Rebuilding Plan for
Atlantic Cod (*Gadus morhua*)
NAFO Divisions 2J3KL

FOREWORD

Fisheries and Oceans Canada (DFO) has developed "*A Fisheries Decision-Making Framework Incorporating the Precautionary Approach*" (PA Framework) policy under the auspices of the Sustainable Fisheries Framework. It outlines the departmental methodology for applying the precautionary approach (PA) to Canadian fisheries. A key component of the PA Framework requires that when a stock has reached or fallen below a limit reference point (LRP), a rebuilding plan must be put in place with the aim of having a high probability of the stock growing above the LRP within a reasonable timeframe.

The purpose of this plan is to identify the main objectives and requirements for rebuilding Atlantic cod in NAFO Divisions 2J3KL, as well as the management measures that will be used to achieve these objectives. This document also serves to communicate basic information about the 2J3KL Atlantic cod (Northern cod) stock and its management to DFO staff, Indigenous groups, and other fishery interests. This plan provides a common understanding of the basic "rules" for rebuilding the stock. The Harvest Decision Rule outlined in this plan is applicable when the spawning stock biomass (SSB) is within 25% to 75% of the LRP, or until an evaluation is triggered (refer to Section 11). Once the SSB grows and remains consistently above the LRP, the stock will be managed through the standard Integrated Fisheries Management Plan (IFMP) process. Management measures outlined in this rebuilding plan may be modified if they fail to result in stock rebuilding.

This rebuilding plan is not a legally binding instrument which can form the basis of a legal challenge. The plan can be modified at any time and does not fetter the Minister's discretionary powers set out in the *Fisheries Act*. The Minister can, for reasons of conservation or for any other valid reasons, modify any provision of the rebuilding plan in accordance with the powers granted pursuant to the *Fisheries Act*.

Where DFO is responsible for implementing a rebuilding plan in an area under a land claim agreement, the rebuilding plan will be implemented in a manner consistent with that agreement.

Signed:

Jacqueline Perry
Regional Director General
Newfoundland and Labrador Region

Preamble

In 2019, a new 2+3KLMNO Groundfish Integrated Fisheries Management Plan (IFMP) was developed by Fisheries and Oceans Canada and the 2+3KLMNO Groundfish Advisory Committee. The IFMP was updated in 2020 and contains information pertaining to the 2J3KL Atlantic cod (Northern cod) fishery. It will be referenced throughout this document and can be found online.

The last scientific assessment for the Atlantic cod stock in NAFO Divisions 2J3KL was completed in March 2019 (SAR 2019/050), and a stock status update occurred in April 2020. An evaluation of the Limit Reference Point (LRP) (SAR 2019/058) took place in January 2019. The next stock assessment is scheduled for spring 2021. Outcomes from the application of this rebuilding plan will be reviewed periodically to determine if changes to the plan might be required (refer to Section 11).

1. Biological Synopsis

Species Biology

Atlantic cod (*Gadus morhua*) is a bottom-dwelling, medium to large fish that can grow more than 1 m, weigh more than 40 kg, and live greater than 25 years. The population of Atlantic cod along the Newfoundland and Labrador shelf typically live a maximum of 15 years, and reach maturity at approximately age 5 (between 45-55 cm long). The number of eggs produced by a mature female in a single breeding season ranges between 300,000 to several million eggs, however less than one egg of each million succeeds in completing the cycle to become a mature cod. Atlantic cod typically spawn in the spring, over a period of less than three months. Across life stages, survival of cod is affected by multiple factors, including ocean currents, temperature, dissolved oxygen levels, prey availability, predation, and fishing pressure. While Atlantic cod are inherently productive, population increases can be diminished by environmental constraints or excessive fishing pressure.

Population and Distribution

Atlantic cod inhabits both the Northwest and Northeast Atlantic Ocean. The Newfoundland and Labrador population of Atlantic Cod inhabits the inshore and offshore waters from the northern tip of Labrador to eastern Newfoundland, including the Grand Banks. On the Grand Banks and Labrador shelf, Atlantic cod consists of four stocks: 2GH; 2J3KL; 3M; and 3NO. The stock area for Northern cod (Atlantic cod in NAFO Div. 2J3KL) is shown in Figure 1.

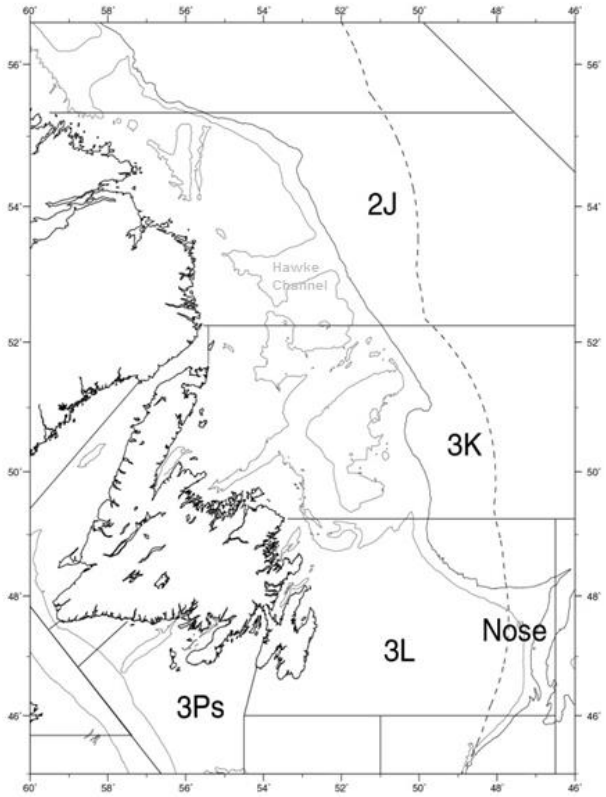

Figure 1. Stock area of Northern (2J3KL) cod. The dashed line indicates Canada's 200 nautical mile Exclusive Economic Zone (EEZ) (SAR 2019/050).

