ATLANTIC GROUNDFISH COUNCIL

association of seafood producers

Northern Cod Fisheries Improvement Project:

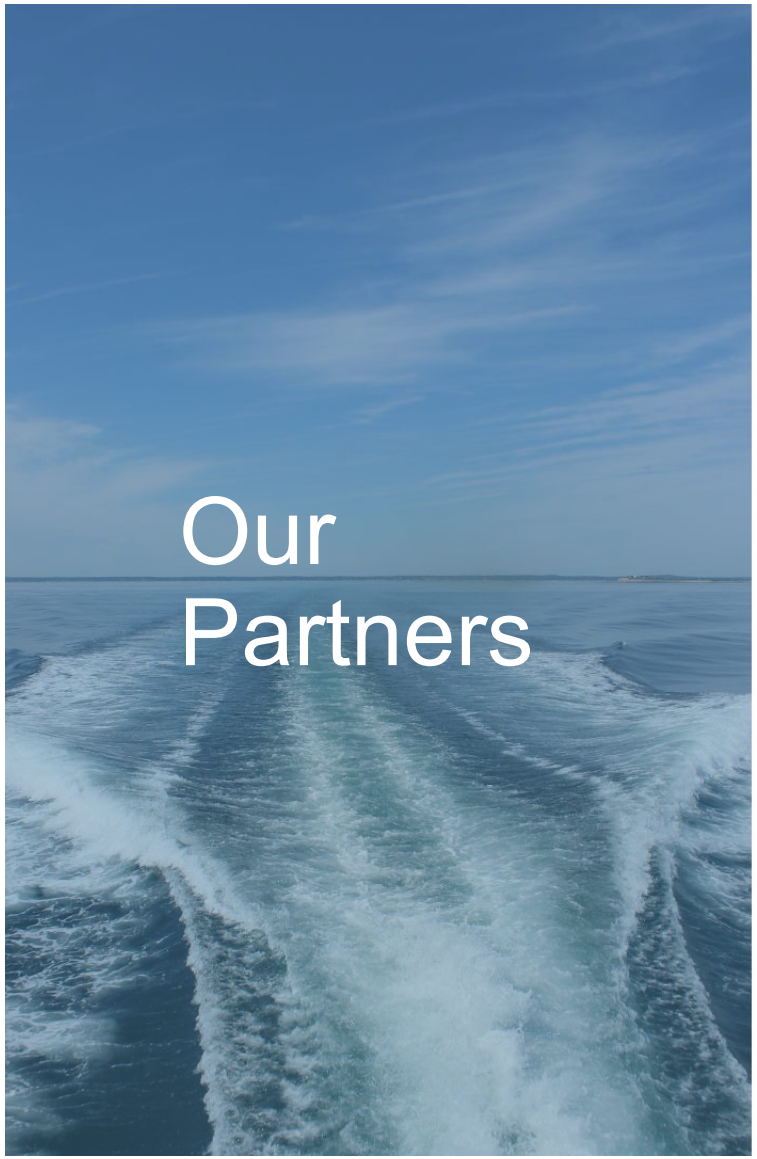
Improving the Future through Improved Science

BARCELONA MAY 2025

AGC/ASP Northern Cod FIP – Our Objectives

- Address gaps in scientific information to facilitate sustainable management of this important resource

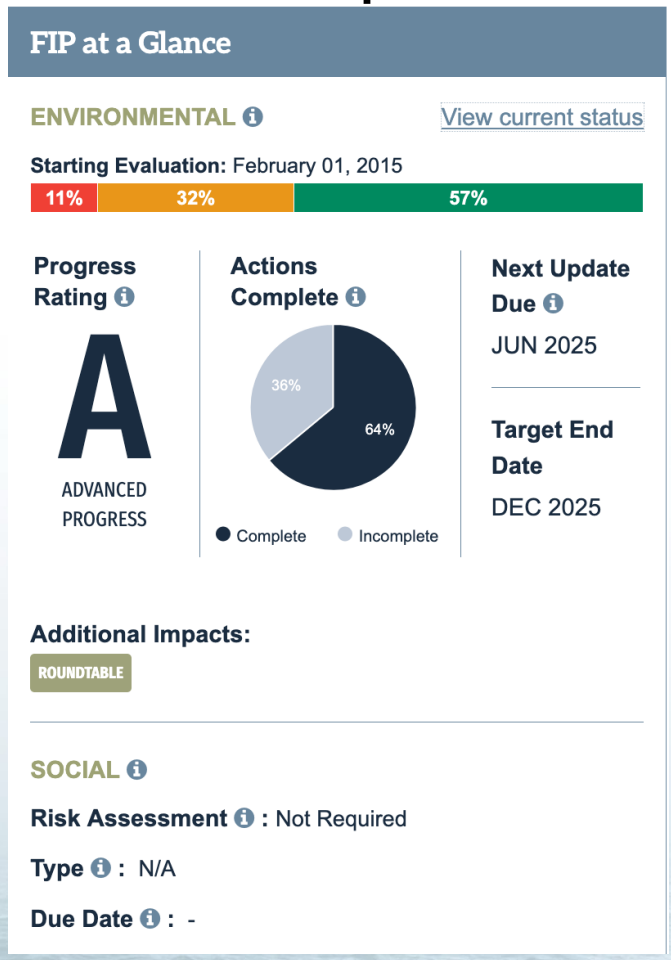
- Prepare information and documentation for eventual MSC certification



