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### **Sentinel Surveys 1995–2018 – Catch Rates and Biological Information on Atlantic Cod (*Gadus morhua*) in NAFO Divisions 2J3KL**

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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

Catch rates and biological information of Atlantic Cod from the Sentinel survey program in Northwest Atlantic Fisheries Organization (NAFO) Divisions (Divs.) 2J3KL are updated for 2018. Temporal trends in gillnet (3¼ and 5½ inch mesh) and linetrawl unstandardized catch rates were initially similar for all gears, with relatively high values at the beginning of each time-series, followed by sharp declines in the late-1990s, early-2000s. Catch rates for small mesh gillnet and linetrawl oscillated around or below the historical mean catch rate thereafter, and increased for large mesh gillnet until 2014–15. Catch rates for all gears declined since then. Mean catch rate for small mesh gillnet was consistently higher than that of large mesh gillnet for most of the time-series.

Standardized age-disaggregated catch rate for large mesh gillnet in the Northern area was stable at low levels in 1995–2004 (mostly ≤6 year-old fish), then increased rapidly and peaked in 2015 before declining over 2016–17. The contribution of ≥7 year-old fish increased considerably since 2012. Catch rates in the Central area were higher at the beginning of the time-series (mostly 6–8 year-old fish), declined rapidly to their lowest values in 2002, and then followed a pattern similar to that of the Northern area. Catch rates in the Southern area declined rapidly over 1998–2002, then remained stable at low levels. Catch rates for small mesh gillnet in Northern and Central areas indicated patterns similar to those of large mesh size gillnet. In the Southern area, catch rates declined until 2014, then increased by several folds over 2015–16. Temporal trend for linetrawl (Central area) was also similar to those of gillnets in Northern and Central areas (mostly 3–8 year-old fish). Three to five year-old fish were well-represented in 1995–2008, but declined thereafter. Age-aggregated catch rates showed patterns similar to those of age-disaggregated estimates in all cases.

Large mesh gillnet and linetrawl captured larger fish from specific size ranges; whereas the small mesh gillnet retaining small and large fish from multiple length-classes. Indices of physiological condition for both males and females cod (Fulton's condition factor, Hepatosomatic Index, and Gonadosomatic Index) varied seasonally and annually.

Total removals (control plus experimental sites, all gears combined) of Atlantic Cod caught in Divs. 2J3KL Sentinel surveys (1995–2017) peaked at 388 t in 1998, declined to 92 t in 2003, reached 270 t annually over 2012–15, and then declined to 173 t in 2017. Several fish species were recorded as Sentinel bycatch in 1995–2017: American Plaice and Winter Flounder were the most common in large mesh gillnet.

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## INTRODUCTION

The Sentinel survey of Atlantic Cod (*Gadus morhua*) has been conducted in NAFO Divs. 2J3KL since 1995, and currently there are 24 years of catch and effort data and biological information. The Sentinel survey for 2019 was ongoing at the time of the present assessment, and its data will be reviewed in subsequent years.

Sentinel survey data were collected by trained fish harvesters at various inshore sites along the Eastern and Northern coasts of Newfoundland, and the Southern coast of Labrador (Fig. 1). The main goals of the Sentinel survey program include: the use of Atlantic Cod catch rates to develop indices of relative abundance for resource assessments; to incorporate knowledge of inshore fish harvesters in the resource assessment process; to evaluate inter-annual variability in resource distribution over inshore areas; and to collect information on key biological parameters used in assessments (e.g., fish length, sex, and otoliths to determine fish age), as well as biological samples used for genetic, physiological, and toxicological analyses, along with stomach contents for food and feeding studies.

## MATERIAL AND METHODS

Approximately 90 inshore fishing enterprises (from Black Tickle to St. Mary's Bay) participated in the first years of the Divs. 2J3KL Sentinel survey. Since 2002, the number of participating enterprises decreased to 40–45 annually. Participants in the Sentinel surveys were trained in various topics, including scientific sampling methods and equipment, computer use, and principles of resource assessment. The surveyed area was subdivided into three inshore areas after 2005: Northern (including NAFO Unit Areas 2Jm, 3Ka, 3Kd); Central (3Kh, 3Ki, 3Lb); and Southern (3Lf, 3Lj, 3Lq) (Fig. 1).

Sentinel fishers were required to fish one control and one experimental site: location of the control site was fixed, and based on historical fishing areas and gear-use patterns; whereas the experimental site changed only within a designated area. For each fishing day, up to half of the fishing gear was deployed at the control site, and the remaining gear was deployed at the experimental site at the discretion of Sentinel fishers.

Sentinel surveys were conducted in summer and fall in all years, coinciding with traditional fishing times for the areas targeted. Gillnets and linetrawls were generally used, although cod traps were periodically employed in 1998–2002.

Large mesh gillnet crews deployed a maximum of six 50-fathom monofilament nets (5½ inch mesh, rigged 2–3 to a fleet), and up to three fleets per fishing day. Linetrawl crews fished two tubs of baited hooks (approximately 500 hooks per tub) per fishing day. In addition, one small-mesh gillnet (3¼ inch monofilament) was fished at selected sites for a minimum of 1 day per week.

Data recorded after each fishing set included: set location (latitude, longitude), set start and soak times, fish and marine invertebrates species caught, marine mammals and seabirds observation at the fishing site, and several environmental parameters (wind direction and speed, percent cloud cover, tidal conditions, in addition to water salinity and temperature at depth in selected sites). All fish (i.e., Atlantic Cod as well as bycatch species) caught by gillnets and linetrawls at control and experimental sites were separate and sampled on land. Each catch was sorted by species, and total number of individuals and fork length (FL) by sex were recorded. Atlantic Cod otoliths were sampled using a length-stratified protocol, and up to 100 whole specimens were frozen biweekly and transported to the Fisheries and Oceans Canada (DFO) Northwest Atlantic Fisheries Centre (NAFC) laboratory in St. John's, NL for

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detailed biological measurements, including total length (cm), gutted weight (g), and liver and gonad weights (g). Total annual removal (t) of Atlantic Cod from Sentinel surveys (control and experimental sites combined) was calculated by applying a standard weight-length relationship to the length data.

## INDICES OF PHYSIOLOGICAL CONDITION

Body weight (gutted), liver and gonad weights were used to calculate three indices that reflect the physiological condition of individual Atlantic Cod (Lambert and Dutil 1997, Mello and Rose 2005): Fulton's condition factor (K); Hepatosomatic Index (HSI); and Gonadosomatic Index (GSI).

$$K_i = (w_i / l_i^3)$$

$$HSI_i = ((h_i / w_i) \times 100)$$

$$GSI_i = ((g_i / w_i) \times 100)$$

where  $w_i$  is gutted weight (g),  $l_i$  is total length (cm),  $h_i$  is liver weight (g), and  $g_i$  is gonad weight (g) of cod  $i$ .

## SENTINEL CATCH RATES

Sentinel catch rates for gillnets (3¼ inch and 5½ inch mesh size) and linetrawls were estimated for each fishing day and fishing community as the number of fish per gillnet and number of fish per 1,000 hooks, respectively. Catch weight per unit effort was not estimated, because weight scales were unavailable to the Sentinel Survey Program.

## STANDARDIZED SENTINEL CATCH RATES

Age-disaggregated and age-aggregated Sentinel catch rates from June-November were standardized using Generalized Linear Models (GLM; McCullagh and Nelder 1989) in order to remove site selection and season effects. In addition, only gillnets with soak times of 12–32 hours and linetrawls with soak times of 24 hours or less were used in this analysis. Zero catches were generated for ages not observed in a set, as sets with effort but no catch were considered valid input to the model. Poisson models with a logarithmic link were fitted with the variables Month and Age as “nested effects”: Month was nested within Fishing Site, and Age was nested within Year. The generic form of the age-disaggregated model is:

$$CPUE = \text{Month (Fishing Site)} \times \text{Age (Year)} + \text{Error}$$

and the age-aggregated model:

$$CPUE = \text{Month (Fishing Site)} \times \text{Year} + \text{Error}$$

Overall model fit was examined using statistical significance of the effects included, and the distribution of residuals.

## RESULTS

Sentinel survey data were gathered from up to 70 different locations/fishing enterprises since 1995; although the number of enterprises participating in this program has decreased substantially since 2002, notably for linetrawl fishing (Tables 1–3). In 1995–2018, the yearly number of fishing sets in the Northern, Central and Southern Areas respectively ranged from 469 to 911, 733–1,476, and 226–803 for large mesh gillnet (5½ inch); from 4 to 206, 18–160,

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and 5–63 sets for small mesh gillnet (3¼ inch); and from 0 to 228, 12–709, and 0–16 sets for linetrawl.

For large mesh gillnet, fishing effort in Divs. 2J3KL initially increased from 1,777 sets in 1995 to nearly 3,100 sets over 2000–02; and then declined to its lowest values of the time-series (1,538) in 2017 (Fig. 2). The number of sets conducted with small mesh gillnet increased from 27 in 1996, peaked at 418 sets in 2002, and then fluctuated between 204–404 sets. Fishing with linetrawl also declined from 1,354 sets in 1995 to its lowest values of the time-series (20) in 2017.

Consistent with patterns in fishing effort, most fish measured for length were caught in large mesh gillnet, followed by small mesh gillnet, and then linetrawl; except in 1995–98, when catches from linetrawl surpassed those from small mesh gillnet (Fig. 3). For large mesh gillnet, the number of fish caught increased from nearly 29,000 in 1995 to 124,000 in 1998, and then declined by four-fold in 2002; beginning in 2003, this trend reversed: catches increased almost every year and peaked at 94,000 fish in 2012, before declining in recent years. For small mesh gillnet, the number of fish measured was less variable, and typically ranged from 9,000–11,400 annually except in 2017–18 (<4,900 fish). Similarly, the number of fish measured from linetrawl remained relatively stable for most of the time-series (except in the late 1990s, when the number of fish caught declined by three-fold, from 36,300 to 12,300), and ranged from 4,000–5,500 in the 2000s, and 900–3,000 in more recent years. The number of sets with no catch ranged from 245–915 (11–30%) for large mesh gillnet, 15–98 (7–41%) for small mesh gillnet, and 0–82 (0–21%) for linetrawl (Fig. 4); no trend over time in the percentage of tows with zero cod catch was observed for large mesh gillnet and linetrawl, but in the case of small mesh gillnet the percentage of sets with no cod increased, notably since the mid-2000s, and peaked at 41% in 2018.

## **SENTINEL CATCH RATES**

Mean annual catch rates for all gears were considerably variable between many locations/fishing enterprises, but were consistently higher in the Central area in all cases (Figs. 5–7). Mean catch rate for large mesh gillnet was in general 5 fish/net or less for most locations in the Northern area prior to 2006 but increased to 10 to 30 fish/net or higher in many locations thereafter; throughout the Central area the mean catch rate were in general 20 to 30 fish/net during the period 1995–99, decreasing to 10–15 fish/net in 2000–05, and then increasing by 3 fold or more thereafter (33–60 fish/net) in most locations; trends in the Southern area were initially similar to the Central area, with catch rates ranging in most locations from 20 to 40 fish/net in 1995–99, then decreasing by two to three fold during the period 2000–05 (0–15 fish/net) and remaining largely unchanged thereafter (with a few exceptions), thus contrasting with the trends observed in the other two areas. For small mesh gillnet, mean catch rates for most locations were consistently higher than those from large mesh gillnet, ranging in general from 20–30 fish/net in the Northern and Southern areas to 50–80 fish/net in the Central area. Mean catch rates for linetrawl were very low (<20 fish per 1000 hooks) in most locations of the Northern area, but generally ranged from 100–400 fish/1,000 hooks in the Central area, and less the 100 fish per 1000 hooks in most locations of the Southern area. No spatial or temporal trends in catch rates are evident for small mesh gillnet and linetrawl throughout the study area.

Mean catch rate by fishing enterprise (Fig. 8) tended to be relatively higher for large mesh gillnet (41–70 fish/net) in St. Anthony (Northern), Happy Adventure, Bonavista, Little Catalina, and Heart's Content (Central), as well Bay de Verde (Southern). In the case of small mesh gillnet catch rates from St. Lunaire (Northern), Happy Adventure, Too Good Arm, and Little Catalina (Central), and St. Shott's (Southern) showed relatively greater values (47–83 fish/net). For

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linetrawl the largest catch rates (305–350 fish/1,000 hooks) were observed in the Central area only, notably in Seldom, Lumsden, Wesleyville, Bonavista, and Petley.

Annual mean catch rate (all enterprises/communities combined) for all gears and areas declined from the beginning of the time-series, reached minimum values during the late 1990s-early 2000s, and then either increased (large mesh gillnet in Central and Northern areas; linetrawl in Northern area), or fluctuated (small mesh gillnet, all areas; linetrawl in Central and Southern areas) around or below the time-series' historical means (Fig. 9). In the Northern area, mean catch rate for large mesh gillnet remained below the historical mean (10 fish/net) until 2011, then increased to 34 fish/net in 2015; mean catch rate declined from 34–40 fish/net in the late 1990s to 5–9 fish/net in the early 2000s (Central and Southern areas), but then increased above the historical average (26 fish/net) over the last decade in the Central area (peak of 42 fish/net in 2014), and fluctuated around the 1995–2018 average (14 fish/net) in the Southern area. Catch rates have declined in Northern and Central areas since 2014 and 2015, respectively. Mean catch rate for small mesh gillnet peaked at 118 fish/net in 1996 (Central area), then declined and fluctuated around the time-series' historical average in all areas (21 fish/net in Northern and Southern areas, 49 fish/net in Central area) after 1999.

For linetrawl, mean catch rates in Central and Southern areas fluctuated mainly around the time-series' historical averages (199 and 92 fish/1000 hooks, respectively), but increased to 357 fish/1,000 hooks in 2015 (Central), and 246 fish/1,000 hooks (Southern) in 2017, prior to declining in 2018 in both areas. Mean catch rate for linetrawl in the Northern area was the lowest of all areas (2–70 fish/1,000 hooks), and only available for 1995–2002 and 2007–08. Confidence intervals of estimates for all gears, either aggregated by community or year, were generally small, with a few exceptions.

## **STANDARDIZED SENTINEL CATCH RATES<sup>1</sup>**

No trends were apparent in the distribution of model residuals of standardized catch rates for large mesh gillnet in all areas in 1995–2018 (control and experimental sites); and for small mesh gillnet in the Central area in 1996–2018 (experimental sites), whether by Year, Month, Fishing Sites, or Fishing Effort (Figs. 10–16). Nested effects Month (within Fishing Site) and Age (within Year) in the age-disaggregated model were highly significant ( $P < 0.0001$ ) in all cases; in addition to Year, the nested effect of Month (within Fishing Site) in the age-aggregated model was also highly significant in all cases (Tables 4–9). These results suggest that overall model parameterization for standardized Sentinel Survey catch rates was appropriate for both gears, and no systematic issues regarding model fit were detected. The age-disaggregated model for linetrawl (both sites and all areas) and for small mesh size gillnet (control sites in all areas, experimental sites in Northern and Southern areas) did not converge, therefore the validity of the model fit was questionable and not considered in further analyses.

For large mesh gillnet, standardized age-disaggregated catch rate of Atlantic Cod in the Northern area was stable at low levels (<3 fish/net) between 1995–2004, and comprised mostly of fish  $\leq 6$  year-old; catch rates increased rapidly and peaked in 2015 (up to 23 fish/net in control site), then declined over 2017 (as low as 6 fish/net), prior to increasing slightly in 2018 (Figs. 17–18). The contribution of  $\geq 7$  year-old fish increased considerably since 2012 (coinciding with increased catch rate); however only a few year-classes were well represented during this period. Catch rate in the Central area was higher at the beginning of the time-series (16–

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<sup>1</sup> Tabulated actual catch rates for all 9 age-groups, 3 fishing gears, 2 fishing sites (control and experimental), and 3 fishing areas (Northern, Central and Southern) are available upon request.



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21 fish/net) and dominated by 6–8 year-old fish, declined rapidly to the lowest estimate in 2002 (2–3 fish/net), increased during most of the 2003–14 period (up to 21 fish/net), and then declined once more in 2015–17 (10–13 fish/net); catch rate increased in 2018 (13–15 fish/net), as observed in the Northern area (Figs. 19–20). Several year-classes can be tracked in the Central area, notably in 2013–18 (e.g., the 2001 and 2002 year-classes appeared in the Sentinel catches as 3 year-old fish in the mid-2000s, and were tracked until 2013). Catch rate in the Southern area declined rapidly from 17–21 fish/net in 1998 to 3 fish/net in 2002, then remained stable at lower levels (<11 fish/net) thereafter (Fig. 21–22). Variations in the proportion of age-classes over the time-series were similar to those observed in the Central area, except in most recent periods (2014–18).

Standardized age-disaggregated catch rates for small mesh gillnet in the Central area (experimental sites) declined from 49 fish/net in 1996 to 19 fish/net in 2001–02, then fluctuated without a clear trend until 2016 (19–32 fish/net), prior to declining in 2017–18 to the same levels as observed in 2001–02 (Fig. 23). Small mesh gillnet caught mostly 3–5 year-old fish, thereby contrasting with large mesh gillnets which caught mostly 6–8 year-old fish. Both gears tracked the same year-classes to a large extent. A declining contribution to catch rate of 3–4 year-old fish in recent years should be noted.

Age-aggregated catch rates for each gear, area and site showed patterns and values similar to those of age-disaggregated estimates, respectively; in addition, age-aggregated catch rates for small mesh gillnet in the Northern and Southern areas varied without trend throughout the time-series (Figs. 24–29). Confidence intervals of estimates were generally small, with a few exceptions.

## **BIOLOGICAL INFORMATION**

### **Length**

Length frequency distributions of Atlantic Cod from Sentinel surveys indicated that large mesh gillnet and linetrawl tended to capture larger fish from specific size ranges with few overlapping length-classes, whereas small mesh gillnet retained small and large fish from multiple length-classes (Fig. 30). Cod from large mesh gillnet were 16–120 cm and 16–117 cm for linetrawl, with modal lengths for any particular year ranging between 60–64 cm (large mesh gillnet) and 53–60 cm (linetrawl). Fish from small mesh gillnet were 17–113 cm, with bi-modal length frequencies ranging between 37–50 cm and 51–63 cm for the first and second modal-classes, respectively.

### **Indices of Physiological Condition**

All three indices (K, HSI, GSI) that reflect the physiological condition of Atlantic Cod varied seasonally and annually (Fig. 31). Fulton's K and HSI covaried seasonally: for both males and females, K was at its lowest value in April, but then peaked in October for females and November for males. The HSI for females was lowest in April, and peaked in August; for males, the index was lowest in May, and peaked in November. The seasonal trend in GSI contrasted with those of the other two indices: peaking in March for males and June for females, and then reaching minimum values in September for males and November for females. Inter-annual trajectories in K and HSI also covaried: peaking in 1996 for both males and females, declining over the late 1990s, and then fluctuating without trend until the mid-2000s. Fulton's K and HSI declined afterwards, reaching their lowest values for both sexes in 2009 (HSI) and 2017 (Fulton's K). For both sexes, GSI increased from its lowest values in 1995, peaked in 2014, and then declined until 2017, but remained above the values from previous decades. All three indices improved in 2018 in relation to the previous year for both males and females.

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It should be noted that the data used for estimating the indices of physiological condition (as well for length frequency distribution) were pooled from fish captured in all fishing communities/fishing enterprises, and that several of these enterprises participated in the Sentinel fishery program over different periods of time. Notwithstanding confidence intervals for these three indices were usually small, suggesting that the impact of such unbalanced spatio-temporal sampling design had limited effect on the precision of the estimated indices.

## SENTINEL SURVEY REMOVALS

Total removal (control plus experimental sites; all gears combined) of Atlantic Cod caught in Divs. 2J3KL Sentinel surveys over 1995–2018 peaked at 388 t in 1998, and then declined to 92 t in 2003. This trend reversed afterwards: removals reached approximately 270 t annually in 2012–15, then declined once again to 148 t in 2018 (Fig. 32).

Several fish species were recorded as Sentinel bycatch in large mesh gillnet over 2005–18 (Fig. 33): American Plaice (*Hippoglossoides platessoides*) and Winter Flounder (*Pseudopleuronectes americanus*) were the most common in large mesh gillnets, followed by Yellowtail Flounder (*Limanda ferruginea*) and redfish (*Sebastes* sp.). Other species reported infrequently as Sentinel bycatch were Witch Flounder (*Glyptocephalus cynoglossus*), Greenland Halibut (*Hippoglossus hippoglossus*) and wolffish (*Anarhichus* sp.). No bycatch data are available for the other two gears. Overall, the amount of bycatch fish recorded in Sentinel fisheries declined by 5 fold between 2005 and 2017; the number of bycatch fish recorded in 2018 was twice as much as observed in the previous year.

## DISCUSSION

This study shows that the standardized age-disaggregated catch rate of Atlantic Cod from large mesh gillnet in the Northern area was stable at low levels prior to 2005 and comprised mostly younger fish ( $\leq 6$  year-old); catch rate increased by several fold and peaked in 2015 before declining over 2016–17 and increasing once more in 2018. The contribution of older fish ( $\geq 7$  year-old) improved considerably since 2012 and coincided with an increase in catch rates. In contrast catch rate in the Central area was higher at the beginning of the time-series (mostly 6–8 year-old fish), declined rapidly to their lowest value in 2002, and then followed a pattern similar to that of the Northern area. Catch rate in the Southern area declined rapidly over 1998–2002, then remained stable at low level thereafter. Trend in standardized catch rate for small mesh gillnet in the Central area was initially similar to that of large mesh size gillnet, except that the majority of the fish caught were 3 to 5 year-old in most years; however, no clear relationships were observed since the mid-2000s.

Moreover, catch rates for large mesh gillnet detected both temporal and spatial changes in cod distribution and abundance in inshore waters across Div. 2J3KL. As indicated by the mean annual catch rate of Atlantic Cod aggregated by community and by area, estimates of relative cod abundance decreased by 2–3 fold starting in the late 1990s and reached the lowest time-series values by the early 2000s in the Central and Southern areas, whereas in the Northern area the index was consistently low during the same period. Starting around the mid-2000s the index increased steadily by 2–3 fold in the Central area and 2–6 fold in the Northern area, but remained very low in most locations of the Southern area during the same period, thus signaling a shift in Atlantic Cod distribution and abundance, from Southern-Central areas (Div. 3KL) during the period of population decline (late 1990s-early 2000s) to Central-Northern areas (Div. 2J3K) since recovering in more recent periods. Large mesh gillnet is the primary gear used in Sentinel surveys of Divs. 2J3KL (82% of sets), and responsible for most of the cod catches (81%) throughout this time-series. This suggests that trends observed

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in catch rates by this gear are representative of the abundance and spatial patterns of Atlantic Cod across the distributional range of this stock in inshore waters during summer and fall (i.e., when Sentinel surveys are conducted).

Of note, temporal trend in standardized catch rate for large mesh gillnet (Northern and Central areas) since the early 2000s were similar to the DFO fall bottom trawl survey abundance index for this stock in offshore waters (DFO 2019). Although the scale or rate of change in catch rates over time or the contribution of the various age-groups to catch rates may differ between these two independent indices of relative abundance, this relationship suggests that the biological and environmental processes driving the dynamics of the population components inhabiting both inshore and offshore waters were similar in recent periods.

Results from the age-disaggregated model for large mesh gillnet (Central area) also indicated that the increase in relative stock size over 2002–07 was due initially to improvements in recruitment and survival of both younger and older fish. However, a subsequent increase in relative stock size, over 2011–14 (Central and Northern areas), resulted primarily from improvements in survival of older fish, rather than recruitment: fish  $\geq 6$  years of age accounted for most of the Sentinel fishery catch during the latter period, while very few younger fish (i.e., 3–5 year-old) were caught by large mesh gillnet since 2015, which coincides with a period of stock decline; a similar trends was observed from the age-disaggregated model for small mesh gillnet (Central area) in 2015–18.

