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SCIENTIFIC COUNCIL MEETING – JUNE 2025

Report of the Scientific Council Meeting

29 May -12 June 2025
Halifax, Nova Scotia

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REPORT OF SCIENTIFIC COUNCIL MEETING
29 May -12 June 2025

Chair: Diana González-Troncoso Rapporteur: Andrea Perreault

I. PLENARY SESSIONS

The Scientific Council met at the Atrium building, Saint Mary's University, Halifax, NS, Canada, during 29 May – 12 June 2025, to consider the various matters in its Agenda. Participants attended both in person and virtually via Webex. Representatives attended from Canada, Denmark (in respect of Faroe Islands and Greenland), the European Union, Norway, Japan, the Russian Federation, Ukraine, and the United Kingdom. Observers from the Food and Agriculture Organization (FAO), Atlantic Groundfish Council, Oceans North, and Sargasso Sea Commission were also present. The Executive Secretary and other members of the Secretariat were in attendance.

The Executive Committee met prior to the opening session of the Scientific Council to discuss the provisional agenda and plan of work.

The Scientific Council was called to order at 11:13 on 29 May 2025. The provisional agenda was **adopted** (Appendix V). The NAFO Secretariat was appointed as the rapporteur.

The opening session was adjourned at 11:30 on 29 May 2025. Several sessions were held throughout the course of the meeting to deal with specific items on the agenda. The Scientific Council considered and **adopted** all the Standing Committees reports on 12 June 2025.

The Scientific Council considered and **adopted** the Scientific Council Report of this meeting of 29 May - 12 June 2025. The Chair received approval to leave the report in draft form for about two weeks to allow for minor editing and proof-reading on the usual strict understanding there would be no substantive changes.

The meeting was adjourned at 10:31 on 12 June 2025.

The Reports of the Standing Committees as adopted by the Council are appended as follows: Appendix I - Report of the Standing Committee on Fisheries Environment (STACFEN), Appendix II - Report of Standing Committee on Publications (STACPUB), Appendix III - Report of Standing Committee on Research Coordination (STACREC), and Appendix IV - Report of Standing Committee on Fisheries Science (STACFIS).

The Agenda, List of Research (SCR) and Summary (SCS) Documents, and List of Representatives, Advisers and Experts, are given in Appendices V-VII.

The Scientific Council's considerations on the Standing Committee Reports, and other matters addressed by the Council, follow in Sections II-XV.

II. REVIEW OF SCIENTIFIC COUNCIL RECOMMENDATIONS IN 2024

Recommendations from 2024 are considered in the relevant sections of this report.

III. FISHERIES ENVIRONMENT

The Scientific Council **adopted** the Report of the Standing Committee on Fisheries Environment (STACFEN), as presented by the Chair, Miguel Caetano. The full report of STACFEN is in Appendix I.

The recommendations made by STACFEN for the work of the Scientific Council as **endorsed** by the Scientific Council, are as follows:

- STACFEN **recommends** *providing Secretariat support for an invited speaker to address emerging issues and concerns in the NAFO Convention Area at the 2026 STACFEN meeting.*
- STACFEN **recommends** *considering convening a meeting with STACFIS members regarding their potential participation in the May 2026 STACREC meeting to evaluate options for integrating environmental data into various stock assessments.*
- STACFEN **recommends** *to participate in the WG-ESA meeting to evaluate options and design an approach to integrate climate change considerations into Scientific Council operations.*

IV. PUBLICATIONS

The Scientific Council **adopted** the Report of the Standing Committee on Publication (STACPUB) as presented by the Chair, Rick Rideout. The full report of STACPUB is in Appendix II.

The recommendations made by STACPUB for the work of the Scientific Council as **endorsed** by the Scientific Council, are as follows:

- STACPUB **recommends** *changing the citation on SCR documents from "Scientific Council Research Document, SCR Doc. 25/XXX" to "NAFO Scientific Council Research Document, NAFO SCR Doc. 25/XXX".*
- STACPUB **recommends** *adding clear guidelines for review/synthesis type papers to the JNAFS website.*
- STACPUB **recommends** *exploring options for delivering JNAFS notifications digitally to scientists in order to promote a broader familiarity with the journal and to potentially attract future paper submissions. This should include the development of a 'sign up for updates' link on the JNAFS website, but could also include the development of an email distribution list, and/or exploring ways to reach out via social media.*

V. RESEARCH COORDINATION

The Scientific Council **adopted** the Report of the Standing Committee on Research Coordination (STACREC) as presented by the Chair, Mark Simpson. The full report of STACREC is in Appendix III.