Our Partners

- DFO and Govt NL
- Important International Customers
  - Marks and Spencer (M&S)
  - Sysco France
  - High Liner Foods
  - Young's Seafood
  - Thistle Seafoods
  - Cornic-Novamer SAS
- Sustainable Fisheries Partnership
- Academia
  - Ocean Tracking Network
  - Dalhousie University
  - Memorial University
- Inshore Processors + Year-round Harvesters
  - AGC Members
  - ASP Members

FIP Snapshot



- FIP started in 2015
- 10 of 11 FIP Actions previously completed
- 1 On-going Action Item
  - Northern Cod Acoustic Tracking (NCAT) Project – Phase 3 - Stock migration and composition research
- 3 FIP actions reopened in 2024 for development of fishery objectives & HCR in the Cautious & Healthy Zones

Human Rights & Social Responsibility (HRSR)

The 2J3KL Northern Cod FIP is at low risk for HRSR issues

- As required by FisheryProgress.org, the FIP has instituted:
  - Human Rights and Social Responsibility Policy
  - Grievance Mechanism
  - Self-Evaluation of Risk
  - Annual reporting, vessel lists
- Fisher Awareness communicated through digital & hard copy channels

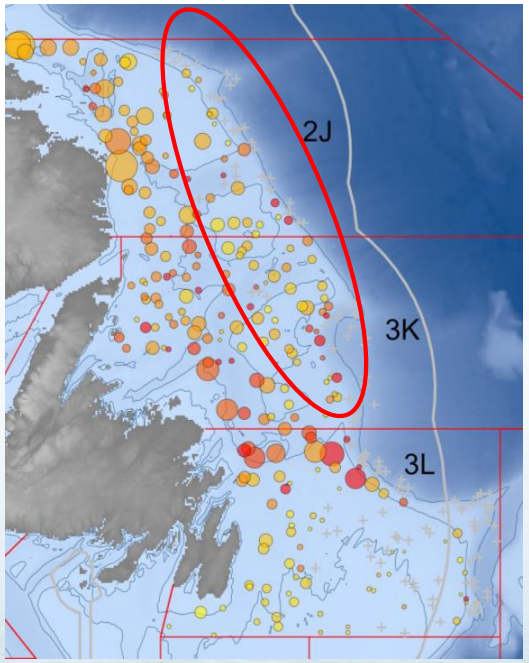
March 2025 Stock Status

Stock Assessment Highlights

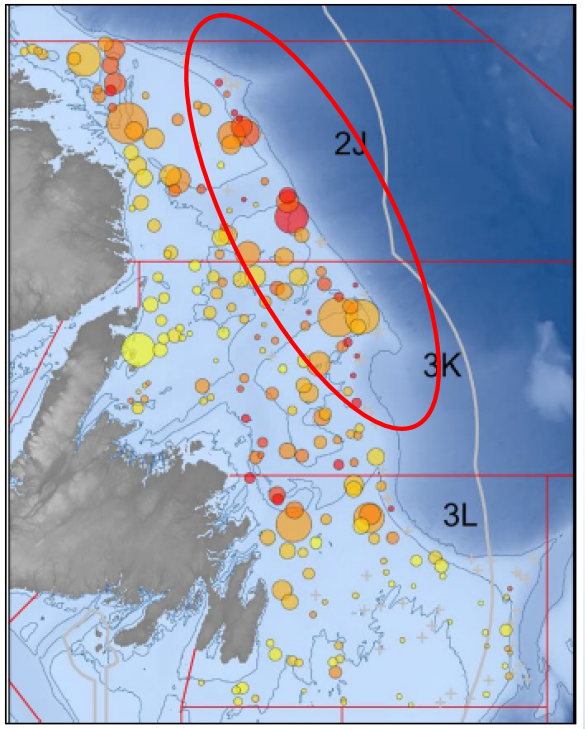
2024 RV Survey – Back on track!

- Survey completed during historical window (mid-Oct to mid-Dec)
- All strata successfully surveyed

2023



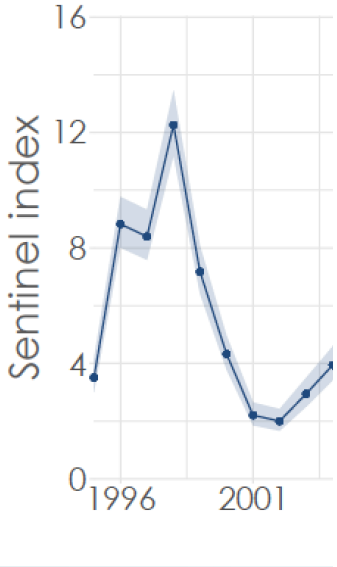
2024



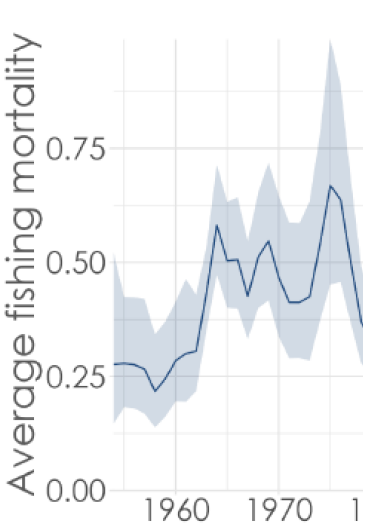
Circle size = numbers
Warmer colour = mean weight

