |
| 1986 | 300,520 | 286,667 | 154,967 | 89,857 | 103,351 | 59,405 | 30,452 | 20,881 | 2,849 | 1,403 | 463,166 |
| 1987 | 221,746 | 234,830 | 222,086 | 110,584 | 53,428 | 58,536 | 37,033 | 18,978 | 13,013 | 2,650 | 516,308 |
| 1988 | 216,013 | 173,124 | 181,304 | 154,126 | 60,570 | 27,476 | 33,075 | 20,916 | 10,718 | 8,846 | 497,030 |
| 1989 | 639,106 | 168,114 | 133,519 | 128,228 | 89,938 | 33,580 | 16,793 | 20,208 | 12,779 | 11,952 | 446,997 |
| 1990 | 321,118 | 498,298 | 129,715 | 93,248 | 71,776 | 47,461 | 19,424 | 9,710 | 11,684 | 14,299 | 397,316 |
| 1991 | 123,230 | 252,638 | 386,923 | 88,854 | 48,357 | 34,561 | 24,634 | 10,076 | 5,037 | 13,478 | 611,921 |
| 1992 | 266,464 | 98,217 | 199,501 | 279,669 | 52,770 | 27,254 | 20,609 | 14,684 | 6,006 | 11,036 | 611,530 |
| 1993 | 104,859 | 215,561 | 78,727 | 146,469 | 168,955 | 30,266 | 16,140 | 12,200 | 8,692 | 10,089 | 471,538 |
| 1994 | 519,991 | 164,928 | 427,183 | 113,770 | 221,779 | 108,503 | 19,648 | 10,475 | 7,918 | 12,189 | 921,464 |
| 1995 | 313,175 | 401,794 | 128,906 | 304,513 | 63,248 | 45,189 | 49,266 | 8,916 | 4,753 | 9,123 | 613,914 |
| 1996 | 518,552 | 250,813 | 314,413 | 88,475 | 152,398 | 10,442 | 14,772 | 16,090 | 2,912 | 4,531 | 604,031 |
| 1997 | 758,206 | 413,748 | 201,552 | 221,683 | 41,874 | 17,420 | 3,505 | 4,954 | 5,396 | 2,496 | 498,880 |
| 1998 | 696,172 | 620,944 | 332,294 | 145,125 | 116,568 | 7,740 | 6,627 | 1,332 | 1,883 | 3,000 | 614,570 |

| Year | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11+ | 4+ |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1999 | 493,884 | 571,317 | 508,992 | 243,786 | 71,576 | 16,632 | 2,888 | 2,471 | 497 | 1,821 | 848,663 |
| 2000 | 1,015,530 | 412,913 | 469,659 | 366,111 | 117,986 | 12,952 | 5,569 | 966 | 827 | 775 | 974,845 |
| 2001 | 802,692 | 845,489 | 344,620 | 353,909 | 190,988 | 13,652 | 4,820 | 2,071 | 359 | 596 | 911,014 |
| 2002 | 1,116,460 | 677,020 | 707,885 | 264,888 | 211,487 | 35,172 | 5,759 | 2,032 | 873 | 402 | 1,228,497 |
| 2003 | 727,664 | 953,894 | 573,141 | 568,899 | 162,204 | 28,758 | 15,533 | 2,542 | 897 | 563 | 1,352,536 |
| 2004 | 672,907 | 629,050 | 815,516 | 460,419 | 385,801 | 24,396 | 10,089 | 5,445 | 891 | 512 | 1,703,068 |
| 2005 | 398,641 | 586,513 | 546,335 | 674,324 | 343,965 | 22,770 | 11,948 | 4,939 | 2,665 | 687 | 1,607,633 |
| 2006 | 1,725,750 | 351,729 | 513,932 | 450,235 | 483,867 | 30,338 | 10,372 | 5,440 | 2,249 | 1,526 | 1,497,958 |
| 2007 | 1,498,960 | 1,530,710 | 311,489 | 446,281 | 360,834 | 78,310 | 11,400 | 3,669 | 1,896 | 1,310 | 1,215,189 |
| 2008 | 1,382,010 | 1,347,630 | 1,365,970 | 273,550 | 369,198 | 88,784 | 31,767 | 4,399 | 1,398 | 1,218 | 2,136,284 |
| 2009 | 1,058,660 | 1,250,340 | 1,216,390 | 1,216,320 | 229,932 | 88,136 | 39,228 | 13,510 | 1,853 | 1,099 | 2,806,468 |
| 2010 | 537,619 | 966,907 | 1,136,070 | 1,092,100 | 1,047,680 | 70,181 | 40,594 | 17,551 | 6,001 | 1,309 | 3,411,486 |
| 2011 | 949,550 | 494,662 | 887,395 | 1,031,850 | 957,003 | 233,501 | 31,988 | 18,151 | 7,810 | 3,249 | 3,170,948 |
| 2012 | 562,933 | 879,473 | 457,569 | 815,876 | 927,212 | 418,128 | 97,398 | 13,198 | 7,469 | 4,547 | 2,741,398 |
| 2013 | 464,786 | 522,128 | 817,815 | 423,421 | 740,108 | 377,119 | 150,144 | 34,656 | 4,685 | 4,263 | 2,552,211 |
| 2014 | 631,502 | 433,571 | 485,393 | 758,312 | 383,352 | 382,181 | 132,210 | 52,049 | 11,980 | 3,091 | 2,208,568 |
| 2015 | 465,639 | 590,366 | 405,004 | 450,280 | 689,308 | 201,696 | 140,420 | 48,084 | 18,882 | 5,464 | 1,959,138 |
| 2016 | 178,891 | 434,616 | 552,199 | 376,856 | 408,558 | 369,444 | 78,349 | 53,982 | 18,437 | 9,329 | 1,867,152 |
| 2017 | 215,595 | 167,319 | 405,710 | 514,280 | 343,281 | 159,083 | 149,297 | 31,321 | 21,521 | 11,062 | 1,635,556 |
| 2018 | 262,240 | 200,888 | 156,425 | 377,246 | 468,992 | 171,347 | 68,131 | 63,266 | 13,237 | 13,761 | 1,332,405 |
| 2019 | 164,016 | 245,177 | 187,183 | 145,732 | 345,150 | 235,962 | 76,726 | 30,218 | 27,992 | 11,938 | 1,060,901 |
| 2020 | 285,954 | 153,329 | 229,165 | 173,962 | 133,407 | 135,178 | 110,463 | 35,577 | 13,978 | 18,460 | 850,190 |
| 2021 | 455,572 | 267,087 | 143,272 | 213,507 | 159,895 | 54,874 | 66,367 | 53,718 | 17,260 | 15,726 | 724,618 |
| 2022 | 891,141 | 424,628 | 249,326 | 133,410 | 195,556 | 39,772 | 27,566 | 33,017 | 26,659 | 16,360 | 721,665 |
| 2023 | 191,905 | 216,730 | 395,648 | 232,017 | 122,261 | 72,671 | 19,447 | 13,317 | 15,902 | 20,703 | 891,966 |

*Table 24. SCA maximum likelihood estimates of August 1 biomass (t) of fall spawners in the Middle region of the southern Gulf of St. Lawrence.*

| Year | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11+ | 4+ |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1978 | 7,019 | 6,412 | 4,442 | 2,212 | 962 | 1,689 | 1,779 | 723 | 329 | 2,717 | 14,853 |
| 1979 | 5,942 | 4,823 | 5,080 | 3,121 | 1,121 | 357 | 845 | 802 | 289 | 1,084 | 12,699 |
| 1980 | 3,391 | 7,614 | 3,560 | 3,311 | 751 | 130 | 46 | 127 | 105 | 181 | 8,211 |
| 1981 | 4,762 | 4,779 | 7,811 | 2,540 | 1,469 | 229 | 47 | 18 | 46 | 98 | 12,258 |
| 1982 | 6,410 | 6,378 | 5,076 | 5,436 | 688 | 248 | 47 | 9 | 4 | 28 | 11,536 |
| 1983 | 4,270 | 7,727 | 5,929 | 3,481 | 3,097 | 357 | 170 | 28 | 4 | 18 | 13,084 |
| 1984 | 4,697 | 5,740 | 7,881 | 3,724 | 1,090 | 713 | 106 | 46 | 8 | 5 | 13,572 |
| 1985 | 5,902 | 6,465 | 6,044 | 6,512 | 2,071 | 506 | 400 | 57 | 23 | 9 | 15,623 |
| 1986 | 4,454 | 7,506 | 5,945 | 4,245 | 4,124 | 1,314 | 401 | 300 | 42 | 22 | 16,394 |
| 1987 | 3,626 | 7,085 | 7,475 | 4,108 | 2,148 | 2,124 | 785 | 250 | 151 | 39 | 17,080 |
| 1988 | 3,987 | 4,888 | 7,813 | 6,047 | 2,858 | 1,272 | 1,578 | 536 | 146 | 110 | 20,360 |
| 1989 | 19,920 | 6,329 | 4,809 | 5,303 | 3,574 | 1,433 | 844 | 939 | 346 | 160 | 17,407 |
| 1990 | 13,492 | 25,351 | 6,846 | 3,560 | 3,426 | 2,168 | 1,002 | 593 | 650 | 360 | 18,605 |
| 1991 | 2,952 | 16,641 | 26,497 | 5,030 | 2,108 | 1,998 | 1,395 | 647 | 399 | 631 | 38,703 |
| 1992 | 11,511 | 4,158 | 17,231 | 20,136 | 2,713 | 929 | 1,019 | 713 | 329 | 533 | 43,603 |
| 1993 | 3,072 | 15,720 | 4,479 | 14,123 | 13,321 | 1,588 | 667 | 666 | 474 | 548 | 35,866 |
| 1994 | 5,995 | 4,279 | 16,893 | 3,612 | 9,808 | 8,529 | 1,091 | 458 | 470 | 703 | 41,564 |
| 1995 | 4,276 | 8,682 | 4,802 | 14,100 | 2,421 | 6,018 | 5,444 | 759 | 296 | 738 | 34,579 |
| 1996 | 3,189 | 4,606 | 9,976 | 3,960 | 7,429 | 1,058 | 2,614 | 2,301 | 347 | 439 | 28,124 |
| 1997 | 9,700 | 7,149 | 5,142 | 8,118 | 2,115 | 3,238 | 491 | 1,206 | 1,040 | 347 | 21,698 |
| 1998 | 7,242 | 11,855 | 10,722 | 4,879 | 4,371 | 940 | 1,385 | 214 | 521 | 605 | 23,638 |
| 1999 | 5,080 | 10,443 | 14,650 | 9,129 | 2,176 | 1,478 | 315 | 444 | 71 | 354 | 28,618 |
| 2000 | 6,274 | 5,918 | 13,556 | 14,194 | 4,123 | 743 | 476 | 100 | 141 | 132 | 33,464 |
| 2001 | 6,564 | 10,411 | 7,916 | 12,781 | 7,134 | 1,606 | 273 | 168 | 36 | 88 | 30,002 |
| 2002 | 8,827 | 10,614 | 13,994 | 9,278 | 8,111 | 3,985 | 792 | 140 | 82 | 59 | 36,441 |
| 2003 | 6,709 | 15,618 | 14,336 | 13,277 | 6,202 | 4,528 | 2,016 | 390 | 72 | 74 | 40,895 |

| Year | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11+ | 4+ |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2004 | 5,847 | 10,163 | 21,345 | 14,190 | 9,248 | 3,797 | 2,469 | 1,075 | 205 | 77 | 52,406 |
| 2005 | 3,151 | 7,711 | 12,550 | 20,074 | 10,022 | 5,847 | 2,038 | 1,327 | 559 | 157 | 52,576 |
| 2006 | 34,593 | 5,649 | 10,390 | 12,861 | 13,475 | 5,732 | 2,733 | 945 | 609 | 311 | 47,056 |
| 2007 | 21,151 | 30,623 | 7,860 | 11,828 | 12,020 | 8,966 | 2,662 | 1,233 | 410 | 404 | 45,383 |
| 2008 | 15,386 | 22,905 | 30,214 | 7,981 | 10,383 | 8,387 | 4,165 | 1,212 | 562 | 365 | 63,268 |
| 2009 | 15,260 | 20,696 | 27,817 | 32,552 | 7,326 | 7,326 | 3,880 | 1,875 | 529 | 395 | 81,700 |
| 2010 | 9,869 | 16,888 | 24,344 | 32,480 | 30,734 | 5,314 | 3,342 | 1,719 | 849 | 394 | 99,176 |
| 2011 | 16,137 | 8,811 | 19,155 | 24,899 | 30,726 | 24,489 | 2,353 | 1,554 | 769 | 565 | 104,511 |
| 2012 | 9,964 | 15,740 | 9,775 | 20,082 | 23,566 | 25,431 | 10,912 | 1,060 | 701 | 594 | 92,122 |
| 2013 | 7,517 | 11,062 | 17,501 | 12,373 | 19,184 | 20,376 | 10,960 | 4,617 | 461 | 551 | 86,023 |
| 2014 | 9,207 | 7,544 | 12,753 | 21,262 | 12,933 | 17,289 | 8,888 | 4,693 | 1,966 | 397 | 80,181 |
| 2015 | 6,021 | 9,556 | 9,472 | 15,253 | 22,426 | 11,731 | 7,724 | 3,933 | 2,022 | 1,047 | 73,608 |
| 2016 | 2,811 | 6,707 | 11,575 | 12,148 | 16,009 | 20,103 | 5,269 | 3,431 | 1,730 | 1,330 | 71,595 |
| 2017 | 3,708 | 3,259 | 7,952 | 13,929 | 11,532 | 13,470 | 9,198 | 2,360 | 1,586 | 1,451 | 61,477 |
| 2018 | 3,642 | 4,102 | 3,916 | 9,019 | 13,481 | 9,490 | 6,099 | 4,085 | 1,043 | 1,385 | 48,516 |
| 2019 | 3,475 | 4,108 | 4,845 | 4,235 | 8,823 | 11,591 | 4,895 | 3,142 | 2,107 | 1,169 | 40,807 |
| 2020 | 6,327 | 3,933 | 4,676 | 5,561 | 4,129 | 7,991 | 6,593 | 2,743 | 1,779 | 1,874 | 35,344 |
| 2021 | 8,877 | 8,692 | 4,561 | 5,408 | 5,643 | 3,960 | 4,943 | 4,019 | 1,683 | 2,211 | 32,429 |
| 2022 | 18,292 | 11,900 | 10,149 | 5,112 | 5,675 | 5,120 | 2,451 | 3,009 | 2,417 | 2,320 | 36,253 |
| 2023 | 7,246 | 24,079 | 13,961 | 10,207 | 5,305 | 5,429 | 3,341 | 1,601 | 1,928 | 2,946 | 44,718 |

*Table 25. SCA maximum likelihood estimates of January 1 abundance (number in thousands) of fall spawners in the Middle region of the southern Gulf of St. Lawrence.*

| Year | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11+ | 4+ |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1978 | 40,792 | 38,586 | 21,743 | 9,605 | 3,520 | 6,468 | 5,446 | 2,015 | 1,121 | 6,582 | 56,499 |
| 1979 | 81,890 | 26,906 | 25,075 | 12,714 | 3,983 | 1,159 | 2,606 | 2,183 | 807 | 3,085 | 51,612 |
| 1980 | 48,338 | 53,825 | 16,982 | 11,867 | 2,358 | 393 | 130 | 288 | 241 | 429 | 32,688 |
| 1981 | 63,001 | 31,863 | 34,792 | 9,552 | 4,246 | 622 | 125 | 41 | 91 | 212 | 49,683 |

| Year | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11+ | 4+ |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1982 | 92,369 | 41,619 | 20,857 | 19,503 | 2,209 | 649 | 118 | 24 | 8 | 57 | 43,425 |
| 1983 | 60,044 | 61,045 | 27,454 | 13,329 | 10,400 | 1,082 | 404 | 73 | 15 | 40 | 52,798 |
| 1984 | 63,076 | 39,671 | 40,052 | 16,008 | 3,962 | 2,256 | 293 | 109 | 20 | 15 | 62,715 |
| 1985 | 81,155 | 41,682 | 26,126 | 24,900 | 7,161 | 1,520 | 1,093 | 142 | 53 | 17 | 61,012 |
| 1986 | 66,918 | 53,636 | 27,514 | 16,886 | 14,271 | 3,880 | 1,048 | 754 | 98 | 48 | 64,499 |
| 1987 | 44,299 | 44,225 | 35,384 | 17,608 | 9,085 | 7,079 | 2,445 | 660 | 475 | 92 | 72,828 |
| 1988 | 64,543 | 29,645 | 29,536 | 22,843 | 9,364 | 4,412 | 4,301 | 1,485 | 401 | 344 | 72,687 |
| 1989 | 259,004 | 43,457 | 19,907 | 18,970 | 11,374 | 4,139 | 2,420 | 2,358 | 814 | 409 | 60,390 |
| 1990 | 169,962 | 177,662 | 29,775 | 13,381 | 11,431 | 6,512 | 2,899 | 1,694 | 1,651 | 856 | 68,199 |
| 1991 | 40,614 | 119,223 | 124,392 | 20,201 | 7,584 | 5,955 | 4,043 | 1,799 | 1,052 | 1,556 | 166,582 |
| 1992 | 150,924 | 29,266 | 85,645 | 84,810 | 10,220 | 3,337 | 3,017 | 2,047 | 911 | 1,321 | 191,309 |
| 1993 | 40,386 | 111,108 | 21,514 | 61,437 | 52,902 | 5,971 | 2,204 | 1,992 | 1,352 | 1,473 | 148,845 |
| 1994 | 79,942 | 30,332 | 83,315 | 15,698 | 38,365 | 30,714 | 3,824 | 1,411 | 1,275 | 1,809 | 176,411 |
| 1995 | 48,465 | 61,336 | 23,229 | 61,828 | 9,733 | 21,866 | 18,784 | 2,338 | 863 | 1,886 | 140,526 |
| 1996 | 86,927 | 37,930 | 47,796 | 16,824 | 29,480 | 3,816 | 8,886 | 7,627 | 949 | 1,116 | 116,494 |
| 1997 | 133,880 | 69,085 | 30,027 | 35,409 | 8,535 | 12,526 | 1,648 | 3,834 | 3,291 | 891 | 96,162 |
| 1998 | 113,801 | 107,501 | 55,243 | 22,384 | 17,685 | 3,534 | 5,194 | 683 | 1,589 | 1,733 | 108,044 |
| 1999 | 76,904 | 92,343 | 86,711 | 40,274 | 9,160 | 5,523 | 1,081 | 1,587 | 209 | 1,015 | 145,559 |
| 2000 | 105,083 | 63,252 | 75,494 | 64,012 | 16,599 | 2,874 | 1,658 | 324 | 476 | 367 | 161,804 |
| 2001 | 110,152 | 87,530 | 52,411 | 57,244 | 29,243 | 5,982 | 971 | 560 | 109 | 284 | 146,804 |
| 2002 | 155,598 | 92,767 | 73,480 | 41,680 | 33,414 | 14,770 | 2,790 | 452 | 261 | 184 | 167,031 |
| 2003 | 107,435 | 132,360 | 78,664 | 59,074 | 24,712 | 17,180 | 6,863 | 1,296 | 210 | 206 | 188,206 |
| 2004 | 87,358 | 92,377 | 113,531 | 64,743 | 38,400 | 14,384 | 8,816 | 3,520 | 665 | 214 | 244,272 |
| 2005 | 58,390 | 75,960 | 80,138 | 94,700 | 43,162 | 23,052 | 7,365 | 4,512 | 1,801 | 449 | 255,180 |
| 2006 | 248,766 | 51,307 | 66,542 | 66,639 | 58,486 | 23,193 | 10,157 | 3,243 | 1,987 | 991 | 231,239 |
| 2007 | 233,763 | 220,883 | 45,506 | 58,372 | 53,518 | 36,689 | 10,328 | 4,456 | 1,421 | 1,304 | 211,595 |
| 2008 | 178,559 | 209,521 | 197,798 | 40,387 | 48,217 | 36,162 | 17,157 | 4,772 | 2,056 | 1,257 | 347,806 |

| Year | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11+ | 4+ |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2009 | 146,957 | 161,363 | 189,154 | 176,819 | 33,359 | 31,920 | 15,655 | 7,329 | 2,036 | 1,413 | 457,685 |
| 2010 | 91,538 | 133,812 | 146,798 | 170,573 | 148,583 | 23,007 | 13,778 | 6,678 | 3,122 | 1,469 | 514,008 |
| 2011 | 152,594 | 83,976 | 122,680 | 133,743 | 147,762 | 111,772 | 10,264 | 6,095 | 2,951 | 2,029 | 537,296 |
| 2012 | 99,163 | 140,985 | 77,554 | 112,817 | 118,861 | 119,349 | 49,184 | 4,491 | 2,665 | 2,177 | 487,099 |
| 2013 | 72,001 | 92,141 | 130,954 | 71,783 | 101,514 | 98,823 | 50,033 | 20,521 | 1,873 | 2,019 | 477,520 |
| 2014 | 89,013 | 67,176 | 85,933 | 121,667 | 64,686 | 83,980 | 40,192 | 20,244 | 8,298 | 1,574 | 426,574 |
| 2015 | 60,196 | 83,305 | 62,846 | 80,112 | 110,273 | 54,181 | 34,872 | 16,610 | 8,362 | 4,078 | 371,334 |
| 2016 | 28,717 | 56,463 | 78,107 | 58,685 | 72,404 | 90,953 | 22,566 | 14,444 | 6,876 | 5,149 | 349,185 |
| 2017 | 36,935 | 26,980 | 53,029 | 73,114 | 53,494 | 61,270 | 40,314 | 9,957 | 6,371 | 5,304 | 302,852 |
| 2018 | 36,631 | 34,730 | 25,358 | 49,626 | 66,072 | 43,839 | 27,707 | 18,124 | 4,474 | 5,245 | 240,444 |
| 2019 | 35,019 | 34,455 | 32,656 | 23,758 | 45,168 | 55,461 | 22,088 | 13,892 | 9,082 | 4,870 | 206,975 |
| 2020 | 70,237 | 32,940 | 32,399 | 30,610 | 21,711 | 38,446 | 30,205 | 11,978 | 7,530 | 7,563 | 180,443 |
| 2021 | 97,360 | 66,059 | 30,972 | 30,385 | 28,115 | 18,812 | 22,244 | 17,414 | 6,903 | 8,698 | 163,542 |
| 2022 | 198,782 | 91,561 | 62,109 | 29,052 | 27,968 | 24,548 | 11,179 | 13,176 | 10,312 | 9,238 | 187,583 |
| 2023 | 79,548 | 186,977 | 86,118 | 58,385 | 27,189 | 25,852 | 15,656 | 7,125 | 8,397 | 12,459 | 241,181 |

*Table 26. SCA maximum likelihood estimates of August 1 biomass (t) of fall spawners in the South region of the southern Gulf of St. Lawrence.*

| Year | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11+ | 4+ |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1978 | 7,942 | 14,432 | 8,129 | 5,179 | 2,272 | 1,900 | 1,443 | 529 | 506 | 1,226 | 21,183 |
| 1979 | 31,172 | 9,836 | 15,459 | 6,769 | 2,876 | 1,094 | 904 | 617 | 211 | 559 | 28,490 |
| 1980 | 12,771 | 18,939 | 8,500 | 12,129 | 4,420 | 1,596 | 749 | 580 | 390 | 484 | 28,849 |
| 1981 | 28,099 | 18,673 | 14,874 | 5,168 | 4,620 | 980 | 308 | 99 | 79 | 112 | 26,240 |
| 1982 | 47,716 | 34,567 | 22,249 | 14,242 | 3,192 | 1,997 | 522 | 156 | 46 | 86 | 42,488 |
| 1983 | 19,167 | 56,112 | 33,262 | 17,035 | 7,760 | 1,340 | 1,042 | 265 | 81 | 67 | 60,852 |
| 1984 | 43,399 | 26,167 | 55,164 | 24,271 | 9,755 | 3,824 | 893 | 657 | 170 | 102 | 94,836 |
| 1985 | 57,955 | 52,561 | 26,629 | 42,336 | 14,887 | 5,156 | 2,650 | 612 | 441 | 177 | 92,888 |
| 1986 | 48,032 | 65,910 | 51,414 | 19,379 | 27,119 | 8,379 | 3,788 | 1,903 | 426 | 382 | 112,792 |
| 1987 | 15,288 | 42,005 | 65,171 | 38,614 | 12,080 | 14,637 | 5,880 | 2,588 | 1,270 | 567 | 140,807 |

| Year | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11+ | 4+ |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1988 | 13,252 | 19,159 | 32,985 | 52,032 | 24,154 | 6,390 | 9,892 | 3,883 | 1,693 | 1,165 | 132,195 |
| 1989 | 64,705 | 15,724 | 17,920 | 22,736 | 34,246 | 13,978 | 4,789 | 7,325 | 2,767 | 2,076 | 105,838 |
| 1990 | 36,915 | 64,829 | 16,639 | 13,215 | 16,425 | 22,708 | 11,677 | 3,961 | 5,904 | 3,760 | 94,290 |
| 1991 | 11,926 | 38,690 | 58,788 | 13,229 | 7,560 | 7,882 | 12,802 | 6,480 | 2,135 | 5,226 | 114,101 |
| 1992 | 34,249 | 9,582 | 35,186 | 44,852 | 8,981 | 4,645 | 6,029 | 9,612 | 4,851 | 5,298 | 119,455 |
| 1993 | 7,825 | 33,487 | 9,327 | 28,230 | 30,574 | 5,600 | 3,672 | 4,673 | 7,312 | 7,795 | 97,183 |
| 1994 | 36,567 | 5,577 | 28,724 | 7,509 | 20,681 | 20,885 | 4,633 | 3,000 | 3,788 | 11,769 | 100,990 |
| 1995 | 2,185 | 15,784 | 5,138 | 23,226 | 4,831 | 11,687 | 12,991 | 3,061 | 1,855 | 9,284 | 72,073 |
| 1996 | 4,200 | 5,949 | 15,366 | 4,966 | 17,214 | 3,227 | 7,585 | 8,233 | 1,860 | 6,508 | 64,958 |
| 1997 | 21,709 | 15,082 | 10,316 | 20,638 | 3,323 | 8,748 | 1,625 | 3,719 | 4,038 | 3,857 | 56,263 |
| 1998 | 11,592 | 21,325 | 29,768 | 10,063 | 14,145 | 1,915 | 4,519 | 845 | 1,838 | 3,811 | 66,903 |
| 1999 | 17,615 | 23,850 | 26,364 | 27,665 | 6,592 | 7,238 | 906 | 2,109 | 396 | 2,466 | 73,737 |
| 2000 | 48,292 | 18,722 | 36,959 | 29,552 | 16,556 | 2,934 | 2,844 | 351 | 810 | 1,074 | 91,079 |
| 2001 | 32,417 | 62,817 | 20,804 | 37,710 | 20,120 | 8,960 | 1,366 | 1,307 | 156 | 774 | 91,197 |
| 2002 | 39,631 | 49,216 | 83,437 | 22,263 | 27,970 | 11,971 | 4,348 | 654 | 613 | 431 | 151,687 |
| 2003 | 20,002 | 50,547 | 60,802 | 89,878 | 17,456 | 17,622 | 6,157 | 2,173 | 329 | 514 | 194,930 |
| 2004 | 17,336 | 26,015 | 62,543 | 60,116 | 69,762 | 11,775 | 9,623 | 3,230 | 1,142 | 422 | 218,613 |
| 2005 | 10,880 | 35,498 | 34,634 | 70,101 | 55,081 | 55,602 | 7,381 | 5,938 | 1,977 | 963 | 231,677 |
| 2006 | 58,581 | 15,434 | 47,488 | 39,183 | 65,037 | 45,980 | 33,172 | 4,468 | 3,418 | 1,707 | 240,453 |
| 2007 | 30,943 | 92,961 | 19,160 | 43,053 | 35,763 | 53,494 | 24,519 | 17,369 | 2,315 | 2,565 | 198,237 |
| 2008 | 42,933 | 47,344 | 117,452 | 21,191 | 40,024 | 29,663 | 26,975 | 12,028 | 8,519 | 2,349 | 258,200 |
| 2009 | 22,308 | 59,241 | 64,766 | 124,359 | 22,118 | 36,484 | 15,581 | 13,902 | 6,021 | 5,283 | 288,515 |
| 2010 | 9,615 | 24,330 | 68,906 | 70,661 | 125,979 | 19,211 | 17,081 | 7,070 | 6,357 | 5,147 | 320,411 |
| 2011 | 16,943 | 11,359 | 29,132 | 69,294 | 65,781 | 109,012 | 8,095 | 6,955 | 2,803 | 4,502 | 295,576 |
| 2012 | 16,479 | 20,978 | 13,086 | 34,013 | 69,653 | 58,311 | 40,170 | 2,901 | 2,569 | 2,547 | 223,249 |
| 2013 | 10,241 | 19,784 | 23,772 | 14,468 | 34,806 | 65,195 | 19,884 | 13,365 | 942 | 1,689 | 174,121 |
| 2014 | 17,096 | 11,771 | 23,807 | 25,586 | 15,354 | 32,752 | 22,373 | 6,707 | 4,428 | 864 | 131,872 |

| Year | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11+ | 4+ |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2015 | 15,221 | 14,453 | 13,132 | 26,510 | 27,342 | 14,164 | 11,312 | 7,619 | 2,180 | 1,779 | 104,039 |
| 2016 | 6,526 | 18,822 | 16,321 | 16,296 | 28,351 | 26,283 | 5,260 | 4,171 | 2,712 | 1,372 | 100,767 |
| 2017 | 6,688 | 6,214 | 23,881 | 22,311 | 18,624 | 27,276 | 10,736 | 2,131 | 1,719 | 1,567 | 108,245 |
| 2018 | 10,930 | 8,892 | 6,651 | 24,952 | 23,151 | 15,778 | 12,058 | 4,707 | 963 | 1,511 | 89,770 |
| 2019 | 5,938 | 10,777 | 12,840 | 8,046 | 24,589 | 21,650 | 7,715 | 5,830 | 2,292 | 1,128 | 84,091 |
| 2020 | 10,476 | 6,312 | 12,456 | 16,675 | 8,969 | 25,746 | 12,328 | 4,329 | 3,177 | 1,833 | 85,514 |
| 2021 | 21,741 | 11,578 | 7,927 | 15,471 | 17,243 | 9,141 | 15,363 | 7,433 | 2,625 | 2,924 | 78,128 |
| 2022 | 32,449 | 22,792 | 15,434 | 10,223 | 16,218 | 16,076 | 5,216 | 8,576 | 4,080 | 2,897 | 78,720 |
| 2023 | 18,473 | 45,674 | 27,658 | 18,254 | 9,986 | 14,894 | 8,766 | 2,805 | 4,609 | 3,579 | 90,552 |

*Table 27. SCA maximum likelihood estimates of January 1 abundance (number in thousands) of fall spawners in the South region of the southern Gulf of St. Lawrence.*

| Year | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11+ | 4+ |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1978 | 121,364 | 142,453 | 57,838 | 25,202 | 10,825 | 7,327 | 5,104 | 1,828 | 1,695 | 3,248 | 113,069 |
| 1979 | 235,670 | 77,344 | 87,153 | 32,080 | 11,587 | 3,910 | 2,937 | 1,850 | 635 | 1,685 | 141,837 |
| 1980 | 251,654 | 152,121 | 48,980 | 52,717 | 17,774 | 5,734 | 2,377 | 1,703 | 1,052 | 1,307 | 131,643 |
| 1981 | 346,088 | 155,832 | 86,114 | 22,352 | 15,926 | 3,160 | 900 | 299 | 195 | 260 | 129,207 |
| 1982 | 604,683 | 225,798 | 101,107 | 52,635 | 9,899 | 5,365 | 1,371 | 389 | 129 | 197 | 171,092 |
| 1983 | 273,305 | 394,573 | 146,761 | 62,991 | 26,092 | 4,041 | 2,855 | 727 | 206 | 173 | 243,847 |
| 1984 | 556,257 | 178,357 | 256,744 | 92,543 | 33,529 | 12,026 | 2,447 | 1,725 | 439 | 229 | 399,682 |
| 1985 | 731,760 | 363,016 | 116,084 | 162,350 | 50,080 | 15,896 | 7,502 | 1,523 | 1,074 | 416 | 354,926 |
| 1986 | 324,803 | 477,578 | 236,431 | 73,944 | 91,727 | 25,555 | 10,723 | 5,054 | 1,026 | 1,004 | 445,463 |
| 1987 | 181,696 | 211,975 | 310,962 | 150,172 | 41,079 | 45,479 | 16,719 | 7,004 | 3,301 | 1,326 | 576,042 |
| 1988 | 187,307 | 119,437 | 138,948 | 197,736 | 81,055 | 19,291 | 27,760 | 10,186 | 4,266 | 2,818 | 482,060 |
| 1989 | 622,701 | 123,606 | 78,670 | 89,696 | 114,494 | 42,792 | 13,228 | 19,011 | 6,974 | 4,851 | 369,716 |
| 1990 | 408,941 | 414,958 | 82,300 | 51,910 | 56,368 | 69,033 | 33,266 | 10,277 | 14,769 | 9,187 | 327,109 |
| 1991 | 116,346 | 274,399 | 277,365 | 52,778 | 26,619 | 23,906 | 36,391 | 17,490 | 5,402 | 12,592 | 452,543 |
| 1992 | 348,128 | 78,720 | 185,483 | 185,592 | 33,430 | 16,093 | 18,067 | 27,486 | 13,209 | 13,590 | 492,950 |
| 1993 | 69,132 | 239,378 | 54,080 | 126,184 | 119,759 | 20,625 | 12,091 | 13,566 | 20,636 | 20,121 | 387,062 |

| Year | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11+ | 4+ |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1994 | 246,224 | 48,622 | 168,280 | 37,821 | 85,817 | 79,538 | 16,153 | 9,466 | 10,621 | 31,910 | 439,606 |
| 1995 | 108,245 | 179,358 | 35,328 | 118,946 | 23,042 | 46,081 | 47,046 | 9,538 | 5,589 | 25,109 | 310,678 |
| 1996 | 274,330 | 81,287 | 134,337 | 25,723 | 74,361 | 12,655 | 26,558 | 27,066 | 5,486 | 17,657 | 323,844 |
| 1997 | 294,317 | 211,001 | 62,249 | 98,136 | 14,570 | 33,935 | 5,745 | 12,020 | 12,246 | 10,472 | 249,372 |
| 1998 | 362,242 | 230,738 | 164,764 | 46,574 | 58,296 | 7,115 | 15,976 | 2,697 | 5,642 | 10,664 | 311,728 |
| 1999 | 209,527 | 289,300 | 183,480 | 125,058 | 27,496 | 27,802 | 3,148 | 7,049 | 1,190 | 7,192 | 382,415 |
| 2000 | 755,392 | 170,384 | 233,917 | 139,536 | 68,322 | 11,342 | 10,148 | 1,145 | 2,562 | 3,047 | 470,020 |
| 2001 | 529,604 | 623,804 | 140,131 | 184,128 | 86,689 | 34,717 | 4,989 | 4,452 | 502 | 2,460 | 458,068 |
| 2002 | 583,579 | 443,147 | 520,115 | 112,455 | 120,213 | 47,498 | 15,979 | 2,291 | 2,044 | 1,360 | 821,955 |
| 2003 | 305,002 | 493,386 | 373,568 | 424,933 | 77,589 | 71,850 | 23,283 | 7,818 | 1,121 | 1,665 | 981,827 |
| 2004 | 337,799 | 260,330 | 420,149 | 310,294 | 308,584 | 50,268 | 37,202 | 12,036 | 4,041 | 1,440 | 1,144,014 |
| 2005 | 171,021 | 291,084 | 224,080 | 357,365 | 247,501 | 233,063 | 29,592 | 21,884 | 7,080 | 3,224 | 1,123,788 |
| 2006 | 991,892 | 149,078 | 253,475 | 192,982 | 289,943 | 190,883 | 132,351 | 16,793 | 12,418 | 5,847 | 1,094,691 |
| 2007 | 508,509 | 873,279 | 131,213 | 222,533 | 166,091 | 230,518 | 100,109 | 68,516 | 8,680 | 9,438 | 937,098 |
| 2008 | 574,966 | 451,803 | 775,672 | 116,253 | 193,305 | 133,343 | 114,631 | 49,143 | 33,581 | 8,878 | 1,424,807 |
| 2009 | 292,296 | 514,872 | 404,483 | 692,963 | 102,150 | 158,986 | 64,128 | 54,536 | 23,349 | 20,170 | 1,520,765 |
| 2010 | 128,339 | 263,509 | 464,011 | 363,482 | 608,887 | 82,062 | 67,878 | 26,980 | 22,903 | 18,273 | 1,654,476 |
| 2011 | 225,904 | 116,415 | 238,967 | 419,889 | 323,409 | 506,445 | 33,086 | 27,066 | 10,744 | 16,394 | 1,576,000 |
| 2012 | 220,341 | 206,095 | 106,188 | 217,644 | 377,912 | 277,620 | 183,524 | 11,897 | 9,723 | 9,748 | 1,194,256 |
| 2013 | 132,929 | 201,899 | 188,816 | 97,152 | 196,998 | 327,727 | 91,854 | 60,297 | 3,905 | 6,391 | 973,140 |
| 2014 | 189,640 | 122,153 | 185,498 | 173,197 | 87,994 | 169,632 | 107,060 | 29,759 | 19,515 | 3,332 | 775,987 |
| 2015 | 204,857 | 174,615 | 112,448 | 170,398 | 156,484 | 74,417 | 55,499 | 34,650 | 9,619 | 7,384 | 620,898 |
| 2016 | 69,043 | 188,865 | 160,941 | 103,401 | 153,858 | 131,382 | 25,470 | 18,770 | 11,702 | 5,741 | 611,264 |
| 2017 | 119,892 | 63,696 | 174,201 | 148,175 | 93,848 | 131,909 | 50,145 | 9,631 | 7,089 | 6,587 | 621,586 |
| 2018 | 116,404 | 110,608 | 58,756 | 160,504 | 135,286 | 82,627 | 59,347 | 22,427 | 4,304 | 6,112 | 529,363 |
| 2019 | 73,485 | 107,441 | 102,079 | 54,167 | 146,732 | 119,606 | 39,982 | 28,561 | 10,786 | 5,009 | 506,922 |
| 2020 | 137,121 | 67,872 | 99,220 | 94,154 | 49,491 | 129,094 | 59,722 | 19,841 | 14,162 | 7,831 | 473,515 |

| Year | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11+ | 4+ |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2021 | 259,962 | 126,662 | 62,692 | 91,608 | 86,642 | 44,940 | 71,108 | 32,825 | 10,902 | 12,085 | 412,801 |
| 2022 | 463,354 | 240,097 | 116,967 | 57,820 | 83,665 | 76,090 | 24,279 | 38,171 | 17,607 | 12,329 | 426,927 |
| 2023 | 240,884 | 427,977 | 221,729 | 107,861 | 52,716 | 72,891 | 40,741 | 12,903 | 20,268 | 15,893 | 545,002 |