The recommendations made by STACREC for the work of the Scientific Council as **endorsed** by the Scientific Council, are as follows:

- STACREC **recommends** *a comprehensive study to investigate redfish stock structure in NAFO Subareas 2 and 3, with consideration of species splitting and recent approaches to studying redfish stock structure in other RFMOs*.
- SC reiterated the **recommendation** that *an external reviewer be invited to provide an independent peer review of the data and assessment methodology used for full stock assessments on an annual basis.*
- STACREC **recommends** that *the NAFO Secretariat review the STATLANT 21B reporting template with the goal of providing an updated reporting template for Scientific Council review.*
- STACREC **recommends** that *the NAFO Secretariat work to include the STATLANT 21 submission rate information, currently available in the STACREC reports, on the NAFO website with the STATLANT 21 databases.*

VI. FISHERIES SCIENCE

The Scientific Council **adopted** the Report of the Standing Committee on Fisheries Science (STACFIS) as presented by the Chair, Martha Krohn. The full report of STACFIS is in Appendix IV.

There were no general recommendations arising from STACFIS. The Council endorsed recommendations specific to each stock and they are highlighted under the relevant stock considerations in the STACFIS report.

VII. MANAGEMENT ADVICE AND RESPONSES TO SPECIAL REQUESTS

1. The NAFO Commission

The Commission requests are outlined in SCS Doc. 25/01.

The Scientific Council noted the Commission requests for advice on Northern shrimp (Northern shrimp in Division 3M and Divisions 3LNO) will be undertaken during the Scientific Council meeting on 09 to 11 September 2025. Advice for squid in Subareas 3+4 will be undertaken during the 2025 September Scientific Council meeting if a Designated Expert is appointed.

a) Request for Advice on TACs and Other Management Measures

The Fisheries Commission at its September 2010 meeting reviewed the assessment schedule of the Scientific Council and with the concurrence of the Coastal States agreed to request advice for certain stocks on either a two-year or three-year rotational basis. In recent years, thorough assessments of certain stocks have been undertaken outside of the assessment cycle either at the request of the Commission or by the Scientific Council's own accord based on recent stock developments.

Cod in Division 3M Advice June 2025 for 2026

Recommendation for 2026

Scientific Council projected the fishing mortality scenarios defined for stocks in the Healthy Zone of the PA Framework. None of those scenarios are projected to maintain the stock above $B_{trigger}$ with a probability higher than 50%.

To maintain the stock in the Healthy Zone with a probability higher than 50%, SC advises that catch not exceed $F_{50\%HZ}$, corresponding the catches of 15 360 t in 2026. This catch level has a risk of 1% of exceeding F_{lim}.

Management objectives

No explicit management plan or management objectives have been defined by the Commission. Convention General Principles are applied.

Convention Principle	Status	Comment
Restore to or maintain at Bmsy	🟡	Blim < B < Btrigger
Eliminate Overfishing (Stock)	🟢	F < Flim
Eliminate Overfishing (Ecosystem)	🟢	Total EPU catches < 2TCI
Apply Precautionary Approach	🟢	All PA reference points defined
Minimize harmful impacts on living marine resources and ecosystems	🟡	Directed fishery, VME closures in effect, Effectiveness of bycatch regulations uncertain
Preserve marine biodiversity	⚪	Cannot be evaluated

