2020 MARITIMES WINTER RESEARCH VESSEL SURVEY TRENDS ON GEORGES BANK

Context

Fisheries and Oceans Canada (DFO) has conducted winter Research Vessel (RV) surveys in the Maritimes Region, Northwest Atlantic Fisheries Organization (NAFO) Area 5Z (Georges Bank), using a standardized protocol, since 1987. Results from these surveys provide information on trends in abundance for groundfish species in the Maritimes Region for ecosystem monitoring. While these data reflect trends in biomass and abundance, and are a critical part of science-based stock assessments, a full assessment, including other sources of data, would be required to evaluate the impacts of management measures on population status.

The 2020 Winter RV Survey was conducted on the CCGS *Teleost.* Fisheries and Aquaculture Management (FAM) requested a review of the DFO Winter RV Survey information on the following species in Strata 5Z1–5Z4: Cod, Haddock, Pollock, Yellowtail Flounder, Smooth Skate, Thorny Skate, Barndoor Skate, Winter Skate, Little Skate, Longhorn Sculpin, Ocean Pout, and American Lobster. The survey information will be used by FAM as background for discussions with various industry stakeholders on recommendations for management measures, and to determine which stocks should be reviewed in more detail in 2021.

This Science Response Report results from the Science Response Process of May 21, 2020, on the Maritimes Research Vessel Survey Trends on Georges Bank.

Additional publications from this meeting will be posted on the DFO Science Advisory Schedule as they become available. (if applicable)

Background

The Winter RV Survey has covered a standard set of strata on Georges Bank (5Z) annually, since 1987. The survey follows a stratified random sampling design and includes sampling of fish and invertebrates using a bottom otter trawl. These surveys are the primary data source for monitoring trends in species distribution, abundance, and biological condition on Georges Bank (for details see Stone and Gross 2012).

This survey was initially designed to provide abundance trends for fish and invertebrates between depths of about 30 m and 200 m — the depth range found in Strata 5Z1–5Z8 (Figure 1). Stratum 5Z9 covers the deeper water of the Fundian Channel and has been sampled annually since 2010. Sampling is generally conducted between mid-February and late March with 103 stations allocated within Strata 5Z1–5Z9. Coverage of 5Z5–5Z8 has been irregular in recent years due to vessel mechanical issues and poor weather; however, the survey has covered 5Z1–5Z4 in all years. Survey indices are expected to be proportional to abundance for species that are found primarily in the shallower water over Georges Bank, but they may not be useful for species that primarily inhabit depths greater than 200 m in the winter.

Sampling in the winter survey was undertaken in 4X strata in the late 1970s and early 1980s. These strata have been sampled periodically in the past decade, when time allowed. Inclusion

of this broader sampling area is useful in understanding the distribution and abundance of deeper-water fish, as the shallow water over Georges Bank is outside their prime habitat.

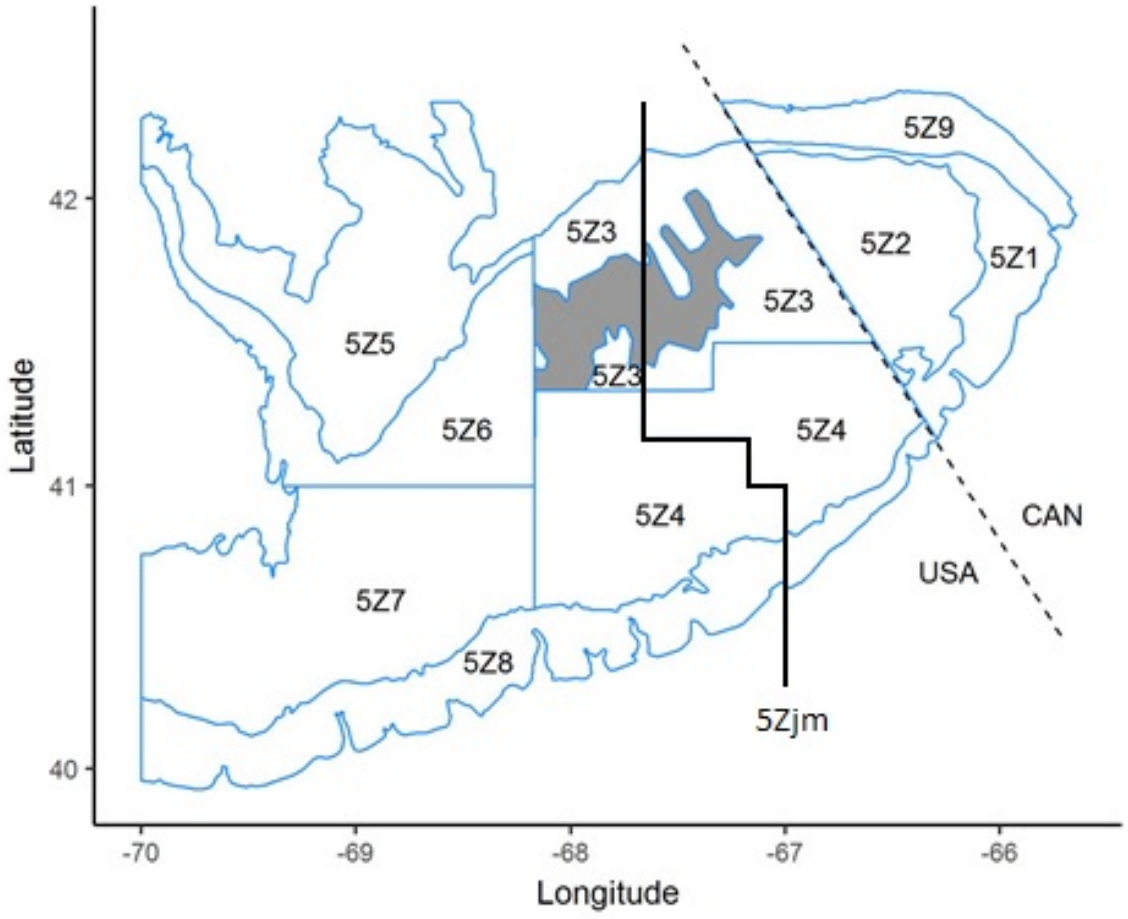

Figure 1. Winter RV Survey strata in 5Z. No sets are made in the shoals of Georges Bank (grey shaded area in 5Z3). The line bisecting 5Z3 and 5Z4 is the 5Zjm line, which is used for management of some species.

Analysis and Response

The 2020 Winter RV Survey successfully completed 65 tows in 5Z and 44 tows in 4X between February 29 and March 19, 2020. The start of the survey was delayed due to mechanical issues with the CCGS *Alfred Needler* and ended early, in response to the COVID-19 pandemic. All sets were conducted by the CCGS *Teleost*. Catch distribution plots are provided for each species. Biomass index trends are shown for 5Z1–5Z4. Comparisons of 2019 and 2020 length frequencies (total abundance-at-length) from the survey catch in 5Z1–5Z4 to the long-term median (1987–2018) are also included for the selected stocks.

The time series of survey biomass indices and the 3-year Geometric Mean (GM) are compared to 40% and 80% of the long-term GM (hereafter referred to as 40% GM and 80% GM, respectively) to provide context for biomass levels. The GM was selected for these comparisons

to reduce the impact of very high values observed in some years. The values are presented in Table 1. Information on the calculation of these indices is contained in Stone and Gross (2012).

For species that in winter are normally found in water deeper than is found in 5Z1–5Z4 on Georges Bank, inclusion of a broader area may be needed to provide indices that are useful for monitoring abundance trends. The 3-yr GM of biomass indices in Strata 5Z1–5Z4 + 5Z9, which includes the adjacent Fundian Channel stratum where depths range from 183 m to 370 m, is included as an illustration of this.

Summaries of Winter Skate data presented here exclude all individuals smaller than 40 cm from earlier years, as fish in this length range likely included a mix of Little Skate and Winter Skate.

Table 1. Winter RV Survey biomass indices (tonnes) by species for 2018, 2019, and 2020, and 40% and 80% of the long-term (1987–2019) geometric mean. No time period averages were provided for mixed Little Skate and Winter Skate because sampling began in 2014 (NA).

Species	2018	2019	2020	Current 3-yr GM	40% long-term GM	80% long-term GM
Cod	7,990	4,271	4,207	5,236	4,843	9,687
Haddock	198,942	96,907	33,258	86,230	21,962	43,924
Pollock	757	170	465	391	547	1,094
Yellowtail	252	57	125	121	1,400	2,799
Smooth Skate	11	3	15	8	2	4
Thorny Skate	67	1	0	4	32	64
Barndoor Skate	345	28	17	55	35	71
Winter Skate	4,621	5,369	3,002	4,208	4,067	8,134
Little Skate	5,923	2,547	1,586	2,881	2,421	4,842
Mixed Winter/Little Skate	1,491	1,866	1,014	1,413	NA	NA
Longhorn Sculpin	1,331	365	1,988	989	1,467	2,934
Ocean Pout	5	8	20	10	142	285
Lobster	3,307	3,932	2,665	3,260	148	298

Atlantic Cod

Atlantic Cod catches were concentrated on the northeast portion of Georges Bank in 5Z2 (Figure 2a). The 2020 survey biomass index was below 40% GM (Figure 2b). The 3-yr GM does not differ greatly with, or without, the inclusion of 5Z9 and remains between 40% GM and 80% GM. The abundance indices for 5Z1–5Z4 in 2020 were generally higher than in 2019. Abundance-at-length indices were generally above the long-term median of <53 cm but remained low at larger sizes (Figure 2c).

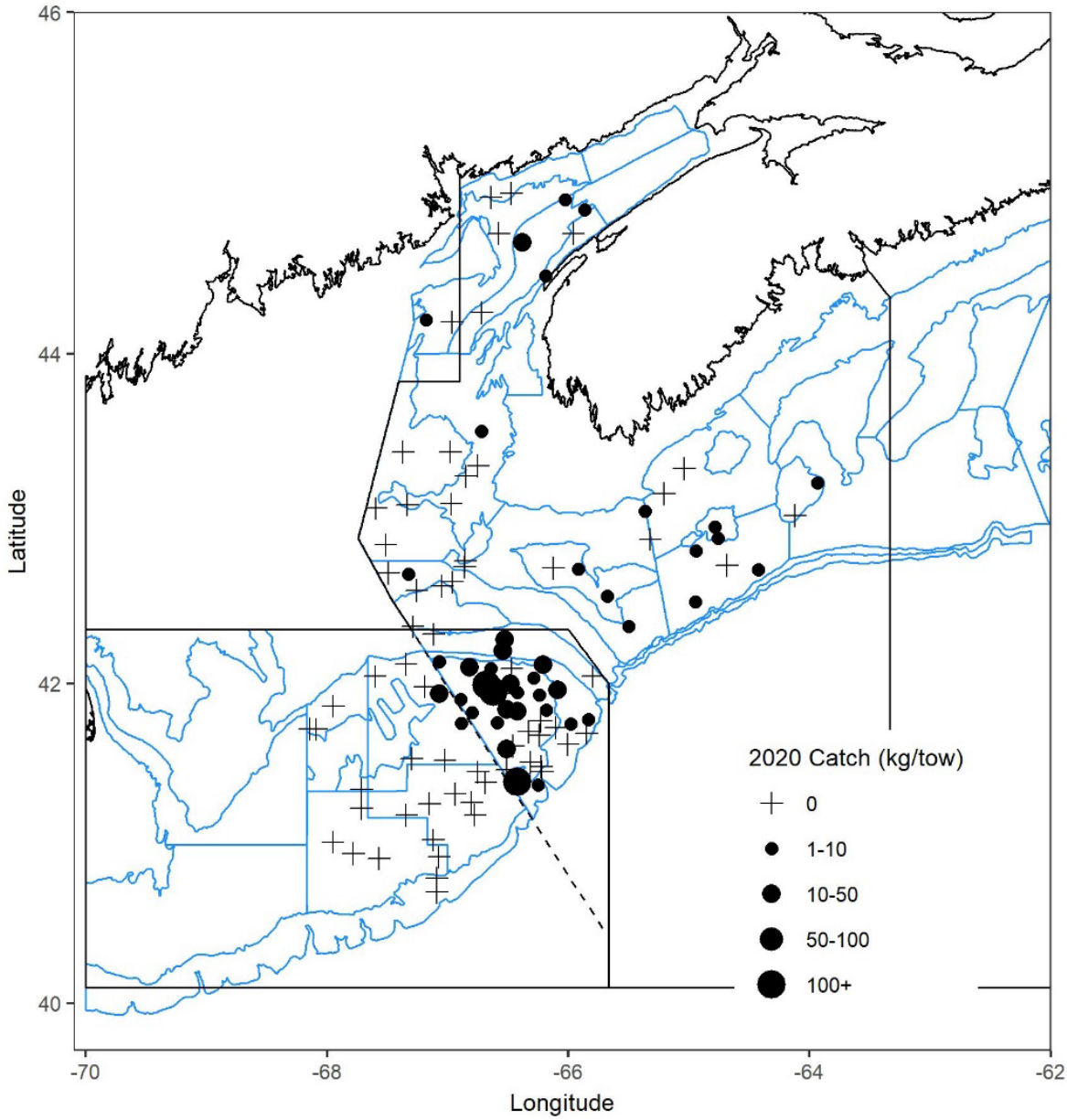

Figure 2a. Distribution of Atlantic Cod catches during the 2020 Winter RV Survey. Black circles represent catches. The circle area is proportional to the 2020 catch size. Zero catch is represented by the + symbol.

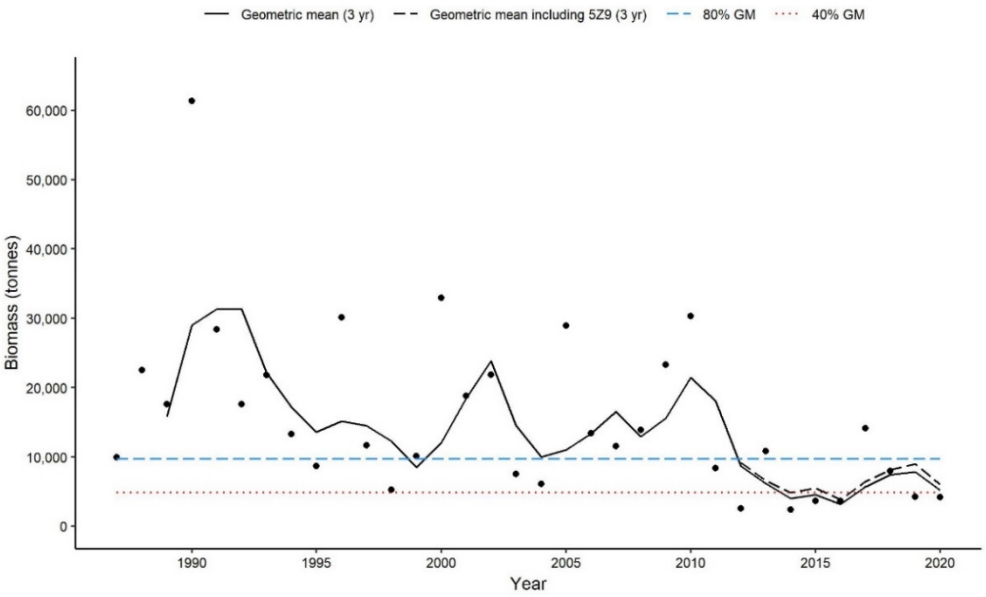

Figure 2b. Biomass index for Atlantic Cod in Strata 5Z1–5Z4 from the Winter RV Survey. The 3-yr geometric mean biomass for 5Z1–5Z4 is represented by the solid black line. The dashed black line represents the combined 3-yr geometric mean biomass (since 2010) of 5Z1–5Z4 and 5Z9. The dashed and dotted horizontal lines represent 80% and 40% of the long-term geometric mean (1987–2019), respectively. The large black dots represent the biomass estimate (5Z1–5Z4) for that year.

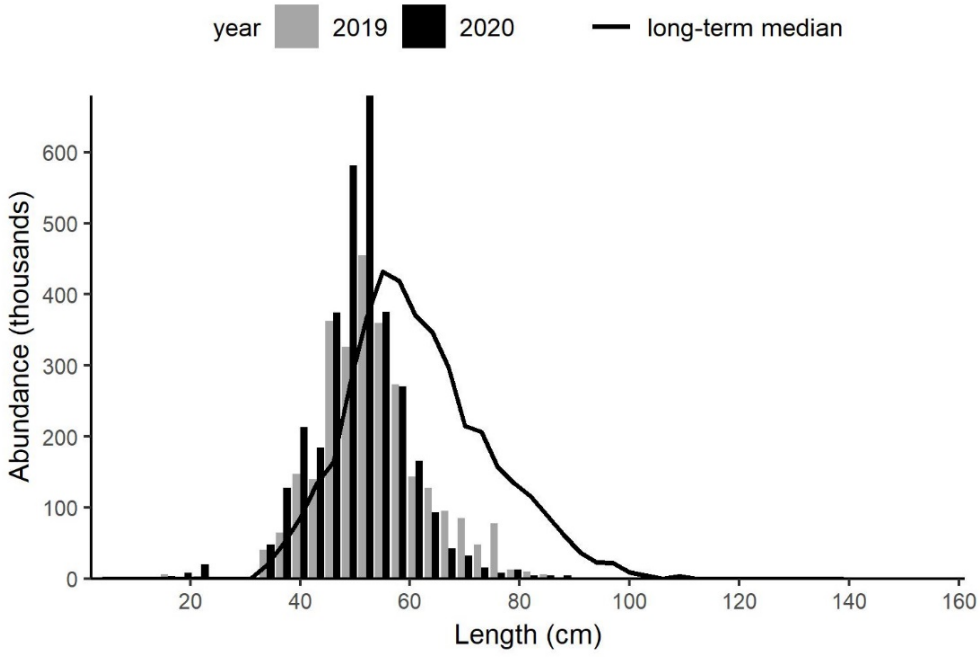

Figure 2c. Length-frequency indices for Atlantic Cod in Strata 5Z1–5Z4 from the Winter RV Survey. The grey bars represent the number-at-length from the 2019 survey. The black bars represent the number-at-length from the 2020 survey. The solid black line represents the median number-at-length for the time period 1987–2018.

