Fisheries and Oceans Canada / Pêches et Océans Canada
Ecosystems and Oceans Science / Sciences des écosystèmes et des océans

Newfoundland and Labrador Region

Canadian Science Advisory Secretariat
Science Advisory Report 2022/022

# STOCK ASSESSMENT OF NAFO SUBDIVISION 3PS COD

*Image:* Atlantic Cod *Gadus morhua.*

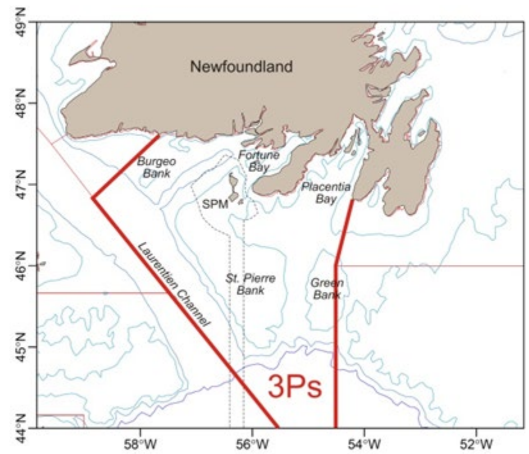


*Figure 1: Subdivision 3Ps management area and economic zone around the French islands of St. Pierre et Miquelon (SPM, dashed line).*

**Context:**

*The Northwest Atlantic Fisheries Organization (NAFO) Subdivision (Subdiv.) 3Ps stock of Atlantic Cod (*Gadus morhua*) off southern Newfoundland extends from Cape St. Mary's to just west of Burgeo Bank, and over St. Pierre Bank and most of Green Bank (Figure 1). The fishery on this stock is managed jointly by Canada and France. The present assessment is the result of a request for science advice from the Resource Management Branch of Fisheries and Oceans Canada (DFO), Newfoundland and Labrador (NL) Region. The main objectives were to evaluate the status of the stock and to provide scientific advice concerning conservation outcomes related to various fishery management options.*

*This Regional Science Advisory Report (SAR) is from the November 8–10, 2021 Assessment of NAFO Subdiv. 3Ps Atlantic Cod and summarizes the main scientific advice from this meeting. A number of other data sources and analyses were explored over the course of the meeting. These other analyses as well as further details on analyses contained herein can be found in the Canadian Science Advisory Secretariat (CSAS) Research Document Series and Proceedings. These additional publications will be posted on the Fisheries and Oceans Canada (DFO) Science Advisory Schedule as they become available.*

## SUMMARY

- This stock is assessed using an integrated state-space model, which incorporates landings and catch-at-age (1959–2020), time-varying natural mortality informed by trends in cod condition, and includes abundance indices from research surveys using bottom trawls conducted by Canada (1983–2021), France (1978–91), industry (Groundfish Enterprise Allocation Council [GEAC],1998–2005), and standardized catch rate indices from inshore Sentinel gillnet and line-trawl surveys (1995–2020).

- Spawning Stock Biomass (SSB) in 2022 is projected to be 31.5 kt (95% CI: 25.3–49.5 kt). SSB remains in the critical zone, at 48% (95% CI: 38–60%) of the Limit Reference Point (LRP) as defined by the DFO Precautionary Approach (PA) Framework.
- The stock and fishery are dominated by a single cohort (2011), which accounted for 29% of the SSB in 2021 and 45% of the commercial catch in 2020. Recruitment since the 2011 cohort has remained among the lowest in the time series.
- Natural mortality (M) is currently driving the dynamics of this stock. M has increased from the early 2000s and is estimated at 0.34 (ages 5–8) in 2021. Fishing mortality has been declining since 2000 and in 2021 is estimated to be 0.03, the lowest level since the moratorium (1994 to 1996).
- Ongoing warming trends, together with more recent increased dominance of warm water fishes, indicate that this ecosystem continues to experience structural changes. In this context, bottom-up effects are contributing to poor fish condition and high natural mortality of cod.
- Projection of the stock to 2024 was conducted assuming fishery removals ranging from 0 to 2.3 times an assumed catch of 1,346 t for 2021. Under these scenarios, there is a probability >99% that the stock will remain below the LRP between 2022 and the beginning of 2024.
- Stock growth is projected over the short term (to 2024) at probabilities of 50% and 75% with removals of 3,100 t and 1,600 t, respectively. However at the upper range of these catches stock decline in 2023 should be expected. When there are no removals in this period, the probability of stock growth is 93%.
- Consistency with the DFO decision-making framework incorporating the PA requires that removals from all sources must be kept at the lowest possible level until the stock clears the Critical Zone.

# INTRODUCTION

## Oceanography and Ecosystem Overview

Oceanographic conditions in Subdiv. 3Ps are influenced by the Labrador Current from the east, the warmer and saltier Gulf Stream waters from the south, as well as the complex bottom topography in the region and local atmospheric climate conditions. Near-bottom temperatures have experienced a general warming trend in some areas since 1990, with 2021 being the warmest of years with available data (data available from 1982–84, and since 1993).

