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Canadian Science Advisory Secretariat
Maritimes Region **Science Response 2020/006**

SCALLOP FISHERY AREA/TIME CLOSURE TO PROTECT ATLANTIC COD (*GADUS MORHUA*) SPAWNING AGGREGATIONS IN NAFO DIVISION 5Z (GEORGES BANK)

Context

The need to reduce the fishing mortality experienced by Atlantic Cod (*Gadus morhua*) on the Canadian portion of Georges Bank has led to efforts by the offshore Scallop fishery to reduce Cod bycatch. Along with active avoidance protocols adopted by the offshore Scallop fleet, Fisheries and Oceans Canada (DFO) has implemented area/time closures from early February to the end of March since 2005. The objectives of these closures are to reduce bycatch and minimize disturbance to spawning aggregations of Cod by the offshore Scallop fishery on Georges Bank.

This document provides information on the spatial distribution of Cod abundance on eastern Georges Bank during the spawning period based upon the DFO Winter Georges Bank Research Vessel (RV) Survey and its overlap with Scallop catches on the Canadian portion of Georges Bank. Areas of high Atlantic Cod concentration (defined as a standardized average of 3.5 or more Age 3+ Cod per tow for the last 10 years) are used to determine the distribution of spawning aggregations of Atlantic Cod on Georges Bank.

This Science Response Report results from the Science Response Process of December 18, 2019, on the Status Update of Scallop Fishery Area Closures on Georges Bank to Protect Cod Spawning Aggregations.

Analysis and Response

The 2019 first quarter Canadian offshore Scallop catches from Georges Bank correspond to approximately 29% (1541 tonnes (t) of meats) of the Total Allowable Catch (TAC) for the year, which is above the long-term average percentage for the first quarter (19% since 1990).

The information used in this analysis has been updated with the 2019 Cod abundance data on eastern Georges Bank obtained from the annual DFO RV Winter Survey, as well as Scallop catches from the Canadian offshore Scallop fishery. Details on the methods for this analysis can be found in the Maritimes Region Science Expert Opinion 2006 (DFO 2006). Information from the DFO Winter RV Survey for Northwest Atlantic Fisheries Organization (NAFO) subdivision 5Zjm conducted in February and March was used to identify areas of high aggregations of adult (Age 3+) Cod. The distribution of Age 3+ Cod was plotted on a grid of 5-minute longitude by 3.33-minute latitude cells (approximately 12.5 nautical miles^2 or 43 km^2 per cell). Cod abundance data were standardized for each year by dividing the number of Age 3+ Cod per tow by the annual mean number of Age 3+ Cod per tow for strata within NAFO subdivision 5Zjm. These standardized estimates were then averaged in each cell using the most recent 10 years of data (2010-2019). Using 10 years of data enables the analysis to account for recent shifts in distribution while reducing the influence of both very large tows and annual variability. Prior to 2013, the full time series was used for this analysis, but the 2013 analysis found that the full time series was unable to identify recent changes in distribution (DFO 2013).

The cells with a standardized average of 3.5 or more Age 3+ Cod per tow for the last 10 years were numbered 1 to 13 in order of decreasing abundance (Figure 1). These cells were compared to 2019 first quarter Scallop catches (Figure 2; Table 1). Of the 13 cells ranked in the previous year's analysis, 12 remained as ranked cells in this analysis. One additional cell along the northern edge of the bank was ranked this year.

In 2019, six cells were closed (see asterisks in Figures 1 and 2) and five of these cells have been ranked again this year (cells 1, 6, 7, 11 and 12; see Variation Order MAR-2019-039 and DFO 2019). The largest aggregations of Cod occurred near the north-central area of the Bank.

Figure 1. Distribution of aggregated Age 3+ Cod on eastern Georges Bank from DFO Winter RV Survey (2010 to 2019). Cells that were part of the 2019 Scallop-fishery Cod closure are indicated by an asterisk (*). The horizontal solid grey line demarcates NAFO subdivisions 5Zj and 5Zm. The diagonal solid grey line demarcates the Georges Bank Scallop management areas 'a' and 'b'. The diagonal dashed grey line indicates the Canada/USA International Court of Justice line. The red boxes indicate Scallop fishery closures that were in place during the first quarter of 2019; these closures are voluntary closures implemented by the Canadian offshore Scallop fleet and were opened later in 2019.