Haddock

Haddock were present in over 88% of sets in 2020 (Figure 3a); however, the biomass index for 5Z1–5Z4 in 2020 decreased to the lowest level since 1999. The 3-yr GM remained well above 80% GM (Figure 3b) due to the high indices in the previous two years. The 3-yr GM with 5Z9 is virtually identical to the 3-yr GM without 5Z9. Abundance indices for 5Z1–5Z4 from 2020 decreased substantially from the 2019 indices for all lengths, with the exception of lengths between 28 cm and 34 cm, which are likely 2-year old fish (the 2018 year-class). There is little indication of incoming recruitment of the 2019 year-class at lengths <26 cm (Figure 3c).

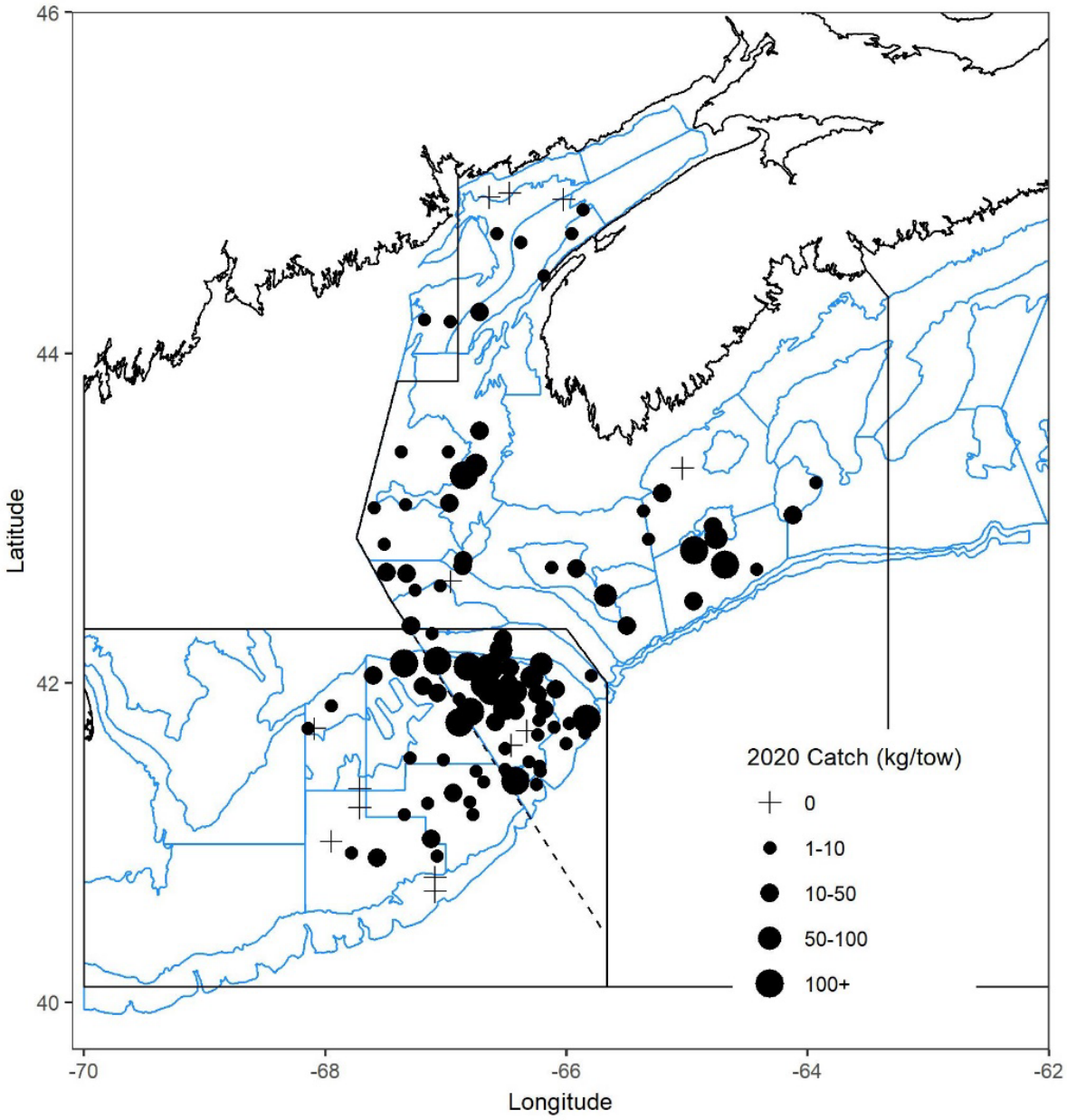

Figure 3a. Distribution of Haddock catches during the 2020 Winter RV Survey. Black circles represent catches. The circle area is proportional to the 2020 catch size. Zero catch is represented by the + symbol.

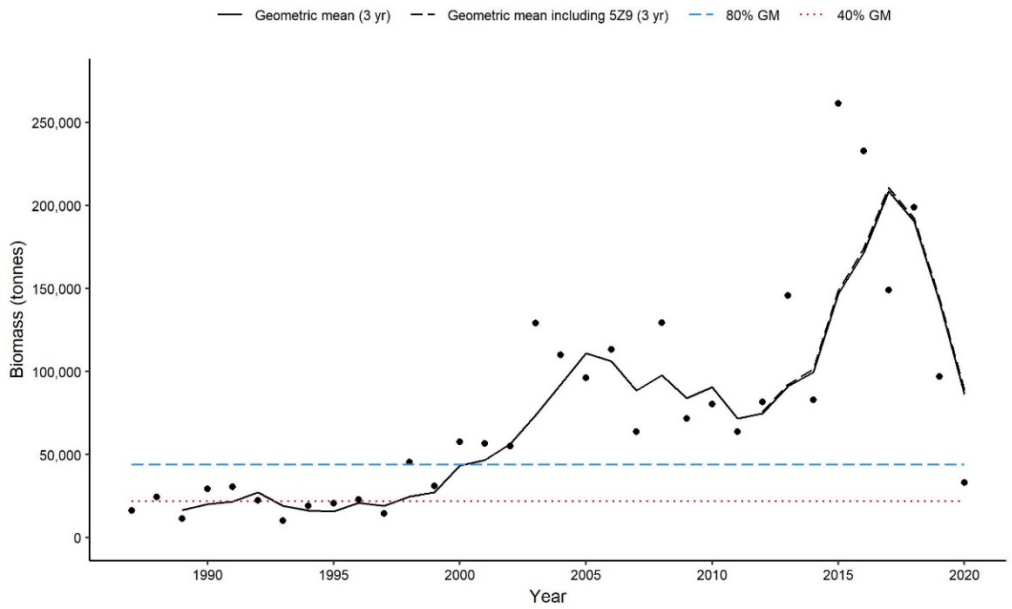

Figure 3b. Biomass index for Haddock in Strata 5Z1–5Z4 from the Winter RV Survey. The 3-yr geometric mean biomass for 5Z1–5Z4 is represented by the solid black line. The dashed black line represents the combined 3-yr geometric mean biomass (since 2010) of 5Z1–5Z4 and 5Z9. The dashed and dotted horizontal lines represent 80% and 40% of the long-term geometric mean (1987–2019), respectively. The large black dots represent the biomass estimate (5Z1–5Z4) for that year.

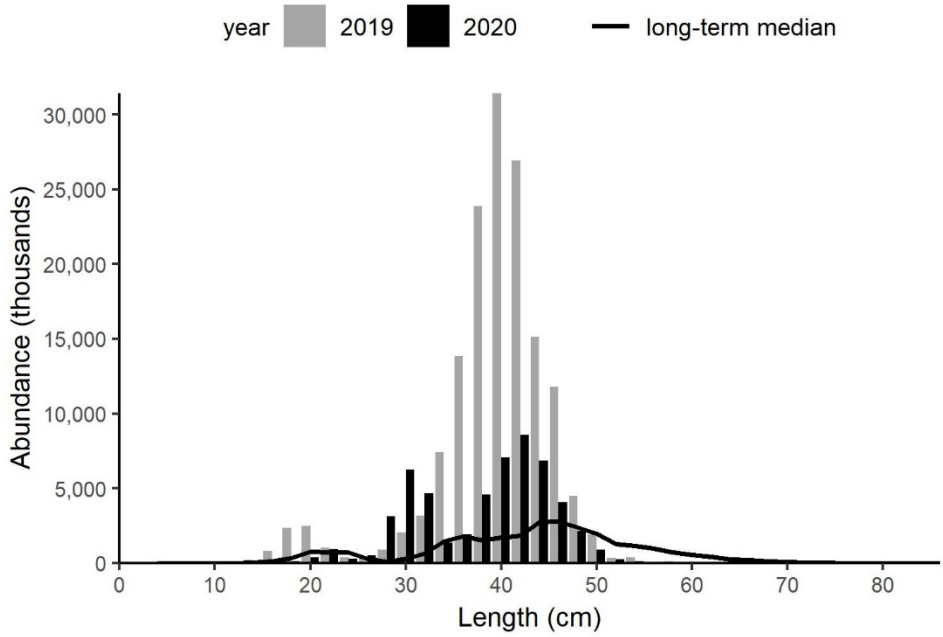

Figure 3c. Length-frequency indices for Haddock in Strata 5Z1–5Z4 from the Winter RV Survey. The grey bars represent the number-at-length from the 2019 survey. The black bars represent the number-at-length from the 2020 survey. The solid black line represents the median number-at-length for the time period 1987–2018.

Pollock

Pollock were only caught in three sets in 5Z1–5Z4 but were well distributed through the deeper water in 5Z9 and western 4X. Larger catches were taken in 5Z9 and in adjacent deep water strata in 4X, outside the standard area used for developing indices for Georges Bank (Figure 4a). The biomass index from 5Z1–5Z4 for 2020 remained low and the 3-yr GM remained below 40% GM (Figure 4b). The 3-yr GM that included 5Z9 decreased from 2019, but it remains at or above the levels observed for most years where this broader area has been covered (beginning in 2012). Inclusion of a broader area will be needed to provide indices that are useful for monitoring abundance trends. Abundance-at-length indices for 5Z1–5Z4 are lower than the long-term median at most lengths (Figure 4c).

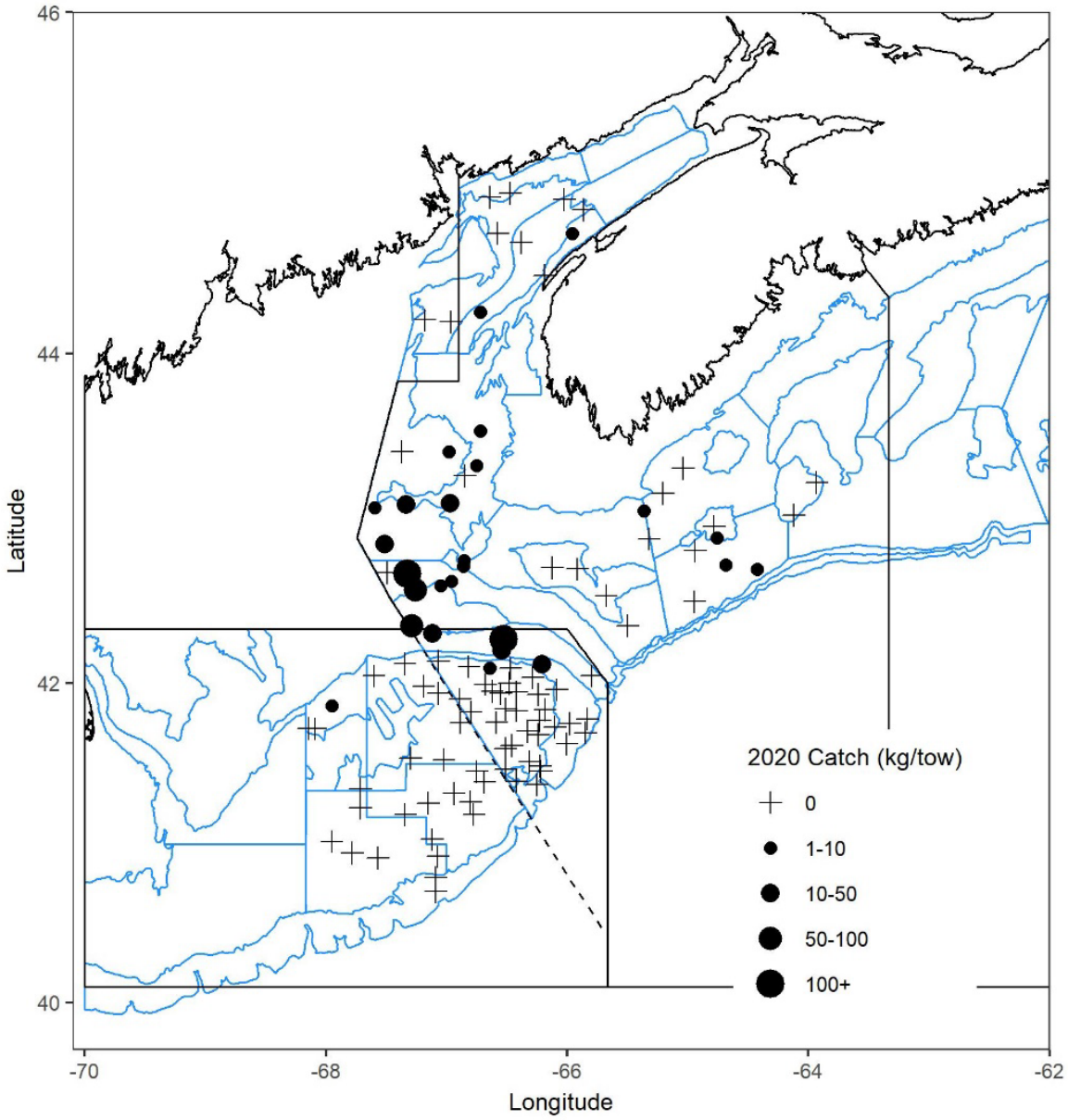

Figure 4a. Distribution of Pollock catches during the 2020 Winter RV Survey. Black circles represent catches. The circle area is proportional to the 2020 catch size. Zero catch is represented by the + symbol.

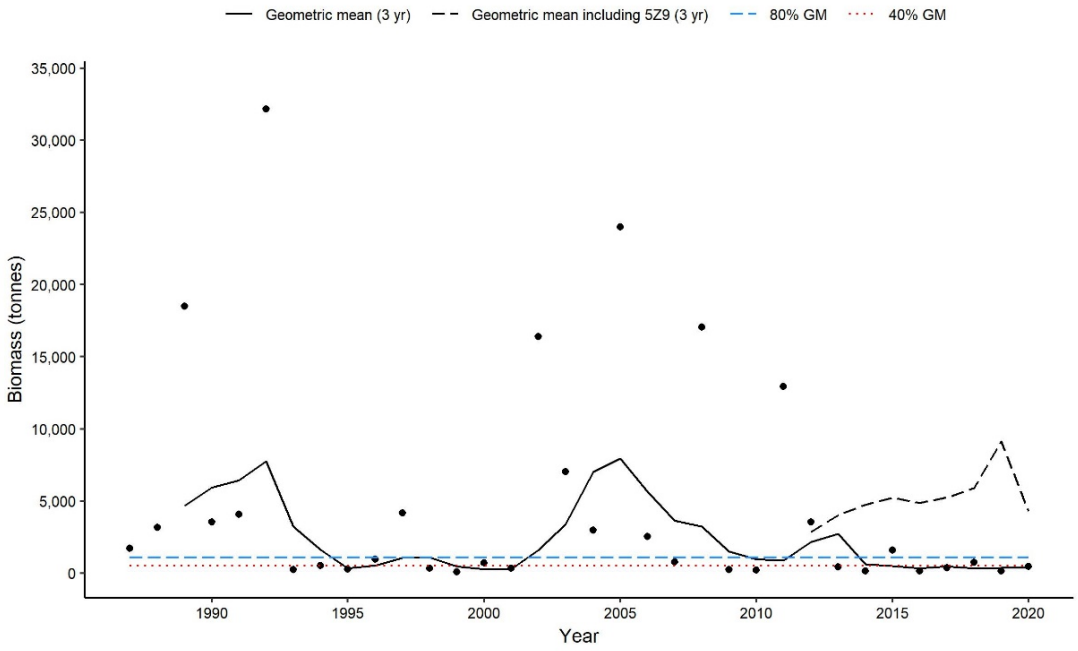

Figure 4b. Biomass index for Pollock in Strata 5Z1–5Z4 from the Winter RV Survey. The 3-yr geometric mean biomass for 5Z1–5Z4 is represented by the solid black line. The dashed black line represents the combined 3-yr geometric mean biomass (since 2010) of 5Z1–5Z4 and 5Z9. The dashed and dotted horizontal lines represent 80% and 40% of the long-term geometric mean (1987–2019), respectively. The large black dots represent the biomass estimate (5Z1–5Z4) for that year.