*Table 28. SCA maximum likelihood estimates of August 1 total biomass (t) of fall spawners in the southern Gulf of St. Lawrence.*

| Year | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11+ | 4+ |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1978 | 32,516 | 30,301 | 20,525 | 14,607 | 6,704 | 6,448 | 7,031 | 2,146 | 1,322 | 6,653 | 65,435 |
| 1979 | 62,689 | 26,745 | 28,550 | 12,856 | 5,723 | 2,153 | 2,495 | 2,315 | 729 | 2,318 | 57,138 |
| 1980 | 31,668 | 55,810 | 20,764 | 19,424 | 6,229 | 2,290 | 1,050 | 975 | 811 | 1,003 | 52,547 |
| 1981 | 80,767 | 48,679 | 53,124 | 13,688 | 8,189 | 1,761 | 678 | 269 | 273 | 561 | 78,542 |
| 1982 | 77,252 | 81,505 | 58,091 | 46,543 | 7,940 | 3,488 | 922 | 371 | 147 | 415 | 117,916 |
| 1983 | 37,784 | 98,882 | 77,378 | 46,013 | 29,198 | 4,248 | 2,062 | 513 | 228 | 338 | 159,979 |
| 1984 | 68,470 | 54,360 | 107,247 | 63,470 | 30,293 | 17,713 | 3,004 | 1,357 | 336 | 427 | 223,847 |
| 1985 | 87,018 | 87,849 | 58,677 | 90,713 | 45,244 | 20,492 | 13,856 | 2,270 | 980 | 561 | 232,793 |
| 1986 | 75,124 | 110,809 | 92,151 | 46,700 | 62,691 | 30,051 | 15,478 | 10,178 | 1,641 | 1,019 | 259,910 |
| 1987 | 41,093 | 85,686 | 120,750 | 72,889 | 30,613 | 36,435 | 20,264 | 10,251 | 6,597 | 1,730 | 299,528 |
| 1988 | 32,362 | 47,803 | 84,120 | 99,052 | 45,087 | 16,683 | 23,210 | 12,288 | 6,089 | 4,875 | 291,405 |
| 1989 | 131,101 | 43,664 | 49,516 | 62,763 | 64,831 | 26,437 | 11,494 | 15,672 | 8,114 | 7,072 | 245,899 |
| 1990 | 82,396 | 157,136 | 50,171 | 41,387 | 41,709 | 40,678 | 19,575 | 8,134 | 11,068 | 10,064 | 222,785 |
| 1991 | 26,224 | 88,755 | 162,220 | 40,211 | 23,515 | 21,048 | 22,736 | 10,769 | 4,378 | 11,211 | 296,088 |
| 1992 | 59,954 | 25,021 | 87,735 | 129,849 | 25,636 | 13,784 | 13,914 | 15,453 | 7,339 | 10,014 | 303,724 |
| 1993 | 17,335 | 69,870 | 25,923 | 74,513 | 86,801 | 15,722 | 9,425 | 9,521 | 10,765 | 11,996 | 244,665 |
| 1994 | 55,465 | 17,898 | 72,982 | 23,506 | 54,269 | 58,784 | 11,599 | 6,960 | 7,006 | 16,916 | 252,022 |
| 1995 | 15,498 | 41,283 | 20,249 | 61,762 | 14,276 | 29,560 | 32,562 | 6,656 | 3,823 | 13,357 | 182,245 |
| 1996 | 18,949 | 24,018 | 47,248 | 18,647 | 35,633 | 6,912 | 14,427 | 15,486 | 3,215 | 8,687 | 150,255 |
| 1997 | 48,902 | 38,245 | 33,346 | 48,263 | 10,118 | 16,476 | 3,117 | 6,484 | 6,889 | 5,145 | 129,838 |
| 1998 | 31,626 | 59,966 | 60,032 | 31,039 | 28,399 | 4,939 | 7,712 | 1,473 | 2,978 | 5,469 | 142,042 |

| Year | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11+ | 4+ |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1999 | 33,295 | 53,006 | 78,217 | 53,451 | 17,023 | 13,109 | 2,034 | 3,277 | 627 | 3,437 | 171,176 |
| 2000 | 63,476 | 42,171 | 75,997 | 77,660 | 28,600 | 6,999 | 4,908 | 732 | 1,206 | 1,466 | 197,569 |
| 2001 | 47,641 | 86,575 | 53,861 | 74,359 | 45,079 | 14,149 | 2,984 | 2,093 | 308 | 1,061 | 193,894 |
| 2002 | 74,539 | 75,020 | 116,582 | 55,814 | 50,252 | 25,274 | 6,782 | 1,421 | 973 | 634 | 257,734 |
| 2003 | 46,054 | 104,060 | 95,994 | 122,244 | 38,371 | 29,924 | 12,648 | 3,343 | 699 | 780 | 304,003 |
| 2004 | 41,120 | 65,144 | 131,451 | 91,682 | 88,363 | 21,847 | 14,927 | 5,937 | 1,634 | 674 | 356,515 |
| 2005 | 24,236 | 66,051 | 83,301 | 135,416 | 77,043 | 67,199 | 12,669 | 8,687 | 3,336 | 1,336 | 388,987 |
| 2006 | 123,250 | 36,554 | 87,660 | 87,535 | 109,238 | 59,060 | 38,653 | 6,990 | 4,696 | 2,491 | 396,323 |
| 2007 | 104,048 | 167,204 | 47,615 | 86,868 | 78,498 | 81,118 | 30,031 | 19,621 | 3,282 | 3,373 | 350,407 |
| 2008 | 108,472 | 143,944 | 207,192 | 51,472 | 77,398 | 58,607 | 39,010 | 14,372 | 9,483 | 3,085 | 460,619 |
| 2009 | 87,740 | 142,119 | 189,664 | 222,896 | 50,115 | 64,726 | 29,315 | 19,252 | 7,056 | 5,991 | 589,016 |
| 2010 | 47,776 | 100,803 | 165,730 | 207,104 | 215,486 | 40,681 | 30,442 | 13,340 | 8,807 | 5,919 | 687,509 |
| 2011 | 64,893 | 49,267 | 118,517 | 173,467 | 194,082 | 183,102 | 18,088 | 13,108 | 5,609 | 5,997 | 711,969 |
| 2012 | 41,762 | 82,648 | 55,421 | 133,689 | 175,782 | 172,231 | 72,744 | 7,256 | 5,185 | 4,398 | 626,705 |
| 2013 | 34,599 | 51,866 | 102,542 | 67,360 | 137,911 | 163,680 | 63,988 | 26,003 | 2,645 | 3,373 | 567,501 |
| 2014 | 44,929 | 41,870 | 63,520 | 122,766 | 74,525 | 131,679 | 60,945 | 23,632 | 9,360 | 2,159 | 488,586 |
| 2015 | 40,493 | 51,376 | 50,488 | 74,981 | 133,916 | 70,454 | 50,916 | 22,985 | 8,554 | 4,260 | 416,553 |
| 2016 | 15,172 | 45,874 | 67,246 | 62,893 | 81,177 | 124,254 | 28,123 | 20,077 | 8,826 | 4,843 | 397,439 |
| 2017 | 14,209 | 16,662 | 57,011 | 86,236 | 69,075 | 75,036 | 52,791 | 11,698 | 8,558 | 5,818 | 366,223 |
| 2018 | 22,971 | 17,701 | 18,294 | 63,810 | 88,519 | 60,649 | 33,380 | 23,327 | 5,215 | 6,503 | 299,697 |
| 2019 | 13,466 | 24,807 | 23,311 | 21,325 | 62,484 | 81,653 | 29,005 | 15,835 | 11,003 | 5,308 | 249,924 |
| 2020 | 23,190 | 14,935 | 28,735 | 28,958 | 24,531 | 61,584 | 42,967 | 15,043 | 8,241 | 8,346 | 218,406 |
| 2021 | 37,136 | 27,255 | 19,388 | 35,993 | 31,301 | 24,928 | 35,371 | 24,095 | 8,440 | 9,321 | 188,837 |
| 2022 | 66,068 | 44,744 | 34,896 | 24,352 | 39,155 | 29,698 | 13,861 | 19,350 | 12,930 | 9,279 | 183,522 |
| 2023 | 39,443 | 92,746 | 54,826 | 40,120 | 23,447 | 35,421 | 16,178 | 7,371 | 10,216 | 11,327 | 198,906 |

*Table 29. SCA maximum likelihood estimates of January 1 total abundance (number in thousands) of fall spawners in the southern Gulf of St. Lawrence.*

| Year | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11+ | 4+ |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1978 | 244,083 | 236,164 | 116,281 | 64,267 | 26,150 | 24,011 | 21,837 | 6,650 | 4,472 | 16,586 | 280,253 |
| 1979 | 567,656 | 167,496 | 148,607 | 56,178 | 21,740 | 7,447 | 7,813 | 6,539 | 2,066 | 6,637 | 257,027 |
| 1980 | 515,315 | 399,755 | 109,861 | 79,442 | 23,660 | 7,989 | 3,298 | 2,746 | 2,127 | 2,565 | 231,688 |
| 1981 | 703,568 | 355,151 | 261,880 | 55,046 | 26,798 | 5,330 | 1,927 | 724 | 652 | 1,277 | 353,634 |
| 1982 | 1,040,623 | 497,477 | 251,334 | 170,026 | 24,788 | 9,422 | 2,363 | 922 | 354 | 916 | 460,124 |
| 1983 | 533,473 | 724,100 | 352,543 | 169,129 | 95,626 | 12,440 | 5,424 | 1,356 | 545 | 771 | 637,835 |
| 1984 | 874,357 | 374,462 | 505,740 | 241,600 | 100,543 | 53,466 | 8,088 | 3,416 | 865 | 888 | 914,607 |
| 1985 | 1,179,678 | 604,065 | 264,094 | 344,915 | 150,747 | 60,897 | 38,417 | 5,735 | 2,331 | 1,232 | 868,368 |
| 1986 | 692,241 | 817,881 | 418,912 | 180,687 | 209,350 | 88,840 | 42,223 | 26,689 | 3,973 | 2,454 | 973,127 |
| 1987 | 447,741 | 491,030 | 568,432 | 278,364 | 103,592 | 111,095 | 56,198 | 26,642 | 16,788 | 4,067 | 1,165,178 |
| 1988 | 467,863 | 322,206 | 349,788 | 374,705 | 150,989 | 51,179 | 65,137 | 32,587 | 15,385 | 12,008 | 1,051,776 |
| 1989 | 1,520,811 | 335,177 | 232,097 | 236,894 | 215,806 | 80,511 | 32,440 | 41,576 | 20,567 | 17,212 | 877,103 |
| 1990 | 900,021 | 1,090,918 | 241,790 | 158,539 | 139,574 | 123,006 | 55,588 | 21,681 | 28,104 | 24,342 | 792,624 |
| 1991 | 280,190 | 646,260 | 788,680 | 161,833 | 82,559 | 64,422 | 65,068 | 29,366 | 11,491 | 27,627 | 1,231,046 |
| 1992 | 765,516 | 206,202 | 470,629 | 550,071 | 96,420 | 46,684 | 41,694 | 44,217 | 20,127 | 25,947 | 1,295,789 |
| 1993 | 214,377 | 566,047 | 154,321 | 334,090 | 341,616 | 56,862 | 30,434 | 27,758 | 30,681 | 31,683 | 1,007,445 |
| 1994 | 846,157 | 243,882 | 678,778 | 167,290 | 345,961 | 218,754 | 39,625 | 21,352 | 19,814 | 45,907 | 1,537,481 |
| 1995 | 469,885 | 642,488 | 187,463 | 485,287 | 96,022 | 113,136 | 115,097 | 20,792 | 11,204 | 36,118 | 1,065,119 |
| 1996 | 879,809 | 370,030 | 496,546 | 131,021 | 256,240 | 26,913 | 50,215 | 50,782 | 9,347 | 23,305 | 1,044,370 |
| 1997 | 1,186,403 | 693,834 | 293,827 | 355,229 | 64,979 | 63,882 | 10,898 | 20,808 | 20,933 | 13,859 | 844,414 |
| 1998 | 1,172,215 | 959,183 | 552,301 | 214,083 | 192,549 | 18,389 | 27,798 | 4,712 | 9,114 | 15,396 | 1,034,341 |
| 1999 | 780,315 | 952,960 | 779,183 | 409,118 | 108,231 | 49,957 | 7,117 | 11,107 | 1,895 | 10,028 | 1,376,637 |
| 2000 | 1,876,005 | 646,550 | 779,070 | 569,659 | 202,908 | 27,169 | 17,375 | 2,435 | 3,865 | 4,189 | 1,606,670 |
| 2001 | 1,442,448 | 1,556,823 | 537,162 | 595,281 | 306,920 | 54,351 | 10,780 | 7,082 | 971 | 3,340 | 1,515,886 |
| 2002 | 1,855,637 | 1,212,934 | 1,301,480 | 419,023 | 365,114 | 97,439 | 24,528 | 4,775 | 3,177 | 1,946 | 2,217,482 |
| 2003 | 1,140,101 | 1,579,640 | 1,025,373 | 1,052,906 | 264,506 | 117,789 | 45,679 | 11,655 | 2,227 | 2,434 | 2,522,569 |

| Year | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11+ | 4+ |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2004 | 1,098,064 | 981,757 | 1,349,196 | 835,456 | 732,785 | 89,049 | 56,107 | 21,001 | 5,596 | 2,165 | 3,091,354 |
| 2005 | 628,052 | 953,557 | 850,553 | 1,126,389 | 634,628 | 278,885 | 48,905 | 31,335 | 11,547 | 4,360 | 2,986,602 |
| 2006 | 2,966,408 | 552,114 | 833,949 | 709,856 | 832,296 | 244,414 | 152,880 | 25,476 | 16,653 | 8,364 | 2,823,888 |
| 2007 | 2,241,232 | 2,624,872 | 488,208 | 727,186 | 580,443 | 345,516 | 121,837 | 76,641 | 11,996 | 12,053 | 2,363,881 |
| 2008 | 2,135,535 | 2,008,954 | 2,339,440 | 430,190 | 610,720 | 258,289 | 163,555 | 58,314 | 37,036 | 11,353 | 3,908,897 |
| 2009 | 1,497,913 | 1,926,575 | 1,810,027 | 2,086,102 | 365,441 | 279,042 | 119,012 | 75,375 | 27,237 | 22,683 | 4,784,918 |
| 2010 | 757,496 | 1,364,228 | 1,746,879 | 1,626,155 | 1,805,150 | 175,250 | 122,250 | 51,209 | 32,026 | 21,051 | 5,579,970 |
| 2011 | 1,328,048 | 695,053 | 1,249,042 | 1,585,482 | 1,428,174 | 851,718 | 75,338 | 51,313 | 21,505 | 21,672 | 5,284,245 |
| 2012 | 882,437 | 1,226,553 | 641,311 | 1,146,337 | 1,423,985 | 815,097 | 330,107 | 29,586 | 19,857 | 16,473 | 4,422,753 |
| 2013 | 669,716 | 816,168 | 1,137,585 | 592,356 | 1,038,620 | 803,669 | 292,031 | 115,473 | 10,463 | 12,674 | 4,002,872 |
| 2014 | 910,155 | 622,900 | 756,824 | 1,053,176 | 536,031 | 635,793 | 279,462 | 102,052 | 39,793 | 7,997 | 3,411,128 |
| 2015 | 730,692 | 848,286 | 580,298 | 700,790 | 956,065 | 330,294 | 230,791 | 99,345 | 36,862 | 16,925 | 2,951,370 |
| 2016 | 276,651 | 679,944 | 791,247 | 538,942 | 634,820 | 591,779 | 126,385 | 87,196 | 37,014 | 20,219 | 2,827,602 |
| 2017 | 372,422 | 257,995 | 632,940 | 735,569 | 490,623 | 352,262 | 239,756 | 50,910 | 34,981 | 22,953 | 2,559,994 |
| 2018 | 415,275 | 346,226 | 240,539 | 587,376 | 670,350 | 297,812 | 155,185 | 103,816 | 22,015 | 25,118 | 2,102,212 |
| 2019 | 272,520 | 387,073 | 321,918 | 223,656 | 537,050 | 411,029 | 138,797 | 72,671 | 47,860 | 21,817 | 1,774,798 |
| 2020 | 493,312 | 254,140 | 360,784 | 298,726 | 204,609 | 302,718 | 200,390 | 67,397 | 35,671 | 33,854 | 1,504,148 |
| 2021 | 812,894 | 459,808 | 236,936 | 335,500 | 274,651 | 118,625 | 159,719 | 103,956 | 35,065 | 36,509 | 1,300,962 |
| 2022 | 1,553,277 | 756,286 | 428,402 | 220,282 | 307,189 | 140,409 | 63,024 | 84,365 | 54,577 | 37,927 | 1,336,175 |
| 2023 | 512,337 | 831,684 | 703,495 | 398,263 | 202,165 | 171,414 | 75,844 | 33,345 | 44,567 | 49,055 | 1,678,148 |

*Table 30. SCA maximum likelihood estimates of the instantaneous rate of fishing mortality (F) of fall spawners in the North region of the southern Gulf of St. Lawrence. F5-10 is the January 1 abundance-weighted average F for ages 5 to 10 years.*

| Year | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11+ | F5-10 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1978 | 0.013 | 0.170 | 0.925 | 1.318 | 1.356 | 1.359 | 1.359 | 1.359 | 1.359 | 1.359 | 1.340 |
| 1979 | 0.009 | 0.119 | 0.650 | 0.925 | 0.953 | 0.954 | 0.955 | 0.955 | 0.955 | 0.955 | 0.941 |
| 1980 | 0.005 | 0.072 | 0.394 | 0.562 | 0.578 | 0.579 | 0.580 | 0.580 | 0.580 | 0.580 | 0.568 |
| 1981 | 0.001 | 0.012 | 0.119 | 0.356 | 0.419 | 0.425 | 0.425 | 0.425 | 0.425 | 0.425 | 0.375 |

| Year | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11+ | F5-10 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1982 | 0.001 | 0.009 | 0.086 | 0.258 | 0.304 | 0.308 | 0.308 | 0.308 | 0.308 | 0.308 | 0.265 |
| 1983 | 0.000 | 0.005 | 0.047 | 0.141 | 0.166 | 0.168 | 0.168 | 0.168 | 0.168 | 0.168 | 0.151 |
| 1984 | 0.000 | 0.004 | 0.036 | 0.107 | 0.126 | 0.127 | 0.128 | 0.128 | 0.128 | 0.128 | 0.116 |
| 1985 | 0.000 | 0.006 | 0.059 | 0.176 | 0.208 | 0.211 | 0.211 | 0.211 | 0.211 | 0.211 | 0.193 |
| 1986 | 0.001 | 0.009 | 0.092 | 0.274 | 0.323 | 0.327 | 0.327 | 0.327 | 0.327 | 0.327 | 0.310 |
| 1987 | 0.001 | 0.012 | 0.119 | 0.355 | 0.418 | 0.424 | 0.425 | 0.425 | 0.425 | 0.425 | 0.397 |
| 1988 | 0.001 | 0.010 | 0.096 | 0.289 | 0.340 | 0.345 | 0.345 | 0.345 | 0.345 | 0.345 | 0.316 |
| 1989 | 0.001 | 0.011 | 0.111 | 0.332 | 0.391 | 0.397 | 0.397 | 0.397 | 0.397 | 0.397 | 0.368 |
| 1990 | 0.001 | 0.014 | 0.140 | 0.418 | 0.492 | 0.499 | 0.499 | 0.499 | 0.499 | 0.499 | 0.467 |
| 1991 | 0.001 | 0.010 | 0.099 | 0.295 | 0.347 | 0.352 | 0.352 | 0.352 | 0.352 | 0.352 | 0.327 |
| 1992 | 0.001 | 0.010 | 0.098 | 0.293 | 0.345 | 0.349 | 0.350 | 0.350 | 0.350 | 0.350 | 0.309 |
| 1993 | 0.001 | 0.007 | 0.069 | 0.208 | 0.245 | 0.248 | 0.248 | 0.248 | 0.248 | 0.248 | 0.231 |
| 1994 | 0.001 | 0.017 | 0.166 | 0.498 | 0.586 | 0.594 | 0.595 | 0.595 | 0.595 | 0.595 | 0.573 |
| 1995 | 0.002 | 0.026 | 0.255 | 0.764 | 0.900 | 0.912 | 0.913 | 0.913 | 0.913 | 0.913 | 0.841 |
| 1996 | 0.002 | 0.025 | 0.245 | 0.734 | 0.864 | 0.876 | 0.877 | 0.877 | 0.877 | 0.877 | 0.825 |
| 1997 | 0.002 | 0.021 | 0.208 | 0.622 | 0.733 | 0.743 | 0.743 | 0.744 | 0.744 | 0.744 | 0.665 |
| 1998 | 0.002 | 0.022 | 0.211 | 0.633 | 0.745 | 0.755 | 0.756 | 0.756 | 0.756 | 0.756 | 0.683 |
| 1999 | 0.002 | 0.025 | 0.240 | 0.720 | 0.848 | 0.859 | 0.860 | 0.860 | 0.860 | 0.860 | 0.776 |
| 2000 | 0.002 | 0.021 | 0.210 | 0.630 | 0.741 | 0.752 | 0.752 | 0.752 | 0.752 | 0.752 | 0.658 |
| 2001 | 0.001 | 0.018 | 0.175 | 0.523 | 0.616 | 0.624 | 0.625 | 0.625 | 0.625 | 0.625 | 0.566 |
| 2002 | 0.001 | 0.016 | 0.159 | 0.476 | 0.561 | 0.568 | 0.569 | 0.569 | 0.569 | 0.569 | 0.518 |
| 2003 | 0.002 | 0.022 | 0.218 | 0.653 | 0.768 | 0.779 | 0.780 | 0.780 | 0.780 | 0.780 | 0.720 |
| 2004 | 0.001 | 0.012 | 0.117 | 0.351 | 0.413 | 0.419 | 0.419 | 0.419 | 0.419 | 0.419 | 0.382 |
| 2005 | 0.001 | 0.013 | 0.128 | 0.385 | 0.453 | 0.459 | 0.460 | 0.460 | 0.460 | 0.460 | 0.406 |
| 2006 | 0.003 | 0.014 | 0.057 | 0.198 | 0.446 | 0.621 | 0.681 | 0.696 | 0.700 | 0.701 | 0.345 |
| 2007 | 0.003 | 0.011 | 0.047 | 0.164 | 0.369 | 0.514 | 0.564 | 0.577 | 0.580 | 0.580 | 0.321 |
| 2008 | 0.002 | 0.009 | 0.036 | 0.125 | 0.282 | 0.393 | 0.431 | 0.441 | 0.443 | 0.444 | 0.274 |

| Year | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11+ | F5-10 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2009 | 0.002 | 0.007 | 0.027 | 0.095 | 0.214 | 0.299 | 0.328 | 0.335 | 0.337 | 0.337 | 0.167 |
| 2010 | 0.001 | 0.004 | 0.018 | 0.063 | 0.142 | 0.197 | 0.217 | 0.221 | 0.223 | 0.223 | 0.106 |
| 2011 | 0.001 | 0.002 | 0.010 | 0.036 | 0.081 | 0.112 | 0.123 | 0.126 | 0.127 | 0.127 | 0.071 |
| 2012 | 0.000 | 0.002 | 0.009 | 0.030 | 0.068 | 0.094 | 0.103 | 0.106 | 0.106 | 0.106 | 0.066 |
| 2013 | 0.001 | 0.003 | 0.011 | 0.037 | 0.083 | 0.116 | 0.127 | 0.130 | 0.131 | 0.131 | 0.090 |
| 2014 | 0.001 | 0.002 | 0.010 | 0.033 | 0.075 | 0.105 | 0.115 | 0.118 | 0.118 | 0.118 | 0.075 |
| 2015 | 0.001 | 0.002 | 0.010 | 0.034 | 0.077 | 0.107 | 0.118 | 0.120 | 0.121 | 0.121 | 0.083 |
| 2016 | 0.001 | 0.002 | 0.010 | 0.035 | 0.080 | 0.111 | 0.122 | 0.125 | 0.125 | 0.126 | 0.089 |
| 2017 | 0.001 | 0.002 | 0.010 | 0.035 | 0.078 | 0.109 | 0.120 | 0.122 | 0.123 | 0.123 | 0.079 |
| 2018 | 0.000 | 0.002 | 0.009 | 0.031 | 0.071 | 0.098 | 0.108 | 0.110 | 0.111 | 0.111 | 0.076 |
| 2019 | 0.000 | 0.002 | 0.009 | 0.031 | 0.071 | 0.098 | 0.108 | 0.110 | 0.111 | 0.111 | 0.086 |
| 2020 | 0.000 | 0.002 | 0.009 | 0.031 | 0.071 | 0.098 | 0.108 | 0.110 | 0.111 | 0.111 | 0.090 |
| 2021 | 0.001 | 0.002 | 0.009 | 0.032 | 0.072 | 0.100 | 0.110 | 0.112 | 0.113 | 0.113 | 0.082 |
| 2022 | 0.001 | 0.003 | 0.011 | 0.040 | 0.089 | 0.125 | 0.137 | 0.140 | 0.141 | 0.141 | 0.103 |
| 2023 | 0.000 | 0.001 | 0.004 | 0.015 | 0.033 | 0.046 | 0.051 | 0.052 | 0.052 | 0.052 | 0.036 |

*Table 31. SCA maximum likelihood estimates of the instantaneous rate of fishing mortality (F) of fall spawners in the Middle region of the southern Gulf of St. Lawrence. F5-10 is the January 1 abundance-weighted average F for ages 5 to 10 years.*

| Year | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11+ | F5-10 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1978 | 0.002 | 0.017 | 0.123 | 0.466 | 0.697 | 0.740 | 0.746 | 0.746 | 0.747 | 0.747 | 0.643 |
| 1979 | 0.006 | 0.046 | 0.334 | 1.271 | 1.901 | 2.019 | 2.034 | 2.036 | 2.036 | 2.036 | 1.597 |
| 1980 | 0.003 | 0.022 | 0.161 | 0.614 | 0.918 | 0.975 | 0.982 | 0.983 | 0.983 | 0.983 | 0.686 |
| 1981 | 0.001 | 0.010 | 0.165 | 1.050 | 1.465 | 1.496 | 1.497 | 1.497 | 1.497 | 1.497 | 1.197 |
| 1982 | 0.000 | 0.002 | 0.034 | 0.215 | 0.299 | 0.306 | 0.306 | 0.306 | 0.306 | 0.306 | 0.226 |
| 1983 | 0.000 | 0.007 | 0.125 | 0.799 | 1.114 | 1.138 | 1.139 | 1.139 | 1.139 | 1.139 | 0.950 |
| 1984 | 0.000 | 0.004 | 0.061 | 0.390 | 0.544 | 0.556 | 0.556 | 0.557 | 0.557 | 0.557 | 0.437 |
| 1985 | 0.000 | 0.001 | 0.022 | 0.143 | 0.199 | 0.203 | 0.203 | 0.203 | 0.203 | 0.203 | 0.159 |
| 1986 | 0.000 | 0.002 | 0.032 | 0.206 | 0.287 | 0.293 | 0.293 | 0.293 | 0.293 | 0.293 | 0.251 |

| Year | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11+ | F5-10 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1987 | 0.000 | 0.002 | 0.036 | 0.230 | 0.321 | 0.327 | 0.328 | 0.328 | 0.328 | 0.328 | 0.280 |
| 1988 | 0.000 | 0.003 | 0.047 | 0.302 | 0.421 | 0.430 | 0.430 | 0.430 | 0.430 | 0.430 | 0.360 |
| 1989 | 0.000 | 0.001 | 0.020 | 0.130 | 0.181 | 0.185 | 0.185 | 0.185 | 0.185 | 0.185 | 0.158 |
| 1990 | 0.000 | 0.002 | 0.033 | 0.213 | 0.298 | 0.304 | 0.304 | 0.304 | 0.304 | 0.304 | 0.270 |
| 1991 | 0.000 | 0.003 | 0.055 | 0.354 | 0.493 | 0.504 | 0.504 | 0.504 | 0.504 | 0.504 | 0.427 |
| 1992 | 0.000 | 0.002 | 0.026 | 0.166 | 0.231 | 0.236 | 0.236 | 0.236 | 0.236 | 0.236 | 0.178 |
| 1993 | 0.000 | 0.002 | 0.029 | 0.185 | 0.258 | 0.263 | 0.263 | 0.263 | 0.263 | 0.263 | 0.223 |
| 1994 | 0.000 | 0.002 | 0.033 | 0.213 | 0.297 | 0.304 | 0.304 | 0.304 | 0.304 | 0.304 | 0.286 |
| 1995 | 0.000 | 0.005 | 0.078 | 0.496 | 0.691 | 0.706 | 0.707 | 0.707 | 0.707 | 0.707 | 0.592 |
| 1996 | 0.000 | 0.004 | 0.070 | 0.449 | 0.626 | 0.640 | 0.640 | 0.640 | 0.640 | 0.640 | 0.587 |
| 1997 | 0.000 | 0.004 | 0.075 | 0.475 | 0.662 | 0.677 | 0.677 | 0.677 | 0.677 | 0.677 | 0.565 |
| 1998 | 0.000 | 0.006 | 0.107 | 0.685 | 0.955 | 0.975 | 0.977 | 0.977 | 0.977 | 0.977 | 0.841 |
| 1999 | 0.000 | 0.006 | 0.108 | 0.691 | 0.964 | 0.984 | 0.986 | 0.986 | 0.986 | 0.986 | 0.777 |
| 2000 | 0.000 | 0.006 | 0.094 | 0.601 | 0.838 | 0.856 | 0.857 | 0.857 | 0.857 | 0.857 | 0.663 |
| 2001 | 0.000 | 0.003 | 0.058 | 0.367 | 0.511 | 0.522 | 0.523 | 0.523 | 0.523 | 0.523 | 0.424 |
| 2002 | 0.000 | 0.003 | 0.057 | 0.361 | 0.504 | 0.514 | 0.515 | 0.515 | 0.515 | 0.515 | 0.442 |
| 2003 | 0.000 | 0.003 | 0.044 | 0.280 | 0.390 | 0.399 | 0.399 | 0.399 | 0.399 | 0.399 | 0.333 |
| 2004 | 0.000 | 0.002 | 0.042 | 0.266 | 0.371 | 0.379 | 0.379 | 0.379 | 0.379 | 0.379 | 0.320 |
| 2005 | 0.000 | 0.003 | 0.055 | 0.353 | 0.492 | 0.502 | 0.503 | 0.503 | 0.503 | 0.503 | 0.419 |
| 2006 | 0.000 | 0.001 | 0.012 | 0.101 | 0.348 | 0.459 | 0.474 | 0.475 | 0.475 | 0.475 | 0.275 |
| 2007 | 0.000 | 0.001 | 0.010 | 0.082 | 0.283 | 0.373 | 0.385 | 0.386 | 0.387 | 0.387 | 0.242 |
| 2008 | 0.000 | 0.001 | 0.011 | 0.090 | 0.311 | 0.411 | 0.424 | 0.426 | 0.426 | 0.426 | 0.294 |
| 2009 | 0.000 | 0.001 | 0.010 | 0.080 | 0.278 | 0.367 | 0.379 | 0.380 | 0.380 | 0.380 | 0.167 |
| 2010 | 0.000 | 0.001 | 0.007 | 0.057 | 0.199 | 0.262 | 0.271 | 0.271 | 0.272 | 0.272 | 0.141 |
| 2011 | 0.000 | 0.000 | 0.005 | 0.039 | 0.134 | 0.177 | 0.183 | 0.184 | 0.184 | 0.184 | 0.117 |
| 2012 | 0.000 | 0.000 | 0.004 | 0.032 | 0.111 | 0.147 | 0.152 | 0.152 | 0.152 | 0.152 | 0.105 |
| 2013 | 0.000 | 0.000 | 0.004 | 0.035 | 0.120 | 0.159 | 0.164 | 0.164 | 0.165 | 0.165 | 0.123 |

| Year | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11+ | F5-10 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2014 | 0.000 | 0.000 | 0.004 | 0.032 | 0.111 | 0.146 | 0.151 | 0.152 | 0.152 | 0.152 | 0.100 |
| 2015 | 0.000 | 0.000 | 0.005 | 0.037 | 0.129 | 0.170 | 0.175 | 0.176 | 0.176 | 0.176 | 0.121 |
| 2016 | 0.000 | 0.000 | 0.004 | 0.030 | 0.105 | 0.138 | 0.143 | 0.143 | 0.143 | 0.143 | 0.106 |
| 2017 | 0.000 | 0.000 | 0.005 | 0.040 | 0.138 | 0.182 | 0.187 | 0.188 | 0.188 | 0.188 | 0.131 |
| 2018 | 0.000 | 0.000 | 0.004 | 0.033 | 0.114 | 0.150 | 0.155 | 0.156 | 0.156 | 0.156 | 0.112 |
| 2019 | 0.000 | 0.000 | 0.004 | 0.029 | 0.100 | 0.132 | 0.136 | 0.137 | 0.137 | 0.137 | 0.110 |
| 2020 | 0.000 | 0.000 | 0.003 | 0.024 | 0.082 | 0.108 | 0.112 | 0.112 | 0.112 | 0.112 | 0.087 |
| 2021 | 0.000 | 0.000 | 0.003 | 0.021 | 0.074 | 0.098 | 0.101 | 0.102 | 0.102 | 0.102 | 0.075 |
| 2022 | 0.000 | 0.000 | 0.001 | 0.005 | 0.017 | 0.023 | 0.024 | 0.024 | 0.024 | 0.024 | 0.017 |
| 2023 | 0.000 | 0.000 | 0.002 | 0.017 | 0.059 | 0.078 | 0.081 | 0.081 | 0.081 | 0.081 | 0.050 |

*Table 32. SCA maximum likelihood estimates of the instantaneous rate of fishing mortality (F) of fall spawners in the South region of the southern Gulf of St. Lawrence. F5-10 is the January 1 abundance-weighted average F for ages 5 to 10 years.*

| Year | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11+ | F5-10 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1978 | 0.024 | 0.065 | 0.163 | 0.351 | 0.592 | 0.782 | 0.883 | 0.925 | 0.941 | 0.947 | 0.553 |
| 1979 | 0.011 | 0.030 | 0.076 | 0.164 | 0.277 | 0.366 | 0.413 | 0.433 | 0.440 | 0.443 | 0.230 |
| 1980 | 0.053 | 0.142 | 0.358 | 0.770 | 1.301 | 1.720 | 1.941 | 2.033 | 2.068 | 2.081 | 1.031 |
| 1981 | 0.001 | 0.006 | 0.066 | 0.388 | 0.662 | 0.703 | 0.707 | 0.708 | 0.708 | 0.708 | 0.523 |
| 1982 | 0.000 | 0.004 | 0.047 | 0.275 | 0.469 | 0.499 | 0.502 | 0.502 | 0.502 | 0.502 | 0.326 |
| 1983 | 0.000 | 0.003 | 0.035 | 0.204 | 0.348 | 0.370 | 0.372 | 0.372 | 0.372 | 0.372 | 0.256 |
| 1984 | 0.000 | 0.003 | 0.032 | 0.188 | 0.320 | 0.340 | 0.342 | 0.342 | 0.342 | 0.342 | 0.236 |
| 1985 | 0.000 | 0.002 | 0.024 | 0.144 | 0.246 | 0.262 | 0.263 | 0.263 | 0.263 | 0.263 | 0.179 |
| 1986 | 0.000 | 0.003 | 0.027 | 0.161 | 0.275 | 0.292 | 0.294 | 0.294 | 0.294 | 0.294 | 0.238 |
| 1987 | 0.000 | 0.003 | 0.033 | 0.197 | 0.337 | 0.358 | 0.360 | 0.360 | 0.360 | 0.360 | 0.263 |
| 1988 | 0.000 | 0.002 | 0.022 | 0.131 | 0.223 | 0.237 | 0.239 | 0.239 | 0.239 | 0.239 | 0.172 |
| 1989 | 0.000 | 0.001 | 0.010 | 0.059 | 0.100 | 0.106 | 0.107 | 0.107 | 0.107 | 0.107 | 0.089 |
| 1990 | 0.000 | 0.004 | 0.046 | 0.269 | 0.459 | 0.488 | 0.491 | 0.491 | 0.491 | 0.491 | 0.434 |
| 1991 | 0.000 | 0.001 | 0.011 | 0.066 | 0.113 | 0.120 | 0.120 | 0.121 | 0.121 | 0.121 | 0.101 |

| Year | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11+ | F5-10 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1992 | 0.000 | 0.001 | 0.011 | 0.064 | 0.109 | 0.115 | 0.116 | 0.116 | 0.116 | 0.116 | 0.082 |
| 1993 | 0.000 | 0.001 | 0.006 | 0.034 | 0.057 | 0.061 | 0.061 | 0.061 | 0.061 | 0.061 | 0.049 |
| 1994 | 0.000 | 0.003 | 0.030 | 0.179 | 0.305 | 0.325 | 0.326 | 0.326 | 0.326 | 0.326 | 0.295 |
| 1995 | 0.000 | 0.003 | 0.031 | 0.184 | 0.313 | 0.333 | 0.335 | 0.335 | 0.335 | 0.335 | 0.261 |
| 1996 | 0.000 | 0.005 | 0.052 | 0.306 | 0.522 | 0.556 | 0.558 | 0.559 | 0.559 | 0.559 | 0.505 |
| 1997 | 0.000 | 0.004 | 0.047 | 0.278 | 0.474 | 0.504 | 0.507 | 0.507 | 0.507 | 0.507 | 0.376 |
| 1998 | 0.000 | 0.005 | 0.051 | 0.303 | 0.516 | 0.549 | 0.552 | 0.552 | 0.552 | 0.552 | 0.451 |
| 1999 | 0.001 | 0.006 | 0.068 | 0.398 | 0.679 | 0.722 | 0.726 | 0.726 | 0.726 | 0.726 | 0.505 |
| 2000 | 0.000 | 0.004 | 0.048 | 0.285 | 0.486 | 0.517 | 0.520 | 0.520 | 0.520 | 0.520 | 0.369 |
| 2001 | 0.000 | 0.004 | 0.042 | 0.248 | 0.424 | 0.451 | 0.453 | 0.453 | 0.453 | 0.453 | 0.325 |
| 2002 | 0.000 | 0.003 | 0.034 | 0.204 | 0.347 | 0.369 | 0.371 | 0.371 | 0.371 | 0.371 | 0.298 |
| 2003 | 0.000 | 0.003 | 0.027 | 0.162 | 0.276 | 0.293 | 0.295 | 0.295 | 0.295 | 0.295 | 0.199 |
| 2004 | 0.000 | 0.001 | 0.013 | 0.077 | 0.132 | 0.140 | 0.141 | 0.141 | 0.141 | 0.141 | 0.110 |
| 2005 | 0.000 | 0.001 | 0.012 | 0.072 | 0.123 | 0.130 | 0.131 | 0.131 | 0.131 | 0.131 | 0.105 |
| 2006 | 0.000 | 0.000 | 0.003 | 0.023 | 0.102 | 0.168 | 0.181 | 0.182 | 0.182 | 0.182 | 0.114 |
| 2007 | 0.000 | 0.000 | 0.003 | 0.023 | 0.101 | 0.167 | 0.179 | 0.181 | 0.181 | 0.181 | 0.116 |
| 2008 | 0.000 | 0.000 | 0.002 | 0.019 | 0.085 | 0.140 | 0.151 | 0.152 | 0.152 | 0.152 | 0.105 |
| 2009 | 0.000 | 0.000 | 0.003 | 0.026 | 0.115 | 0.189 | 0.204 | 0.206 | 0.206 | 0.206 | 0.081 |
| 2010 | 0.000 | 0.000 | 0.002 | 0.019 | 0.087 | 0.142 | 0.153 | 0.155 | 0.155 | 0.155 | 0.076 |
| 2011 | 0.000 | 0.000 | 0.002 | 0.014 | 0.061 | 0.100 | 0.108 | 0.109 | 0.109 | 0.109 | 0.063 |
| 2012 | 0.000 | 0.000 | 0.002 | 0.012 | 0.055 | 0.090 | 0.097 | 0.098 | 0.098 | 0.098 | 0.064 |
| 2013 | 0.000 | 0.000 | 0.002 | 0.014 | 0.065 | 0.107 | 0.115 | 0.116 | 0.116 | 0.116 | 0.086 |
| 2014 | 0.000 | 0.000 | 0.002 | 0.019 | 0.085 | 0.140 | 0.150 | 0.152 | 0.152 | 0.152 | 0.099 |
| 2015 | 0.000 | 0.000 | 0.003 | 0.021 | 0.094 | 0.154 | 0.166 | 0.167 | 0.167 | 0.167 | 0.092 |
| 2016 | 0.000 | 0.000 | 0.002 | 0.016 | 0.073 | 0.120 | 0.130 | 0.131 | 0.131 | 0.131 | 0.081 |
| 2017 | 0.000 | 0.000 | 0.001 | 0.010 | 0.047 | 0.077 | 0.083 | 0.083 | 0.084 | 0.084 | 0.049 |
| 2018 | 0.000 | 0.000 | 0.001 | 0.010 | 0.043 | 0.071 | 0.076 | 0.077 | 0.077 | 0.077 | 0.043 |

| Year | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11+ | F5-10 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2019 | 0.000 | 0.000 | 0.001 | 0.011 | 0.049 | 0.080 | 0.086 | 0.087 | 0.087 | 0.087 | 0.060 |
| 2020 | 0.000 | 0.000 | 0.000 | 0.004 | 0.017 | 0.028 | 0.030 | 0.031 | 0.031 | 0.031 | 0.021 |
| 2021 | 0.000 | 0.000 | 0.001 | 0.011 | 0.050 | 0.083 | 0.089 | 0.090 | 0.090 | 0.090 | 0.057 |
| 2022 | 0.000 | 0.000 | 0.002 | 0.013 | 0.058 | 0.096 | 0.103 | 0.104 | 0.104 | 0.104 | 0.071 |
| 2023 | 0.000 | 0.000 | 0.001 | 0.009 | 0.040 | 0.066 | 0.071 | 0.072 | 0.072 | 0.072 | 0.043 |