Historically, much of the 2J3KL cod stock was highly migratory. They over-wintered near the edge of the continental shelf and migrated in spring/summer to shallow waters along the coast and onto the plateau of Grand Bank.

Habitat Requirements

Juvenile cod settle to the bottom, where they appear to remain for a period of one to four years. Juveniles prefer a near-shore habitat, such as eelgrass, where there is protection from predators. After age four, juvenile cod begin to undertake seasonal movements (apparently undirected swimming in coastal waters) and migrations (directed movements to and from specific, highly predictable locations) characteristic of adults. As adults, cod have a broad range of habitats and do not seem to prefer a particular depth or bottom type.

Ecosystem Interactions

Northern cod are generalist predators that primarily eat fish as adults. During the larval stage, the young feed on phytoplankton and small zooplankton. As juveniles, cod feed on small shellfish such as shrimp and, as they become adults, consume larger shellfish and fish. Capelin, in particular, are an important part of the annual diet (Rose and O'Driscoll 2002; Dawe et al. 2012).

Adult cod, especially those greater than seven years old, are apex predators on the Newfoundland and Labrador shelf and, as such, have few natural predators. Juvenile cod are known prey of harp seals (Stansbury et al. 1998; Hammill and Stenson 2000; Stenson 2013), Greenland halibut (Bowering and Lilly 1992), and adult cod (Bogstad et al. 1994).

Evidence suggests that predation pressure is not a major driver of 2J3KL cod population dynamics (Buren et al. 2014), but rather that population has been primarily driven by food availability (especially capelin), and by fishery removals.

2.0 Overview of the Fishery

Cod fishing has shaped the cultural and economic identity of Newfoundland and Labrador for more than 500 years. Europeans documented discovery of the rich fishing grounds in the late 1400's, and the settlement of Newfoundland and Labrador is attributed to the fishery. The 2J3KL Atlantic cod stock supported a significant directed fishery throughout the 18th and 19th centuries (upwards of 300,000 t). By the 1950s technology and seafood markets began to rapidly change and fishing pressure increased on the stock. Total peak landings occurred in the late 1960s at approximately 810,000 t. By the late 1970s landings declined to 140,000 t. However, following the extension of Canadian jurisdiction to 200 nm in 1977, catch subsequently rose to 240,000 t by the early-1980s. Substantial declines in catches and stock biomass resulted in a moratorium in 1992.

In 1994 the Minister announced the Sentinel Survey Projects, which continues annually, with approximately 40 harvesters participating. Objectives of the Sentinel Survey included developing a catch rate time-series for the inshore area, to incorporate knowledge of inshore harvesters; to describe cod distribution over time, to train harvesters in scientific sampling methods, and to gather biological and oceanographic data.

By 1998, a small fishery (with a TAC of 4,000 t) was reopened for inshore vessels. The TAC was increased to 9,000 t in 1999 but lowered to 5,600 t by 2001-2002. Initially, good catch rates were experienced in many areas, but in succeeding years, catches became increasingly concentrated in only a few areas. In the spring of 2003, the stock was again closed.

Since 2006, fishing removals of 2J3KL cod have been authorized in the inshore Stewardship fishery; in the Newfoundland and Labrador recreational groundfish fishery; and as part of an Indigenous food, social and ceremonial (FSC) cod fishery in Labrador. Details about each of these fishery components are described further below.

The 2J3KL Cod Stewardship fishery was established to; obtain a better understanding of the 2J3KL cod stock, develop a culture of stewardship among harvesters, collect fishery data to contribute to the stock assessment, and facilitate harvester participation in the stock assessment process. It is an inshore, fixed-gear fishery with gillnets, longline, hand lines and cod pots as the authorized gear types. Although managed using an individual quota (IQ) system between 2006 and 2015, since 2016, Stewardship fishery removals have been managed using weekly limits. During the 2019 season, the maximum authorized harvest level was 12,350 t, and 84% (10,410 t) was landed (refer to DFO Species Quota Report website for annual landings). There were 1,865 license holders with access to 2J3KL cod in 2019, and of these 1,439 (77%) had landings. The majority of fishing activity and participation occurs in NAFO Divisions 3KL. In 2019, 50% of landings were caught in NAFO Div. 3L, 46% in 3K, and 4% in 2J. In 2020, the maximum authorized harvest level was maintained at 12,350 t. Current measures used to manage the Stewardship fishery include a maximum authorized harvest level approved by the Minister, as well as season dates, weekly limits, and gear restrictions (with number of gillnets and hooks specified). In addition, the fishery is open to the inshore fleet only; most vessels are less than 12 m and operate within 12 nautical miles of land. These measures are detailed in the 2020 Conservation Harvesting Plan.

It should be noted that the maximum authorized harvest level includes all 2J3KL cod removals in the Stewardship fishery, as well as removals in the cod quality project. The Cod Quality Project is a joint initiative lead by the Fisheries Science Stewardship and Sustainability Board (FSSSB) and FFAW-Unifor, which has been ongoing since 2014, allowing a limited number of inshore harvesters to develop and implement the use of harvest methods to improve the quality of products provided to market.