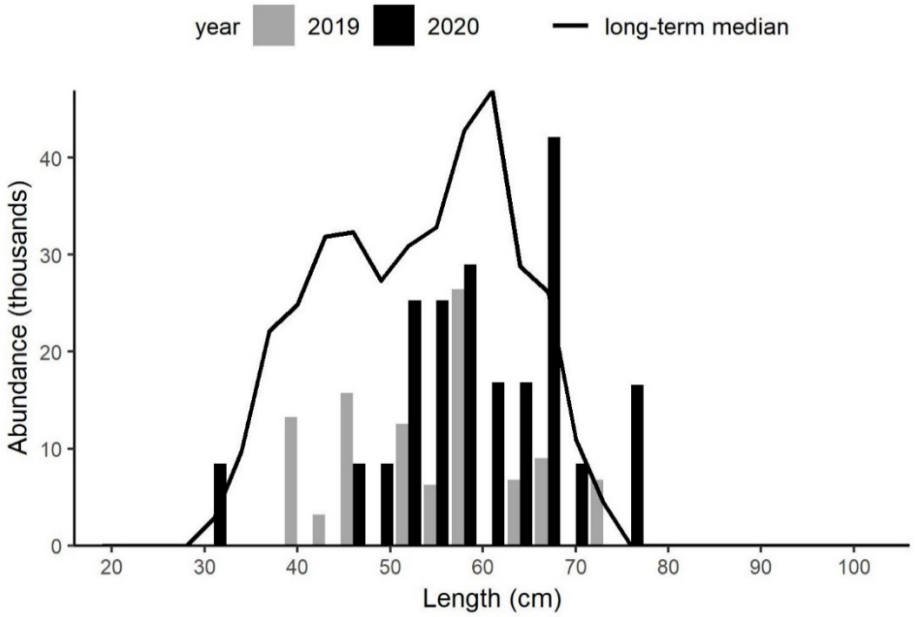

Figure 4c. Length-frequency indices for Pollock in Strata 5Z1–5Z4 from the Winter RV Survey. The grey bars represent the number-at-length from the 2019 survey. The black bars represent the number-at-length from the 2020 survey. The solid black line represents the median number-at-length for the time period 1987–2018.

Yellowtail Flounder

Yellowtail Flounder were found primarily in 5Z2 and 5Z4 (Figure 5a). Catches were low in all areas. The 2020 biomass index for 5Z1–5Z4 more than doubled compared to 2019, but it still remained one of the lowest in the time series. The 3-yr GM remained below 40% GM for the seventh year in a row (Figure 5b). The 3-yr GM with 5Z9 is virtually identical to the 3-yr GM without 5Z9. Abundance-at-length indices in 2019 were very low at all lengths. Indices at-length for 2020 remained well below the long-term median for most lengths (Figure 5c).

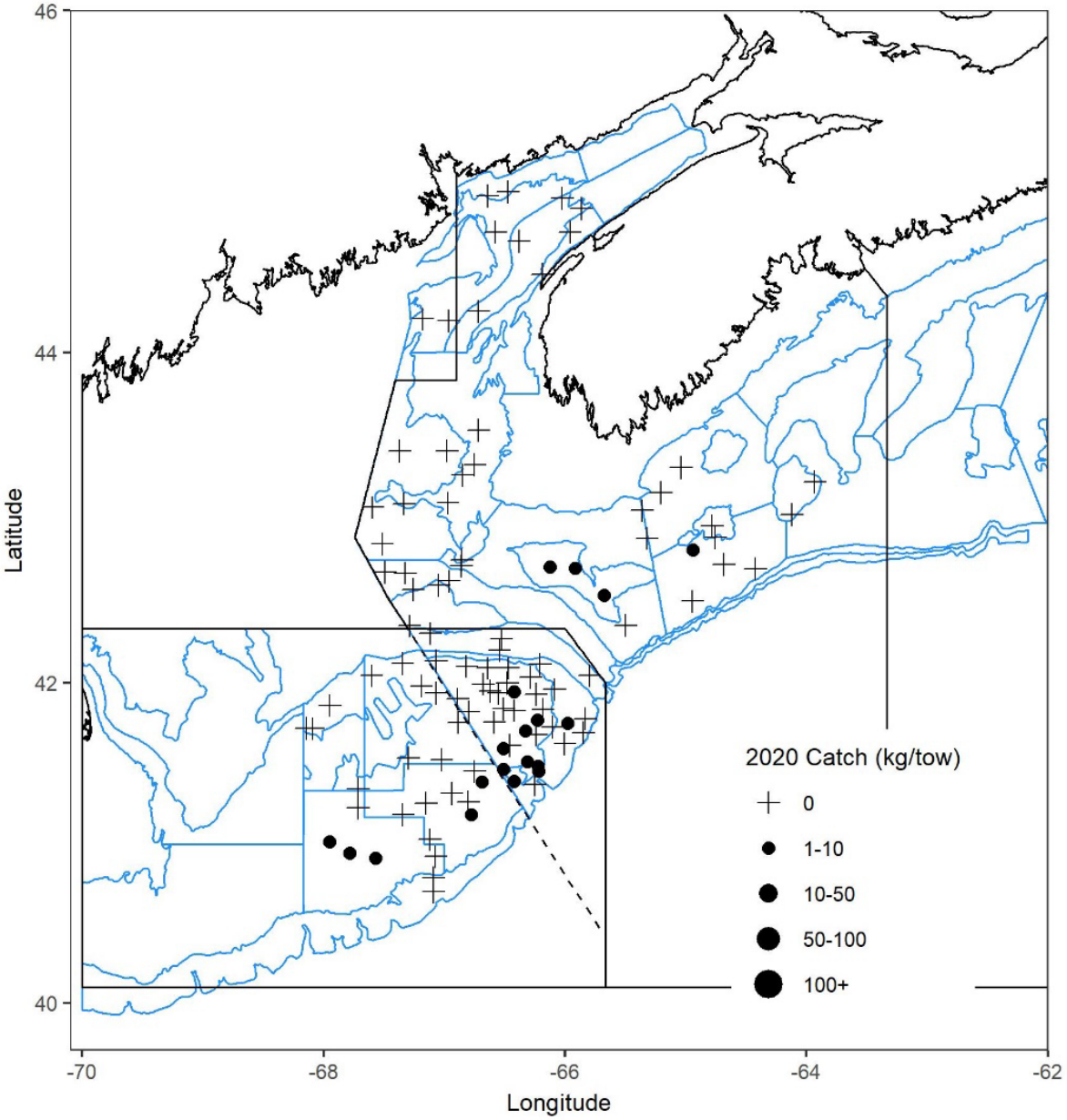

Figure 5a. Distribution of Yellowtail Flounder catches during the 2020 Winter RV Survey. Black circles represent catches. The circle area is proportional to the 2020 catch size. Zero catch is represented by the + symbol.

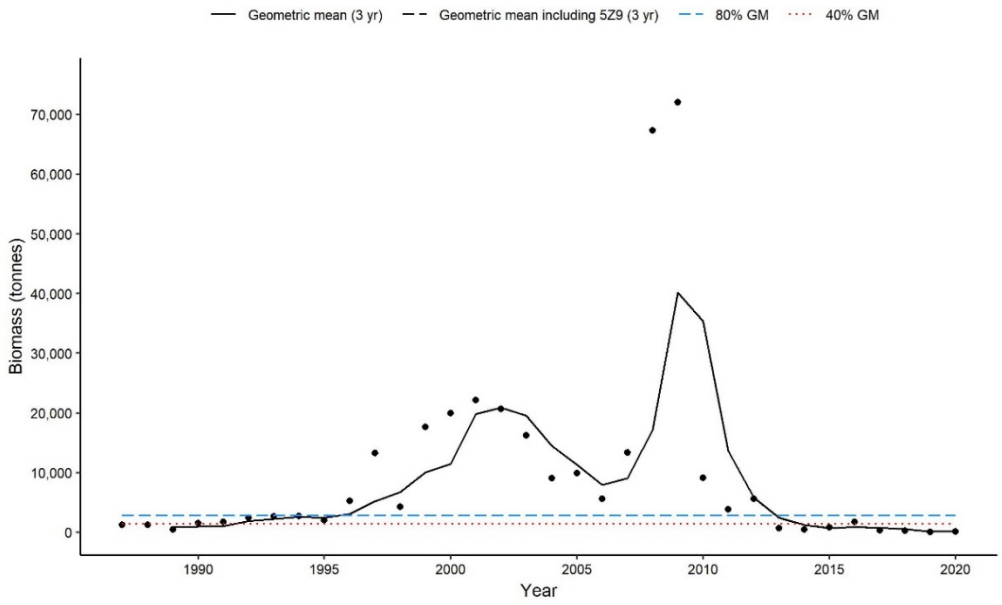

Figure 5b. Biomass index for Yellowtail Flounder in Strata 5Z1–5Z4 from the Winter RV Survey. The 3-yr geometric mean biomass for 5Z1–5Z4 is represented by the solid black line. The dashed black line represents the combined 3-yr geometric mean biomass (since 2010) of 5Z1–5Z4 and 5Z9. The dashed and dotted horizontal lines represent 80% and 40% of the long-term geometric mean (1987–2019), respectively. The large black dots represent the biomass estimate (5Z1–5Z4) for that year.

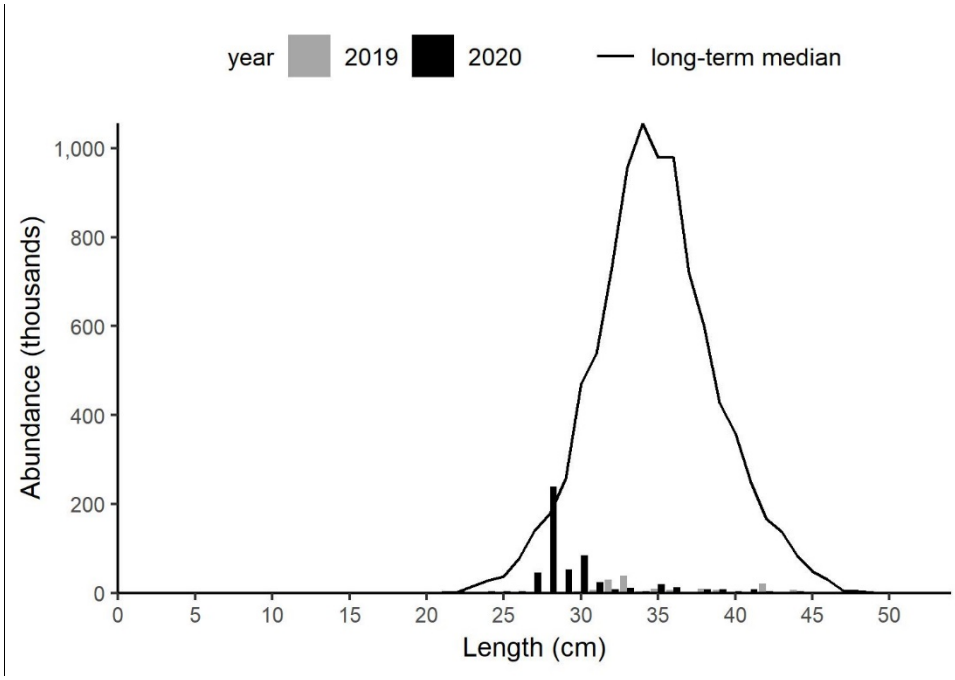

Figure 5c. Length-frequency indices for Yellowtail Flounder in Strata 5Z1–5Z4 from the Winter RV Survey. The grey bars represent the number-at-length from the 2019 survey. The black bars represent the number-at-length from the 2020 survey. The solid black line represents the median number-at-length for the time period 1987–2018.

Smooth Skate

Smooth Skate were caught in small numbers in sets in 5Z and in only one set within the 5Z1–5Z4 index area (Figure 6a). Catches were primarily from 5Z9 and in adjacent deep-water strata in 4X, outside the standard area used for developing indices for Georges Bank (Figure 4a). The biomass indices were very low for all years in 5Z1–5Z4 (Figure 6b). Including 5Z9 in the biomass index gives a much higher 3-yr GM, with the highest value coming from 2020. Only one individual was caught in the 5Z1–5Z4 index area in 2020 (Figure 6c). The long-term median is 0 for all lengths, which indicates that the survey infrequently captures Smooth Skate at any length within the 5Z1–5Z4 area.

In winter RV surveys, Smooth Skate are most commonly found in the Fundian Channel (5Z9), the Great South Channel (5Z5), and at the mouth of the Bay of Fundy. Biomass indices for Smooth Skate are far higher in 4X than in 5Z1–5Z4 during the winter (Figure 6d), and in recent years indices have been higher in 4X than in the late 1970s and early 1980s. Smooth Skate are generally low in abundance over Georges Bank in 5Z1–5Z4, in both winter and summer (Figure 6e), indicating they do not seasonally migrate on and off the bank. Biomass indices in 4X5, however, are higher in winter surveys than in summer surveys (Figure 6f). Either the distribution changes seasonally, such that the population is more available to the survey in winter than in summer, or the behavior changes seasonally making them more susceptible to capture by the survey trawl in winter.

Given the distribution of Smooth Skate, monitoring trends for 5Z separately from 4X may not be informative. The higher catch in winter surveys suggests this is a better seasonal survey for monitoring biomass trends for this species.

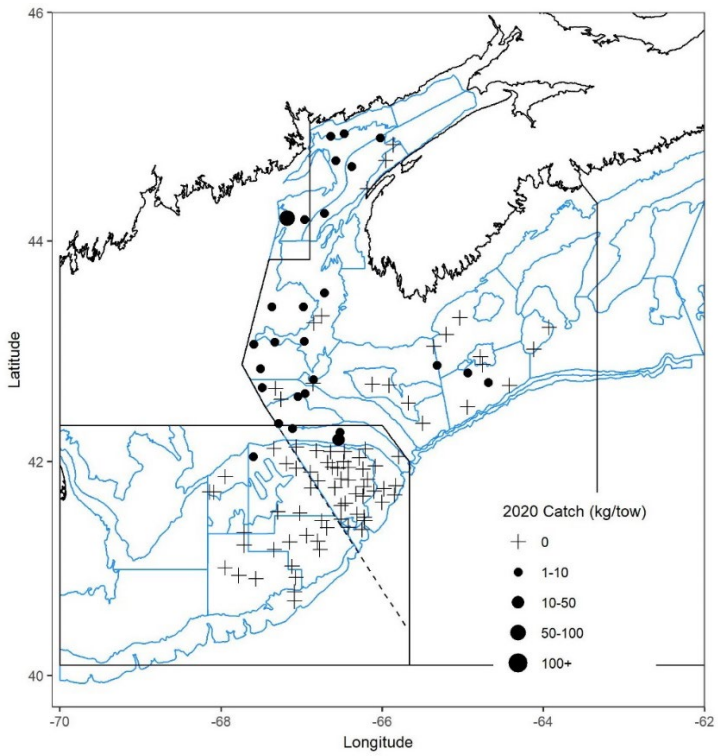

Figure 6a. Distribution of Smooth Skate catches during the 2020 Winter RV Survey. Black circles represent catches. The circle area is proportional to the 2020 catch size. Zero catch is represented by the + symbol.

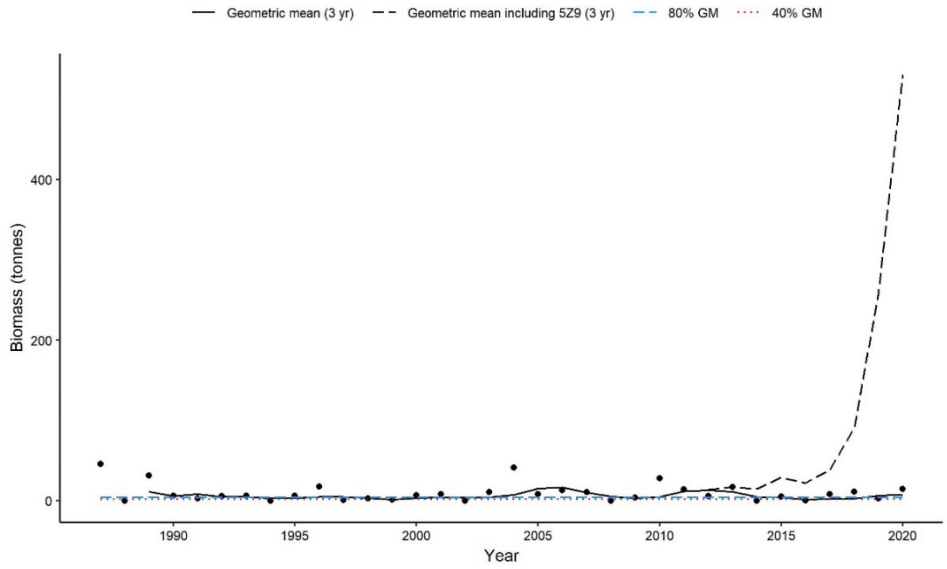

Figure 6b. Biomass index for Smooth Skate in Strata 5Z1–5Z4 from the Winter RV Survey. The 3-yr geometric mean biomass for 5Z1–5Z4 is represented by the solid black line. The dashed black line represents the combined 3-yr geometric mean biomass (since 2010) of 5Z1–5Z4 and 5Z9. The dashed and dotted horizontal lines represent 80% and 40% of the long-term geometric mean (1987–2019), respectively. The large black dots represent the biomass estimate (5Z1–5Z4) for that year.