*Table 33. SCA maximum likelihood estimates of the instantaneous rate of fishing mortality (F) of fall spawners in the southern Gulf of St. Lawrence. F5-10 is the January 1 abundance-weighted average F for ages 5 to 10 years.*

| Year | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11+ | F5-10 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1978 | 0.004 | 0.019 | 0.046 | 0.052 | 0.025 | 0.024 | 0.024 | 0.007 | 0.005 | 0.017 | 0.929 |
| 1979 | 0.005 | 0.011 | 0.039 | 0.032 | 0.017 | 0.006 | 0.009 | 0.008 | 0.003 | 0.009 | 0.722 |
| 1980 | 0.015 | 0.037 | 0.038 | 0.056 | 0.027 | 0.011 | 0.005 | 0.004 | 0.003 | 0.004 | 0.899 |
| 1981 | 0.000 | 0.003 | 0.028 | 0.027 | 0.020 | 0.004 | 0.001 | 0.000 | 0.000 | 0.001 | 0.579 |
| 1982 | 0.000 | 0.003 | 0.017 | 0.044 | 0.009 | 0.004 | 0.001 | 0.000 | 0.000 | 0.000 | 0.281 |
| 1983 | 0.000 | 0.003 | 0.017 | 0.037 | 0.030 | 0.004 | 0.002 | 0.000 | 0.000 | 0.000 | 0.258 |
| 1984 | 0.000 | 0.001 | 0.018 | 0.038 | 0.021 | 0.010 | 0.002 | 0.001 | 0.000 | 0.000 | 0.176 |
| 1985 | 0.000 | 0.002 | 0.011 | 0.055 | 0.033 | 0.014 | 0.008 | 0.001 | 0.001 | 0.000 | 0.186 |
| 1986 | 0.000 | 0.004 | 0.022 | 0.040 | 0.063 | 0.028 | 0.013 | 0.009 | 0.001 | 0.001 | 0.279 |
| 1987 | 0.000 | 0.004 | 0.038 | 0.073 | 0.039 | 0.043 | 0.023 | 0.011 | 0.007 | 0.002 | 0.330 |
| 1988 | 0.000 | 0.002 | 0.022 | 0.077 | 0.043 | 0.016 | 0.020 | 0.010 | 0.005 | 0.004 | 0.248 |
| 1989 | 0.001 | 0.002 | 0.016 | 0.050 | 0.049 | 0.019 | 0.009 | 0.010 | 0.006 | 0.005 | 0.227 |
| 1990 | 0.001 | 0.009 | 0.023 | 0.056 | 0.065 | 0.059 | 0.027 | 0.010 | 0.014 | 0.012 | 0.438 |
| 1991 | 0.000 | 0.003 | 0.048 | 0.037 | 0.024 | 0.018 | 0.015 | 0.007 | 0.003 | 0.007 | 0.248 |
| 1992 | 0.000 | 0.001 | 0.024 | 0.108 | 0.024 | 0.012 | 0.010 | 0.009 | 0.004 | 0.006 | 0.209 |
| 1993 | 0.000 | 0.002 | 0.006 | 0.046 | 0.062 | 0.010 | 0.005 | 0.004 | 0.004 | 0.004 | 0.160 |
| 1994 | 0.001 | 0.003 | 0.079 | 0.067 | 0.168 | 0.100 | 0.018 | 0.010 | 0.009 | 0.018 | 0.456 |
| 1995 | 0.001 | 0.011 | 0.036 | 0.285 | 0.071 | 0.072 | 0.074 | 0.013 | 0.007 | 0.018 | 0.620 |

| Year | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11+ | F5-10 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1996 | 0.001 | 0.007 | 0.087 | 0.080 | 0.189 | 0.019 | 0.033 | 0.034 | 0.006 | 0.015 | 0.690 |
| 1997 | 0.001 | 0.010 | 0.047 | 0.182 | 0.043 | 0.039 | 0.007 | 0.012 | 0.012 | 0.008 | 0.550 |
| 1998 | 0.001 | 0.015 | 0.085 | 0.121 | 0.134 | 0.013 | 0.019 | 0.003 | 0.006 | 0.010 | 0.635 |
| 1999 | 0.001 | 0.016 | 0.144 | 0.253 | 0.088 | 0.040 | 0.006 | 0.009 | 0.001 | 0.008 | 0.676 |
| 2000 | 0.002 | 0.010 | 0.117 | 0.309 | 0.135 | 0.018 | 0.011 | 0.002 | 0.002 | 0.002 | 0.578 |
| 2001 | 0.001 | 0.018 | 0.069 | 0.252 | 0.169 | 0.027 | 0.006 | 0.004 | 0.001 | 0.002 | 0.470 |
| 2002 | 0.002 | 0.013 | 0.135 | 0.164 | 0.177 | 0.045 | 0.011 | 0.002 | 0.001 | 0.001 | 0.438 |
| 2003 | 0.001 | 0.023 | 0.139 | 0.457 | 0.156 | 0.050 | 0.022 | 0.005 | 0.001 | 0.001 | 0.462 |
| 2004 | 0.001 | 0.008 | 0.106 | 0.203 | 0.214 | 0.023 | 0.013 | 0.005 | 0.001 | 0.000 | 0.264 |
| 2005 | 0.000 | 0.008 | 0.077 | 0.318 | 0.207 | 0.052 | 0.013 | 0.007 | 0.003 | 0.001 | 0.282 |
| 2006 | 0.005 | 0.005 | 0.031 | 0.100 | 0.265 | 0.061 | 0.036 | 0.008 | 0.005 | 0.003 | 0.240 |
| 2007 | 0.004 | 0.018 | 0.016 | 0.083 | 0.165 | 0.092 | 0.028 | 0.016 | 0.003 | 0.003 | 0.208 |
| 2008 | 0.003 | 0.012 | 0.053 | 0.040 | 0.136 | 0.068 | 0.038 | 0.011 | 0.007 | 0.002 | 0.193 |
| 2009 | 0.002 | 0.009 | 0.036 | 0.148 | 0.070 | 0.068 | 0.032 | 0.019 | 0.006 | 0.005 | 0.116 |
| 2010 | 0.001 | 0.004 | 0.023 | 0.085 | 0.231 | 0.032 | 0.023 | 0.010 | 0.006 | 0.004 | 0.101 |
| 2011 | 0.001 | 0.001 | 0.010 | 0.048 | 0.117 | 0.097 | 0.009 | 0.006 | 0.003 | 0.003 | 0.070 |
| 2012 | 0.000 | 0.002 | 0.004 | 0.031 | 0.097 | 0.082 | 0.035 | 0.003 | 0.002 | 0.002 | 0.066 |
| 2013 | 0.000 | 0.001 | 0.010 | 0.020 | 0.087 | 0.094 | 0.038 | 0.015 | 0.001 | 0.002 | 0.089 |
| 2014 | 0.000 | 0.001 | 0.005 | 0.032 | 0.043 | 0.076 | 0.037 | 0.014 | 0.006 | 0.001 | 0.079 |
| 2015 | 0.000 | 0.001 | 0.005 | 0.022 | 0.082 | 0.042 | 0.032 | 0.014 | 0.005 | 0.003 | 0.084 |
| 2016 | 0.000 | 0.001 | 0.006 | 0.017 | 0.051 | 0.069 | 0.016 | 0.011 | 0.005 | 0.003 | 0.084 |
| 2017 | 0.000 | 0.000 | 0.005 | 0.022 | 0.039 | 0.039 | 0.030 | 0.007 | 0.004 | 0.003 | 0.074 |
| 2018 | 0.000 | 0.000 | 0.002 | 0.015 | 0.046 | 0.029 | 0.016 | 0.012 | 0.002 | 0.003 | 0.066 |
| 2019 | 0.000 | 0.001 | 0.002 | 0.006 | 0.036 | 0.040 | 0.015 | 0.008 | 0.005 | 0.002 | 0.077 |
| 2020 | 0.000 | 0.000 | 0.002 | 0.007 | 0.012 | 0.021 | 0.017 | 0.006 | 0.003 | 0.003 | 0.059 |
| 2021 | 0.000 | 0.001 | 0.001 | 0.008 | 0.018 | 0.011 | 0.016 | 0.011 | 0.004 | 0.004 | 0.066 |
| 2022 | 0.001 | 0.001 | 0.003 | 0.006 | 0.023 | 0.013 | 0.007 | 0.009 | 0.006 | 0.004 | 0.073 |

| Year | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11+ | F5-10 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2023 | 0.000 | 0.000 | 0.002 | 0.005 | 0.008 | 0.010 | 0.005 | 0.002 | 0.003 | 0.003 | 0.036 |

*Table 34. Risk analysis table from the SCA model of annual catch options (between 2 and 18 kt) for 2024 and 2025 and subsequent years until 2029, with predicted resulting SSB in kilotonnes (kt) in 2025, 2026 and 2029, resulting probabilities (%) of SSB being lower than the LRP, resulting probabilities of increases in SSB by 5%, and resulting fully recruited fishing mortality rate (F5-10) for the fall spawner component of Atlantic Herring from the southern Gulf of St. Lawrence.*

| | **Year** | **Catch options (kilotonnes)** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | *2* | *4* | *6* | *8* | *10* | *12* | *14* | *16* | *18* |
| SSB (kt) | 2025 | 407 | 406 | 406 | 405 | 403 | 402 | 399 | 399 | 397 |
| | 2026 | 389 | 387 | 385 | 384 | 381 | 379 | 378 | 375 | 373 |
| SSB < LRP | 2025 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 2026 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 2029 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Increase in SSB | 2025 | 53 | 52 | 52 | 51 | 50 | 49 | 49 | 47 | 46 |
| | 2026 | 34 | 33 | 33 | 32 | 31 | 30 | 30 | 29 | 28 |
| Average F5-10 | 2024 | 0.01 | 0.01 | 0.02 | 0.03 | 0.03 | 0.04 | 0.05 | 0.05 | 0.06 |
| | 2025 | 0.01 | 0.01 | 0.02 | 0.02 | 0.03 | 0.03 | 0.04 | 0.05 | 0.05 |

## FIGURES

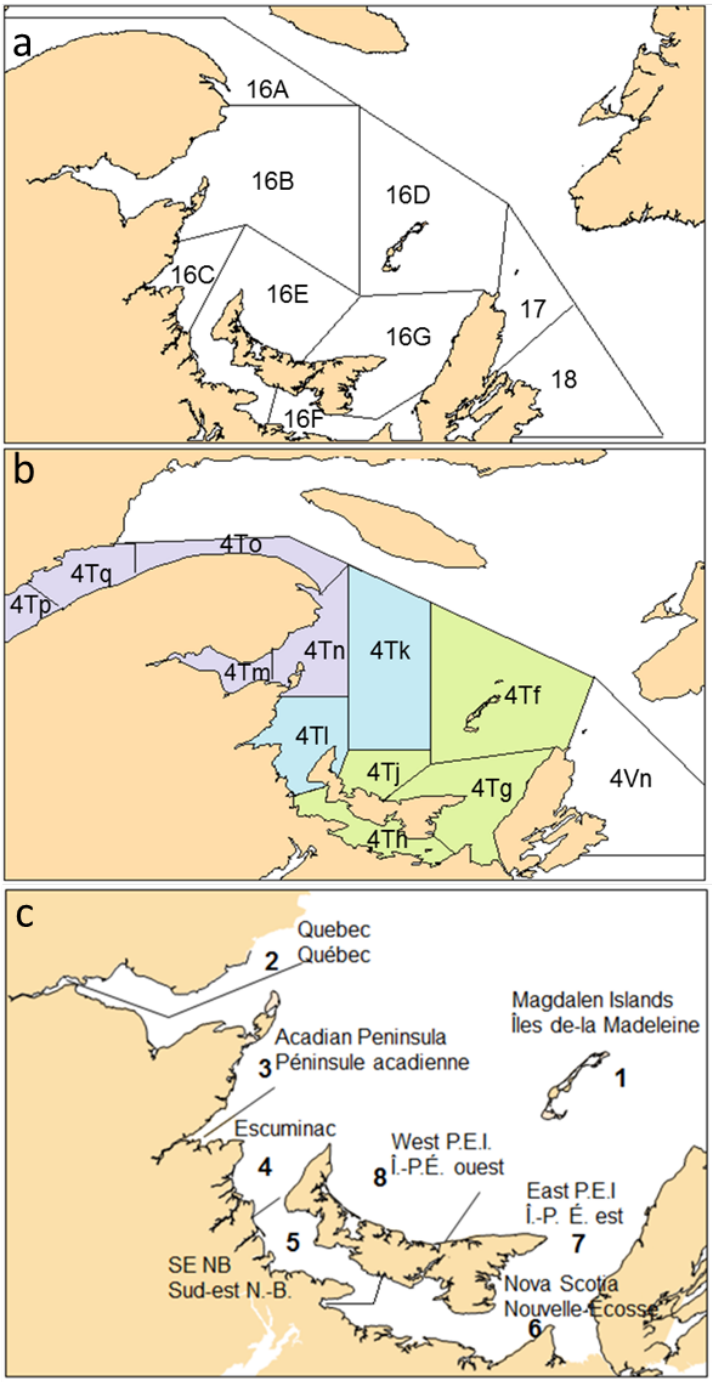


*Figure 1. Southern Gulf of St. Lawrence Herring fishery management zones (upper panel, a), Northwest Atlantic Fisheries Organization (NAFO) Divisions 4T and 4Vn, where purple represents the North region, blue = Middle region, and green = South region (middle panel, b), and geographic areas used in the telephone survey of the Herring gillnet fishery (lower panel, c).*

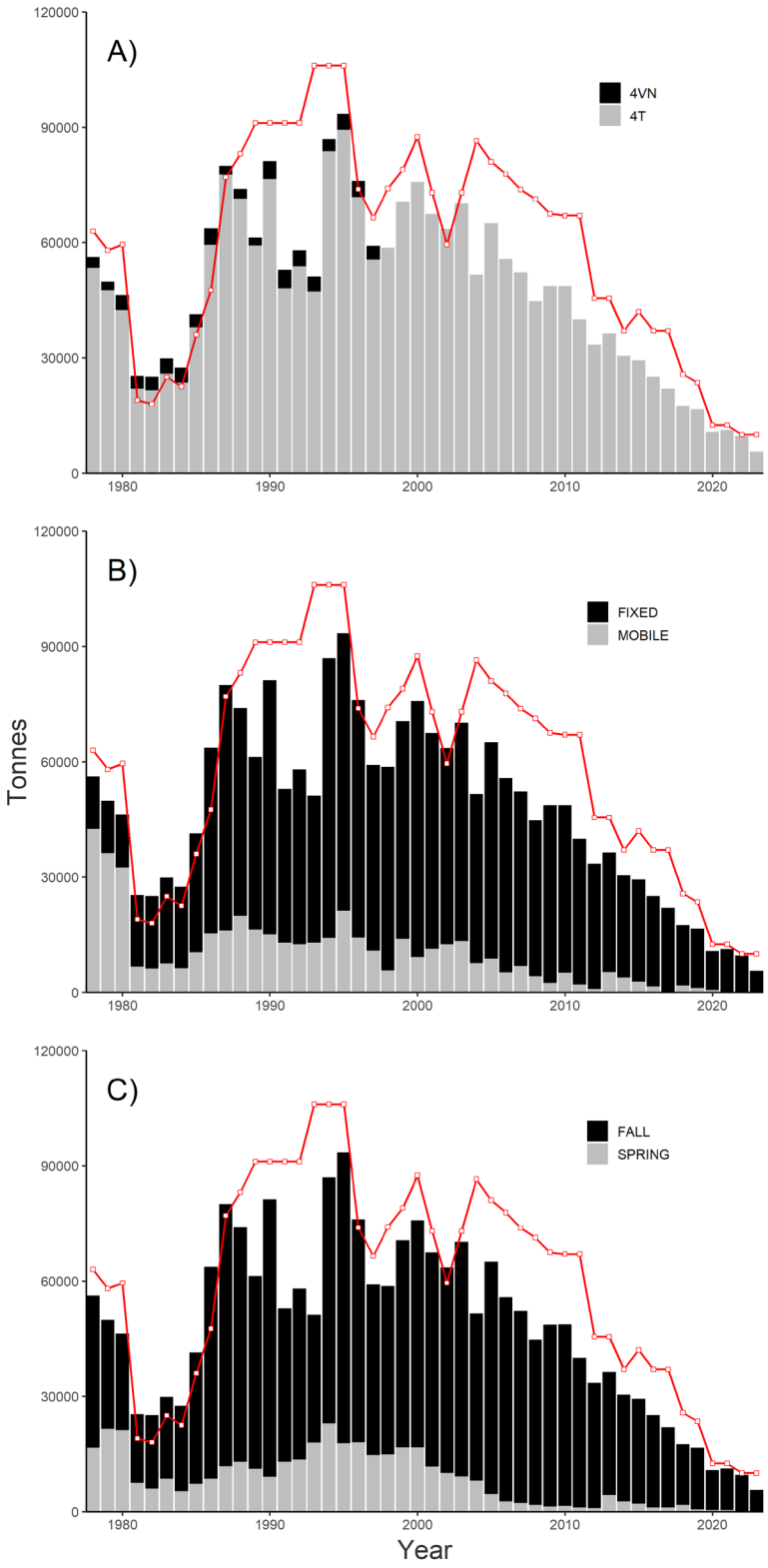


*Figure 2. Reported landings (tonnes) of southern Gulf of St. Lawrence Atlantic Herring (spring and fall spawners combined) by NAFO Division (upper panel, A), by gear fleet (middle panel, B), and by fishing season (lower panel, C), 1978 to 2023. In all panels, the corresponding annual TAC (tonnes) is shown in red line. For landings by season, the landings in Div. 4Vn were attributed to the fall fishing season.*

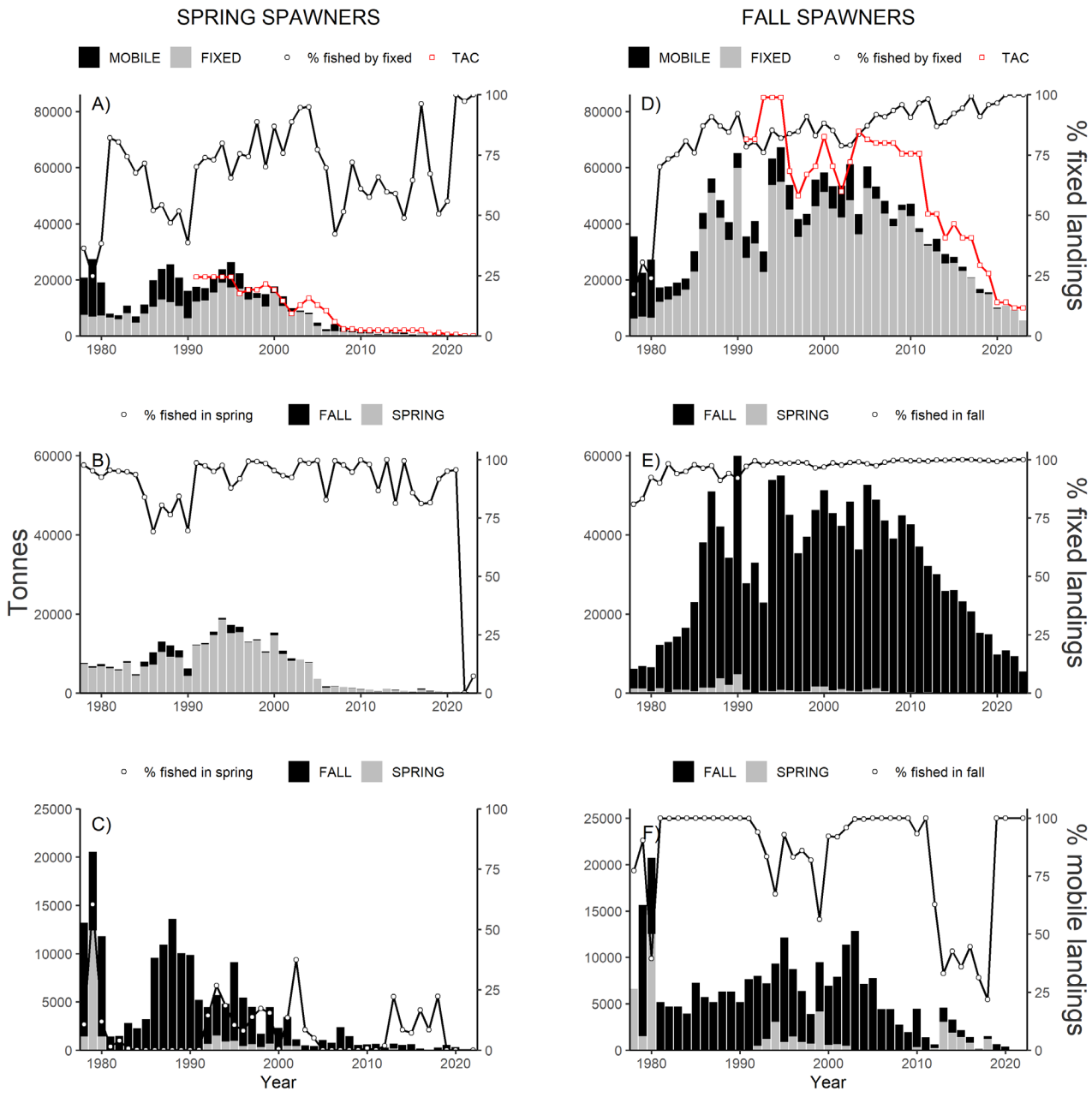


*Figure 3. Estimated landings (tonnes) of the spring spawner component (left) and fall spawner component (right) of Atlantic Herring from the southern Gulf of St. Lawrence, 1978 to 2023. Panels A and D show the estimated landings by gear type and the proportion of the landings attributed to the fixed gear fleet and the TAC for the spawner component (red symbols) for 1991 to 2023. Panels B and E show the estimated landings of Herring in the fixed-gear fleet that occurred in the spring fishery season and the fall fishery season as well as the proportion of Herring landed in the matching fishing season. Panels C and F show the estimated landings of Herring in the mobile gear fleet that occurred in the spring fishery season and the fall fishery season as well as the proportion of Herring landed in the matching fishing season. For landings by season, the landings in NAFO Division 4Vn were attributed to the fall fishing season.*

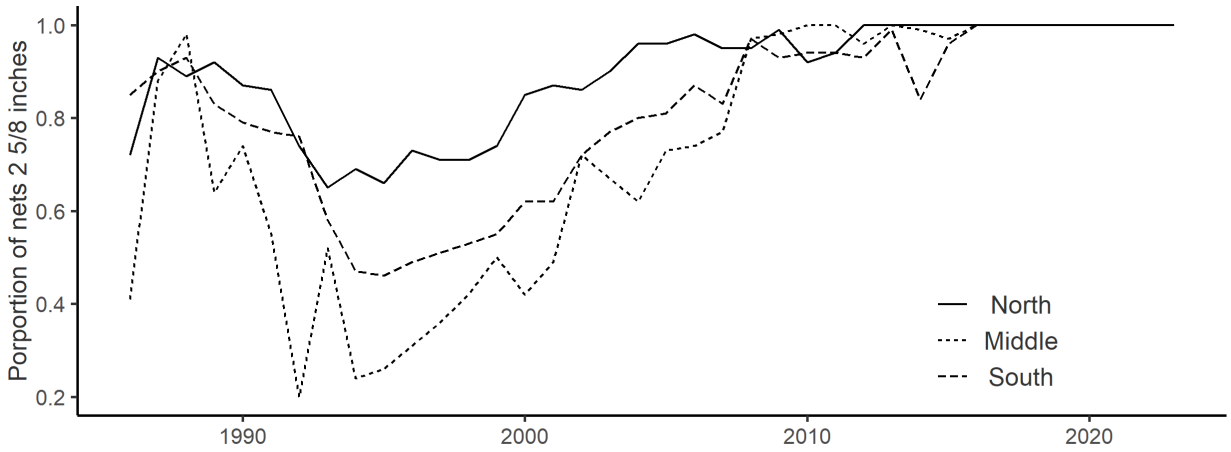


*Figure 4. Variations in the proportions of gillnets with mesh size 2 5/8 inches by region, 1986 to 2023. It is assumed that all other nets used were of mesh size 2 ¾.*

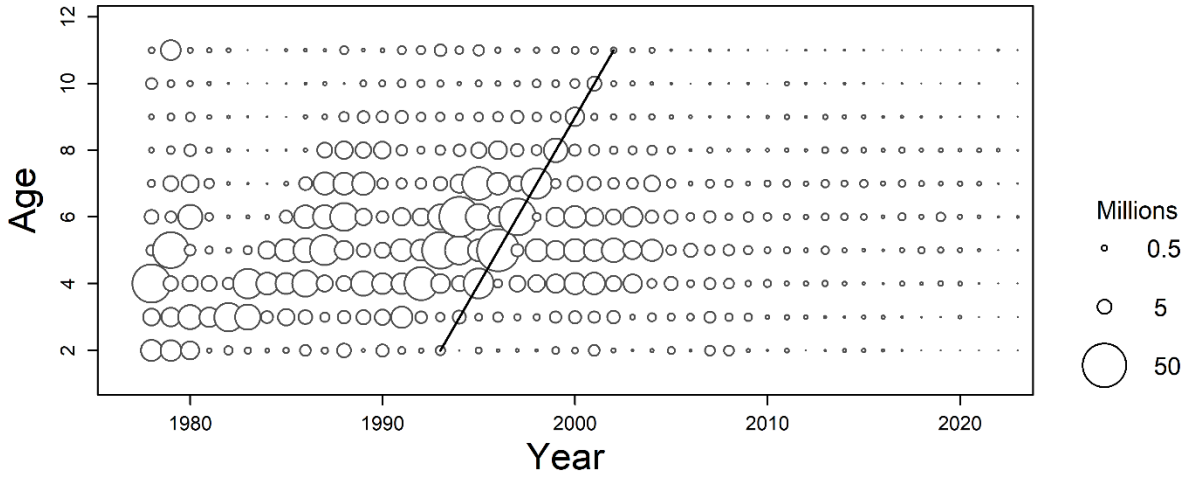


*Figure 5. Catch-at-age of the spring spawner component from the fishery, all gears combined, 1978 to 2023. Size of the bubble is proportional to the catch numbers by age and year. The diagonal line represents the most recent strong year class (1991). The values indicated at age 11 represent catches for ages 11 years and older.*

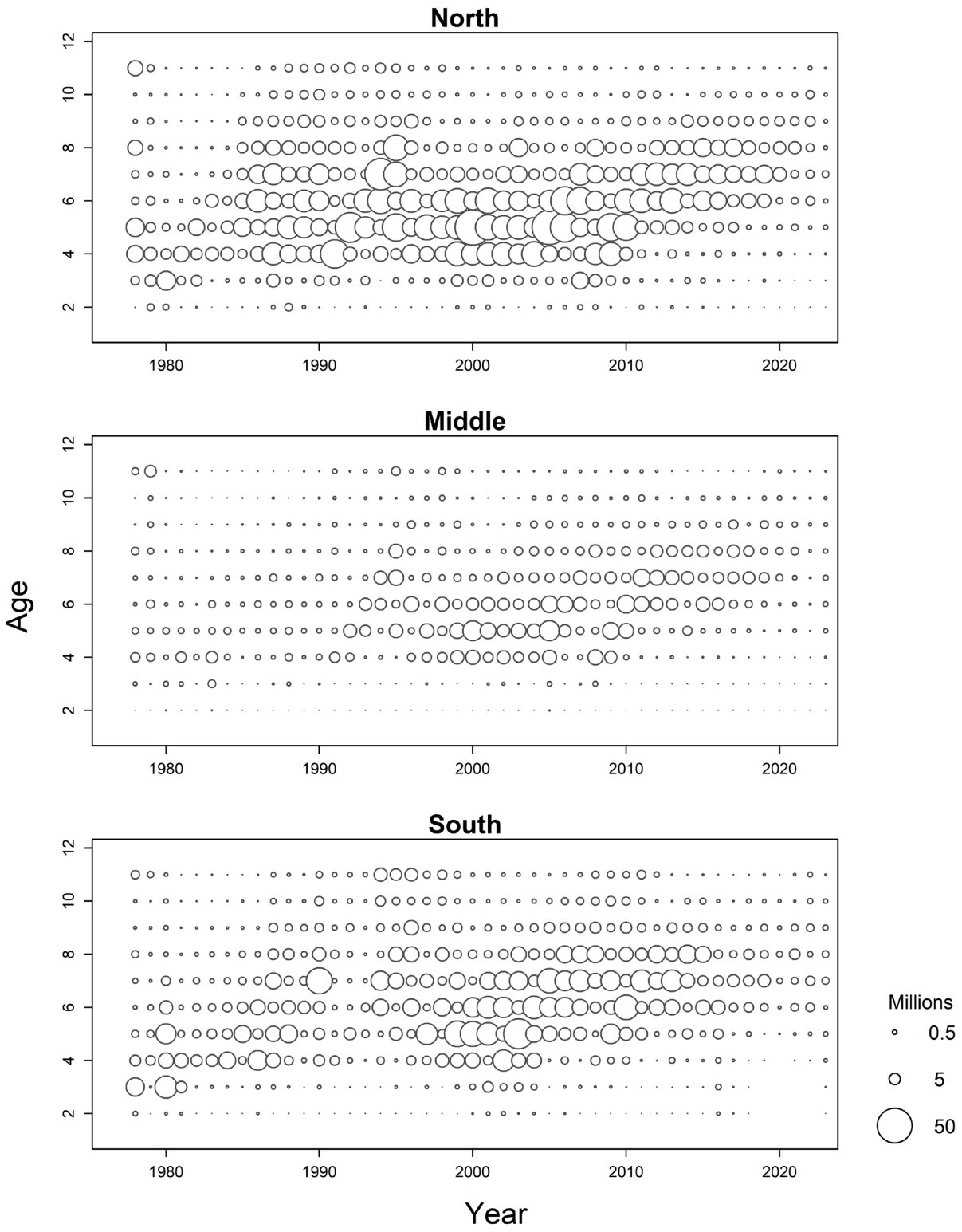


*Figure 6. Bubble plots of fishery catch-at-age (number) by region for both mobile and fixed gear combined, 1978 to 2023. The size of the bubble is proportional to the number of fish in the catch by age and year. The values indicated at age 11 represent catches for ages 11 years and older.*

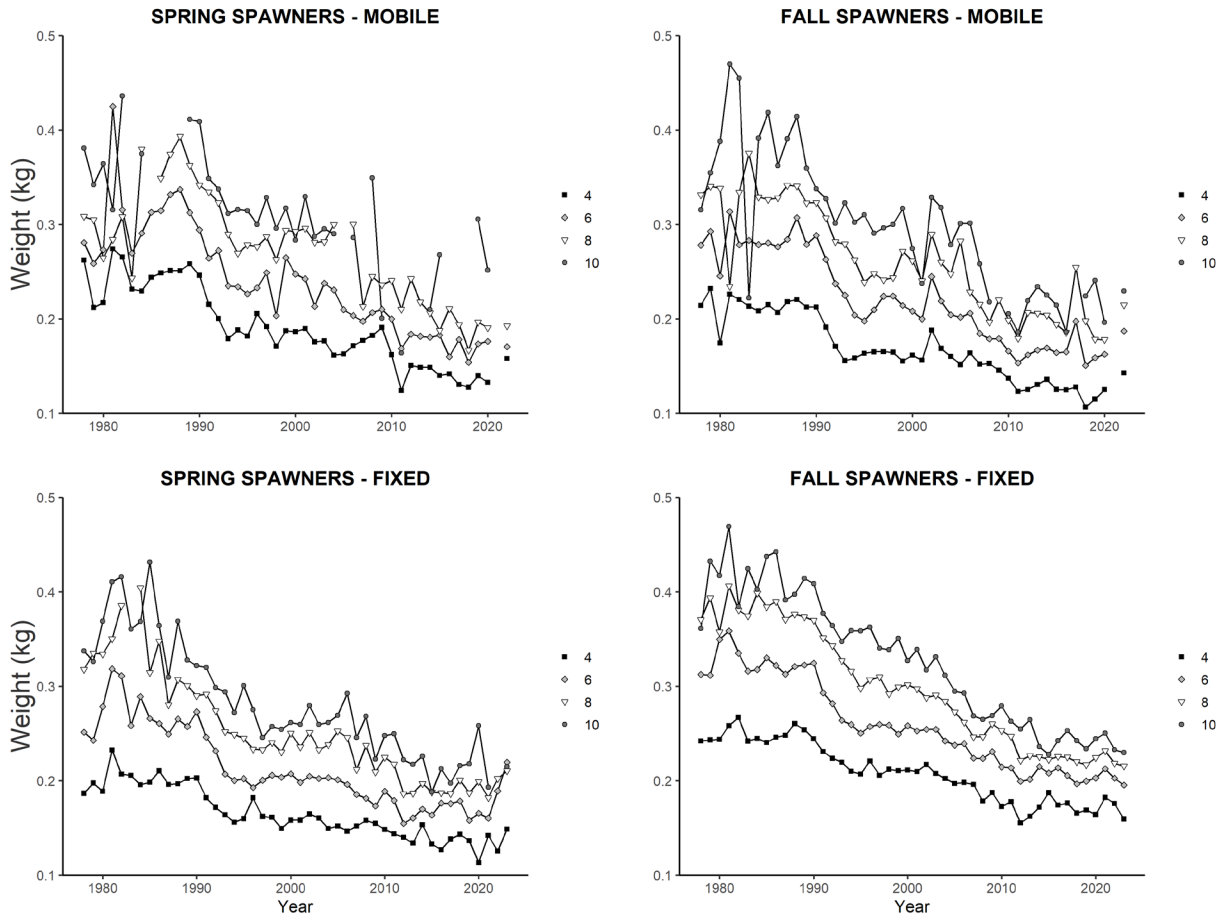


*Figure 7. Mean weight (kg) of Atlantic Herring for ages 4, 6, 8, and 10 of spring spawners (left panels) sampled from catches in the spring season and fall spawners (right panels) sampled from catches in the fall season from mobile (upper panels) and fixed (lower panels) commercial gears, in NAFO Div. 4T for 1978 to 2023.*

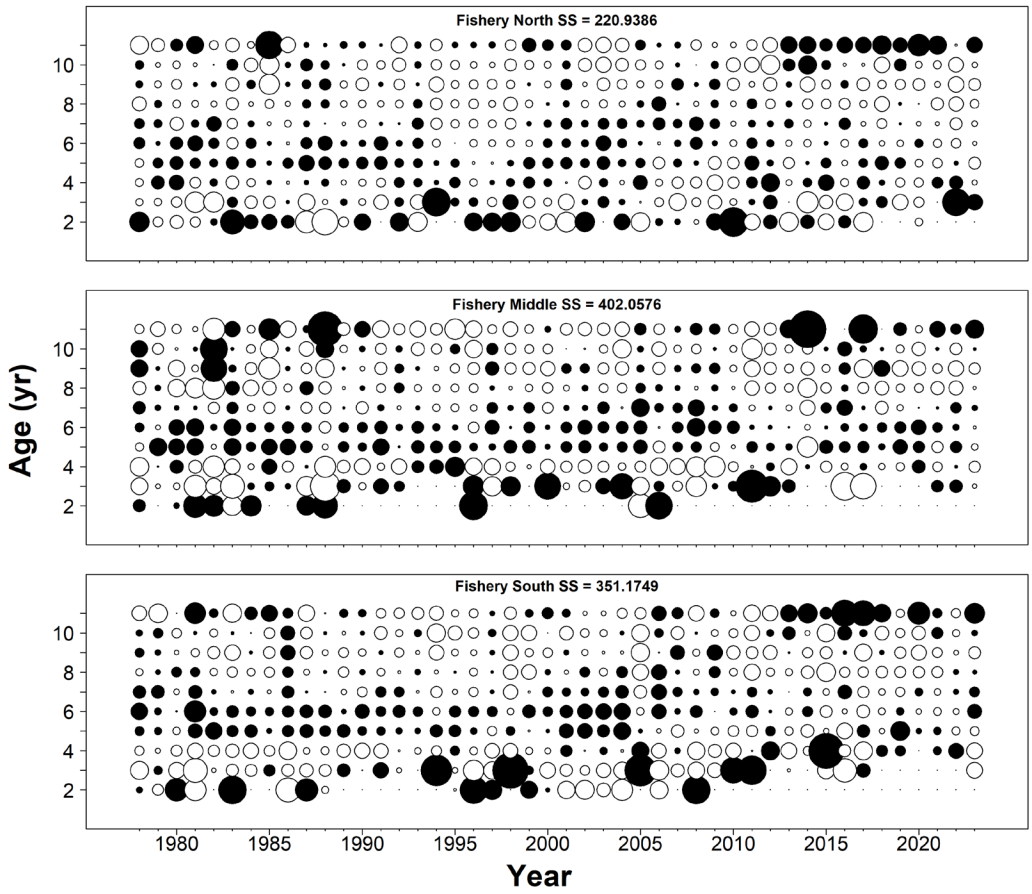


*Figure 8. Fishery catch PAA residuals by region (North, Middle and South) from the SCA population model of fall spawning Herring from the southern Gulf of St. Lawrence. Rows are for ages and columns are years. The circle radius is proportional to the absolute value of residuals. Black circles indicate negative residuals (i.e., observed < predicted).*

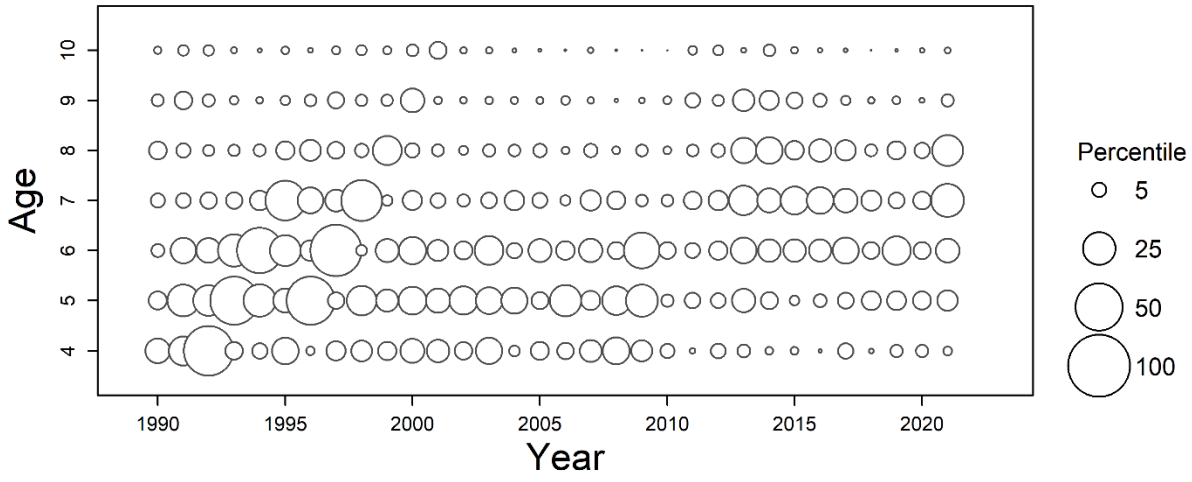


*Figure 9. Bubble plot of spring spawner Herring fixed gear catch-per-unit-effort values (number per net-haul per trip) at age, 1990 to 2021. As there was no fishery in 2022 and 2023, CPUE was not estimated for those years. The size of the bubble is proportional to the maximum CPUE index value.*

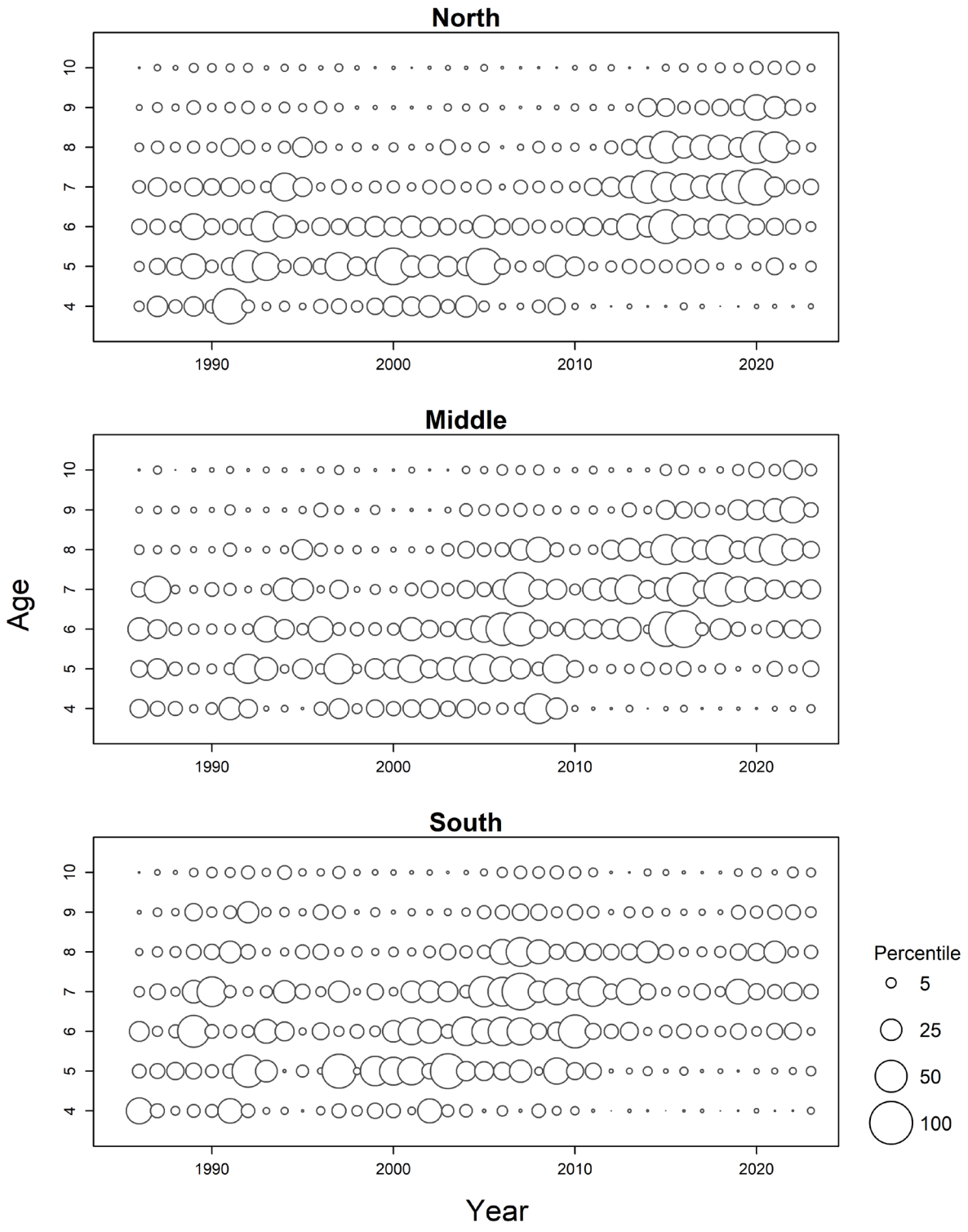


*Figure 10. Fall spawner (FS) fixed gear age-disaggregated catch-per-unit-effort values (number per net-haul per trip) by region (upper panel North, middle panel Middle, and lower panel South), 1986 to 2023. The size of the bubble is proportional to the CPUE index value.*

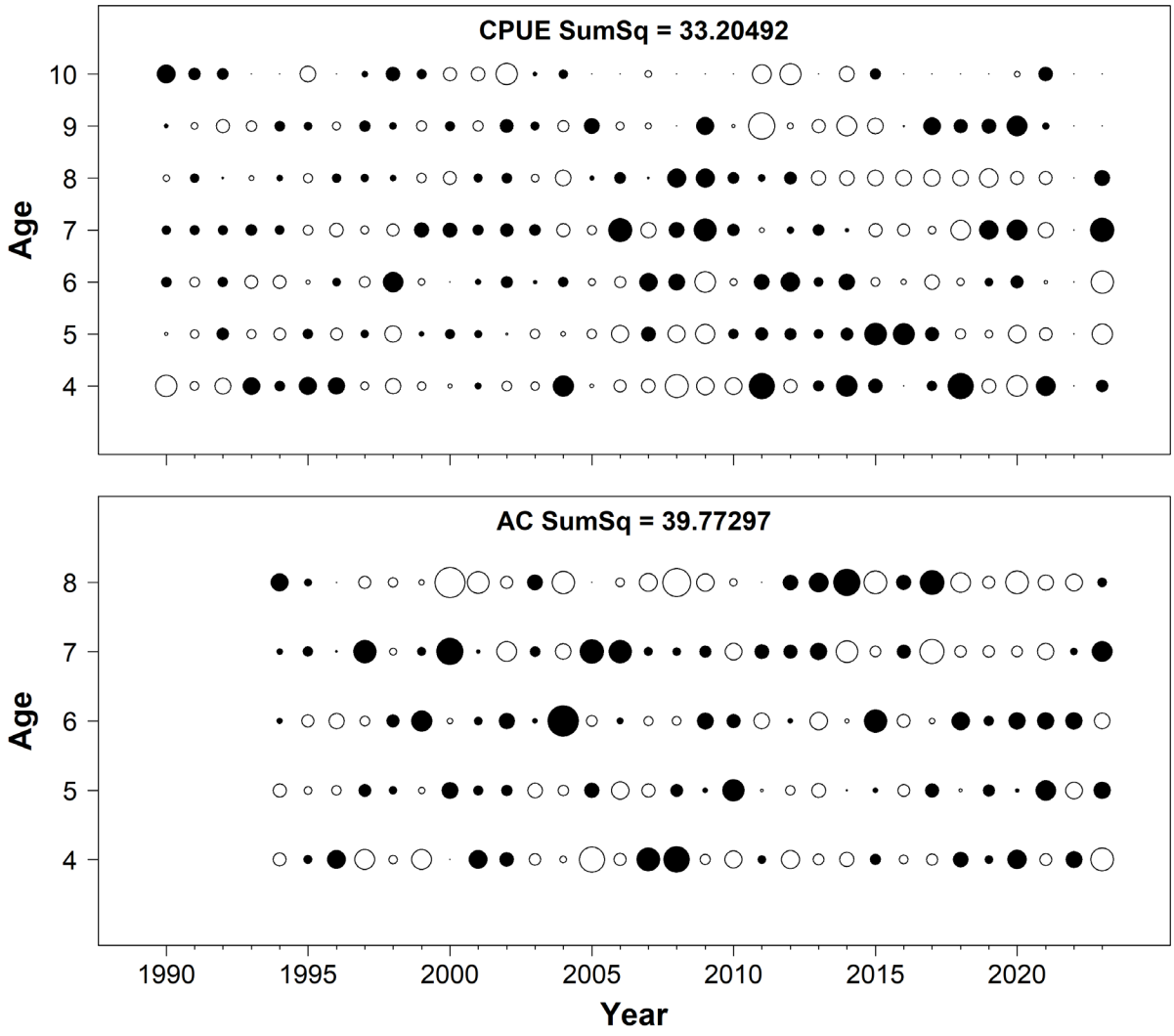


*Figure 11. Residuals in PAA (observed – predicted indices) for the population model of spring spawners in the southern Gulf of St. Lawrence. The upper panel shows residuals for the CPUE index and the bottom panel shows residuals for the acoustic index. Rows are for ages and columns for years. Circle radius is proportional to the absolute value of residuals. Black circles indicate negative residuals (i.e., observed < predicted).*