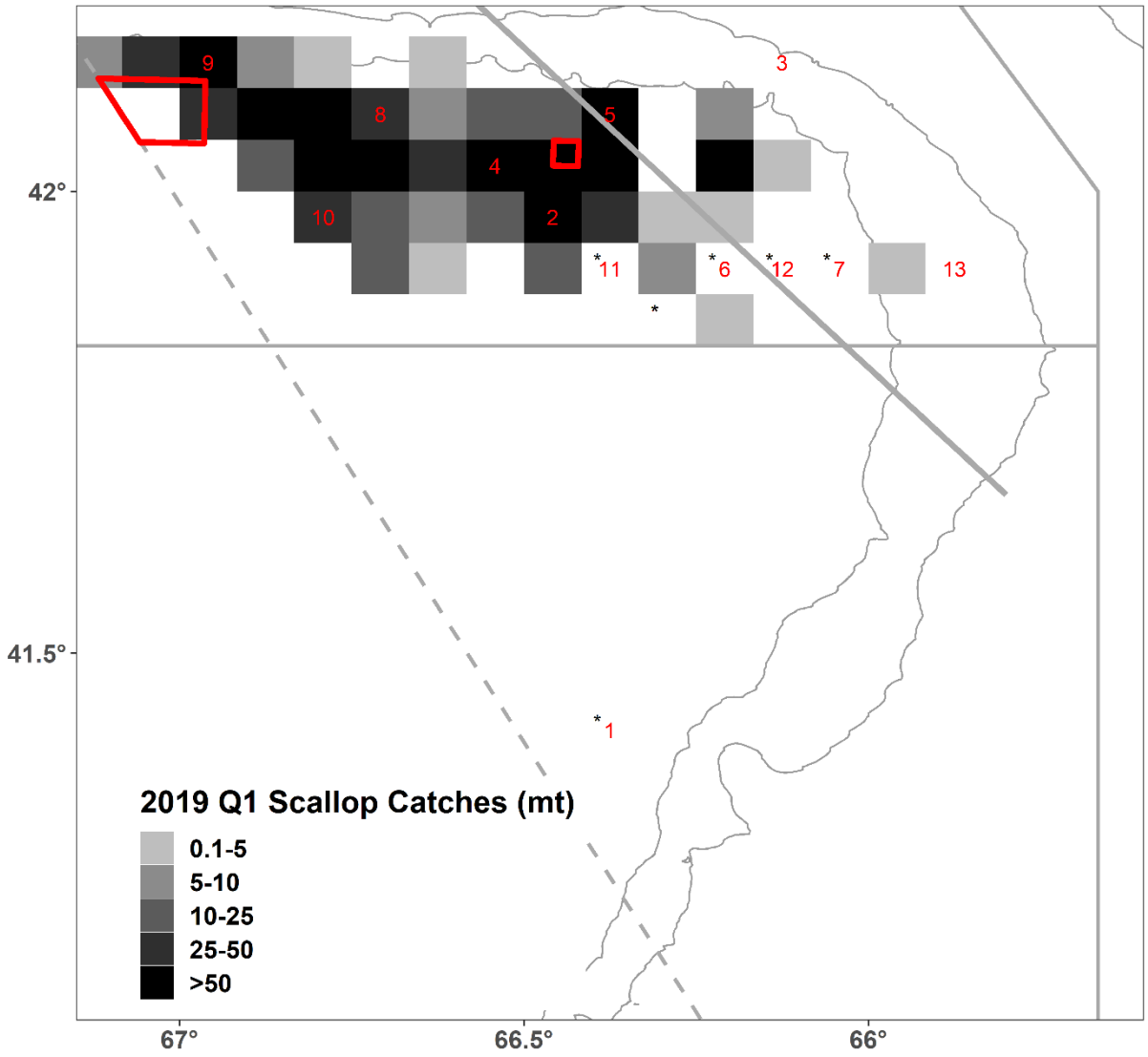

Figure 2. Distribution of Georges Bank offshore Scallop catch (tonnes (t) of meat) by the Canadian Scallop fishery during the first quarter of 2019. The darkest cells have values ranging from 51 to 168 tonnes of scallop meat. Cells that were part of the 2019 Scallop-fishery Cod closure are indicated by an asterisk (*). The horizontal solid grey line demarcates NAFO subdivisions 5Zj and 5Zm. The diagonal solid grey line demarcates the Georges Bank Scallop management areas 'a' and 'b'. The diagonal dashed grey line indicates the Canada/USA International Court of Justice line. The numbers 1 to 13 represent the ranked Cod cells from Figure 1. The red boxes indicate Scallop fishery closures that were in place during the first quarter of 2019; these closures are voluntary closures implemented by the Canadian offshore Scallop fleet and were opened later in 2019.