In conclusion, the Sentinel survey program constitutes an independent source of information that can be readily incorporated in resource assessment of commercial fish stocks (e.g., Divs. 2J3KL Atlantic Cod). It also engages stakeholders such as the inshore fish harvesters and enable them to participate in the shared responsibility of resource conservation and sustainable exploitation.

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## TABLES

*Table 1. Number of Sentinel survey sets using 5½ inch gillnet, by community and Fishing Area, 1995–2018 (including sets with no catches). (Northern Area).*

<b>Community</b>	<b>1995</b>	<b>1996</b>	<b>1997</b>	<b>1998</b>	<b>1999</b>	<b>2000</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>2004</b>	<b>2005</b>	<b>2006</b>
Black Tickle	0	48	46	40	48	42	57	54	54	60	60	52
Williams_Hr	54	46	44	40	30	40	42	36	0	38	0	0
Tub_Hr	22	10	12	12	27	60	56	60	0	0	0	0
Triangle	22	17	20	22	47	60	56	56	58	60	60	60
Pennys_Hr	45	49	39	46	48	61	56	42	60	59	54	59
Spear_Hr	47	68	67	71	48	59	59	66	60	60	60	60
St_Lewis	0	71	69	39	46	59	60	59	60	60	60	60
Marys_Hr	0	0	0	0	0	57	59	60	58	58	60	54
Cape_Charles	28	24	22	24	47	0	0	0	0	0	0	0
Quirpon	0	0	0	0	0	0	60	0	0	0	0	0
St_Lunaire	38	51	43	46	60	60	60	60	56	60	60	60
Great_Brehat	54	68	58	70	30	0	0	0	0	0	0	0
St_Anthony	0	0	0	0	0	0	0	0	0	0	0	0
Goose_Cove	0	21	48	56	46	46	52	54	60	61	60	59
Conche	39	42	45	48	60	60	60	58	60	60	60	60
Englee	40	42	43	48	48	60	61	60	60	60	60	51
Hr_Deep	36	44	34	42	46	56	54	54	60	59	57	59
Jacksons_Arm	44	54	49	72	45	0	0	0	0	0	0	0
Sopps_Arm	0	0	0	0	0	50	59	60	60	57	59	60
Westport	0	0	0	0	0	58	60	55	0	0	0	0
<b>TOTAL</b>	<b>469</b>	<b>655</b>	<b>639</b>	<b>676</b>	<b>676</b>	<b>828</b>	<b>911</b>	<b>834</b>	<b>706</b>	<b>752</b>	<b>710</b>	<b>694</b>

*Table 1 (continued). Number of Sentinel survey sets using 5½ inch gillnet, by community and Fishing Area, 1995–2018 (including sets with no catches). (Northern Area continued).*

<b>Community</b>	<b>2007</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>	<b>2017</b>	<b>2018</b>
Black Tickle	60	59	60	58	59	59	57	55	46	59	49	57
Williams_Hr	0	0	0	0	0	0	0	17	42	60	60	60
Tub_Hr	0	0	0	0	0	0	0	0	0	0	0	0
Triangle	60	60	60	56	60	60	59	60	52	60	57	60
Pennys_Hr	60	59	60	59	51	60	60	59	49	58	46	56
Spear_Hr	60	59	0	0	0	0	0	0	0	0	0	0

<b>Community</b>	<b>2007</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>	<b>2017</b>	<b>2018</b>
St Lewis	60	59	120	118	120	120	116	60	56	60	48	58
Marys Hr	60	60	59	60	59	60	60	57	43	58	51	59
Cape Charles	0	0	0	0	0	0	0	0	0	0	0	0
Quirpon	0	0	0	0	0	0	0	0	0	0	0	0
St Lunaire	60	58	60	60	59	66	54	59	59	60	60	60
Great Brehat	0	0	0	0	0	0	0	0	0	0	0	0
St Anthony	0	0	0	0	0	0	46	46	44	48	46	50
Goose Cove	50	50	48	50	50	50	0	0	0	0	0	0
Conche	60	60	60	60	60	54	56	50	46	49	59	0
Englee	60	54	59	0	0	0	0	0	0	0	0	0
Hr Deep	58	58	57	60	59	56	57	60	59	43	44	46
Jacksons Arm	0	0	0	0	0	0	0	0	0	0	0	0
Sopps Arm	38	57	60	60	60	60	60	60	60	45	48	60
Westport	0	0	0	0	0	0	0	0	0	0	0	0
<b>TOTAL</b>	686	693	703	641	637	645	625	583	556	600	568	566

Table 1 (continued). Number of Sentinel survey sets using 5½ inch gillnet, by community and Fishing Area, 1995–2018 (including sets with no catches). (Central Area).

<b>Community</b>	<b>1995</b>	<b>1996</b>	<b>1997</b>	<b>1998</b>	<b>1999</b>	<b>2000</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>2004</b>	<b>2005</b>	<b>2006</b>
Coachmans Cove	20	23	38	40	49	56	55	55	56	57	59	51
Mings Bight	0	0	0	17	32	34	30	36	29	36	36	42
La Scie	0	17	17	18	24	59	42	42	42	42	41	42
Shoe Cove	0	18	15	17	30	47	46	42	42	42	41	42
Smiths Hr	59	63	60	72	48	58	59	58	60	54	60	60
Jacksons Cove	56	48	48	48	32	42	38	40	0	0	0	0
Miles Cove	56	67	70	71	48	59	57	50	54	59	60	60
Glovers Hr	0	0	0	0	0	54	59	57	58	59	56	54
Summerford	60	71	67	69	78	68	60	60	64	76	72	66
Durrell	20	11	8	8	22	51	51	56	0	0	0	0
Too Good Arm	39	45	44	46	42	66	60	59	60	60	59	53
Deep Bay	26	23	24	42	42	0	0	0	0	0	0	0
Fogo	0	0	0	0	48	72	108	105	61	59	60	60
Joe Batts Arm	8	14	4	25	67	72	59	77	0	0	0	0
Tilting	12	30	28	30	75	72	60	78	60	63	60	60
Seldom	36	39	17	37	68	70	74	69	58	60	53	60
Aspen Cove	0	28	27	24	30	35	34	30	23	36	36	36
Musgrave Hr	0	0	0	0	0	0	0	0	0	0	0	0

<b>Community</b>	<b>1995</b>	<b>1996</b>	<b>1997</b>	<b>1998</b>	<b>1999</b>	<b>2000</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>2004</b>	<b>2005</b>	<b>2006</b>
Lumsden	20	47	52	48	42	48	42	36	40	42	36	33
Wesleyville	20	47	53	47	38	42	42	42	42	42	42	0
Newtown	0	0	0	0	0	0	0	0	0	0	0	44
Greenspond	0	0	0	0	0	0	0	0	0	0	0	0
Centreville	40	29	30	32	20	40	40	40	0	0	0	0
St Chads	60	59	60	58	0	0	0	0	0	0	0	0
Happy Adventure	0	0	0	0	59	60	54	60	60	56	60	60
Plate Cove West	27	43	44	48	41	58	60	60	60	57	60	54
Bonavista	0	39	16	16	30	31	30	30	0	0	0	0
Little Catalina	60	59	51	54	28	40	32	40	40	38	39	36
Petley	40	47	48	38	50	68	60	58	53	57	60	58
Thornlea	60	71	69	66	48	77	84	60	0	0	0	0
Hopeall	40	32	32	32	32	40	40	40	40	40	40	40
Hearts Content	0	16	8	36	36	57	40	40	50	50	49	45
<b>TOTAL</b>	<b>759</b>	<b>986</b>	<b>930</b>	<b>1,039</b>	<b>1,159</b>	<b>1,476</b>	<b>1,416</b>	<b>1,420</b>	<b>1,052</b>	<b>1,085</b>	<b>1,079</b>	<b>1,056</b>

Table 1 (continued). Number of Sentinel survey sets using 5½ inch gillnet, by community and Fishing Area, 1995–2018 (including sets with no catches). (Central Area continued).

<b>Community</b>	<b>2007</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>	<b>2017</b>	<b>2018</b>
Coachmans Cove	56	56	56	56	56	56	56	55	57	56	42	58
Mings Bight	41	36	42	36	41	36	0	0	0	0	0	0
La Scie	42	42	41	42	41	41	41	38	0	16	10	20
Shoe Cove	42	42	42	42	40	42	42	41	40	36	26	28
Smiths Hr	58	60	60	60	60	57	59	59	60	52	60	60
Jacksons Cove	0	0	0	0	0	0	0	0	0	0	0	0
Miles Cove	72	66	72	60	60	60	60	55	52	60	59	60
Glovers Hr	60	60	57	59	58	60	60	51	47	60	57	59
Summerford	66	59	66	59	60	60	60	58	60	58	60	54
Durrell	0	0	0	0	0	0	0	0	0	0	0	0
Too Good Arm	60	53	60	59	60	60	60	41	41	42	41	0
Deep Bay	0	0	0	0	0	0	0	0	0	0	0	0
Fogo	60	60	60	60	60	60	50	52	40	40	20	40
Joe Batts Arm	0	0	0	0	0	0	0	0	0	0	0	0
Tilting	60	60	60	59	59	60	60	48	60	59	75	40
Seldom	59	60	54	58	60	58	56	44	60	59	44	40
Aspen Cove	36	37	36	36	36	32	34	0	0	0	0	0
Musgrave Hr	0	0	0	0	0	0	0	0	44	60	43	51

<b>Community</b>	<b>2007</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>	<b>2017</b>	<b>2018</b>
Lumsden	30	39	34	31	60	58	42	43	42	40	40	40
Wesleyville	0	0	0	0	0	0	0	0	0	0	0	0
Newtown	0	0	0	0	0	0	0	0	0	0	0	0
Greenspond	32	41	47	47	48	48	54	60	60	56	60	60
Centreville	0	0	0	0	0	0	0	0	0	0	0	0
St Chads	0	0	0	0	0	0	0	0	0	0	0	0
Happy Adventure	60	49	46	47	48	48	45	36	37	44	31	39
Plate Cove West	60	60	60	60	60	55	49	60	60	58	15	48
Bonavista	0	0	0	0	0	0	0	0	0	0	0	0
Little Catalina	40	40	38	36	40	40	40	40	36	20	0	60
Petley	60	52	52	50	56	59	60	59	54	54	50	0
Thornlea	0	0	0	0	0	0	0	0	0	0	0	0
Hopeall	40	60	54	0	14	0	0	0	0	0	0	0
Hearts Content	40	40	40	40	39	40	40	28	40	34	0	30
<b>TOTAL</b>	<b>1,074</b>	<b>1,072</b>	<b>1,077</b>	<b>997</b>	<b>1,056</b>	<b>1,030</b>	<b>968</b>	<b>868</b>	<b>890</b>	<b>904</b>	<b>733</b>	<b>787</b>

Table 1 (continued). Number of Sentinel survey sets using 5½ inch gillnet, by community and Fishing Area, 1995–2018 (including sets with no catches). (Southern Area).

<b>Community</b>	<b>1995</b>	<b>1996</b>	<b>1997</b>	<b>1998</b>	<b>1999</b>	<b>2000</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>2004</b>	<b>2005</b>	<b>2006</b>
Bay de Verde	0	28	40	27	40	56	59	57	59	60	57	49
Ochre Pitt Cove	40	36	44	48	48	60	60	60	0	0	0	0
Carbonear	39	48	52	60	40	60	47	48	48	48	48	54
Port de Grave	40	0	48	48	48	60	60	55	0	0	0	0
Foxtrap	32	37	23	32	28	32	31	32	32	32	28	32
Pouch Cove	39	32	31	43	45	60	60	61	60	60	60	60
Petty Hr	0	0	0	0	47	57	45	32	0	0	0	0
Bay Bulls	58	8	43	48	32	0	0	0	0	0	0	0
St Lewis	38	46	47	48	30	48	35	38	26	0	0	0
Bay Bulls	0	0	0	0	0	0	0	0	0	60	55	53
Calvert	0	10	12	12	29	41	40	60	48	60	60	60
Ferryland	57	38	34	36	36	56	58	57	0	0	0	0
Aquaforte	59	45	48	47	32	48	40	38	0	0	0	0
Renews	0	0	25	26	32	47	60	60	59	53	50	59
St Shott s	0	16	38	48	30	38	39	40	36	32	40	40
Riverhead	28	64	60	72	63	72	69	78	28	34	32	14
Admirals Beach	61	48	44	48	32	38	39	40	40	35	37	39
Point Lance	58	48	48	48	6	30	31	41	20	28	28	28

<b>Community</b>	<b>1995</b>	<b>1996</b>	<b>1997</b>	<b>1998</b>	<b>1999</b>	<b>2000</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>2004</b>	<b>2005</b>	<b>2006</b>
<b>TOTAL</b>	549	504	637	691	618	803	773	797	456	502	495	488

*Table 1 (continued). Number of Sentinel survey sets using 5½ inch gillnet, by community and Fishing Area, 1995–2018 (including sets with no catches). (Southern Area continued).*

<b>Community</b>	<b>2007</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>	<b>2017</b>	<b>2018</b>
Bay de Verde	60	46	49	51	55	44	0	0	0	0	0	0
Ochre Pitt Cove	0	0	0	0	0	0	0	0	0	0	0	0
Carbonear	48	54	54	54	51	54	54	54	49	0	0	0
Port de Grave	0	0	0	0	0	0	0	0	0	0	0	0
Foxtrap	32	32	30	32	32	32	32	32	31	31	33	32
Pouch Cove	60	58	60	60	0	0	0	0	0	0	0	0
Petty Hr	0	0	0	0	0	0	0	0	0	0	0	0
Bay Bulls	0	0	0	0	0	0	0	0	0	0	0	0
St Lewis	0	0	0	0	0	0	0	0	0	0	0	0
Bay Bulls	60	66	60	60	59	94	90	78	76	80	75	76
Calvert	60	59	60	60	59	0	0	0	0	0	0	0
Ferryland	0	0	0	0	0	0	0	0	0	0	0	0
Aquaforte	0	0	0	0	0	0	0	0	0	0	0	0
Renews	58	57	58	60	56	54	60	35	40	39	39	39
St Shott s	0	0	0	0	0	0	0	0	0	0	0	0
Riverhead	32	32	40	28	36	36	40	40	40	40	50	40
Admirals Beach	40	37	40	40	40	37	40	40	40	39	40	39
Point Lance	28	32	28	28	28	36	30	28	24	0	0	0
<b>TOTAL</b>	478	473	479	473	416	387	346	307	300	229	237	226

*Table 2. Number of Sentinel survey sets using 3¼ inch gillnet, by community and Fishing Area, 1995–2018 (including sets with no catches). (Northern Area).*

<b>Community</b>	<b>1996</b>	<b>1997</b>	<b>1998</b>	<b>1999</b>	<b>2000</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>2004</b>	<b>2005</b>	<b>2006</b>	<b>2007</b>
Black Tickle	0	11	14	16	0	20	18	18	20	20	17	20
Williams Hr	0	9	10	8	9	10	9	0	10	0	0	0
Tub Hr	1	4	4	9	20	20	20	0	0	0	0	0
Triangle	0	6	7	15	12	20	20	20	20	20	20	20
Pennys Hr	1	3	15	16	21	20	14	20	20	17	20	20
Spear Hr	1	6	22	16	20	20	22	20	20	20	20	20
St Lewis	0	9	9	14	20	20	20	20	21	20	20	20
Marys Hr	0	0	0	0	17	20	20	20	20	20	18	20



<b>Community</b>	<b>1996</b>	<b>1997</b>	<b>1998</b>	<b>1999</b>	<b>2000</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>2004</b>	<b>2005</b>	<b>2006</b>	<b>2007</b>
Cape Charles	0	1	8	15	0	0	0	0	0	0	0	0
Quirpon	0	0	0	0	0	16	0	0	0	0	0	0
St Lunaire	1	0	9	4	0	10	15	15	17	10	9	4
Great Breat	0	0	6	0	0	0	0	0	0	0	0	0
Goose Cove	0	0	0	0	0	0	8	20	20	20	14	10
Englee	0	0	9	7	7	10	10	10	10	10	6	9
Hr Deep	0	6	7	8	10	11	10	10	10	0	0	0
Jacksons Arm	0	4	12	8	0	0	0	0	0	0	0	0
Sopps Arm	0	0	0	0	0	0	10	10	10	10	10	8
Westport	0	0	0	0	0	9	9	0	0	0	0	0
<b>TOTAL</b>	<b>4</b>	<b>59</b>	<b>132</b>	<b>136</b>	<b>136</b>	<b>206</b>	<b>205</b>	<b>183</b>	<b>198</b>	<b>167</b>	<b>154</b>	<b>151</b>

Table 2 (continued). Number of Sentinel survey sets using 3¼ inch gillnet, by community and Fishing Area, 1995–2018 (including sets with no catches). (Northern Area continued).

<b>Community</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>	<b>2017</b>	<b>2018</b>
Black Tickle	19	20	18	20	19	17	16	13	14	13	17
Williams Hr	0	0	0	0	0	0	0	10	20	20	20
Tub Hr	0	0	0	0	0	0	0	0	0	0	0
Triangle	20	20	10	18	20	20	20	14	20	13	16
Pennys Hr	20	20	20	17	20	20	19	14	19	12	16
Spear Hr	20	0	0	0	0	0	0	0	0	0	0
St Lewis	20	36	40	40	40	38	20	18	20	16	18
Marys Hr	20	20	19	20	20	20	20	10	18	15	19
Cape Charles	0	0	0	0	0	0	0	0	0	0	0
Quirpon	0	0	0	0	0	0	0	0	0	0	0
St Lunaire	0	0	0	0	0	0	0	0	0	0	0
Great Breat	0	0	0	0	0	0	0	0	0	0	0
Goose Cove	10	10	10	10	10	0	0	0	0	0	0
Englee	10	8	0	0	0	0	0	0	0	0	0
Hr Deep	0	0	0	0	0	0	0	0	0	0	0
Jacksons Arm	0	0	0	0	0	0	0	0	0	0	0
Sopps Arm	10	10	10	10	10	10	10	10	5	8	10
Westport	0	0	0	0	0	0	0	0	0	0	0
<b>TOTAL</b>	<b>149</b>	<b>144</b>	<b>127</b>	<b>135</b>	<b>139</b>	<b>125</b>	<b>105</b>	<b>89</b>	<b>116</b>	<b>97</b>	<b>116</b>

Table 2 (continued). Number of Sentinel survey sets using 3¼ inch gillnet, by community and Fishing Area, 1995–2018 (including sets with no catches). (Central Area).

Community	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Coachmans Cove	0	4	7	9	10	10	10	10	10	10	10	10
La Scie	0	1	3	4	11	7	5	4	7	7	7	7
Miles Cove	8	11	12	8	10	11	9	10	10	10	9	12
Glovers Hr	0	0	0	0	0	10	8	9	10	9	9	9
Summerford	6	9	12	13	11	11	10	11	14	12	11	11
Too Good Arm	0	7	8	6	11	10	9	10	10	10	9	10
Deep Bay	0	0	7	7	0	0	0	0	0	0	0	0
Fogo	0	0	0	0	0	0	5	10	10	10	0	0
Joe Batts Arm	0	0	4	11	5	11	9	0	0	0	0	0
Tilting	0	0	5	7	6	9	5	4	9	7	4	4
Seldom	0	0	8	0	0	0	0	0	0	0	0	0
Wesleyville	0	12	15	12	14	13	14	14	14	14	0	0
Newtown	0	0	0	0	0	0	0	0	0	0	14	0
Greenspond	0	0	0	0	0	0	0	0	0	0	0	0
Happy Adventure	0	0	0	0	10	9	10	10	9	10	10	9
Plate Cove West	0	4	8	7	10	10	10	10	9	10	8	10
Little Catalina	0	13	20	8	19	12	20	20	19	20	18	20
Petley	4	8	8	9	12	11	10	10	10	10	10	10
Hopeall	0	0	0	0	0	10	10	10	9	10	10	10
Hearts Content	0	4	12	12	18	8	8	10	10	10	9	10
<b>TOTAL</b>	18	73	129	113	147	152	152	152	160	159	138	132

Table 2 (continued). Number of Sentinel survey sets using 3¼ inch gillnet, by community and Fishing Area, 1995–2018 (including sets with no catches). (Central Area continued).

Community	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Coachmans Cove	10	10	10	10	10	10	10	10	10	5	10
La Scie	7	7	7	7	7	7	6	0	0	0	0
Miles Cove	9	11	10	7	10	10	10	8	8	10	10
Glovers Hr	10	9	9	9	10	10	8	8	8	7	9
Summerford	10	11	10	10	10	10	8	10	10	10	10
Too Good Arm	10	10	10	11	10	10	2	3	3	2	0
Deep Bay	0	0	0	0	0	0	0	0	0	0	0
Fogo	0	0	0	0	0	0	0	0	0	0	0
Joe Batts Arm	0	0	0	0	0	0	0	0	0	0	0
Tilting	7	4	4	0	0	0	0	0	0	0	0

<b>Community</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>	<b>2017</b>	<b>2018</b>
Seldom	0	0	0	0	0	0	0	0	0	0	0
Wesleyville	0	0	0	0	0	0	0	0	0	0	0
Newtown	0	0	0	0	0	0	0	0	0	0	0
Greenspond	0	3	8	8	8	9	10	10	8	10	8
Happy_Adventure	9	10	10	10	10	10	9	8	9	8	9
Plate_Cove_West	10	10	10	10	10	10	10	10	10	0	8
Little_Catalina	20	19	18	20	20	20	20	18	10	0	0
Petley	10	10	10	10	10	10	10	10	10	10	0
Hopeall	0	0	0	0	0	0	0	0	0	0	0
Hearts_Content	10	10	10	10	17	20	0	0	0	0	0
<b>TOTAL</b>	<b>122</b>	<b>124</b>	<b>126</b>	<b>122</b>	<b>132</b>	<b>136</b>	<b>103</b>	<b>95</b>	<b>86</b>	<b>62</b>	<b>64</b>

Table 2 (continued). Number of Sentinel survey sets using 3¼ inch gillnet, by community and Fishing Area, 1995–2018 (including sets with no catches). (Southern Area).

<b>Community</b>	<b>1996</b>	<b>1997</b>	<b>1998</b>	<b>1999</b>	<b>2000</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>2004</b>	<b>2005</b>	<b>2006</b>	<b>2007</b>
Bay de Verde	0	2	4	6	8	8	9	9	10	8	7	9
Foxtrap	1	7	8	7	8	7	8	8	8	7	8	8
Pouch Cove	0	3	8	8	10	10	9	10	10	10	10	10
Bay Bulls	0	6	12	8	0	0	0	0	0	0	0	0
St Lewis	0	0	0	0	0	7	7	6	0	0	0	0
Bay Bulls	0	0	0	0	0	0	0	0	0	1	0	1
Ferryland	2	5	3	3	5	7	8	0	0	0	0	0
Renews	0	0	0	0	0	0	0	10	0	4	10	10
St Shott s	0	5	3	0	7	0	0	0	0	0	0	0
Admirals Beach	2	15	24	15	19	20	20	20	18	19	20	20
<b>TOTAL</b>	<b>5</b>	<b>43</b>	<b>62</b>	<b>47</b>	<b>57</b>	<b>59</b>	<b>61</b>	<b>63</b>	<b>46</b>	<b>49</b>	<b>55</b>	<b>58</b>

Table 2 (continued). Number of Sentinel survey sets using 3¼ inch gillnet, by community and Fishing Area, 1995–2018 (including sets with no catches). (Southern Area continued).