Beginning in 1996 (except 1997), limited recreational fisheries were permitted in most areas of the province. A province wide recreational groundfish fishery has occurred annually since 2006 in coastal Newfoundland and Labrador waters. Current measures used to manage the recreational groundfish fishery include, season dates, gear restriction (angling gear and hand lines only), and retention limits (up to five groundfish per person per day to a maximum of 15 fish per boat). Prior to 2016, the recreational season would open for a three week period mid-July to early August and again for a week at the end of September. From 2016 to 2020, the recreational groundfish fishery was permitted on 39 designated days, starting with the first weekend in July and continuing to Labour Day weekend, and then for an additional week in late September / early October. Currently there is no requirement to report recreational landings however data is collected through the Citizen Cod Project operated by science and there are estimates via a tagging study. Tour boat operators can also apply for a license which is subject to reporting requirements and a two fish catch limit, per tourist, in addition to catch and release between the established recreational groundfish season dates.

There is also an Indigenous food, social and ceremonial (FSC) component in Labrador whereby harvesting of 2J cod is authorized under an FSC license with a seasonal harvest limit of 60 cod per designated individual. In 2019-20 there were 66 designates.

Governance and Approval Process

Canadian groundfish fisheries are governed by the Fisheries Act, regulations made pursuant to the Act, and DFO policies. The Fisheries Licensing Policy of Newfoundland and Labrador Region provides details on the various licensing policies that govern the commercial fishing industry in the Newfoundland and Labrador Region (please note that DFO should be consulted for all purposes of interpreting this document). Other key regulations and policies that apply include, but are not limited to:

- Aboriginal Communal Fishing Licences Regulations
- Atlantic Fishery Regulations 1985
- Fishery (General) Regulations
- Commercial Fisheries Licensing Policy for Eastern Canada, 1996

DFO has established a 2+3KLMNO Groundfish Advisory Committee as a forum to discuss issues with stakeholders and Indigenous groups related to the management of the 2J3KL cod stock. The Committee meets annually in spring to discuss 2J3KL cod and to bring forward proposals representing the perspectives of various stakeholders. Based on the science assessment and input from the Advisory Committee, the Minister determines the management approach for the Stewardship fishery.

The 2J3KL cod stock is a transboundary stock straddling Canada's 200-mile limit and the stock occurs in both Canadian domestic waters and the North Atlantic Fisheries Organization (NAFO) Regulatory Area (NRA). NAFO is a regional fisheries management organization consisting of Canada and twelve other Contracting Parties, with an overall objective to ensure the long term conservation and sustainable use of the fishery resources in the Convention Area. While the NAFO Convention Area includes the 200-mile exclusive economic zones of coastal states jurisdiction, the NRA is limited to those parts of the

Convention Area beyond areas of national jurisdiction. Currently, all Contracting Party vessels are restricted to 5% bycatch of 2J3KL cod in the NRA portion of Division 3L. While 2J3KL cod is managed exclusively by Canada, under the NAFO Conservation and Enforcement Measures should the moratorium be lifted, the Canadian TAC shall be 95% of the TAC for this stock and remaining 5% of future quotas in NAFO Divisions 2J3KL would be allocated for use by other Contracting Parties.

3. Stock Status

Precautionary Approach

In 2003, the Privy Council Office, on behalf of the Government of Canada, published a framework applicable to all federal government departments that set out guiding principles for the application of precaution to decision making about risks of serious or irreversible harm where there is a lack of full scientific certainty.

A fishery decision-making framework incorporating the precautionary approach (2009) was developed, and applies where decisions on harvest strategies or harvest rates for a stock must be taken to determine TAC or other measures to control harvests. The framework applies to key harvested stocks managed by DFO: those stocks that are the specific and intended targets of a fishery, whether in a commercial, recreational or subsistence fishery. In applying the framework, all removals of these stocks from all types of fishing must be taken into account.

The following are the primary components of the generalized framework:

- Reference points and stock status zones (Healthy, Cautious and Critical);
- Harvest strategy and harvest decision rules; and
- The need to take into account uncertainty and risk when developing reference points and developing and implementing decision rules.

A conservation Limit Reference Point (LRP) was established for 2J3KL cod in 2010, re-evaluated in 2019, and is defined as the average spawning stock biomass (SSB) during the 1980s (DFO 2010, 2019).

Stock Assessment

Beginning in 2018, the Minister directed that a full stock assessment of 2J3KL Atlantic cod would take place annually for the next five years. The assessment is based on the Northern Cod Assessment Model (NCAM), an integrated state-space model developed specifically for 2J3KL Northern cod that utilizes much of the existing information on the productivity of this stock. Key features of the NCAM model are that it provides annual estimates of natural mortality (M) and fishing mortality (F) along with measures of uncertainty (see Cadigan 2015, 2016). Whereas previous models assumed a constant M = 0.2, the NCAM estimates M alongside F using RV survey and tagging data.

The abundance, biomass, and spawning biomass (2+ years) of Northern cod have remained low after the collapse and moratorium in 1992, but has increased between 2005 and 2019.