Satellite remote sensing data (1998–2021) indicated that the timing of onset and duration of the spring phytoplankton bloom in Subdiv. 3Ps were normal for this period in 2021. Surface production was also normal during 2021, following three consecutive years of above normal production. No zooplankton data were available from 2019 to 2021.

The overall biomass of the Subdiv. 3Ps fish community declined in the late 1980s and early 1990s then remained relatively stable. There are some indications of improvement since 2018. The overall abundance generally increased from the mid-1990s to early 2010s driven by increases in small planktivorous fishes (e.g., sandlance [*Ammodytes sp.*]), but has declined since. Atlantic Cod was the historically dominant species among predatory fishes in this ecosystem unit, but its dominance has been markedly reduced since 2010 due to increases in warm water species such as Silver Hake (*Merluccius bilinearis*).

Cod in Subdiv. 3Ps has shown a variable diet composition over time (e.g., Redfish [*Sebastes spp.*] and Capelin [*Mallotus villosus*] in the mid-1990s, Snow Crab [*Chionoecetes opilio*] and sandlance in the mid-2010s). These changes indicate less consistency in diet composition relative to adjacent stocks in the NL bioregion, suggesting that food availability in this ecosystem unit may be highly variable. This, in conjunction with overall declines in weight-at-age and generally poor cod condition in the 2010s could indicate food limitation effects on cod. The changes in species composition in the fish community, cod diet, and condition metrics are evidence that the structure of the Subdiv. 3Ps ecosystem may be changing.

A very small proportion of the Grey Seal (*Halichoerus grypus*) population in Atlantic Canada utilizes Subdiv. 3Ps. Satellite tagging data (Hammill et al. 2017) indicates that Grey Seals that travel to this area are mostly found during the summer months. Harbour Seals (*Phoca vitulina*) are found in Subdiv. 3Ps throughout the year. An aerial survey for Harbour Seals was flown along the Newfoundland coastline during the summer of 2021 and data analysis is ongoing. Available dietary data collected the south coast of Newfoundland (particularly Placentia Bay and the Burin Peninsula) and Miquelon, France indicates that Atlantic Cod are rarely seen in the diets of Grey or Harbour Seals in Subdiv. 3Ps (Stenson and Hamilton, unpublished data).

## Fishery

In the 1960s and early-1970s, this stock was heavily exploited, with catches at their highest in 1961 at 87 kt (Figure 2). A total allowable catch (TAC) was introduced in 1973 at 70,500 t. Landings then decreased sharply in the early 1990s and a moratorium was imposed in August 1993. The fishery reopened in May 1997 with a TAC of 10,000 t, which increased to 30,000 t by 1999 and has declined since. The TAC was set at 2,691 t and 1,346 t for the 2020–21 and 2021–22 management periods, respectively. TAC and reported combined landings by Canada and France over the past decade are shown in Table 1.

Of the 1,776 t landed during the 2020–21 season, 1,749 t was taken by Canada (including 15 t from Sentinel Surveys), and 27 t was landed by France. Catch-at-age determined from sampling of the commercial catch indicates that the 2011 year class (9 years old in 2020) continues to be dominant in the fishery, and in the 2020 season accounted for roughly 45% of the catch by weight. Typically the fishery on this stock harvests primarily ages 5–8.

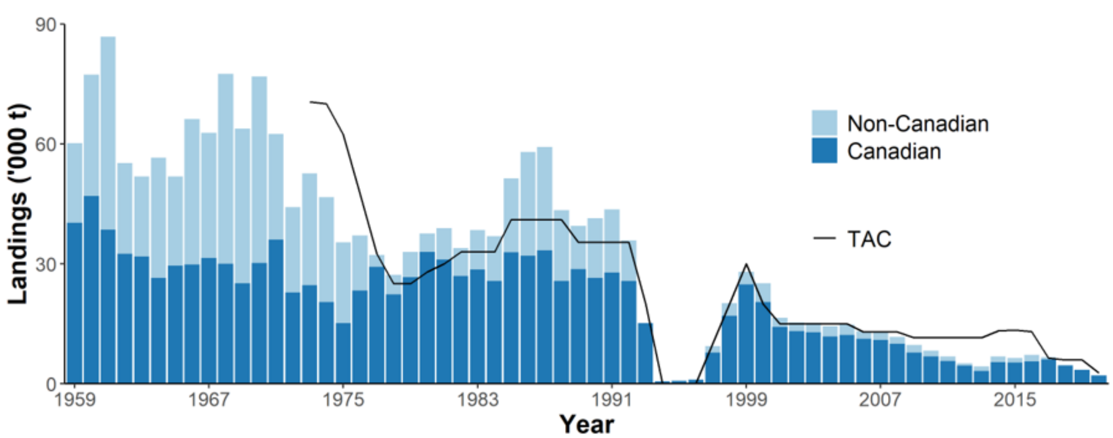


*Figure 2: Reported annual landings and TACs (t) in 1959–2020. Values are based on calendar year in 1959–99 and on management year (1 April-31 March) since 2000.*