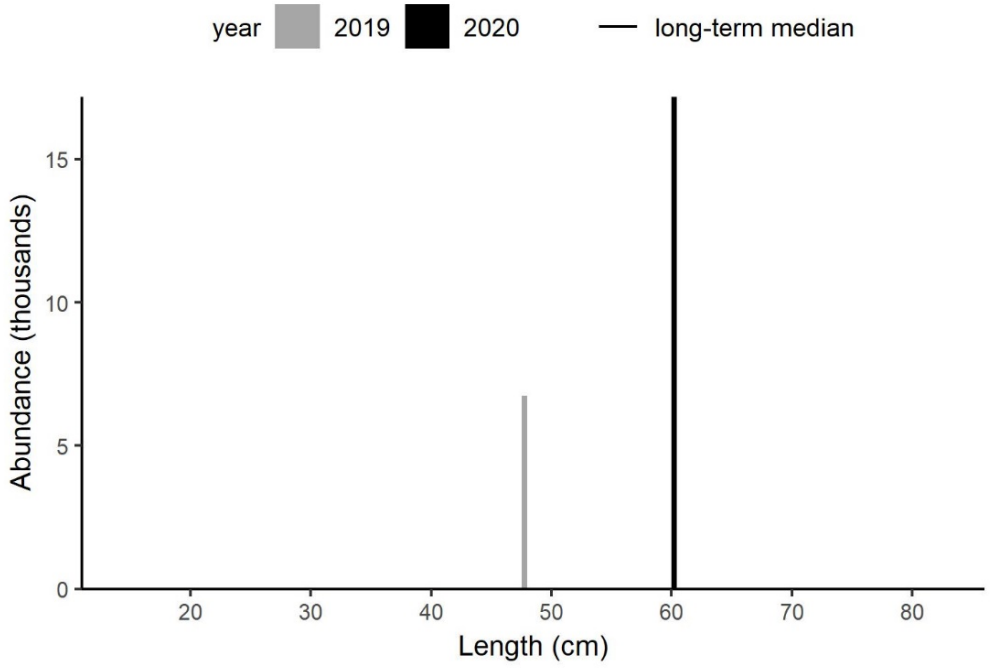

Figure 6c. Length-frequency indices for Smooth Skate in Strata 5Z1–5Z4 from the Winter RV Survey. The grey bars represent the number-at-length from the 2019 survey. The black bars represent the number-at-length from the 2020 survey. The long-term median is 0 for all lengths.

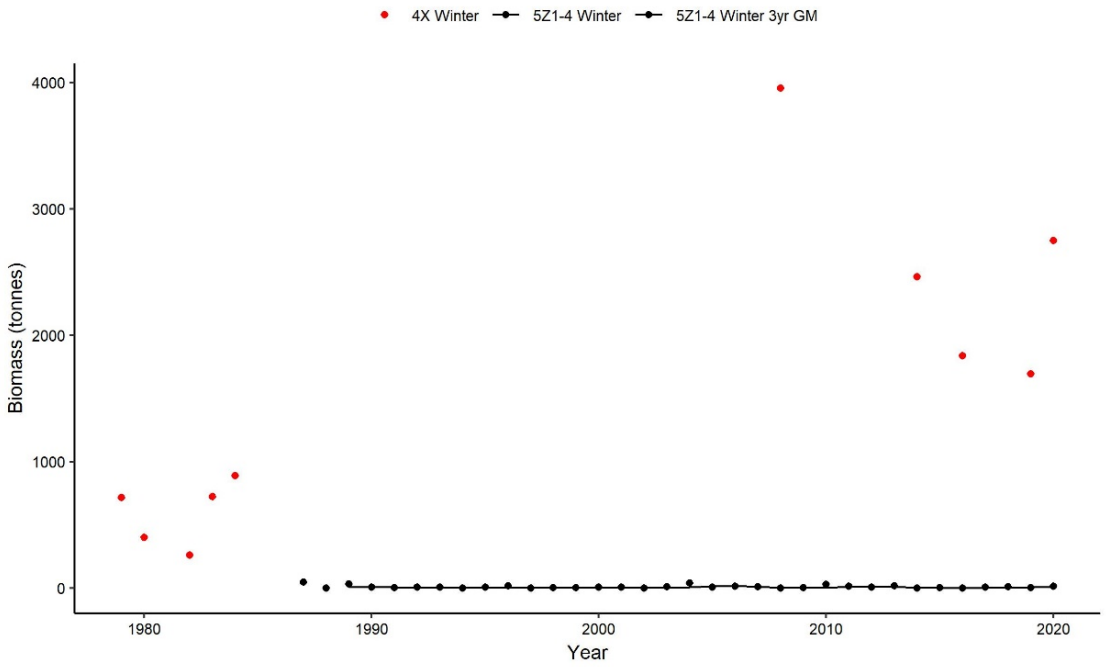

Figure 6d. Winter survey biomass indices for Smooth Skate in 4X (red dots) and 5Z1–5Z4 (black dots), and the 3-year geometric mean for 5Z1–5Z4 (black line).

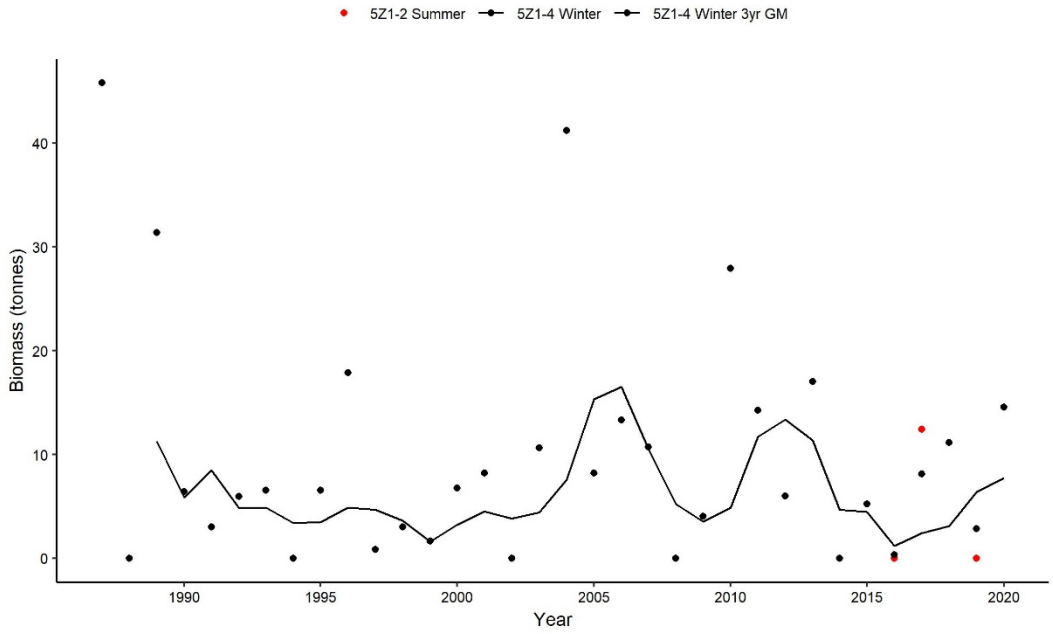

Figure 6e. Annual biomass index for Smooth Skate in Strata 5Z1–5Z4 (black dots) and the 3-year geometric mean biomass for 5Z1–5Z4 (solid black line) from the Winter RV Survey (1987–2020), and the annual biomass index for Strata 5Z1–5Z2 (red dots) from the Summer RV Survey for years with sufficient survey coverage (2016–2017, 2019).

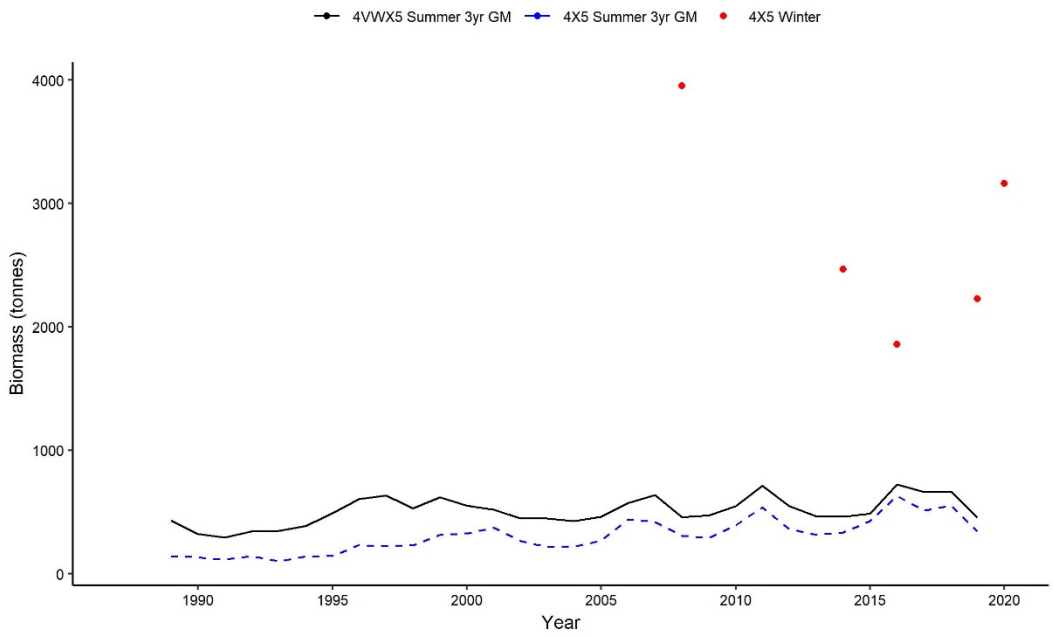

Figure 6f. The 3-year geometric mean biomass index for Smooth Skate from survey strata representing NAFO areas 4VWX5 (solid black line) and 4X5 (dashed blue line) from the Summer RV Survey (1987 to 2019), and the annual biomass index from survey strata representing NAFO Areas 4X5 (red dots) from the Winter RV Survey for years with sufficient survey coverage (2008, 2014, 2016, 2019, 2020).

Thorny Skate

No Thorny Skate were caught in 5Z1–5Z4 on Georges Bank (Figure 7a), and they were also in low abundance in nearby 4X strata. Both the 2020 biomass index for 5Z1–5Z4 and the 3-yr GM were well below 40% GM, and they were the lowest in the time series (Figure 7b). The 3-yr GM does not differ greatly with, or without, the inclusion of 5Z9, and follows the same trend. Summer RV surveys indicate the same overall declining trend for Thorny Skate in 4VWX as do surveys conducted by the National Oceanic and Atmospheric Administration (NOAA) in the Gulf of Maine (NEFSC 2019).

No Thorny Skate were caught in 2020 in 5Z1–5Z4 (Figure 7c), and only a single individual was caught in 5Z9. The long-term median is 0 for all lengths, which indicates that the survey infrequently captures Thorny Skate at any length within the 5Z1–5Z4 area. Reporting on this species in the Georges Bank area is unlikely to describe current status of the stock, which inhabits a much broader area.

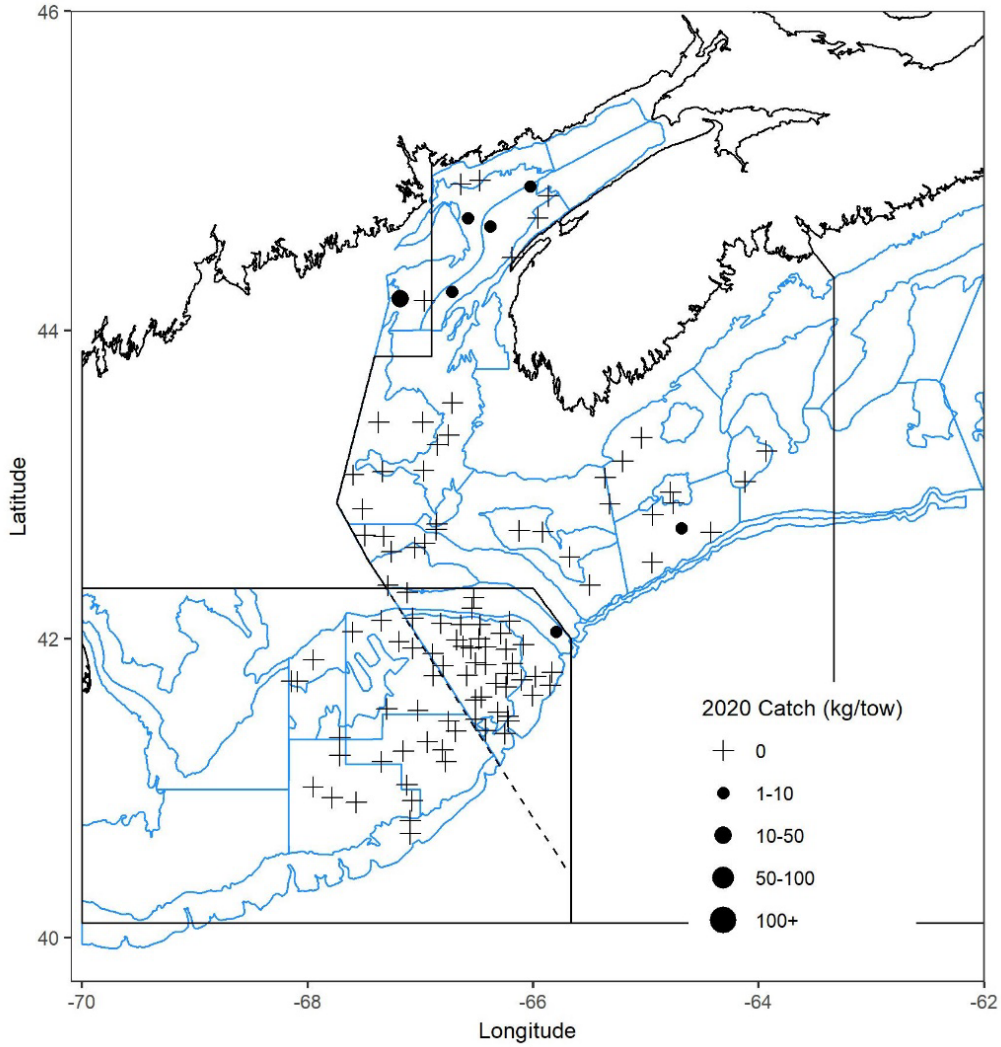

Figure 7a. Distribution of Thorny Skate catches during the 2020 Winter RV Survey. Black circles represent catches. The circle area is proportional to the 2020 catch size. Zero catch is represented by the + symbol.

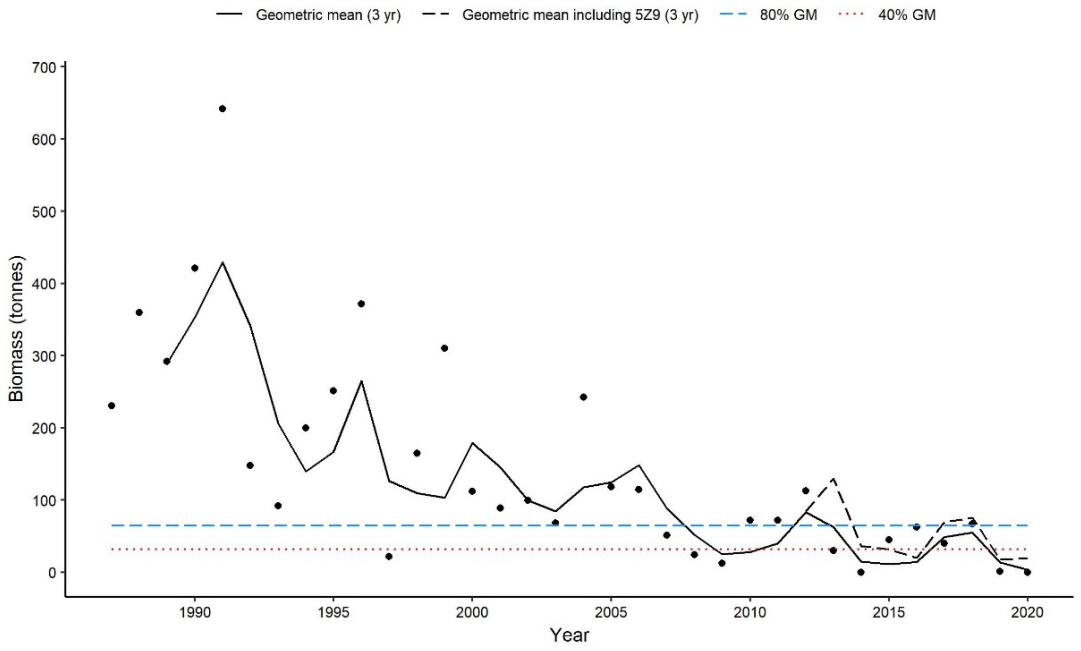

Figure 7b. Biomass index for Thorny Skate in Strata 5Z1–5Z4 from the Winter RV Survey. The 3-yr geometric mean biomass for 5Z1–5Z4 is represented by the solid black line. The dashed black line represents the combined 3-yr geometric mean biomass (since 2010) of 5Z1–5Z4 and 5Z9. The dashed and dotted horizontal lines represent 80% and 40% of the long-term geometric mean (1987–2019), respectively. The large black dots represent the biomass estimate (5Z1–5Z4) for that year.

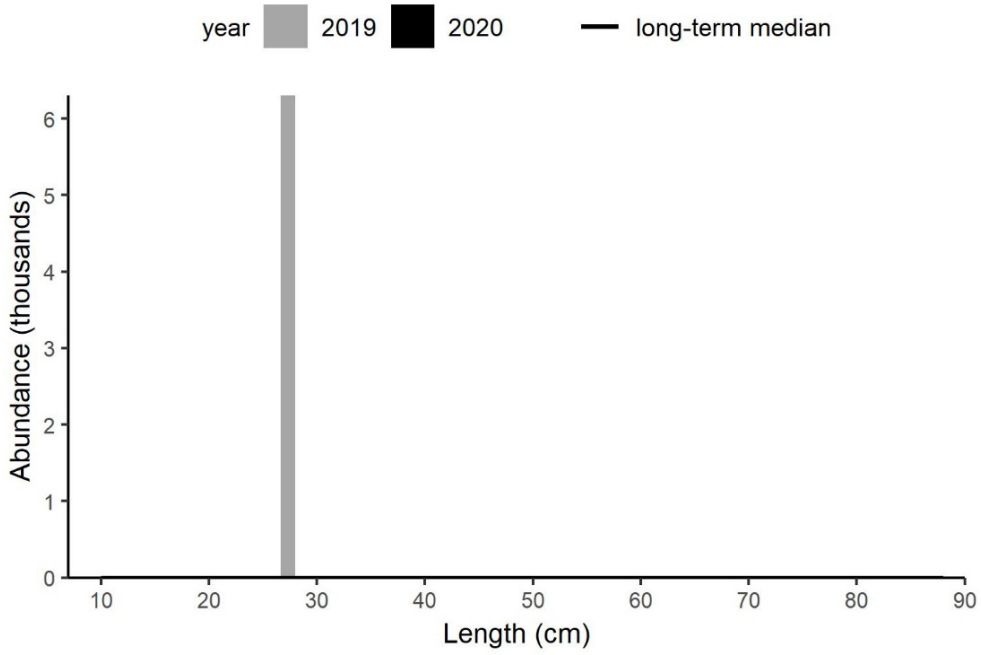

Figure 7c. Length-frequency indices for Thorny Skate in Strata 5Z1–5Z4 from the Winter RV Survey. The grey bar represents the number-at-length from the 2019 survey. No Thorny Skate were caught during the 2020 survey. The long-term (1987–2018) median is 0 for all lengths.