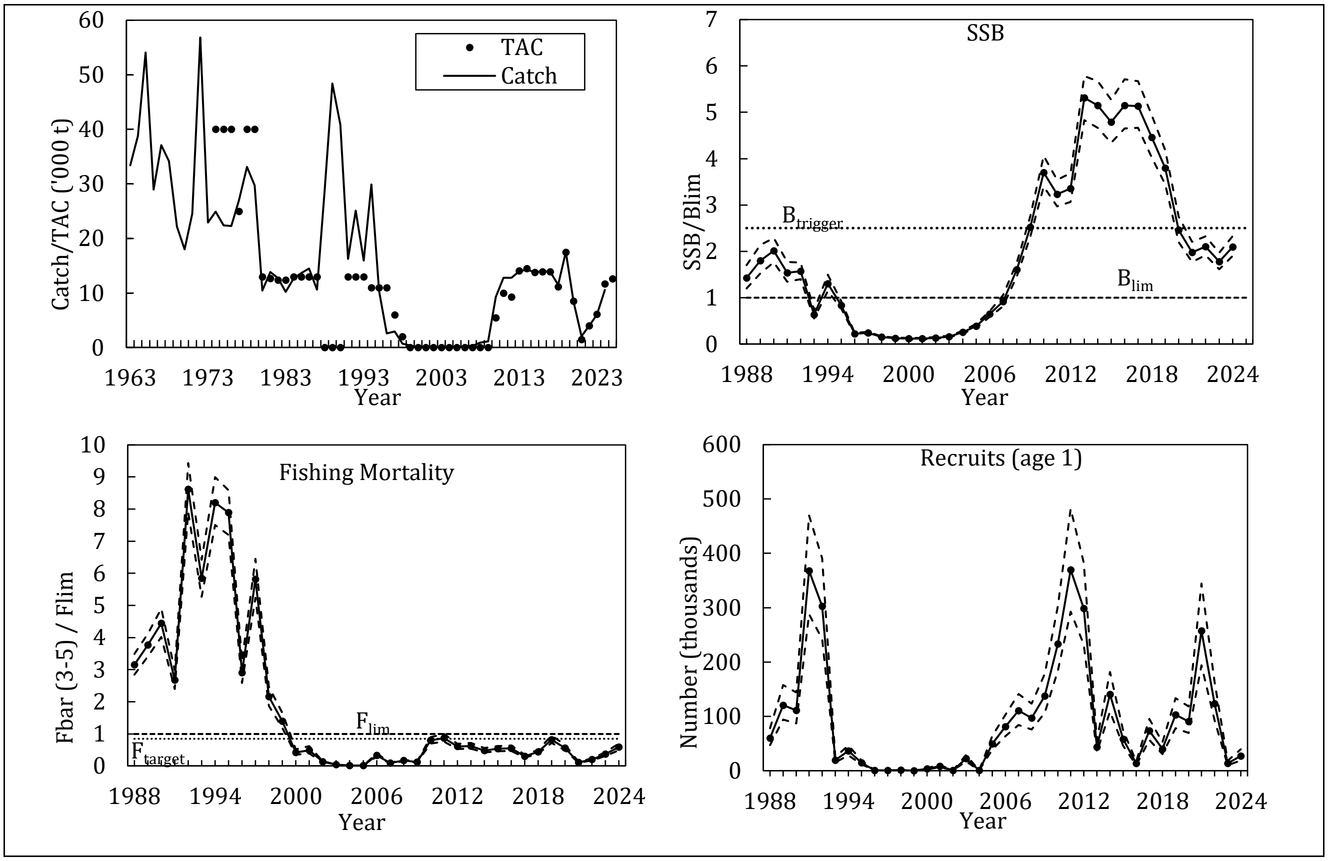
🟢 OK
🟡 Intermediate
🔴 Not accomplished
⚪ Unknown

Management unit

The cod stock in Flemish Cap (NAFO Div. 3M) is considered to be a separate population.

Stock status

SSB declined rapidly since 2017 but has remained stable during the last 4 years and is estimated to be above B_{lim} and below $B_{trigger}$ (Cautious Zone) in 2024. Since 2013, recruitment has varied at intermediate levels but much lower than those observed in 2011-2012. In 2021, a good recruitment was observed, while in 2023 and 2024 is at a very low level. Fishing mortality has remained below F_{lim} since the fishery reopened in 2010. The F has been below F_{target} during that period except in 2011. In 2021, the minimum level of F since the re-opening was reached, increasing since then. In 2024, F is below F_{lim} and F_{target} with high probability.



Reference points

B_{msy} is defined for this stock as the equilibrium SSB that corresponds to the $F_{35\%SPR}$. B_{lim} is 30% B_{msy} (B_{lim} = 15 724 t). $B_{trigger}$ is approved to be 75% B_{MSY} ($B_{trigger}$ = 39 310 t). F_{lim} corresponds to $F_{35\%SPR}$ (F_{lim} = 0.171) and F_{target} is the 85% of F_{lim} (F_{target} = 0.145) (NAFO/COM-SC Doc. 24-03).

Projections

Stochastic projections of the stock dynamics from 2025 to the start of 2027 were conducted. All scenarios assumed that the yield for 2025 is the established TAC (12 613 t). F_{bar} is the mean of the F at ages 3-5 and is used as the indicator of overall fishing mortality.

The stock is projected to be in the Healthy Zone starting in 2025. Five scenarios were considered for the year 2026: $F_{bar} = 0$, the three levels defined for stocks in the Healthy Zone (F_{bar} = 75% F_{lim}, F_{bar} = 85% F_{lim} and $F_{bar} = F_{lim}$) and an additional scenario that identified F that gave 50% probability of being in the Healthy Zone at the end of the projection period ($F_{50\%HZ}$).

Table 1.

	B		SSB		Yield
$F_{bar}=0$					
2025	72781	(64190 - 84672)	42110	(37010 - 47199)	12613
2026	70715	(59492 - 86463)	49894	(42995 - 57342)	0
2027	74739	(60797 - 93900)	54593	(47562 - 61647)	
$F_{bar}=F_{50\%HZ}$ (median=0.114)					
2025	72781	(64190 - 84672)	42110	(37010 - 47199)	12613
2026	70715	(59492 - 86463)	49894	(42995 - 57342)	15360
2027	59027	(45109 - 78281)	39297	(32323 - 46311)	
F_{bar}=0.75Flim (median=0.128)					
2025	72781	(64190 - 84672)	42110	(37010 - 47199)	12613
2026	70715	(59492 - 86463)	49894	(42995 - 57342)	16948
2027	57413	(43514 - 76682)	37782	(30770 - 44755)	
$F_{bar}=0.85F_{lim}$ (median=0.145)					
2025	72781	(64190 - 84672)	42110	(37010 - 47199)	12613
2026	70715	(59492 - 86463)	49894	(42995 - 57342)	18774
2027	55556	(41684 - 74838)	35939	(28998 - 42910)	
$F_{bar}=F_{lim}$ (median=0.171)					
2025	72781	(64190 - 84672)	42110	(37010 - 47199)	12613
2026	70715	(59492 - 86463)	49894	(42995 - 57342)	21362
2027	52942	(39067 - 72241)	33433	(26520 - 40388)	

Table 2.