*Table 1: TAC and landings by management year (thousand metric tons)*

| Management Year | 12–13 | 13–14 | 14–15 | 15–16 | 16–17 | 17–18 | 18–19 | 19–20 | 20–21[1] | 21–22[1,2] |
|---|---|---|---|---|---|---|---|---|---|---|
| TAC[3] | 11.5 | 11.5 | 13.225 | 13.49 | 13.043 | 6.5 | 5.98 | 5.98 | 2.691 | 1.346 |
| Canada | 4.0 | 4.6 | 5.8 | 5.9 | 5.2 | 4.9 | 4.5 | 3.3 | 1.75 | .5 |
| France | 0.8 | 1.4 | 1.6 | 0.9 | 1.1 | 0.2 | 0.2 | 0.2 | 0.03 | 0.02 |
| Totals | 4.8 | 6.0 | 7.3 | 6.8 | 6.3 | 5.0 | 4.7 | 3.5 | 1.78 | .52 |

[1] Provisional., [2] Approximate landings to 16 November, 2021.
[3] TAC is shared between Canada (84.4%) and France (St. Pierre et Miquelon; 15.6%).

## Commercial Logbooks

Logbooks are completed by commercial fishers to record fishing effort and catches. Previous assessments of this stock have examined standardized catch indices (see Ings et al. 2019), however, in the current assessment the standardization models showed poor fit and were not considered acceptable for use. Here we look at unstandardized median catch rates by community for line trawl and gill net vessels (Figure 3). Logbook data highlight differences across space; in any year some areas may experience high catch rates, while others are low. In 2020 there is an approximately equal split in areas seeing above or below normal catch rates in the >35 ft vessels, while most areas saw at or below average catch rates in the <35 ft vessels. There is considerable uncertainty in the interpretation of fishery catch rate data; these data may be more reflective of changes in fishery performance or the nature of the fishery rather than differences in population size.

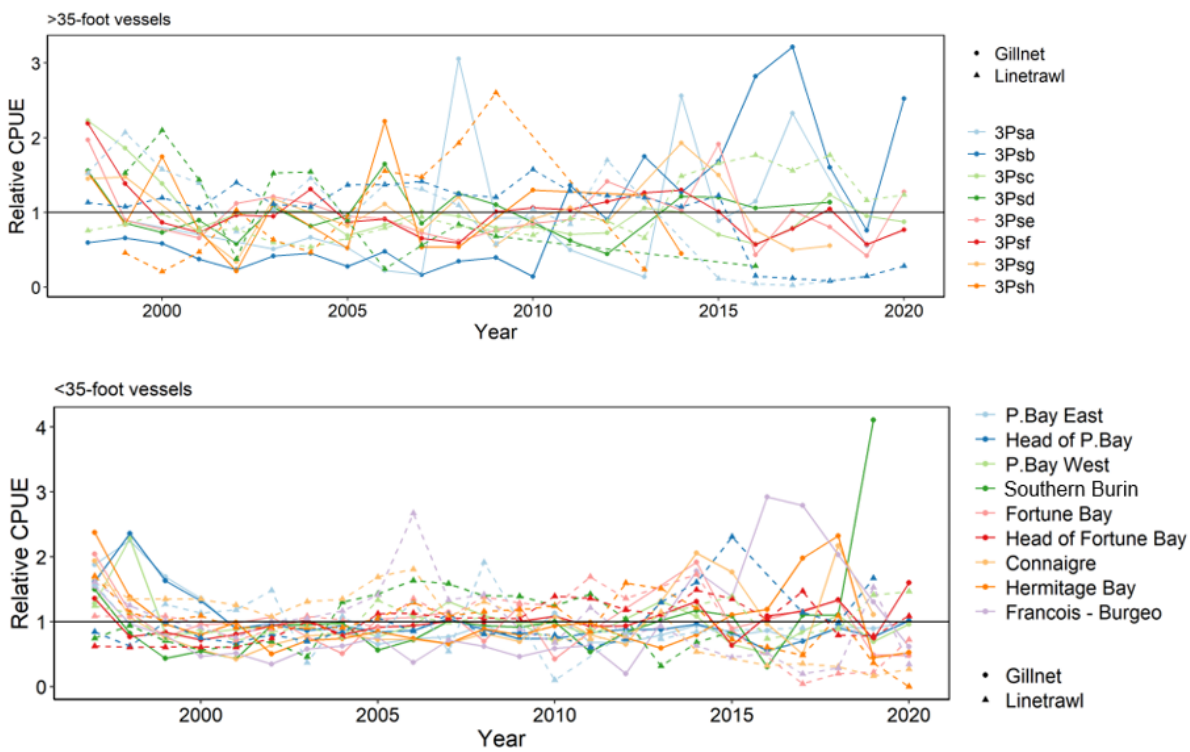


*Figure 3: Relative catch per unit effort (CPUE) from gillnet and linetrawl fishers in the >35 ft (top) and <35 ft (bottom) fleets. Mean annual CPUE is shown relative to the time series mean for each location.*

### Species Biology

Stock structure and migration patterns of Subdiv. 3Ps cod are complex. Cod mix with adjacent stocks at the margins of the stock boundary, some offshore components migrate seasonally to inshore areas, and there are inshore components of this stock. These features add uncertainty to the assessment of stock status.