Key indices

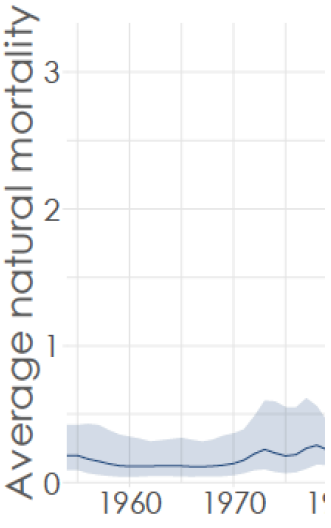
Sentinel Index



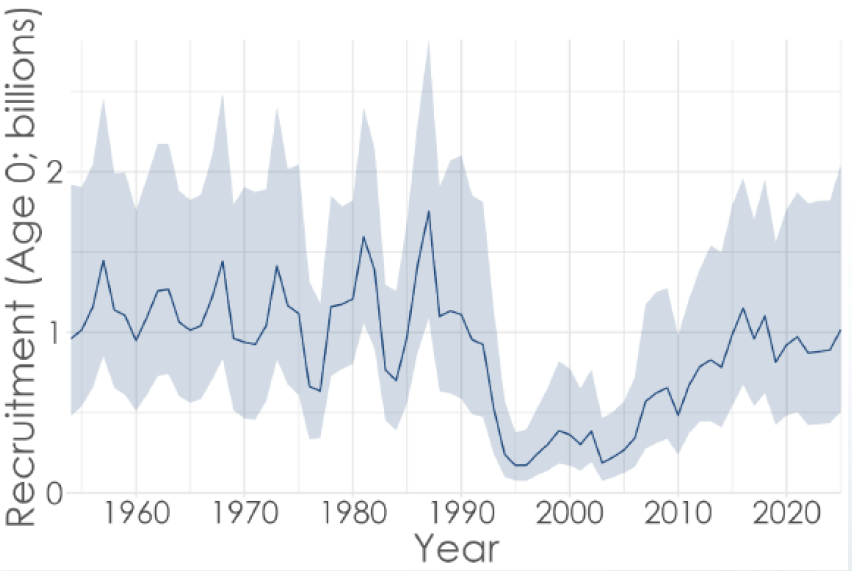
Fishing mortality



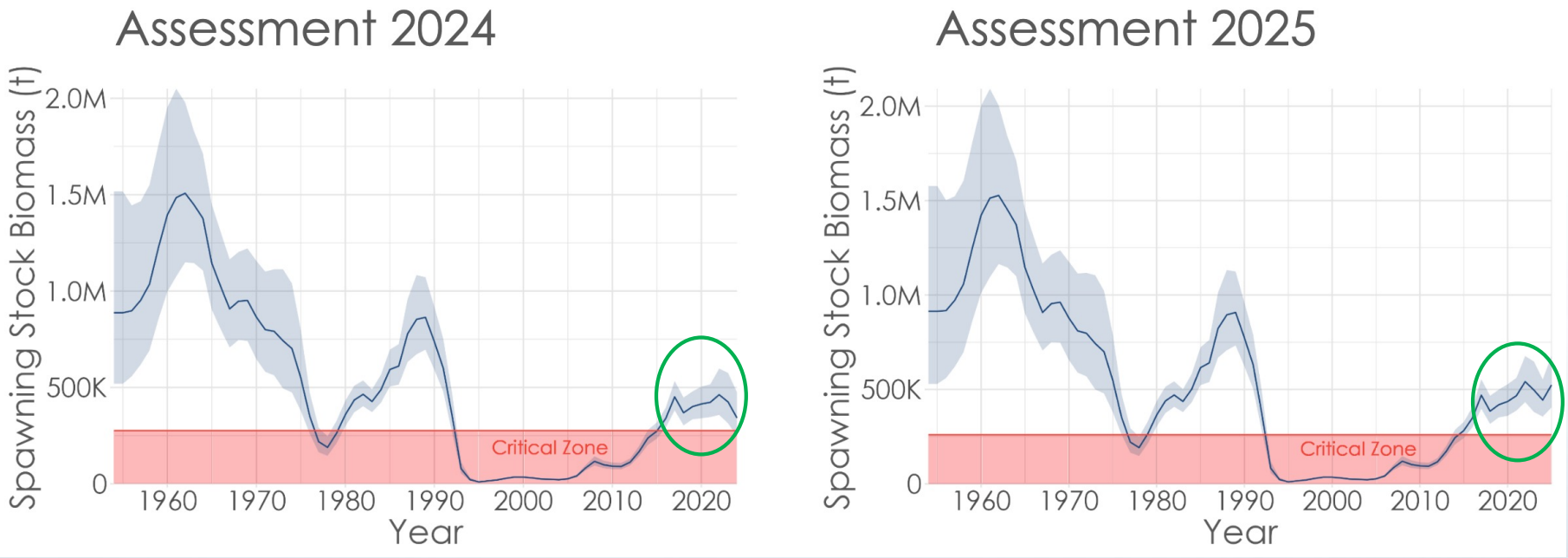
Natural mortality



Recruitment

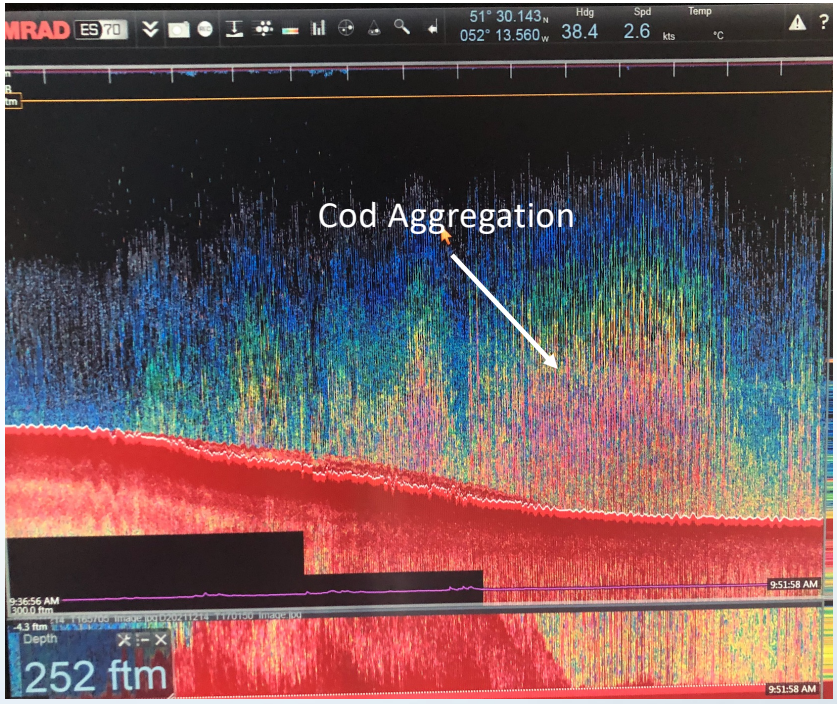


Change in stock status perspective in 2025



March 2025 Assessment – Very Positive!

- Stock increased, now at 524,000t (~2x LRP)!
- Catch rates remained high, wide range of age classes
- Capelin increased in 2024
- Stock widespread throughout 2J3KL
- Recruitment at 90% pre-moratorium average levels
- F remains very low at 0.02