				Healthy zone		
		$F=0$	$F = F_{50\%HZ}$	$F = 0.75F_{msy}$	$F = 0.85F_{msy}$	$F_{lim} = F_{msy}$
Yield (50%)	2025	12613	12613	12613	12613	12613
	2026	0	15360	16948	18774	21362
$P(F>F_{lim})$	2025	<1%	<1%	<1%	<1%	<1%
	2026	<1%	1%	5%	16%	50%
$P(B<B_{lim})$	2025	<1%	<1%	<1%	<1%	<1%
	2026	<1%	<1%	<1%	<1%	<1%
	2027	<1%	<1%	<1%	<1%	<1%
$P(F>F_{target})$	2025	<1%	<1%	<1%	<1%	<1%
	2026	<1%	7%	21%	50%	83%
$P(B<B_{trigger})$	2025	27%	27%	27%	27%	27%
	2026	3%	3%	3%	3%	3%
	2027	<1%	50%	61%	73%	85%
$P(B_{2027}>B_{2025})$		100%	20%	10%	4%	1%
$(B_{2027} - B_{2025}) / B_{2025}$		29.5%	-7.3%	-11%	-15.2%	-21.1%

Under the scenarios with $F_{bar} \leq F_{50\%HZ}$, SSB during the projected years will remain in the Healthy Zone (above $B_{trigger}$) with a probability higher than 50%. Under all scenarios, the probability of F_{bar} exceeding F_{lim} is less than or equal to 16% in 2026 (Tables 1 and 2).

Assessment

A Bayesian SCAA model, introduced at the 2018 benchmark, was used as the basis for the assessment of this stock with data from 1988 to 2024.

The next full assessment for this stock will be in 2026.

Human impact

Mainly fishery related mortality has been documented. Other sources (e.g., pollution, shipping, oil-industry) are undocumented.

Biological and environmental interactions

Redfish, shrimp and small cod are important prey items for cod. There are strong trophic interactions between these species in the Flemish Cap.

The Flemish Cap (3M) Ecosystem Production Unit (EPU), with the exception of a short-lived increase in 2005-2009, has shown a fairly stable total biomass over time despite the changes in individual stocks. This indicates no major changes in overall ecosystem productivity.

Ecosystem sustainability of catches

The impact of bottom fishing activities on VMEs in the NRA was last assessed in 2021. The risk of Significant Adverse Impacts (SAIs) on sponge and large gorgonian VMEs was assessed to be low, while this risk for sea pen VMEs has been assessed as intermediate. The risks of SAIs on small gorgonian, black coral, bryozoan and sea squirt VMEs were assessed as high. A number of areas in the Flemish Cap (3M) EPU have been closed to bottom fishing to protect VMEs.

3M Cod is included in the piscivores guild of the Flemish Cap (3M) Ecosystem Production Unit (EPU). Other NAFO managed stocks in this guild and EPU are 3M redfish and 2+3KLMNOPs Greenland halibut. The Catch/TCI for 2024 was below the 2TCI ecosystem reference point (3M Piscivore $Catch_{2024}$/TCI=1.43).

Fishery

Cod is caught in directed trawl and longline fisheries and as bycatch in the directed redfish fishery by trawlers. The fishery is regulated by quota. New technical regulations were introduced in 2021, in particular a closure of the directed fishery in the first quarter as well as sorting grids to protect juveniles (see request 9).

Recent catch estimates and TACs ('000 t) are as follows:

	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
TAC	13.9	13.9	11.1	17.5	8.5	1.5	4.0	6.1	11.7	12.6
STATLANT 21	13.8	13.9	10.5	13.0	8.5	2.6	NA	NA	NA	
STACFIS	14.0	13.9	11.5	17.5	8.5	2.1	4.0	6.2	10.6	

NA - In 2022-2024, STATLANT 21 information is incomplete.

Special comments

Scientific Council reiterates the **proposal** to conduct a full assessment of cod in Div. 3M every two years, since biological parameters have remained reasonably stable in recent years and projections proved to be robust over two years. SC proposes that this new two-year cycle begins with the June 2027 assessment based on assessment schedules of other stocks.

Scientific Council notes the increased uncertainty in the assessment and projections due to the lack of data (age length keys and maturity ogives) in the years 2023 and 2024.