Spawning is spatially widespread in Subdiv. 3Ps, occurring close to shore as well as on Burgeo Bank, St. Pierre Bank, and in the Halibut Channel. Timing of spawning is variable and extremely protracted; spawning cod are present from March until August in Placentia Bay, and data suggest spawning starts in April in the Halibut Channel area. A rapid shift in age at maturity occurred in the early 1990s, with the proportion of female cod maturing at ages 4–6 increasing for all cohorts subsequent to 1985. The reasons for this change toward earlier age at maturity are not fully understood but may have a genetic component that is partly a response to high levels of mortality including fishing.

Growth, calculated from length-at-age in research trawl survey samples, has varied over time but has generally decreased since the mid-2000s. Length-at-age in 2021 returned to near-average levels after being well below average in most of the previous seven years (2012–19).

## ASSESSMENT

### Sources of Information

A state-space stock assessment model was developed for this stock though an in-depth framework process (Varkey et al. 2022), and has been used in subsequent assessments to assess stock status (DFO 2020, 2021). Additionally in 2021 the assessment model was reviewed and endorsed by an external scientific review panel.

The model uses indices of abundance from research trawl surveys conducted by Canada (1983–2005, 2007–19, 2021), France (1978–91) and an industry organization (GEAC; 1997–2005), plus the Sentinel line trawl and gill net surveys (1995–2020). Also included is a time-varying component for natural mortality that is informed by a condition-linked mortality index which is modeled from biological sampling data from the Canadian research vessel (RV) survey and Sentinel gillnet and linetrawl surveys (adapted from Regular et al. 2022). Beginning of the year weights-at-age (stock weights) and proportions mature at age are modeled from data derived from the Canadian RV survey. Fisheries data used in the model included landings and catch-at-age data from 1959 to 2020. In model fitting, the magnitude of the catch total weights (i.e., landings) and the age-composition information in the catch-at-age data were fitted separately. The age-composition information in the catch-at-age was fitted using continuation ratio logits. Confidence in the magnitude of fisheries landings data has varied over time and the model uses censored likelihood on landings bounds (DFO 2021) that were developed based on a literature review and fisher interviews. The assessment model estimates stock trends from 1959 to January 1, 2022.

#### Surveys

*Scientific Trawl Surveys*

Canadian RV bottom trawl surveys have been conducted in Subdiv. 3Ps since 1972; however, surveys from 1972 to 1982 are not included in this assessment due to poor coverage of the area. The surveyed area was increased by 18% due to the addition of inshore strata in 1994 and 1997. The survey was incomplete in 2006 due to mechanical issues with the research vessel. There was no survey during 2020 due to impacts of the COVID-19 pandemic.

Survey indices of abundance and biomass based on strata <550 m (<300 ftm) are presented in Figure 4. These include only offshore strata prior to 1997, and all index strata (i.e., including the expanded inshore coverage) since. Expanded survey coverage had minimal impact on overall cod survey indices; trends from 1997 onwards with and without the inshore strata are similar (see DFO 2021). Survey biomass has generally declined since the early-2000s, while abundance has been variable. The biomass index in 2021 remains low. An increase in abundance observed in 2021 is associated with a higher than average number of age-2 fish in the survey, however this value remains well below that associated with the last stronger than average year class observed in the survey (2011 cohort).

In 2021, cod condition (relative condition factor, K) improved in the RV survey, and was above the series average (1994–2021) for the first time since 2013. Mean weight- and length-at-age were also near average in 2021, after being well below average in 6 of the 7 previous surveys.