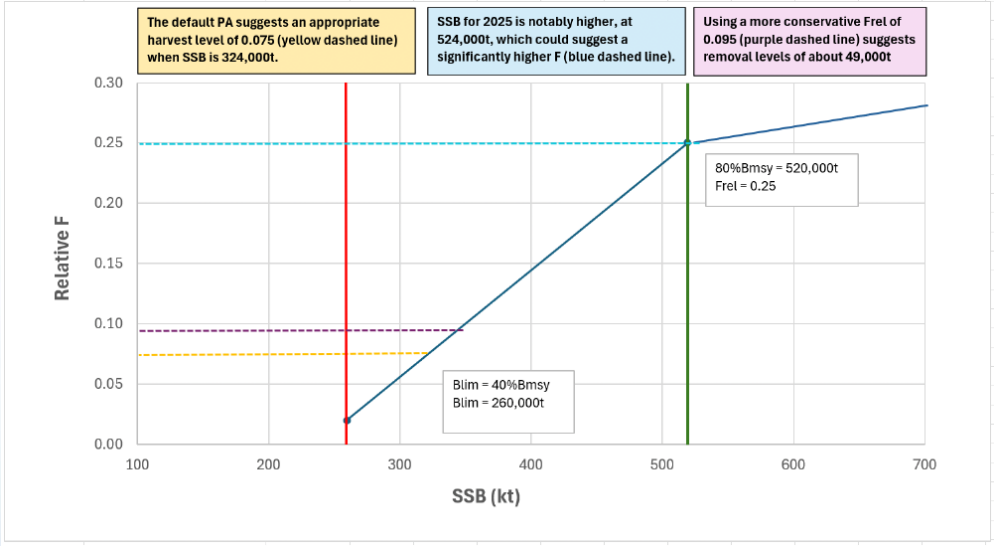
Some of our concerns…

- Need HCR to manage fishery sustainably
- Retrospective in assessment model needs investigation
- Poor control of and data from recreational fishery
- Weight & length at age is low

Our Position…

We suggest a TAC increase in line with the PA Framework and recommended a TAC of 49kt.

- No official USR, assumed Harvest rate of 0.25 at default USR (80% Bmsy).
- Using sloped blue line (rel F) between LRP (260kt) and USR (520kt), and using the current SSB (524kt) gives a rel F of 0.095 or 49kt.