Barndoor Skate

Barndoor Skate were captured along the edges of Georges Bank and in the surrounding deeper waters of 4X (Figure 8a). The highest catches were taken in 5Z9 and in adjacent strata of 4X. The biomass index declined from 2019 to 2020 and the 3-yr GM is below 80% GM (Figure 8b). Including 5Z9 in the index area gives a much higher biomass index. In this larger area, there is no indication of a general decline in biomass in recent years.

All Barndoor Skate caught in 5Z1–5Z4 in 2020 were <52 cm (Figure 8c), while those caught in deeper waters ranged between 43 cm and 133 cm. The long-term median for 5Z1–5Z4 is 0 for all lengths, which indicates that the survey infrequently captures Barndoor Skate at any length within the 5Z1–5Z4 area.

While few Barndoor Skate are caught during winter RV surveys in 5Z1–5Z4, biomass indices are higher in summer surveys on Georges Bank, indicating that they seasonally migrate on and off the bank (Figure 8d). Biomass indices for summer and winter RV surveys are similar in magnitude (Figure 8e), suggesting either may be suitable for monitoring population trends for this species in waters of the Maritimes Region.

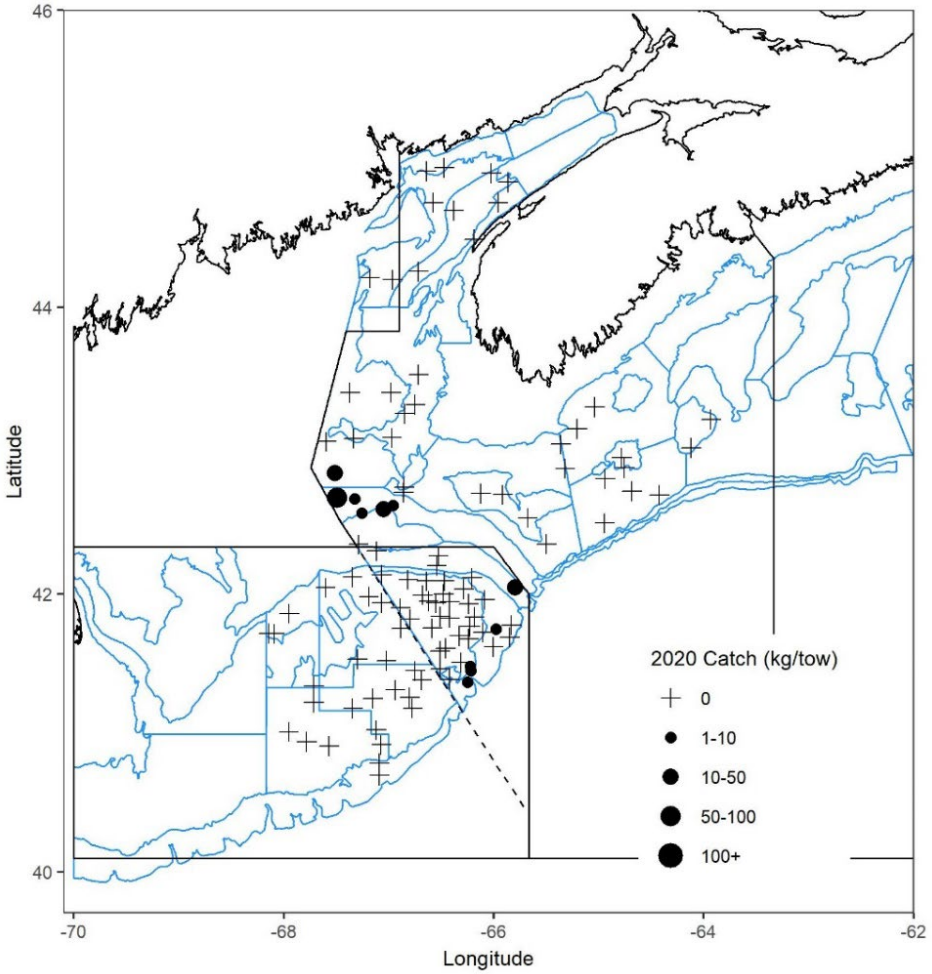

Figure 8a. Distribution of Barndoor Skate catches during the 2020 Winter RV Survey. Black circles represent catches. The circle area is proportional to the 2020 catch size. Zero catch is represented by the + symbol.

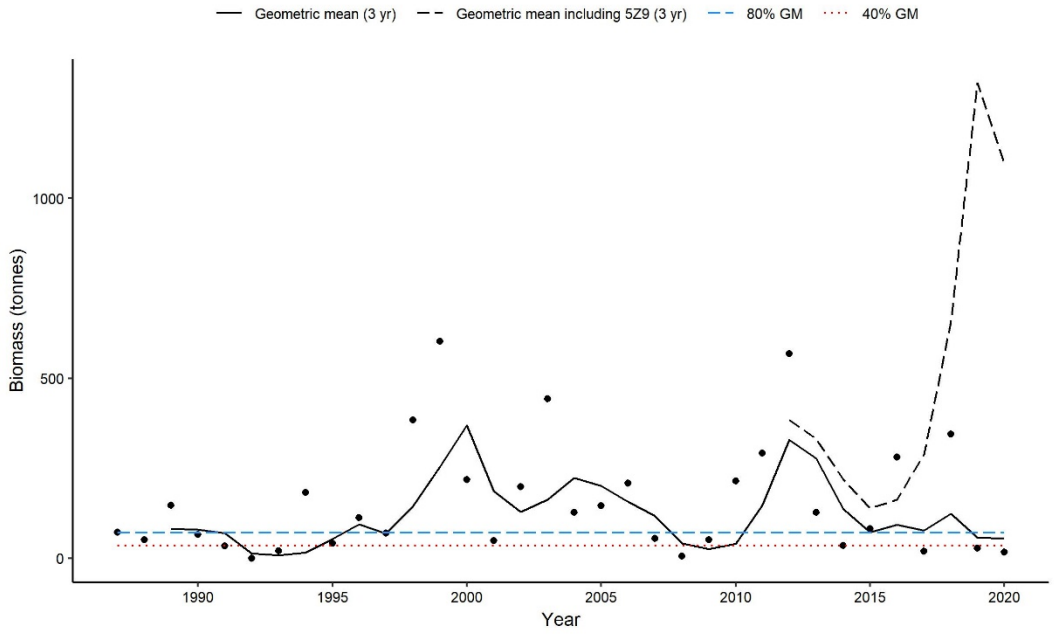

Figure 8b. Biomass index for Barndoor Skate in Strata 5Z1–5Z4 from the Winter RV Survey. The 3-yr geometric mean biomass for 5Z1–5Z4 is represented by the solid black line. The dashed black line represents the combined 3-yr geometric mean biomass (since 2010) of 5Z1–5Z4 and 5Z9. The dashed and dotted horizontal lines represent 80% and 40% of the long-term geometric mean (1987–2019), respectively. The large black dots represent the biomass estimate (5Z1–5Z4) for that year.

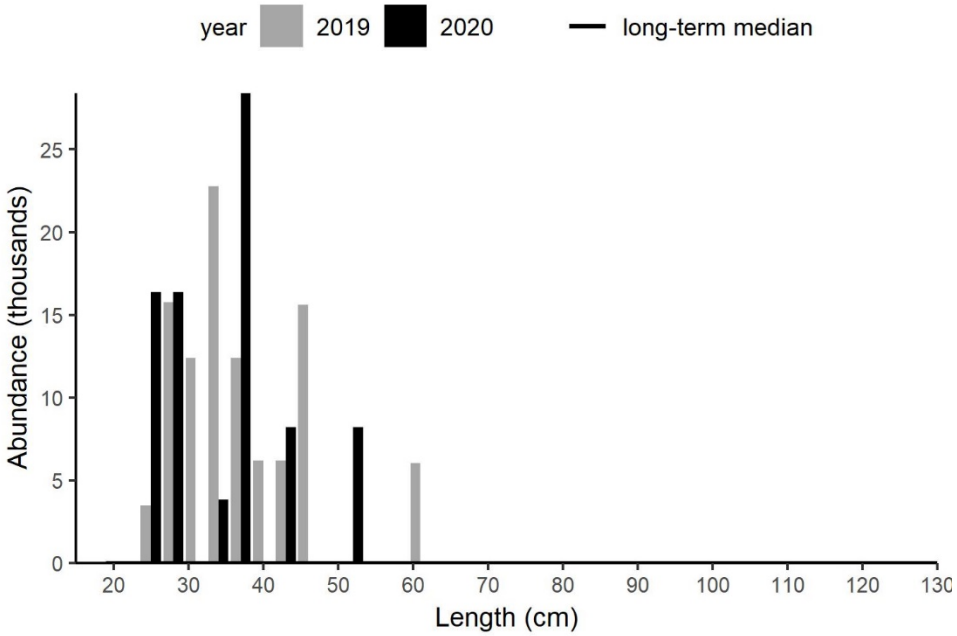

Figure 8c. Length-frequency indices for Barndoor Skate in Strata 5Z1–5Z4 from the Winter RV Survey. The grey bars represent the number-at-length from the 2019 survey. The black bars represent the number-at-length from the 2020 survey. The long-term median is 0 for all lengths.

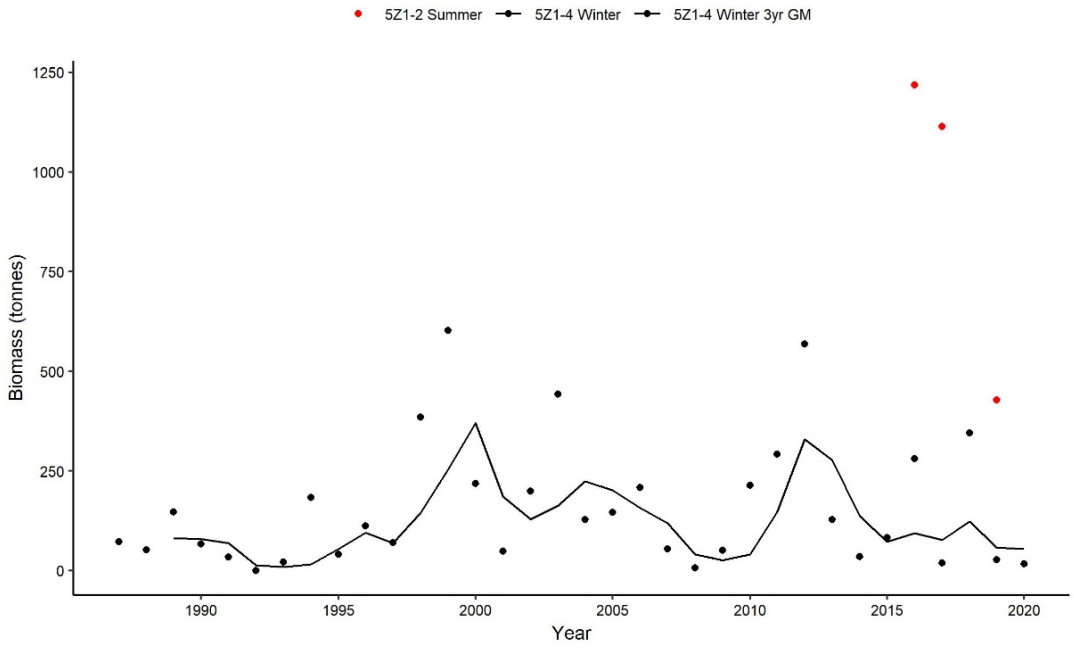

Figure 8d. Annual biomass index for Barndoor Skate in Strata 5Z1–5Z4 (black dots) and the 3-year geometric mean biomass for 5Z1–5Z4 (solid black line) from the Winter RV Survey (1987–2020), and the annual biomass index for Strata 5Z1–5Z2 (red dots) from the Summer RV Survey for years with sufficient survey coverage (2016–2017, 2019).

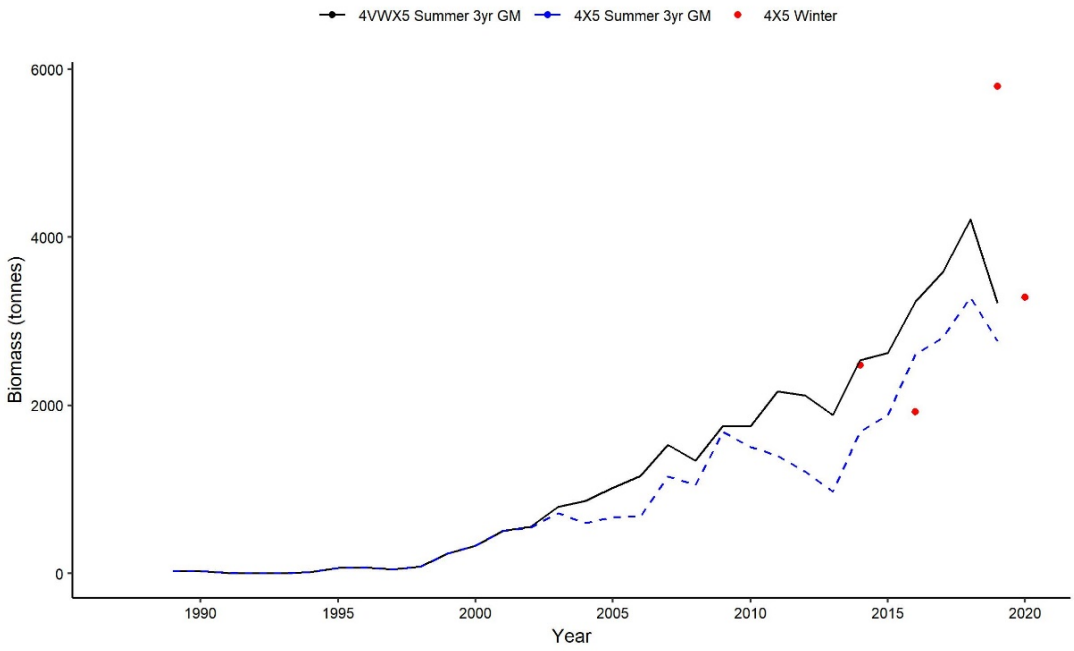

Figure 8e. The 3-year geometric mean biomass index for Barndoor Skate from survey strata representing NAFO areas 4VWX5 (solid black line) and 4X5 (dashed blue line) from the Summer RV Survey (1987 to 2019), and the annual biomass index from survey strata representing NAFO Areas 4X5 (red dots) from the Winter RV Survey for years with sufficient survey coverage (2014, 2016, 2019, 2020).

Winter Skate

At lengths below 35–40 cm, it is very difficult to distinguish between Little Skate and Winter Skate. Common practice at sea, in the past, was to group all small skates as Winter Skate if they lacked the features of sexual maturity used to identify Little Skate. These small skates (<40 cm) are now separated as either Little Skate or Winter Skate, at sea. For the purpose of comparisons over time, only data for Winter Skate above 39 cm were included in these summaries.

The distribution of Winter Skate catches in the 2020 survey were primarily on the northeast peak of Georges Bank (Figure 9a), with few caught in adjacent strata of 4X. The 2020 biomass index was low, but the 3-yr GM increased and is now just above 40% GM (Figure 9b). The 3-yr GM is slightly higher with the inclusion of 5Z9 in some years, but 5Z1–5Z4 accounts for the bulk of the biomass index for this species. The abundance-at-length indices are well below the long-term median for smaller Winter Skate but are closer to the median, starting at 70 cm (Figure 9c).

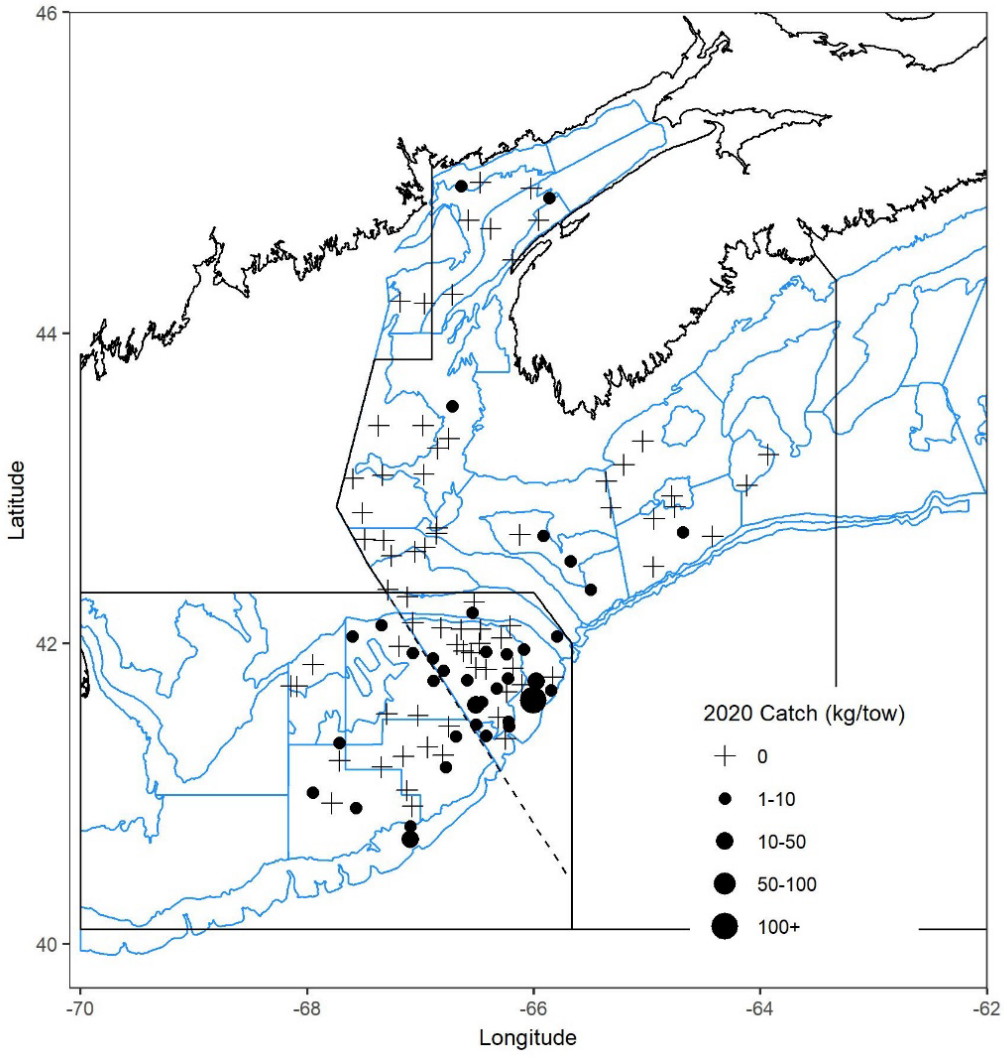

Figure 9a. Distribution of Winter Skate catches during the 2020 Winter RV Survey. Black circles represent catches. The circle area is proportional to the 2020 catch size. Zero catch is represented by the + symbol.