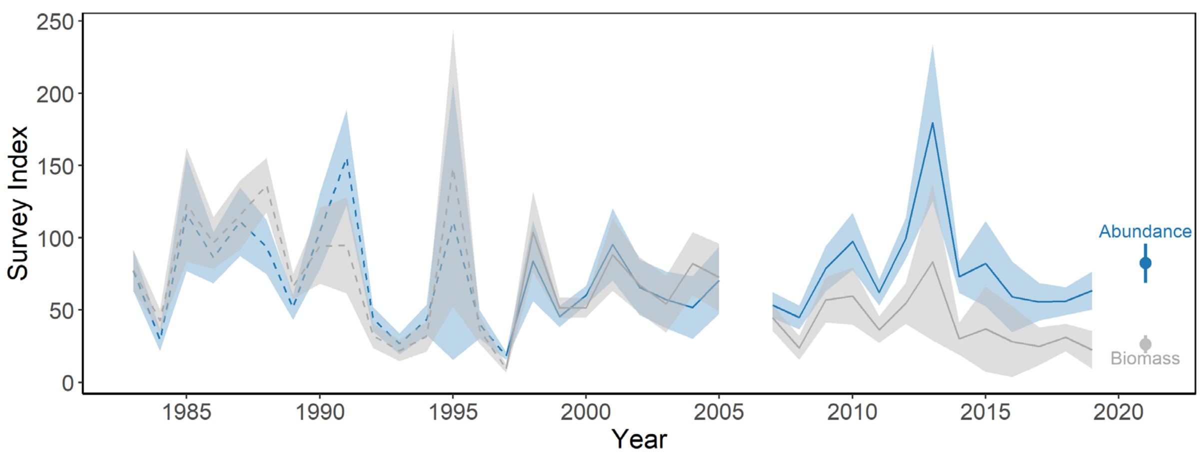


*Figure 4: DFO research survey biomass (grey) and abundance (blue) indices; indices are presented here without units. Error bars are ± one standard deviation. Prior to 1997 (dashed lines) RV survey indices do not include inshore strata.*

Two other scientific surveys are included in the assessment model for this stock. France (ERHAPS) conducted a bottom trawl research survey in Subdiv. 3Ps during February-March of 1978–92 (Bishop et al. 1993). An industry-led (GEAC) bottom trawl survey was conducted from 1997 to 2005 and in 2007 (McClintock 2011).

*Sentinel Survey*

Fixed-gear Sentinel surveys have been conducted at sites along the south coast of Newfoundland from St. Bride's to Burgeo since 1995 (Mello et al. 2022). Sentinel gillnet sets primarily occur in Placentia Bay, whereas line-trawls are mostly from sites west of the Burin Peninsula. The Sentinel survey for 2021 was ongoing at the time of the assessment, therefore, data for this year are not reported here. The Sentinel survey data are standardized to remove site and seasonal effects to produce annual indices of the total and age-specific catch rates.

Following the research recommendation from the previous assessment, a review of the Sentinel index standardization approach identified two errors in the computer code used to compile, edit, and analyze the Sentinel survey data. These errors resulted in an incorrect application of age-length keys, and the exclusion of data from 2 and 4 communities used in the estimation of catch rate indices for the gillnet and line-trawl, respectively. Comparison of indices before and after the correction indicate the overall effect on index estimation was minimal. Corrected age aggregated indices were within the 95% confidence intervals (CIs) of the previous estimates, except for the 2020 line-trawl estimate which was above the upper limit of the CI. Trends and the magnitude of change within age disaggregated indices were very similar, except for age 3 in gillnets from 1996 to 2004 and ages 9 and 10 in recent line-trawls which were revised upward from 2015–17 and downwards in 2019 and 2020.

The standardized total annual catch rate (Figure 5) for gillnets was highest from 1995 to 1997, but declined sharply to 1999 and has subsequently remained low. Line-trawl catch rates were high in 1995–96 before declining rapidly to 1999. This decline has generally continued since, reaching the lowest in the time-series in 2018. Increased catch rates over 2019 and 2020 are due primarily to catches of relatively high numbers of older (ages 8–10) cod.

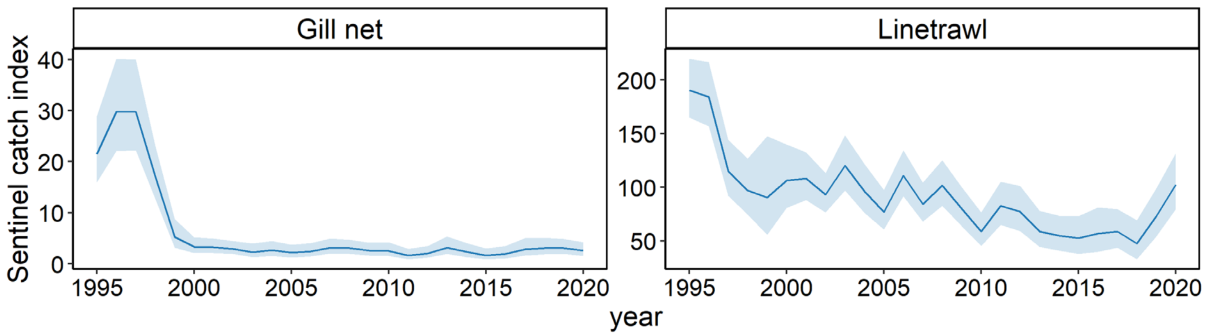


*Figure 5: Standardized catch rates from the Sentinel survey using gillnets (left) and line-trawls (right).*

The standardized age-specific catch rates for Sentinel gillnets and line-trawls showed similar trends, with the relatively strong 1989 and 1990 year-classes replaced subsequently by weaker year-classes resulting in an overall decline in catch rates. Comparison of Sentinel catch rates and the DFO research survey index at times show inconsistent age compositions; these differences are not fully understood. The 2011 year class, which appeared as the strongest recent cohort in the DFO survey, was prominent in the 2019 and 2020 Sentinel surveys.

Cod condition (K) in the sentinel survey has generally declined since the early 2000s (Mello et al. 2019). Male condition reached a time series low in 2019, while over 2017–19 female condition was relatively stable near the time series mean. Limited sample size in 2020 resulting from COVID-19 related restrictions precludes any conclusion on condition in the Sentinel survey in 2020.

