



# UPDATE OF STOCK STATUS INDICATORS OF ATLANTIC COD IN THE NORTHERN GULF OF ST. LAWRENCE (3PN, 4RS) IN 2021

## Context

The most recent assessment of the northern Gulf of St. Lawrence (3Pn, 4RS) Atlantic cod (*Gadus morhua*) stock was conducted in February 2019 (DFO 2019). The next full assessment of this stock is scheduled for February 2023. In the interim years, an update of the main indicators of this resource is conducted to determine if major changes in stock status have occurred (DFO 2019).

This Science Response Report results from the Regional Science Response Process of January 26, 2022 on the update of stock status indicators for cod (3Pn4RS) in the northern Gulf of St. Lawrence.

## Background

The indicators used to monitor the state of the stock in the intermediate years are the landings from the commercial fishery, the biomass and abundance indices from the bottom trawl survey carried out by Fisheries and Oceans Canada (DFO) in the northern Gulf of St. Lawrence (NAFO divisions 4RS) and indices from the sentinel fishery (trawl, longline and gillnet) conducted in NAFO Sub-Division 3Pn and Divisions 4RS (DFO 2019). The calculations of these indices are based on the methods described in Brassard et al. (2020).

## The Fishery

The total allowable catch (TAC) was 1 000 t for the 2021-2022 fishing season (from May 15, 2021 to May 14, 2022). As of December 20, 2021, preliminary landings of cod totalled 668 t (Figure 1), 26% of which were landed in Quebec and 74% in Newfoundland and Labrador. The two main fishing gears used were gillnet (73%) and longline (24%). In 2021, the recreational fishing season was 39 days and no estimate of catches is available. However, estimates of harvest by this activity from several sources of data (DFO, unpublished data and Benoît et al. (2021)) have determined that the recreational cod fishery is important in the northern Gulf of St. Lawrence. Since 2008, the majority of catch estimates in recreational fishing have been between 200 to 500 tonnes of cod per year, which could represent around 40% of the total annual catches in recent years.

## Analysis and Response

### Stock Status Indicators

#### DFO Bottom Trawl Research Survey (4RS)

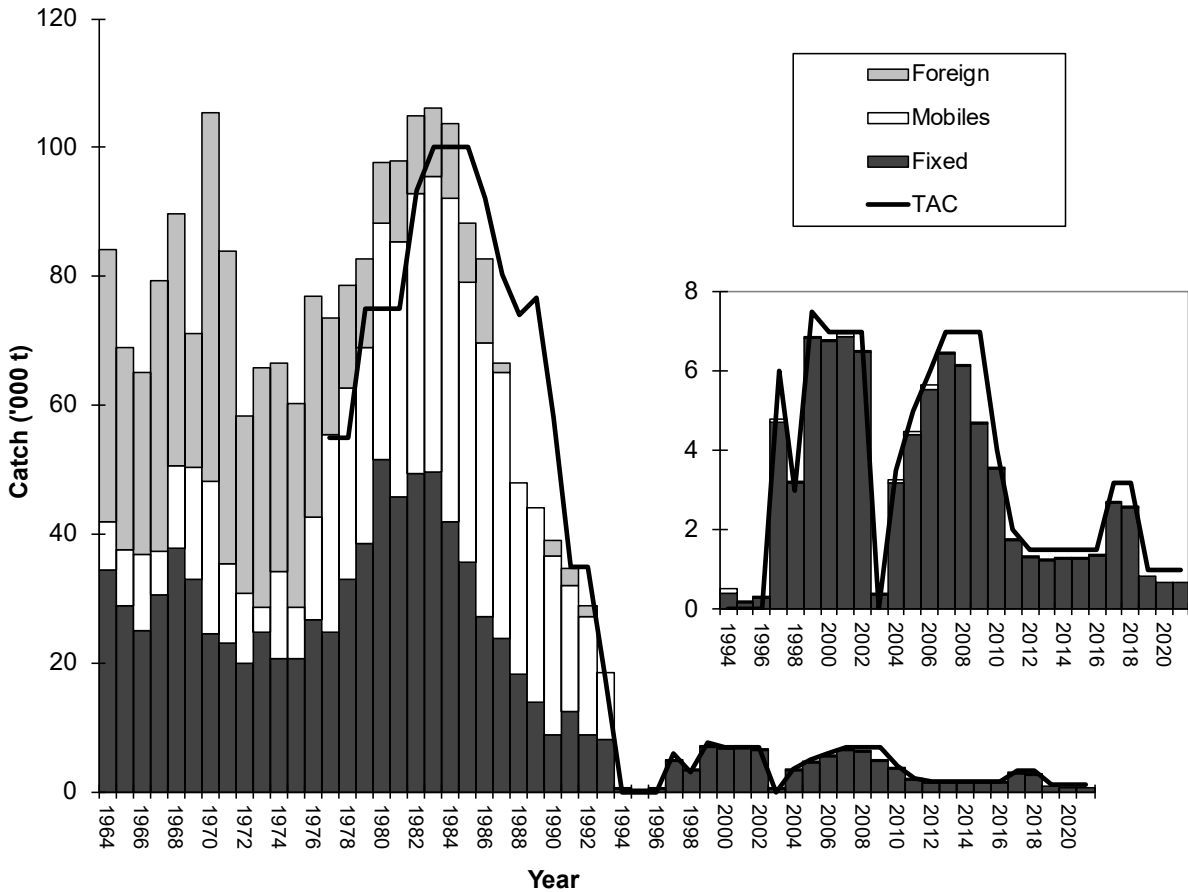
In the DFO survey, the average number and weight of cod per tow had generally shown a slow and gradual increase from 1993 to 2014. From 2014 to 2016, the values of these indices were stable and above the series average. These indices fluctuated between 2017 and 2020. In