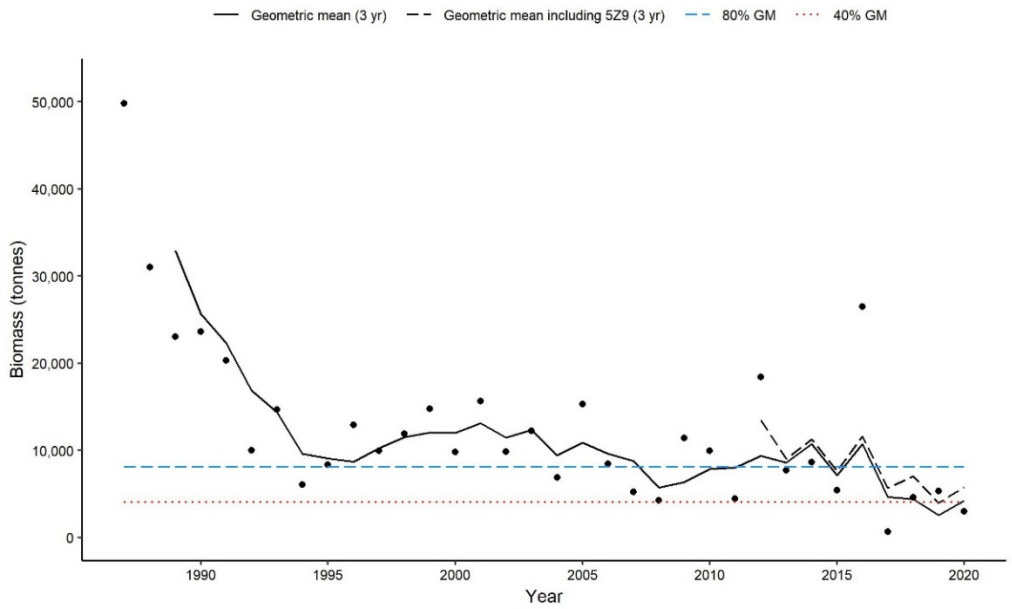

Figure 9b. Biomass index for Winter Skate in Strata 5Z1–5Z4 from the Winter RV Survey. The 3-yr geometric mean biomass for 5Z1–5Z4 is represented by the solid black line. The dashed black line represents the combined 3-yr geometric mean biomass (since 2010) of 5Z1–5Z4 and 5Z9. The dashed and dotted horizontal lines represent 80% and 40% of the long-term geometric mean (1987–2019), respectively. The large black dots represent the biomass estimate (5Z1–5Z4) for that year.

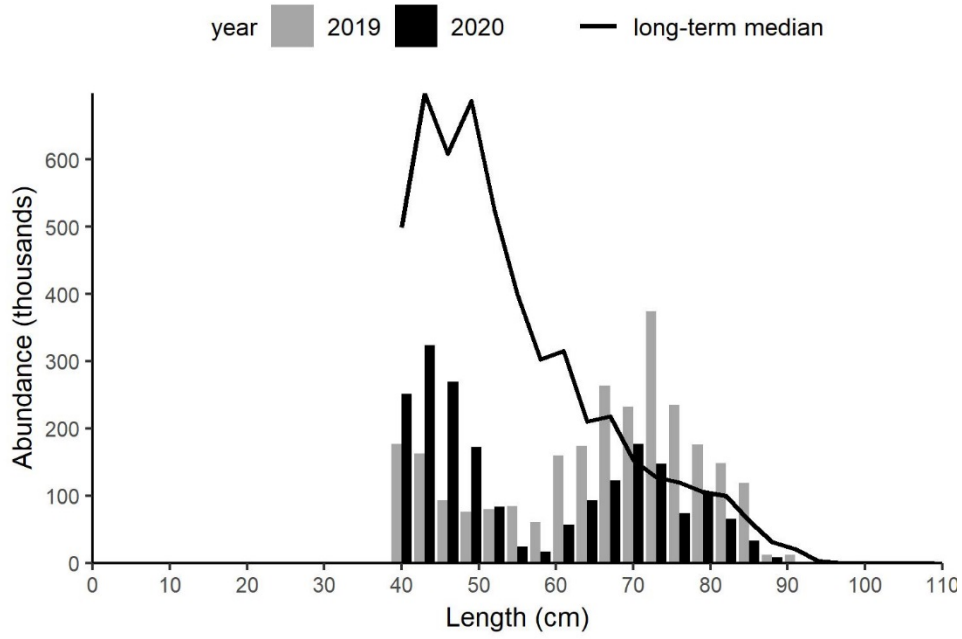

Figure 9c. Length-frequency indices for Winter Skate in Strata 5Z1–5Z4 from the Winter RV Survey. The grey bars represent the number-at-length from the 2019 survey. The black bars represent the number-at-length from the 2020 survey. The solid black line represents the median number-at-length for the time period 1987–2018.

Little Skate

Little Skate were distributed across Georges Bank in 2020, with few caught in sets in 5Z9 or adjacent deep-water strata in 4X (Figure 10a). The 2020 biomass index for 5Z1–5Z4 is the lowest in the series, and the 3-yr GM remains below 80% GM for the fourth year in a row (Figure 10b). The 3-yr GM with 5Z9 is virtually identical to the 3-yr GM without 5Z9. The abundance-at-length indices were below the long-term median for most lengths in 2020 (Figure 10c).

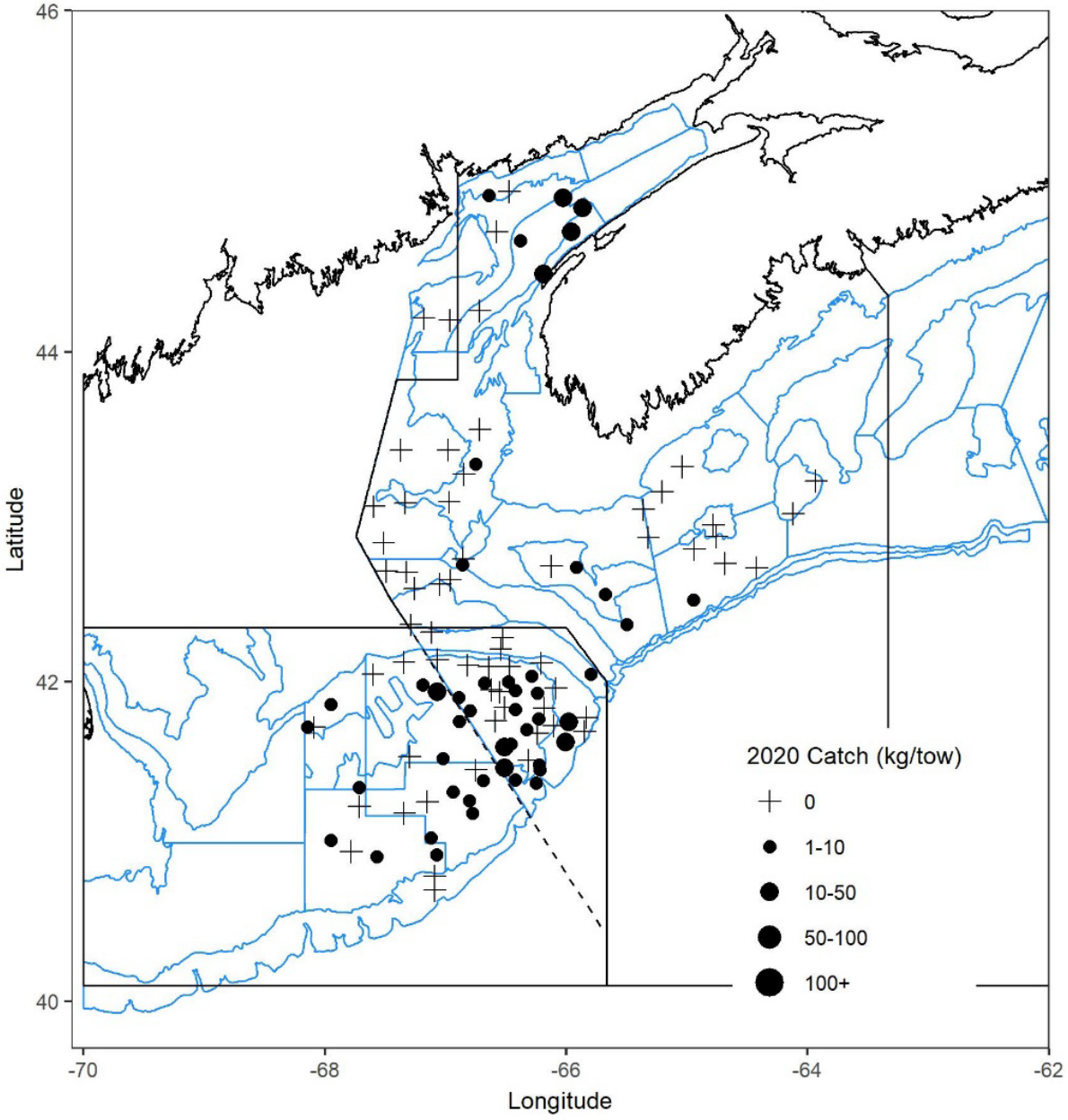

Figure 10a. Distribution of Little Skate catches during the 2020 Winter RV Survey. Black circles represent catches. The circle area is proportional to the 2020 catch size. Zero catch is represented by the + symbol.

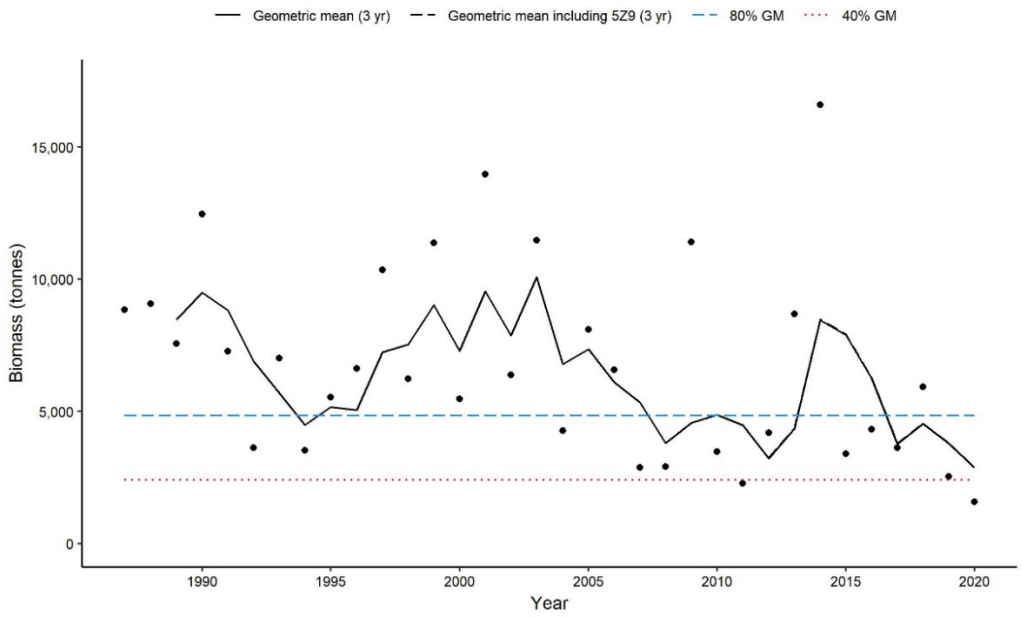

Figure 10b. Biomass index for Little Skate in Strata 5Z1–5Z4 from the Winter RV Survey. The 3-yr geometric mean biomass for 5Z1–5Z4 is represented by the solid black line. The dashed black line represents the combined 3-yr geometric mean biomass (since 2010) of 5Z1–5Z4 and 5Z9. The dashed and dotted horizontal lines represent 80% and 40% of the long-term geometric mean (1987–2019), respectively. The large black dots represent the biomass estimate (5Z1–5Z4) for that year.

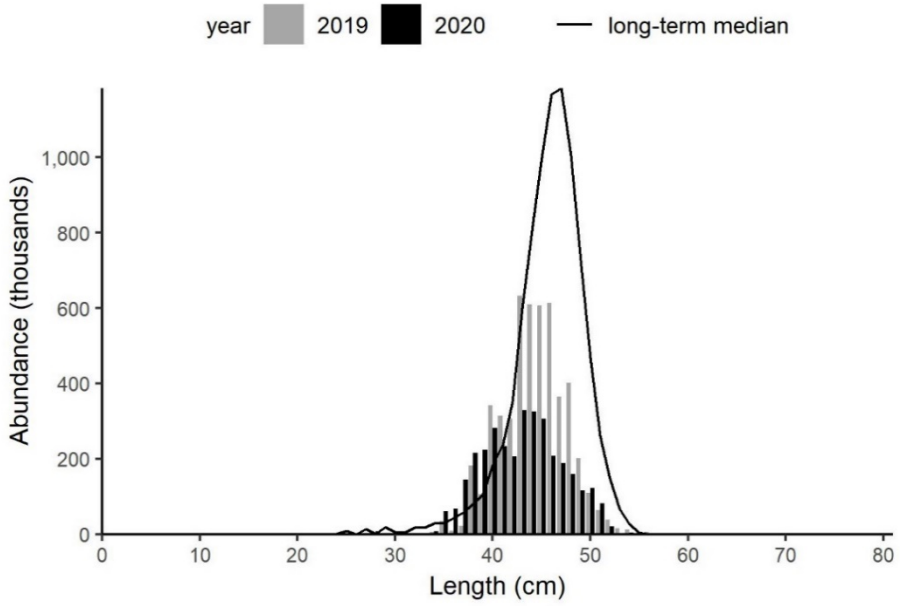

Figure 10c. Length-frequency indices for Little Skate in Strata 5Z1–5Z4 from the Winter RV Survey. The grey bars represent the number-at-length from the 2019 survey. The black bars represent the number-at-length from the 2020 survey. The solid black line represents the median number-at-length for the time period 1987–2018.

Juvenile Little Skate and Winter Skate

In the past, small skates (<35–40 cm in length) were grouped as Winter Skate, as they lacked the sexual maturity used to identify Little Skate. However, they are now separated as either Little Skate or Winter Skate, at sea. For the purpose of comparisons over time, data for Winter Skate less than 40 cm in length were included in these summaries.

Juvenile skates were caught in all sets in 5Z3 and 5Z4 in 2020 but not on the northeast peak of Georges Bank. Few were caught in 5Z9 or in adjacent deep-water strata of 4X (Figure 11a). The 3-yr GM biomass index has generally been higher since 2010, than earlier in the time series, and remained above 80% GM in 2020 (Figure 11b). The abundance indices were above the long-term median for most lengths in 2020 but lower than observed in 2019 (Figure 11c).

While biomass indices for both Winter Skate and Little Skate were low in the survey in 2020, the biomass index for juveniles remains high, abundance-at-length indices were generally above the median, and catches were widely distributed in shallow water on Georges Bank.