## Model Results

### Recruitment

Recruitment (age 2 cod) peaked in 1965–66 at approximately 200 million fish, then generally declined until the mid-to late 1970s when there were about 35 million age-2 fish in the population (Figure 6). During most of the 1980s, recruitment varied between 70 and 150 million fish. Recruitment estimates have been below the long-term average since the mid-1990s (values around 25–45 million fish), and over the last decade have reached historic lows (~9 million in 2016 and 2017). Recruitment levels increased since, reaching near 25 million in 2021.

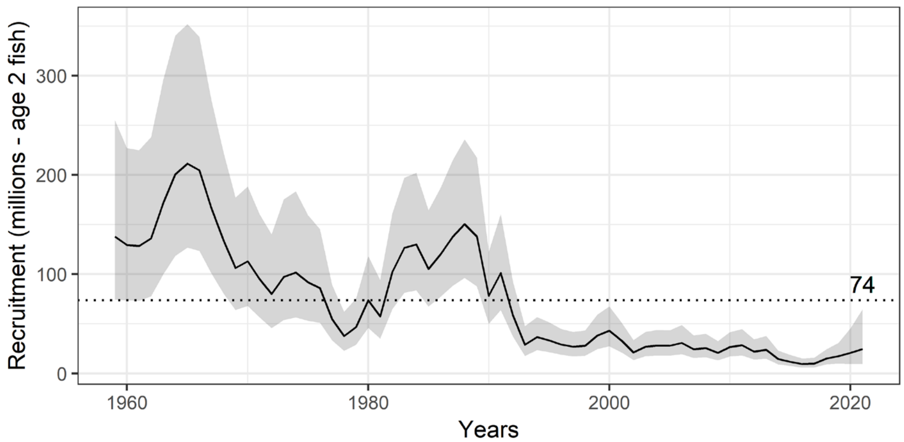


*Figure 6: Estimated recruitment (median estimate of age-2 abundance, with 95% confidence interval) from 1959 to 2021. The dashed horizontal line is the time-series median (74 million).*

### Mortality Rates

The assessment model provides estimates of both fishing (F) and natural mortality (M) (Figure 7 and Figure 8). The estimated fishing mortality rate for ages 5–8 generally increased from 1959 (F=0.23) to the mid-1970s (peaked at 0.41 in 1975) leading up to the extension of jurisdiction in 1977, then declined rapidly to approximately 0.28 and remained at similar values until the mid-1980s. Fishing mortality estimates increased again until the moratorium in 1993. Average F was near zero (<0.02) during the moratorium (August 1993–May 1997) when removals were only from bycatch, and then increased to 2000 after the reopening of the fishery. F has been declining since that time and in 2021 is estimated to be 0.03, the lowest level since the moratorium.

Natural mortality (M) was near 0.33 from 1959 to 1980, then declined to near 0.27 through the early 2000s. M subsequently increased considerably and estimates over the last 10 years (2012–21) have averaged near 0.37, reaching a time-series high at 0.41 in 2019. M in 2021 is estimated at 0.34.

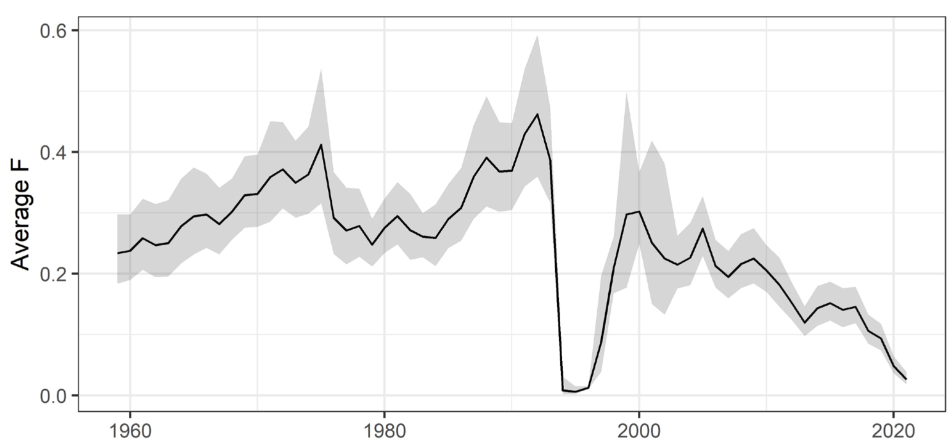


*Figure 7: Average Fishing (F) mortality (ages 5–8) estimates from 1959 to 2021 with 95% confidence interval.*