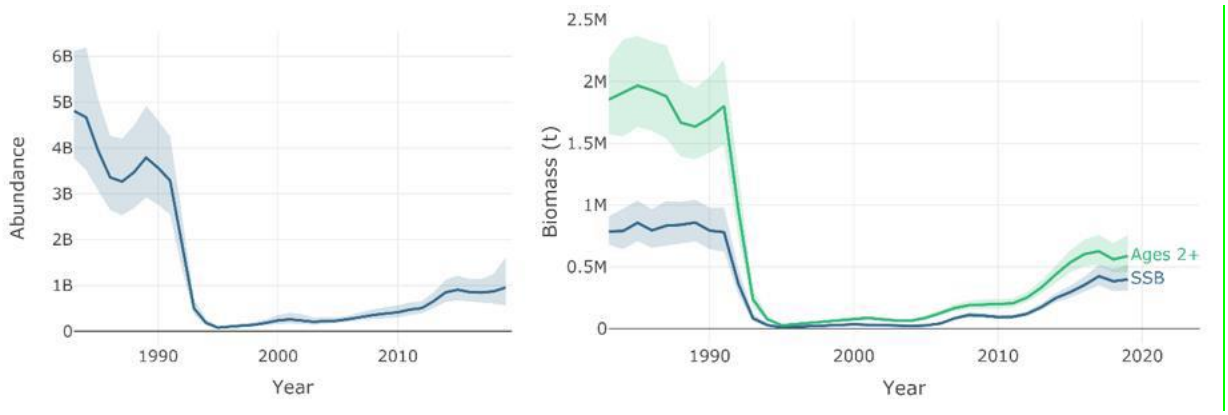

Figure 2. Trends in Northern cod abundance and biomass from 1983-2019. Shaded areas are 95% confidence intervals (SAR 2019/050). SSB = Spawning stock biomass; Age 2+ = weight of all fish that are ages 2 and older.

The rate of natural mortality (M) has also been variable during 1983-2018. Recent values of M had declined since the increase during 2008-2010; however M increased from 0.38 (equivalent to an annual survival of 68%) in 2016 to a higher level of 0.53 (59% annual survival) in 2017. Natural mortality has decreased again in 2018, to 0.39 (68% annual survival). NCAM results attribute the cause of stock collapse during the early 1990s more to natural mortality and less to fishing mortality than previous models (e.g. Myers et al. 1996)

Due to the COVID-19 pandemic, a full stock assessment did not occur in 2020, however, the Spawning Stock Biomass (SSB) remained in the critical zone in 2019, at 48% of the Limit Reference Point (LRP).

Stock Scenarios

Medium-term (three-year) projections indicate that the stock will continue to grow over the next three years and that there is between 63 and 73% probability of SSB in 2022 being above the 2019 value, and a low probability (<10%) of exceeding B_{lim} in 2022. In 2022, under current catch levels, the SSB relative to B_{lim} is projected to be 56% of Blim.

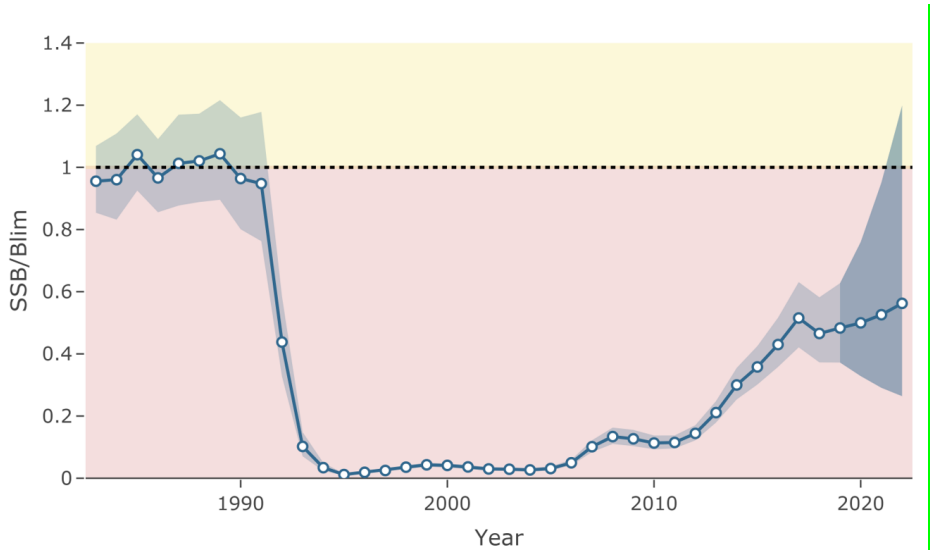

Figure 3. Three year projections (to 2022) of 2J3KL cod Spawning Stock Biomass (SSB) under status quo catch (13, 797 t) relative to the limit reference point B_{lim}, where B_{lim} (horizontal dashed line) is defined as the average SSB

during the 1980s. Solid line with circles is the model median estimate and light grey envelope is 95% confidence intervals. Dark grey envelope is 95% confidence intervals for the projection period (SAR 2019/050).

A key determinant of the three year projected SSB is natural mortality. If natural mortality rates in 2019 are appreciably different than those used, projected outcomes will differ from values reported above. There is a high level of uncertainty in the projections beyond the first year due to the level of future natural mortality.

There was concern about carrying out medium-term projections due to uncertainty about the level of future natural mortality. However, since it appeared that the higher level of M in 2017 was reduced in 2018, it was decided that three year projections would be carried out, with the caveat that there was a high level of uncertainty and caution should be taken in interpreting the projections.