<b>Community</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>	<b>2017</b>	<b>2018</b>
Bay de Verde	7	8	0	0	0	0	0	0	0	0	0
Foxtrap	8	8	8	9	8	8	10	16	16	16	6
Pouch Cove	10	10	10	0	0	0	0	0	0	0	0
Bay Bulls	0	0	0	0	0	0	0	0	0	0	0
St Lewis	0	0	0	0	0	0	0	0	0	0	0
Bay Bulls	2	2	7	4	5	9	5	4	4	0	0
Ferryland	0	0	0	0	0	0	0	0	0	0	0

<b>Community</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>	<b>2017</b>	<b>2018</b>
Renews	9	10	10	9	9	10	7	10	10	9	8
St Shott s	0	0	0	0	0	0	0	0	0	0	0
Admirals Beach	21	20	20	20	19	20	20	19	20	20	18
<b>TOTAL</b>	<b>57</b>	<b>58</b>	<b>55</b>	<b>42</b>	<b>41</b>	<b>47</b>	<b>42</b>	<b>49</b>	<b>50</b>	<b>45</b>	<b>32</b>

Table 3. Number of Sentinel survey sets using linetrawl, by community and Fishing Area, 1995–2018 (including sets with no catches). (Northern Area).

<b>Community</b>	<b>1996</b>	<b>1997</b>	<b>1998</b>	<b>1999</b>	<b>2000</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>2004</b>	<b>2005</b>	<b>2006</b>	<b>2007</b>
Black Tickle	0	1	2	17	0	0	3	0	0	0	0	0
Williams Hr	0	0	0	0	0	0	6	0	0	0	0	0
Tub Hr	0	45	38	52	38	3	4	0	0	0	0	0
Triangle	7	41	36	37	0	0	4	0	0	0	0	0
Pennys Hr	0	36	35	36	2	0	7	0	0	0	0	0
Spear Hr	0	0	0	0	0	0	3	0	0	0	0	0
St Lewis	0	0	0	0	3	0	0	0	2	0	2	0
Marys Hr	0	0	0	0	0	0	1	0	0	0	1	0
Cape Charles	2	28	28	39	0	0	0	0	0	0	0	0
St Lunaire	8	10	14	2	0	0	0	0	0	0	0	0
Goose Cove	60	32	14	16	8	14	8	6	0	0	0	0
Conche	15	12	11	11	5	3	3	0	0	0	0	0
Englee	19	13	11	9	0	3	4	0	0	0	0	0
Hr Deep	12	4	21	8	0	0	0	0	0	0	0	0
Jacksons Arm	0	6	14	0	0	0	0	0	0	0	0	0
Sopps Arm	0	0	0	0	0	0	1	0	0	0	0	0
<b>TOTAL</b>	<b>123</b>	<b>228</b>	<b>224</b>	<b>227</b>	<b>56</b>	<b>23</b>	<b>44</b>	<b>6</b>	<b>2</b>	<b>0</b>	<b>3</b>	<b>0</b>

Table 3 (continued). Number of Sentinel survey sets using linetrawl, by community and Fishing Area, 1995–2018 (including sets with no catches). (Northern Area continued).

<b>Community</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>	<b>2017</b>	<b>2018</b>
Black Tickle	0	0	0	0	0	0	0	0	0	0	0
Williams Hr	0	0	0	0	0	0	0	0	0	0	0
Tub Hr	0	0	0	0	0	0	0	0	0	0	0
Triangle	0	0	0	0	0	0	0	0	0	0	0
Pennys Hr	0	0	0	0	0	0	0	0	0	0	0
Spear Hr	0	0	0	0	0	0	0	0	0	0	0
St Lewis	0	0	0	0	0	0	0	0	0	0	0
Marys Hr	2	0	1	0	0	0	0	0	0	0	0

<b>Community</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>	<b>2017</b>	<b>2018</b>
Cape Charles	0	0	0	0	0	0	0	0	0	0	0
St Lunaire	0	0	0	0	0	0	0	0	0	0	0
Goose Cove	0	0	0	0	0	0	0	0	0	0	0
Conche	0	0	0	0	0	0	0	0	0	0	0
Englee	8	2	0	0	0	0	0	0	0	0	0
Hr_Deep	0	0	0	0	0	0	0	0	0	0	0
Jacksons_Arm	0	0	0	0	0	0	0	0	0	0	0
Sopps_Arm	0	0	0	0	0	0	0	0	0	0	0
<b>TOTAL</b>	10	2	1	0	0	0	0	0	0	0	0

Table 3 (continued). Number of Sentinel survey sets using linetrawl, by community and Fishing Area, 1995–2018 (including sets with no catches). (Central Area).

<b>Community</b>	<b>1995</b>	<b>1996</b>	<b>1997</b>	<b>1998</b>	<b>1999</b>	<b>2000</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>2004</b>	<b>2005</b>	<b>2006</b>
Coachmans Cove	35	43	12	14	5	10	8	5	4	3	6	2
Mings Bight	68	50	52	41	12	23	29	24	20	16	16	12
La Scie	51	38	42	38	14	5	24	18	12	12	12	12
Shoe Cove	74	47	54	50	22	11	18	18	16	17	17	12
Durrell	43	63	46	45	14	6	8	3	0	0	0	0
Too Good Arm	16	16	12	12	9	8	7	0	0	0	0	0
Deep Bay	33	33	33	18	0	0	0	0	0	0	0	0
Fogo	0	0	0	15	16	0	0	0	0	0	0	0
Joe Batts Arm	58	34	32	27	6	10	9	0	0	0	0	0
Tilting	57	25	35	22	6	7	4	0	1	0	0	0
Seldom	17	14	22	10	4	3	0	0	0	0	0	0
Aspen Cove	41	19	19	30	17	24	24	25	23	25	23	24
Lumsden	54	24	22	15	12	8	12	16	12	11	14	13
Wesleyville	44	20	11	16	12	12	12	12	11	11	12	0
Newtown	0	0	0	0	0	0	0	0	0	0	0	6
Greenspond	0	0	0	0	0	0	0	0	0	0	0	0
Centreville	13	11	11	12	8	7	4	0	0	0	0	0
Happy Adventure	0	0	0	0	0	0	8	0	0	0	0	0
Plate Cove West	10	12	12	13	3	0	6	0	0	0	0	0
Bonavista	0	13	28	25	0	9	3	8	0	0	0	0
Petley	15	12	11	12	6	7	8	0	0	0	0	0
Hopeall	11	18	12	12	0	10	6	0	0	0	0	0
Hearts Content	69	16	37	29	5	0	11	12	0	0	0	0
<b>TOTAL</b>	709	508	503	456	171	160	201	141	99	95	100	81

Table 3 (continued). Number of Sentinel survey sets using linetrawl, by community and Fishing Area, 1995–2018 (including sets with no catches). (Central Area continued).

Community	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Coachmans Cove	4	4	4	4	4	4	4	3	3	4	0	2
Mings Bight	10	16	12	16	12	16	0	0	0	0	0	0
La Scie	12	12	11	12	12	12	12	12	0	0	0	0
Shoe Cove	17	14	13	12	12	12	12	12	12	11	12	12
Durrell	0	0	0	0	0	0	0	0	0	0	0	0
Too Good Arm	0	0	0	0	0	0	0	0	0	0	0	0
Deep Bay	0	0	0	0	0	0	0	0	0	0	0	0
Fogo	0	0	0	0	0	0	0	0	0	0	0	0
Joe Batts Arm	0	0	0	0	0	0	0	0	0	0	0	0
Tilting	0	0	0	0	0	0	0	0	0	0	0	0
Seldom	0	0	0	0	0	0	0	0	0	0	0	0
Aspen Cove	23	8	24	21	24	18	21	0	0	0	0	0
Lumsden	16	12	16	13	0	0	0	0	0	0	0	0
Wesleyville	0	0	0	0	0	0	0	0	0	0	0	0
Newtown	0	0	0	0	0	0	0	0	0	0	0	0
Greenspond	2	4	4	4	4	2	0	0	0	0	0	0
Centreville	0	0	0	0	0	0	0	0	0	0	0	0
Happy Adventure	0	0	0	0	0	0	0	0	0	0	0	0
Plate Cove West	0	0	0	0	0	0	0	0	0	0	0	0
Bonavista	0	0	0	0	0	0	0	0	0	0	0	0
Petley	0	0	0	0	0	0	0	0	0	0	0	0
Hopeall	0	0	0	0	0	0	0	0	0	0	0	0
Hearts Content	0	0	0	0	0	0	0	0	0	0	0	0
<b>TOTAL</b>	84	70	84	82	68	64	49	27	15	15	12	14

Table 3 (continued). Number of Sentinel survey sets using linetrawl, by community and Fishing Area, 1995–2018 (including sets with no catches). (Southern Area).

Community	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Bay de Verde	0	24	10	17	8	0	0	0	0	0	0	0	0
Ochre Pitt Cove	12	9	0	10	0	0	0	0	0	0	0	0	0
Carbonear	15	22	19	11	6	0	12	12	8	8	8	4	8
Port de Grave	12	7	7	9	0	0	0	0	0	0	0	0	0
Foxtrap	42	24	24	24	6	6	12	12	8	8	12	8	8
Pouch Cove	14	11	11	12	0	0	0	0	0	0	0	0	0
Petty Hr	197	99	205	234	137	182	156	166	0	0	0	0	0

<b>Community</b>	<b>1995</b>	<b>1996</b>	<b>1997</b>	<b>1998</b>	<b>1999</b>	<b>2000</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>2004</b>	<b>2005</b>	<b>2006</b>	<b>2007</b>
St Lewis	17	0	0	0	0	0	3	0	0	0	0	0	0
Bay Bulls	0	0	0	0	0	0	0	0	0	0	3	0	0
Calvert	74	52	45	49	17	23	18	0	8	0	0	0	0
Ferryland	0	15	17	15	0	0	0	0	0	0	0	0	0
Aquaforte	0	2	0	0	0	0	0	0	0	0	0	0	0
Renews	7	40	9	4	0	0	1	0	0	0	0	0	0
St Shott s	33	21	0	0	0	0	0	0	0	0	0	0	0
Riverhead	99	52	38	27	9	10	28	6	8	8	8	6	16
Point Lance	0	0	0	0	0	0	4	0	16	12	11	12	12
<b>TOTAL</b>	<b>522</b>	<b>378</b>	<b>385</b>	<b>412</b>	<b>183</b>	<b>221</b>	<b>234</b>	<b>196</b>	<b>48</b>	<b>36</b>	<b>42</b>	<b>30</b>	<b>44</b>

Table 3 (continued). Number of Sentinel survey sets using linetrawl, by community and Fishing Area, 1995–2018 (including sets with no catches). (Southern Area Continued).

<b>Community</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>	<b>2017</b>	<b>2018</b>
Bay de Verde	0	0	0	0	0	0	0	0	0	0	0
Ochre Pitt Cove	0	0	0	0	0	0	0	0	0	0	0
Carbonear	4	4	4	6	4	4	4	0	0	0	0
Port de Grave	0	0	0	0	0	0	0	0	0	0	0
Foxtrap	8	8	8	8	8	8	8	8	8	8	8
Pouch Cove	0	0	0	0	0	0	0	0	0	0	0
Petty Hr	0	0	0	0	0	0	0	0	0	0	0
St Lewis	0	0	0	0	0	0	0	0	0	0	0
Bay Bulls	0	0	0	0	0	0	0	0	0	0	0
Calvert	0	0	0	0	0	0	0	0	0	0	0
Ferryland	0	0	0	0	0	0	0	0	0	0	0
Aquaforte	0	0	0	0	0	0	0	0	0	0	0
Renews	0	0	0	0	0	0	0	0	0	0	0
St Shott s	0	0	0	0	0	0	0	0	0	0	0
Riverhead	8	0	8	0	0	0	0	0	0	0	0
Point Lance	8	12	12	12	4	9	0	4	0	0	0
<b>TOTAL</b>	<b>28</b>	<b>24</b>	<b>32</b>	<b>26</b>	<b>16</b>	<b>21</b>	<b>12</b>	<b>12</b>	<b>8</b>	<b>8</b>	<b>8</b>

Table 4. Model information and results of fitting age-disaggregated and age-aggregated standardized Sentinel catch rates for large mesh gillnet (5½ inch), using data from control and experimental sites in Divs. 2J3KL (Northern Area), 1995–2018.

Class	Level	Values
Fishing Site	21	1 2 2.5 3 4 5 6 6.5 7 9 9.5 10 10.5 11 12 13 13.5 14 15 15.25 15.5
Month	6	6 7 8 9 10 11
Year	24	1995–2018
Age	8	3 4 5 6 7 8 9 10

### LR Statistics for Type 3 Analysis

#### Age-disaggregated – Control Sites

Source	Num DF	Den DF	F Value	Pr > F	Chi-Square	Pr > ChiSq
Month (Fishing Site)	79	6521	117.60	<0001	9,290.12	<0001
Age (Year)	191	6521	125.30	<0001	23,932.6	<0001

#### Age-aggregated – Control Sites

Source	Num DF	Den DF	F Value	Pr > F	Chi-Square	Pr > ChiSq
Month (Fishing Site)	79	746	17.44	<0001	1,377.78	<0001
Year	23	746	64.16	<0001	1,475.76	<0001

#### Age-disaggregated – Experimental Sites

Source	Num DF	Den DF	F Value	Pr > F	Chi-Square	Pr > ChiSq
Month (Fishing Site)	84	6,724	109.47	<0001	9,195.45	<0001
Age (Year)	191	6,724	119.76	<0001	22,874.1	<0001

#### Age-aggregated – Experimental Sites

Source	Num DF	Den DF	F Value	Pr > F	Chi-Square	Pr > ChiSq
Month (Fishing Site)	84	767	16.08	<0001	1,350.40	<0001
Year	23	767	49.05	<0001	1,128.04	<0001

Table 5. Model information and results of fitting age-disaggregated and age-aggregated standardized Sentinel catch rates for large mesh gillnet (5½ inch), using data from control and experimental sites in Divs. 2J3KL (Central Area), 1995–2018.

Class	Level	Values
Fishing Site	39	16 17 18 19 20 21 22 22.5 23 24 25 25.5 26 27 27.5 27.75 28 29 29.5 30 30.5 31 32 33 33.5 33.75 34 35 35.5 36 36.5 37 38 38.5 39 40 41 41.5 42
Month	6	6 7 8 9 10 11
Year	24	1995–2018
Age	8	3 4 5 6 7 8 9 10

### LR Statistics for Type 3 Analysis

#### Age-disaggregated – Control Sites

Source	Num DF	Den DF	F Value	Pr > F	Chi-Square	Pr > ChiSq
Month (Fishing Site)	188	12,772	104.79	<0001	19,701.1	<0001
Age (Year)	191	12,772	216.34	<0001	41,321.0	<0001

#### Age-aggregated – Control Sites

Source	Num DF	Den DF	F Value	Pr > F	Chi-Square	Pr > ChiSq
Month (Fishing Site)	188	1432	16.69	<0001	3,138.16	<0001



Source	Num DF	Den DF	F Value	Pr > F	Chi-Square	Pr > ChiSq
Year	23	1,432	37.71	<0001	867.31	<0001

Age-disaggregated – Experimental Sites

Source	Num DF	Den DF	F Value	Pr > F	Chi-Square	Pr > ChiSq
Month (Fishing Site)	190	12,842	67.64	<0001	12,852.4	<0001
Age (Year)	191	12,842	240.13	<0001	45,865.7	<0001

Age-aggregated – Experimental Sites

Source	Num DF	Den DF	F Value	Pr > F	Chi-Square	Pr > ChiSq
Month (Fishing Site)	190	1439	10.95	<0001	2,080.00	<0001
Year	23	1439	38.82	<0001	892.93	<0001

Table 6. Model information and results of fitting age-disaggregated and age-aggregated standardized Sentinel catch rates for large mesh gillnet (5½ inch), using data from control and experimental sites in Divs. 2J3KL (Southern Area), 1995–2018.

Class	Level	Values
Fishing Site	23	43 43.5 44 45 45.5 46 47 48 49 50 51 51.5 52 53 54 55 56 57 58 58.5 59 59.5 60
Month	6	6 7 8 9 10 11
Year	24	1995–2018
Age	8	3 4 5 6 7 8 9 10

LR Statistics for Type 3 Analysis

Age-disaggregated – Control Sites

Source	Num DF	Den DF	F Value	Pr > F	Chi-Square	Pr > ChiSq
Month (Fishing Site)	110	6,402	71.29	<0001	7,842.41	<0001
Age (Year)	191	6,402	98.11	<0001	18,738.2	<0001

Age-aggregated – Control Sites

Source	Num DF	Den DF	F Value	Pr > F	Chi-Square	Pr > ChiSq
Month (Fishing Site)	110	704	10.09	<0001	1,110.03	<0001
Year	23	704	20.28	<0001	466.41	<0001

Age-disaggregated – Experimental Sites

Source	Num DF	Den DF	F Value	Pr > F	Chi-Square	Pr > ChiSq
Month (Fishing Site)	114	6,510	59.91	<0001	6,829.79	<0001
Age (Year)	191	6,510	94.45	<0001	18,040.1	<0001

Age-aggregated – Experimental Sites

Source	Num DF	Den DF	F Value	Pr > F	Chi-Square	Pr > ChiSq
Month (Fishing Site)	114	714	8.61	<0001	981.28	<0001
Year	23	714	18.00	<0001	414.03	<0001

Table 7. Model information and results of fitting age aggregated standardized Sentinel catch rates for small mesh gillnet (3¼ inch), using data from experimental sites in Divs. 2J3KL (Northern Area), 1996–2018. The age-disaggregated model did not converge.

Class	Level	Values
Fishing Site	18	1 2 2.5 3 4 5 6 6.5 7 9 10 11 13 13.5 14 15 15.25 15.5

Class	Level	Values
Month	6	6 7 8 9 10 11
Year	23	1996–2018

### LR Statistics for Type 3 Analysis

Age-aggregated – Experimental Sites

Source	Num DF	Den DF	F Value	Pr > F	Chi-Square	Pr > ChiSq
Month (Fishing Site)	61	449	8.04	<0001	490.34	<0001
Year	22	449	5.95	<0001	130.84	<0001

Table 8. Model information and results of fitting age-disaggregated and age-aggregated standardized Sentinel catch rates for small mesh gillnet (3¼ inch), using data from experimental sites in Divs. 2J3KL (Central Area), 1996–2018.

Class	Level	Values
Fishing Site	22	16 18 22 22.5 23 25 25.5 26 27 28 29 30 33 33.5 33.75 35.5 36 36.5 38 39 41 42
Month	6	6 7 8 9 10 11
Year	23	1996–2018
Age	8	3 4 5 6 7 8 9 10

### LR Statistics for Type 3 Analysis

Age-disaggregated – Experimental Sites

Source	Num DF	Den DF	F Value	Pr > F	Chi-Square	Pr > ChiSq
Month (Fishing Site)	95	6,649	33.11	<0001	3,145.50	<0001
Age (Year)	183	6,649	62.08	<0001	11,360.0	<0001

Age-aggregated – Experimental Sites

Source	Num DF	Den DF	F Value	Pr > F	Chi-Square	Pr > ChiSq
Month (Fishing Site)	95	748	7.45	<0001	707.77	<0001
Year	22	748	4.29	<0001	94.33	<0001

Table 9. Model information and results of fitting age-aggregated standardized Sentinel catch rates for small mesh gillnet (3¼ inch), using data from experimental sites in Divs. 2J3KL (Southern Area), 1996–2018. The age-disaggregated model did not converge.

Class	Level	Values
Fishing Site	10	43 47 48 50 51 51.5 53 55 56 59
Month	6	6 7 8 9 10 11
Year	23	1996–2018

### LR Statistics for Type 3 Analysis

Age-aggregated – Experimental Sites

Source	Num DF	Den DF	F Value	Pr > F	Chi-Square	Pr > ChiSq
Month (Fishing Site)	41	228	4.02	<0001	165.02	<0001
Year	22	228	3.45	<0001	75.94	<0001

## FIGURES

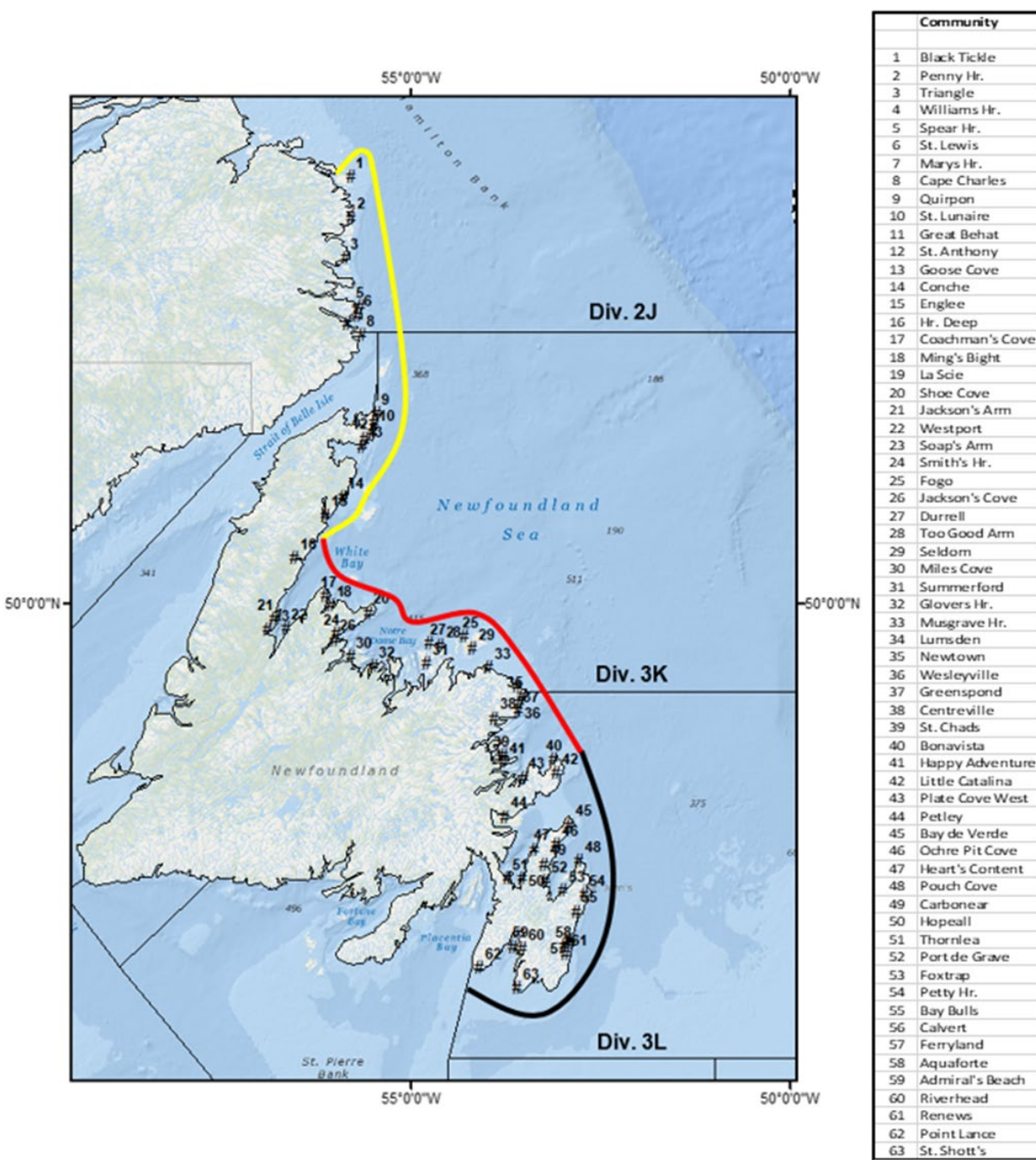


Figure 1. Map of NAFO Divs 2J3KL indicating the Sentinel Survey study area and the three inshore strata used: (1) Northern (NAFO unit areas 2Jm, 3Ka and 3Kd, yellow line), (2) Central (3Kh, 3Ki, and 3Lb, red line), and (3) Southern (3Lf, 3Lj, and 3Lq, black line), 1995–2018.