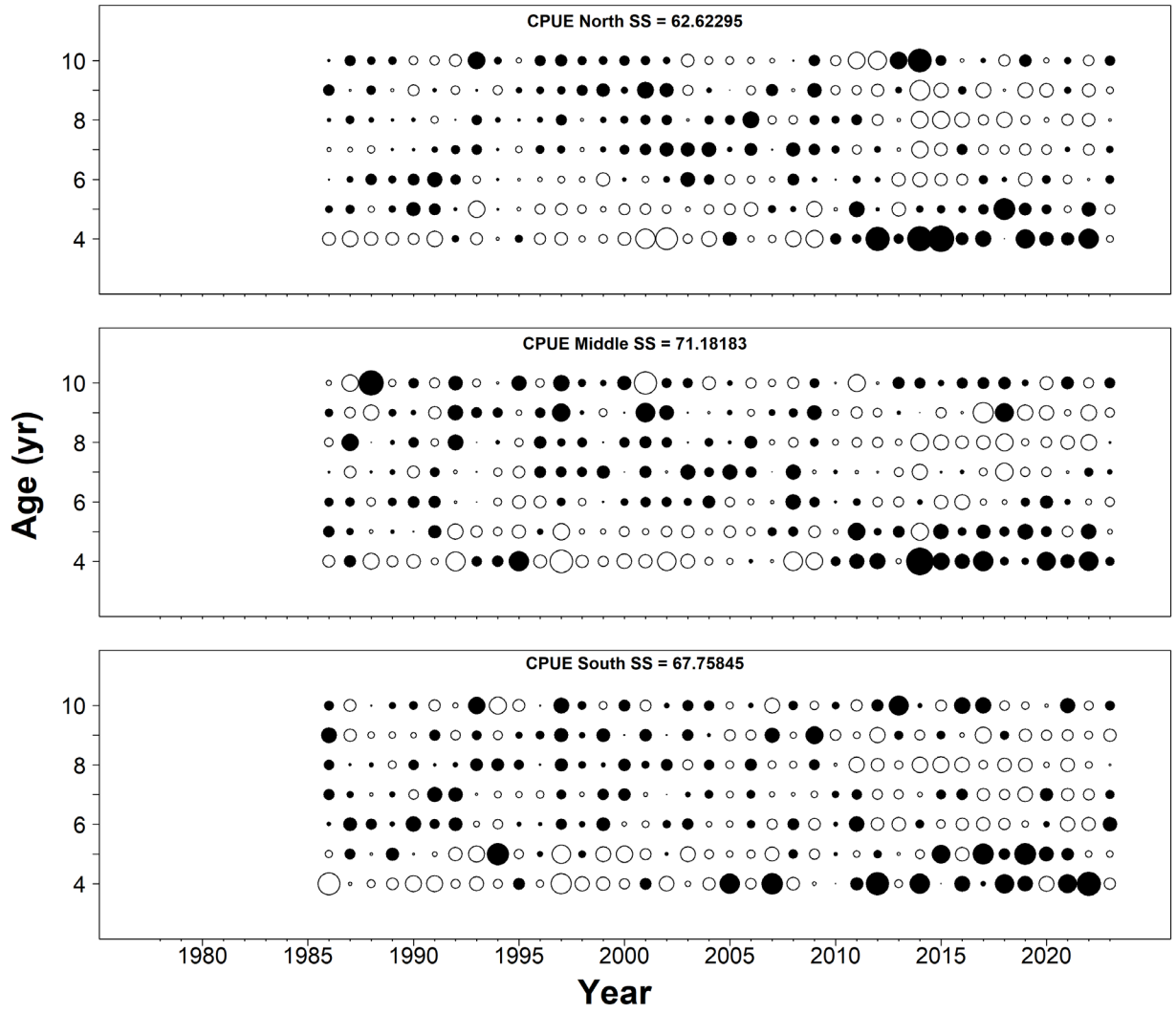


*Figure 12. CPUE index PAA residuals by region (North, Middle and South) from the SCA population model of fall spawning Herring from the southern Gulf of St. Lawrence. Rows are for ages and columns are years. The circle radius is proportional to the absolute value of residuals. Black circles indicate negative residuals (i.e., observed < predicted).*

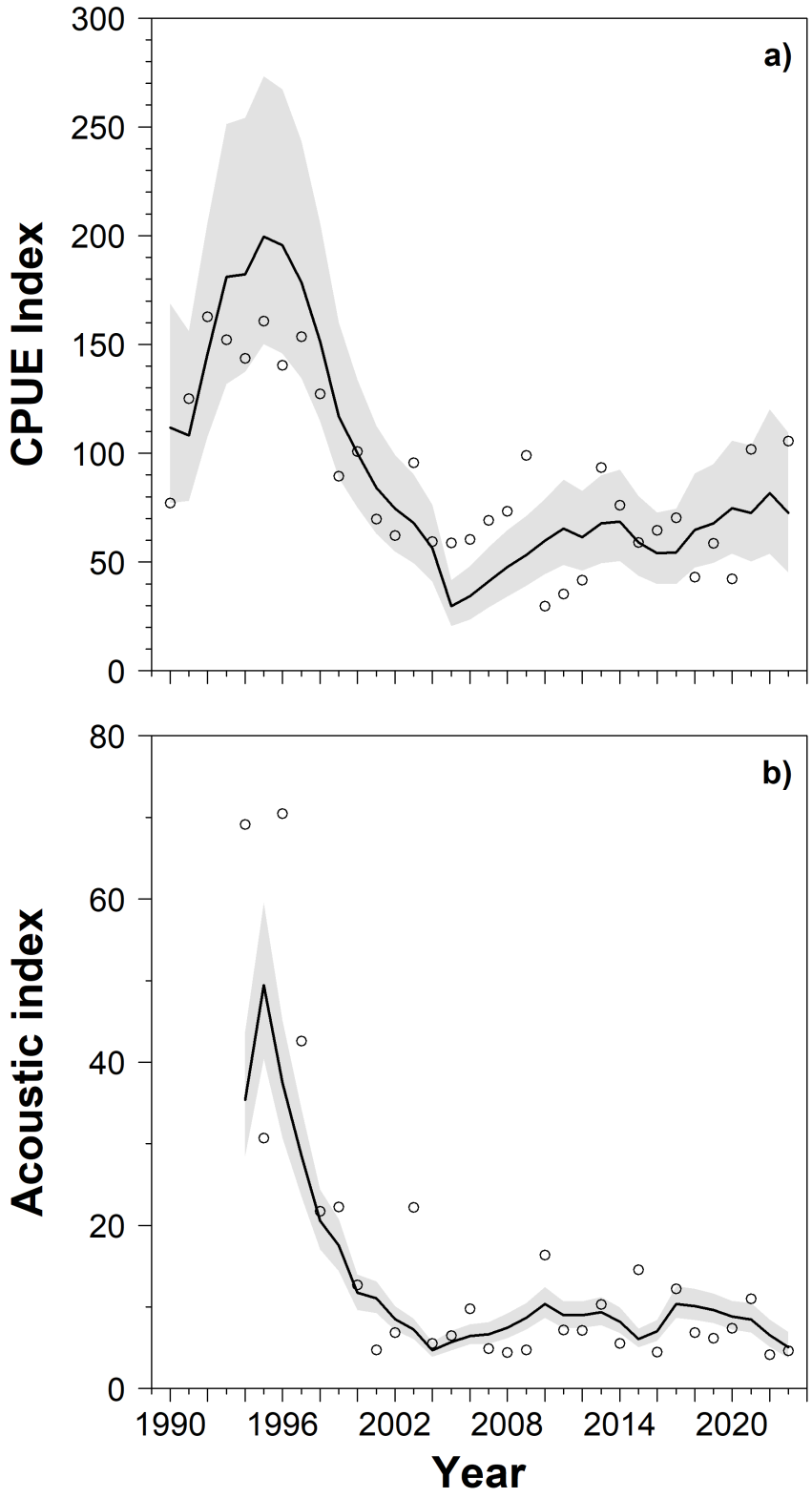


*Figure 13. Observed (circles) and predicted (lines and shading) age-aggregated CPUE (upper panels) and acoustic (lower panels) indices (kg) for the population model of spring spawners in the southern Gulf of St. Lawrence. The lines show the median predicted indices and the shading the 95% confidence intervals of the predictions based on MCMC sampling.*

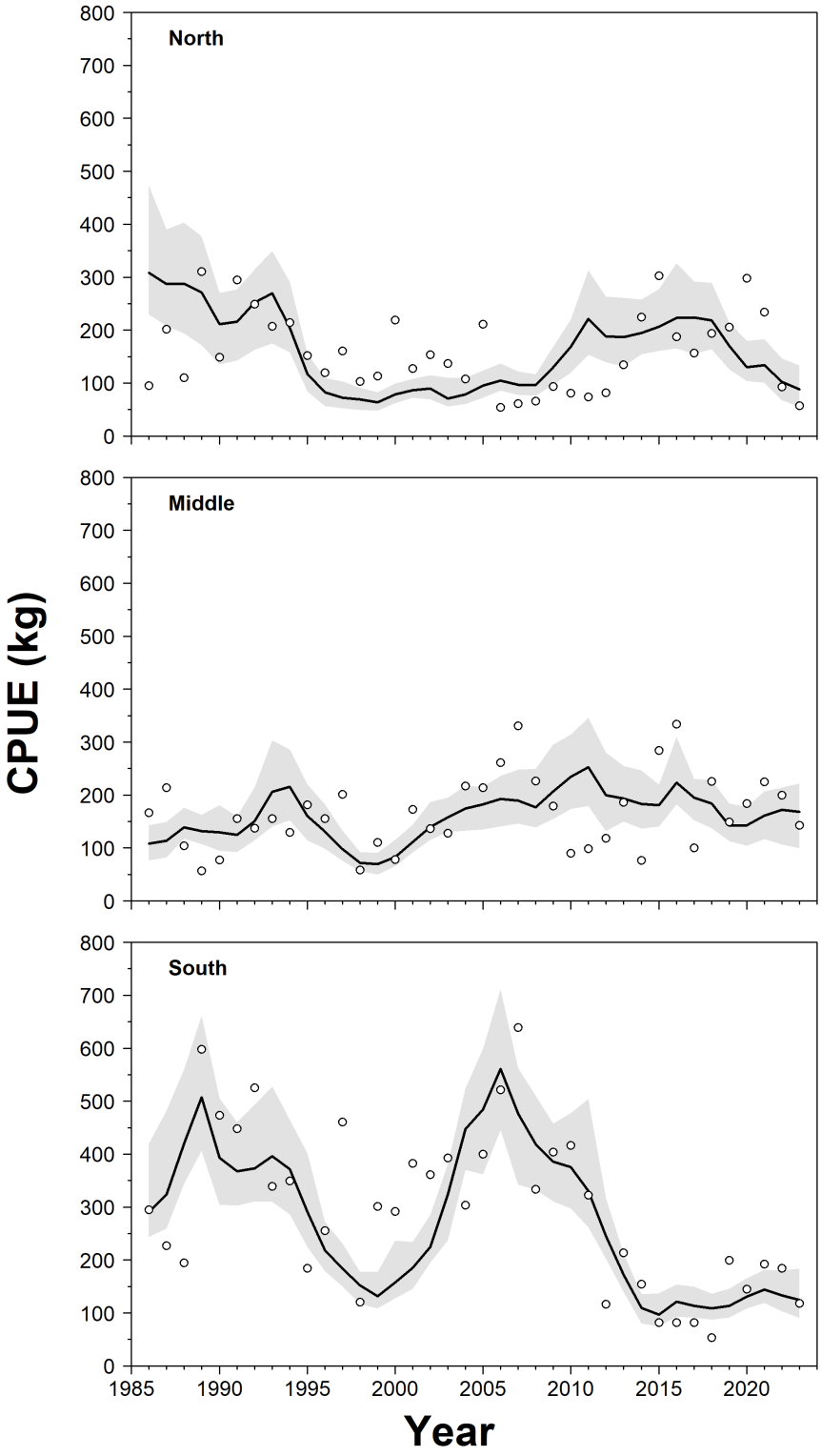


*Figure 14. Observed (circles) and predicted (lines and shading) age-aggregated commercial gillnet CPUE indices by region (CPUE North, CPUE Middle, CPUE South) from the SCA population model for fall spawners from the southern Gulf of St. Lawrence. The lines show the median predicted indices and the shading the 95% confidence intervals of the predictions based on MCMC sampling.*

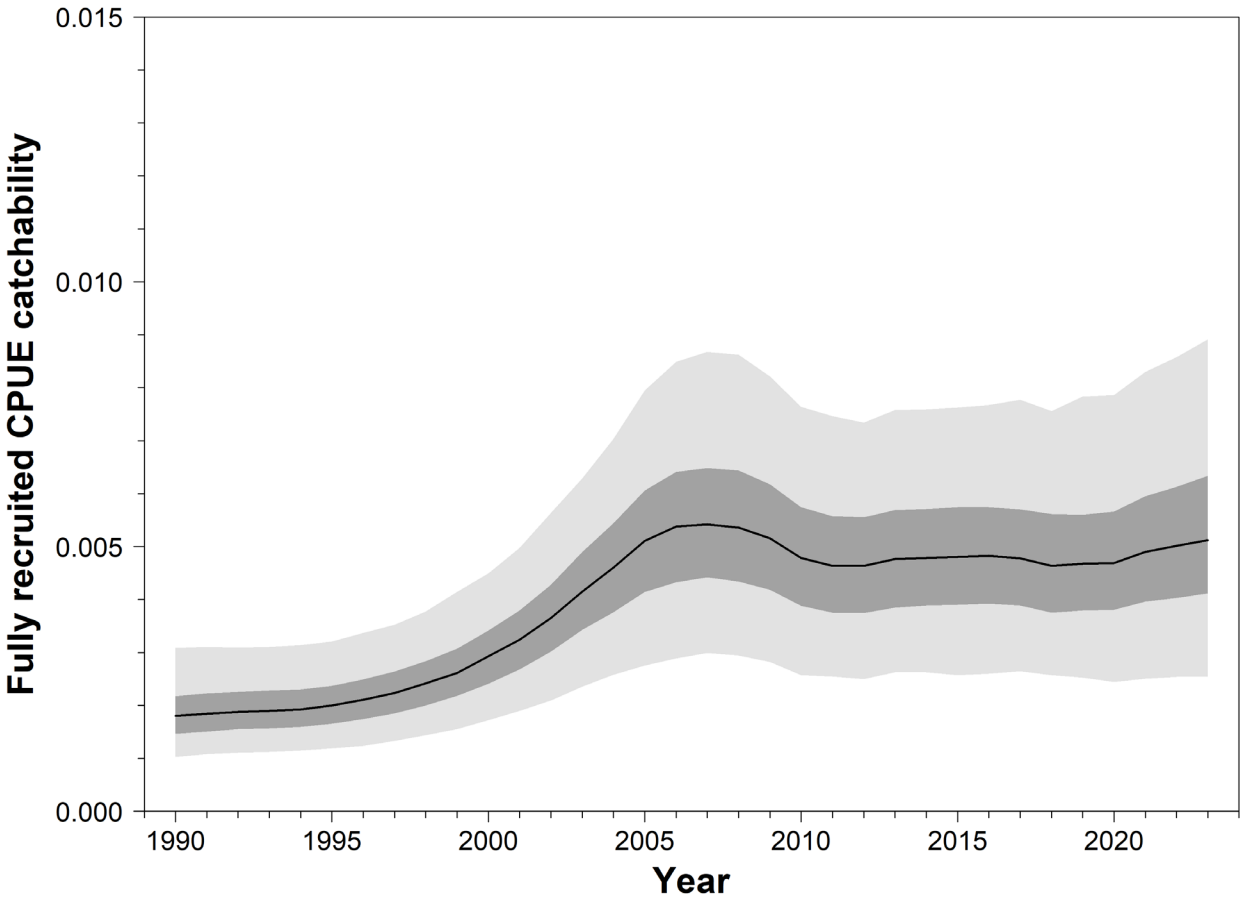


*Figure 15. Estimated fully recruited catchability to the CPUE index (q) from the spring spawners population model. Lines show the median estimates and shading their 50% (dark shading) and 95% (light shading) confidence interval based on MCMC sampling.*

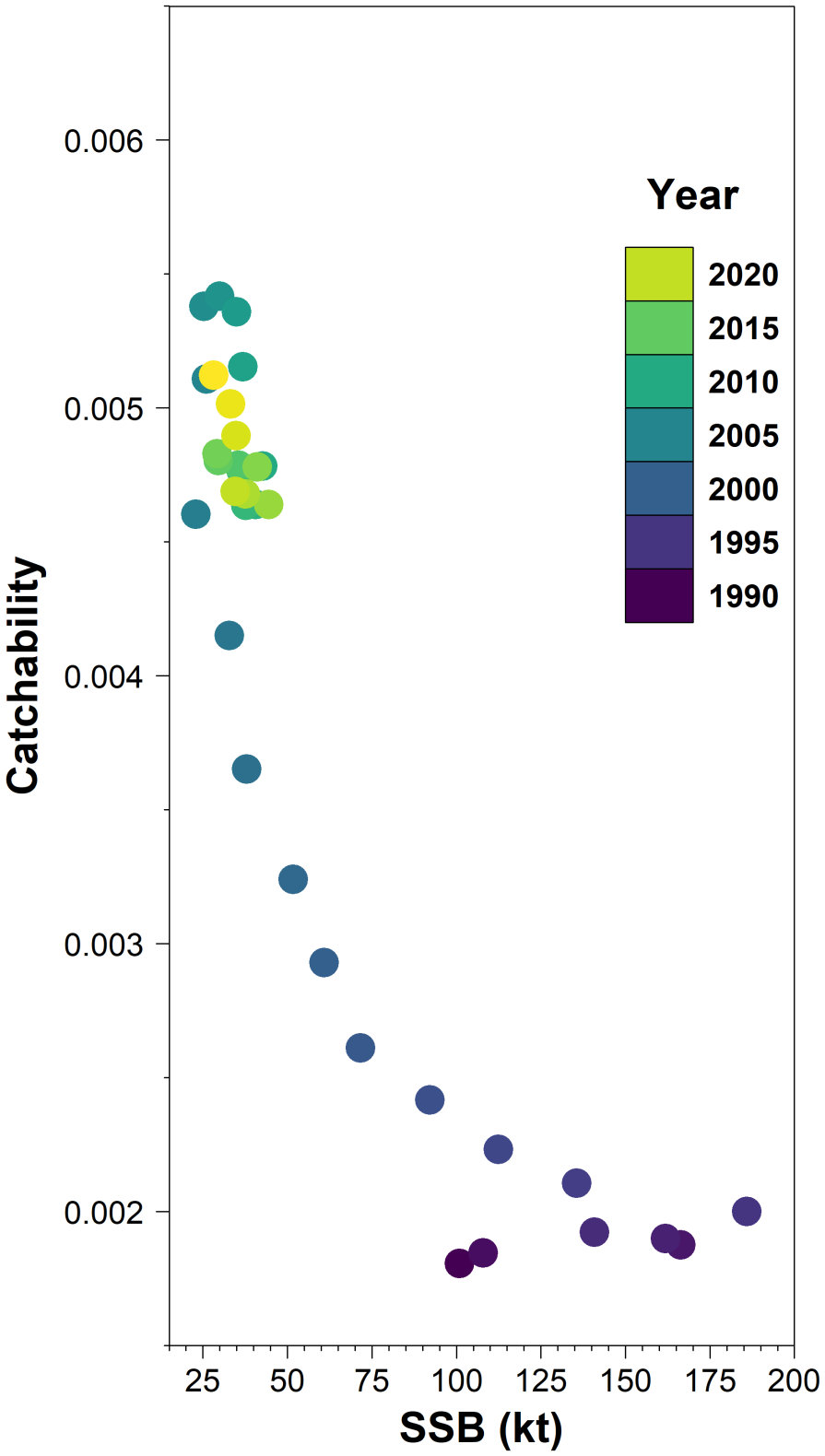


*Figure 16. Fully recruited catchability to the CPUE gillnet fishery (q) in function of SSB (kilotonnes) for spring spawning Herring in the southern Gulf of St. Lawrence between 1990 and 2023.*

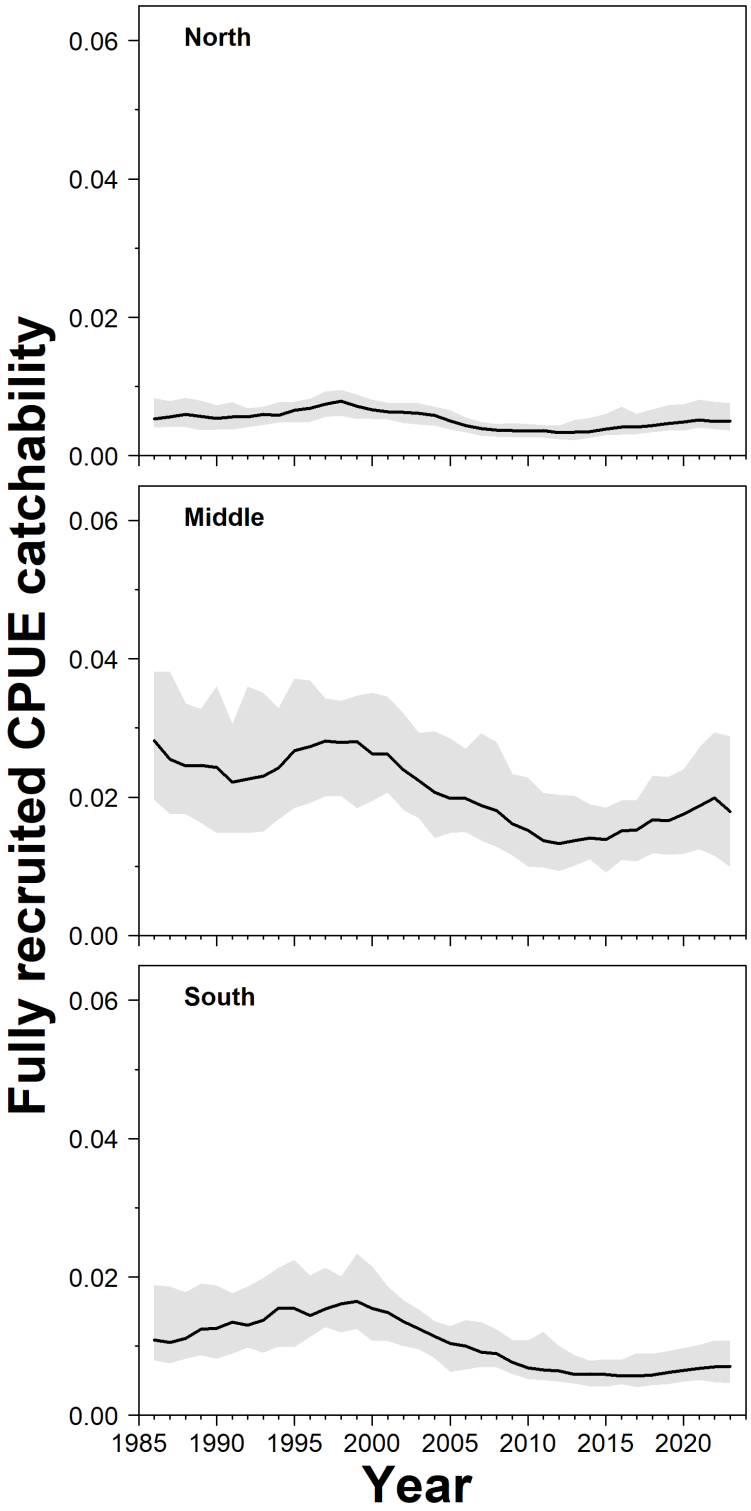


*Figure 17. Estimated fully recruited catchability for the commercial gillnet CPUE index by region (North, Middle, South), from the SCA population model of fall spawning Atlantic Herring in the southern Gulf of St. Lawrence. Lines show the median estimates and shading their 95% confidence intervals based on MCMC sampling.*

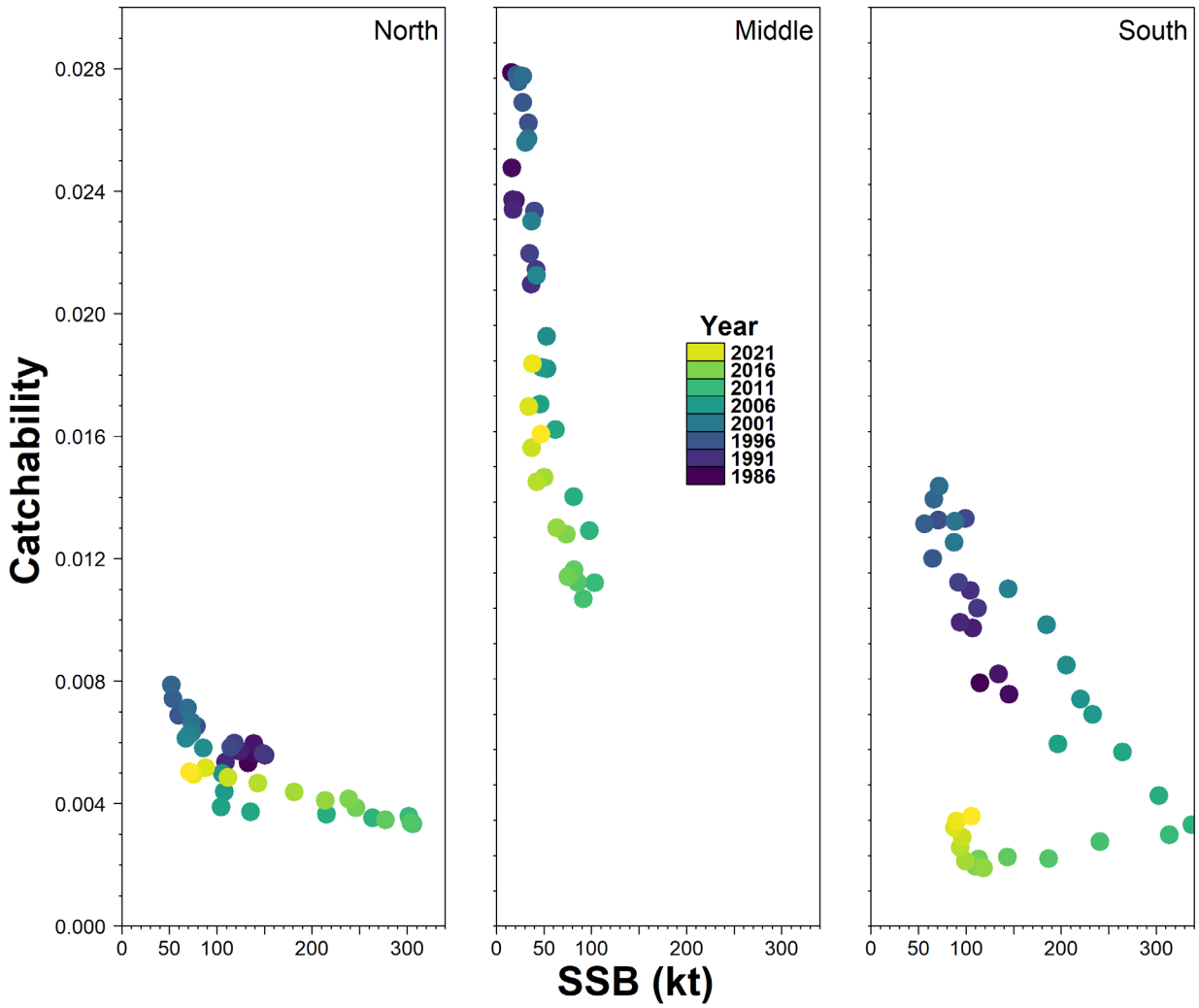


*Figure 18. Fully recruited catchability to the CPUE gillnet fishery (q) in function of SSB (kilotonnes) for by region (North, Middle, South) for fall spawning Atlantic Herring in the southern Gulf of St. Lawrence.*

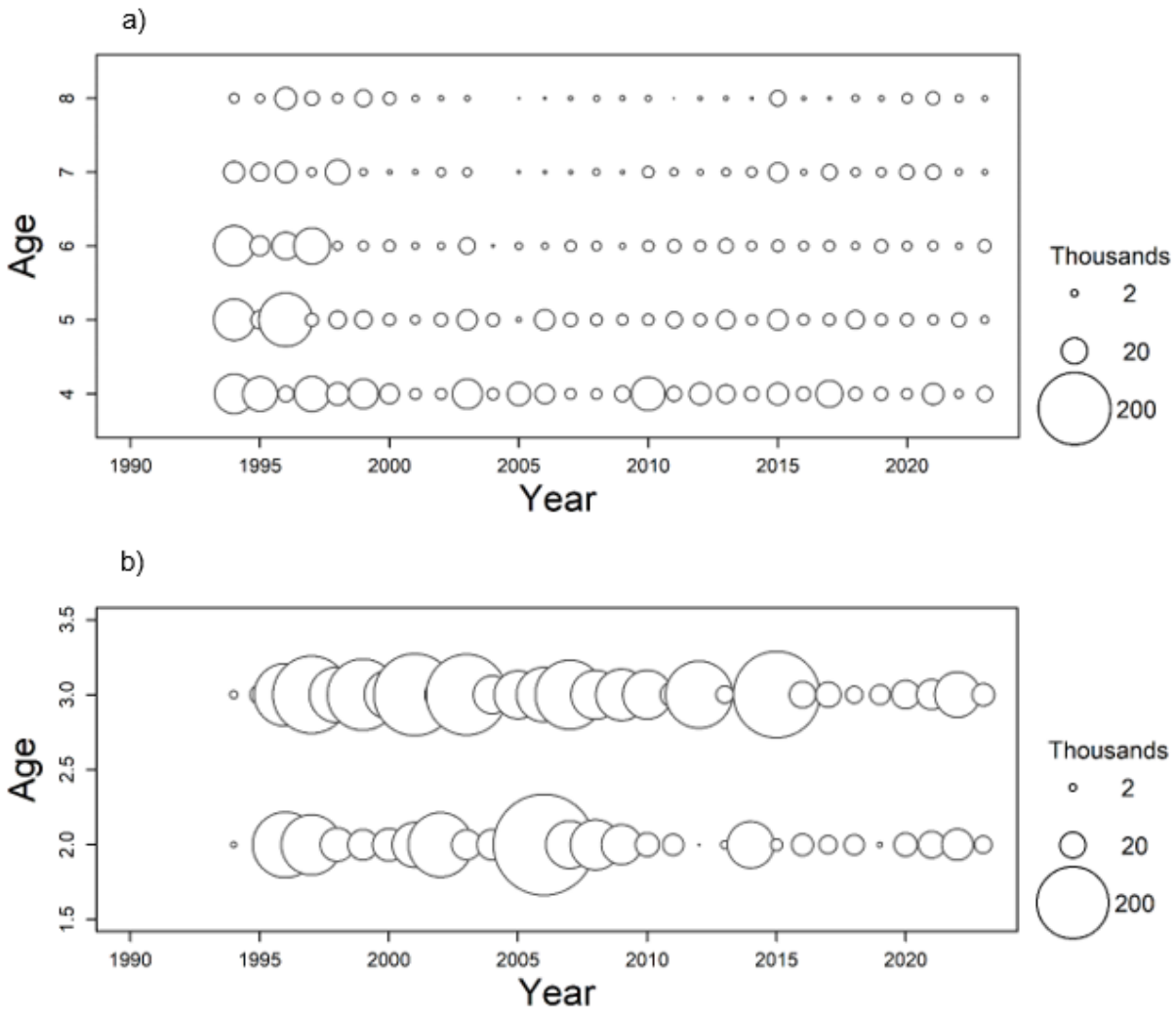


*Figure 19. Bubble plot of abundance-at-age (number) from the fisheries-independent acoustic survey for spring spawners (upper panel a); ages 4 to 8) and fall spawners (lower panel b); ages 2 to 3) from 1994 to 2023.*

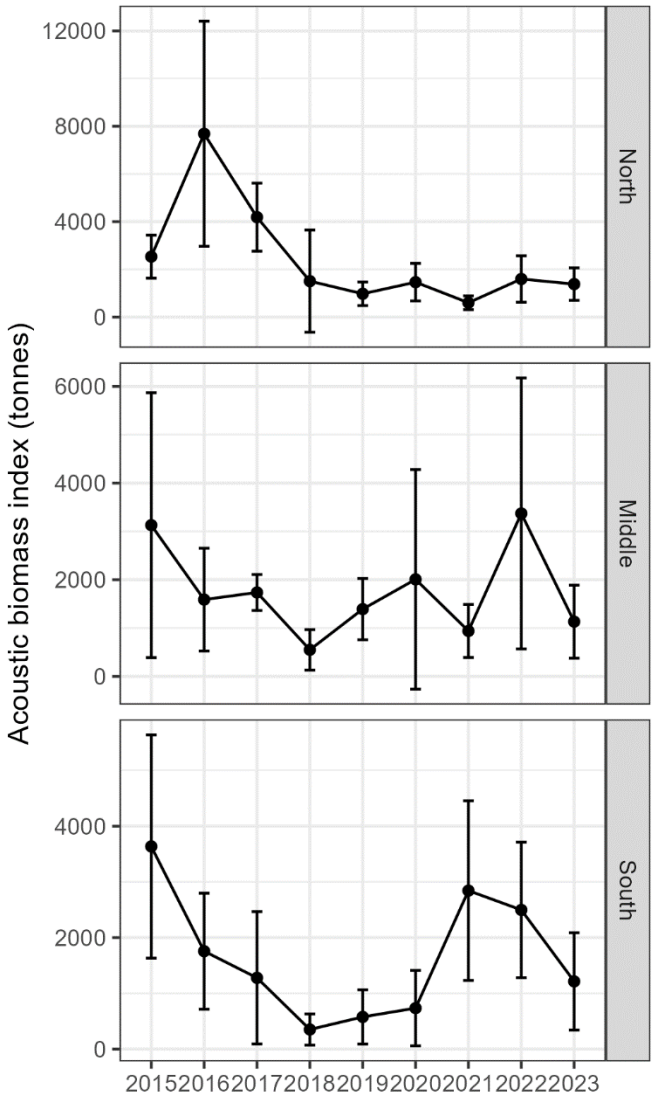


*Figure 20. FSCP acoustic biomass indices of NAFO Division 4T fall spawning Atlantic Herring in the North, Middle and South regions between 2015 and 2023. Points are average and vertical lines are 95% confidence intervals.*

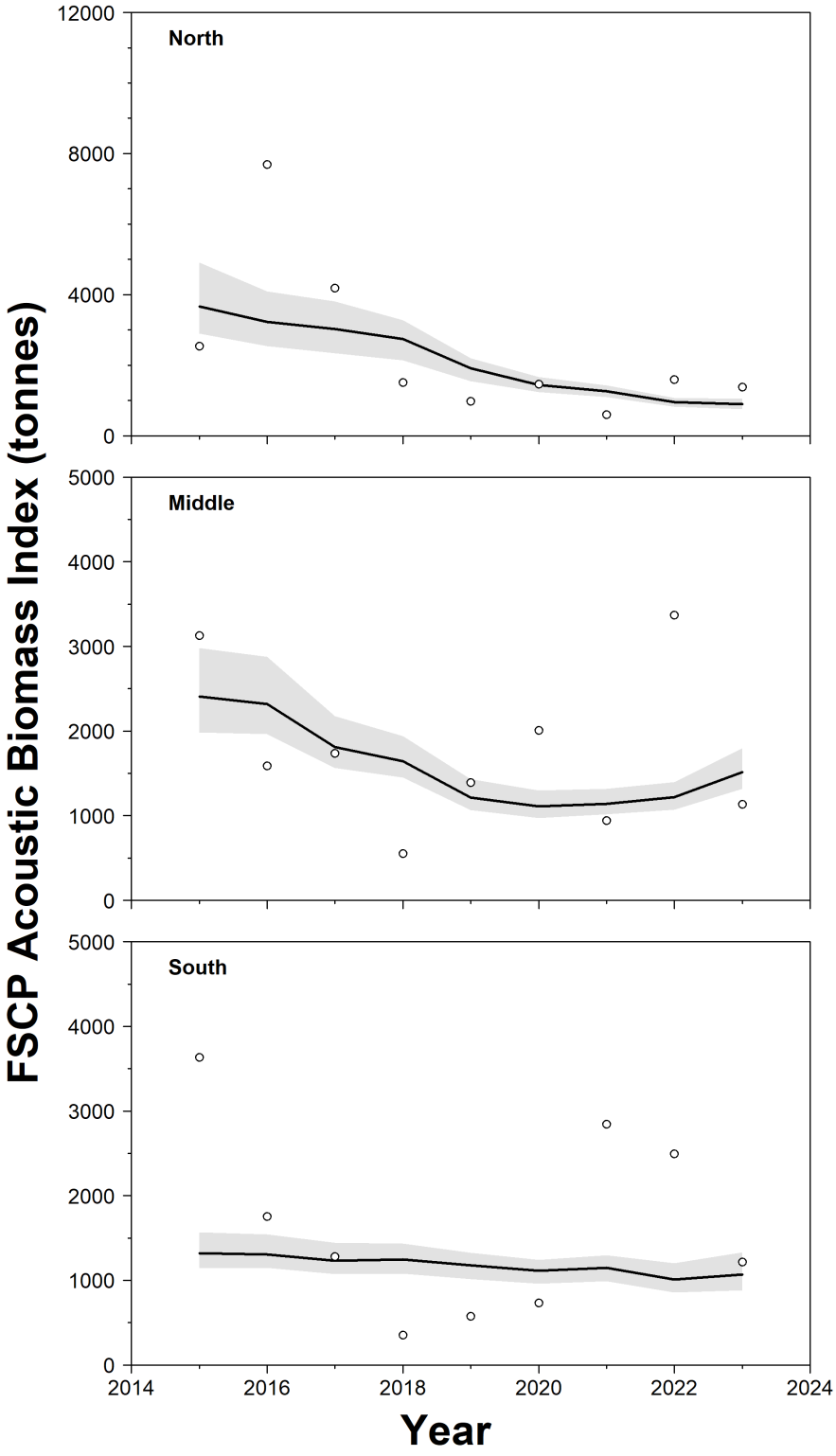


*Figure 21. Observed (circles) and predicted (lines and shading) age-aggregated FSCP Acoustic Biomass Index from the SCA population model for fall spawners from the southern Gulf of St. Lawrence. The lines show the median predicted indices and the shading the 95% confidence intervals of the predictions based on MCMC sampling.*

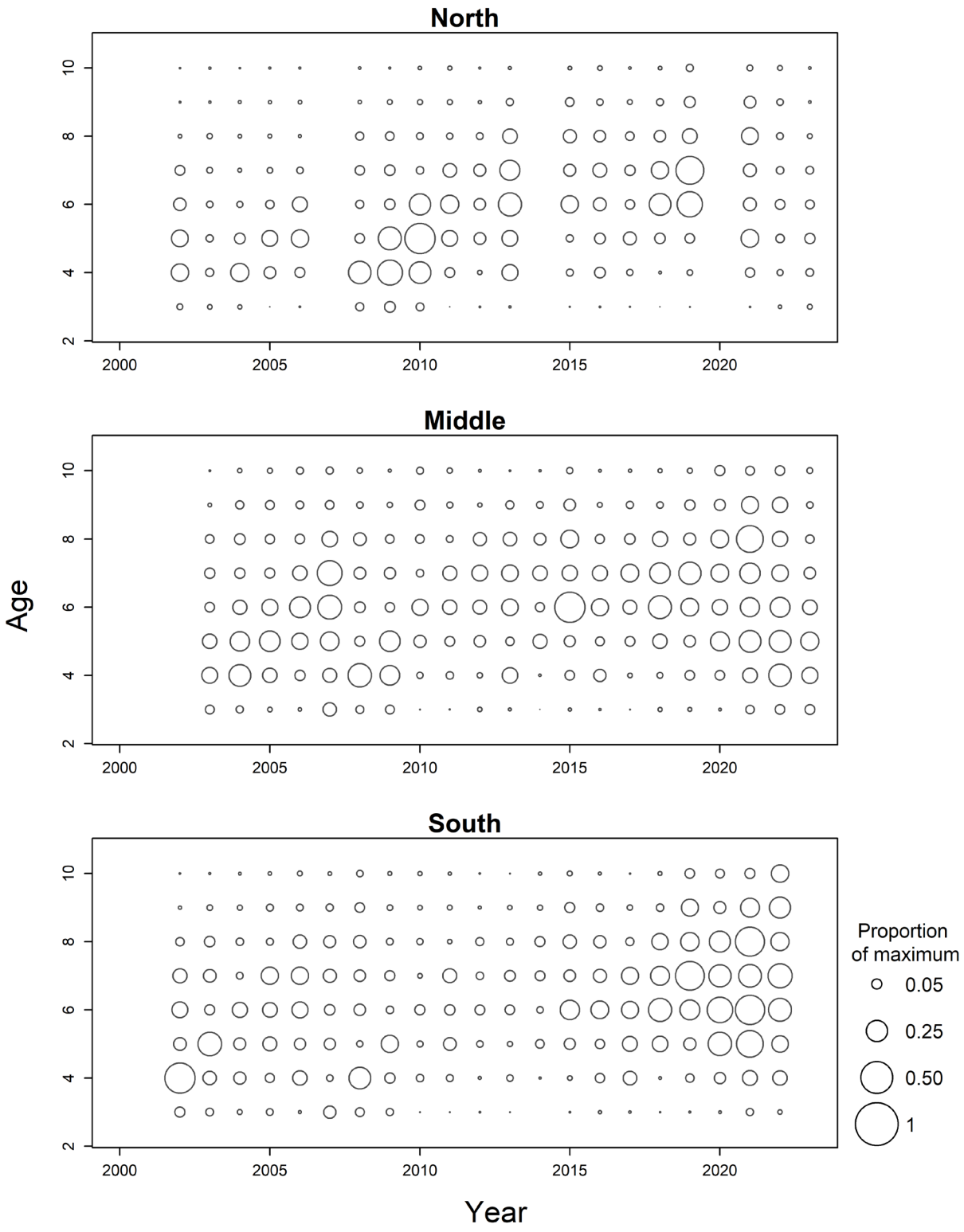


*Figure 22. Bubble plots of catch-at-age indices (number) of fall spawners from the experimental netting survey by region (upper panel North, middle panel Middle, and lower panel South) from 2002 to 2023. The size of the bubble is proportional to the index value. South did not have experimental nets in 2023.*