COSEWIC Assessment

Atlantic cod was initially included on Schedule 3 of the *Species at Risk Act* (SARA) as Special Concern under one designable unit (DU) in 1998. In May 2003, the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) split Atlantic cod into four discrete populations: Maritimes; Newfoundland and Labrador; Arctic; and Laurentian North. The Newfoundland and Labrador DU includes the cod management units 2GH, 2J3KL and 3NO, and was assessed as Endangered due to sharp declines in abundance and area of occupancy. The Governor in Council did not list Atlantic cod under SARA at that time. In April 2010, the Newfoundland and Labrador DU of Atlantic cod was reassessed by COSEWIC and once again determined to be Endangered (assessment available on the SARA Public Registry). Following this assessment by COSEWIC, DFO Science completed a Recovery Potential Assessment. To date, there has been no SARA listing decision for the Atlantic cod and the stock continues to be managed under the *Fisheries Act*.

Aboriginal Traditional Knowledge

Aboriginal traditional knowledge and traditional ecological knowledge from Indigenous groups are considered in science processes and management decisions. Please refer to Section 2.3 of the 2+3KLMNO Groundfish IFMP for additional information.

4. SOCIO-ECONOMIC AND CULTURAL IMPORTANCE

The commercial fishery in Newfoundland and Labrador during the pre-moratorium period was highly dependent on cod and supported significant employment in the harvesting and processing sectors (24,400 and 21,000 jobs respectively). On average, approximately 63 per cent of fishing revenue for the less than 35' fleet was derived from this one species. In the 35 to 65' category, 2J3KL Northern cod accounted for an average of 37 per cent of fishing revenue. At today's landed prices, the 1987-91 annual average 2J3KL cod catch would have a landed value of approximately $200 million.

Since the moratorium, the commercial fishing industry has evolved to be more reliant on shellfish (notably snow crab and shrimp), while supporting fewer individuals in the harvesting (9,200) and processing sectors (6,200). Harvesters in 2J3KL are now less dependent on cod. In 2019, for enterprises less than 40', an average of approximately 16 per cent of fishing income was derived from cod, whereas

that figure was less than one per cent for enterprises greater than 40'. Fishing enterprises in the Newfoundland and Labrador Region are multi-species firms and dependency varies inter-annually, with changes in resource availability and landed prices. However, on average, snow crab remains the largest contributor to the fishing earnings of enterprises based in NAFO Divisions 2J, 3K, and 3L.

During the 2019 season, 84 per cent of the maximum authorized harvest level was landed (10,410 t). Total landings increased by 13.2 per cent between 2018 and 2019. A small amount of 2J3KL cod was landed in the sentinel fishery program (87 t). The landings for the 2010-2019 period are shown in Figure 4.

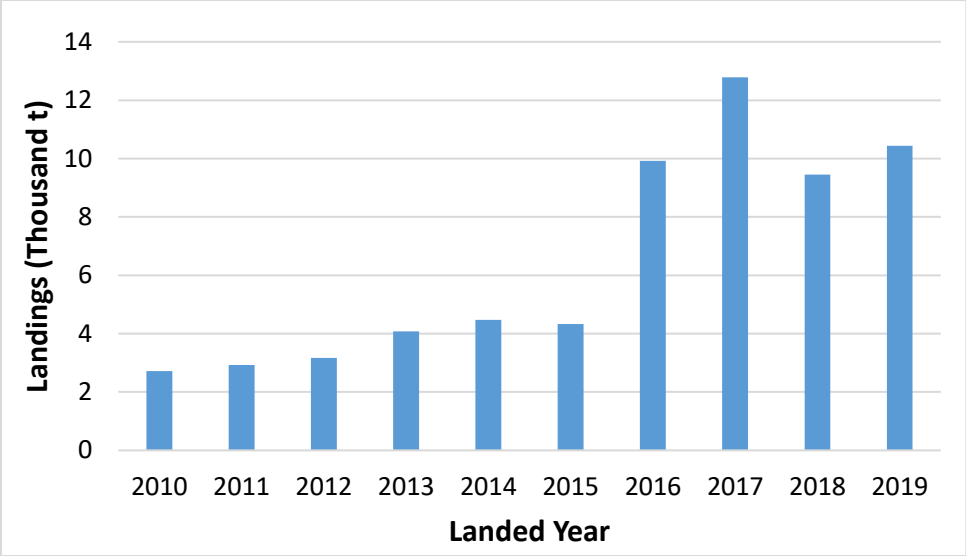

Figure 4. Landings (round weight) of 2J3KL Cod (all catch), in thousand tonnes, for period of 2010-2019.

Cod landings and landed value have increased over the 2010 to 2019 time period, from a low of approximately 2,700 tonnes and an estimated $2.7 million in 2010 to a high of about 12,800 tonnes and $18 million in 2017. In 2019, landings and landed value were approximately 10,400 tonnes and $16.5 million. The average landed price per pound, round weight equivalent (RWE), in 2019 was $0.72; an increase from $0.63 in 2018 (refer to Figure 5).