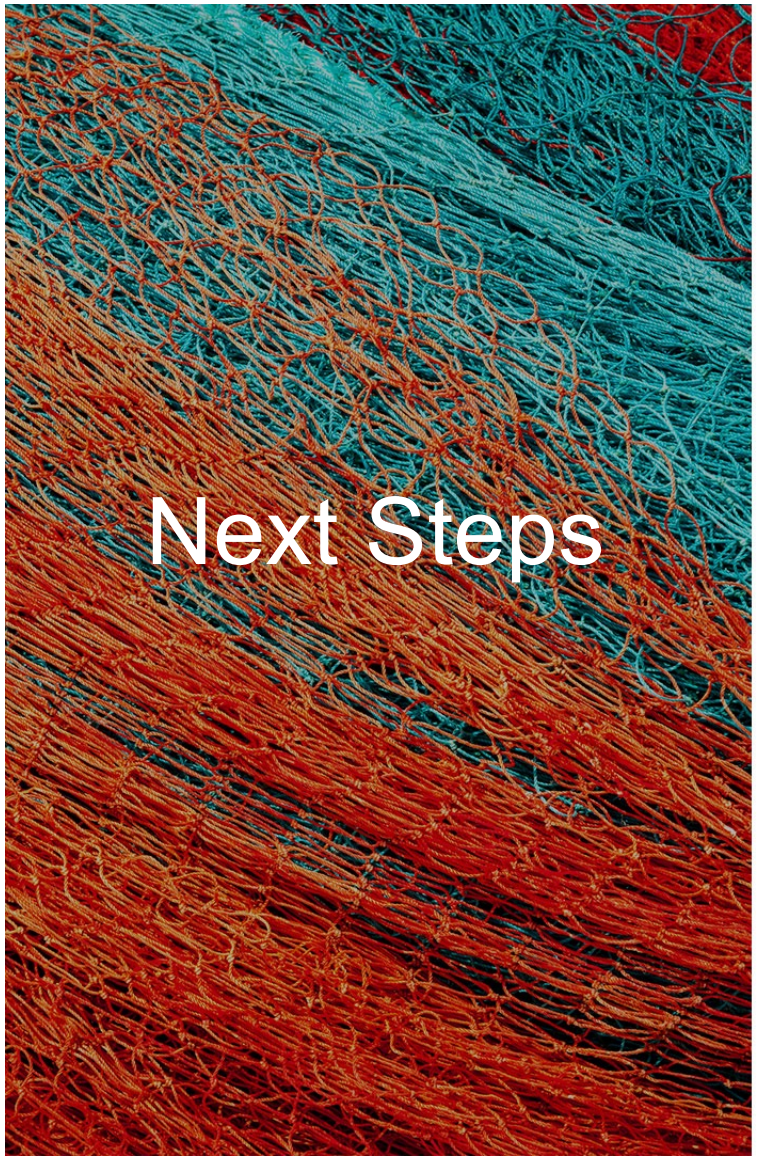
Proposed 2025-26 harvest recommendation for Northern cod. Solid red line = LRP. Solid green line = proposed USR. Solid blue line = relative F. Dashed yellow, purple, and blue lines indicate various potential F levels relevant for various SSB levels.

Comparison of World's Three Largest Cod Stock

Stock	**Northern Cod (2J3KL)**	**Iceland (Div. 5a)**	**Barents Sea (Subareas 1 & 2)**
Location	Canada	Iceland	Northeast Arctic
2024 Spawning Stock Biomass (t)	**524,000**	**377,477**	**552,219**
TAC (t)	18,947 (2024)	213,214* (2024/25)	340,000 (2025)
Limit Reference Point (t)	260,000	125,000	220,000
Fishing mortality**	**0.02** (2024)	**0.18** (2023/24)	**0.59** (2024)
Breakdown of gear type used	Primarily gillnet with some longline, handline, and otter trawl	OT – 55% LL – 26% GN – 6% DS – 7% JG – 6%	OT – 60 - 80% FG – 20 – 40%
Seasons/months of harvest	Fixed Gear – July – Nov Otter Trawl – Year-Round with spawning period closures	Year-Round	Year-Round with spawning period closures
Sustainability status	FIP (A Rating)	MSC IRFC	MC

*Icelandic fishing year calendar 1 Sept 2024 - 31 Aug 2025.