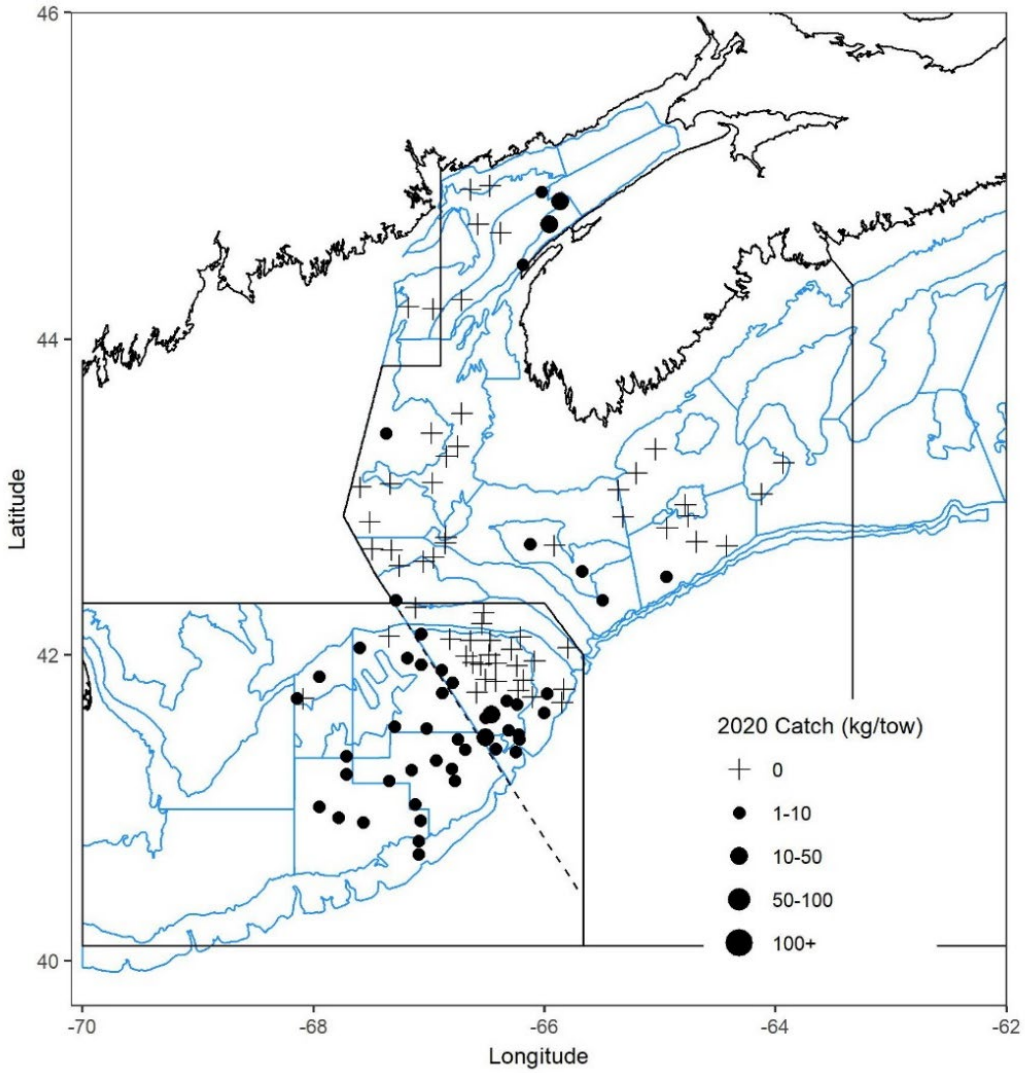

Figure 11a. Distribution of Little Skate catches during the 2020 Winter RV Survey. Black circles represent catches. The circle area is proportional to the 2020 catch size. Zero catch is represented by the + symbol.

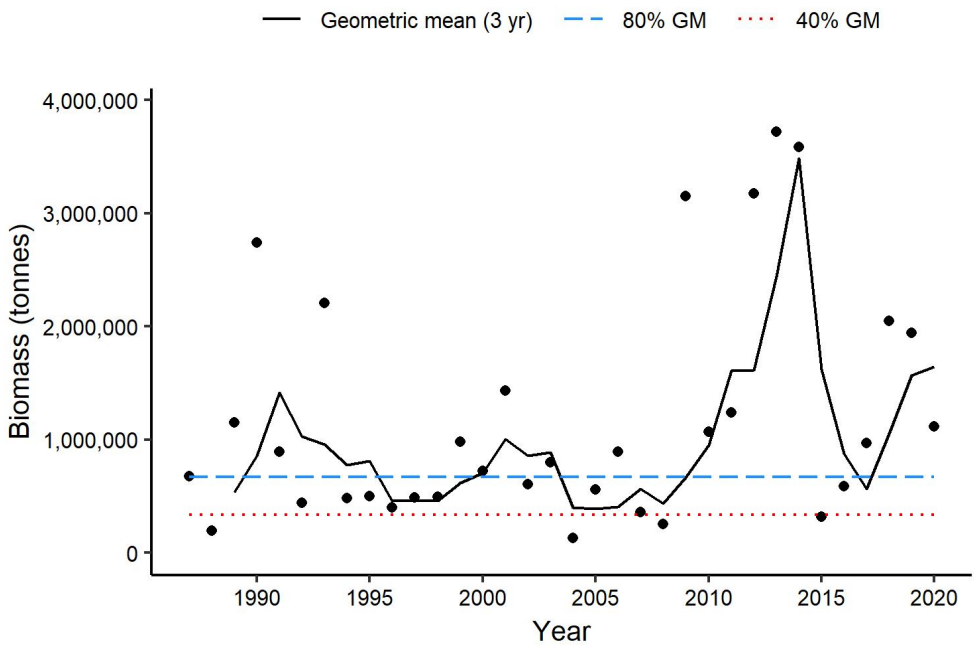

Figure 11b. Biomass index for juvenile Little Skate and Winter Skate combined in Strata 5Z1–5Z4 from the Winter RV Survey. The 3-year geometric mean biomass (5Z1–5Z4) is represented by the solid black line. The dashed and dotted horizontal lines represent 80% and 40% of the long-term geometric mean (1987–2019), respectively. The large black dots represent the biomass estimate (5Z1–5Z4) for that year.

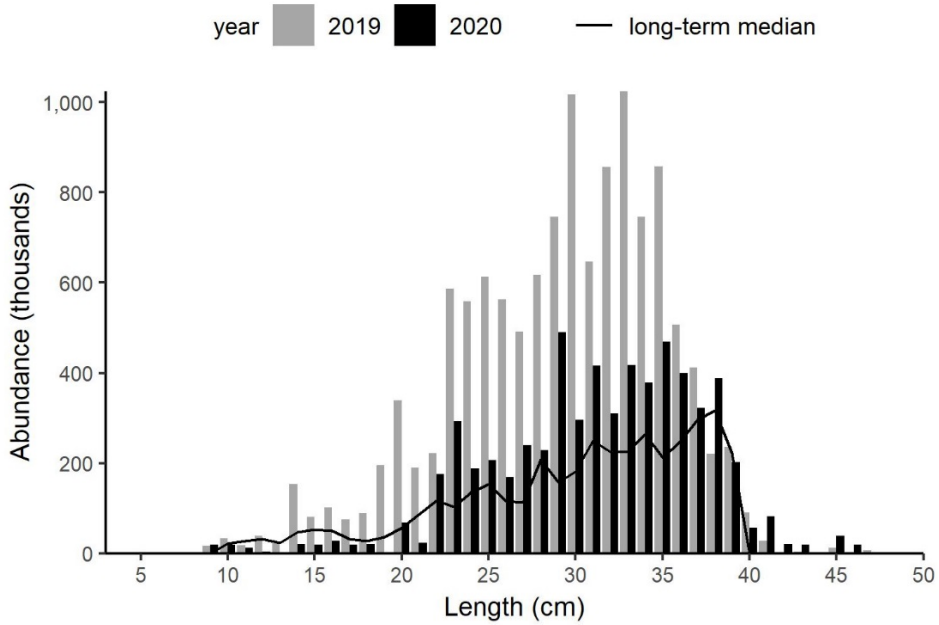

Figure 11c. Length-frequency indices for juvenile Little Skate and Winter Skate combined in Strata 5Z1–5Z4 from the Winter RV Survey. The grey bars represent the number-at-length from the 2019 survey. The black bars represent the number-at-length from the 2020 survey. The solid black line represents the median number-at-length for the time period 1987–2018.

Longhorn Sculpin

Longhorn Sculpin were distributed across Georges Bank in 2020, but they were caught in few sets in 5Z9 or adjacent deep-water strata in 4X (Figure 12a). The 2020 biomass index for 5Z1–5Z4 was the highest since 2016, but the 3-yr GM remains below 40% GM (Figure 12b). The 3-yr GM with 5Z9 is virtually identical to the 3-yr GM without 5Z9, since this species is generally found in shallower water. The abundance indices in 2020 were above the median at lengths <24 cm and >29 cm but below the median for lengths that have generally represented the bulk of the population (Figure 12c).

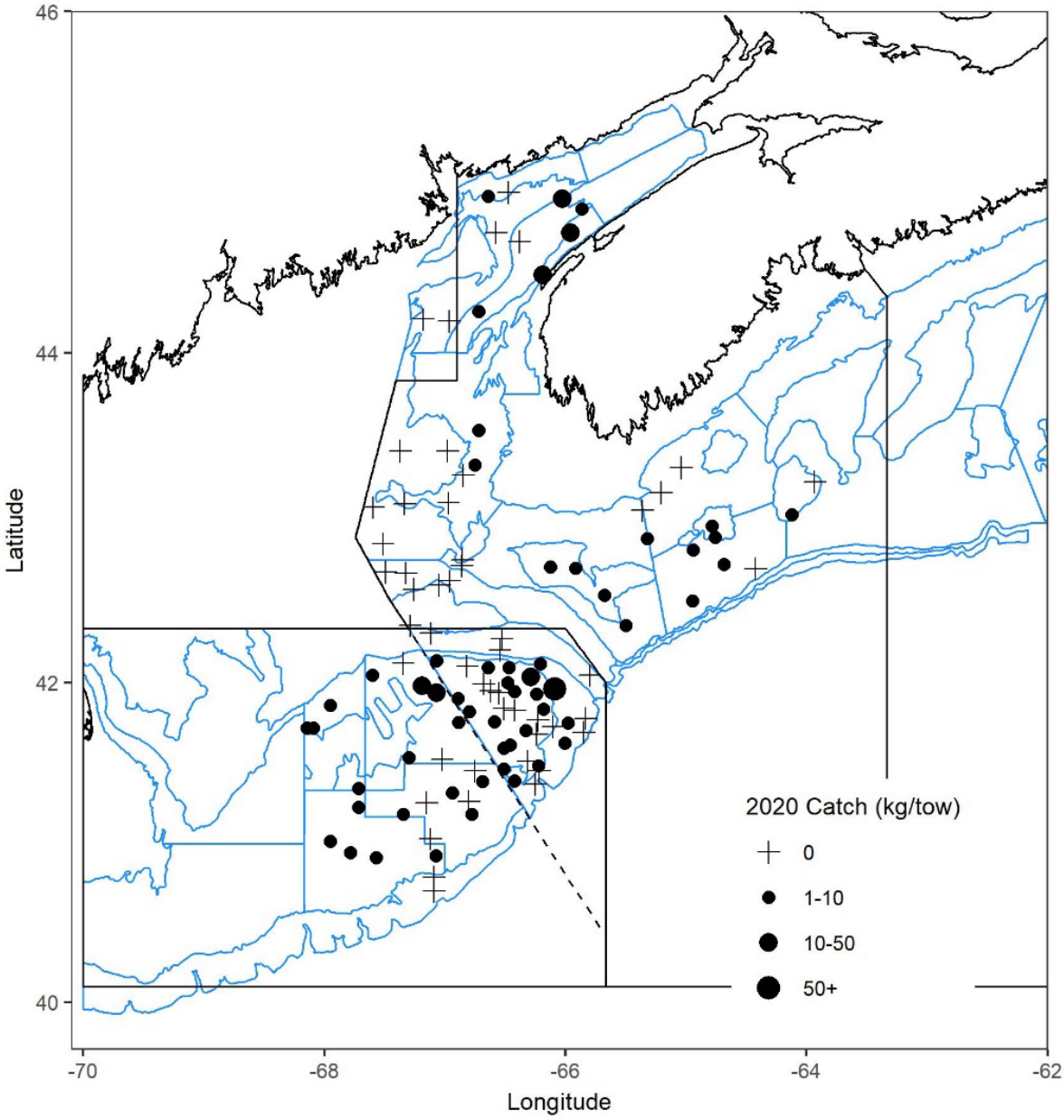

Figure 12a. Distribution of Longhorn Sculpin catches during the 2020 Winter RV Survey. Black circles represent catches. The circle area is proportional to the 2020 catch size. Zero catch is represented by the + symbol.

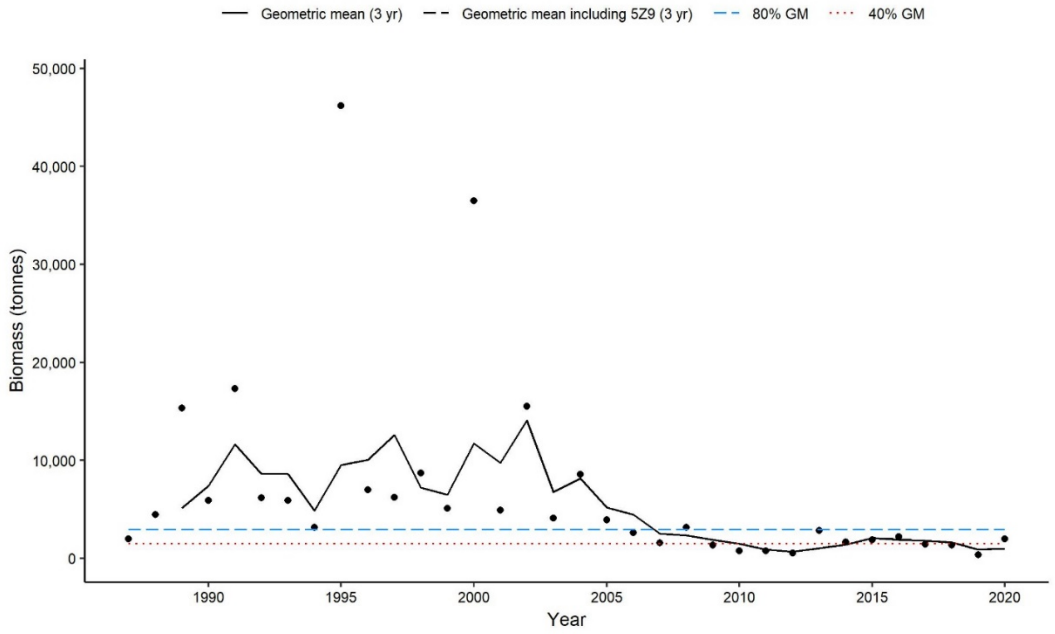

Figure 12b. Biomass index for Longhorn Sculpin in Strata 5Z1–5Z4 from the Winter RV Survey. The 3-yr geometric mean biomass for 5Z1–5Z4 is represented by the solid black line. The dashed black line represents the combined 3-yr geometric mean biomass (since 2010) of 5Z1–5Z4 and 5Z9. The dashed and dotted horizontal lines represent 80% and 40% of the long-term geometric mean (1987–2019), respectively. The large black dots represent the biomass estimate (5Z1–5Z4) for that year.

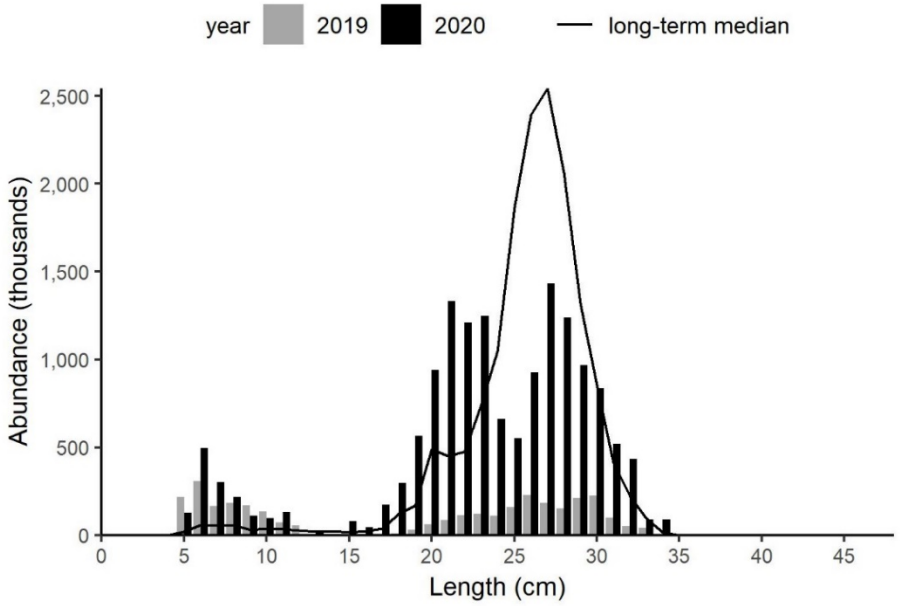

Figure 12c. Length-frequency indices for Longhorn Sculpin in Strata 5Z1–5Z4 from the Winter RV Survey. The grey bars represent the number-at-length from the 2019 survey. The black bars represent the number-at-length from the 2020 survey. The solid black line represents the median number-at-length for the time period 1987–2018.

Ocean Pout

Ocean Pout were caught in eight sets on Georges Bank and were not caught in 5Z9 or adjacent deep-water strata in 4X (Figure 13a). The 2020 biomass index for 5Z1–5Z4 is among the lowest in the series and the 3-yr GM remains well below 40% GM (Figure 13b). The 3-yr GM does not change with the inclusion of 5Z9, as this species is not generally found in deeper water. The abundance indices in 2020 were below the long-term median for most lengths but above the median at lengths <23 cm (Figure 13c).