Sources of information

SCS Doc. 25/05REV, 25/07, 25/08, 25/09 and SCR Doc. SCR 25/04, SCR 25/032.

Yellowtail flounder in Divisions 3LNO Advice June 2025 for 2026-2027

Recommendation for 2026-2027
Scientific Council projected the fishing mortality scenarios defined for stocks in the Healthy Zone of the PA Framework. All scenarios are projected to maintain the stock above $B_{trigger}$ with a probability of 96% or higher.

F_{target} corresponds to catches of 24 290 t and 22 000 t in 2026 and 2027, respectively. These catch levels have risks of no more than 25% of exceeding F_{lim}.

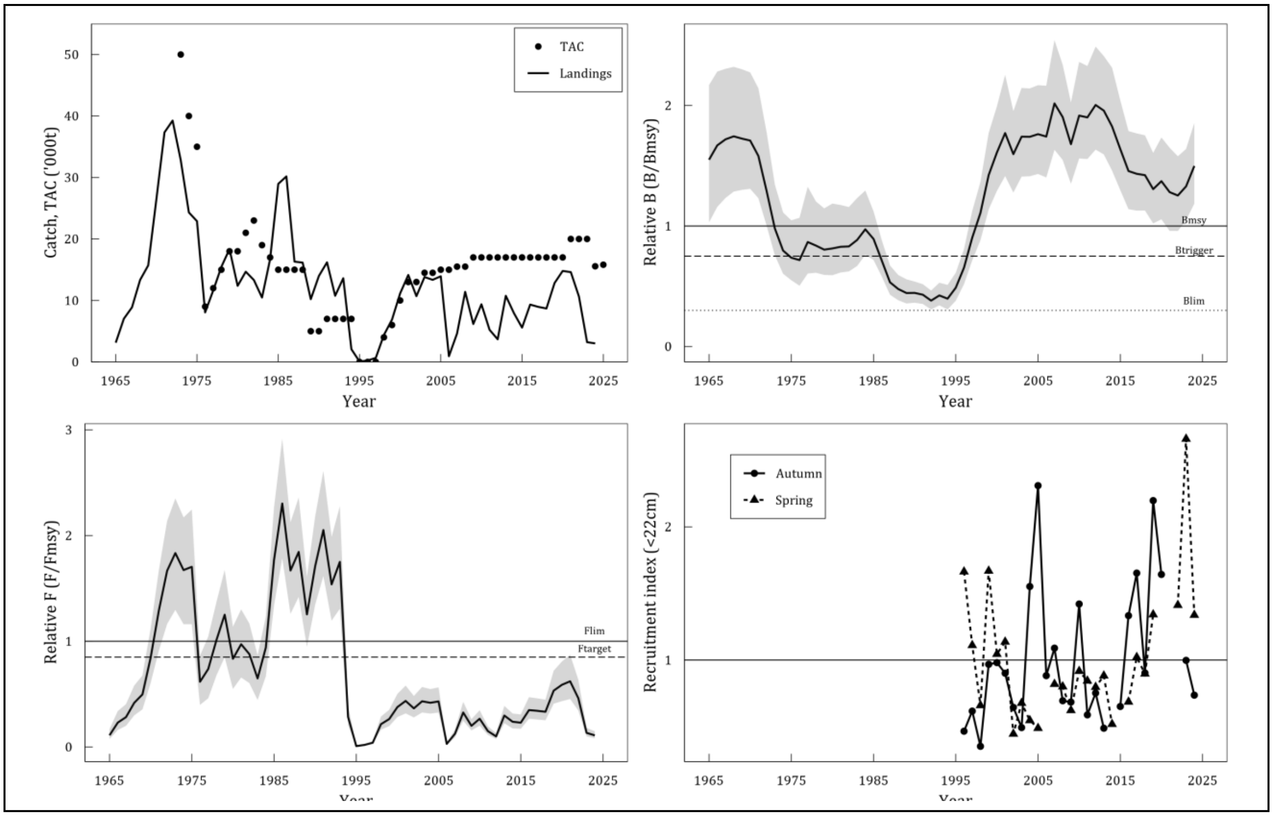
Management objectives
No explicit management plan or management objectives are defined by the Commission. Convention General Principles are applied.

Convention Principle	Status	Comment
Restore to or maintain at Bmsy	OK	B > Bmsy
Eliminate Overfishing (Stock)	OK	F < Flim
Eliminate Overfishing (Ecosystem)	OK	Total EPU catches < 2TCI
Apply Precautionary Approach	OK	All PA reference points defined
Minimize harmful impacts on living marine resources and ecosystems	Intermediate	Directed fishery, VME closures in effect, Effectiveness of bycatch regulations uncertain
Preserve marine biodiversity	Unknown	Cannot be evaluated

OK
Intermediate
Not accomplished
Unknown

Management unit
The management unit is NAFO Divisions 3LNO. The stock is mainly concentrated on the southern Grand Bank and is recruited from the Southeast Shoal area nursery ground.