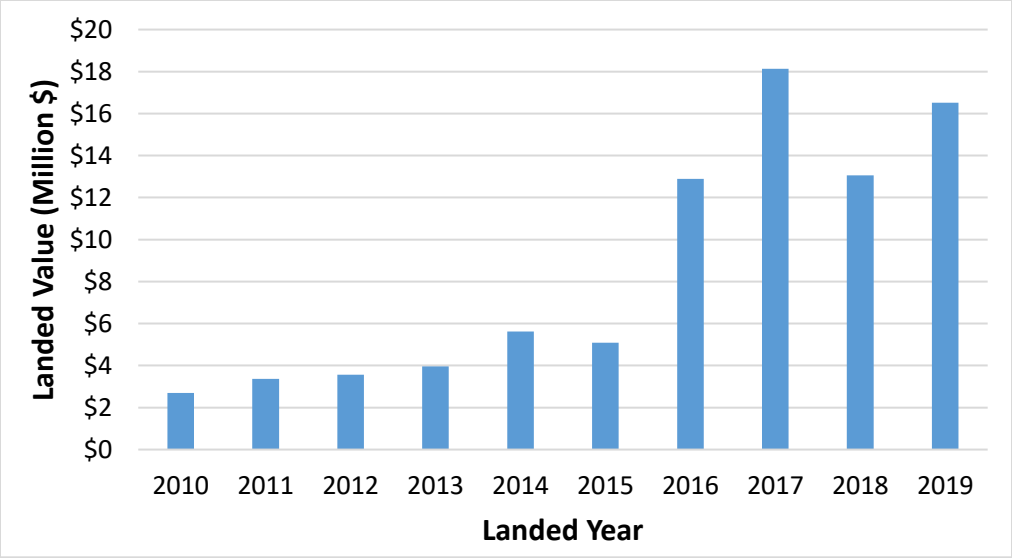

Figure 5. Landed value of 2J3KL cod (all catch) in millions of dollars, for period of 2010-2019.

A recreational groundfish fishery for cod has been ongoing in 2J3KL since 2006. The 2015 Survey of Recreational Fishing in Canada collected information about recreational fishing activities to assess the economic and social importance of recreational fisheries to Canada's provinces and territories. The data indicated that cod was the primary recreational species caught in Newfoundland and Labrador. Participation in recreational fishing in Newfoundland and Labrador is quite high with over 110,000 active resident anglers according to the 2015 survey.

The rebuilding of 2J3KL cod has a benefit in terms of its continued functional role in the ecosystem. Canadians, including Indigenous peoples, may also place a value on conservation and protection of the species in and of itself, and its value to future generations. The value of these benefits is currently unknown. A recovered stock would also have significantly more commercial value.

5. MANAGEMENT ISSUES

The 2019 2J3KL cod stock assessment indicated that the primary threat limiting survival and recovery of 2J3KL cod today is high natural mortality. The estimates of natural mortality remain highly variable with numerous possible explanations including unreported fisheries removals, predation by harp seals, effects of temperature, and starvation from lack of prey. Of these, evidence is growing that prey availability may be a key limiting factor in recovery, particularly availability of capelin. There is a negative relationship between the number of capelin available per cod and average cod mortality, and average rates of natural mortality also tend to be higher when a high proportion of cod are observed to be in poor body condition in spring. These preliminary results suggest that high mortality rates may be related to cod dying of starvation. Ecosystem indicators suggest waters are cooler than average, and that this area may be in a low productivity period, with decreased abundance of key forage species such as capelin and shrimp. Top-down forces, such as predation of cod by harp seals, may be another factor impacting natural mortality, however, the most recent assessment indicates that there is little evidence that harp seals are a major driver of this cod population. Most notably, the 2J3KL cod population has increased while the seal population has remained stable at a time-series high of more than seven million individuals.

The secondary threat limiting recovery is fishing mortality. To manage catches, a maximum authorized harvest level for the 2J3KL Stewardship cod fishery and cod quality project was implemented beginning

in 2018. The number of participants in the Stewardship fishery is limited to inshore participants only, and as per the Fisheries Licensing Policy of Newfoundland and Labrador Region, there are no new licenses available. There is a limited fishing season (season opens in early August and lasts between 8 weeks and 13 weeks, depending on NAFO Area). In addition, the small fish protocol states that the minimum size for Atlantic cod is 45 cm. Areas may be closed to fishing when the number of cod caught that are less than 45cm long exceeds 15% of the total number of cod caught.

Since 2006, there has also been a province wide recreational groundfish fishery in Newfoundland and Labrador which is highly valued and culturally important. The recreational groundfish fishery is managed using season dates and daily catch limits, however the number of participants is unknown. The annual scientific assessment of 2J3KL cod includes an estimate of cod catches in the recreational groundfish fishery based on tagging studies. In the 2019 assessment, this was estimated to be approximately 25% of the commercial catch during period of 2016-2018. There is ongoing work to ensure this estimate is accurate including comparison with other modeling work, examination of surveillance estimates and phone surveys.

The incidental catch of 2J3KL cod in other fisheries is managed using the Policy on Managing Bycatch. The objectives of this policy are: one, to ensure that Canadian fisheries are managed in a manner that supports the sustainable harvesting of aquatic species and that minimizes the risk of fisheries causing serious or irreversible harm to bycatch species; and two, to account for total catch. Landing of any incidental catch of 2J3KL cod in other directed groundfish fisheries is mandatory in Newfoundland and Labrador and is recorded through the dockside monitoring program. Reported bycatch of 2J3KL cod is relatively low; between 2009 and 2019, an average of 34 t per year was landed in other groundfish fisheries in NAFO Divisions 2J, 3K, and 3L. Retention of incidental catch of groundfish (including 2J3KL cod) in non-groundfish directed fisheries is not authorized. Reporting of discards to the Department is required.

Overall, fishing mortality of 2J3KL cod remains low compared to natural mortality.

6. OBJECTIVES

As outlined in the Precautionary Approach Framework, the primary objective of this rebuilding plan is to promote stock growth out of the Critical zone (e.g. grow the stock beyond the LRP), by ensuring removals from all fishing sources are kept to the lowest possible level until the stock has cleared this zone. Within the Critical zone, this objective remains the same whether the stock is declining, stable or increasing.