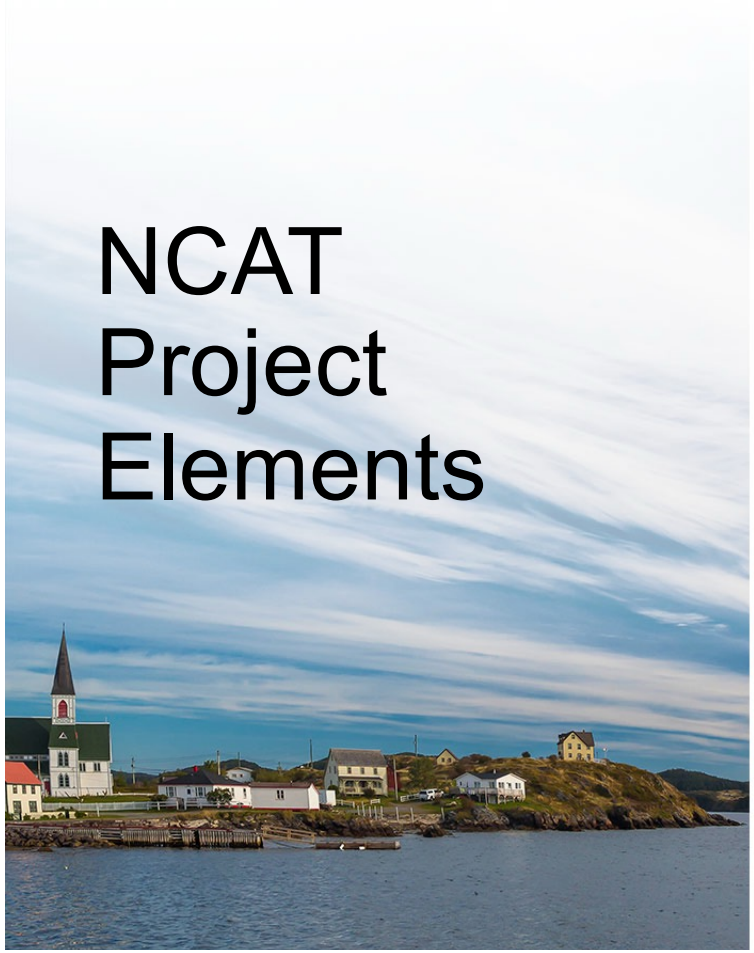
**Fishing mortality from assessment model outputs.



- DFO Working Group to develop harvest strategy for the fishery in the PA Cautious & Healthy Zones (objectives, HCR & other measures) later this year.
- WG includes DFO, industry, Govt NL, ENGO stakeholders.
- Next assessment will be conducted in spring 2026

2024 / 25 Northern Cod Acoustic Tracking (NCAT) Activities

NCAT Project Elements



- Research plan to investigate Northern Cod migration & stock composition
- Genetic studies provided insight into genes linked to behavior, habitat choice & diet
- Acoustic array refurbished in 2024
- 1100 cod tags deployed to date
- Receiver data to be uploaded via autonomous Wave Glider

NCAT Project Timeline

2015: NC FIP led by AGC & ASP with SFP

2016: Research plan developed with DFO, MUN/MI & DAL

2017: Array design workshop

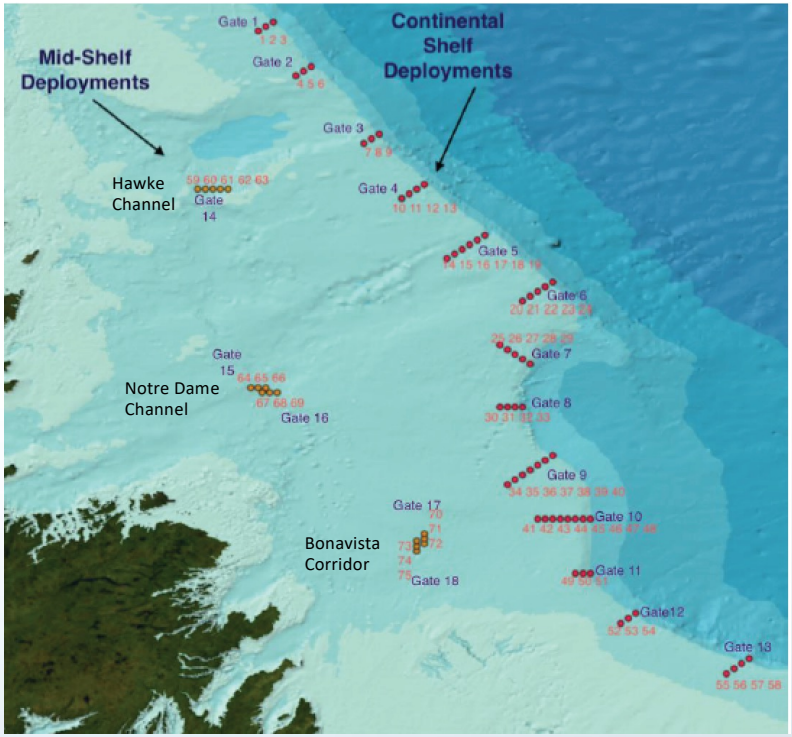
2019: First NCAT cod tagged (inshore), Puncher *et al*, genome paper

2020: NCAT array deployed

2021-2024: Cod tagged inshore & offshore

2023-24: Delgado *et al*, genomics & telemetry paper

2024: NCAT Array refurbished (+5 years)



NCAT Tagging… so far

	2019	2020	2021	2022	2023	2024	Total
2J Inshore	52			4			56
2J Offshore			51	268			319
3K Inshore	155						155
3KOffshore			15	99	34	232	380
3L Inshore	80			54			134
3L Offshore	10						10
Totals	297	0	66	425	34	232	1054