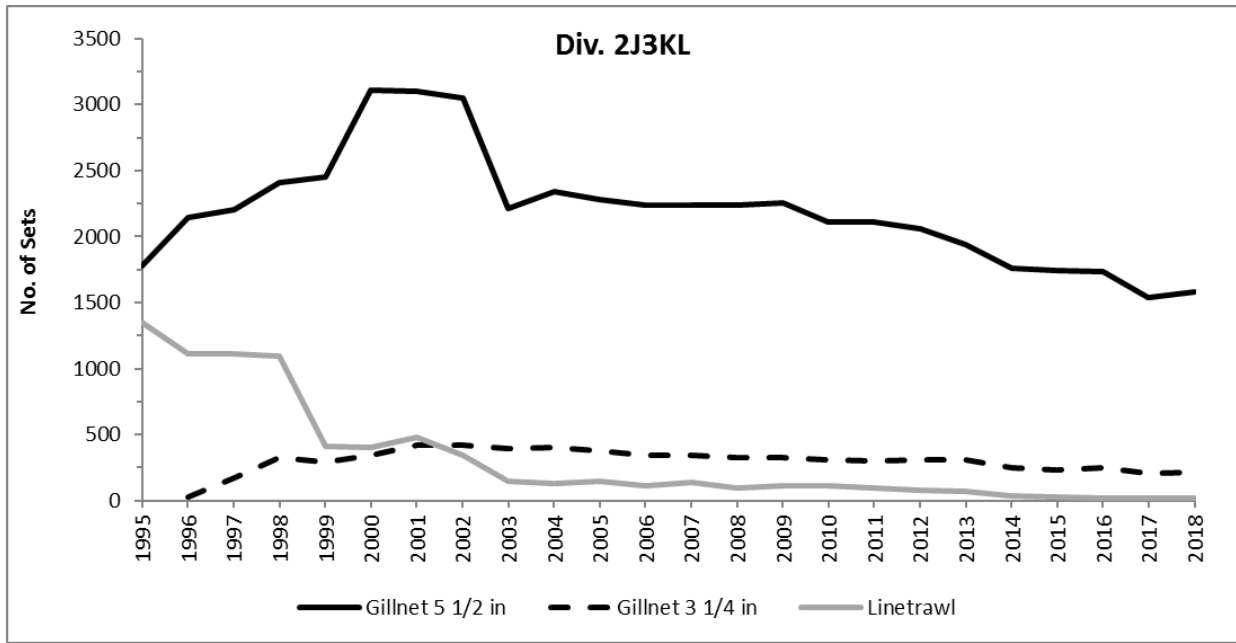


Figure 2. Annual Sentinel survey number of sets by gear type in NAFO Divs. 2J3KL, 1995–2018.

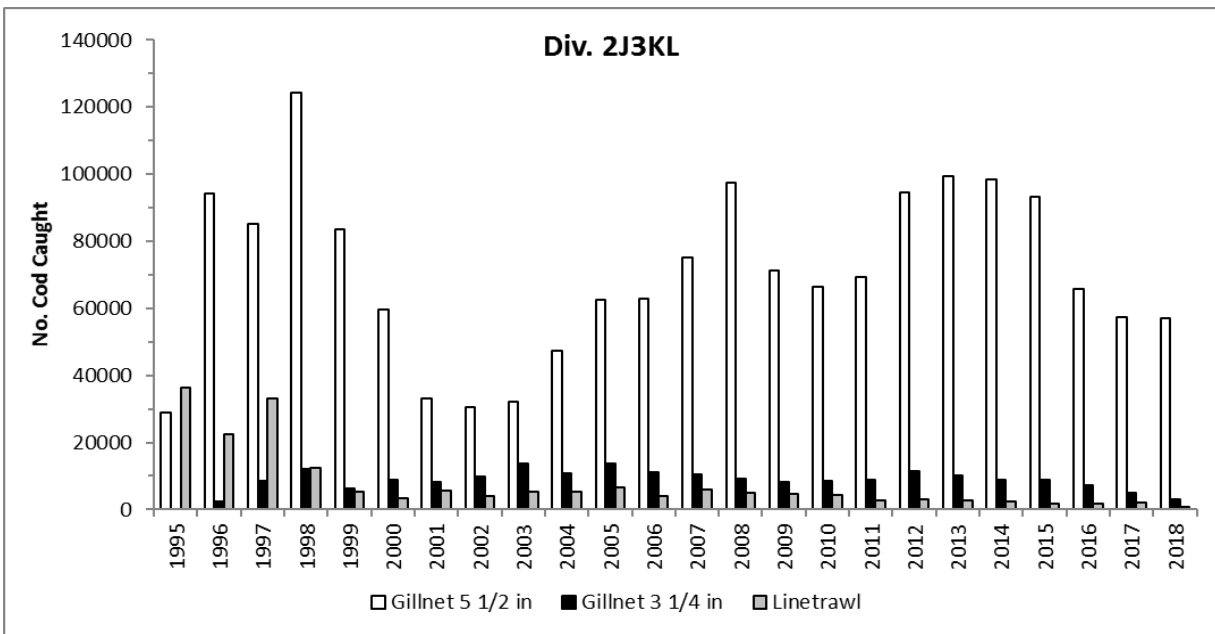


Figure 3. Annual Sentinel survey number of Atlantic Cod caught by gear type in NAFO Divs. 2J3KL, 1995–2018.

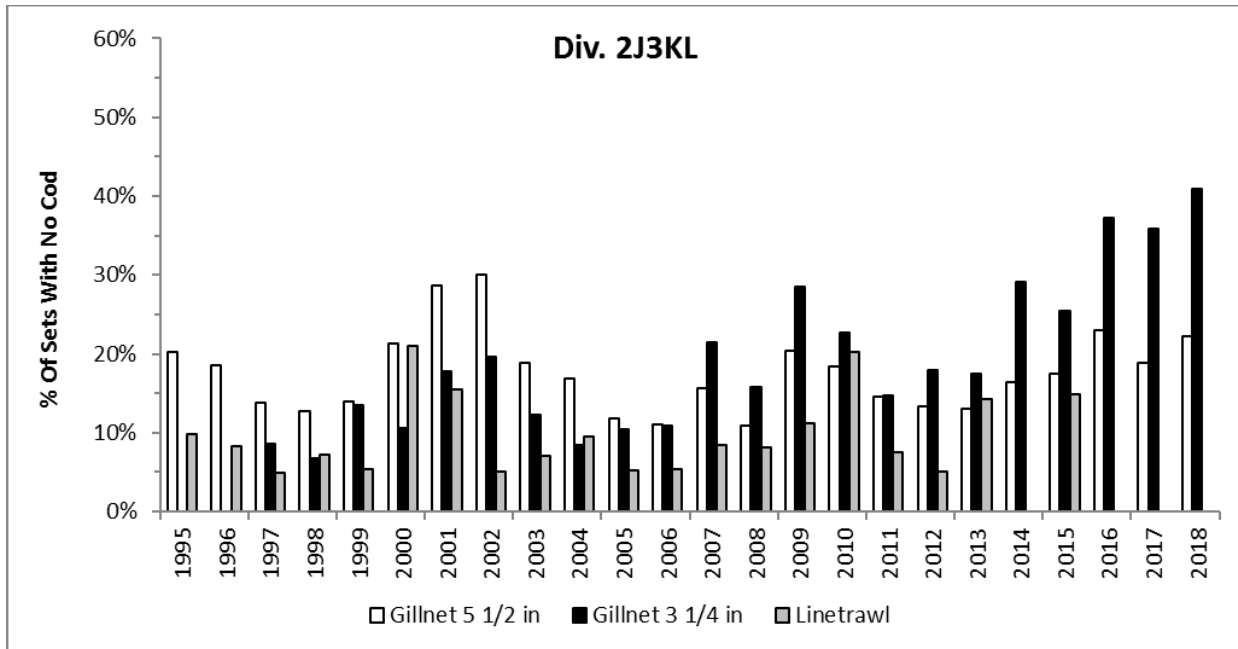


Figure 4. Annual Sentinel survey percentage of sets with no Atlantic Cod by gear type in NAFO Divs. 2J3KL, 1995–2018.

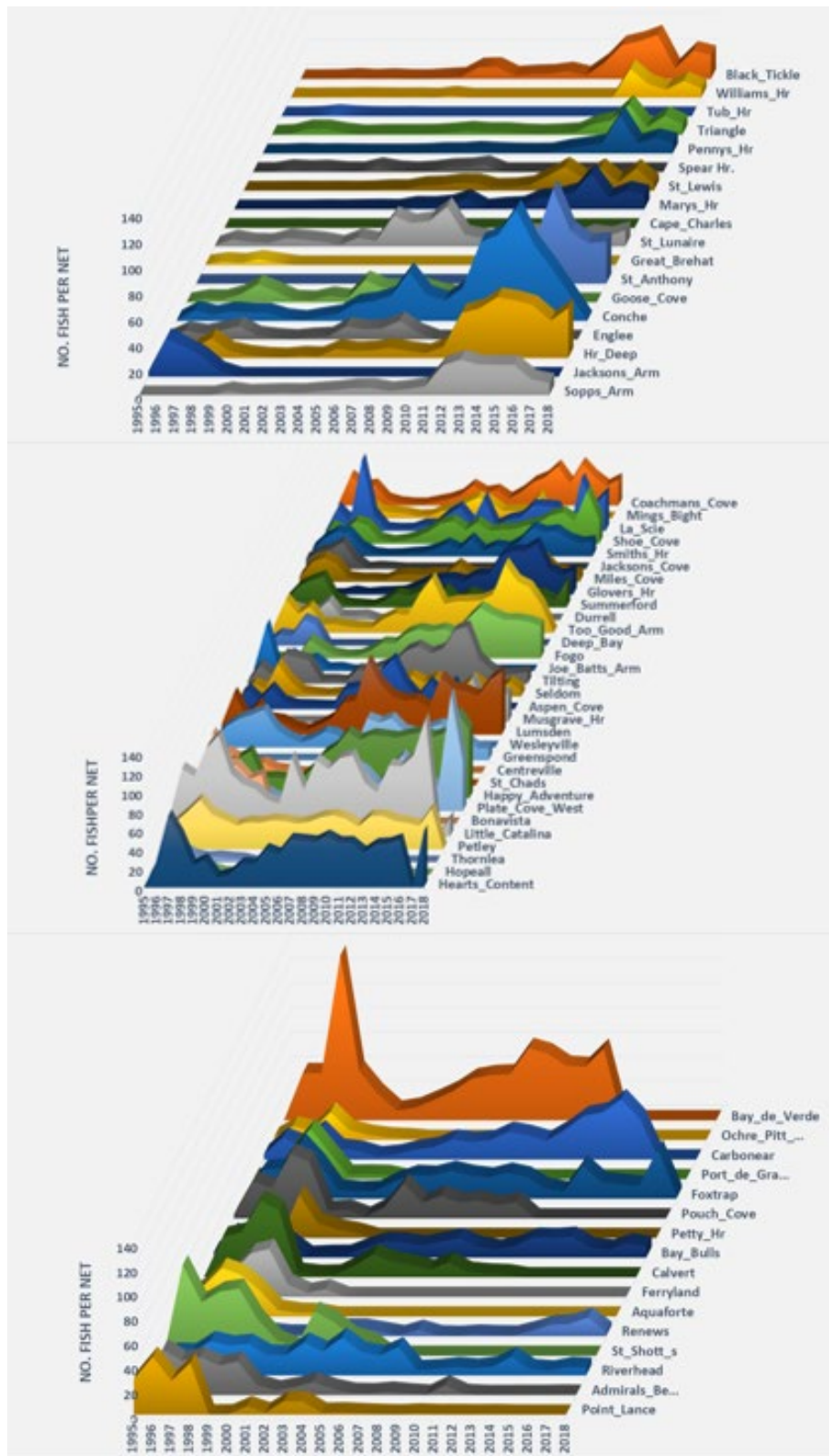


Figure 5. Distribution of mean annual catch rate of Atlantic Cod from large mesh gillnet, aggregated by fishing communities of Sentinel surveys in Northern (top panel), Central (middle panel), and Southern (bottom panel) areas of Divs. 2J3KL, 1995–2018.

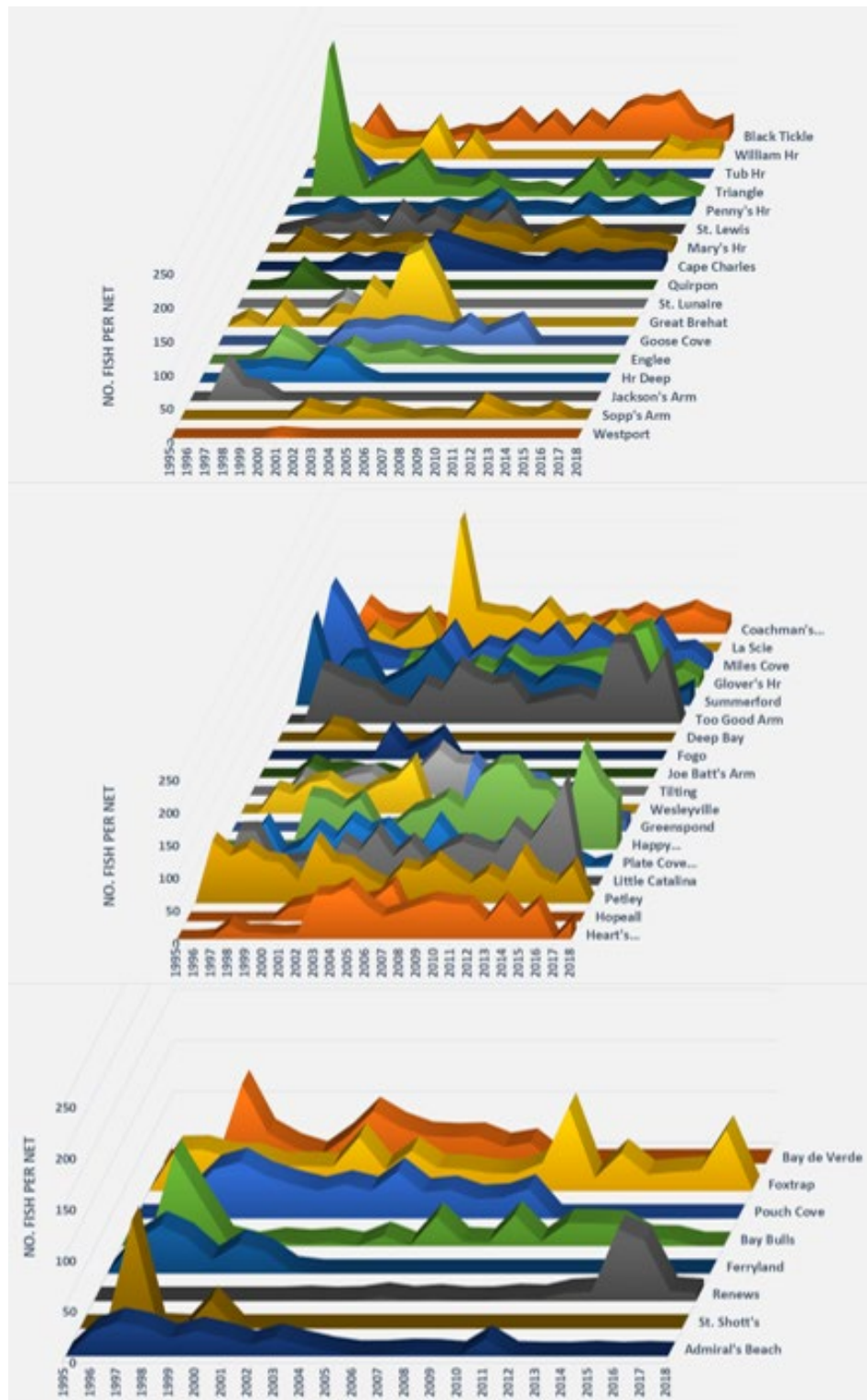


Figure 6. Distribution of mean annual catch rate of Atlantic Cod from small mesh gillnet, aggregated by fishing communities of Sentinel surveys in Northern (top panel), Central (middle panel), and Southern (bottom panel) areas of Divs. 2J3KL, 1996–2018.



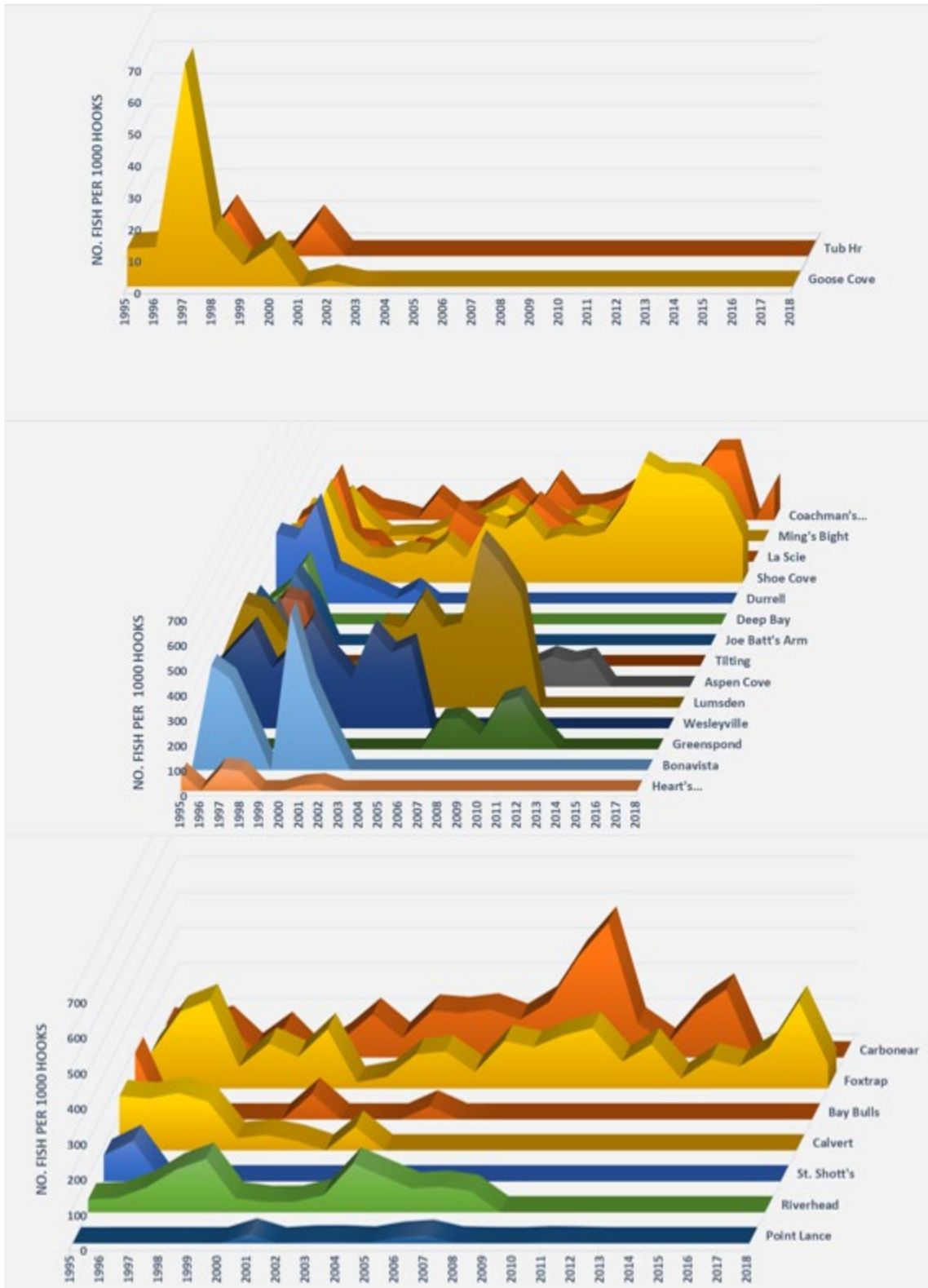


Figure 7. Distribution of mean annual catch rate of Atlantic Cod from linetrawl, aggregated by fishing communities of Sentinel surveys in Northern (top panel), Central (middle panel), and Southern (bottom panel) areas of Divs. 2J3KL, 1995–2018.



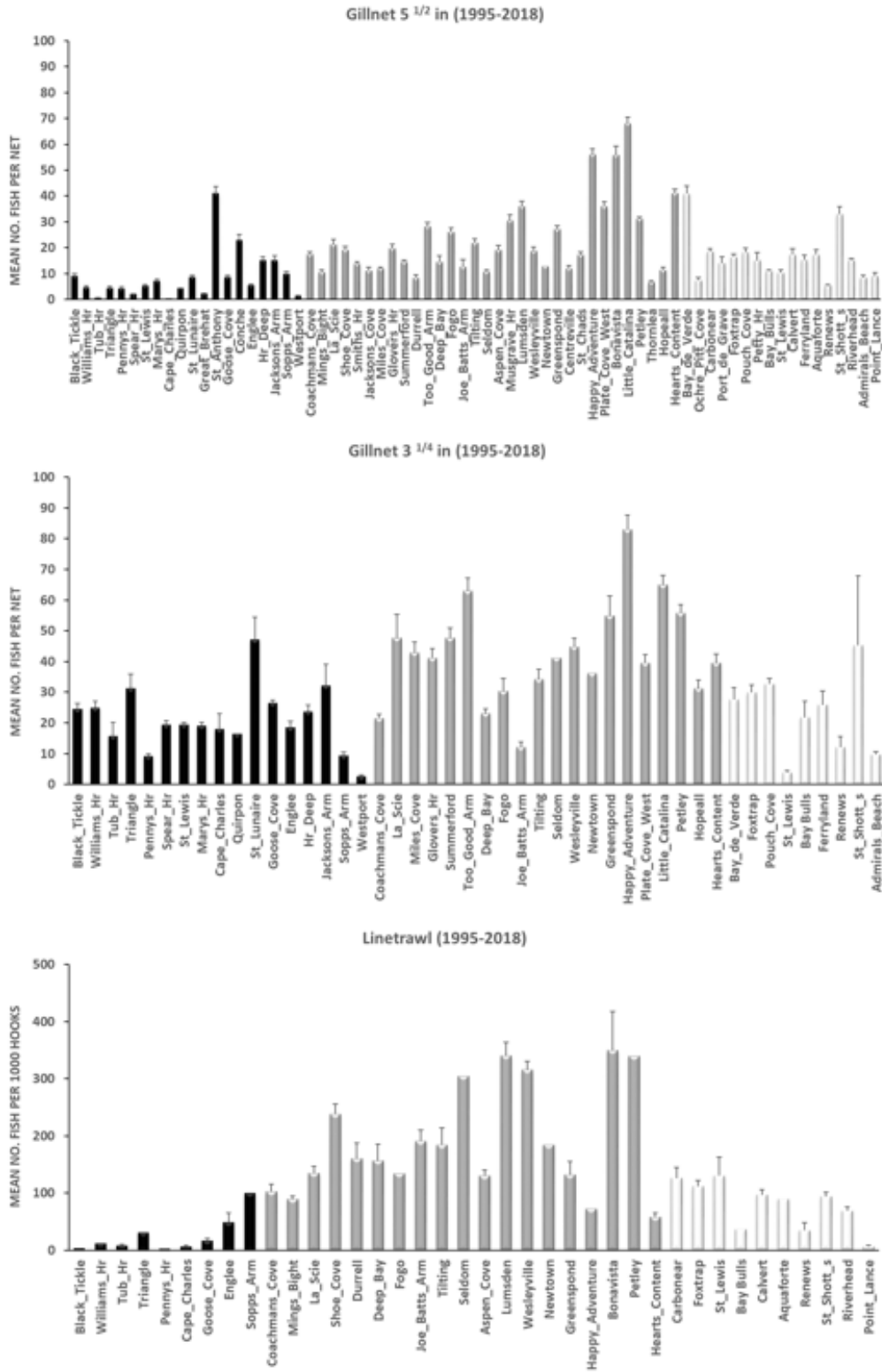


Figure 8. Distribution of mean catch rate of Atlantic Cod from large and small mesh gillnet and linetrawl, aggregated by fishing communities of Sentinel surveys in Northern (black bars), Central (dark grey bars), and Southern (light grey bars) areas of Divs. 2J3KL, 1995–2018. T-bars = +95% CI.