Short-term Objective

The short-term objective is to facilitate an increase of the 2J3KL Cod spawning stock biomass (SSB) beyond 75% of B_{lim}, while also providing reasonable fishing opportunities. As evident from the history of this stock, a timeline for this objective cannot be defined, as high levels of natural mortality can delay rebuilding. Tactical management action is therefore required to ensure low levels of fishing mortality is maintained while the stock is below 75% of B_{lim}.

Long-term Objective

The long-term objective is to have 2J3KL cod SSB exceed B_{lim} with a high probability. Again, the timeline for meeting this objective cannot be determined as the rate of recovery critically depends on future rates of recruitment and natural mortality. Long-term forecasts of these rates are highly uncertain, which makes it difficult to conduct meaningful evaluations of strategic management measurements.

7. MANAGEMENT MEASURES

The threats to survivorship identified in the 2011 Recovery Potential Assessment and in recent stock assessments of 2J3KL cod, are high rates of natural mortality, as well as comparatively low levels of fishing mortality. The measures to be implemented to support the rebuilding objectives are outlined below.

Implement Harvest Decision Rule for 2J3KL Atlantic Cod

The principles of the Harvest Decision Rule (HDR) are as follows:

- The HDR is based on a phased approach in the short-term until the spawning stock biomass (SSB) is above the interim target of 75% of Biomass Limit Reference Point (B_{lim}).
- Until then, a low level of fishing mortality (F) is maintained and is linked to stock magnitude and direction with a cap on removals.
- The HDR is informed by the annual scientific stock assessment. Annual changes in total landings are computed by a rule that uses the size of the stock relative to B_{lim}, relative to a base landings level (chosen to be the level of landings in 2017).

The Interim Approach informs management decisions while the stock remains well within the Critical Zone of the Precautionary Approach framework, specifically within the range of 25% to 75% B_{lim}. The HDR provides for increased stability (i.e. smooth change in catch as stock size changes); increased responsiveness as stock approaches upper or lower ends of this range; and changes in total removals based upon the SSB.

The HDR is based on two quadratic formulas that computes the relative change in landings based on stock status relative to B_{lim} (refer to Figure 6).

A modest increase in removals within range of 50-75% B_{lim}

- At 75% B_{lim}, a 50% increase in landings from current level
- Majority of increase occurs as you approach 75% B_{lim}

Within range of 25-50% B_{lim}

- At 25% B_{lim}, a 67% decrease in landings from current level
- Rate of decline increases as stock size decreases

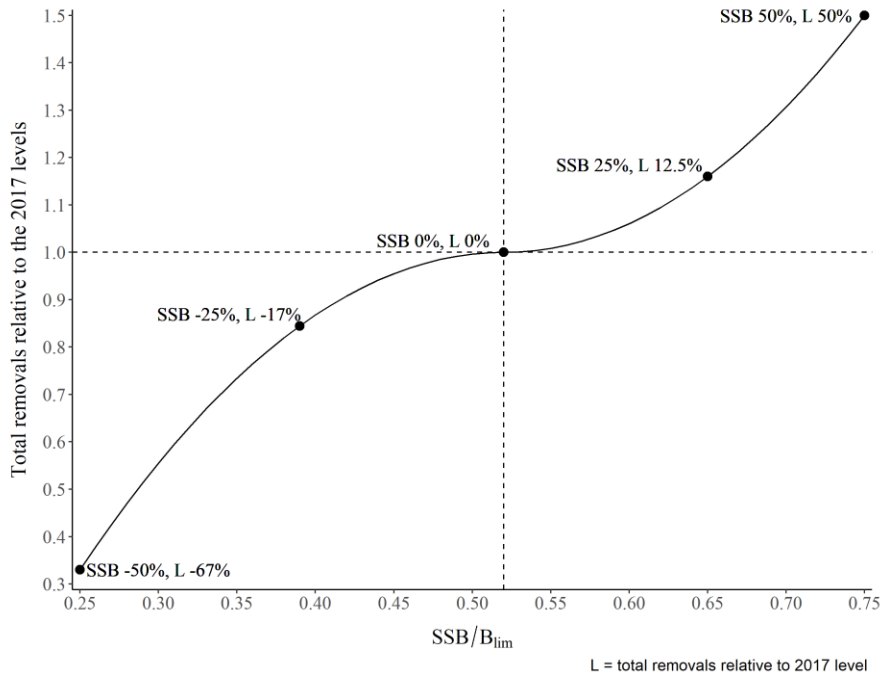

Figure 6. Depiction of the interim Harvest Decision Rule for 2J3KL Atlantic Cod showing how total removals, relative to removals in 2017 (12,848t), are to be adjusted given changes in the status of the stock (SSB / Blim).

As a result of high uncertainty in the future levels of natural mortality, the current driver of stock trajectory, the efficacy of any rule for this stock cannot be demonstrated. This is a principle-based approach to provide structure around the inter-annual landings change for this stock. Ongoing monitoring of the implementation will occur and adjustments will be considered as necessary

Gear Modification and Restrictions

The 2J3KL cod Stewardship fishery is restricted to gillnets, longlines, hand lines, and cod pots only, with additional restrictions on the number of nets and hooks permitted (varies by license and NAFO Area). Gillnets are the most common gear type utilized, accounting for an average of 85 per cent of landings between 2017 and 2019. The recreational groundfish fishery and the FSC fishery for cod is restricted to the use of hand lines and angling gear only.