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**Quebec Region**

2021, the average number per tow and the average weight were above the average of their respective series (Figure 2).

In 2021, the size frequency distribution of cod caught indicated that the abundance of fish over 40 cm was similar to the series average. However, juvenile cod whose size is between 28 and 38 cm have an abundance greater than the average for the series. These fish are from the 2018 cohort (Figure 3).



*Figure 1. Annual landings by fleet and total allowable catches (TAC) by management year (1964 to 1998, management according to calendar year; 1999: TAC from 1999/01/01 to 2000/05/14; 2000 to 2021: TAC from May 15 to May 14 of the following year).*

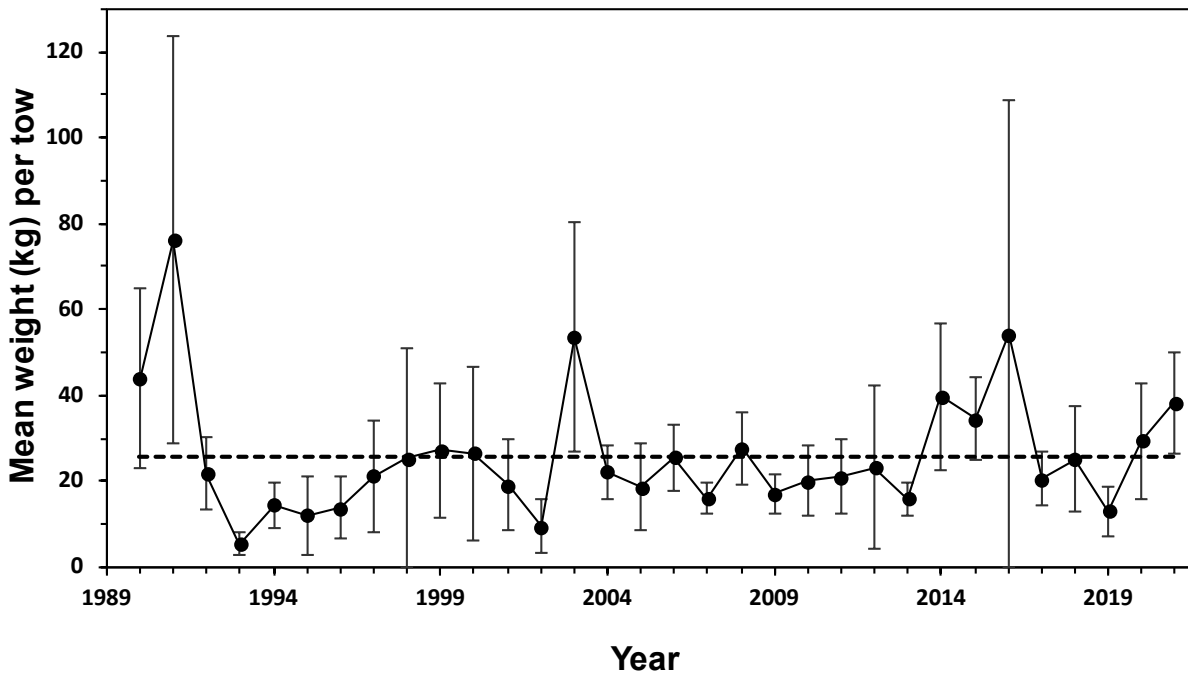
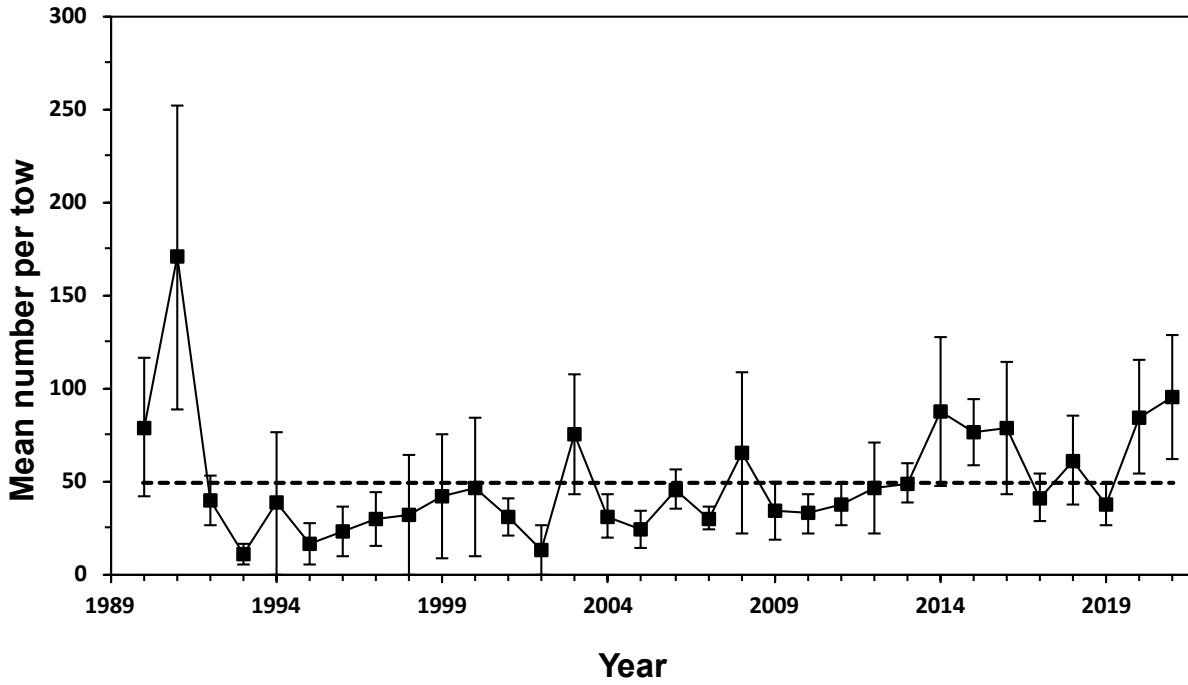


Figure 2. Average number and average weight of cod per 15-minute tow observed between 1990 and 2021 during DFO research surveys (4RS). The dotted line represents the 1990–2020 series average.