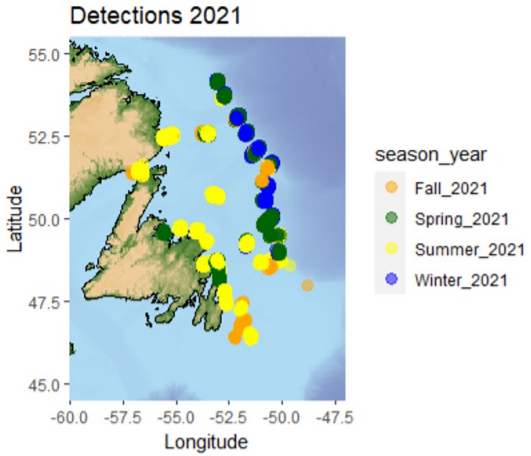
Purchased	1260
Used to date	-1054
Not working	-11
Missing	-29
Remaining	166

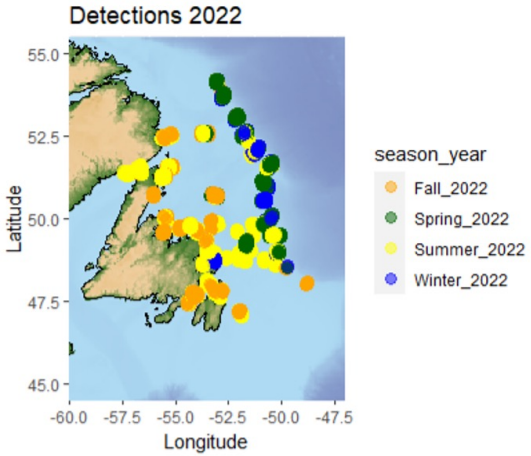
+ 46 in 2J in March 2025

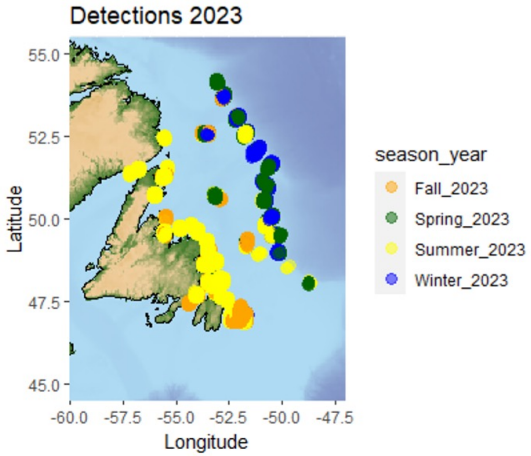
Some NCAT Telemetry Stats

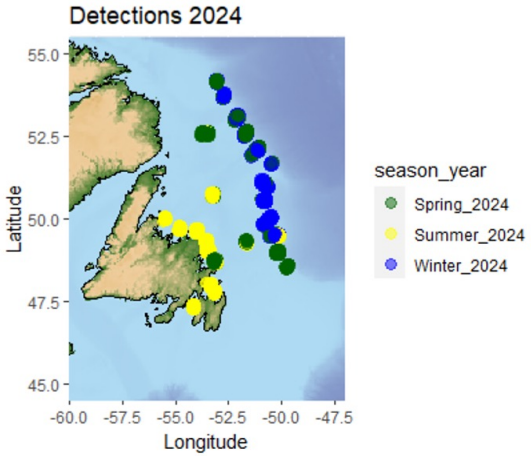
- Over 1M detections of NCAT tagged cod on 13 different arrays
- 446 NCAT cod detected at least 1 day after release
- On average, NCAT-tagged cod detected on 13.4 different days
- Most individuals detected in 2J and 3K NAFO Divisions. Of 446 NCAT cod detected:
  - 246 found in only 1 NAFO Division.
  - 56 have been found in 3 different NAFO Divisions and
  - 9 cod in 4 different NAFO Divisions
  - 32.3% of cod detected were found at both inshore & offshore sites
  - 26% detected only at inshore sites
  - 41.7% detected only at offshore sites
- Migration timing slightly shifted to later in the summer in 2022/ 23 vs 2020/ 21

NCAT Detections 2021 - 24









NCAT Array refurbished in 2024

- OTN swapped out 74 of 75 receivers
- Acoustic receivers and releases powered until 2029
- Cost ~$350K

Telemetry / Genetics Research

Genetics/ Genomics Papers

Fisheries Research 216 (2019) 29–40

Contents lists available at ScienceDirect

Fisheries Research

journal homepage: www.elsevier.com/locate/fishres

Chromosomal inversions in the Atlantic cod genome: Implications for management of Canada's Northern cod stock

Gregory Neils Puncher[a,b,*], Sherrylynn Rowe[c], George A. Rose[d], Nathalie M. Leblanc[a], Geneviève J. Parent[b], Yanjun Wang[e], Scott A. Pavey[a]

Received: 10 August 2020 | Accepted: 24 November 2020

DOI: 10.1111/jfb.14632

REGULAR PAPER

JOURNAL OF FISH BIOLOGY fsbi

Life-stage-dependent supergene haplotype frequencies and metapopulation neutral genetic patterns of Atlantic cod, *Gadus morhua*, from Canada's Northern cod stock region and adjacent areas

Gregory Neils Puncher[1,2,3] | Sherrylynn Rowe[3] | George A. Rose[4] | Geneviève J. Parent[2] | Yanjun Wang[5] | Scott A. Pavey[1]