Management of Incidental Catch

For mid-shore and offshore fleets, incidental catch (or bycatch) of Atlantic cod in other groundfish fisheries is monitored and may not exceed 1,250 kg or 5% of total catch, on a per trip basis, whichever is greater. In addition, if bycatch levels are high, the vessel should move at least 0.5 nautical mile away from the area fished and avoid fishing in the same area for the duration of the trip. Monitoring occurs though the dockside monitoring program and at-sea observer coverage. At-sea observer coverage has a 10% target, except for the 3LNO Yellowtail fishery where observer coverage is 25%.

As a result of concerns about the level of bycatch of groundfish and other species by the small-meshed shrimp trawls, an exclusion device known as the Nordmore grate was introduced in the Canadian shrimp fishery in 1993. This device sorts out the larger species, allowing them to escape through an opening in

the top of the net, while allowing smaller shrimp to pass through and be retained in the cod-end of the net and has been mandatory since 1997. Further information can be found in the Northern shrimp IFMP.

Marine Conservation Areas

Several of the marine conservation areas established to date around Newfoundland and Labrador benefit 2J3KL cod. The Funk Island Deep Closure (7,274 km^2 in NAFO Division 3K) and Hawke Channel Closure (8,837 km^2 in NAFO Division 2J) prohibit bottom trawl, gillnet and longline fisheries to conserve Atlantic cod as well as benthic habitat. The Northeast Newfoundland Slope Closure (55,353 km^2 in NAFO Divisions 3K and 3L), established to protect corals and sponges, prohibits all bottom contact fishing for cod and all other species. As well, fishing is prohibited in the Gilbert Bay Marine Protected Area on the south coast of Labrador to protect the Gilbert Bay population of Atlantic cod, which has distinct genetics, behavior and physiology.

Monitoring

Monitoring tools in use in the 2J3KL Stewardship cod fishery include the dockside monitoring program, patrols by DFO fishery officers (air, sea and land), at-sea observer coverage, vessel monitoring system (VMS) and completion of logbooks.

In the recreational groundfish fishery, a science tagging program as well as a dockside 'citizen cod' project have been implemented to gain information about catches. Indigenous groups participating in FSC fisheries report the number of designates permitted to fish 2J3KL cod annually to the Department. Please refer to section 7 of the 2+3KLMNO Groundfish IFMP for further details on monitoring.

8. ACCESS AND ALLOCATION

Sharing Arrangements, Quotas and Allocations

While 2J3KL cod remains under moratorium, there are no sharing arrangements, quotas or allocations in place. The 2J3KL cod Stewardship fishery is a small-scale inshore fishery, and a maximum authorized harvest level is determined annually by the Minister based on the most recent science assessment, and stakeholder input. In addition, the fishery is managed and in a manner consistent with the constitutional protection of Indigenous and treaty rights.

Participation in the 2J3KL Stewardship cod fishery is restricted to inshore groundfish license holders with a homeport in NAFO Divisions 2J3KL and the 4R equivalent area defined as North Boat Harbour to Cape Bauld.

The Newfoundland and Labrador recreational groundfish fishery has been in place since 2006 which allows access to 2J3KL cod in accordance with the specified management measures outlined in Section 5 and is open to both residents and non-residents.

Access to cod is granted for food, social and ceremonial (FSC) purposes to Indigenous groups in Labrador fishing in NAFO Division 2J with a seasonal harvest limit of 60 cod per designated individual. In 2019, there were 66 designates for cod.

The Minister can, for reasons of conservation or for any other valid reasons, modify access, allocations and sharing arrangements, in accordance with the powers granted pursuant to the *Fisheries Act*.

9. SHARED STEWARDSHIP

Shared stewardship is achieved through the involvement of stakeholders and Indigenous groups in advisory committees and science advisory processes. In addition, there are two industry-led Fishery Improvement Projects (FIPs) for 2J3KL cod focused on improved sustainability.

The first FIP was launched in 2015 and is led by the Atlantic Groundfish Council (AGC) and the Association of Seafood Producers (ASP). The second FIP was launched in 2015 by WWF-Canada and the Food, Fisheries, and Allied Workers Union-UNIFOR (FFAW).

10. COMPLIANCE

The Conservation and Protection (C&P) program promotes and maintains compliance with legislation, regulations and management measures implemented to achieve the conservation and sustainable use of Canada's aquatic resources, and the protection of species at risk, fish habitat and oceans. The program is delivered through a balanced regulatory management and enforcement approach. Specifically:

- promotion of compliance through education and shared stewardship
- monitoring, control and surveillance activities
- management of major cases and special investigations in relation to complex compliance issues
- and use of intelligence data supplied through the National Fisheries Intelligence Service

During the 2016 to 2019 period, an average of 4,598 hours were spent by C&P staff monitoring the 2J3KL fishery. Details on the compliance strategy, priorities, and enforcement data can be found in Section 9 of the 2+3KLMNO Groundfish IFMP.

11. EVALUATION AND PERFORMANCE REVIEW

The Department will engage stakeholders on any matter related to the implementation / review of the RP through the established GAC process. Outcomes from the application of this rebuilding plan will be monitored periodically, and a comprehensive review will be undertaken within five years, unless the following exceptions occur before that time:

1. The median SSB approaches or falls outside the bounds of the Harvest Decision Rule (25% or 75% of B_{lim});
2. There is a significant and sustained change (e.g. 3 year) directional change in natural mortality; or
3. There is a major change in the scientific understanding of the 2J3KL cod stock (e.g. a new model or LRP).