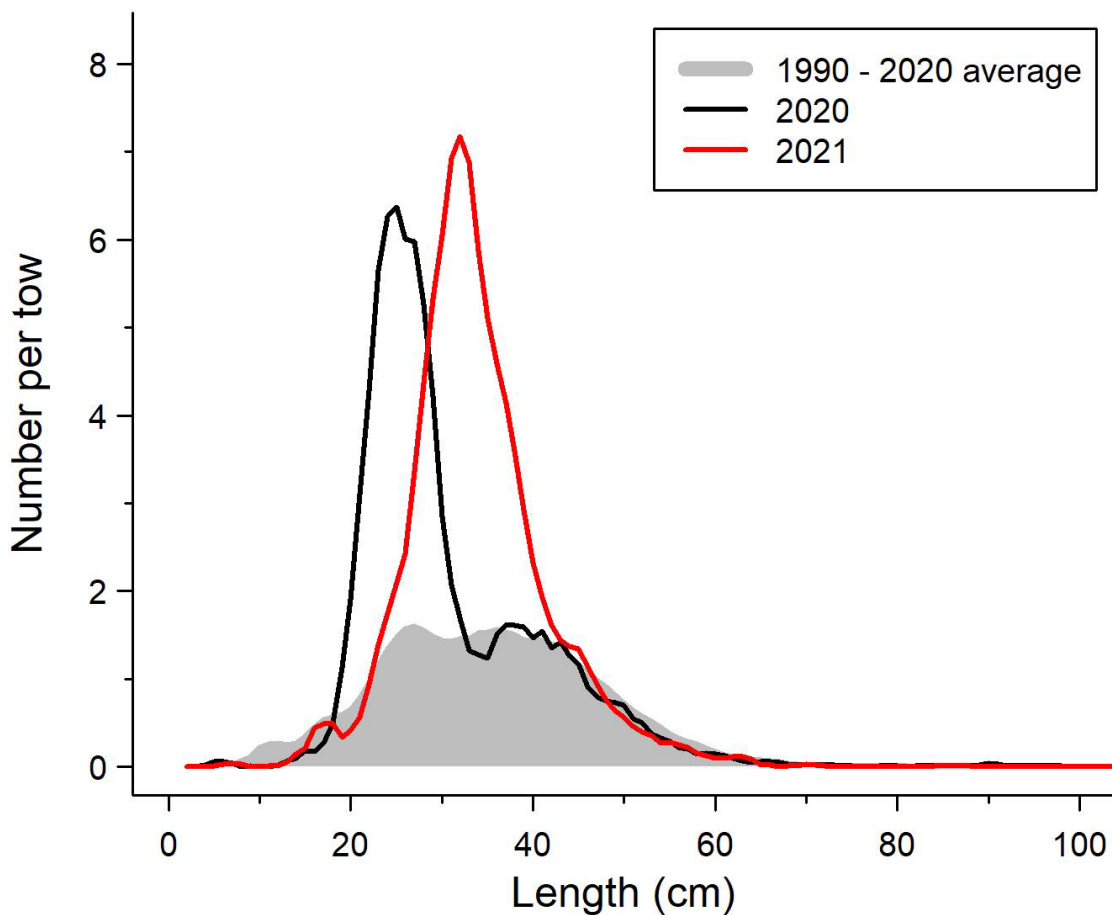


Figure 3. Length frequency distributions of cod (mean number per 15-minute tow) in the DFO survey in NAFO divisions 4RS.

#### Sentinel Fisheries Program – Mobile Gear Survey (3Pn, 4RS)

The average number of cod abundance index per tow from the mobile gear sentinel survey showed some stability from 2003 to 2009 and then fluctuated without showing a clear trend. From 2017 to 2019, this index was below the average for the series (2003-2020), while in 2020 and 2021, the observed values were near this average (Figure 4).

In 2021, the size frequency distribution of cod shows that the abundance of fish over 40 cm was lower than the series average (2003-2020) and that of cod between 28 and 35 cm was higher than the series average, these cod correspond to the 2018 cohort (Figure 5).