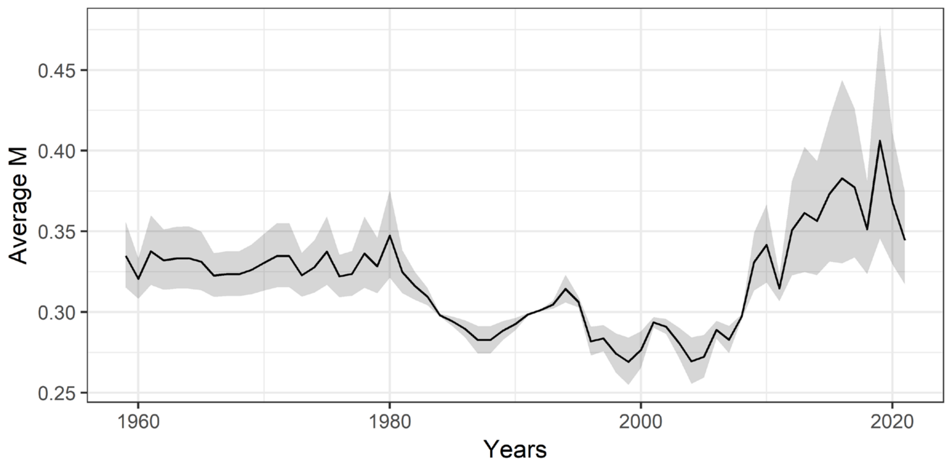


*Figure 8: Average Natural (M) mortality (ages 5–8) estimates from 1959 to 2021 with 95% confidence interval.*

### Spawning Biomass

SSB declined from the beginning of the time-series in 1959 (234 kt) to values near the LRP by the mid-1970s (Figure 9). Subsequently, SSB increased and was estimated to be above 100 kt over 1981–88, but this period was followed by a continuous decline to less than 40 kt in 1993. The SSB was below the LRP from 1991 to 1994. SSB increased during the moratorium, but by 1999 started declining again. From about 2001–06 SSB was relatively stable at values that were just below the LRP. SSB decreased in the mid-2000s, and has been at a low level (near 30 kt) since 2009. With an assumed catch of 1,346 t for calendar year 2021, SSB in the beginning of 2022 is estimated to be 31.5 kt (48% of the LRP).

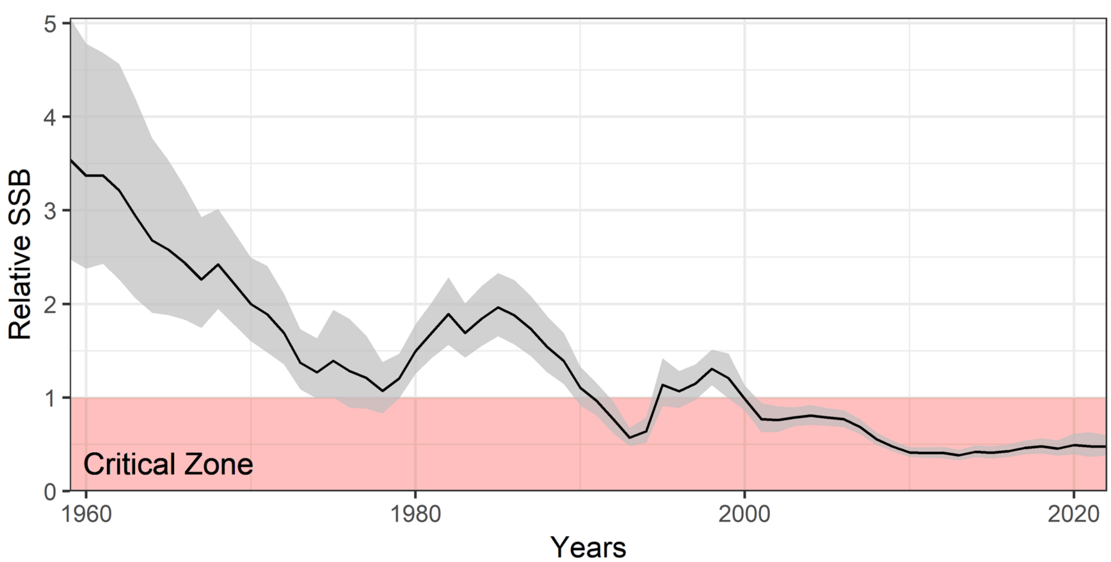


*Figure 9: Estimates of SSB (black line = median estimate with grey area = 95% confidence interval) for the period 1959–2022, relative to the Limit Reference Point (LRP = 66 kt SSB). This reference point represents the boundary between the Critical (red shaded area) and Cautious zones of DFO's Precautionary Approach framework.*

The 2011 cohort has been the only recent significant year class and is reflected in both the age composition of the population and the fishery. In 2021, ~30% of the SSB was made up of this cohort, by far the largest proportion of the stock that has been age 10 in any one year (previous high was the strong 1989 cohort at ~20% of the SSB). Recruitment estimates indicate that this cohort did not enter particularly large, but this year class has persisted. Cohort strength is influenced by biological (e.g., early-life survival, feeding success), and environmental and ecological conditions (e.g., predation, North Atlantic Oscillation). It is not currently known what conditions led to the persistence of this 2011 cohort. The dominance of this cohort in the population and the fishery is attributed to a lack of fish entering the population since, rather than the absolute size of the cohort.