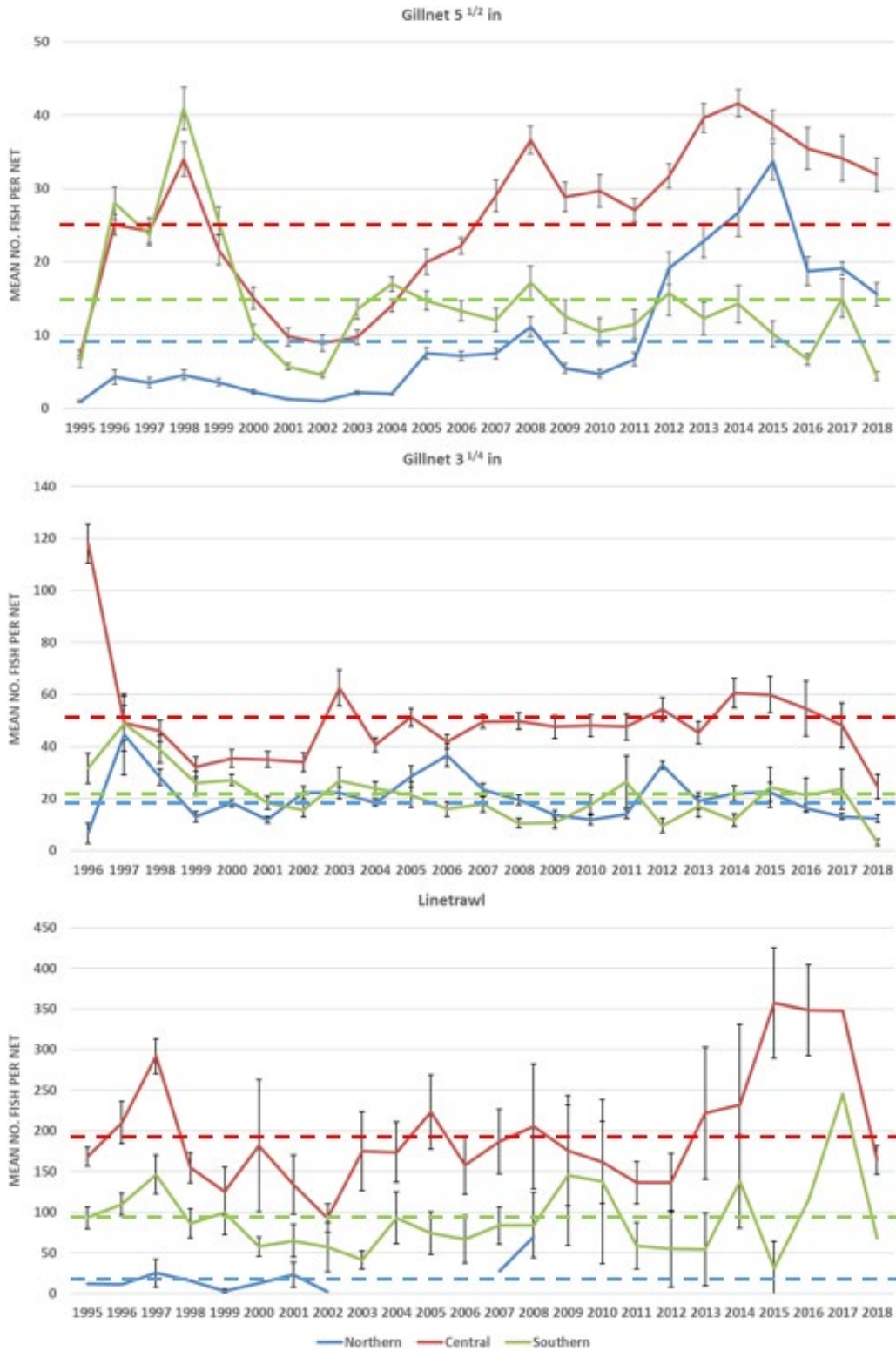


Figure 9. Distribution of mean annual catch rate of Atlantic Cod from large and small mesh gillnet and linetrawl from Sentinel surveys in Divs. 2J3KL, 1995–2018. The dashed lines represent the time-series' historical mean for each gear and area. T-bars = +/-95% CI.

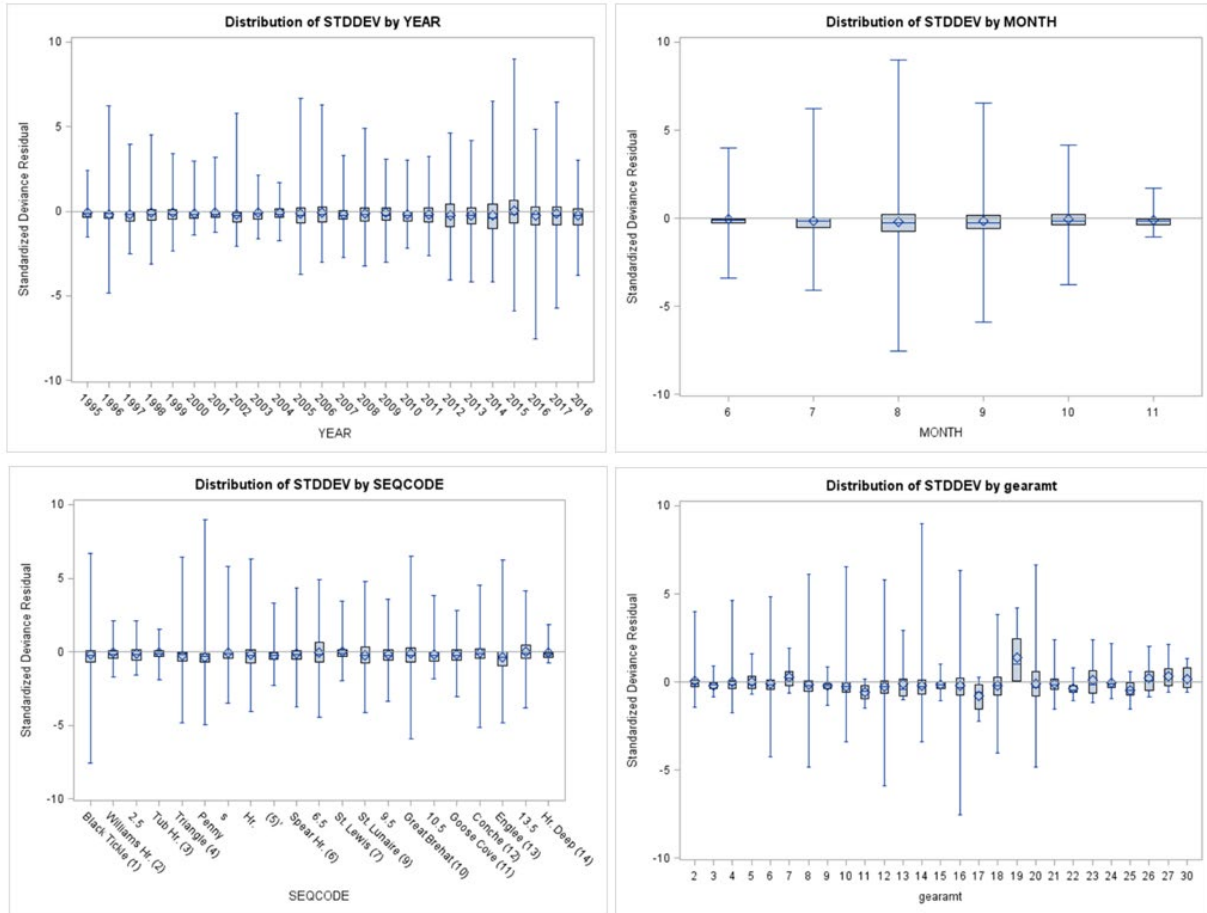


Figure 10. Deviance residuals (+/-95% CI) from the standardized catch rate model (control sites) for large mesh gillnet (5½ inch) in Divs. 2J3KL (Northern area), 1995–2018. Panels show residuals plotted by Year, Month, Fishing Site (SEQCODE), and Fishing Effort (gearamt).

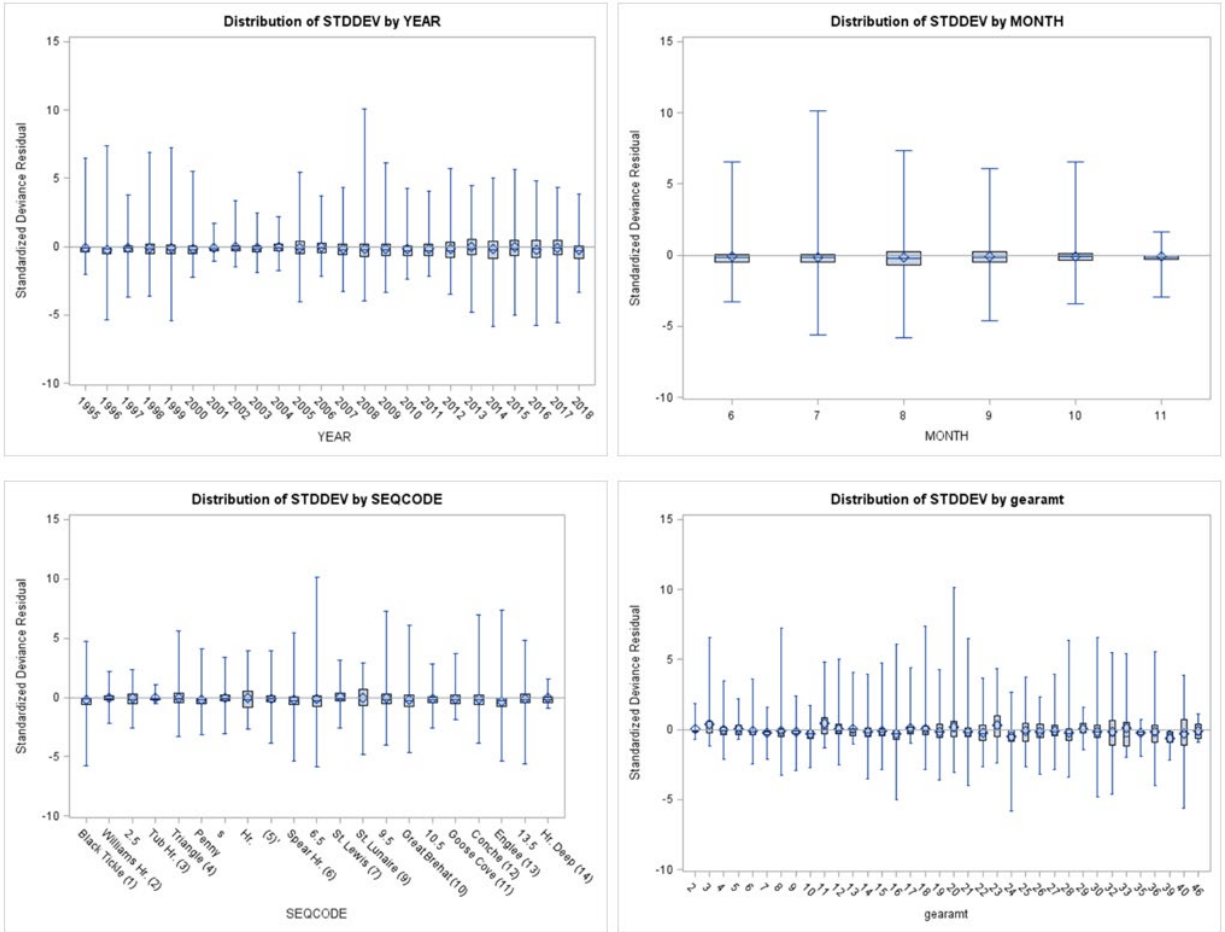


Figure 11. Deviance residuals (+/-95% CI) from the standardized catch rate model (experimental sites) for large mesh gillnet (5½ inch) in Divs. 2J3KL (Northern area), 1995–2018. Panels show residuals plotted by Year, Month, Fishing Site (SEQCODE), and Fishing Effort (gearamt).

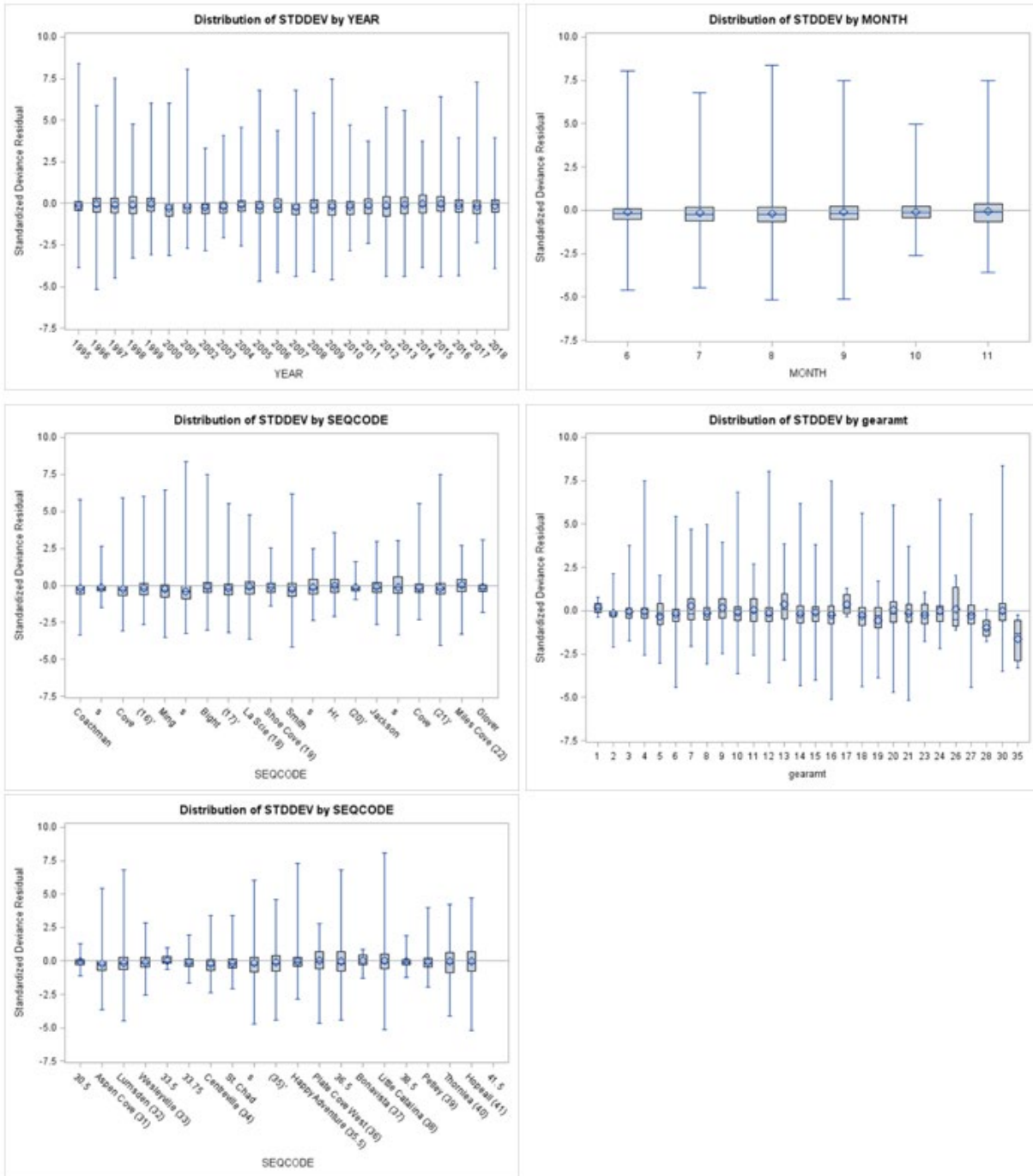


Figure 12. Deviance residuals ( $\pm 95\%$  CI) from the standardized catch rate model (control sites) for large mesh gillnet (5½ inch) in Divs. 2J3KL (Central area), 1995–2018. Panels show residuals plotted by Year, Month, Fishing Site (SEQCODE), and Fishing Effort (gearamt).

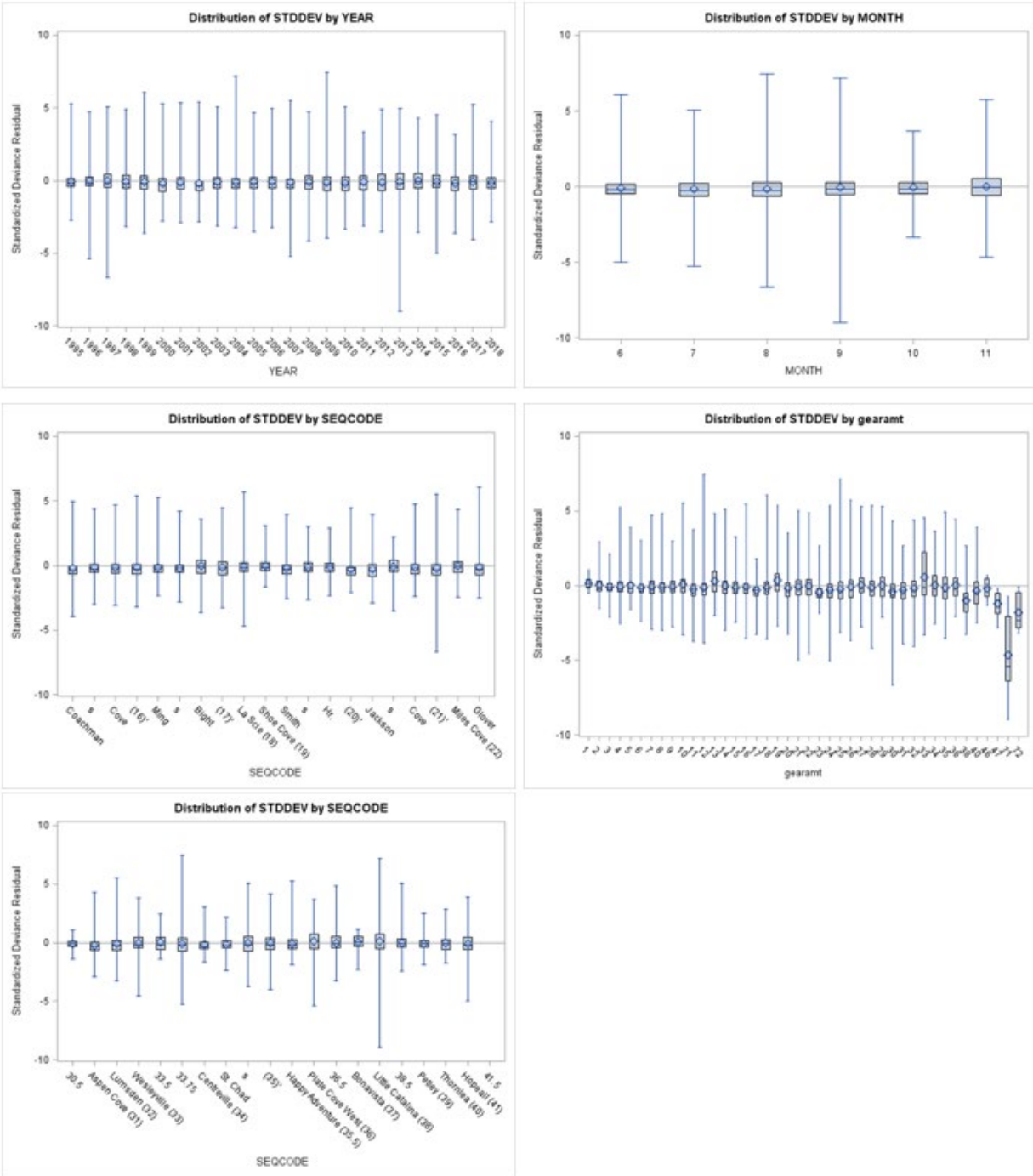


Figure 13. Deviance residuals ( $\pm 95\%$  CI) from the standardized catch rate model (experimental sites) for large mesh gillnet (5½ inch) in Divs. 2J3KL (Central area), 1995–2018. Panels show residuals plotted by Year, Month, Fishing Site (SEQCODE), and Fishing Effort (gearamt).

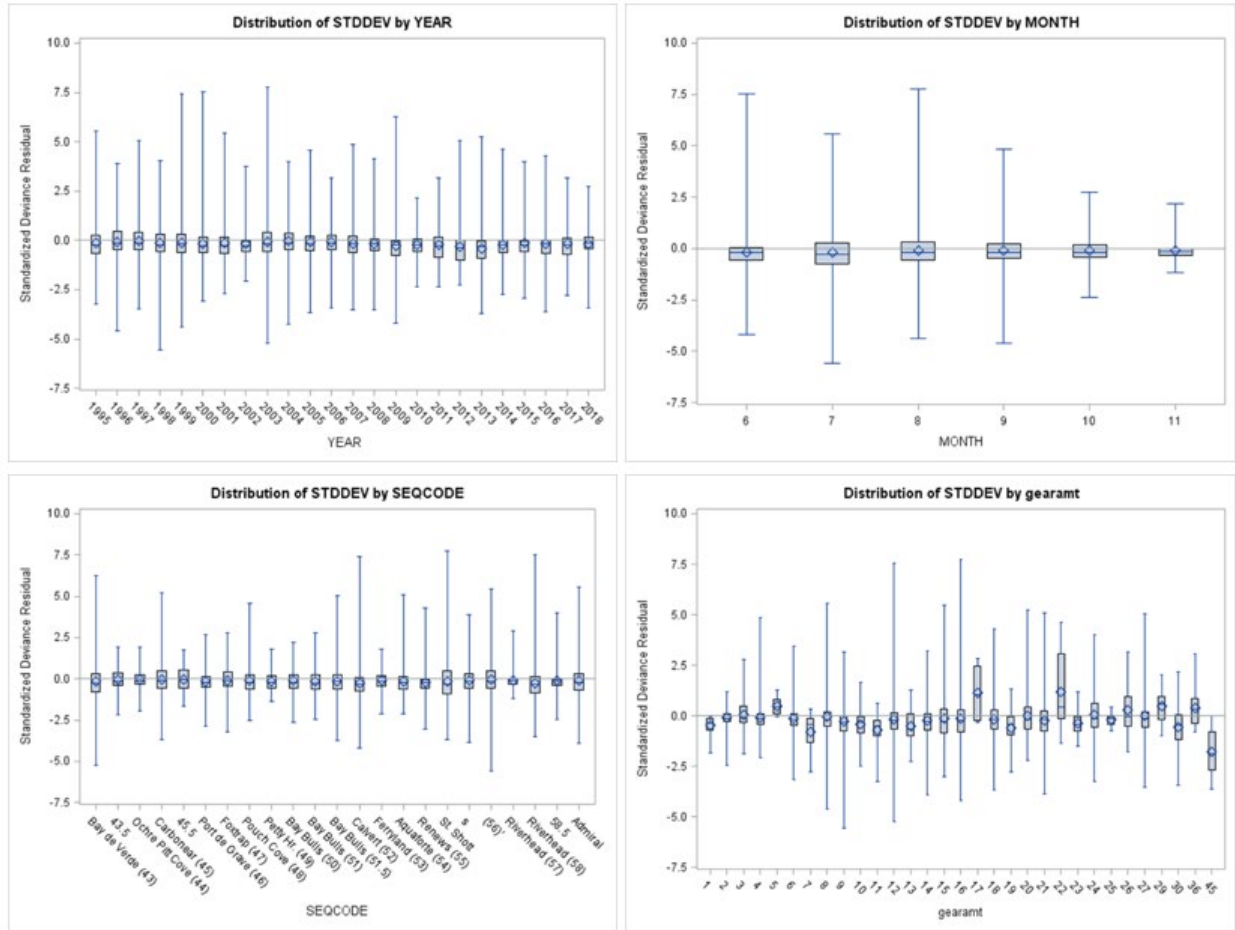


Figure 14. Deviance residuals (+/-95% CI) from the standardized catch rate model (control sites) for large mesh gillnet (5½ inch) in Divs. 2J3KL (Southern area), 1995–2018. Panels show residuals plotted by Year, Month, Fishing Site (SEQCODE), and Fishing Effort (gearamt).