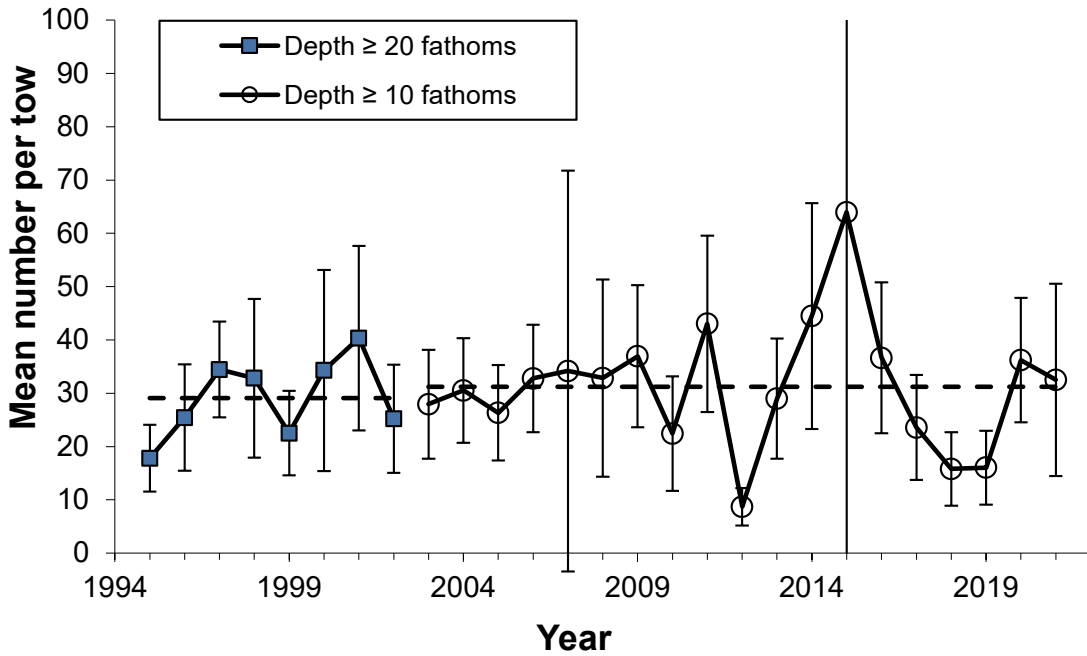


Figure 4. Average number of cod per 30-minute tow ( $\pm$  95% confidence interval) during the mobile survey of the sentinel program (1995 to 2002, including strata of more than 20 fathoms; 2003-2021, includes strata of more than 10 fathoms). The dotted line represents the average of each series (1995-2002 and 2003-2020).

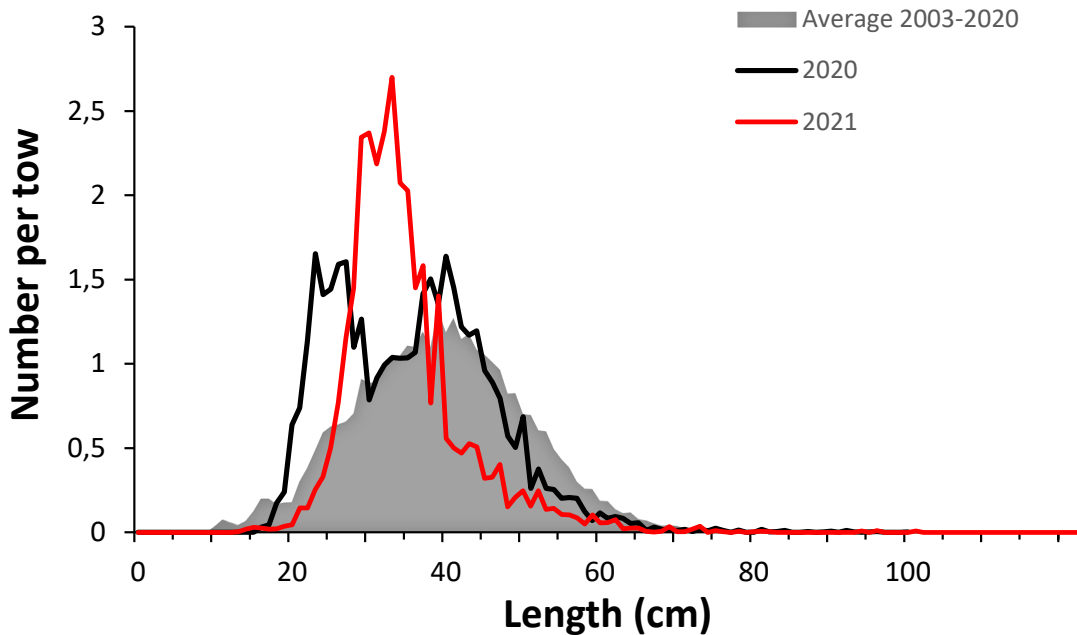


Figure 5. Length frequency distributions (mean number per 30-minute tow) observed for Atlantic cod from the mobile survey (depth  $\geq$  10 fathoms) of the sentinel fishery program in NAFO Divisions 3Pn, 4RS