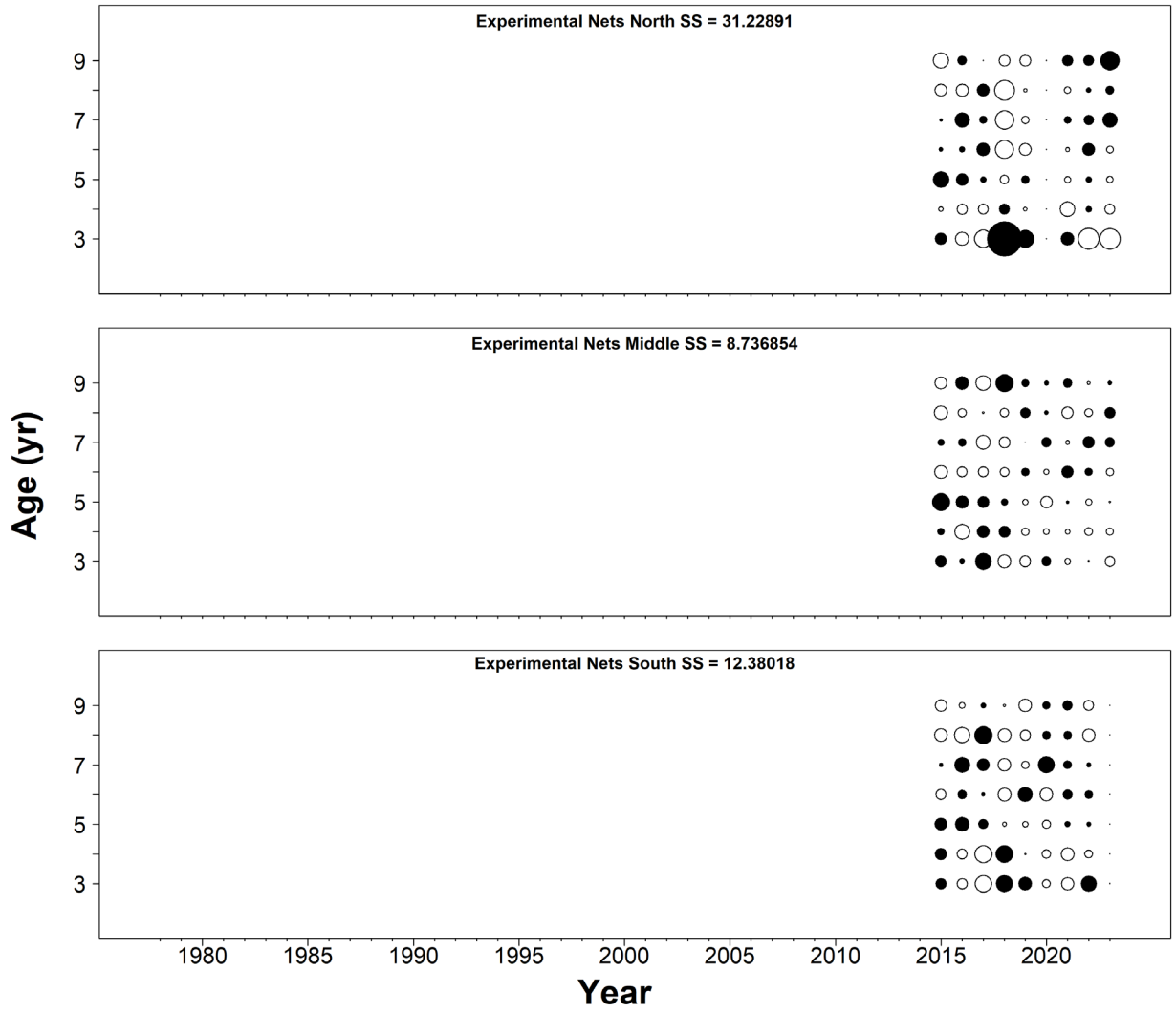


*Figure 23. Experimental nets index PAA residuals by region (North, Middle and South) from the SCA population model of fall spawning Herring from the southern Gulf of St. Lawrence. Rows are for ages and columns are years. The circle radius is proportional to the absolute value of residuals. Black circles indicate negative residuals (i.e., observed < predicted). Results are only provided for the years during which the acoustic survey was conducted.*

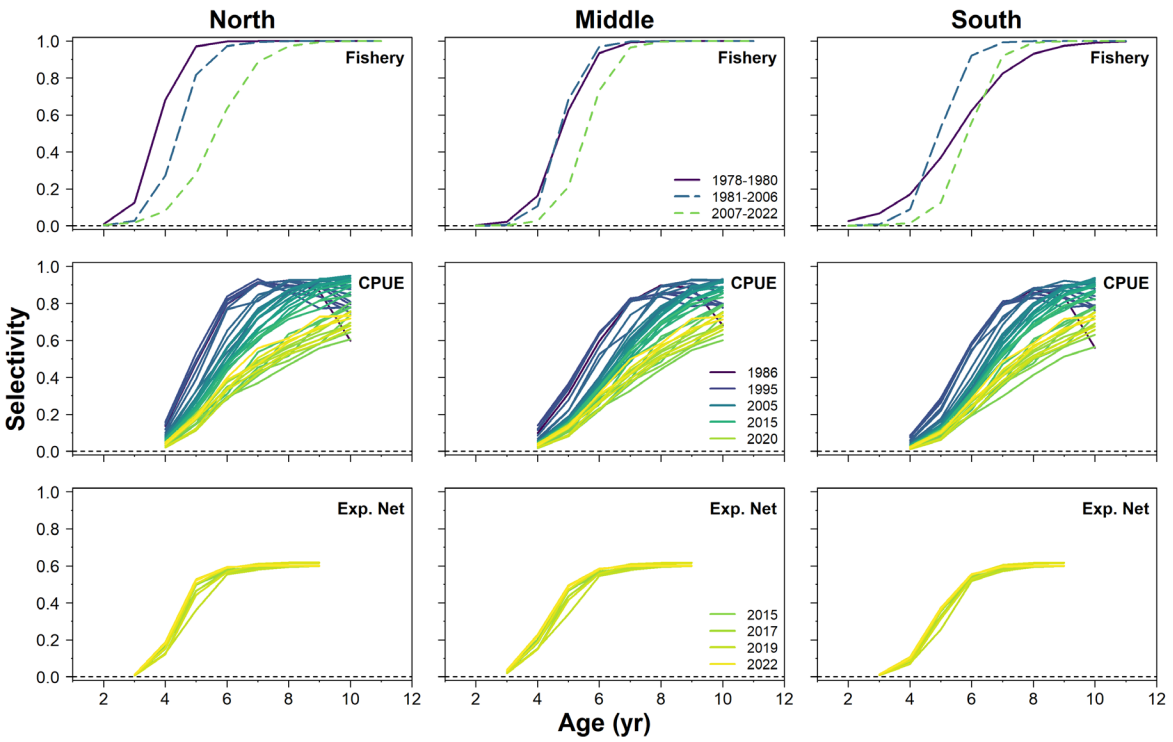


*Figure 24. Estimated fishery (top row), CPUE (Middle row) and experimental nets (bottom row) selectivity for three populations of the southern Gulf of St. Lawrence (North in the left column, Middle in the Middle column and South in the right column), from the SCA population model. Lines show the maximum likelihood estimates for years or time-periods identified in respective Figure legends.*

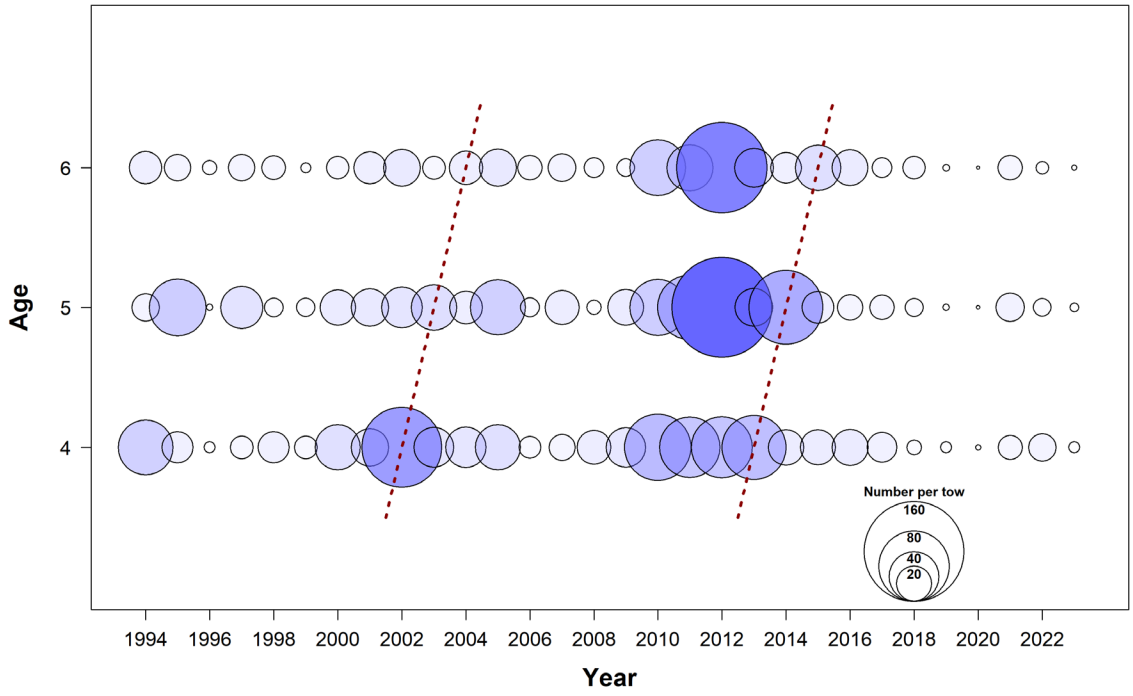


*Figure 25. Multispecies bottom trawl survey abundance index (number of fish per standardized tow) for fall spawning Herring ages 4 to 6 years, 1994 to 2023.*

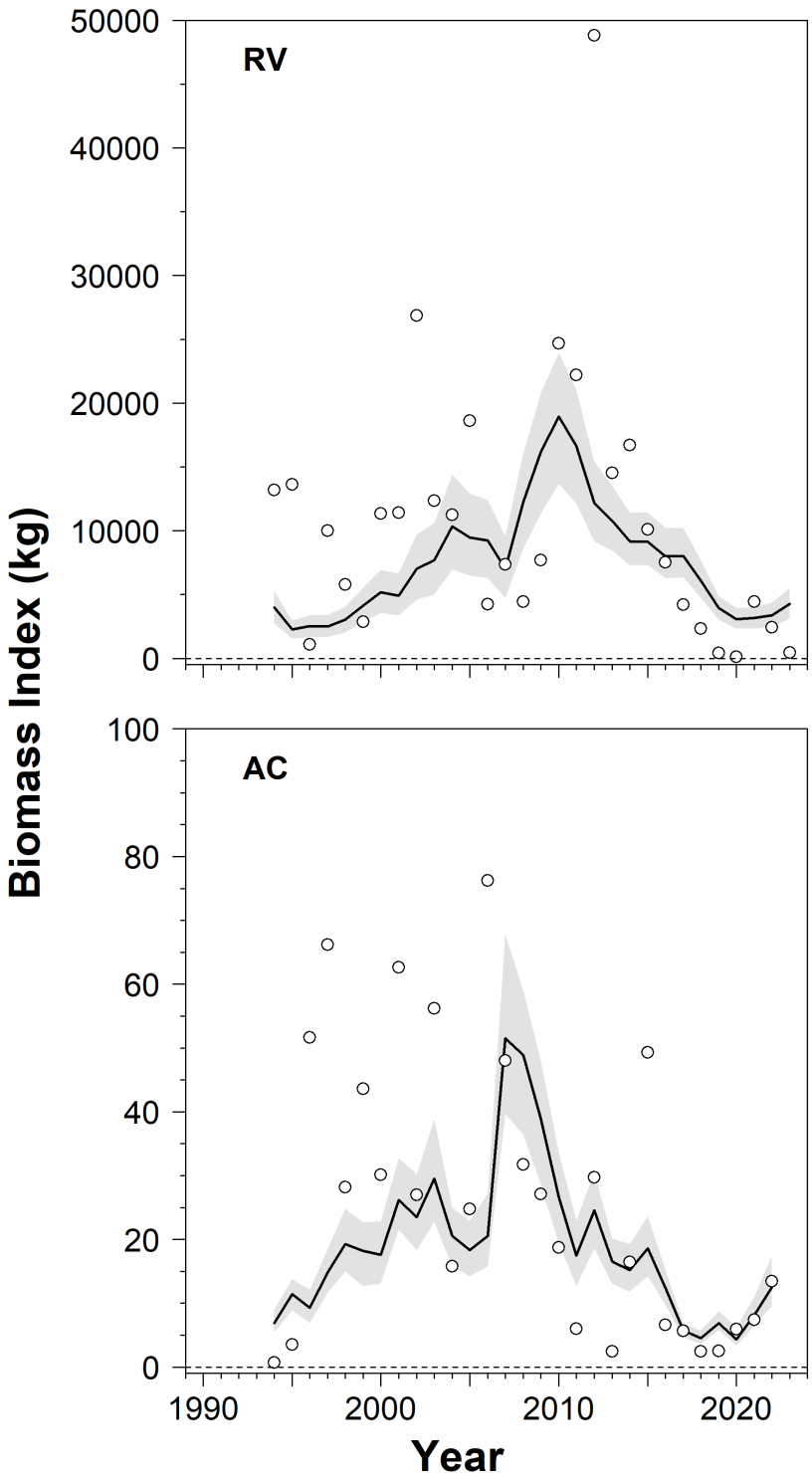


*Figure 26. Observed (circles) and predicted (lines and shading) age-aggregated RV indices (RV, all regions combined) and acoustic indices (AC, all regions combined) from the SCA population model for fall spawners from the southern Gulf of St. Lawrence. The lines show the median predicted indices and the shading the 95% confidence intervals of the predictions based on MCMC sampling.*

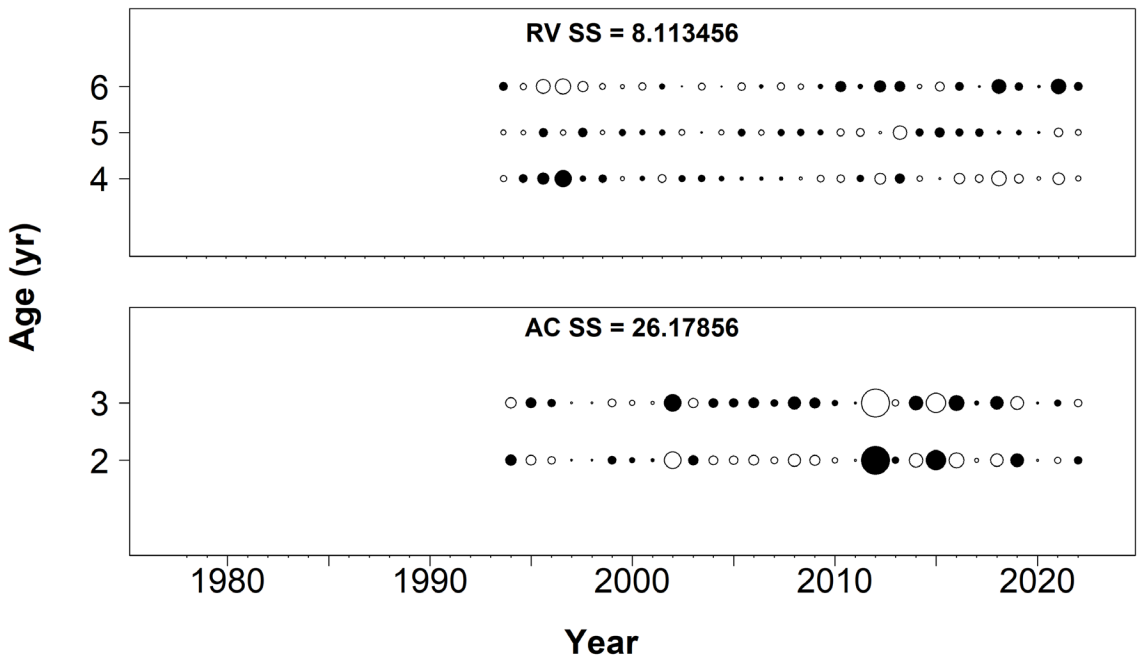


*Figure 27. RV survey index (top) and acoustic survey index (AC, bottom) PAA residuals from the SCA population model of fall spawning Herring from the southern Gulf of St. Lawrence. Rows are for ages and columns are years. The circle radius is proportional to the absolute value of residuals. Black circles indicate negative residuals (i.e., observed < predicted).*

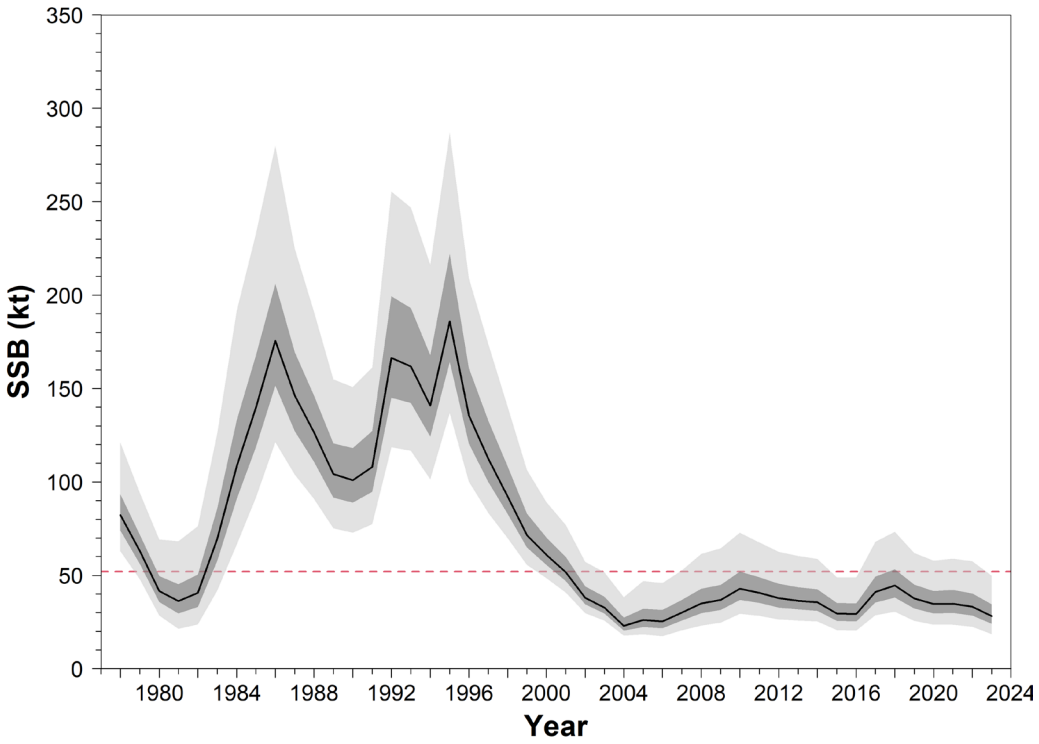


*Figure 28. Estimated beginning of the fishing season (April 1) SSB of the spring spawner component of Atlantic Herring in the southern Gulf of St. Lawrence, 1978 to 2023. The solid line is the median MCMC estimate and shading its 50% (dark shading) and 95% (light shading) confidence intervals. The red dashed horizontal line is the Limit Reference Point (LRP) (51,938 t of SSB).*

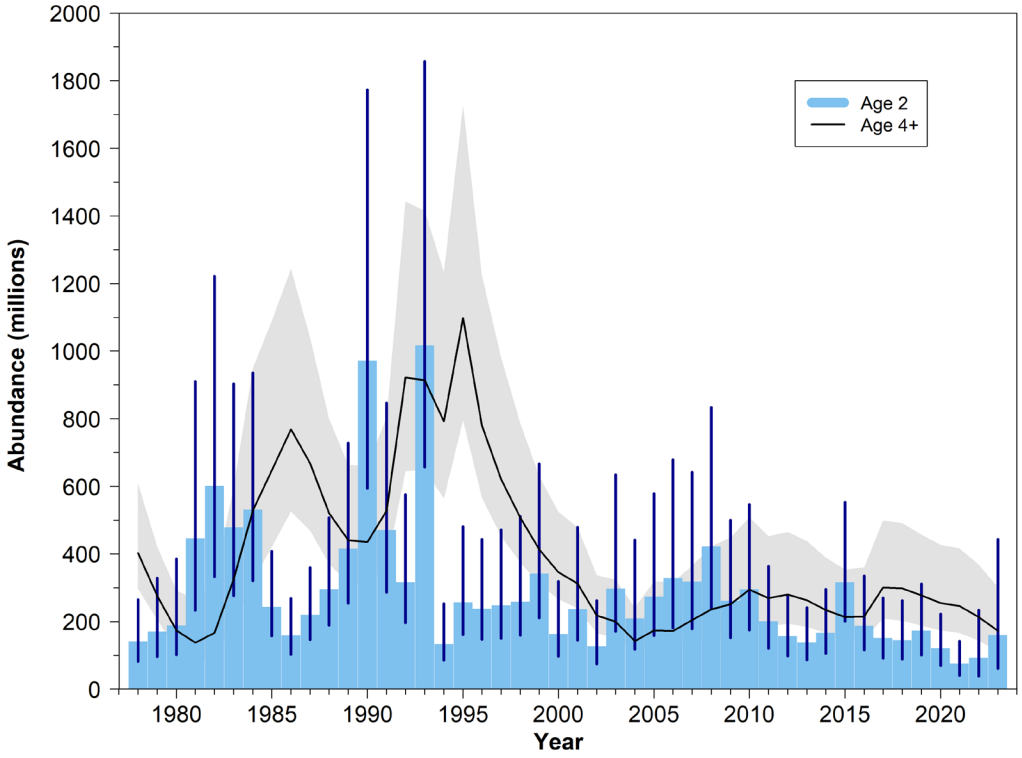


*Figure 29. Estimated January 1 abundance of 2-year-old Herring (blue bars), and Herring 4 years and older (black line) of the spring spawner component in the southern Gulf of St. Lawrence. Black line shows the median MCMC estimate and vertical lines and shading show 95% confidence intervals.*

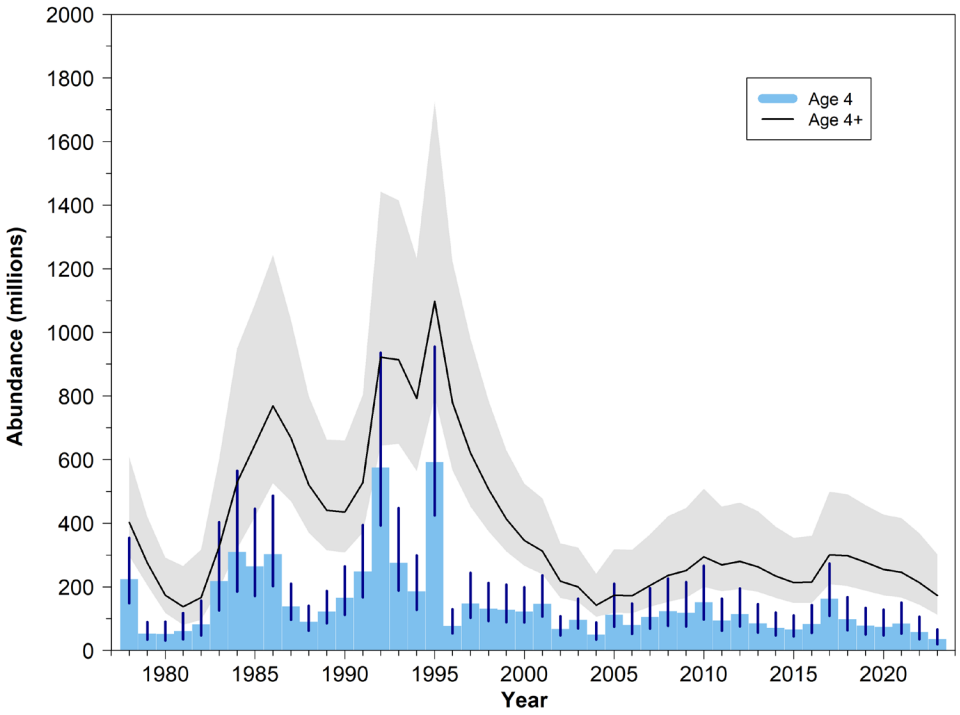


*Figure 30. Estimated January 1 abundance of 4-year-old Herring (blue bars), and Herring 4 years and older (black line) of the spring spawner component in the southern Gulf of St. Lawrence. Black line shows the median MCMC estimate and vertical lines and shading show 95% confidence intervals.*

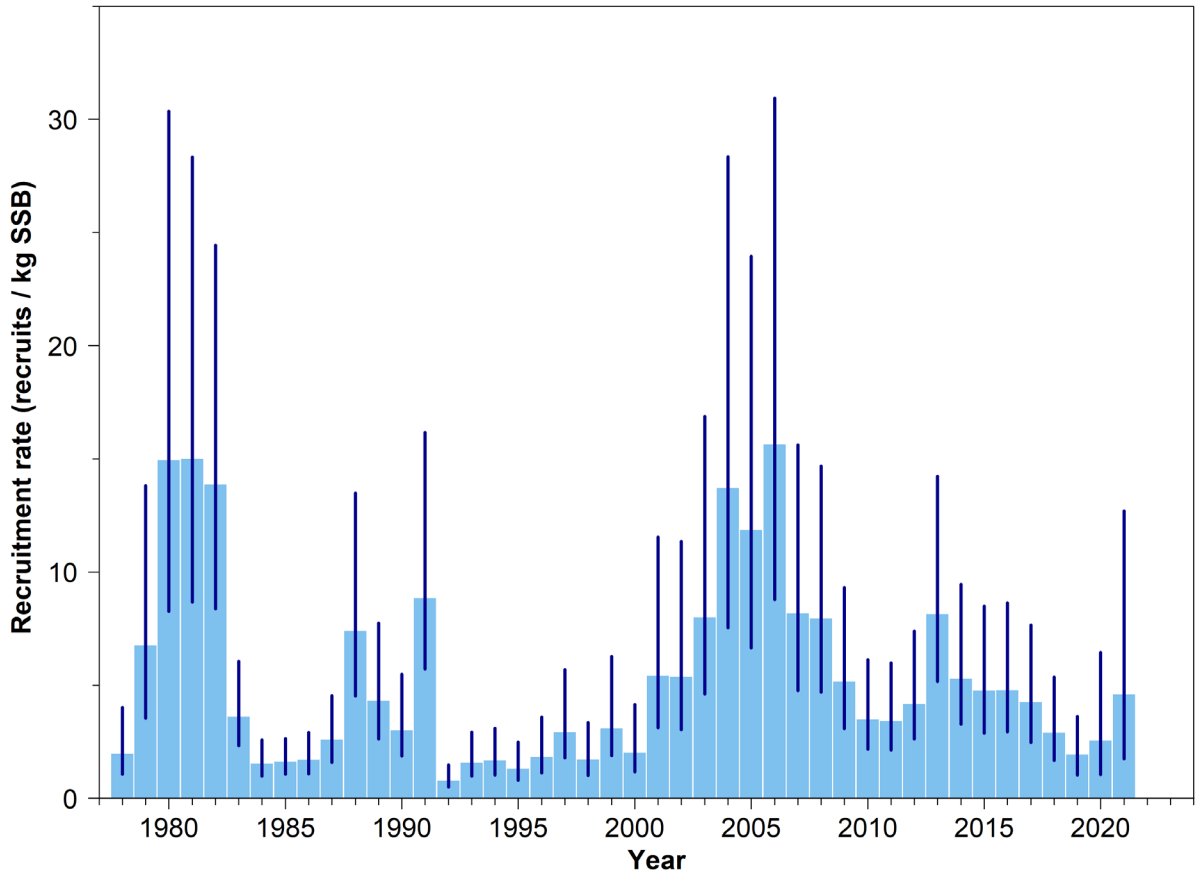


*Figure 31. Recruitment rates for age 2 recruits for the 1978 to 2021 cohorts of spring spawning Atlantic Herring in NAFO Div. 4T. Vertical lines indicate 95% confidence intervals.*

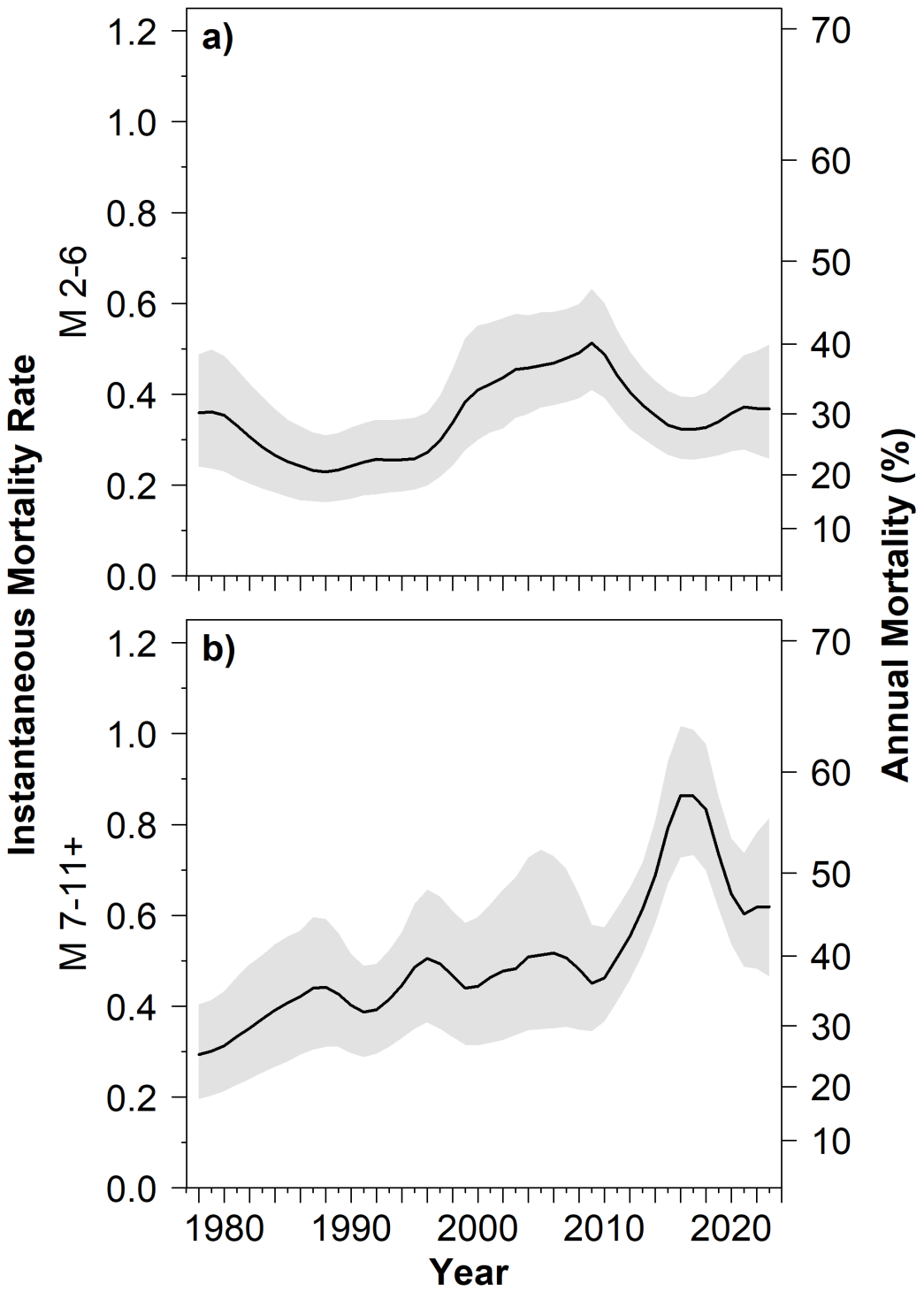


*Figure 32. Estimated instantaneous natural mortality rate (left axis) and annual mortality (%, right axis) of spring spawning Atlantic Herring from the population model, for ages 2 to 6 (upper panel) and 7 to 11+ (lower panel). Lines show the median estimates and shading their 95% confidence interval based on MCMC sampling.*

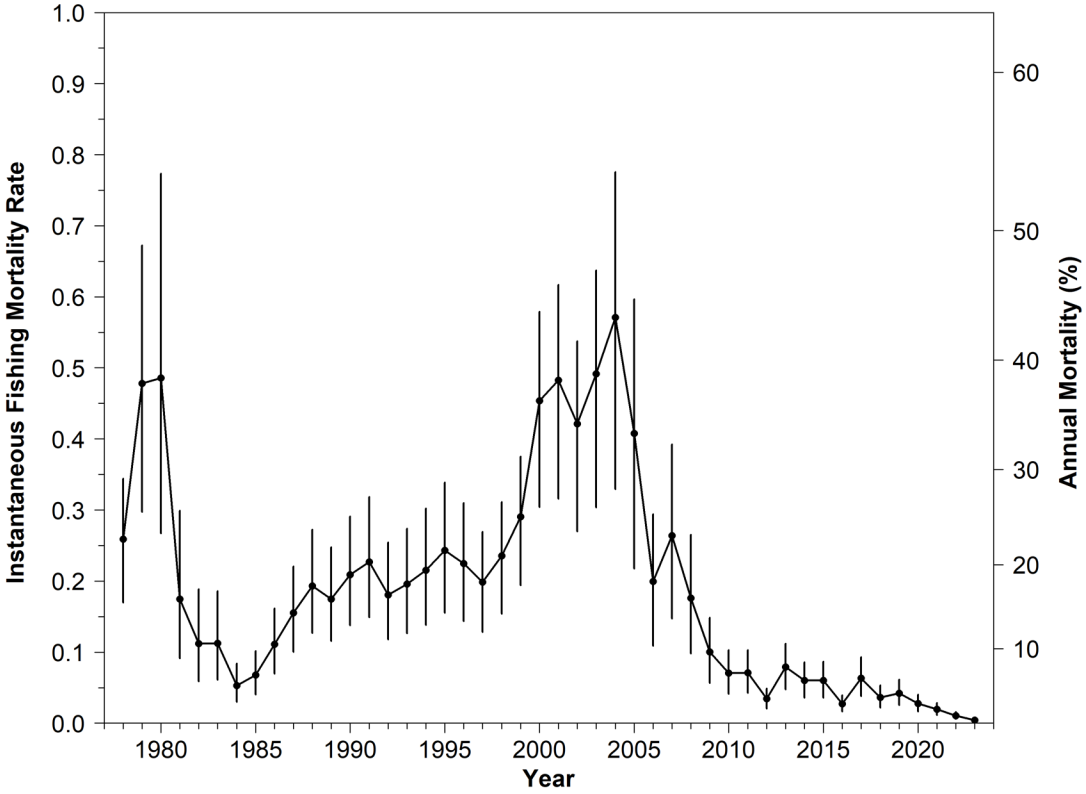


*Figure 33. Estimated January 1 abundance weighted ages 6 to 8 fishing mortality (F6-8, left axis; annual exploitation rate, right axis) of spring spawning Herring in the southern Gulf of St. Lawrence. Circles are the median estimates and vertical lines their 95% confidence intervals.*

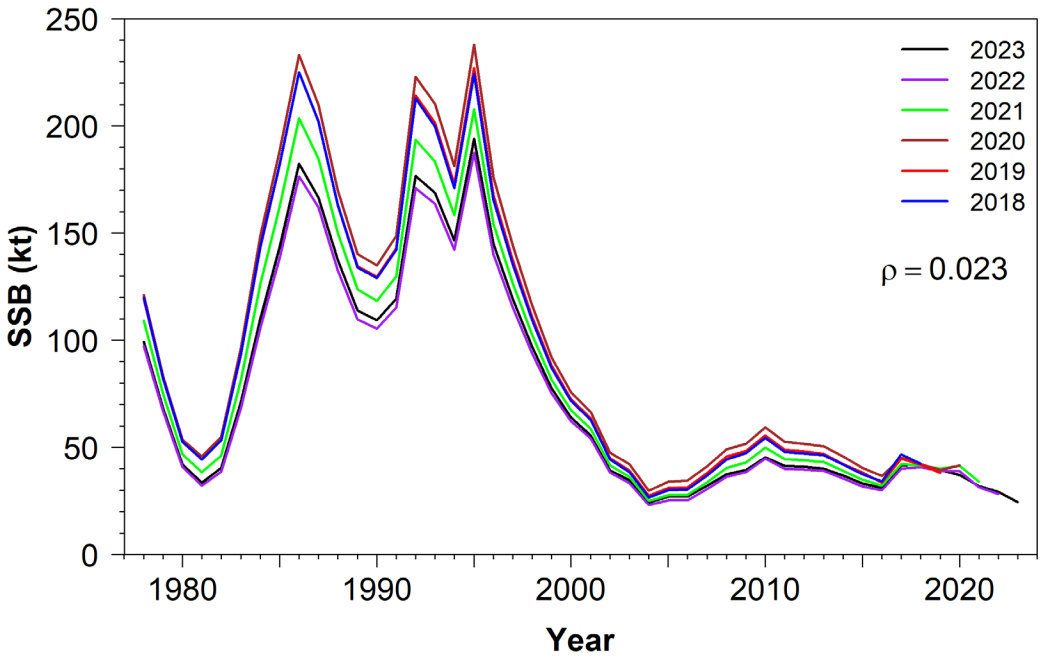


*Figure 34. Retrospective patterns in estimated spawning stock biomass (SSB) of ages 4 to 10 and years 2021 to 2015 for spring spawners in the southern Gulf of St. Lawrence. Lined colours correspond to peels between years 2015 and 2023.*

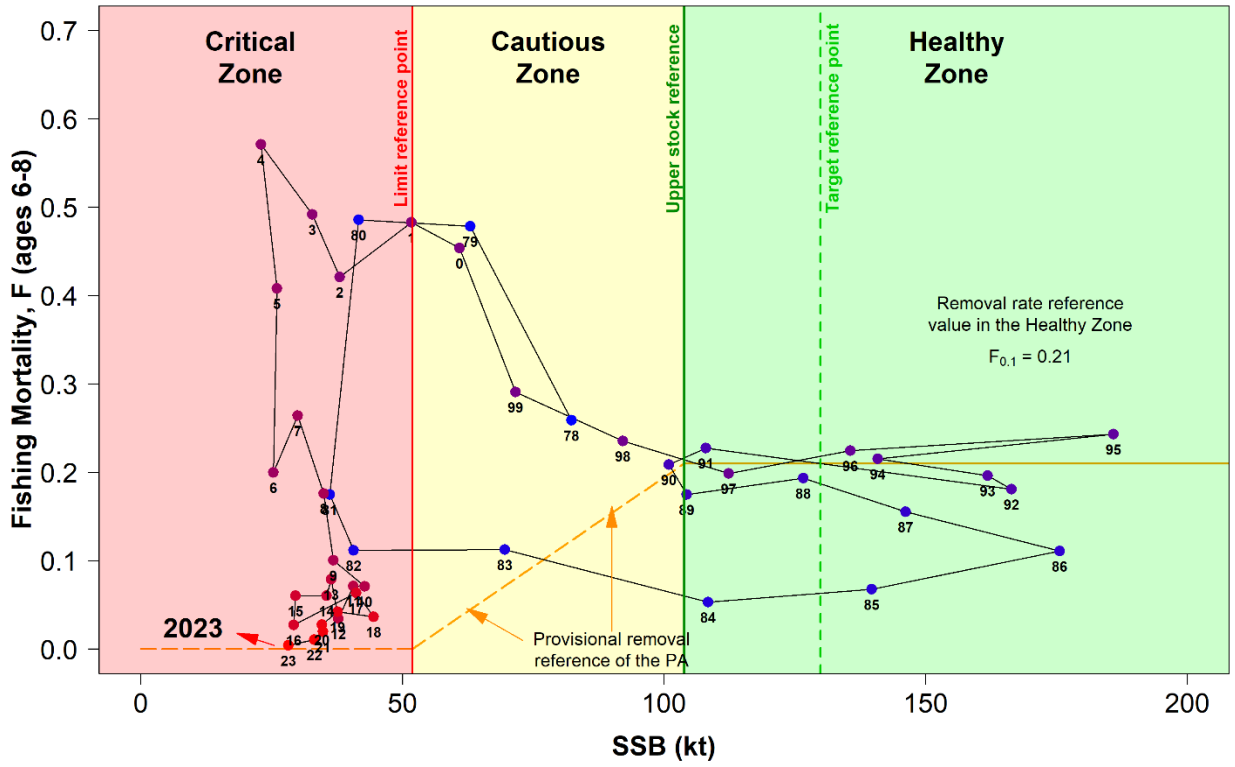


*Figure 35. The southern Gulf of St. Lawrence Atlantic Herring spring spawner component trajectory in relation to SSB (kt = thousand t) and abundance weighted fishing mortality rates for ages 6 to 8 years. The red vertical line is the LRP, ,the green vertical line is the Upper Stock Reference (USR) and the light green dashed vertical line is the Target Reference Point. The orange solid horizontal line is the removal rate reference value ($F_{0.1}$ = 0.21) in the Healthy Zone and orange dashed line is the provisional harvest decision rule of the Precautionary Approach Framework in the Cautious and Critical Zones. Point labels are years (83 = 1983, 0 = 2000).*