Stock status
The stock is in the Healthy Zone. The stock size remains above B_{msy} with a probability >99%, and has been between 1.3x and 1.5x B_{msy} since 2016. There is a very low risk (<1%) of the stock being below $B_{trigger}$ and a very low risk of F being above $F_{lim}=F_{msy}$ or F_{target} (<1%). Recruitment has been generally above average since the late 2010s.



Reference points

B_{lim} is 30% B_{msy}, $B_{trigger}$ is 75% B_{msy}, F_{target} is 85% F_{msy}, and F_{lim} is F_{msy}.

Projections

Stochastic projections were for $Catch_{2025} = TAC_{2025} = 15\ 810$ t. Constant fishing mortality was applied from 2026-2027 at four levels of F*:* F=0, and the three levels defined for stocks in the Healthy zone (75% F_{msy}, 85% F_{msy}, and F_{msy}). At the end of the projection period, the risk of the biomass being below B_{lim} is less than 1% in all cases, and the risk of the biomass being below $B_{trigger}$ is 4% or less in all cases.

At 75% F_{msy}, the probability that F > F_{lim} was between 11% and 12% in the medium term (2026, 2027). Projected at the level of 85% F_{lim}, the probability that F > F_{lim} ranges between 24% and 25% and for F_{msy} projections, this probability increases to 50%.

The probability that biomass in 2028 is greater than B_{2025} is 70%, 21%, 16%, and 11% for projections of F=0, 75% F_{msy}, 85% F_{msy}, and F_{msy} respectively. At 75% F_{msy} to F_{msy} biomass declines towards B_{msy} are expected, with decreases from 2025 to 2028 estimated at 15 to 23%.

Projections with Catch$_{2025}$ = 15 810 t		
Year	Yield ('000t) median	Projected Relative Biomass (B/Bmsy) median (80%CI)
F=0		
2025	15.81	1.62 (1.26, 2.03)
2026	0	1.55 (1.19, 1.96)
2027	0	1.69 (1.31, 2.12)
2028	-	1.79 (1.39, 2.22)
F = 0.75F_{msy}		
2025	15.81	1.62 (1.26, 2.03)
2026	21.43	1.55 (1.19, 1.96)
2027	19.88	1.44 (1.09. 1.84)
2028	-	1.37 (1.02, 1.77)
F = 0.85F_{msy}		
2025	15.81	1.62 (1.26, 2.03)
2026	24.29	1.55 (1.19, 1.96)
2027	22.00	1.41 (1.80, 1.06)
2028	-	1.32 (0.97, 1.72)
F = F_{msy}		
2025	15.81	1.62 (1.26, 2.03)
2026	28.58	1.55 (1.19, 1.96)
2027	24.96	1.36 (1.02, 1.74)
2028	-	1.24 (0.89, 1.64)

		Catch 2025 = 15 810 t			
		F=0	Healthy Zone		
			F = 0.75F_{msy}	F = 0.85F_{msy}	F = F_{msy}
Yield ('000t) (50%)	2025	15.81	15.81	15.81	15.81
	2026	0	21.43	24.29	28.58
	2027	0	19.88	22.00	24.96
$P(F>F_{lim})$	2025	<1%	<1%	<1%	<1%
	2026	<1%	11%	24%	50%
	2027	<1%	12%	25%	50%
$P(B<B_{lim})$	2025	<1%	<1%	<1%	<1%
	2026	<1%	<1%	<1%	<1%
	2027	<1%	<1%	<1%	<1%
	2028	<1%	<1%	<1%	<1%
$P(F>F_{target})$	2025	3%	3%	3%	3%
	2026	<1%	29%	50%	78%
	2027	<1%	30%	50%	76%
$P(B<B_{trigger})$	2025	<1%	<1%	<1%	<1%
	2026	<1%	<1%	<1%	<1%
	2027	<1%	<1%	<1%	1%
	2028	<1%	1%	2%	4%
$P(B_{2028}>B_{2025})$		70%	21%	16%	11%
$(B_{2028}-B_{2025})/B_{2025}$		+10.8%	-15.0%	-18.2%	-22.9%

Assessment

A Schaefer surplus production model in a Bayesian framework was used for the assessment of this stock. The results were comparable to the previous assessment. Input data comes from research surveys and the fishery.

The next full assessment for this stock will be in 2027.

Human impact
Mainly fishery related mortality has been documented. Other sources (e.g. pollution, shipping, oil-industry) are undocumented.

Biology and Environmental interactions

Yellowtail flounder diet in the Grand Bank is typically dominated by sandlance and invertebrates like amphipods, polychaetes, and brittle stars.