### Sentinel Fisheries Program – Fixed Gear (3Pn, 4RS)

The standardized catch per unit effort (CPUE) index of the longline sentinel fisheries program increased from 1995 to 2006 and then decreased until 2010. It subsequently fluctuated around the average (1995-2020). The 2021 value was lower than the series average (Figure 6). The standardized CPUE index of the gillnet sentinel fisheries shows a similar pattern to that of the longline sentinel fisheries index. However, from 2017 to 2021, the values were at the level of the series average (Figure 6). These last two indices are mainly representative of the abundance of commercial-size cod (Brassard et al. 2020).

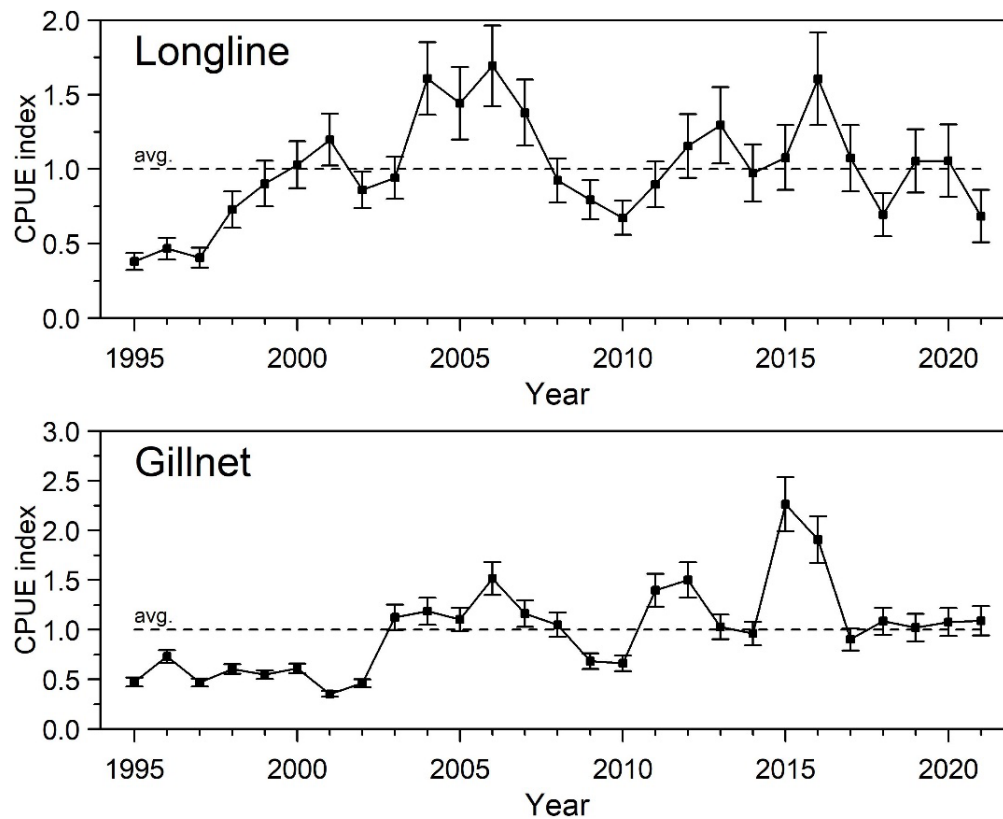


Figure 6. Standardized catch per unit of effort (CPUE) ( $\pm$  95% confidence interval) of the sentinel fixed gear program (longline and gillnet). The dotted line represents the average of the 1995-2020 series. These data are preliminary.

## Conclusion

The abundance of commercial-sized cod appears to be stable as the arrival of a new cohort is underway. The fish in this new cohort, whose size is well below the commercial regulatory size of 43 cm, will not be available for the 2022-2023 commercial fishing season.

The update of the main indicators for monitoring the status of the Atlantic cod stock in the northern Gulf of St. Lawrence (3Pn, 4RS) in 2021 does not present any major changes compared to the previous assessment. Therefore the conclusion of the most recent scientific advice remains appropriate: "According to the precautionary approach, harvests from all sources should be as low as possible in order to promote spawning stock biomass recovery."(DFO 2019).

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**Sources of Information**

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