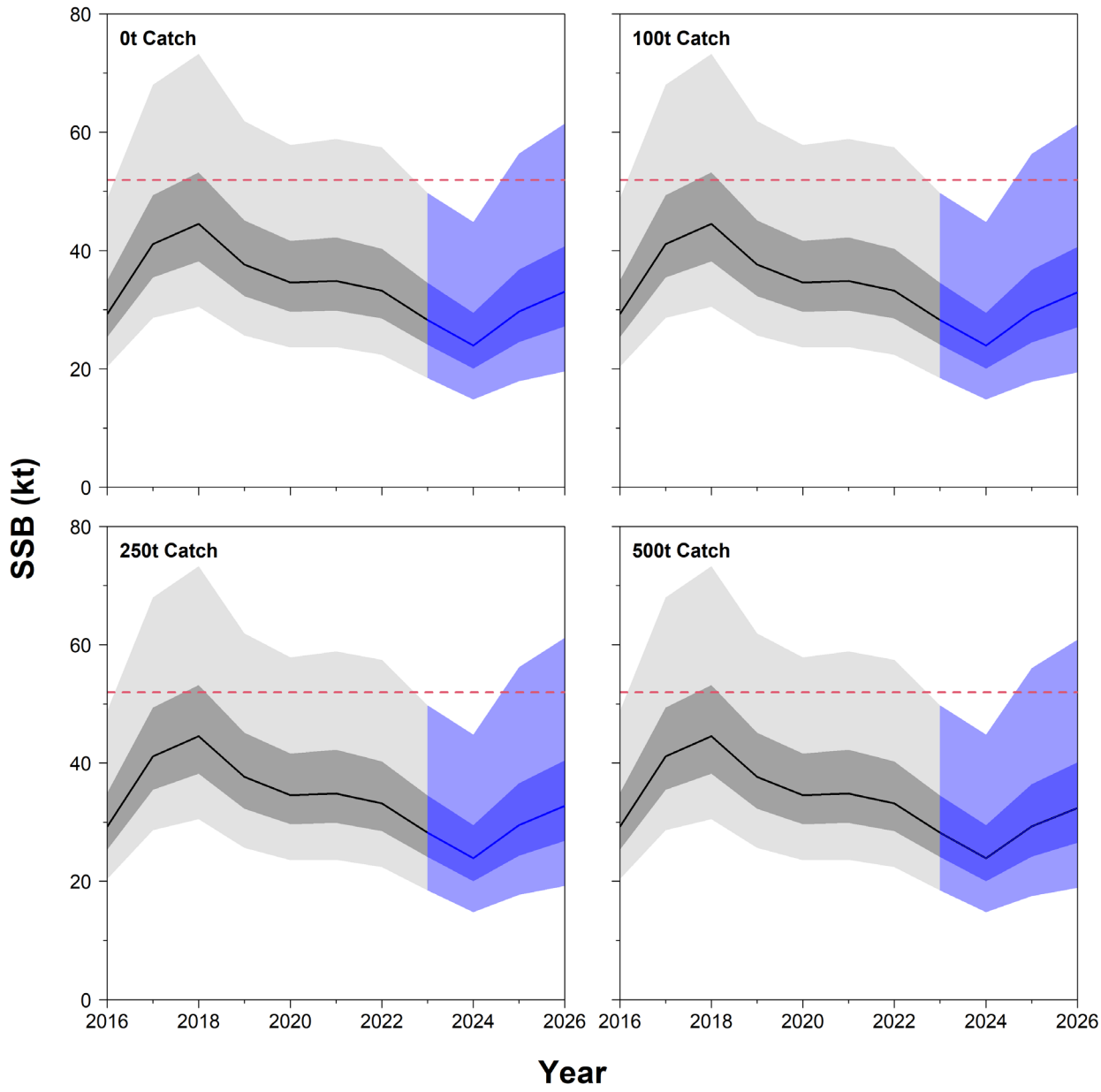


*Figure 36. Projected April 1 SSB (in kt) of spring spawning Atlantic Herring from the southern Gulf of St. Lawrence under a recent 5 years average recruitment level and 2-year average natural mortality level at various catch levels in 2024 and 2025. Lines show the median estimates of the April 1 SSB, dark shading the 50% confidence interval and light shading the 95% confidence intervals of these estimates (based on MCMC sampling). Black and grey indicate the historical period and blue the projection period. The red horizontal line is the LRP.*

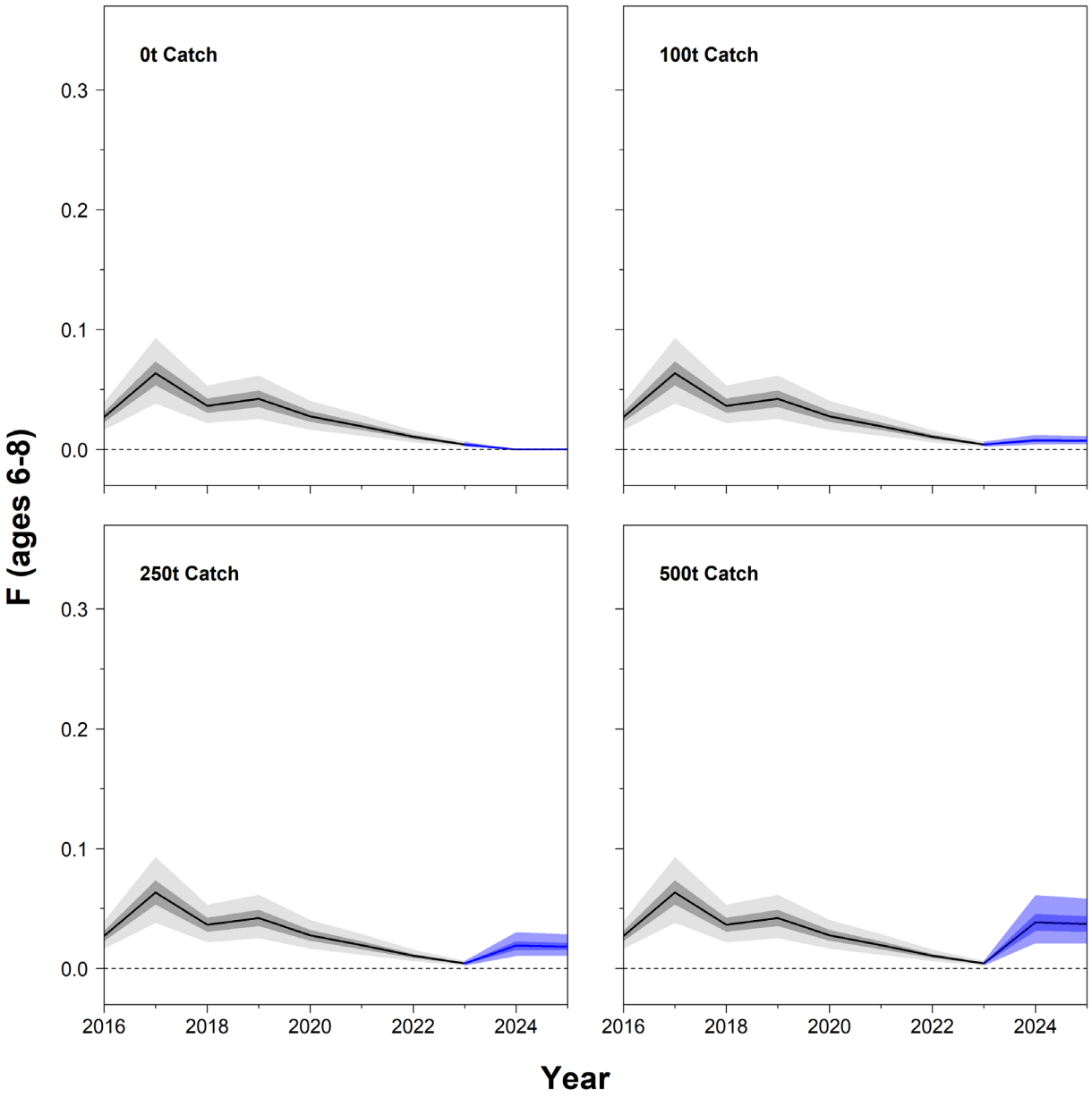


*Figure 37. Projected ages 6 to 8 fishing mortality rate (F) of spring spawner Atlantic Herring from the southern Gulf of St. Lawrence at various catch levels in 2024 and 2025. Lines show the median estimates of fishing mortality, dark shading the 50% confidence interval and light shading the 95% confidence intervals of these estimates (based on MCMC sampling). Black and grey indicate the historical period and blue the projection period.*

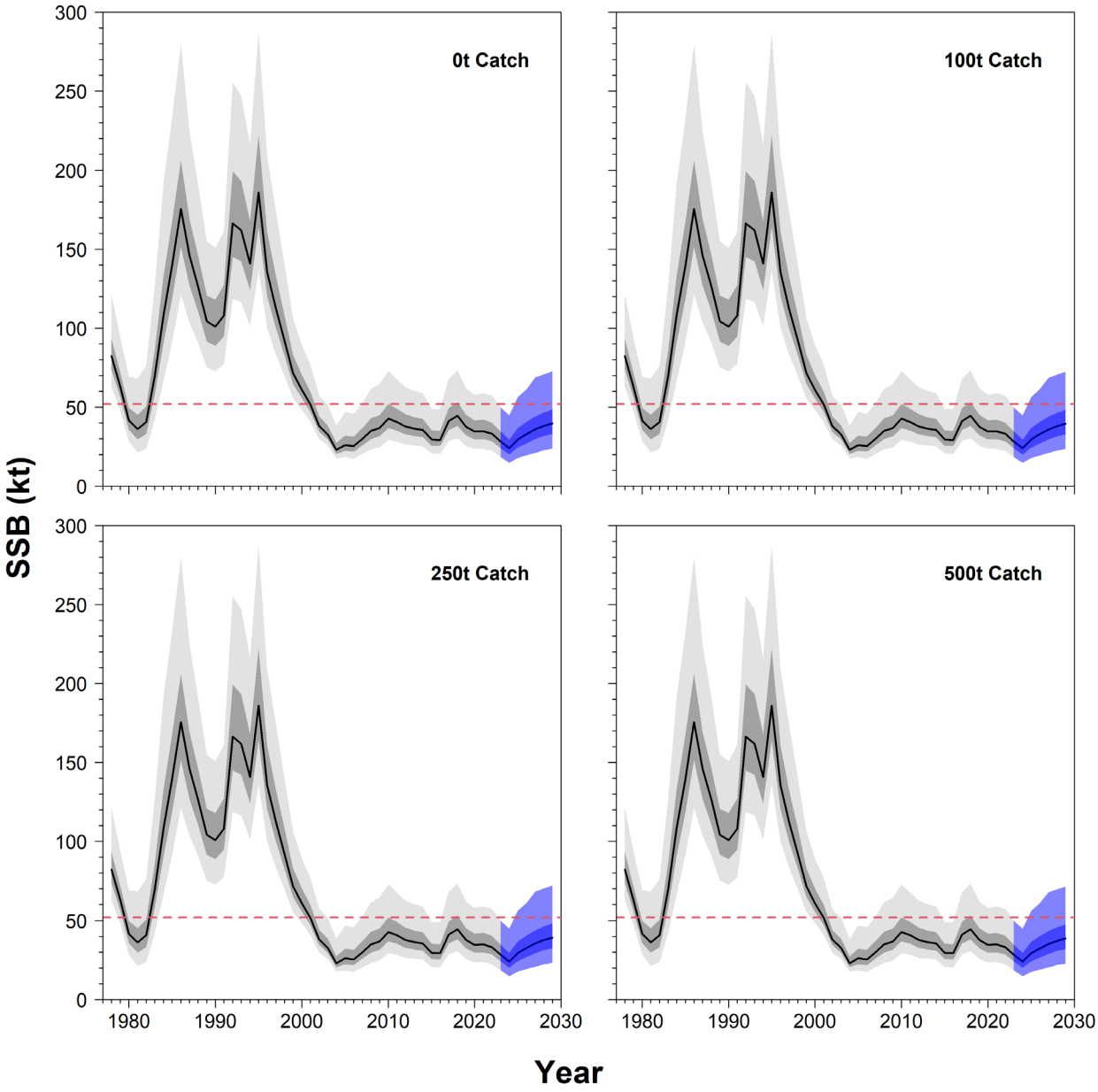


*Figure 38. Projected April 1 SSB (in kt) of spring spawner Atlantic Herring from the southern Gulf of St. Lawrence under a recent 5 years average recruitment level and 2-year average natural mortality level at various catch levels in all years between 2024 and 2029. Lines show the median estimates of the April 1 SSB, dark shading the 75% confidence interval and light shading the 95% confidence intervals of these estimates (based on MCMC sampling).*

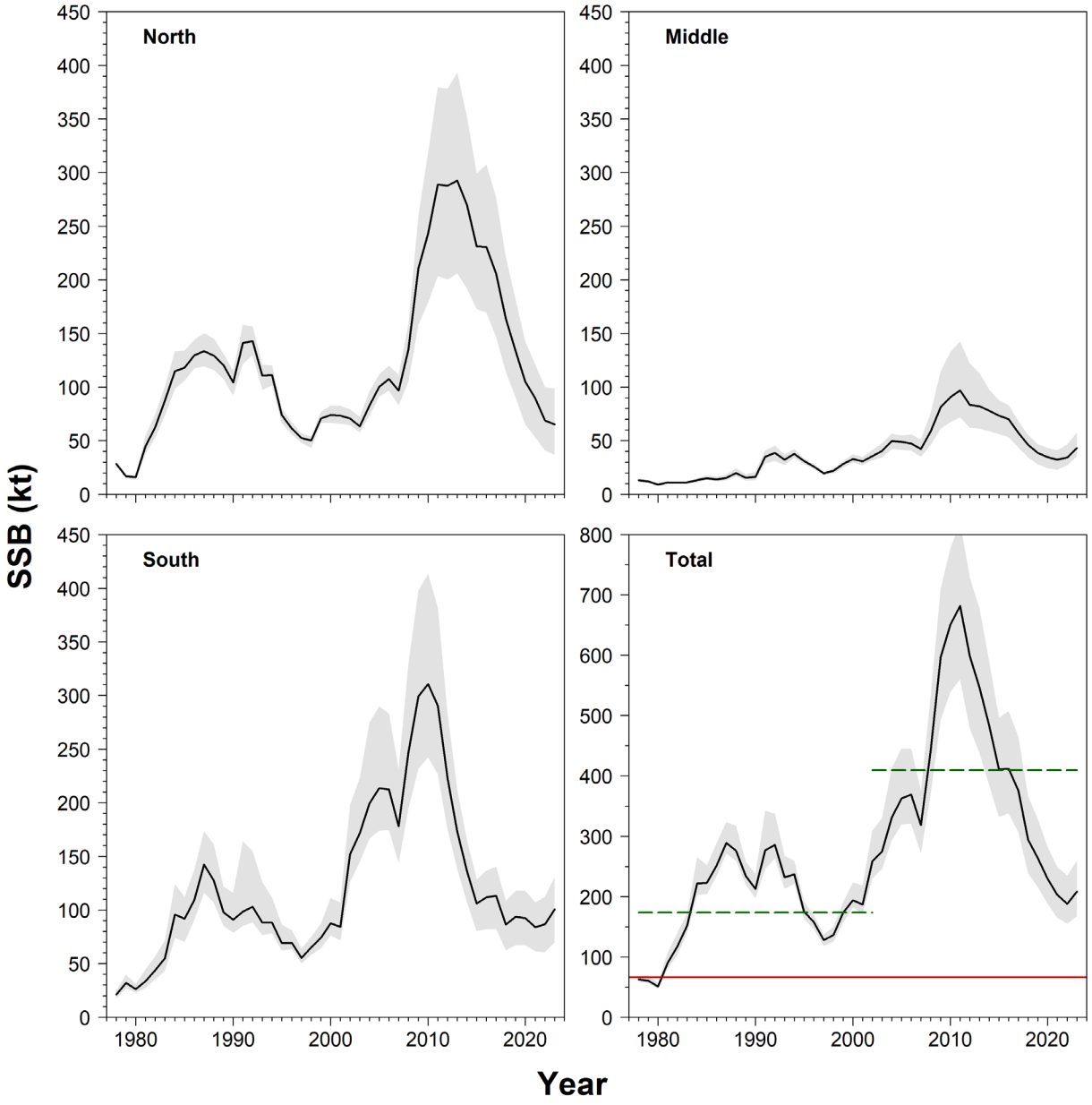


*Figure 39. Estimated beginning of fishing season (August 1) SSB of fall spawning Herring by region and overall (Total) for the southern Gulf of St. Lawrence from the SCA population model. The black line shows the median estimates of the MCMC sampling and the shading their 95% confidence intervals. In the bottom right panel for Total, the solid and dashed yellow horizontal lines represent the USR level and the red horizontal line is the LRP. SSB, USR and LRP values are adjusted to August 1st using natural mortality estimates at age for 7 months.*

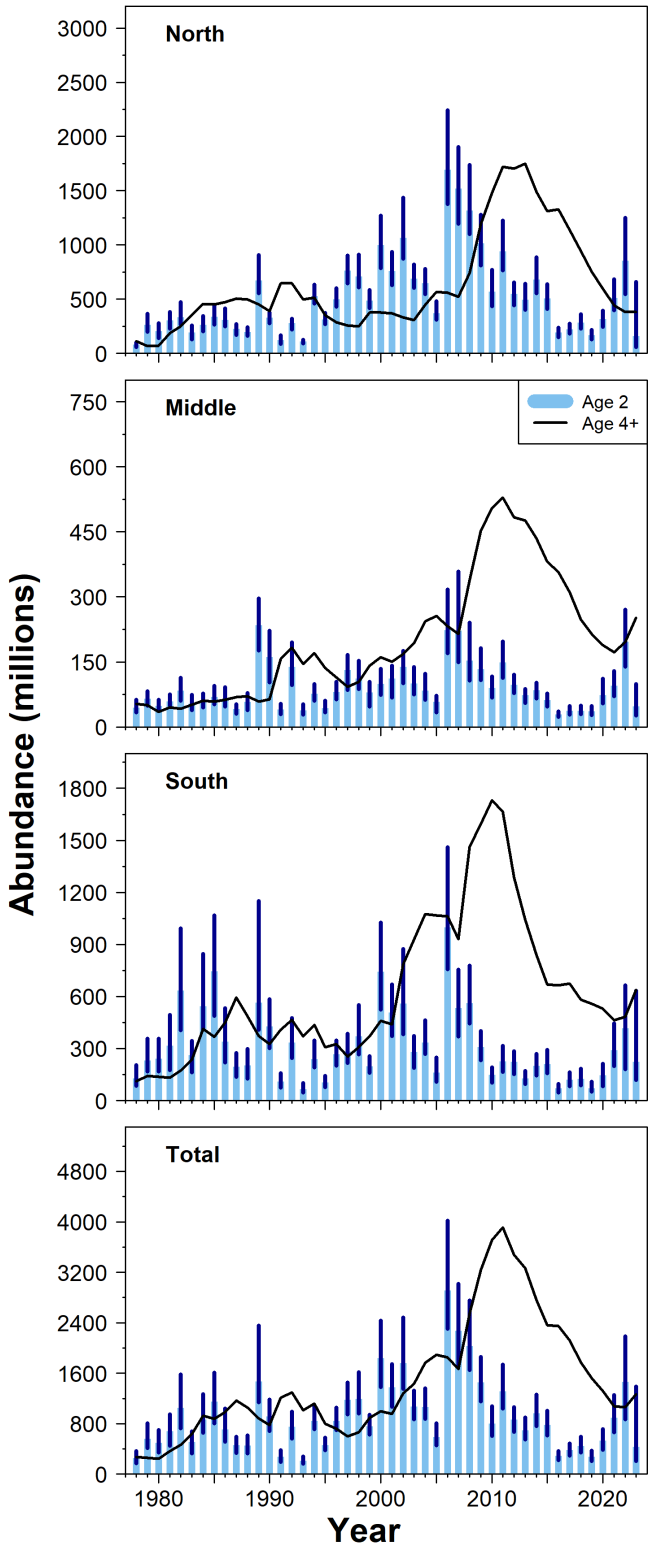


*Figure 40. Estimated January 1 abundance of 2-year-old Herring (blue bars), and Herring 4 years and older (black line) of the fall spawner component in three regions (North, Middle, South) in the southern Gulf of St. Lawrence from the SCA population model. Black line shows the median MCMC estimate and vertical lines show 95% confidence intervals.*

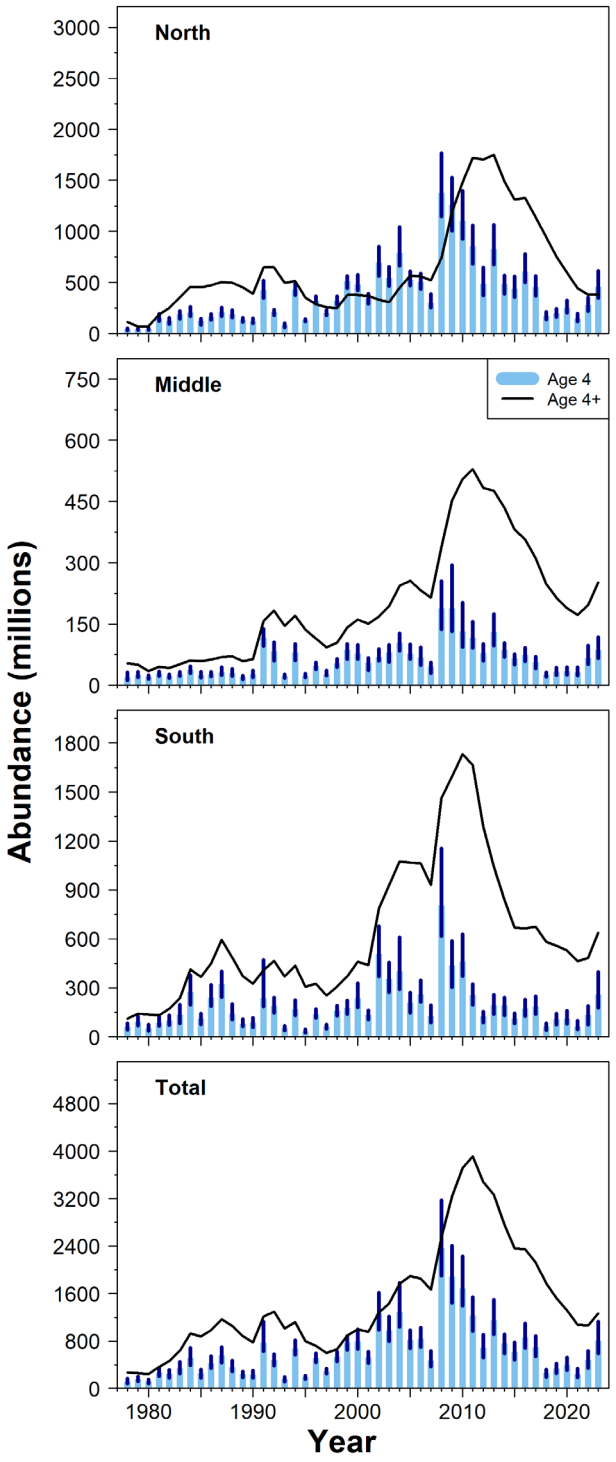


*Figure 41. Estimated January 1 abundance of 4-year-old Herring (blue bars), and Herring 4 years and older (black line) of the fall spawner component in three regions (North, Middle, South) in the southern Gulf of St. Lawrence from the SCA population model. Black line shows the median MCMC estimate and vertical lines show 95% confidence intervals.*

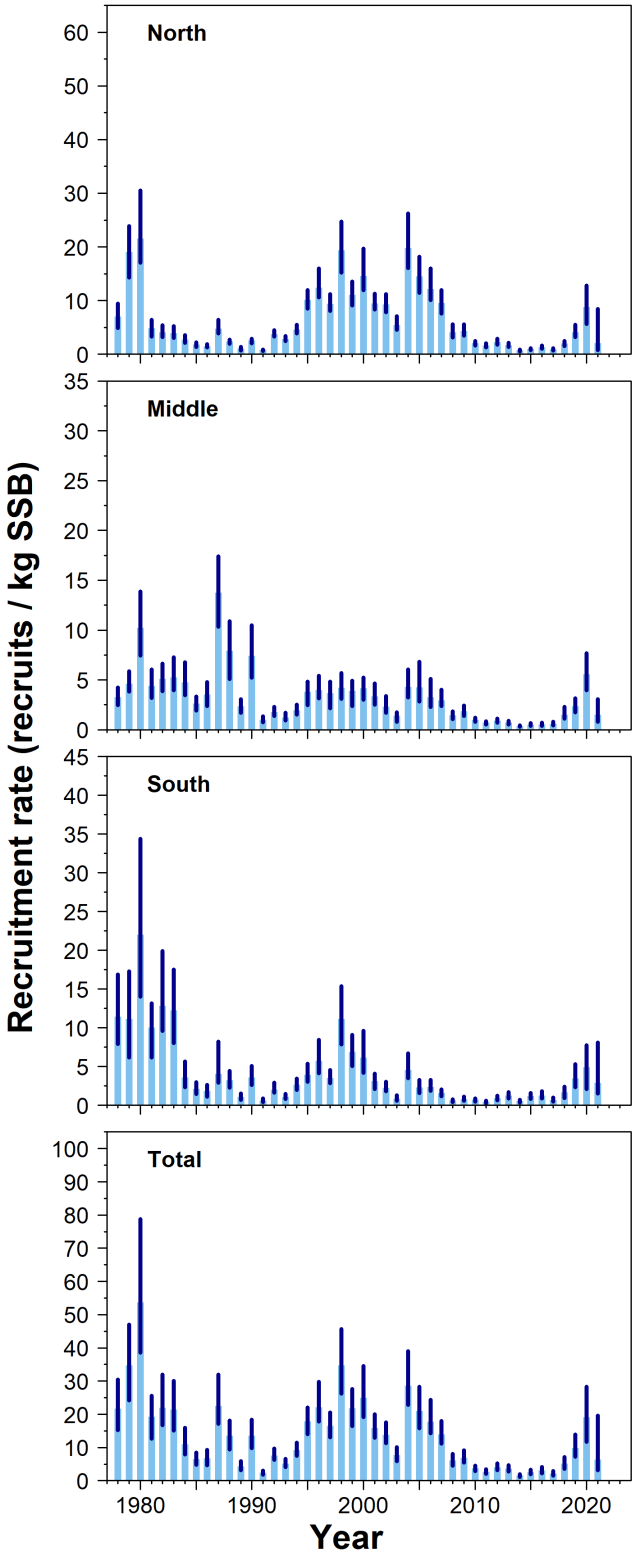


*Figure 42. Estimated recruitment rate (recruits per kg of SSB) at age 2 (circles) of fall spawners in the three regions (North, Middle, South) and summed over regions (Total) of the southern Gulf of St. Lawrence, from the SCA population model. Bars show the median estimates and vertical lines show the 95% confidence intervals.*

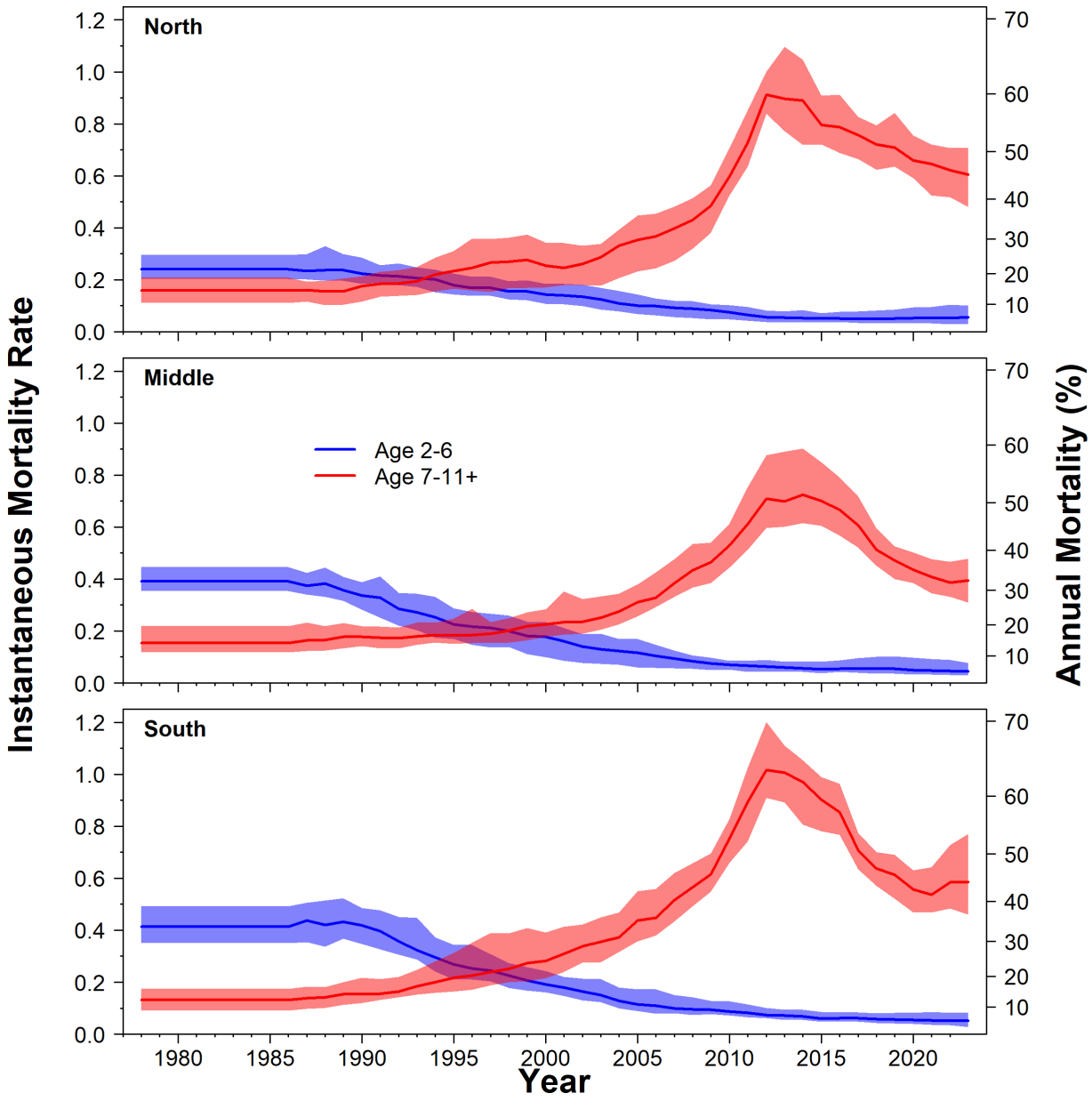


*Figure 43. Estimated instantaneous natural mortality rate (left axis) and annual mortality (%, right axis) of fall spawning Atlantic Herring for three regions of the sGSL (North, Middle, South) from the SCA population model, for ages 2 to 6 (blue) and 7 to 11+ (red). Lines show the median estimates and shading their 95% confidence interval based on MCMC sampling.*

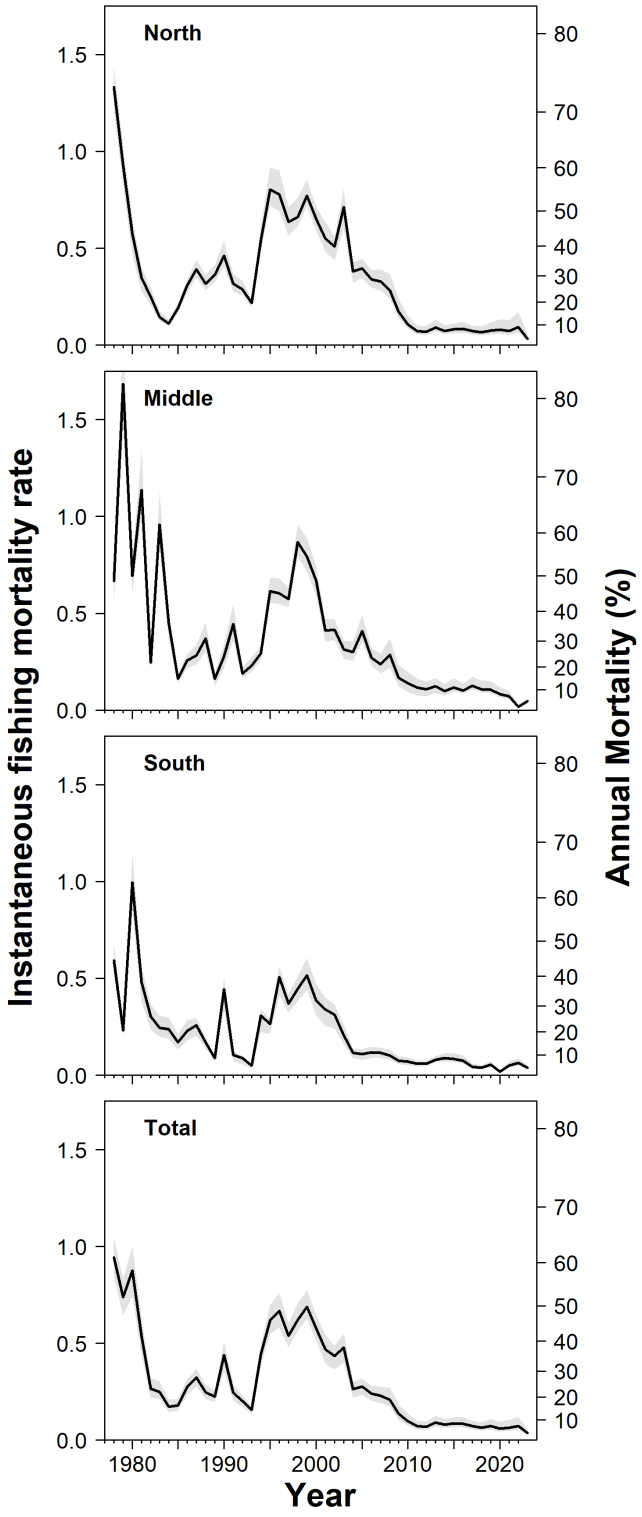


*Figure 44. Estimated beginning-of-the-year abundance averaged age 5 to 10 fishing mortality (F5-10, left axis; annual exploitation rate, right axis) of fall spawning Herring by region and averaged over regions (weighted by region-specific abundance at ages 5-10 years) in the southern Gulf of St Lawrence from the SCA model. Lines show the median estimates and shading their 95% confidence intervals.*

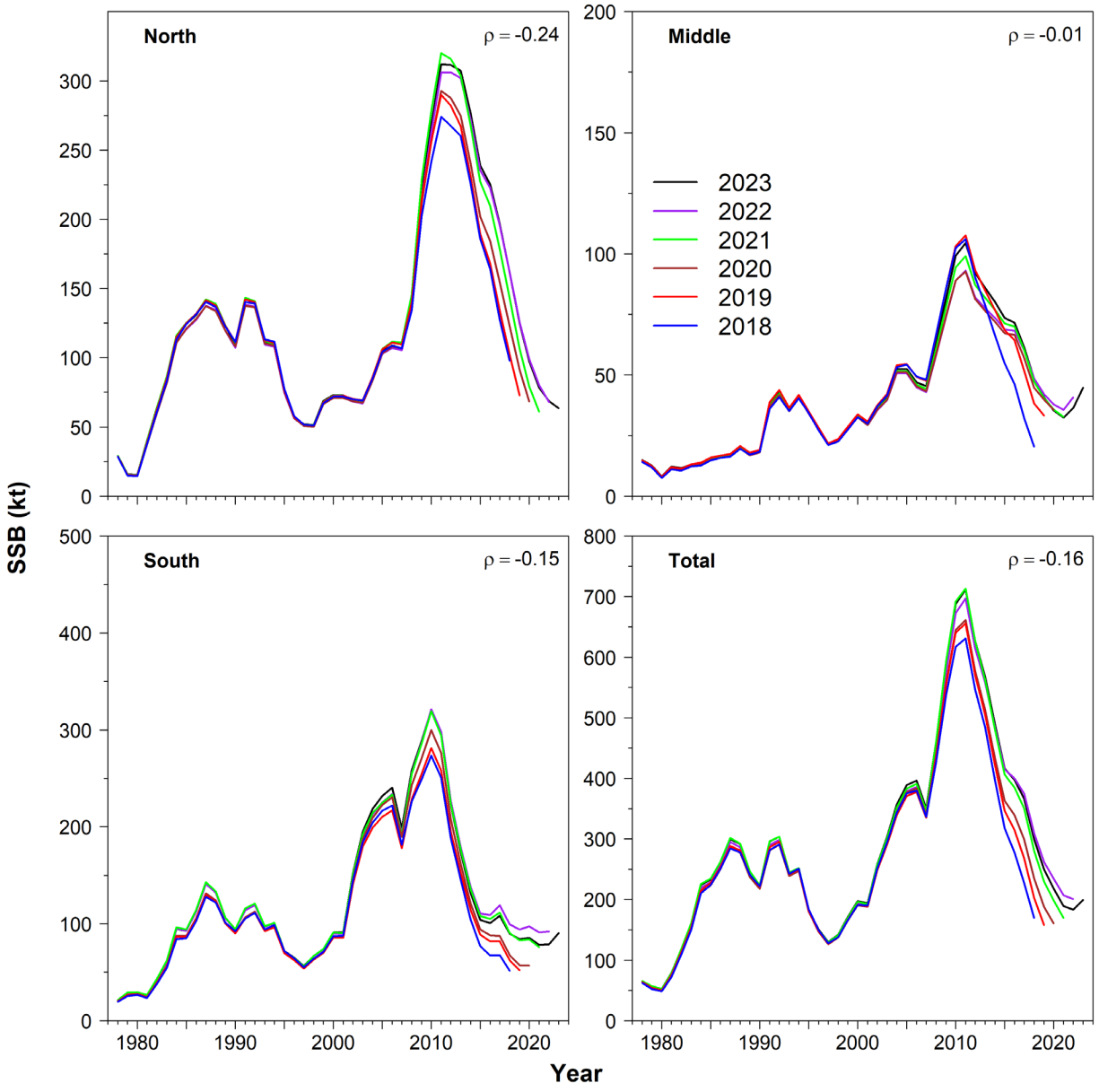


*Figure 45. Retrospective patterns in SSB and Mohn's rho of fall spawners within the three regions (North, Middle, South) for the SCA population model of Atlantic Herring of the southern Gulf of St. Lawrence. Coloured lines shows retrospective peels between 2018 and 2023.*

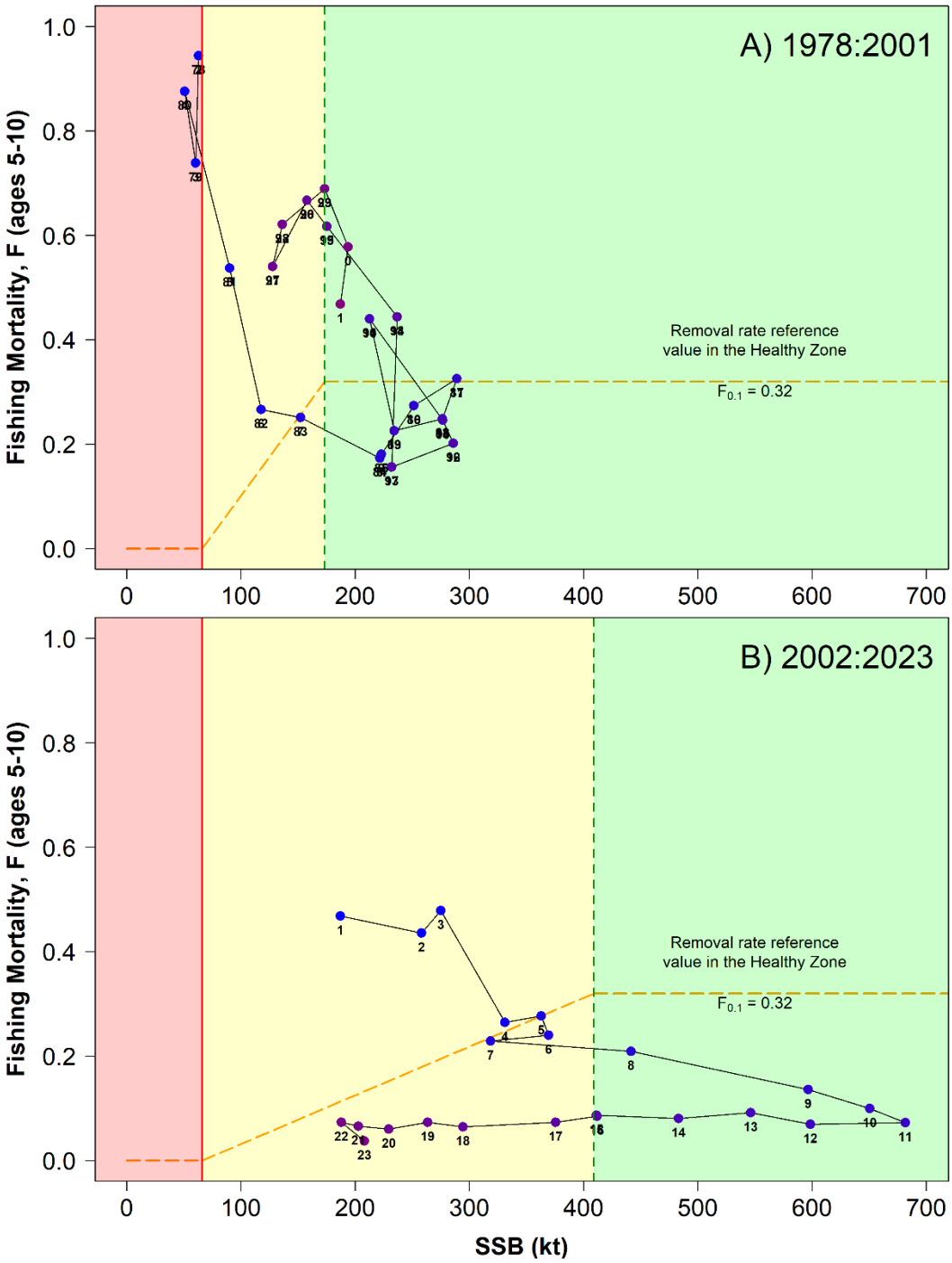


*Figure 46. Southern Gulf of St. Lawrence Atlantic Herring fall spawner component trajectory in relation to SSB and fishing mortality rates for ages 5 to 10 years from the SCA population model for 1978-2001 (top) and 2022-2023 (bottom). The red vertical line is the LRP and the green vertical line is the USR. The orange dashed line is the provisional removal reference of the Precautionary Approach Framework.*