A small upward revision to recent SSB estimates – though remaining within the 95% CI – was apparent in a comparison of the 2021 and 2020 assessments of this stock. This increase is attributed to an increase in survey indices at older ages, above average fish condition in the 2021 RV survey, and subsequent decreased estimated natural mortality. SSB at the start of the time series (pre-1980) was also revised upwards in the current assessment after an update to the M-condition index values assumed in this period.

### Projections

Projection of the stock to 2024 was conducted assuming annual fishery removals ranging from 0 to 2.3 times (catch multipliers) an assumed catch of 1,346 t for 2021. Under these scenarios, there is a probability >99% that the stock will remain below the LRP through at least the start of 2024. Projections (Table 2) indicate that there is a 75% probability of growth to 2024 with removals of 1,600 t, and a 50% probability at removals of 3,100 t. However, at the upper range of the catch multipliers examined, stock decline in 2023 should be expected. When there are no removals in 2022 or 2023 the probability of stock growth is 93%. Growth is defined here as any increase in SSB. Under an assumed total catch of 1,346 t an increase in SSB of ~10% is projected by 2024. This increases to ~20% under a no-catch scenario.

*Table 2: Risk of projected SSB being below the LRP under six scenarios of catch removals (catch multiplier = 1 is assumed catch of 1,346 t) over 2022–24. By represents SSB in projection year.*

| Catch Multiplier | Projected Catch (t) | Median Projected SSB ($B_y$) (kt) | | Probability of growing out of the critical zone P($B_y$>LRP) | | Probability of growth from current levels P($B_y$>projected B2021) | | Biomass as % of LRP ($B_y$/LRP) | | Change in SSB relative to B2022 ($B_y$-B2022) /B2022 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 2023 | 2024 | 2023 | 2024 | 2023 | 2024 | 2023 | 2024 | 2023 | 2024 |
| 2.3 | 3,096 | 30.8 | 31.6 | <0.1% | <0.1% | 40% | 50% | 47% | 48% | -2% | 0% |
| 1.75 | 2,356 | 31.6 | 33.1 | <0.1% | <0.1% | 51% | 63% | 48% | 50% | 0% | 5% |
| 1.5 | 2,019 | 32.1 | 33.9 | <0.1% | <0.1% | 57% | 69% | 49% | 51% | 2% | 8% |
| 1 | 1,346 | 32.8 | 35.3 | <0.1% | <0.1% | 68% | 79% | 50% | 53% | 4% | 12% |
| 0.5 | 673 | 33.7 | 36.7 | <0.1% | <0.1% | 78% | 87% | 51% | 56% | 7% | 17% |
| 0.001 | 1 | 34.4 | 38.2 | <0.1% | <0.1% | 84% | 93% | 52% | 58% | 9% | 21% |

## Sources of Uncertainty

Survey indices are at times influenced by "year-effects", an atypical survey result that can be caused by a number of factors (e.g., environmental conditions, movement, degree of aggregation) unrelated to absolute stock size. There are indications that the 2013 RV survey was influenced by one exceptionally large catch of age-2 cod that contributed to a large spike in the survey abundance and increased uncertainty. Similarly, a high concentration of the stock on Burgeo Bank was noted in 2016. This index uncertainty is not accounted for in the assessment model. The exceptionally low indices from the Sentinel Line trawl in 2018, which led to a decreased estimate of SSB in the 2019 assessment, was likely a year effect; subsequent values have increased, particularly at older ages which should have been represented in the 2018 survey.

Burgeo Bank is a known seasonal mixing area for cod from Subdiv. 3Ps and from the northern Gulf of St. Lawrence (nGSL). The potential presence of non-3Ps cod in this area at the time of the DFO survey, combined with the fact that a large portion of survey indices have come from the Burgeo Bank area in some years, suggests the potential for overestimation of survey indices.

Natural mortality plays an important role in projections for this stock. If natural mortality rates are appreciably different from those used, projected outcomes will differ from values reported above.

## CONCLUSIONS AND ADVICE

The 3Ps cod stock remains well within the critical zone (48% of the LRP) of Canada's Precautionary Approach Framework (DFO 2009). Consistency with the Framework would require that removals from all sources must be kept at the lowest possible level while the stock is in the critical zone. It is highly likely the stock will remain in the critical zone through at least the beginning of 2024.

Increased natural mortality and low recruitment are limiting the growth of this stock. Poor fish condition is of the major factors impacting increased natural mortality levels. Fishing mortality is currently low. The 2011 cohort has been supporting the stock and fishery over the last few years. However, subsequent recruitment reached historically low levels, with very few fish entering the population in any year since then. While projections indicate there is a moderate-to-high likelihood that the stock will show modest growth in the short term, it is unlikely the stock will grow significantly in the near future.

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## SOURCES OF INFORMATION

This Science Advisory Report is from the November 8–10, 2021 regional advisory meeting on the Assessment of Northwest Atlantic Fisheries Organization (NAFO) Subdivision 3Ps Atlantic Cod. Additional publications from this meeting will be posted on the Fisheries and Oceans Canada (DFO) Science Advisory Schedule as they become available.

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