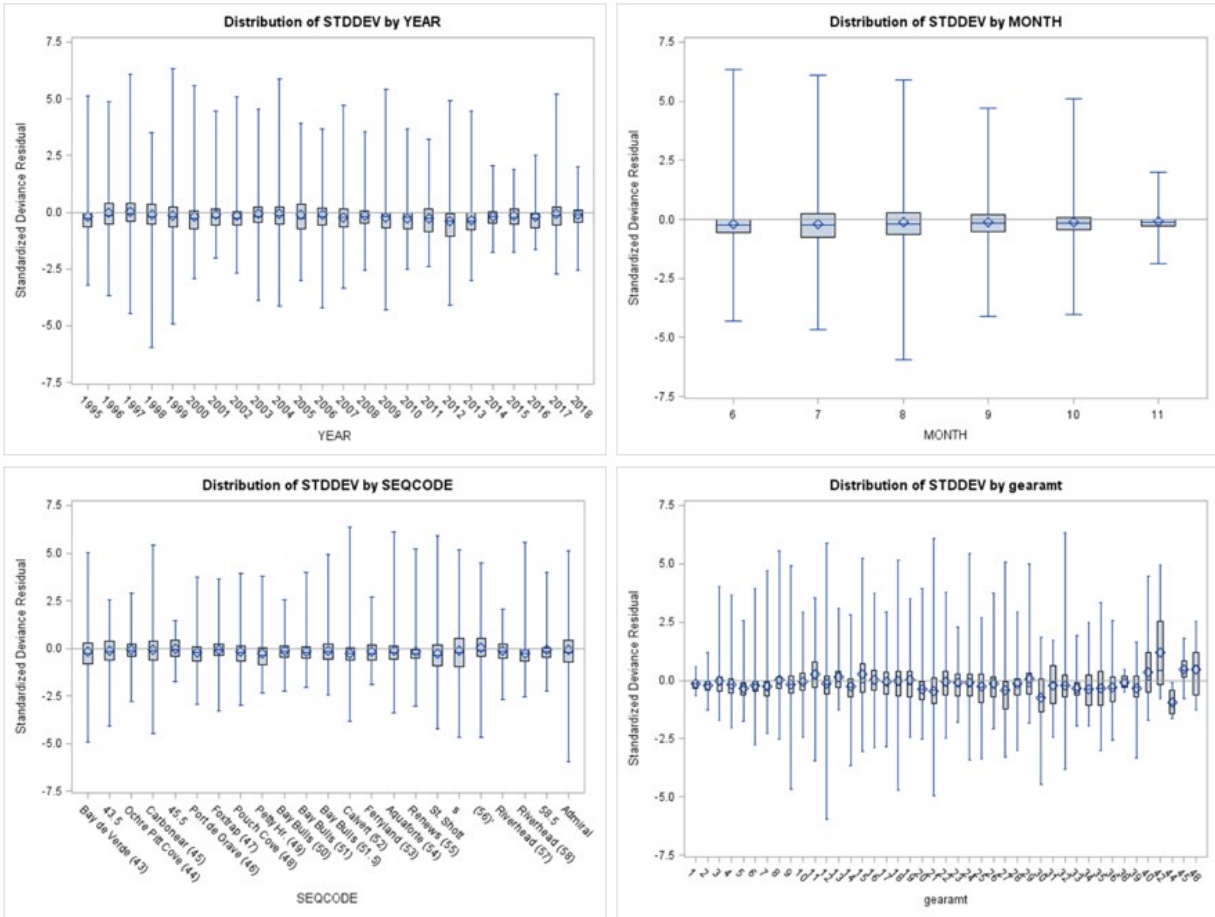


Figure 15. Deviance residuals (+/-95% CI) from the standardized catch rate model (experimental sites) for large mesh gillnet (5½ inch) in Divs. 2J3KL (Southern area), 1995–2018. Panels show residuals plotted by Year, Month, Fishing Site (SEQCODE), and Fishing Effort (gearamt).



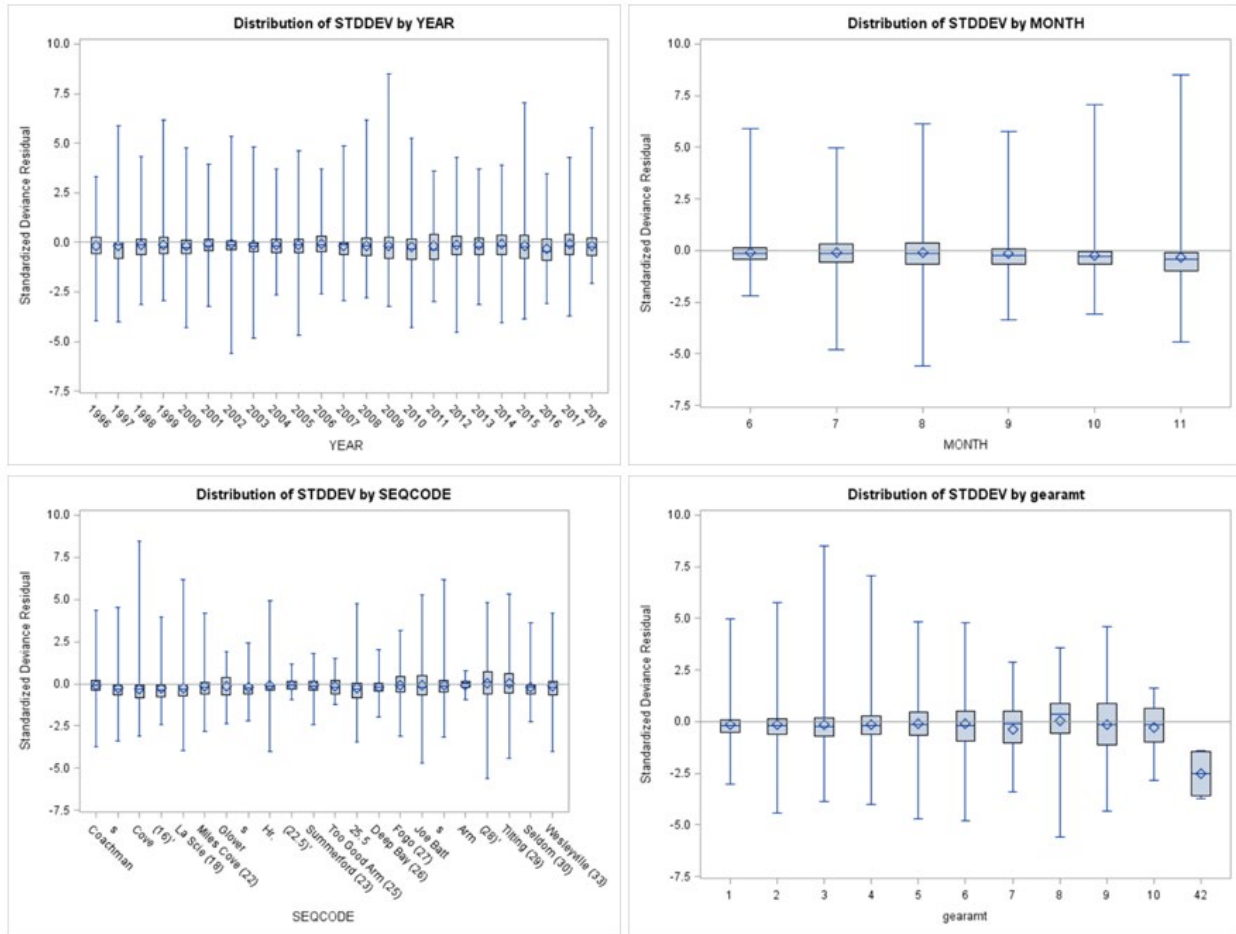


Figure 16. Deviance residuals (+/-95% CI) from the standardized catch rate model (experimental sites) for small mesh gillnet (3¼ inch) in Divs. 2J3KL (Central area), 1996–2018. Panels show residuals plotted by Year, Month, Fishing Site (SEQCODE), and Fishing Effort (gearamt).

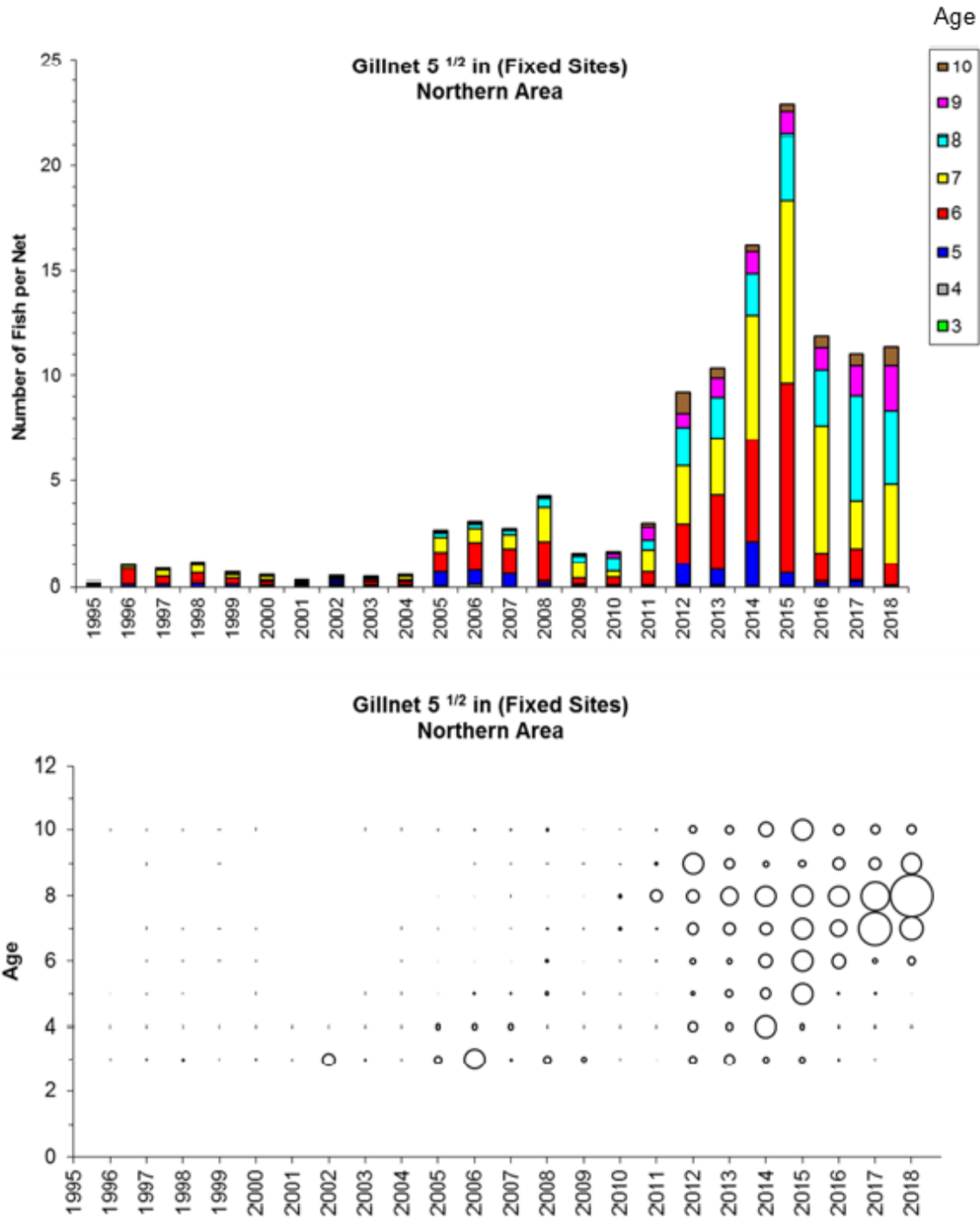


Figure 17. Standardized age-disaggregated catch rate of Atlantic Cod (top), and the proportions of Sentinel catch rate-at-age (bottom) for large mesh gillnet (5 1/2 inch), using data from Sentinel survey control sites in Divs. 2J3KL (Northern area), 1995–2018.

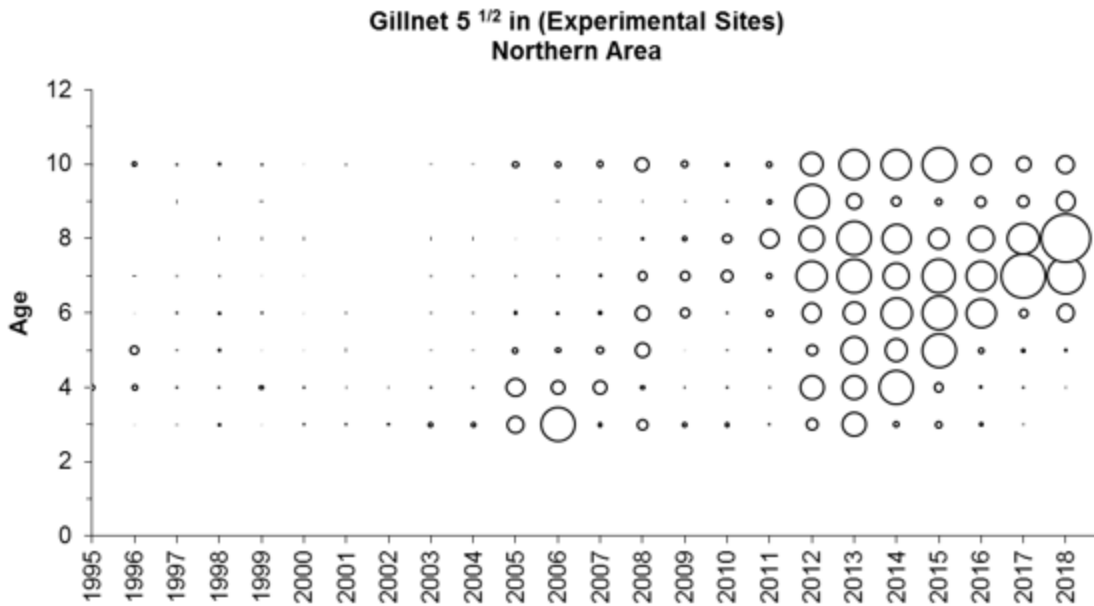
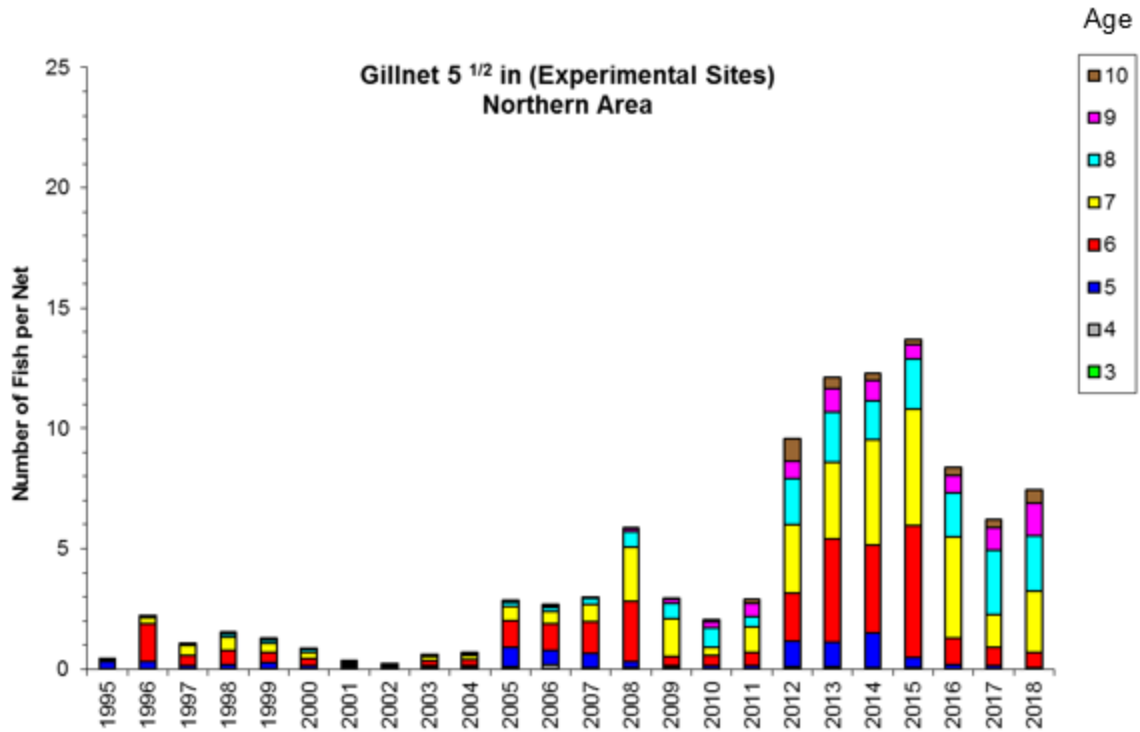


Figure 18. Standardized age-disaggregated catch rate of Atlantic Cod (top), and the proportions of Sentinel catch rate-at-age (bottom) for large mesh gillnet (5 1/2 inch), using data from Sentinel survey experimental sites in Divs. 2J3KL (Northern area), 1995–2018.

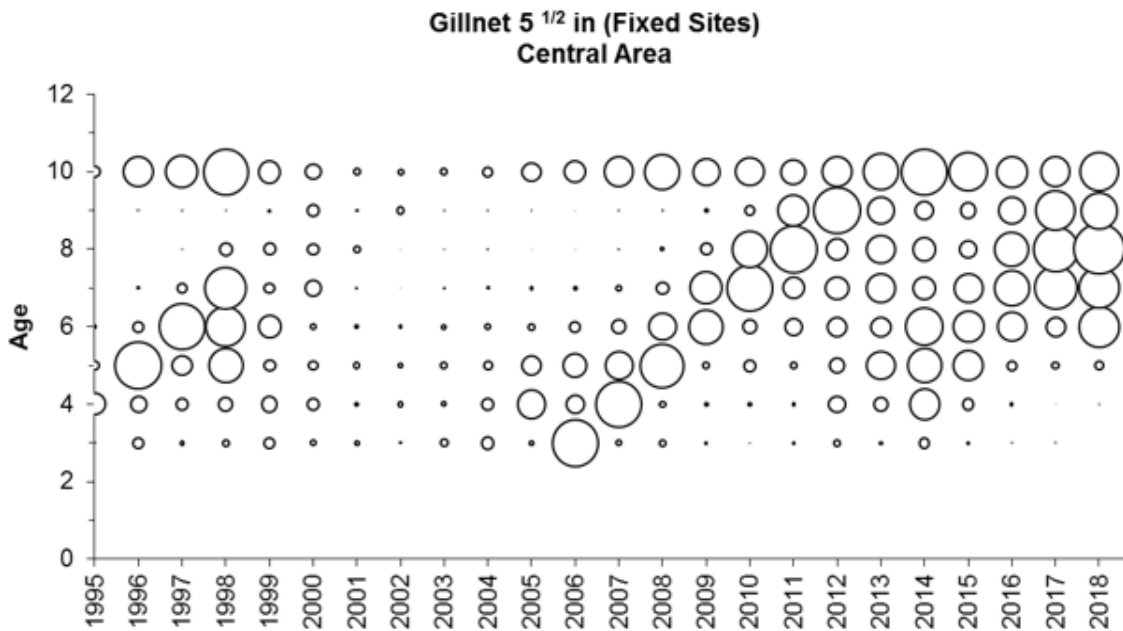
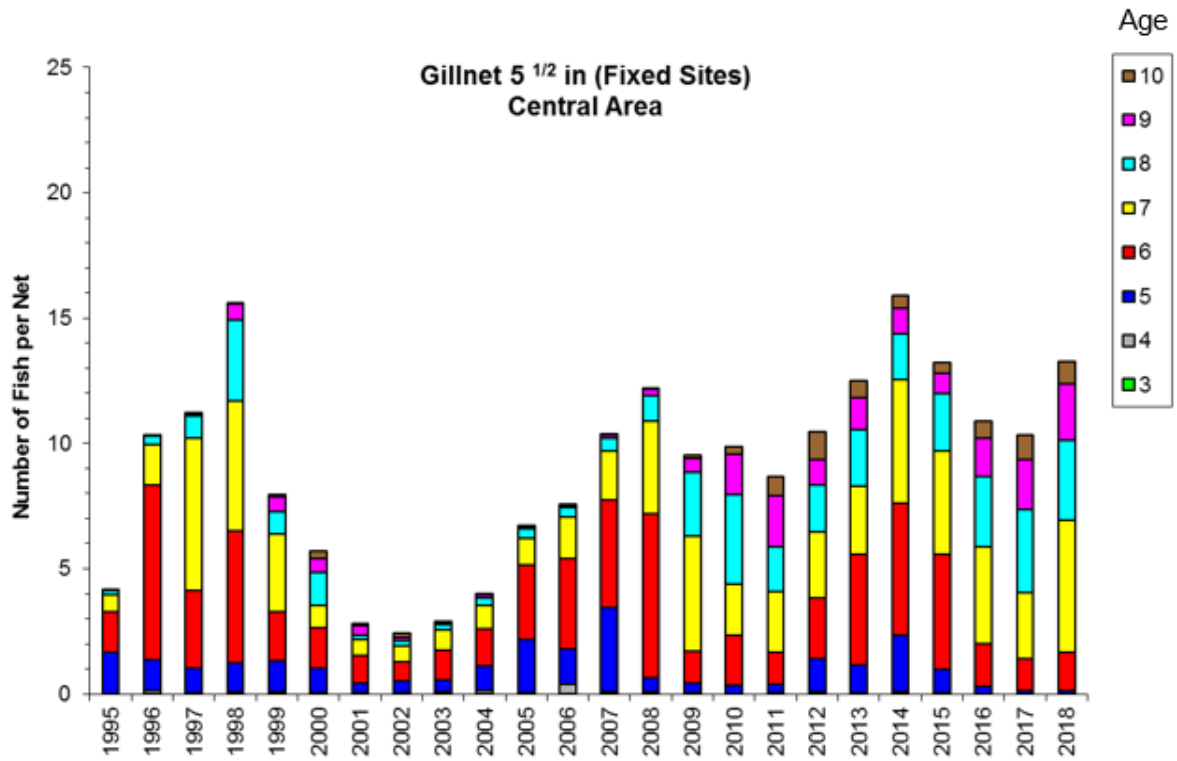


Figure 19. Standardized age-disaggregated catch rate of Atlantic Cod (top), and the proportions of Sentinel catch rate-at-age (bottom) for large mesh gillnet (5½ inch), using data from Sentinel survey control sites in Divs. 2J3KL (Central area), 1995–2018.