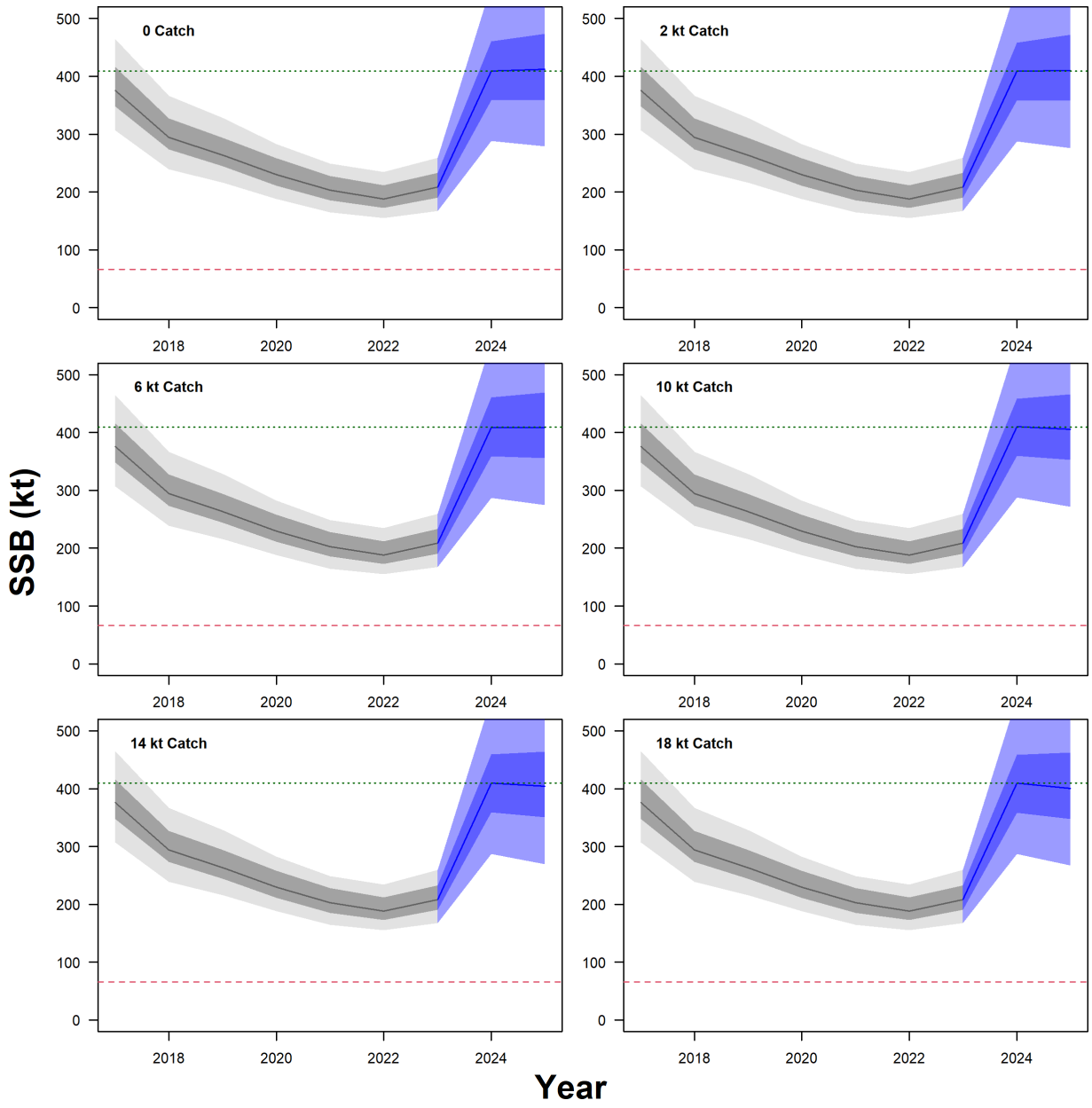


*Figure 47. Projected SSB (in kt) of fall spawning Atlantic Herring from the southern Gulf of St. Lawrence at various catch levels in 2024 and 2025, under a 5 recent years average recruitment and 2 recent years average natural mortality scenario. Lines show the median estimates of August 1 SSB, dark shading the 50% confidence intervals and light shading the 95% confidence interval (based on MCMC sampling). Black and grey indicate the historical period and blue the projection period. The red horizontal line is the LRP.*

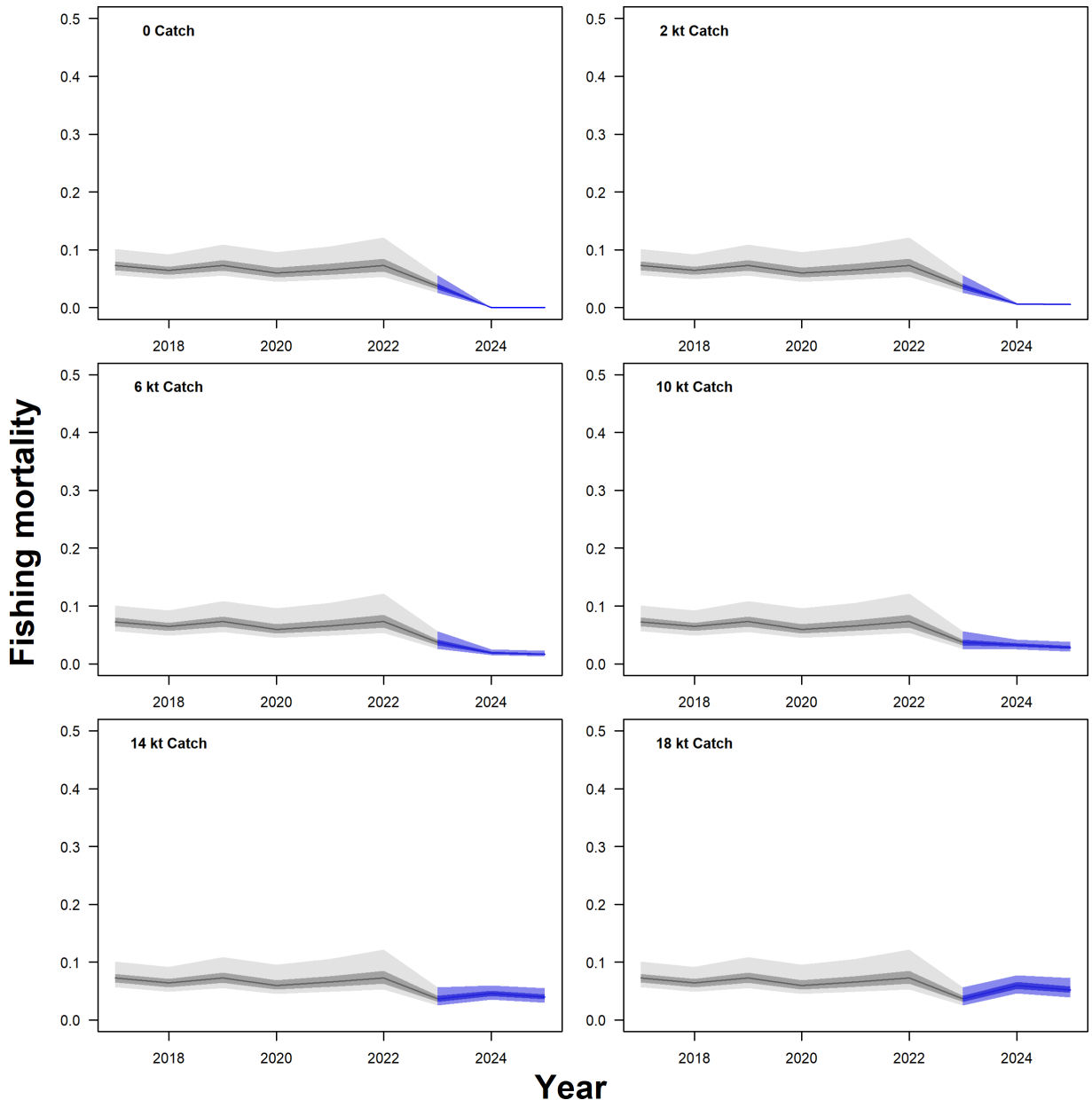


*Figure 48. Projected average fishing mortality ($F_{5\text{-}10}$) of fall spawning Atlantic Herring from the southern Gulf of St. Lawrence at various catch levels in 2024 and 2025, under a 5 recent years average recruitment and 2 recent years average natural mortality scenario. Lines show the median estimates of fishing mortality, dark shading the 50% confidence intervals and light shading the 95% confidence interval (based on MCMC sampling). Black and grey indicate the historical period and blue the projection period.*

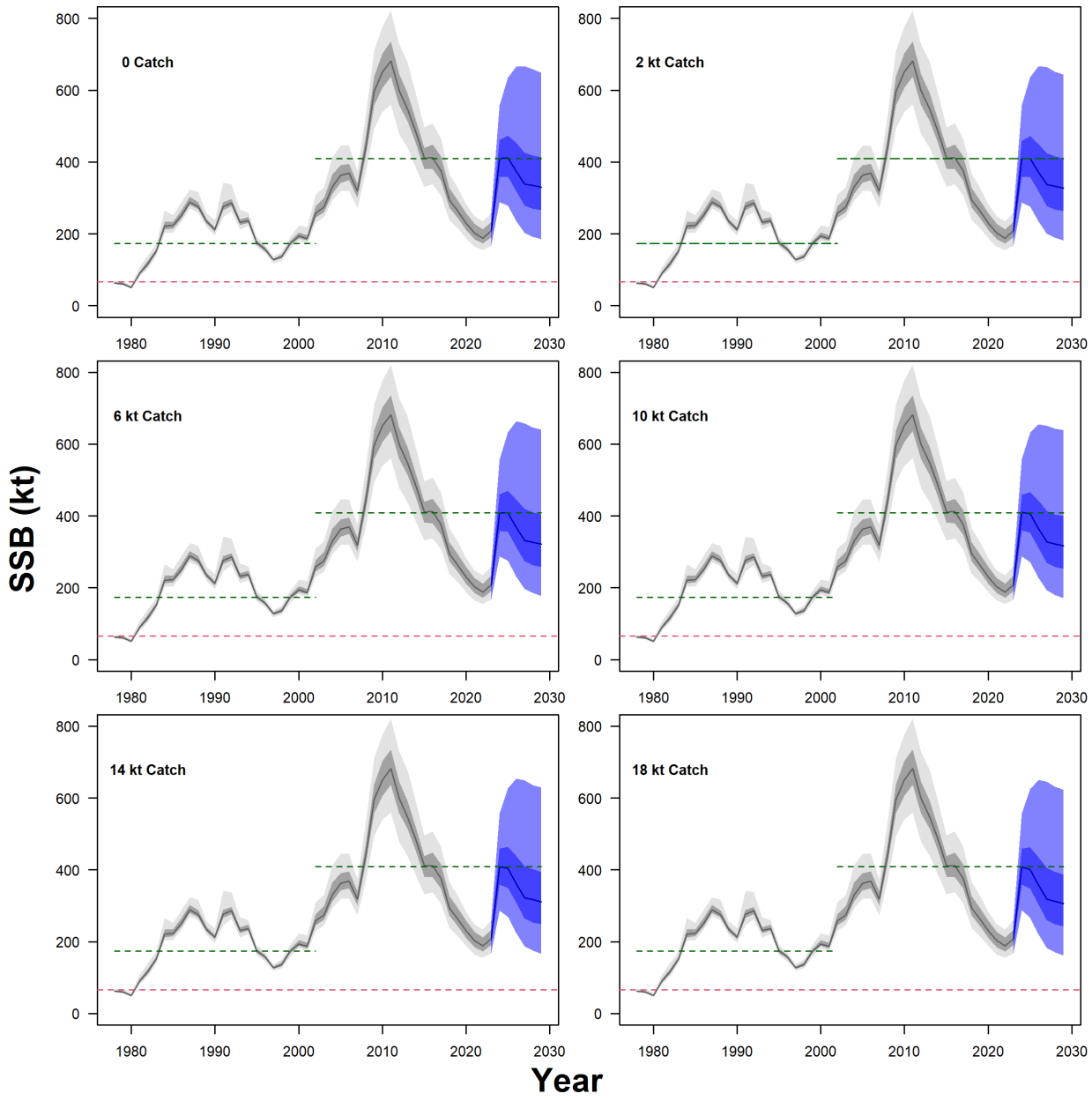


*Figure 49. Six years projections of SSB (in kt) of fall spawning Atlantic Herring from the southern Gulf of St. Lawrence at various catch levels from the SCA population model, under a 5 recent years average recruitment and 2 recent years average natural mortality scenario. Lines show the median estimates of August 1 SSB, light shading shows the 50% and dark shading shows the 95% confidence intervals (based on MCMC sampling). The green and red horizontal lines are the USR and LRP, respectively.*

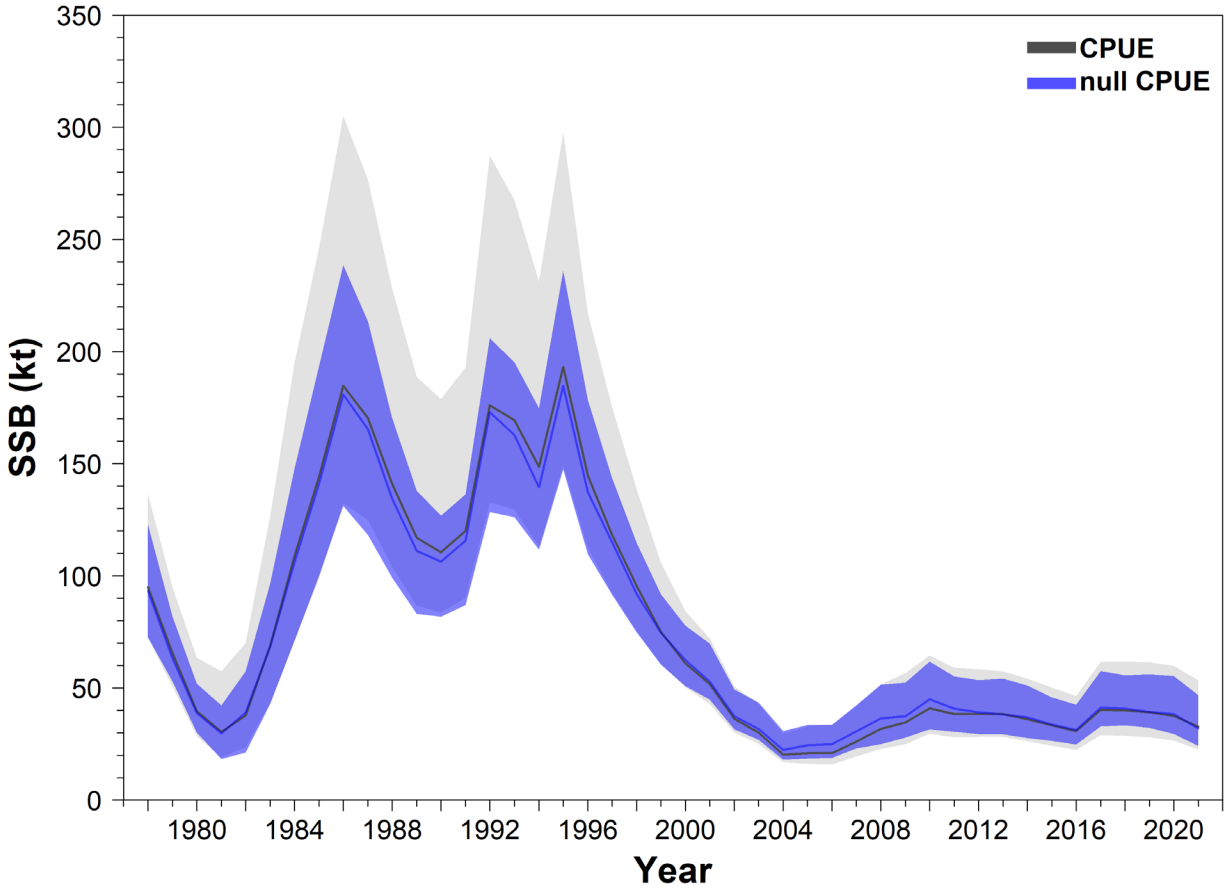


*Figure 50. Estimated beginning of fishing season (April 1) SSB of spring spawning Herring for 1978 to 2021 with SCA models including the catch-per-unit-effort index (CPUE; grey) and without the CPUE index (blue). Full line is the median estimate of biomass from MCMC sampling and shading represent the 95% confidence interval.*

## APPENDIX A. FISHERY-INDEPENDENT ACOUSTIC SURVEY RESULTS

The 2022-2023 acoustic surveys were carried out between September 23 and October 7 in the 4Tmno areas (i.e., Chaleurs-Miscou; Figures B1 and B2) and the biomass of Herring were estimated to be 27,268 t and 19,363 t, respectively. The distribution of Herring in the area can be seen in Figures B1-B2 and Tables B1-B2. The 2022 acoustic biomass index of the Chaleurs-Miscou area for the combined spring and fall spawner groups increased by 44.5% compared to the lowest in the history of the survey that was recorded in 2019. The 2023 biomass was just 2.9% higher than the 2019 biomass (Figure B3).

Bottom trawl samples were collected where Herring densities were found by the hydroacoustic vessel. The catch (length frequency) by set was weighted by the sum of acoustic Herring densities recorded in the stratum or group of strata defined in the catch-at-age parameters as representing the biomass in that area. Using the Herring densities recorded as the weighting factor is considered a better method as it does not depend on an estimated standardized amount of Herring caught in a set of one nautical mile.

*Table A1. Herring biomass densities and estimates by stratum and area from the fishery-independent acoustic surveys conducted in 2022.*

| Stratum | Average TS (dB/kg) | Stratum Area ($km^2$) | Mean Sa ($/m^2$) | Density (kg/m2) | Biomass (tonnes) | SE (tonnes) | SE (%) |
|---|---|---|---|---|---|---|---|
| ***Gaspé*** | | | | | | | |
| Rivière au Renard | -34.15 | 124.6 | -56.53 | 0.0058 | 720.3 | 345.6 | 48.0 |
| Cap Bon Ami | -34.15 | 69.0 | -64.33 | 0.0010 | 66.2 | 42.5 | 64.2 |
| Malbaie | -34.15 | 95.6 | -69.47 | 0.0003 | 28.1 | 29.3 | 104.1 |
| Anse à Beaufils | -34.15 | 96.0 | -70.05 | 0.0003 | 24.7 | 12.0 | 48.4 |
| ***Chaleur*** | | | | | | | |
| Grande Rivière | -34.15 | 106.4 | 55.70 | 0.0070 | 745.2 | 465.9 | 62.5 |
| Newport | -34.15 | 124.9 | -58.23 | 0.0039 | 488.5 | 369.3 | 75.6 |
| Shigawake | -34.15 | 265.6 | -63.07 | 0.0013 | 340.7 | 236.1 | 69.3 |
| New Carlisle | -34.31 | 169.0 | 59.81 | 0.0028 | 476.4 | 133.1 | 27.9 |
| New Richmond | -33.64 | 111.6 | -55.69 | 0.0062 | 696.2 | 240.9 | 34.6 |
| Belledune | -33.66 | 266.0 | -57.52 | 0.0041 | 1092.4 | 639.8 | 58.6 |
| Nepisiguit | -33.98 | 211.3 | -51.87 | 0.0162 | 3430.3 | 1834.3 | 53.5 |
| Maisonnette | -34.15 | 145.0 | -47.27 | 0.0488 | 7072.4 | 2234.3 | 31.6 |
| ***Miscou*** | | | | | | | |
| West Miscou | -34.05 | 330.5 | -60.82 | 0.0021 | 695.3 | 99.9 | 14.4 |
| North Miscou | -33.91 | 295.7 | -55.33 | 0.0072 | 2132.1 | 987.8 | 46.3 |
| Miscou NW | -34.15 | 444.0 | -55.54 | 0.0010 | 4305.6 | 2398.4 | 55.7 |
| Miscou NE | -34.15 | 352.8 | -58.56 | 0.0036 | 1279.1 | 378.6 | 29.6 |
| Miscou SW | -34.30 | 552.2 | -60.66 | 0.0023 | 1277.7 | 522.6 | 40.9 |
| Miscou SE | -34.11 | 521.3 | -57.48 | 0.0046 | 2397.5 | 1150.3 | 48.0 |
| ***Total*** | - | - | - | - | **27,268.7** | - | - |

*Table A2. Herring biomass densities and estimates by stratum and area from the fishery-independent acoustic surveys conducted in 2023.*

| Stratum | Average TS (dB/kg) | Stratum Area ($km^2$) | Mean Sa ($/m^2$) | Density (kg/m2) | Biomass (tonnes) | SE (tonnes) | SE (%) |
|---|---|---|---|---|---|---|---|
| ***Gaspé*** | | | | | | | |
| Rivière au Renard | -34.39 | 124.6 | 0.00 | 0.0000 | 0.0 | 0.0 | 0.0 |
| Cap Bon Ami | -34.39 | 69.0 | 0.00 | 0.0000 | 0.0 | 0.0 | 0.0 |
| Malbaie | -34.39 | 95.6 | -79.73 | < 0.0001 | 2.8 | 1.6 | 58.3 |
| Anse à Beaufils | -34.39 | 96.0 | -60.73 | 0.0023 | 223.1 | 151.1 | 67.7 |
| ***Chaleur*** | | | | | | | |
| Grande Rivière | -34.39 | 106.4 | -58.92 | 0.0035 | 374.5 | 177.7 | 47.5 |
| Newport | -34.39 | 124.9 | -58.92 | 0.0035 | 439.9 | 176.6 | 40.1 |
| Shigawake | -34.79 | 265.6 | -55.51 | 0.0085 | 2254.6 | 1158.5 | 51.4 |
| New Carlisle | -34.39 | 169.0 | -53.96 | 0.0110 | 1865.9 | 413.5 | 22.2 |
| New Richmond | -34.39 | 111.6 | -54.01 | 0.0109 | 1216.7 | 174.4 | 14.3 |
| Belledune | -34.39 | 266.0 | -58.25 | 0.0041 | 1094.2 | 235.4 | 21.5 |
| Nepisiguit | -34.39 | 211.3 | -54.58 | 0.0096 | 2021.2 | 842.3 | 41.7 |
| Maisonnette | -34.79 | 145.0 | -59.16 | 0.0037 | 530.3 | 173.7 | 32.8 |
| ***Miscou*** | | | | | | | |
| West Miscou | -33.45 | 330.5 | -58.26 | 0.0033 | 1092.5 | 802.1 | 73.4 |
| North Miscou | -34.39 | 295.7 | -60.93 | 0.0022 | 655.6 | 614.5 | 93.7 |
| Miscou NW | -34.51 | 444.0 | -55.51 | 0.0080 | 3531.6 | 2379.4 | 67.4 |
| Miscou NE | -34.39 | 352.8 | -57.48 | 0.0049 | 1730.8 | 773.7 | 44.7 |
| Miscou SW | -34.39 | 552.2 | -61.78 | 0.0018 | 1006.9 | 525.4 | 52.2 |
| Miscou SE | -34.39 | 521.3 | -60.34 | 0.0025 | 1323.2 | 533.0 | 40.3 |
| ***Total*** | - | - | - | - | **19,363.8** | - | - |

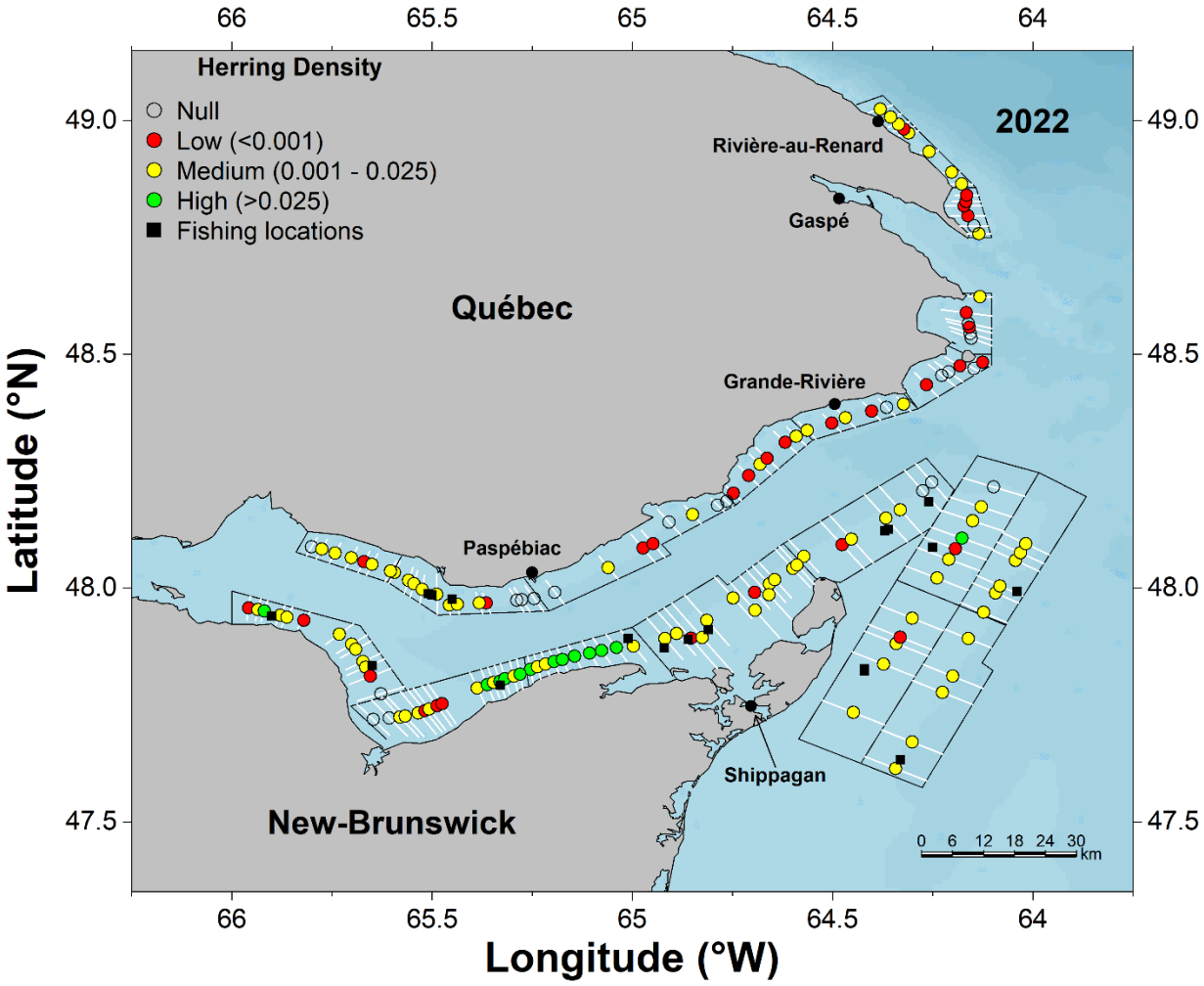


*Figure A1. Surveyed transects covered during the 2022 acoustic surveys (whites lines) and Herring biomass density (colored circles, kg/m$^2$, Low, Medium or High, by transect).*

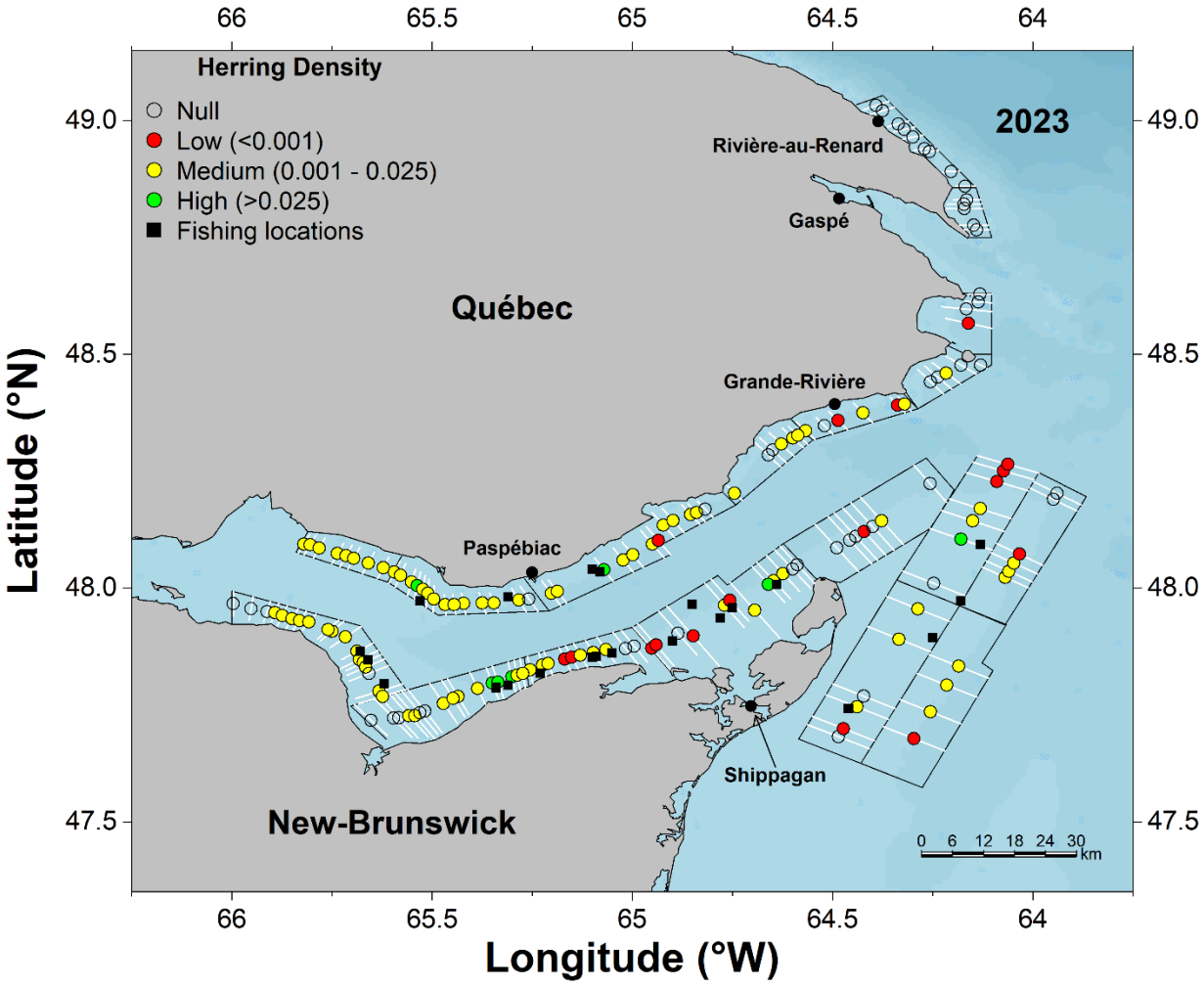


*Figure A2. Surveyed transects covered during the 2023 acoustic surveys (whites lines) and Herring biomass density (colored circles, kg/m$^2$, Low Medium or High, by transect).*

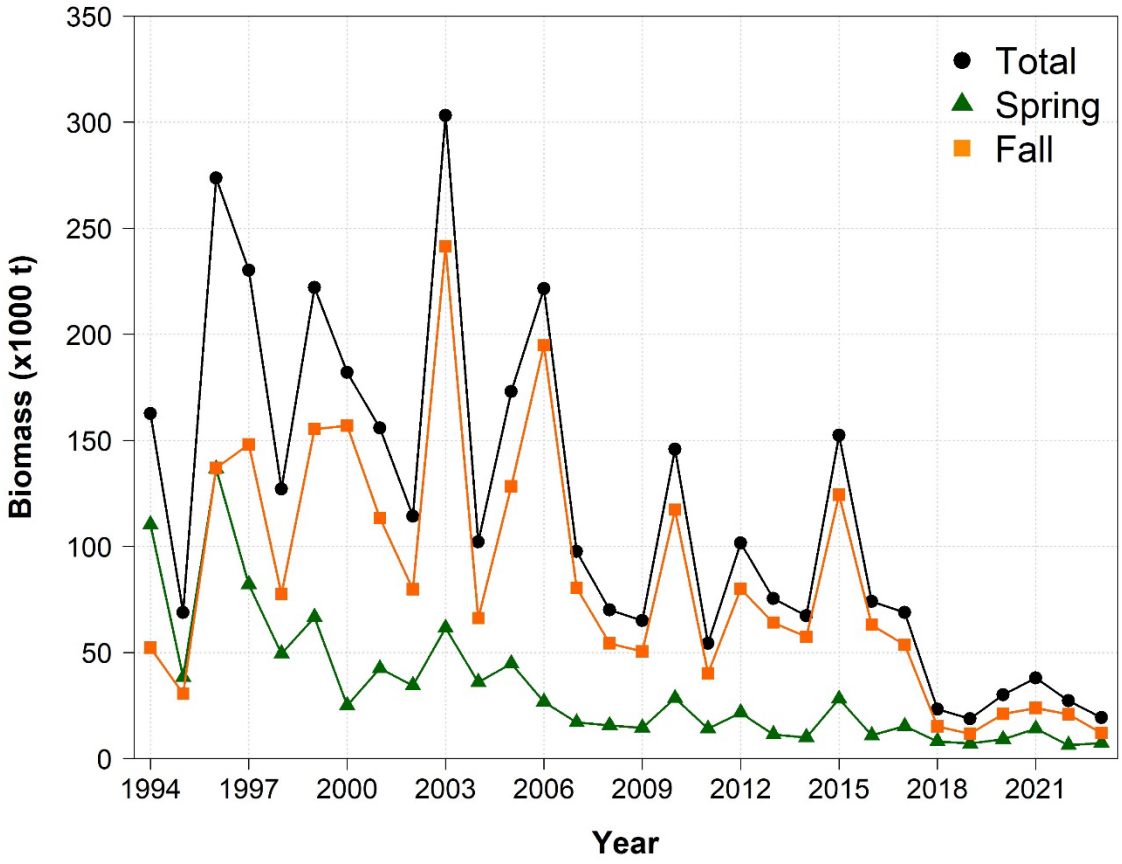


*Figure A3. Acoustic survey total biomass (black) of spring (green) and fall (orange) spawners between 1994 and 2023.*

## APPENDIX B. SPAWNING GROUND ACOUSTIC SURVEY RESULTS

The fall spawning ground acoustic survey began in 2015, and has been conducted each year since. It follows a stratified random design with a protocol consistent with the fishery-independent acoustic survey. Six spawning grounds were identified: Gaspé, Miscou, Escuminac/Richibucto, West PEI, East PEI (Fisherman's Bank/North Lake), and Pictou (Figure B1). Strata were defined for each spawning ground using the acoustic information collected in previous industry partnership studies. Strata were designed to be large enough to encompass the historical spawning grounds in each region. Transects were randomly generated each year within strata at a minimum of 400 m apart (Figure B2).

Each fishing association selected one or two fish harvesters to conduct acoustic surveys to quantify the biomass of fish schools using a hull or side-mounted 120 kHz single beam transducer. Acoustic data from fishing vessels has been used to analyze school morphology characteristics, spatial patterns, relative changes in school density (Shen et al. 2008) and to develop estimates of abundance (Melvin et al. 2002; Honkalehto et al. 2011). In the sGSL, fishery acoustic data collected on Atlantic Herring spawning aggregations can be used to obtain relative nightly biomass estimates (Claytor and Allard 2001; Claytor and Clay 2001). For each region, the goal of the analysis is to estimate the relative spawning biomass from a set of nightly acoustic observations. Surveys were to be conducted once each before and after the fishing season as well as during each weekend fishing closure, where possible. West PEI and Escuminac/Richibucto regions did not have weekend fishing closures until 2018; sampling in these regions was thus only possible before and after the fishing season until the implementation of weekend closures. Fish size and age frequency data used to convert the acoustic data into biomass estimates were obtained from the experimental gillnet surveys. Nightly acoustic data were processed and analyzed for each region in order to obtain a nightly estimate of biomass (Tables B1 to B3), as described in Claytor and Clay 2001.

Figure B3 shows the mean nightly biomass per spawning ground for each year. Some regions/years show great variations in nightly fish biomass (i.e., Miscou and Gaspé 2016, Escuminac 2015). In general, there is a decreasing trend in biomass in most regions over time. Due to weather and other logistical constraints, there are missing sampling trips for some regions and years; the presence or absence of samples, especially at the beginning or end of a fishing season, can have a great impact on the mean nightly biomass of fish observed in an area. Escuminac/Richibucto and West PEI regions are especially sensitive to missing samples prior to 2018 when weekend fishing closures were implemented, as only two trips (one before and one after the fishing season) were able to be completed each year before this time. The proportion of the strata covered and the frequency of survey coverage varied among year and regions from complete strata coverage on a weekly basis to a complete absence of surveys for East PEI in 2015 and 2021 and Escuminac in 2018 (Tables B1 to B6 for details). Coverage in 2022 and 2023 was very good. Gaspé (except for 2017), Miscou and Pictou regions show good coverage over the sampling season with five samples almost every year (Table B4).

The highest mean nightly biomass value in 2015 was in Escuminac, and in 2016 were in Gaspé and Miscou, respectively. Biomass values in Gaspé and Miscou have lowered and remained low, with some fluctuations, after their peak. The lowest biomass values in Gaspe were seen in 2018 and 2023, and the lowest values in Miscou were seen in 2019 and 2021. Escuminac/Richibucto had a high total nightly biomass in 2015, with decreasing mean biomass values ever since. There was an increase in biomass in 2022 for Escuminac, but the biomass returned to very low values again in 2023. The lowest biomass estimates for the Escuminac/Richibucto region were observed in 2019, 2020, and 2021; however, sampling effort in this region was low in all years up until 2020. Similarly, due to lack of weekend fishing closures in West PEI until 2018, it is difficult to say that the spawning biomass is accurately

estimated in 2015-2017. The mean nightly biomass estimates for West PEI in 2019, 2020, and 2022 were the highest mean nightly biomass estimates of all six sampling regions in those years. Pictou shows a general decreasing trend in biomass from 2015-2020, with the highest biomass level observed in 2015. The biomass estimate in Pictou in 2021 and 2022, however, shows a substantial increase, and these are the second highest biomass estimates for the Pictou region, behind 2015. This 2021 value in Pictou represents the highest nightly estimated biomass in all regions in 2021.

Figure B4 shows the mean nightly biomass per geographic region, where North represents Gaspé and Miscou, Middle represents Escuminac/Richibucto and West PEI, and South represents East PEI and Pictou. Overall, the highest biomass for each geographic region is seen in 2015 (Middle and South regions), or 2016 (North), and the lowest biomass per night of acoustics per region in 2021, 2018, and 2018, for the North, Middle, and South regions, respectively (Figure B4). The results show a general decrease in average nightly biomass in all geographic regions over time, with the exception of an increase in the South region in 2021, followed by its decline again. The North region had higher biomass values than the Middle and South regions in 2016 and 2017, however, the biomass observed in all three regions has become more similar beginning in 2018, with the exception of the South biomass increasing in 2021.

For this index to continue to be included in future assessments, surveys need to be consistent across regions and conscientiously carried out. Weekend closures in West PEI and Escuminac that began in 2018 and remain for future years will allow harvesters to acquire more samples from these spawning beds. In some cases, the first sampling date shows the highest biomass of the season, which could indicate inadequate capture of the spawner biomass estimate for the spawning grounds, however, this is not consistent over time or among areas. This survey is currently aligned with dates of the fishing season.