The Grand Bank (3LNO) Ecosystem Production Unit (EPU) is currently experiencing low productivity conditions, with EPU biomass well below pre-collapse levels (pre-1990s). While some rebuilding was observed since the 1990s, biomass declined across multiple trophic levels and stocks through the late 2010s. Positive signals are evident in the last two years, with biomass approaching the early-mid 2010s level.

Fishery
Yellowtail flounder is caught in a directed trawl fishery and as by-catch in other trawl fisheries. The fishery is regulated by quota and minimum size restrictions. Since 2006 catches have generally been well below the TAC. Recent highs from 2019 to 2022 which ranged from 10 600 t to 14 800 t are followed by two years with catches at 3 250t in 2023 and 3 020 t in 2024, with decreases in catch attributed to industry and economic related factors. American plaice and Atlantic cod are taken as by-catch in the yellowtail fishery. There is a 15% by-catch restriction on American plaice and a 4% limit on cod.

Recent catches and TACs ('000 tons) are as follows:

	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
TAC	17	17	17	17	17	17	20	20	15.6	15.8
STATLANT 21	8.3	9.2	8.6	12.3	14.0	14.7	NA	NA	NA	
STACFIS	9.3	9.2	8.7	12.8	14.8	14.6	10.6	3.3	3.0	

NA - In 2022-2024, STATLANT 21 information is incomplete.

Ecosystem sustainability of catches

Fishing intensity on yellowtail flounder has impacts on Divs. 3NO Atlantic cod and Divs. 3LNO American plaice through by-catch. The impact of bottom fishing activities on VMEs in the NRA was last assessed in 2021. The risk of Significant Adverse Impacts (SAIs) on sponge and large gorgonian VMEs was assessed to be low, while this risk for sea pen VMEs has been assessed as intermediate. The risks of SAIs on small gorgonian, black coral, bryozoan and sea squirt VMEs were assessed as high. Some areas in the Grand Bank (3LNO) EPU have been closed to bottom fishing to protect sponge and coral species.

Yellowtail flounder is included in the benthivore guild of the Grand Bank EPU. Other NAFO managed stocks in this guild within the EPU include Divs. 3LNOPs thorny skate, 3NO witch flounder, 3LNO American plaice, and 3LNO shrimp. The Catch/TCI for 2024 was below the 2TCI ecosystem reference point (3LNO Benthivore $Catch_{2024}/TCI=0.74$).

Special comments
Management of yellowtail flounder should take into consideration the fact that the fishery impacts depleted fish stocks on the Grand Bank, and may be impeding recovery of Divs. 3NO cod and Divs. 3LNO American plaice which have both been below B_{lim} for decades.

Data from Canadian directed yellowtail fishing reports indicate that catch of American plaice has not exceeded 5% of yellowtail catch in any year over the last five years (2020-2024). However, even very low levels of F have been shown to meaningfully impact growth of the Divs. 3LNO American plaice stock.

New vessels are being used to conduct the Canadian surveys and information from 2022 onwards. Previous Canadian survey data have been converted to be directly comparable with these new vessels.

Sources of information
SCR 18/039, 25/006, 25/026, 25/028, 25/029, 24/037; SCS 25/05, 25/09, 24/11 NAFO/COM-SC Doc. 24-03

Redfish in Division 3O Advice June 2025 for 2026-2028

Recommendation for 2026-2028

The stock has decreased since 2012 and there is a 62% risk of the stock being below B_{lim} in 2024.

To be consistent with the NAFO Precautionary Approach, Scientific Council advises that no directed fishery should occur in 2026, 2027, and 2028. Bycatch should be kept at the lowest possible level.

Management objectives

No explicit management plan or management objectives have been defined by the Commission. Convention General Principles are applied.

Convention Principle	Status	Comment
Restore to or maintain at Bmsy	Not accomplished	B < Blim
Eliminate Overfishing (Stock)	Not accomplished	F > Flim
Eliminate Overfishing (Ecosystem)	OK	Total EPU catches < 2TCI
Apply Precautionary Approach	OK	All PA reference points defined
Minimize harmful impacts on living marine resources and ecosystems	Intermediate	Directed fishery, VME closures in effect, Effectiveness of bycatch regulations uncertain
Preserve marine biodiversity	Unknown	Cannot be evaluated