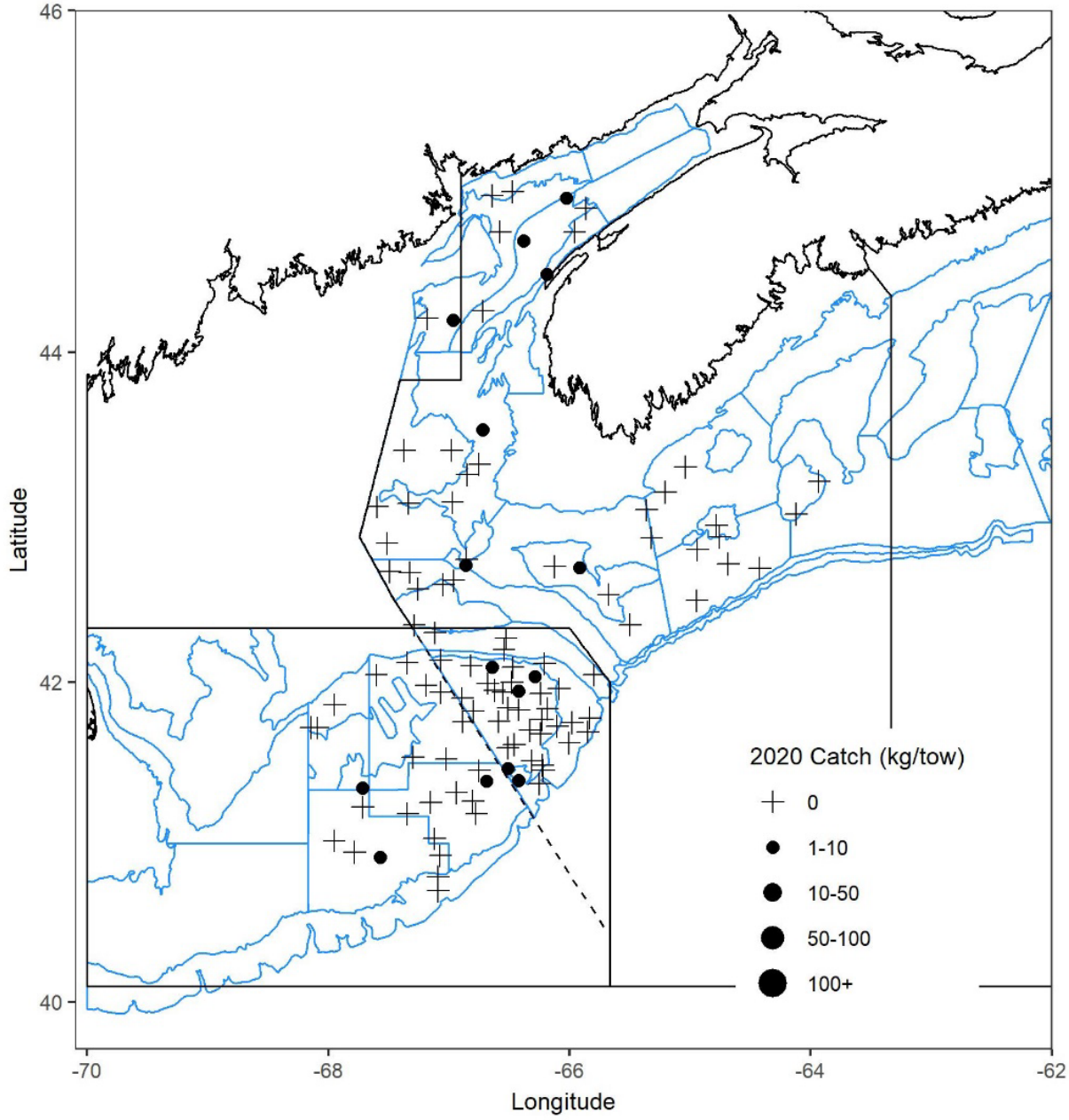

Figure 13a. Distribution of Ocean Pout catches during the 2020 Winter RV Survey. Black circles represent catches. The circle area is proportional to the 2020 catch size. Zero catch is represented by the + symbol.

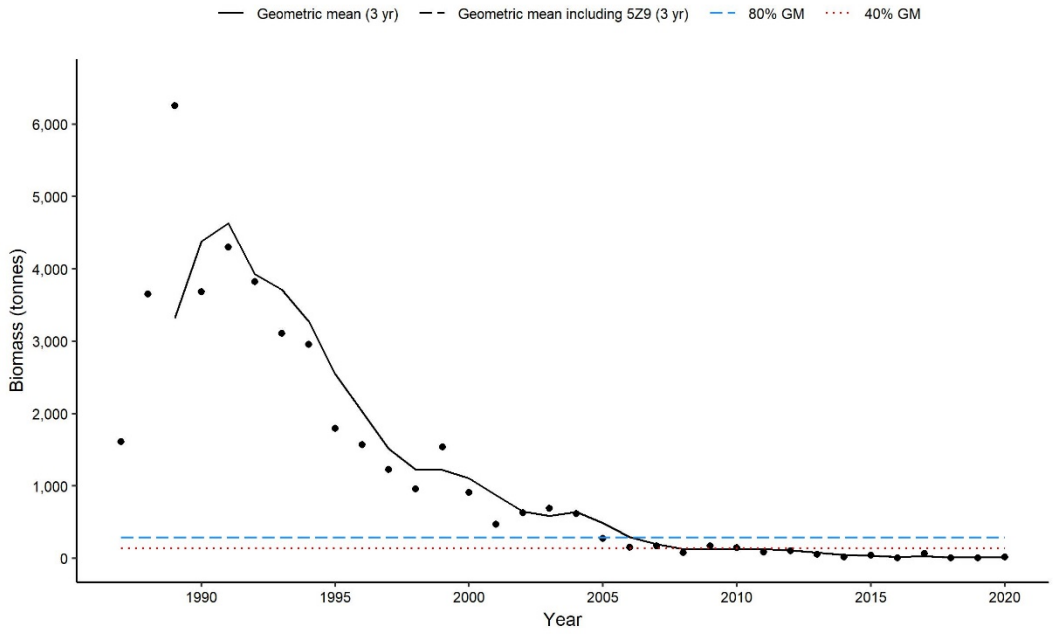

Figure 13b. Biomass index for Ocean Pout in Strata 5Z1–5Z4 from the Winter RV Survey. The 3-yr geometric mean biomass for 5Z1–5Z4 is represented by the solid black line. The dashed black line represents the combined 3-yr geometric mean biomass (since 2010) of 5Z1–5Z4 and 5Z9. The dashed and dotted horizontal lines represent 80% and 40% of the long-term geometric mean (1987–2019), respectively. The large black dots represent the biomass estimate (5Z1–5Z4) for that year.

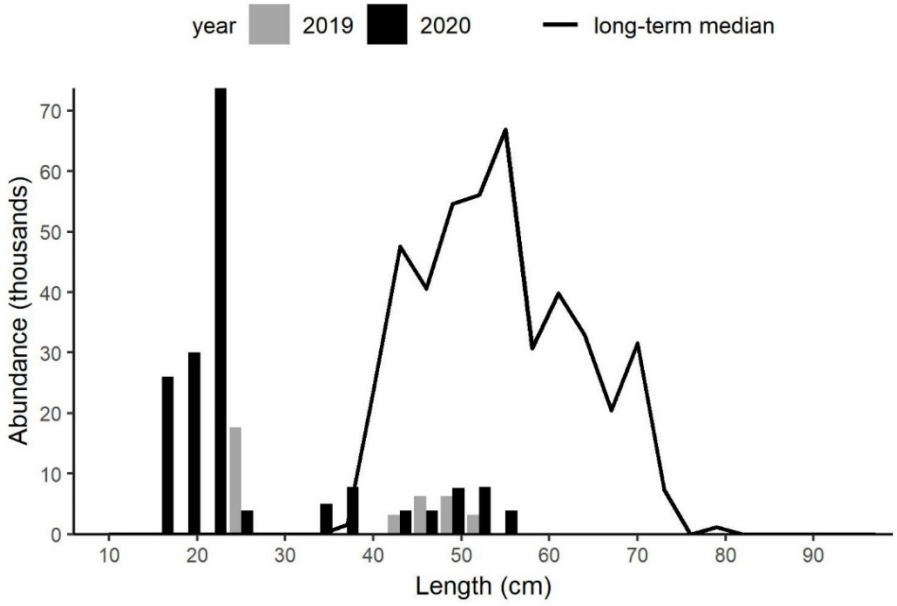

Figure 13c. Length-frequency indices for Ocean Pout in Strata 5Z1–5Z4 from the Winter RV Survey. The grey bars represent the number-at-length from the 2019 survey. The black bars represent the number-at-length from the 2020 survey. The solid black line represents the median number-at-length for the time period 1987–2018.

American Lobster

American Lobster catches were concentrated on the northeast portion of Georges Bank in 5Z1 and 5Z2, and they were caught in all but two sets in adjacent 5Z9 and 4X strata (Figure 14a). The 2020 biomass index for 5Z1–5Z4 is among the highest in the series and the 3-yr GM is well above 80% GM. Including 5Z9 in the biomass index almost doubles the indices (Figure 14b). The long-term median abundance-at-length index for 5Z1–5Z4 is 0 for all lengths, which reflects the infrequent catches of American Lobster at any length within the 5Z1–5Z4 area over most of the time series (Figure 13c). More recently, American Lobster are being captured at greater abundances for a wide range of lengths (Figure 14c).

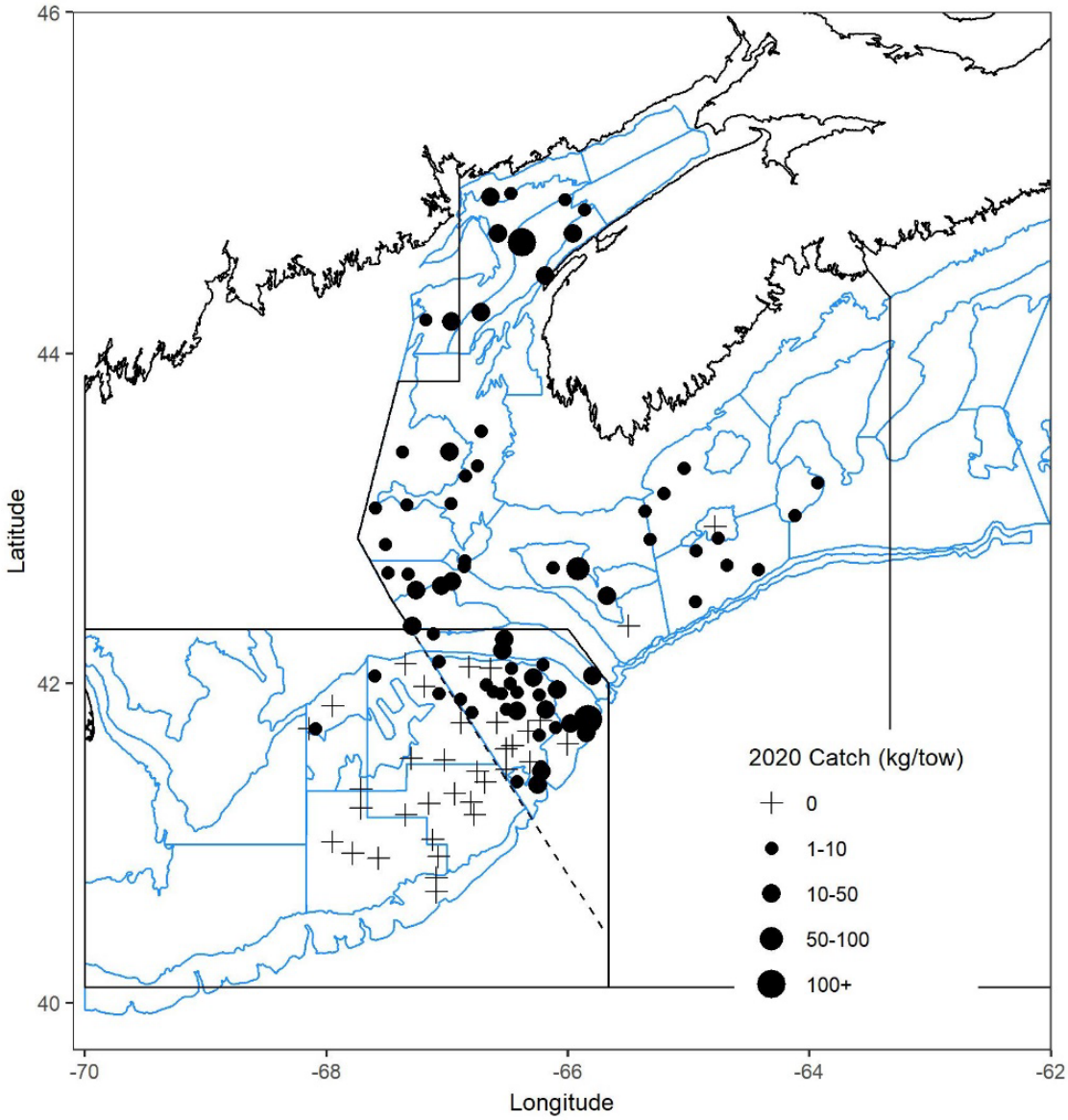

Figure 14a. Distribution of American Lobster catches during the 2020 Winter RV Survey. Black circles represent catches. The circle area is proportional to the 2020 catch size. Zero catch is represented by the + symbol.

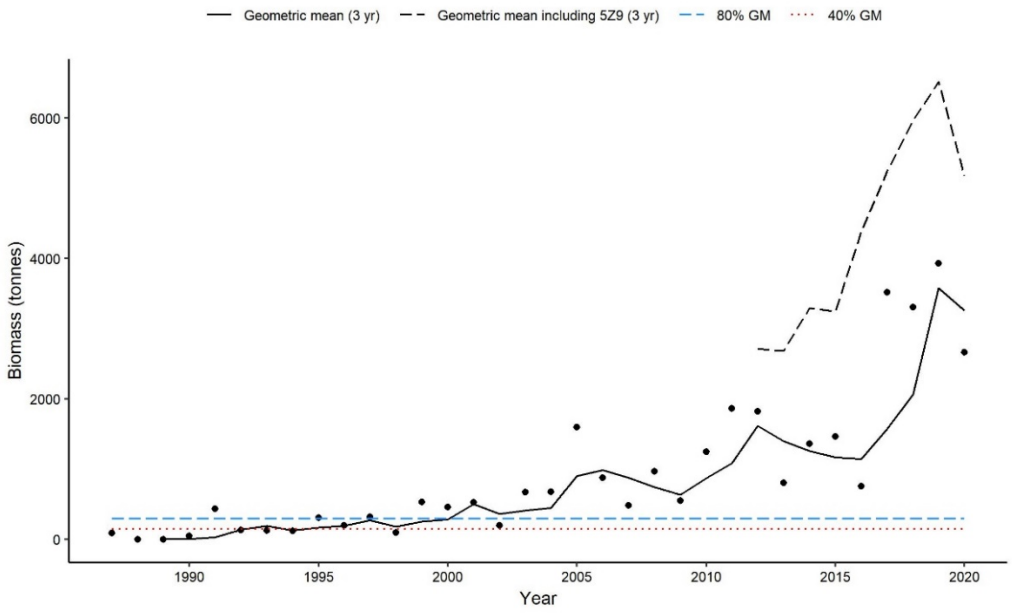

Figure 14b. Biomass index for American Lobster in Strata 5Z1–5Z4 from the Winter RV Survey. The 3-yr geometric mean biomass for 5Z1–5Z4 is represented by the solid black line. The dashed black line represents the combined 3-yr geometric mean biomass (since 2010) of 5Z1–5Z4 and 5Z9. The dashed and dotted horizontal lines represent 80% and 40% of the long-term geometric mean (1987–2019), respectively. The large black dots represent the biomass estimate (5Z1–5Z4) for that year.

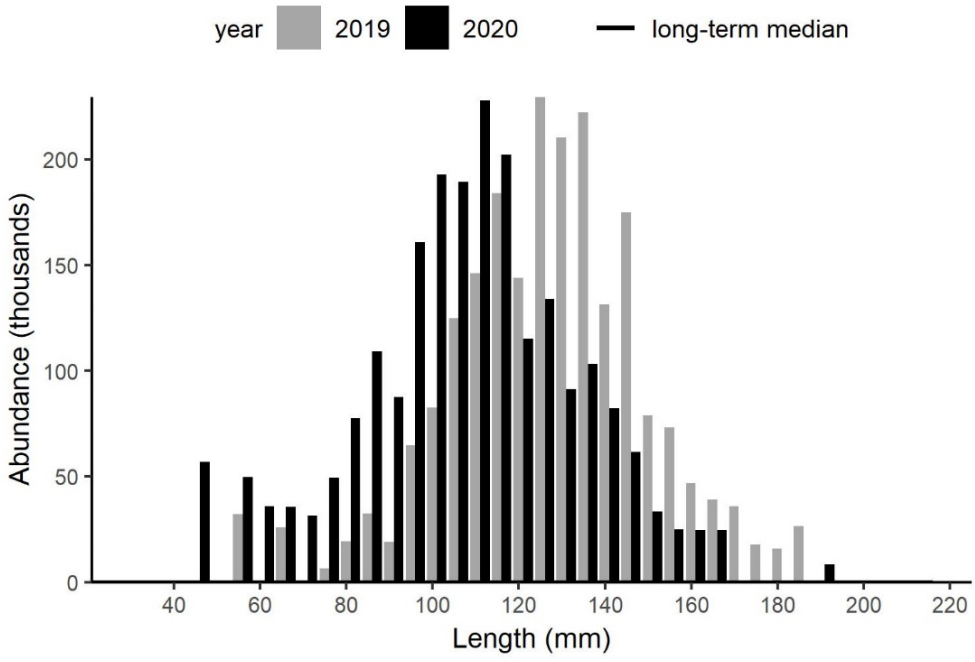

Figure 14c. Length-frequency indices for American Lobster in Strata 5Z1–5Z4 from the Winter RV Survey. The grey bars represent the number-at-length from the 2019 survey. The black bars represent the number-at-length from the 2020 survey. The long-term median is 0 for all lengths.

Conclusions

The 3-year GM biomass indices in 2020 for Strata 5Z1–5Z4 from the Winter RV Survey were below 40% of the long-term GM (1987–2019) biomass for Pollock, Yellowtail Flounder, Thorny Skate, Longhorn Sculpin, and Ocean Pout. For species such as Smooth Skate, Barndoor Skate, Pollock, and American Lobster, inclusion of Stratum 5Z9 made a clear difference to the 3-yr GM. Monitoring abundance trends for skates and Pollock, which have a much broader stock area and are primarily distributed in deeper water in winter, will require inclusion of data from outside the standard 5Z1–5Z4 area used for Georges Bank stocks. For some species, monitoring stock status will involve including data from additional strata, which do not have as long of a time series, or using a combination of winter and summer RV survey data.

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Sources of Information

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