DOWNLOAD PDF 337 102

The genomic consequences of fisheries collapse in a marine fish

ATLANTIC COD | CONSERVATION GENETICS | GENETIC DIVERSITY LOSS | LOW COVERAGE WHOLE GENOME SEQUENCING | POPULATION GENETICS - EMPIRICAL | RUNS OF HOMOZYGOSITY

Maria Lisette Delgado Aquije, Mallory Van Wyngaarden, Anthony Einfeldt, Gregory McCracken, Ian Paterson, Corey Morris, Ian Bradbury, Paul Bentzen, Daniel Ruzzante

Manuscript submitted to Journal of Fish Biology

Title: Northern Cod movement: insights from acoustic telemetry and genomics

Authors: M. Lisette Delgado[1*], Nicole Smith[2], Frederick Whoriskey[1,3], Steve Devitt[4], Emilie Novaczek[2], Corey J. Morris[2], Tony Kess[2], Ian Bradbury[1,2], Sara Iverson[1,3], Paul Bentzen[1], Daniel E. Ruzzante[1*]

Affiliations:
[1]Department of Biology, Dalhousie University, Halifax, NS, Canada
[2]Fisheries and Oceans Canada, Northwest Atlantic Fisheries Centre, St. John's, NL, Canada
[3]Ocean Tracking Network, Dalhousie University, Halifax, NS, Canada
[4]Atlantic Groundfish Council, Canada
*corresponding authors: m.lisette.delgado@dal.ca, daniel.ruzzante@dal.ca

Some high-level genomic research results

- Using low-coverage whole genome sequencing on collections from the 1990s & 2010 (Delgado et al, 2024)
  - Detected a decline in genetic diversity of Atlantic Cod in the Canadian portion of the species range
  - Most recent collections exhibited lower genetic diversity and fewer genetically distinguishable groups than 1990s collections
  - WGS of 77 tagged cod showed no relation between chromosomal inversions & the four migratory phenotypes
  - Genomic regions encoding for hormone receptors showed differentiation between cod detected north vs. south of the Notre Dame Channel during spawning season

New research project – Dalhousie

- Dr. Marina Parrondo Lombardía funded through NSERC, MITACS & AGC, led by Daniel Ruzzante
- Supports a 2-year PDF (~$25K)
- Research will focus on:
  - Using telemetry data to understand individual movement patterns in the Northern cod complex including seasonal migratory behavior.
  - Using genomics data to examine the potential associations between telemetry and genomic data and examine whether there are differences in movement between male & female cod.

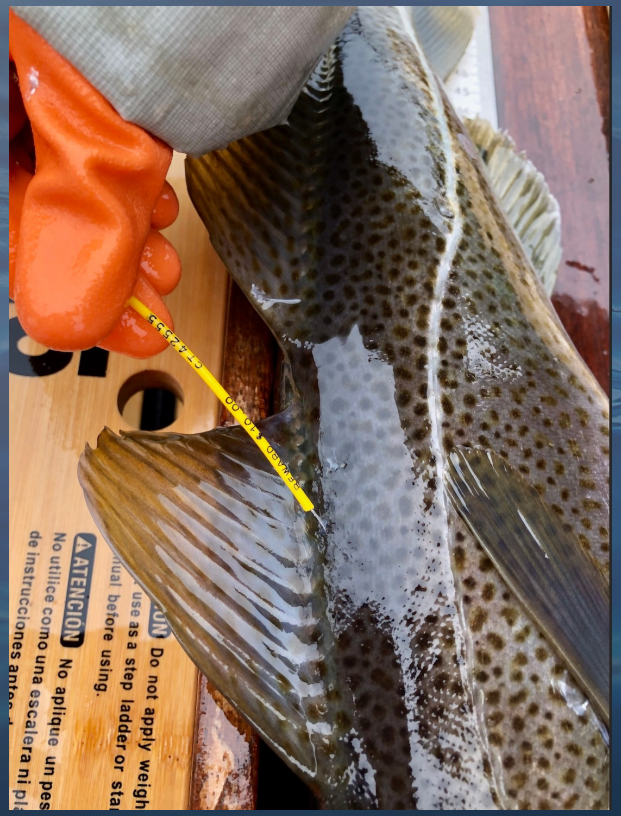
New research project – MUN/MI & DFO

- Proposal to NL Industry, Energy & Technology, championed by Dr. Jonathan Fisher of MUN
- Seeking to support PDF for 2 years (~$80K)
- Research will focus on:
  - Compilation of >20 years of telemetry data
  - Estimation of mortality rates
  - Integration of estimates to inform the NCAM and fishery decisions
  - Investigate broad-scale distribution patterns of Northern Cod by incorporating seasonal components to understand annual patterns changes.

2025/ 2026 Workplan - On the Water

- Focus over next year will be two research projects

- Next Cod Tagging– likely Winter 2027
  - ~120 of original 1260 tags remain
  - NC FIP purchased 60 tags in 2025
  - Possible new funding opportunity to replace AFF to support tagging



Questions?

Steve Devitt

Director, Sustainability

Atlantic Groundfish Council

sdevitt@atlanticgroundfish.ca