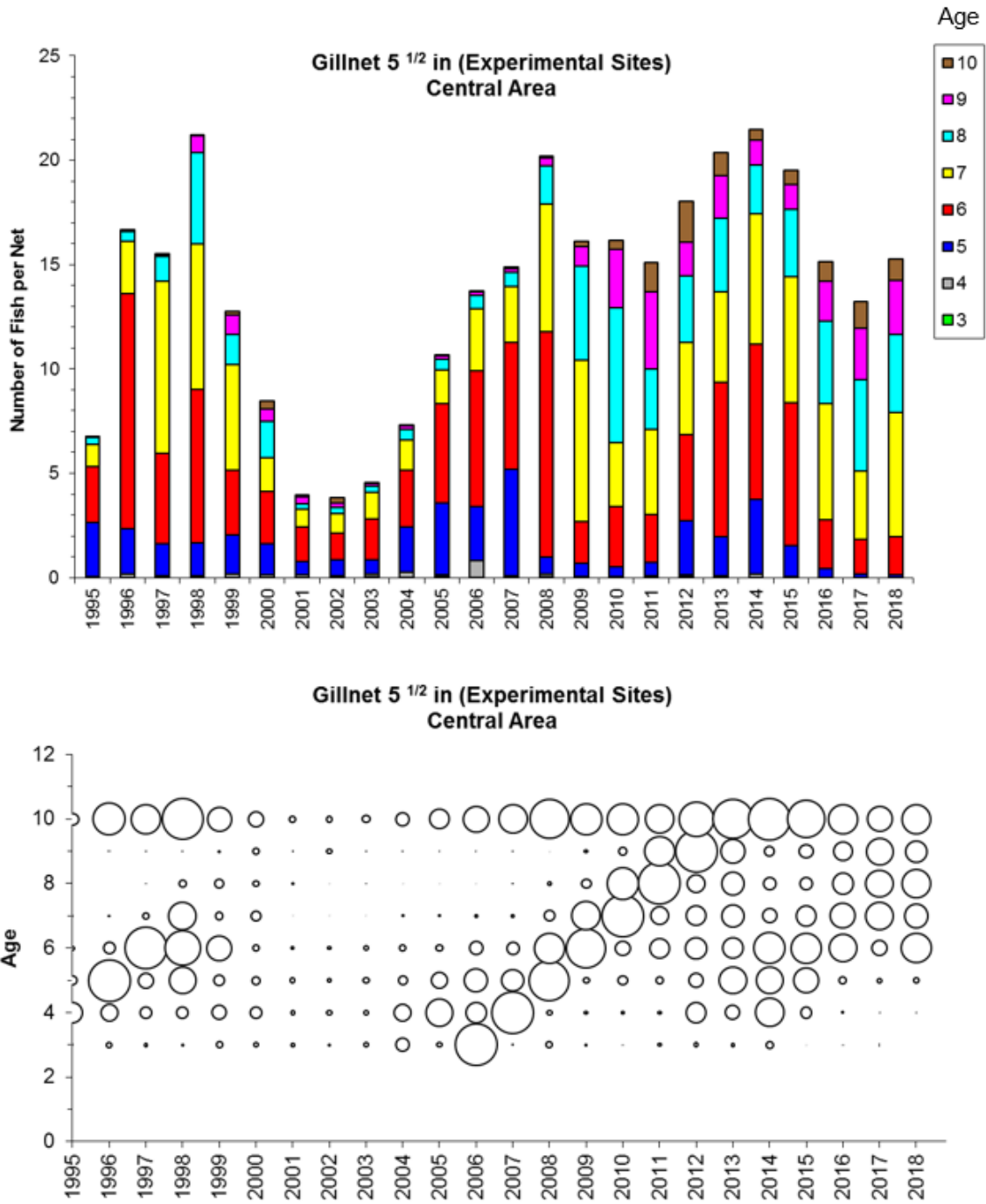


Figure 20. Standardized age-disaggregated catch rate of Atlantic Cod (top), and the proportions of Sentinel catch rate-at-age (bottom) for large mesh gillnet (5½ inch), using data from Sentinel survey experimental sites in Divs. 2J3KL (Central area), 1995–2018.

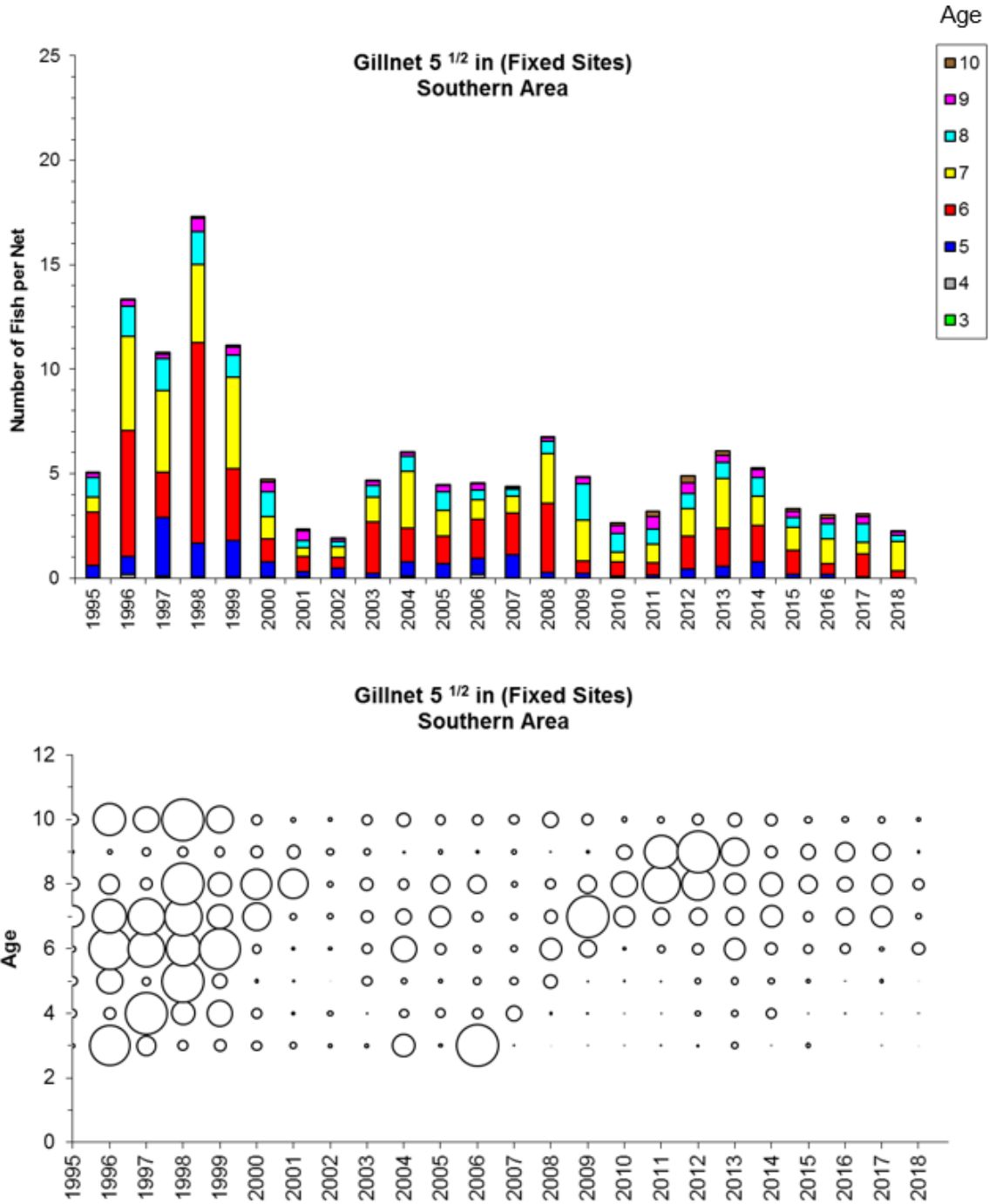


Figure 21. Standardized age-disaggregated catch rate of Atlantic Cod (top), and the proportions of Sentinel catch rate-at-age (bottom) for large mesh gillnet (5½ inch), using data from Sentinel survey control sites in Divs. 2J3KL (Southern area), 1995–2018.

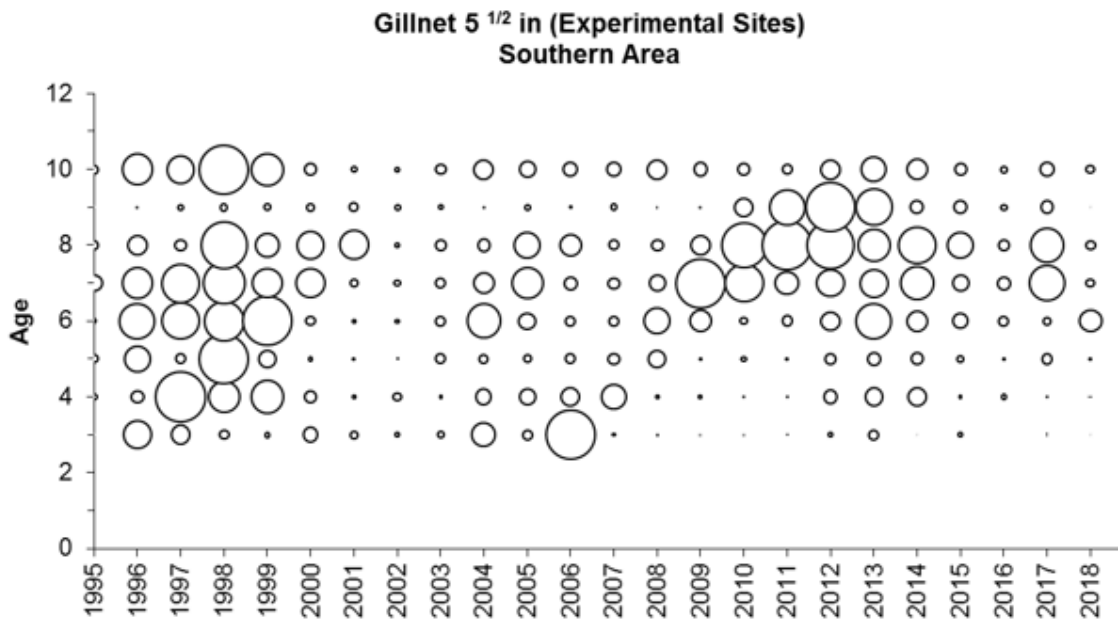
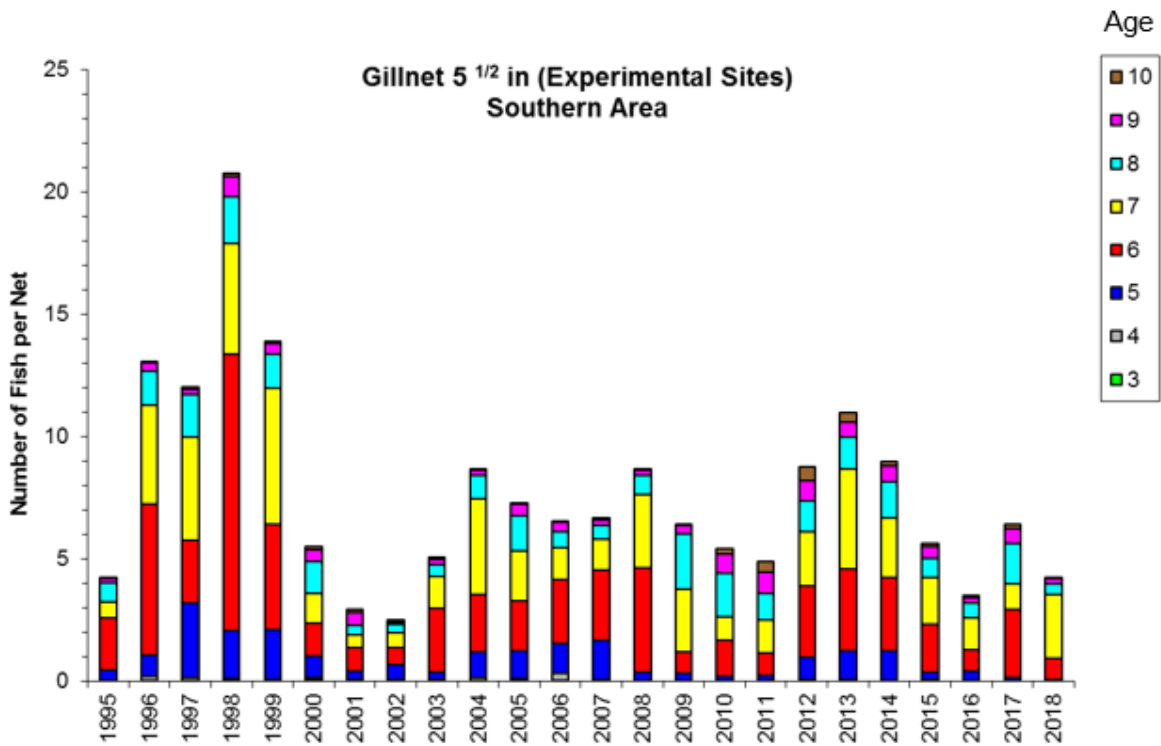


Figure 22. Standardized age-disaggregated catch rate of Atlantic Cod (top), and the proportions of Sentinel catch rate-at-age (bottom) for large mesh gillnet (5½ inch), using data from Sentinel survey experimental sites in Divs. 2J3KL (Southern area), 1995–2018.

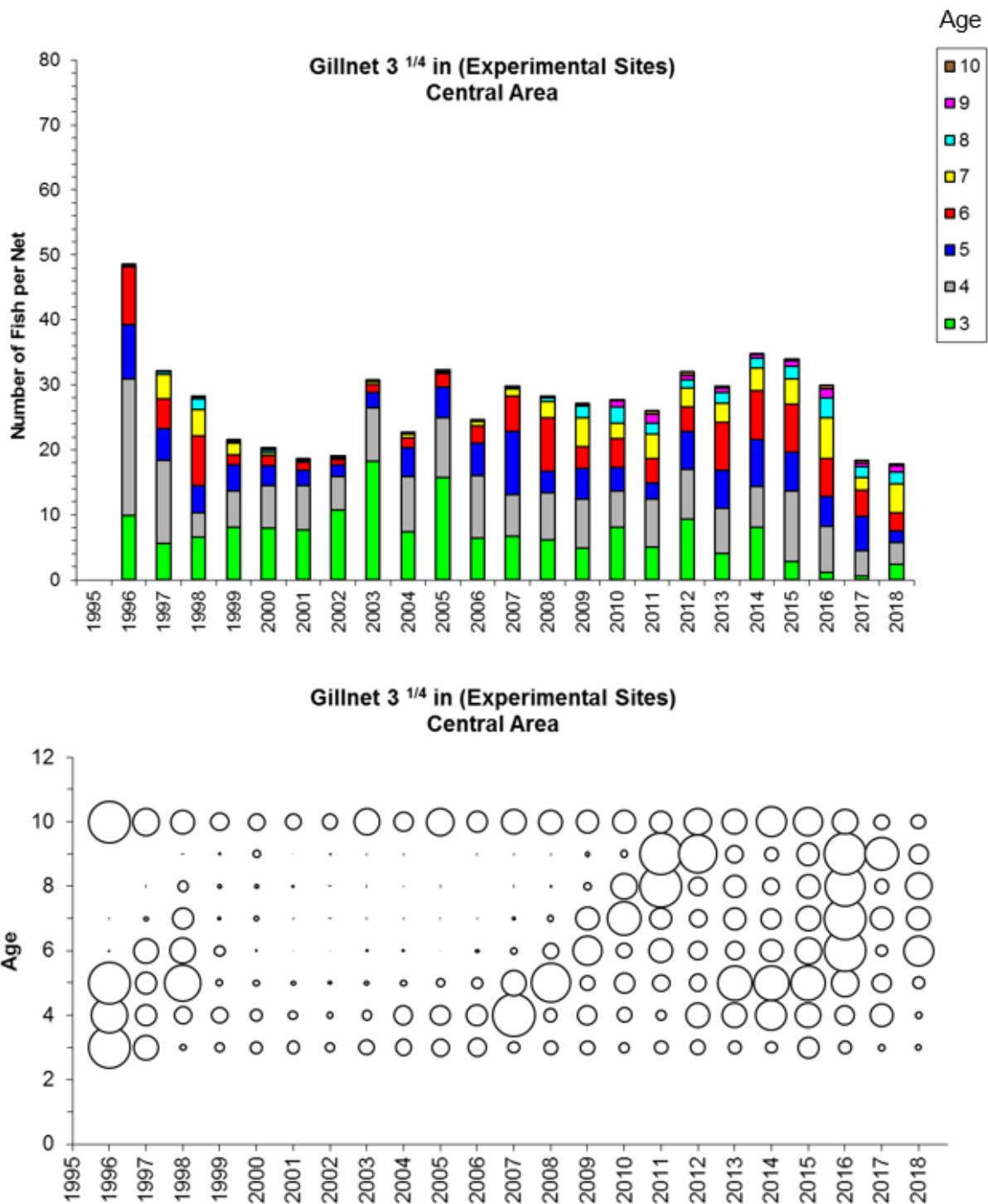


Figure 23. Standardized age-disaggregated catch rate of Atlantic Cod (top), and the proportions of Sentinel catch rate-at-age (bottom) for small mesh gillnet (3 1/4 inch), using data from Sentinel survey experimental sites in Divs. 2J3KL (Central area), 1996–2018.



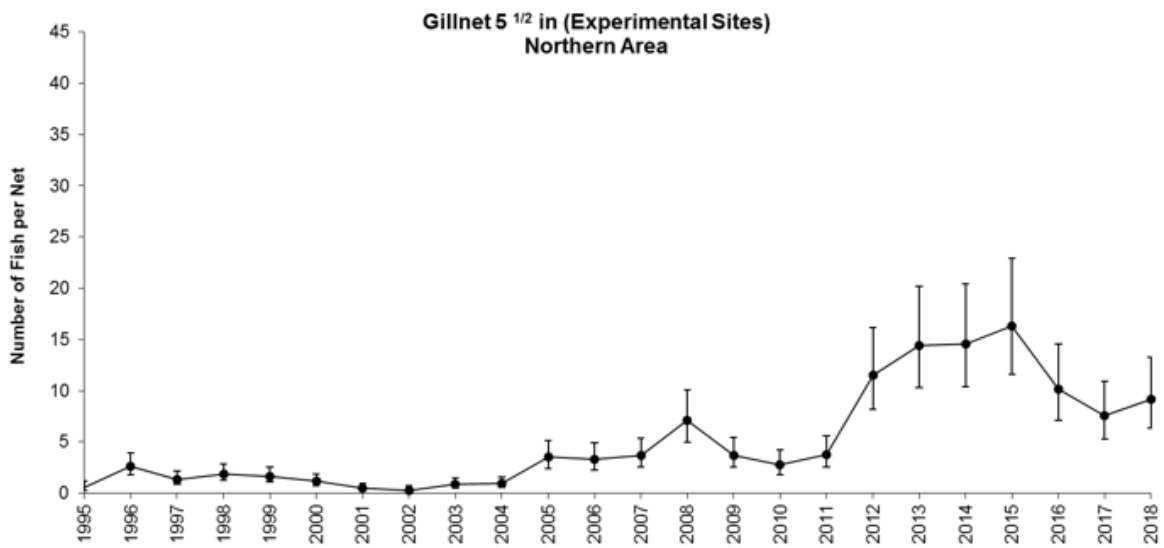
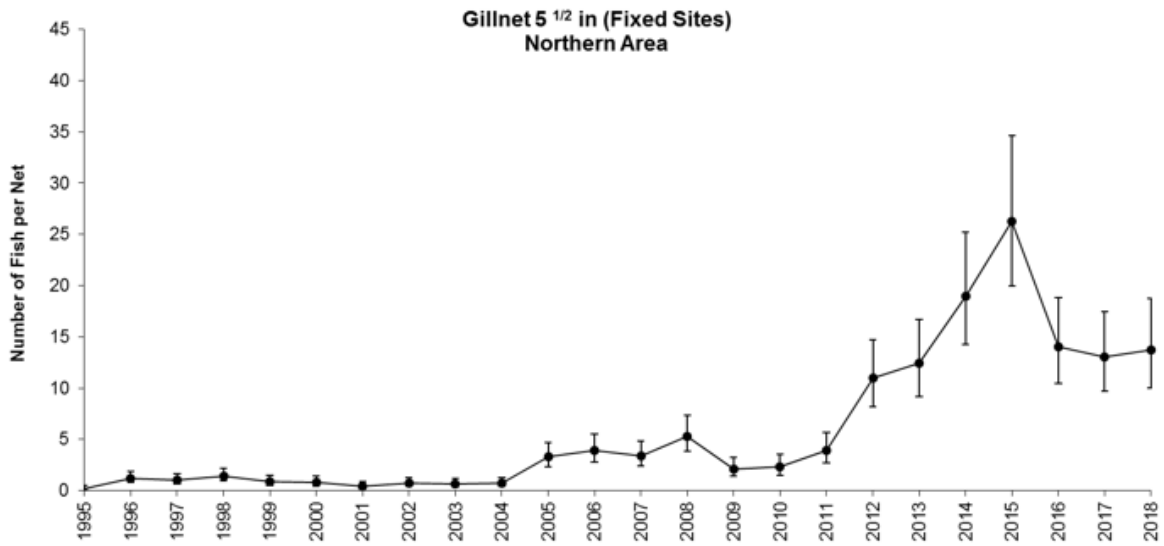


Figure 24. Standardized age-aggregated catch rate of Atlantic Cod ( $\pm$ 95% CI) for large mesh gillnet (5½ inch), using data from Sentinel survey control and experimental sites in Divs. 2J3KL (Northern area), 1995–2018.

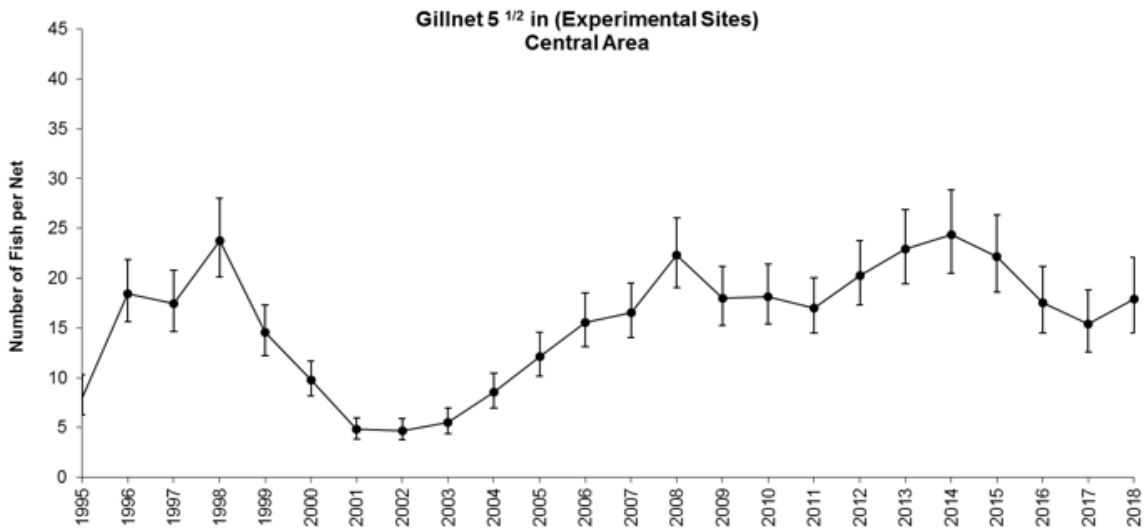
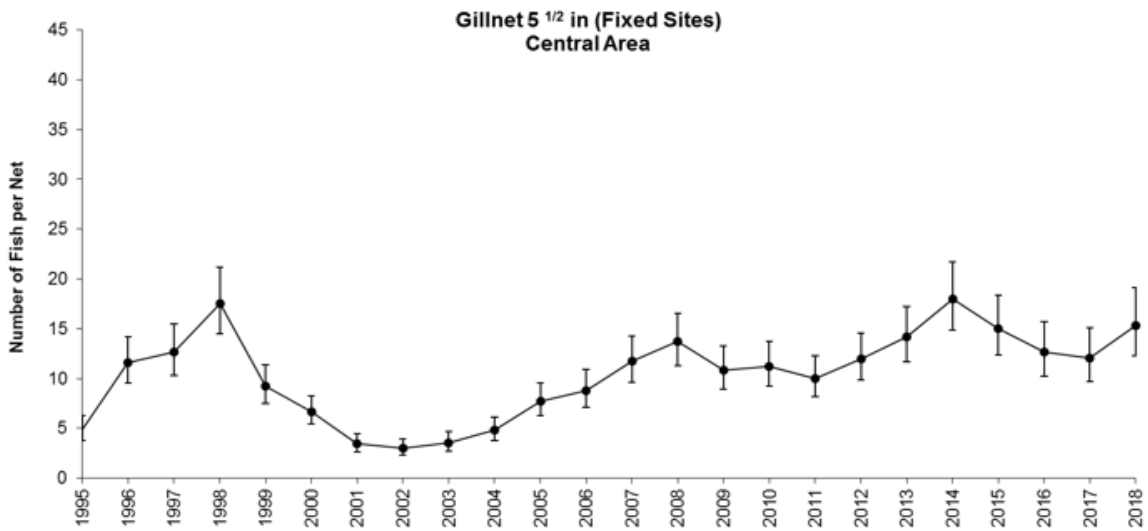


Figure 25. Standardized age-aggregated catch rate of Atlantic Cod (+/-95% CI) for large mesh gillnet (5½ inch), using data from Sentinel survey control and experimental sites in Divs. 2J3KL (Central area), 1995–2018.