Table 1. The first quarter Scallop catch (tonnes of meat) in 2019 from the Canadian offshore Scallop fleet for each of the high density Cod cells. High density Cod cells are cells with 3.5 or more standardized Age 3+ Cod on average over the last 10 years of the DFO Winter RV Survey (2010 to 2019). The Cod cells, numbered 1 to 13, are in descending order of Cod abundance. The greyscale rankings are used to highlight cells with Scallop catch (darker represents increased catch). Note that the values in Table 1 prior to 2019 have been updated and may vary from the values used in previous updates.

	Cod Cell Rank													
Year	**1***	**2**	**3**	**4**	**5**	**6***	**7***	**8**	**9**	**10**	**11***	**12***	**13**	
2019	0	170	0	94.3	50.7	0	0	34.9	80.2	45.0	0	0	0	
2018	0	67.0	0	36.1	11.4	0	0	62.4	16.3	22.8	0	0	0	
2017	0.5	47.3	0	64.3	9.8	7.9	0	117	36.1	4.9	1.4	0	0	**Legend**
2016	0	7.8	0	4.1	0	1.1	0	29.1	18.3	4.9	0	0	0	Catch > 50
2015	0	6.5	0	1.0	0	1.5	0	2.0	12.6	16.7	0	0	0	25 < Catch ≤ 50
2014	0	98.0	0	59.9	7.2	0	0	16.9	13.4	2.3	0	0	0	10 < Catch ≤ 25
2013	0	0.4	0	39.0	10.3	0	0	22.8	44.8	0	0	0	0	5 < Catch ≤ 10
2012	0	0.6	0	9.1	0	9.8	0	8.3	2.0	0	19.4	0	0	0 < Catch ≤ 5
2011	0	6.8	0	17.6	0	0	0	0.4	36.3	6.4	5.8	0	0	Catch = 0
2010	0	14.9	0	3.2	0	0.8	0	0.4	4.0	154	0	0	0	

* indicates cells that were part of the 2018 closure

Six of the top 13 ranked Cod cells had Scallop catches in the first quarter of 2019 (cells 2, 4, 5, 8, 9, and 10; Table 1). The catch from these cells was 475 t of meat for this period (approximately 31% of the total Canadian first quarter Georges Bank Scallop catch).

The cells selected for closure in 2019 (see asterisks in Figure 2 and Table 1) had no first quarter Scallop catch prior to the closure, which began on February 3, 2019. A closure similar to 2019 based on the top ranking cells would have a relatively low impact on the offshore Scallop fishery if the 2020 first quarter Scallop fishing distribution is similar to that of the first quarter in 2019 (Figure 2).

Conclusions

Based on a 10-year average of DFO Winter RV Survey data, the highest densities of Cod on Georges Bank are found in the northern portion of the bank. There were 13 cells with more than 3.5 Age 3+ Cod per standardized tow, and 12 of these cells were found in this northern area. A Cod area/time closure based on the top ranking cells would have a relatively low impact on the offshore Scallop fishery provided the 2020 first quarter Scallop fishing distribution is similar to that of the first quarter in 2019.

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Sources of Information

DFO. 2006. Science Expert Opinion on Scallop Fishery Area/Time Closure - 2006. Mar. Reg. Expert Opin. 2006/05.

DFO. 2013. Scallop Fishery Area/Time Closure to Protect Cod Spawning Aggregations in 5Z (Georges Bank). DFO Can. Sci. Advis. Sec. Sci. Resp. 2013/008.

DFO. 2019. Scallop Fishery Area/Time Closure to Protect Atlantic Cod (Gadus morhua) Spawning Aggregations in NAFO Division 5Z (Georges Bank). DFO Can. Sci. Advis. Sec. Sci. Resp. 2019/019

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