*Table B1. Atlantic Herring biomass densities and estimates by spawning ground from the spawning ground acoustic surveys conducted in 2022.*

| Herring Fishing Area | Region | Area | Date | Mean Target Strength (dB $kg^{-1}$) | Area ($km^2$) | Mean Backscatter (dB $m^{-2}$) | Biomass Density (kg $m^{-2}$) | Biomass Estimate (t) | Biomass Estimate Standard Error (t) |
|---|---|---|---|---|---|---|---|---|---|
| 16B | North | Gaspé | 2022-08-20 | -35.3165 | 38.6 | -49.29 | 6.51E-02 | 3008 | 2565 |
| 16B | North | Gaspé | 2022-08-27 | -35.3165 | 38.6 | -61.00 | 3.53E-03 | 121 | 75 |
| 16B | North | Gaspé | 2022-09-04 | -35.3165 | 38.6 | -57.62 | 8.77E-03 | 316 | 316 |
| 16B | North | Gaspé | 2022-09-10 | -35.3165 | 38.6 | -54.46 | 2.74E-02 | 1327 | 1266 |
| 16B | North | Miscou | 2022-08-20 | -35.4790 | 386.9 | -55.40 | 2.13E-02 | 6423 | 3094 |
| 16B | North | Miscou | 2022-08-27 | -35.4790 | 386.9 | -43.67 | 5.14E-03 | 1459 | NA |
| 16B | North | Miscou | 2022-09-02 | -35.4790 | 386.9 | -64.42 | 2.57E-03 | 681 | 389 |
| 16B | North | Miscou | 2022-09-09 | -35.4790 | 386.9 | -62.27 | 3.46E-03 | 1327 | 864 |
| 16C | Middle | Escuminac | 2022-08-25 | -35.7350 | 145.5 | -44.19 | 9.45E-03 | 897 | 734 |
| 16C | Middle | Escuminac | 2022-09-02 | -35.7350 | 145.5 | -59.88 | 8.00E-03 | 656 | 177 |
| 16C | Middle | Escuminac | 2022-09-09 | -35.7350 | 145.5 | -64.01 | 2.52E-03 | 406 | 279 |
| 16C | Middle | Escuminac | 2022-09-30 | -35.7350 | 145.5 | -19.47 | 2.29E-01 | 9026 | 9032 |
| 16C | Middle | Escuminac | 2022-10-08 | -35.7350 | 145.5 | -75.03 | 1.13E-04 | 6 | 5 |
| 16E | Middle | West PEI | 2022-08-25 | -35.4119 | 111.3 | -42.15 | 3.64E-02 | 11665 | 9315 |
| 16E | Middle | West PEI | 2022-09-02 | -35.4119 | 111.3 | -53.36 | 5.91E-02 | 10568 | 6710 |
| 16E | Middle | West PEI | 2022-09-09 | -35.4119 | 111.3 | -63.67 | 1.66E-03 | 271 | 161 |
| 16E | Middle | West PEI | 2022-10-05 | -35.4119 | 111.3 | -33.20 | 4.08E-04 | 96 | 54 |
| 16E | Middle | West PEI | 2022-10-12 | -35.4119 | 111.3 | -45.59 | 3.74E-03 | 277 | 189 |
| 16F | South | Pictou | 2022-09-07 | -35.6167 | 127.2 | -23.43 | 3.55E-02 | 1446 | 1005 |
| 16F | South | Pictou | 2022-09-30 | -35.6167 | 127.2 | -46.50 | 1.37E-02 | 4993 | 4832 |

| Herring Fishing Area | Region | Area | Date | Mean Target Strength (dB $kg^{-1}$) | Area ($km^2$) | Mean Backscatter (dB $m^{-2}$) | Biomass Density (kg $m^{-2}$) | Biomass Estimate (t) | Biomass Estimate Standard Error (t) |
|---|---|---|---|---|---|---|---|---|---|
| 16F | South | Pictou | 2022-10-07 | -35.6167 | 127.2 | -20.70 | 1.84E-02 | 6862 | 6667 |
| 16F | South | Pictou | 2022-10-12 | -35.6167 | 127.2 | -41.53 | 3.29E-02 | 1599 | 944 |
| 16F | South | Pictou | 2022-10-21 | -35.6167 | 127.2 | -35.15 | 3.58E-03 | 952 | 409 |
| 16G | South | East PEI | 2022-09-02 | -35.6167 | 56.1 | -54.56 | 3.47E-02 | 2138 | 1269 |
| 16G | South | East PEI | 2022-09-09 | -35.6167 | 56.1 | -44.29 | 1.42E-01 | 7407 | 2742 |
| 16G | South | East PEI | 2022-10-01 | -35.6167 | 56.1 | -58.44 | 5.24E-03 | 252 | 167 |
| 16G | South | East PEI | 2022-10-07 | -35.6167 | 56.1 | -54.28 | 2.04E-02 | 754 | 307 |
| 16G | South | East PEI | 2022-10-16 | -35.6167 | 56.1 | -64.62 | 2.17E-03 | 78 | 45 |

*Table B2. Atlantic Herring biomass densities and estimates by spawning ground from the spawning ground acoustic surveys conducted in 2023.*

| Herring Fishing Area | Region | Area | Date | Mean Target Strength (dB $kg^{-1}$) | Total Area ($km^2$) | Mean Backscatter (dB $m^{-2}$) | Mean Biomass Density (kg $m^{-2}$) | Total Biomass Estimate (t) | Biomass Estimate Standard Error (t) |
|---|---|---|---|---|---|---|---|---|---|
| 16B | North | Gaspé | 2023-08-26 | -35.1098 | 38.6 | -41.45 | 1.74E-03 | 73 | 21 |
| 16B | North | Gaspé | 2023-09-08 | -35.1098 | 38.6 | -36.46 | 7.15E-03 | 233 | 160 |
| 16B | North | Gaspé | 2023-09-15 | -35.1098 | 38.6 | -60.17 | 3.85E-03 | 172 | 133 |
| 16B | North | Gaspé | 2023-09-23 | -35.1098 | 38.6 | -62.34 | 3.38E-03 | 158 | 153 |
| 16B | North | Gaspé | 2023-09-29 | -35.1098 | 38.6 | -56.06 | 1.72E-02 | 471 | 164 |
| 16B | North | Miscou | 2023-08-16 | -35.4708 | 386.9 | -60.24 | 6.71E-03 | 3297 | 1606 |
| 16B | North | Miscou | 2023-08-26 | -35.4708 | 386.9 | -40.45 | 2.54E-03 | 440 | 332 |
| 16B | North | Miscou | 2023-09-01 | -35.4708 | 386.9 | -68.82 | 8.70E-03 | 2392 | 965 |
| 16B | North | Miscou | 2023-09-07 | -35.4708 | 386.9 | -68.19 | 5.61E-03 | 2559 | 1679 |
| 16B | North | Miscou | 2023-09-13 | -35.4708 | 386.9 | -63.63 | 3.43E-03 | 998 | NA |
| 16B | North | Miscou | 2023-09-22 | -35.4708 | 386.9 | -35.60 | 3.41E-03 | 1511 | 553* |
| 16B | North | Miscou | 2023-09-28 | -35.4708 | 386.9 | -46.29 | 7.75E-03 | 3402 | 2063* |
| 16B | North | Miscou | 2023-10-12 | -35.4708 | 386.9 | -33.92 | 3.57E-04 | 135 | 84* |
| 16B | North | Miscou | 2023-10-25 | -35.4708 | 386.9 | -50.21 | 2.57E-03 | 1262 | 638* |
| 16B | North | Miscou | 2023-10-30 | -35.4708 | 386.9 | -40.00 | 5.36E-04 | 189 | 60* |
| 16B | North | Miscou | 2023-11-06 | -35.4708 | 386.9 | -40.41 | 2.06E-03 | 603 | NA* |
| 16B | North | Miscou | 2023-11-11 | -35.4708 | 386.9 | -20.46 | 8.54E-04 | 253 | 128* |
| 16B | North | Miscou | 2023-11-14 | -35.4708 | 386.9 | -64.60 | 2.72E-03 | 1275 | 788* |
| 16B | North | Miscou | 2023-11-21 | -35.4708 | 386.9 | -26.77 | 1.04E-03 | 479 | 363* |
| 16C | Middle | Escuminac | 2023-09-03 | -35.6060 | 145.5 | -62.39 | 2.01E-03 | 113 | 56 |
| 16C | Middle | Escuminac | 2023-09-08 | -35.6060 | 145.5 | -32.01 | 7.07E-04 | 165 | 76 |
| 16C | Middle | Escuminac | 2023-09-23 | -35.6060 | 145.5 | 0.00 | 0.00E+00 | 0 | NA |
| 16C | Middle | Escuminac | 2023-09-30 | -35.6060 | 145.5 | -15.59 | 5.06E-04 | 40 | 27 |
| 16E | Middle | West PEI | 2023-08-29 | -35.2339 | 111.3 | -27.50 | 1.09E-02 | 3643 | 1534 |
| 16E | Middle | West PEI | 2023-09-15 | -35.2339 | 111.3 | -57.59 | 5.71E-03 | 591 | 512 |
| 16E | Middle | West PEI | 2023-09-23 | -35.2339 | 111.3 | -30.26 | 1.45E-03 | 267 | 139 |
| 16E | Middle | West PEI | 2023-09-29 | -35.2339 | 111.3 | -30.72 | 2.36E-03 | 124 | 66 |
| 16E | Middle | West PEI | 2023-10-06 | -35.2339 | 111.3 | -26.49 | 1.27E-02 | 3987 | 1878 |
| 16F | South | Pictou | 2023-09-14 | -35.3668 | 127.2 | -26.18 | 4.03E-04 | 44 | 47 |
| 16F | South | Pictou | 2023-09-22 | -35.3668 | 127.2 | -53.29 | 7.09E-04 | 123 | 89 |
| 16F | South | Pictou | 2023-09-29 | -35.3668 | 127.2 | -33.17 | 2.22E-02 | 5607 | 4464 |
| 16F | South | Pictou | 2023-10-05 | -35.3668 | 127.2 | -24.49 | 1.04E-03 | 305 | 184 |
| 16F | South | Pictou | 2023-10-12 | -35.3668 | 127.2 | -26.60 | 5.82E-04 | 223 | 70 |
| 16G | South | East PEI | 2023-09-01 | -35.3668 | 56.1 | -55.88 | 2.00E-02 | 1225 | 467 |
| 16G | South | East PEI | 2023-09-08 | -35.3668 | 56.1 | -48.28 | 5.47E-02 | 2334 | 1292 |
| 16G | South | East PEI | 2023-09-22 | -35.3668 | 56.1 | -51.18 | 2.62E-02 | 1271 | 828 |
| 16G | South | East PEI | 2023-09-29 | -35.3668 | 56.1 | -50.07 | 3.42E-02 | 1564 | 348 |
| 16G | South | East PEI | 2023-10-13 | -35.3668 | 56.1 | -55.59 | 1.00E-02 | 529 | 189 |

**These nightly biomass estimates were conducted after the regular time-sampling grid and are not included in Figures B3 and B4, below.

*Table B3. Number of individual acoustic sampling trips per year and region from the spawning ground acoustic surveys.*

| Region | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 |
|---|---|---|---|---|---|---|---|---|---|
| Gaspé | 5 | 5 | 1 | 5 | 7 | 5 | 5 | 4 | 5 |
| Miscou | 5 | 5 | 4 | 5 | 7 | 6 | 4 | 4 | 14 |
| Escuminac | 2 | 2 | 1 | 0 | 1 | 6 | 3 | 5 | 4 |
| West PEI | 2 | 1 | 2 | 6 | 4 | 7 | 4 | 5 | 5 |
| Pictou | 5 | 5 | 4 | 5 | 5 | 5 | 5 | 5 | 5 |
| East PEI | 0 | 3 | 5 | 2 | 2 | 3 | 0 | 5 | 5 |
| Total | 19 | 21 | 17 | 23 | 26 | 32 | 21 | 28 | 38 |

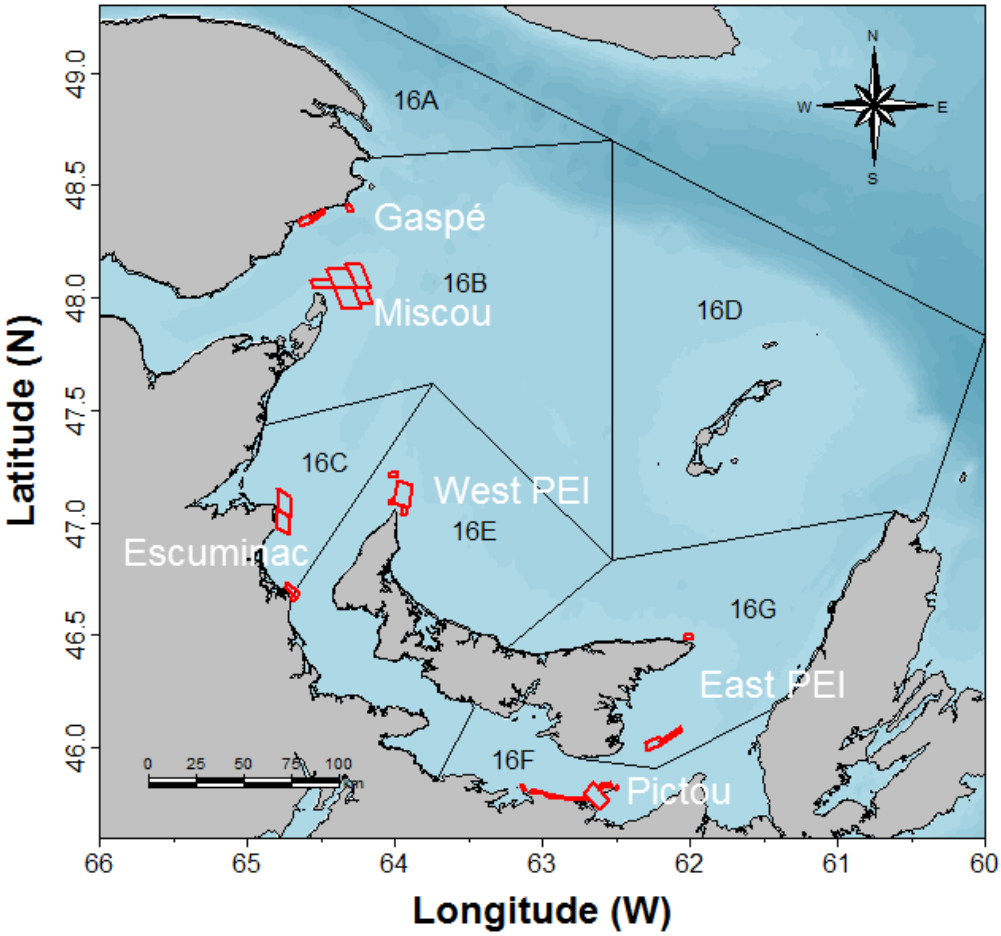


*Figure B1. Spawning grounds surveyed during the spawning ground acoustic surveys.*

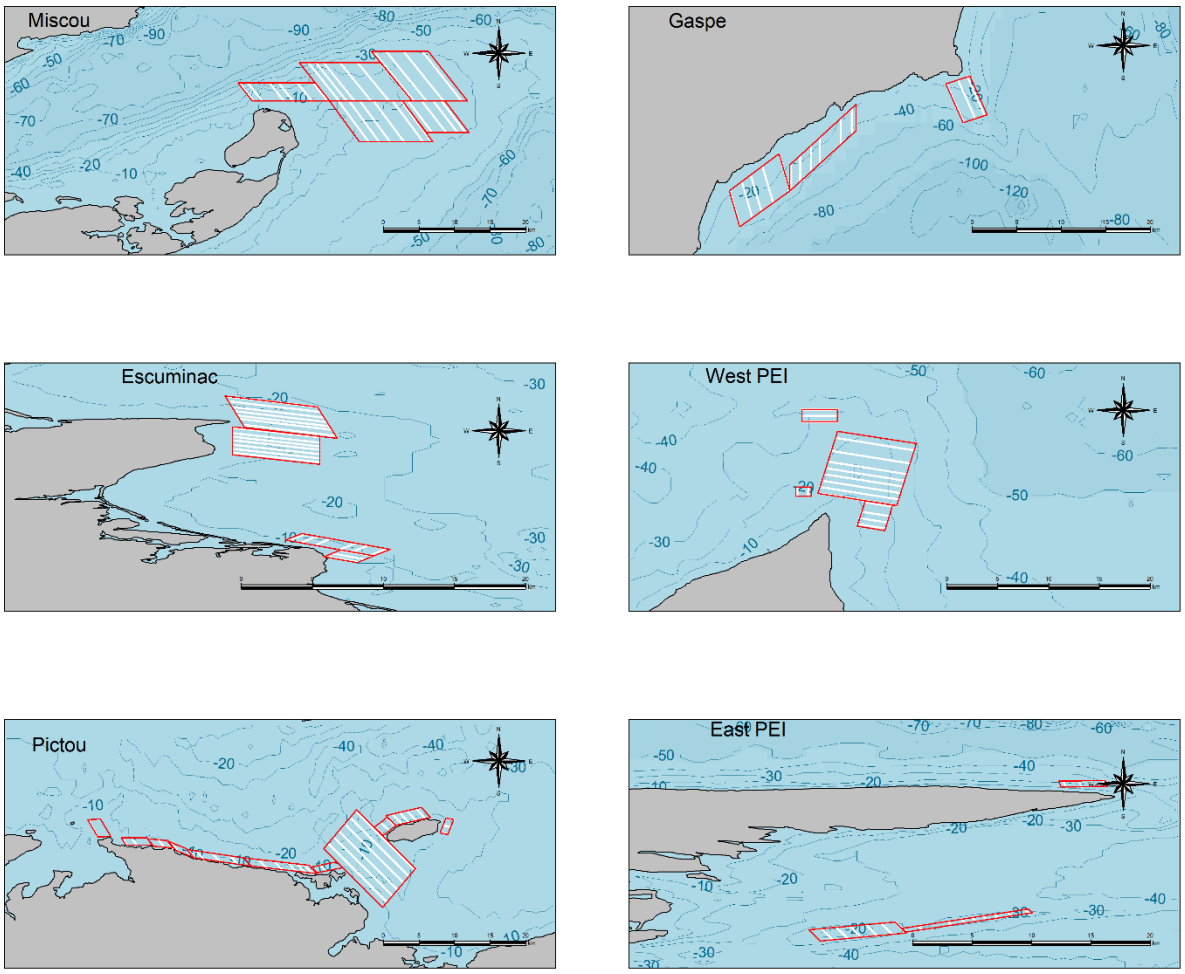


*Figure B2. Strata (red boxes) and transects (white lines) surveyed during the spawning ground acoustic surveys.*

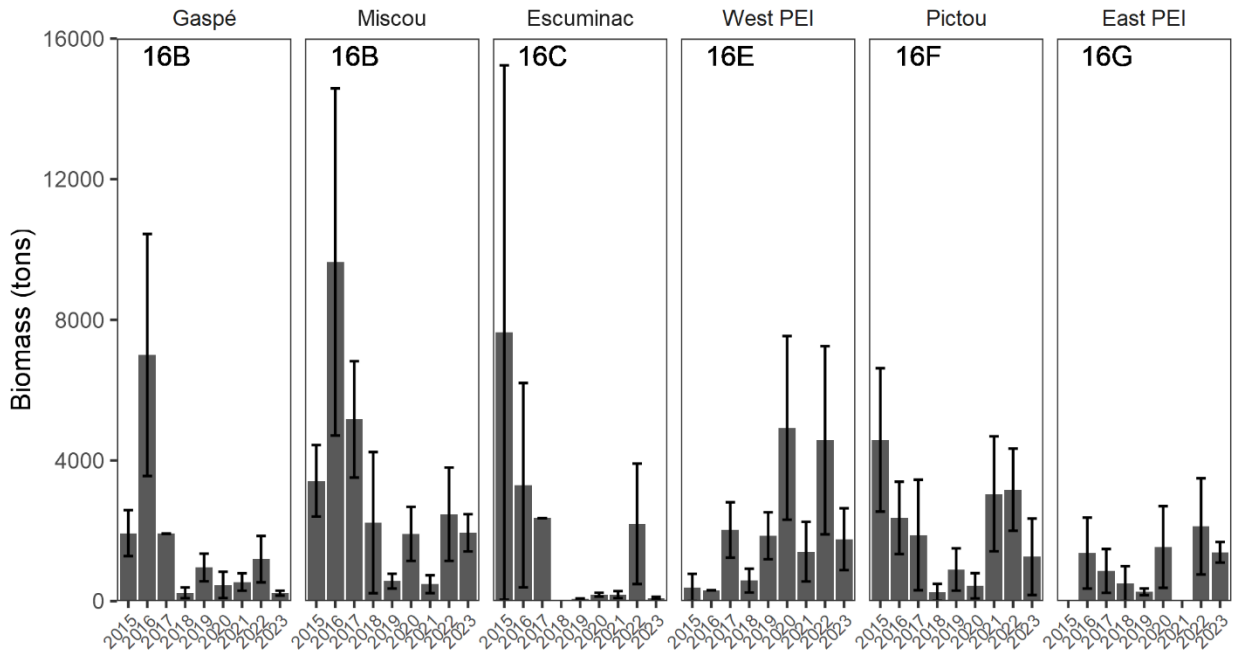


*Figure B3. Nightly Atlantic Herring biomass estimates (tonnes; mean ± one standard error bar) by spawning ground from the spawning ground acoustic surveys for years 2015 to 2023.*

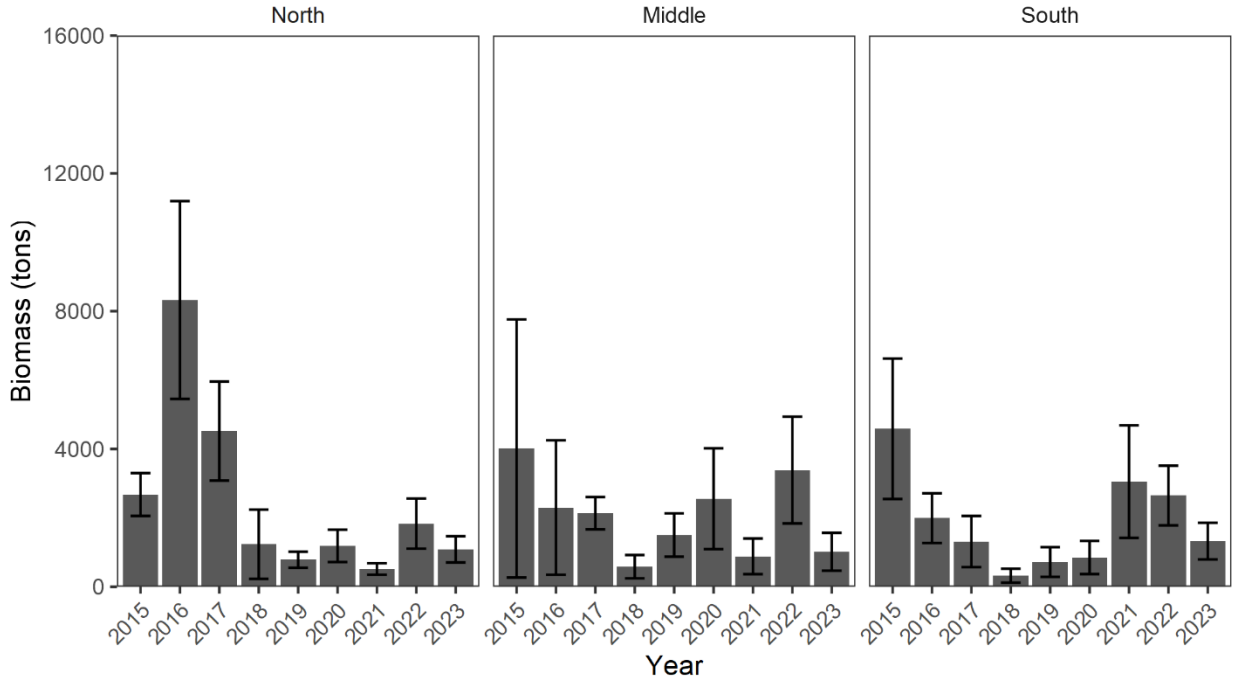


*Figure B4. Nightly Atlantic Herring biomass estimates (tonnes; mean ± one standard error bar) by geographic region (North, Middle, South) from the spawning ground acoustic surveys for years 2015 to 2023.*

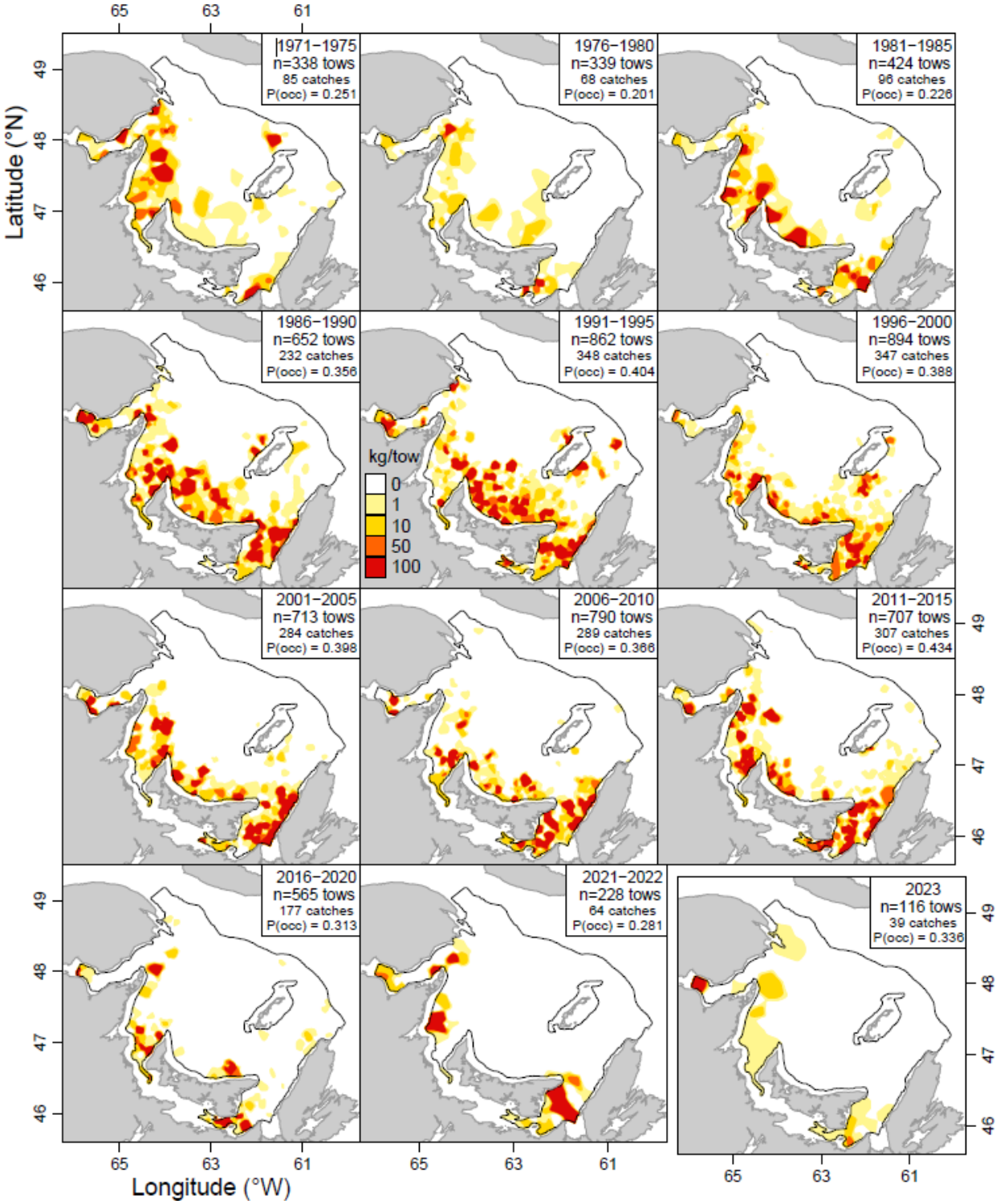


*Figure C1. Spatial distribution of Herring catches by blocks of years in the southern Gulf of St. Lawrence bottom trawl research vessel survey from 1971 to 2023. P(occ) indicates probability of occurrence (the number of tows catching Herring divided by the total number of tows).*

## APPENDIX D. DIFFERENCES IN SSB FROM AUTOMATING PROPORTION-AT-AGE MATRICES

Since 2020, the spawning biomass of Atlantic Herring in the southern Gulf of Saint Lawrence (4TVn) has been assessed using a statistical catch-at-age (SCA) model (Turcotte et al. 2021). Data sources includes commercial landings, experimental netting and acoustics survey biomass from both industry and fishery-independent surveys (Multi-species survey and Baie-des-Chaleurs survey).

- PAA: Proportion at age
- NAA: Number at age
- WAA: Weight at age
- BegWAA : Beginning of the year weight at age

Originally, values were calculated via excel from multiple data sources, steps, sheets, files and pivot tables. Values were then copy-pasted manually in the right format for the model input. This took a long time with manual verification and was prone to typos and copy errors.

We translated these Excel sheet and tables into R functions and scripts that calculate the matrices and create files in the right format for the model input. The outputs of these translated scripts suggested that the translation process only lead to minor differences with previous estimates. This process also lead to the identification and correction of issues in the dataset, in addition to the detection of decisional differences when dealing with very low or absent values. Here is a summary of those differences.

**Differences in the fall spawning component model**

1. **Number-at-age in North region**: An error was found while calculating the matrices accounting for the edge fishery (Laurentian channel at the edge of 4T) for the North region. For the edge fishery (mobile fleet), ages are proportionally attributed to each region (north, middle and south) based on the landings of the fixed gear fleet. Ages were not summed properly for mobile and fixed fleet to calculate total number at age (and resulting metrics based on it). Age 2 of the fixed fleet was summed with Age 3 of the mobile fleet, and Age 3 of fixed fleet was summed with Age 4 of the mobile fleet, etc. This error resulted in a value difference in proportion-at-age ranging from 0 to 0.41 with an average of 0.06 ± 0.1 (SD). For landings, differences averaged 1802 ± 1068.
2. **In weight-at-age of the Middle and South regions at age 2**, the weight at age (WAA) pasted across in the Excel sheet was the weight-at-age for all regions instead of being filtered for Middle and South like it should have been. This affected weight-at-age for age 2 but also beginning of the year weight-at-age for ages 2 and 3. The resulting differences averaged 0.017 ± 0.004 for weight-at-age.
3. **For weight-at-age in the North region in 2018 and 2022, ages 3 and 4**, the values in the final Excel file did not match the values in the other Excel files where they originated which suggest an error. The average difference is 0.012 ± 0.001.
4. **For weight-at-age in 1994 for the North and Middle region**, the weight-at-age combined for fixed and mobile fleet in the Excel sheet corresponded to the fixed gear weight-at-age only. This not only affected weight-at-age but also landings estimates. Average difference for weight-at-age is 0.017 ± 0.018, ranging from 0.001 to 0.08. Difference in landings is of 485.

5. **For weight-at-age in 2016 and 2017 of the South region**, the weight-at-age copy-pasted was from a filter using the fishing season instead of spawning group. The values correspond to the weight-at-age looking at Herring fished in the fall instead of the weight-at-age of the fall spawning component. This resulted in variation in the weight-at-age (mean difference: 0.006 ± 0.01) but created a difference of 75.66 (2016) and 232 (2017) in landings.
6. **For beginning of the year weight-at-age of the North and Middle region**: The function to calculate beginning of the year is usually for center values :

$$e^{\ln(WAA_{t-1a-1})+\ln(WAA_{ta})/2}$$

and for values at the edge of the table (age 2 and year 1978):

$$e^{2*\ln(WAA_{ta})-\ln(BegWAA_{t+1a+1})}$$

where *t* = year et *a* = age. In 2008 and 2009, the 'edge' function was used for all ages. Additionally, the 'edge' function was used for ages 3 and 4 for all years until 2008. This could potentially result from a copy-paste error, as the South region did not have this specification. This error resulted in a mean difference of 0.023 ± 0.16.

7. **Null values (NA)**: In the Excel version, some NAs in number-at-age of the Middle and South regions were replaced by 0. In the R version, a function was created to replace NAs with a value of choice and we chose to replace those 0 by the average of the three previous years for PAA CPUE. However, since the model would not run without the 0s in paaCatch, we made sure NA in paaCatch was replaced by 0s and not the mean, like all the other parameters. This is something that could be looked into in the future.

**Differences in the spring spawning component model**

1. **For 1983 and 1984 null values**, the previous number-at-age for commercial data had no data for age 11 and averaging was with data for years before and after. Our new function calculates the average with the previous three years. This resulted in imperceptible difference since the value was so low that it was replaced by a null value.
2. **In CPUE proportion at age**, some values were under 0.01, but were not summed with another age and replaced by a null value, as conditions in other years. We kept the threshold at 0.01 and replaced those values by a null value as well.
3. **In 2004 for proportion at age for the acoustic survey in the Baie-des-Chaleurs**, some data was missing for ages 7 et 8. The Excel version averaged with previous and following years, but we made the decision to average with three previous years and be consistent about it. It resulted in an mean difference of 0.026 ± 0.012 for acoustic proportion-at-age and 0.575 for the acoustic index.

**Differences created in SSB estimates**

The mean difference in SSB for spring spawners was 10.56 and 10,742 for fall spawners (North = 32,875; Middle =10,095; South = 9,643; Figure D1). For spring spawners, the SSB estimates are now ~ 14% higher. For fall spawners, the SSB is now ~ 30% higher in the North, ~20% lower in the Middle and ~7% lower in the South. Despite these changes in the estimates, this R method is not only more efficient in time and effort, but also reduces risks of human errors.

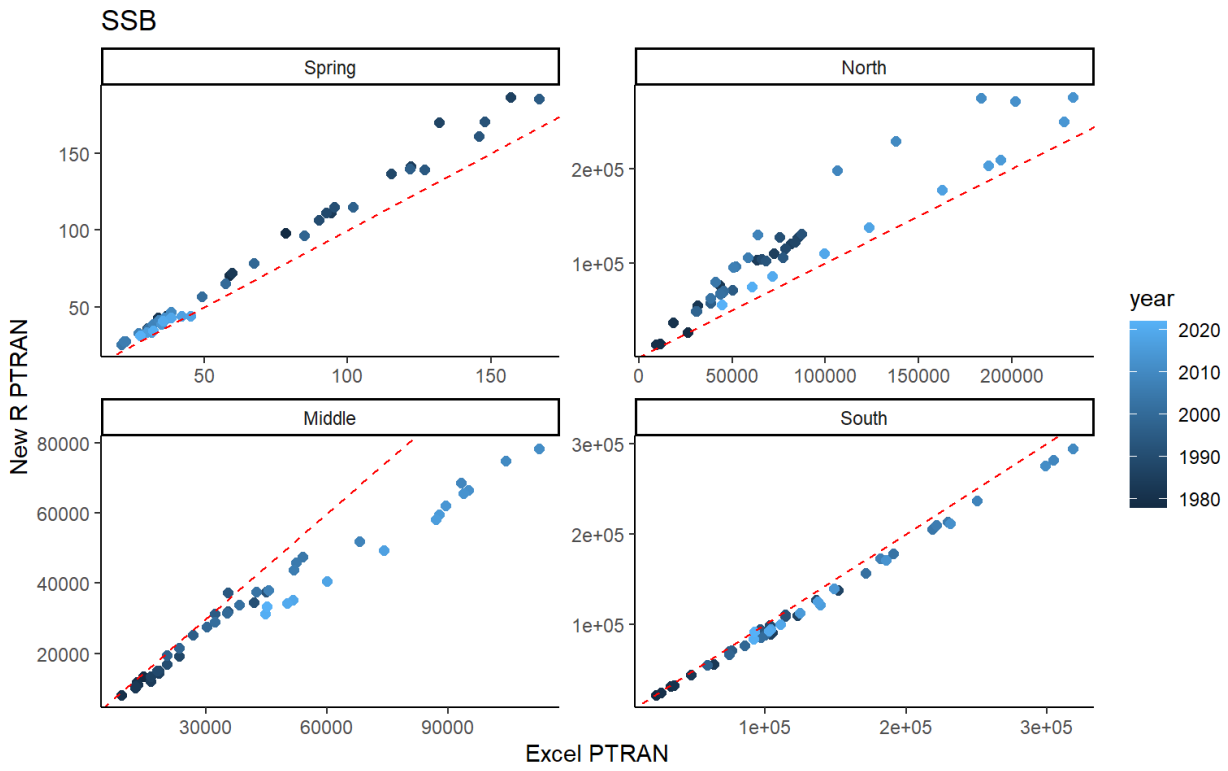


*Figure D1. SSB estimates by regions for the automated output from R (y-axis) and Excel output (x-axis). The red dashed line represent a slope of 1 and indicates that new values are equivalent, over (top) or under (bottom) of older values.*

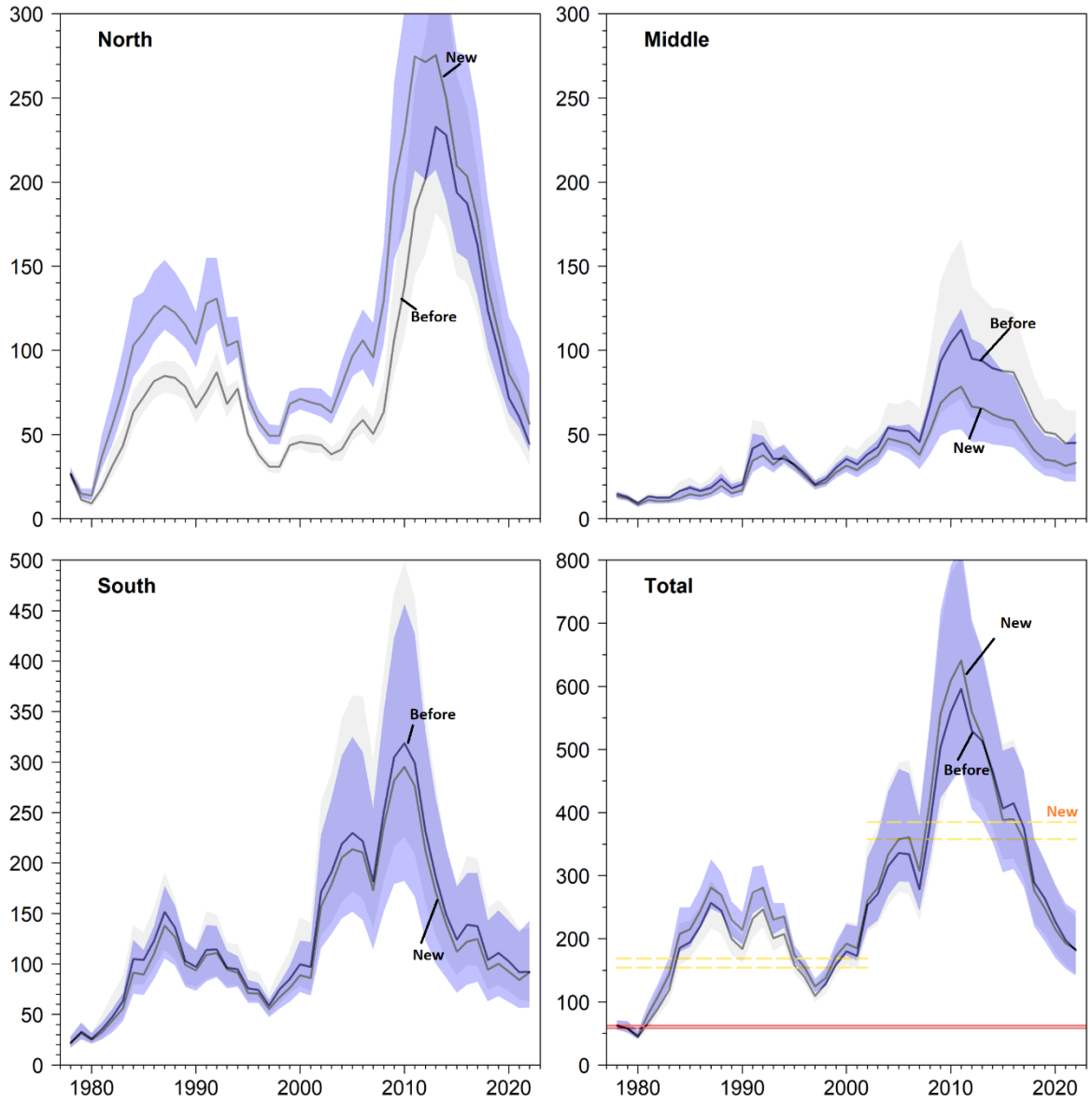


*Figure D2. SSB estimates for fall spawners by regions for the automated output from R (grey) and Excel output (blue). The red line represent the LRP and the yellow dashed lines are the USR (R = top, Excel = below).*

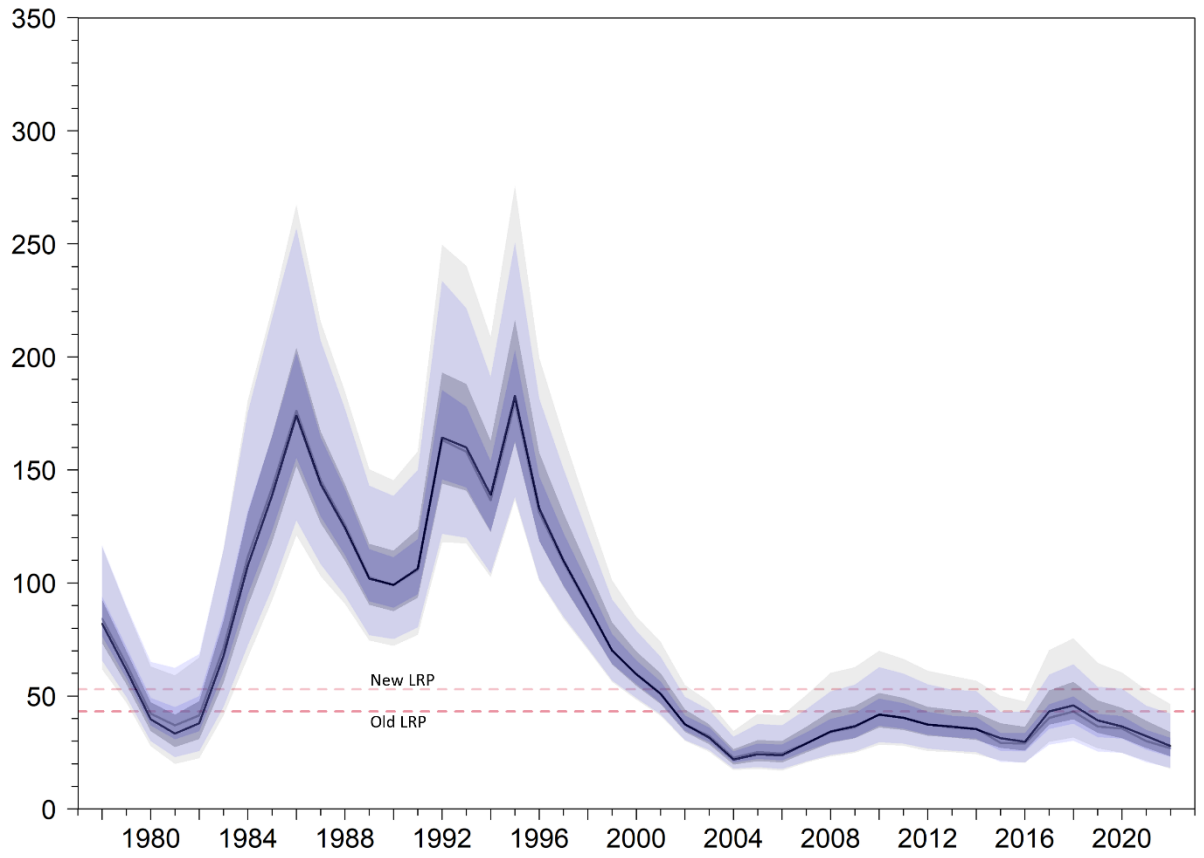


*Figure D3. SSB estimates for spring spawners by regions for the automated output from R (grey) and Excel output (blue). The red line represent the LRP (R = top, Excel = below).*