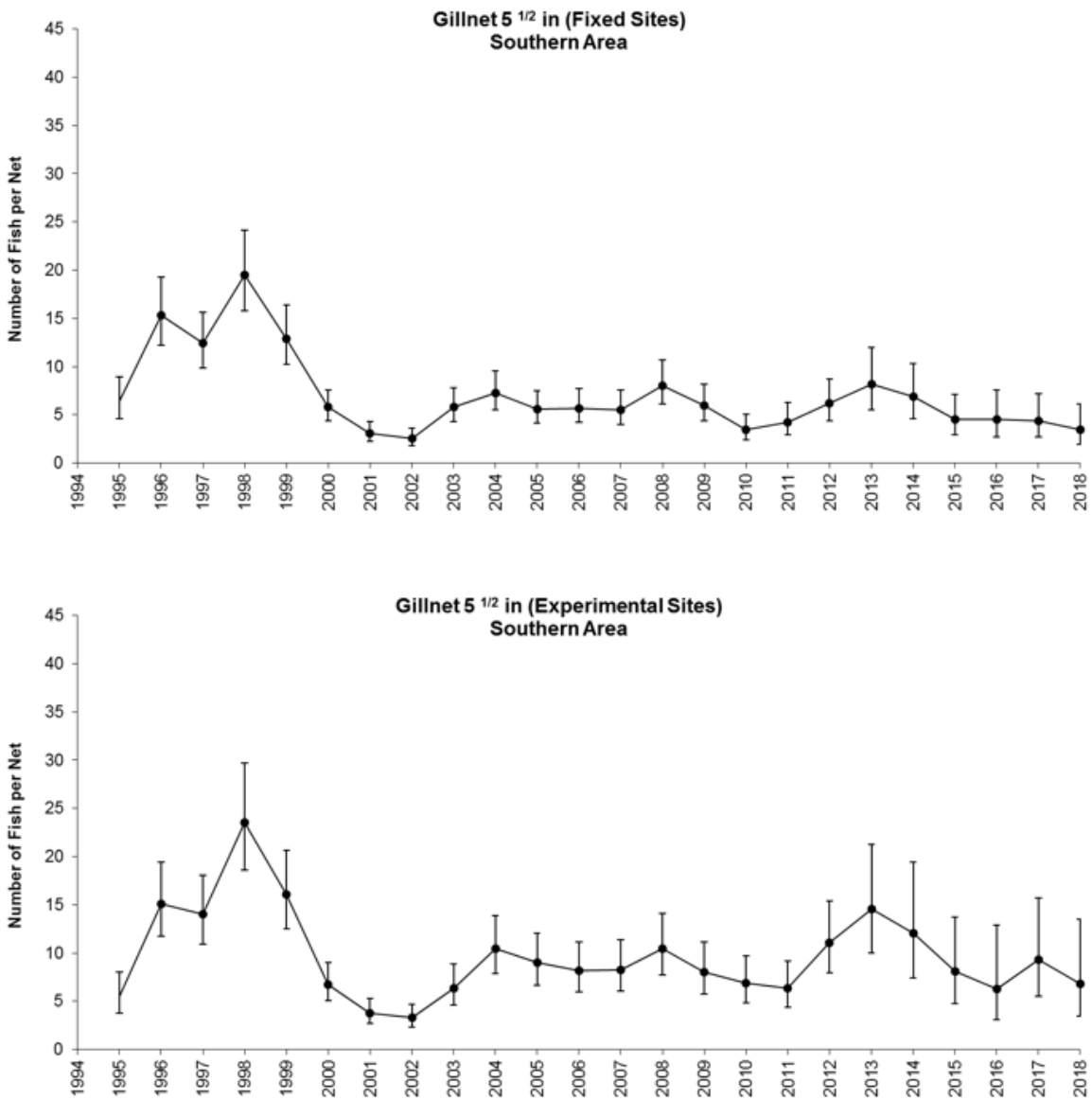


Figure 26. Standardized age-aggregated catch rate of Atlantic Cod (+/-95% CI) for large mesh gillnet (5 1/2 inch), using data from Sentinel survey control and experimental sites in Divs. 2J3KL (Southern area), 1995–2018.

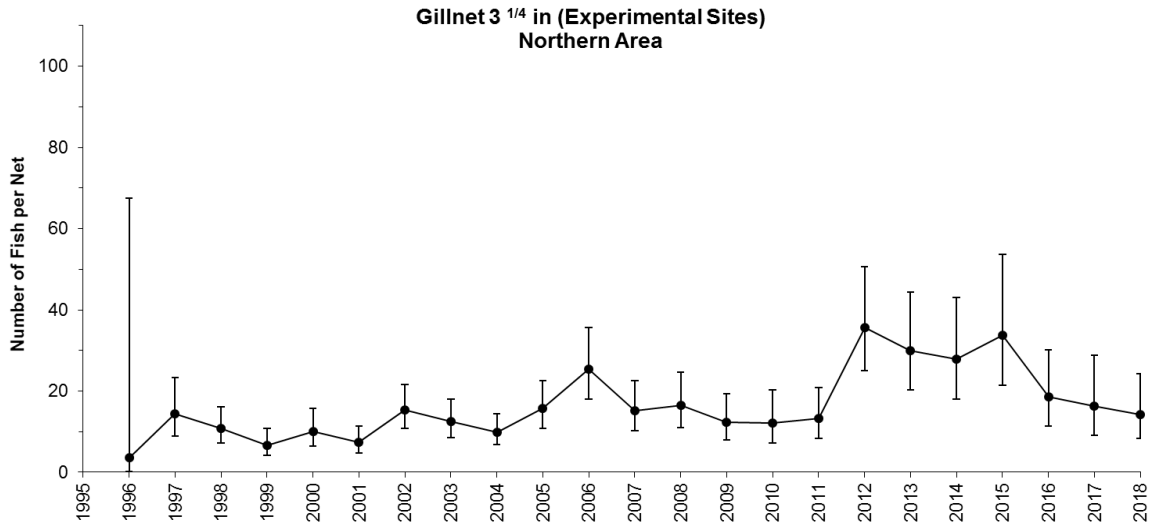


Figure 27. Standardized age-aggregated catch rate of Atlantic Cod (+/-95% CI) for small mesh gillnet (3¼ inch), using data from Sentinel survey experimental sites in Divs. 2J3KL (Northern area), 1996–2018.

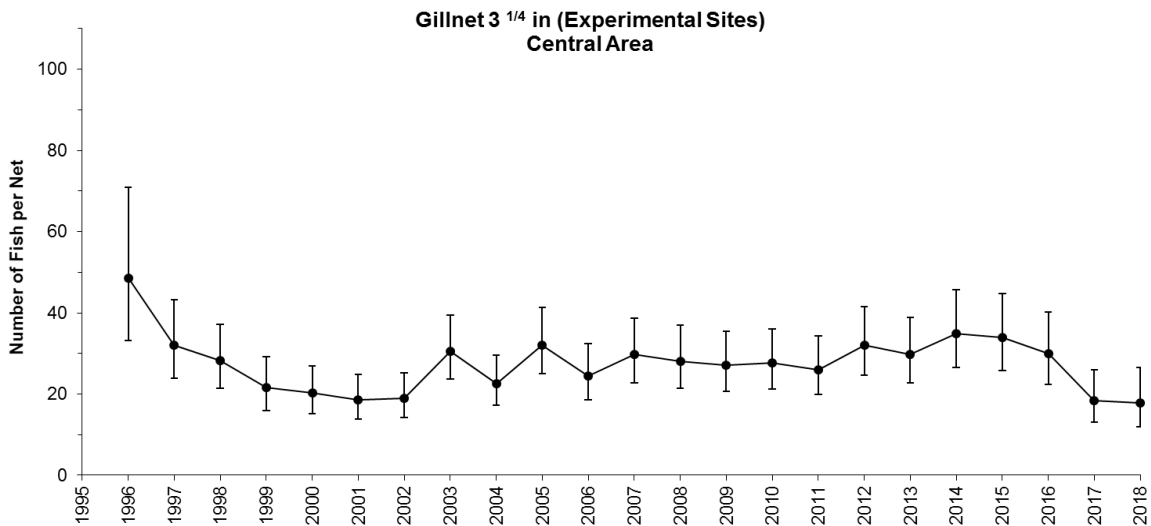


Figure 28. Standardized age-aggregated catch rate of Atlantic Cod (+/-95% CI) for small mesh gillnet (3¼ inch), using data from Sentinel survey experimental sites in Divs. 2J3KL (Central area), 1996–2018.

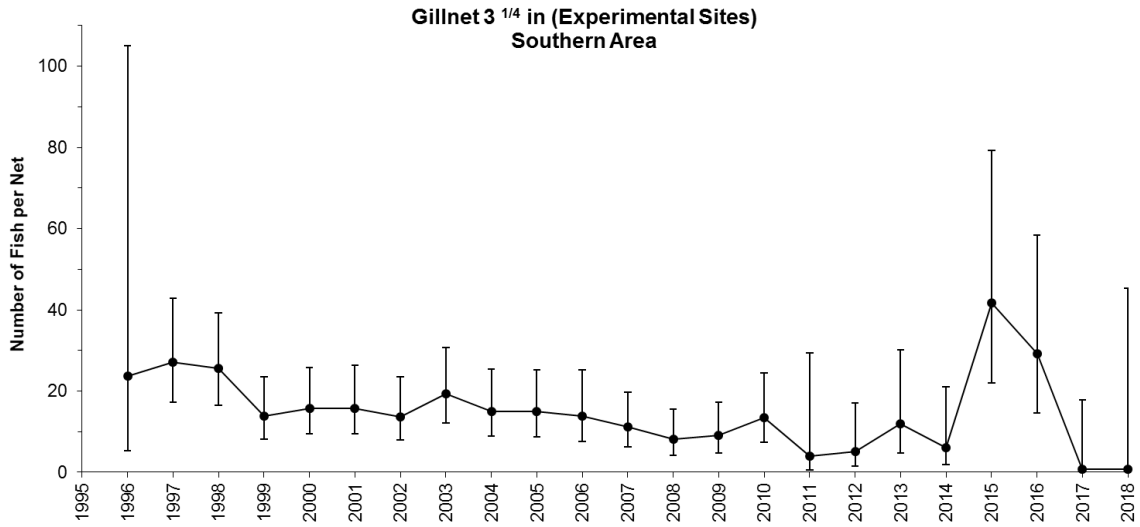


Figure 29. Standardized age-aggregated catch rate of Atlantic Cod ( $\pm 95\%$  CI) for small mesh gillnet (3 1/4 inch), using data from Sentinel survey experimental sites in Divs. 2J3KL (Southern area), 1996–2018.

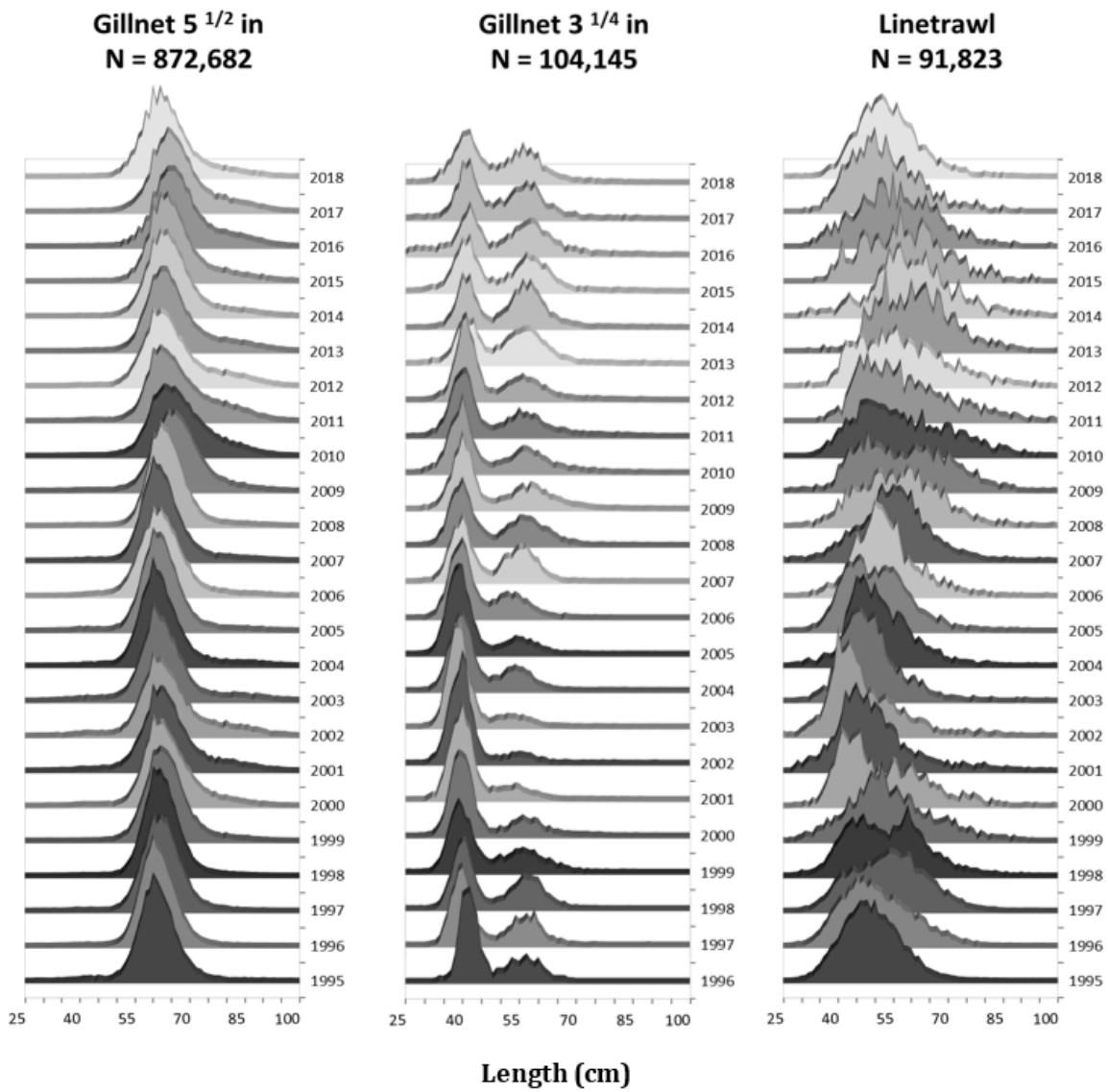


Figure 30. Length frequency distributions of Atlantic Cod (scaled to 1) by gear type from Sentinel surveys in Divs. 2J3KL (control and experimental sites combined), 1995–2018. N = number of fish measured.

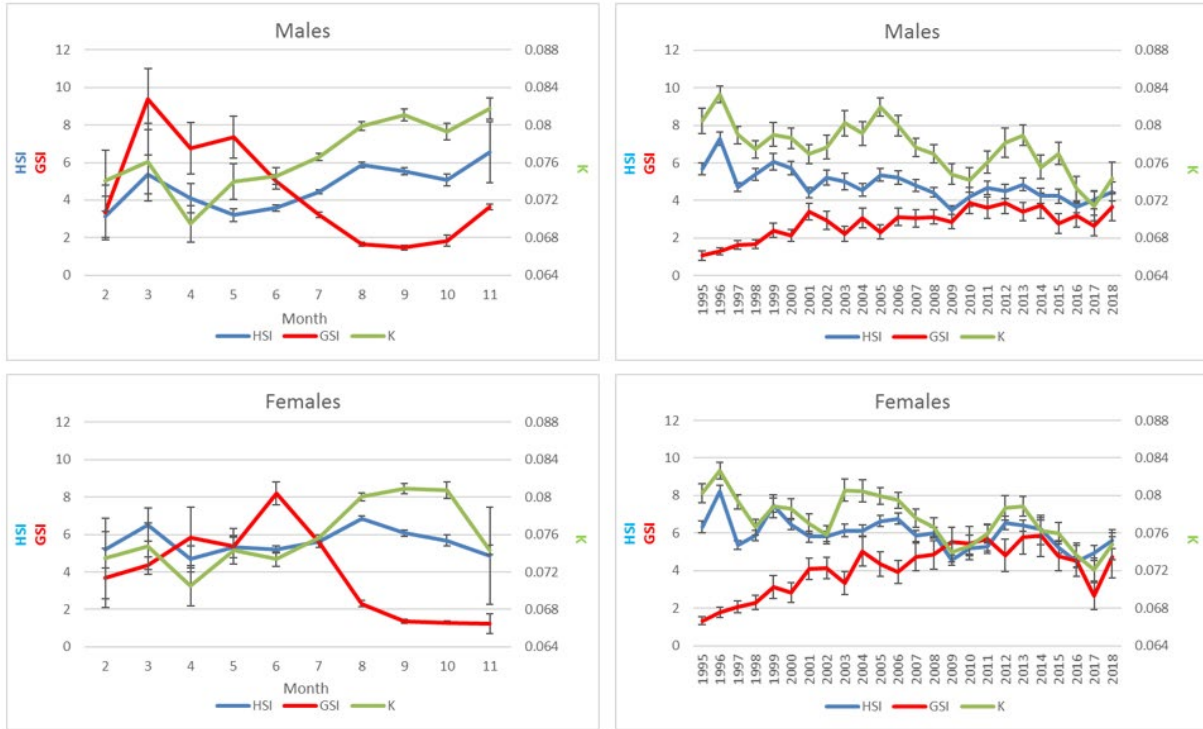


Figure 31. Temporal changes in mean Fulton's *K* condition factor ( $N=9,382$  fish), mean Hepatosomatic Index (HSI;  $N=9,324$  fish), and mean Gonadosomatic Index (GSI;  $N=9,334$  fish) by sex for Atlantic Cod (all sizes combined) from Sentinel surveys in Divs. 2J3KL, 1995–2018. T-bars represent  $\pm 95\%$  CI.

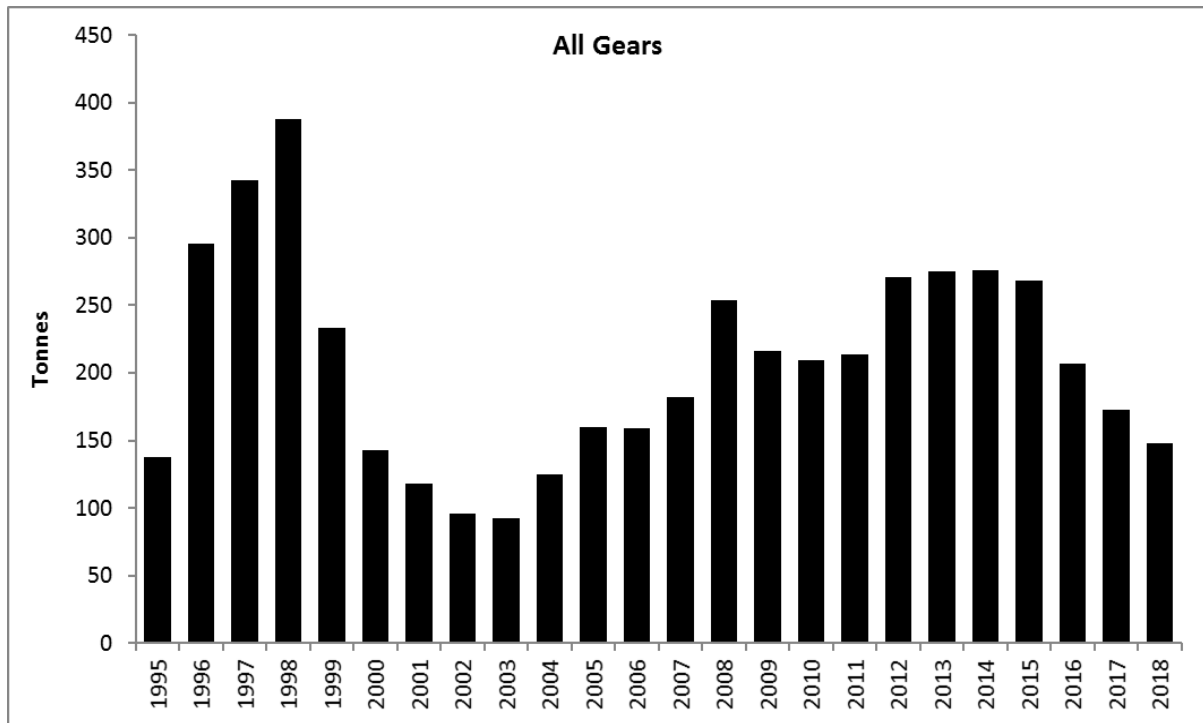


Figure 32. Total annual removal of Atlantic Cod from Sentinel surveys (control and experimental sites combined) in Divs. 2J3KL, 1995–2018.

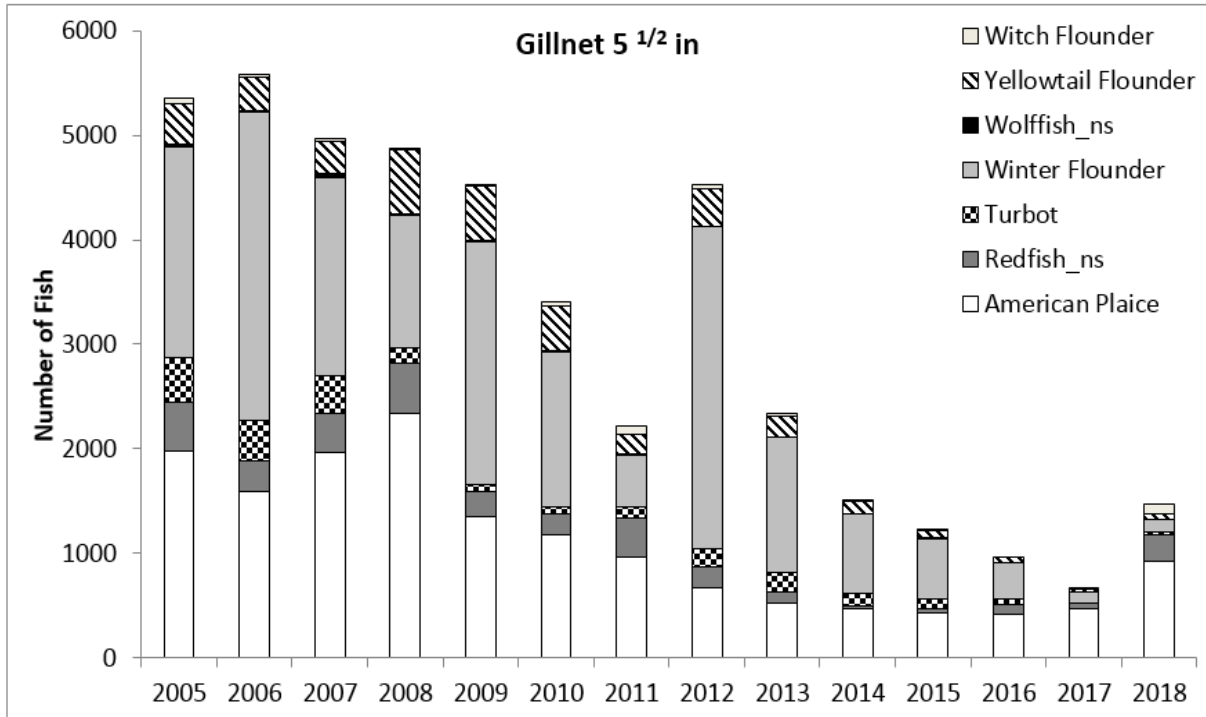


Figure 33. Total annual number of fish per bycatch species from Sentinel surveys (control and experimental sites) in Divs. 2J3KL, 2005–18.