- OK
- Intermediate
- Not accomplished
- Unknown

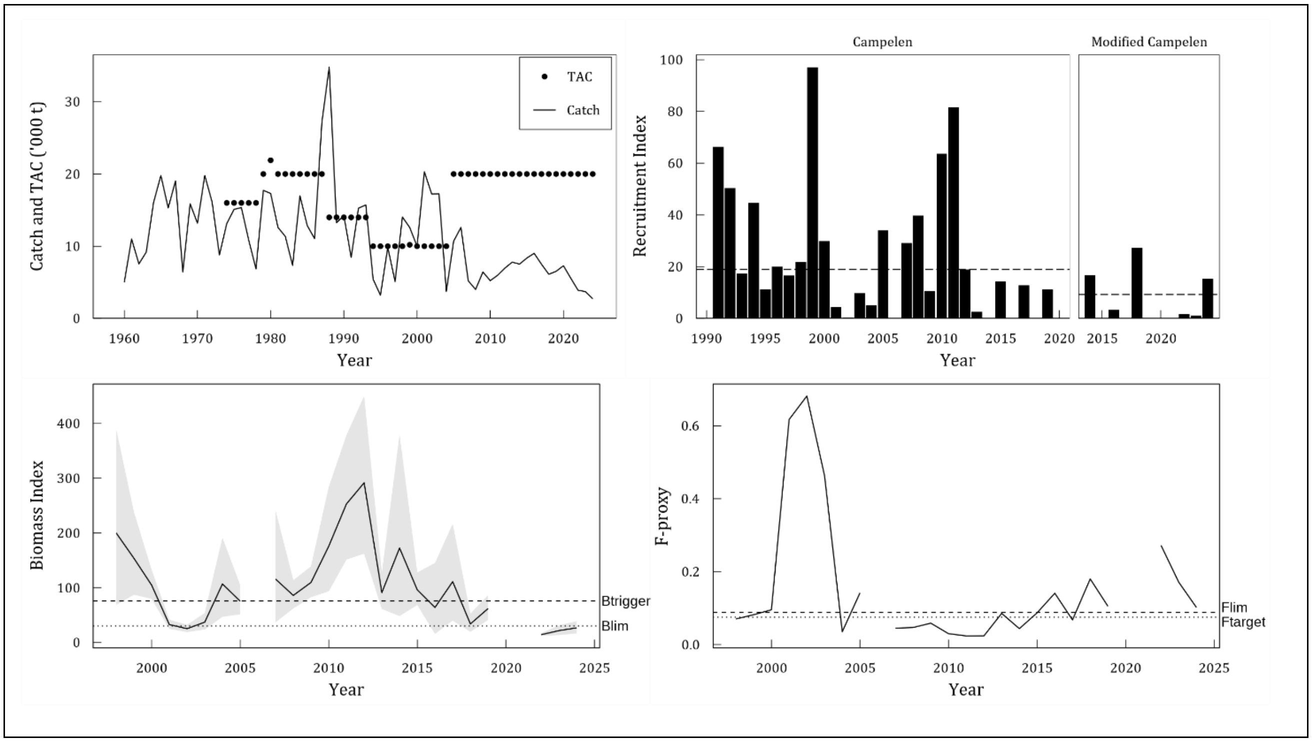
Management unit

The management unit is NAFO Div. 3O.

Stock status

Redfish in Div. 3O is in the Critical Zone. Biomass in 2024 was below the limit reference point (B_{lim} = 0.3 B_{msy}-proxy) with a moderate probability [P(B_{2024}> B_{lim})> 0.62]. The fishing mortality proxy was above F_{target} [P(F_{2024}>F_{target})>0.58] and F_{lim} [P(F_{2024}>F_{lim})>0.53].

Recruitment in 2024 was above the median of comparable survey values since 2014, but the short time series limits confidence in interpreting this as a meaningful trend.



Reference points

The biomass limit reference point for this stock was updated from that accepted at the 2022 assessment given the lack of conversion factors for the Canadian autumn survey and the inability to rescale autumn Campelen data. The rescaled Canadian spring survey is now used as the basis for this reference point, with the average of the survey time series being considered a proxy for B_{msy}. B_{lim} is defined at 30% of the proxy-B_{msy} level and $B_{trigger}$ is defined as 75% of the proxy-B_{msy} level. Similarly, F_{msy} was considered as the average of the F_{proxy} time-series (1998-2024) and F_{target} is 0.85 F_{msy}.

Projections

Projections cannot be provided for this stock at this time.

Assessment

This assessment is based upon an evaluation of survey biomass, recruitment indices and a fishing mortality proxy. The rescaled Canadian spring series is used to determine the state of the stock. The assessment is index-based and associated with relatively high uncertainty.

The next full assessment of this stock will be in 2028.

Human impact

Mainly fishery-related mortality has been documented. Other sources (e.g. pollution, shipping, oil-industry) are undocumented.

Biological and environmental interactions

There are three species of the genus *Sebastes* with distribution overlapping in several areas of Northwest Atlantic, the deep sea redfish (*Sebastes mentella*), Acadian redfish (*Sebastes fasciatus*), and golden redfish (*Sebastes norvegicus*).

Redfish diet in the Grand Bank (3LNO) EPU typically includes large zooplankton species (e.g. amphipods, euphausiids), small forage fishes (e.g. sandlance and capelin), and occasionally shrimp.

The Grand Bank (3LNO) Ecosystem Production Unit (EPU) continues experiencing low productivity conditions, with EPU biomass well below pre-collapse levels (pre-1990s). Rebuilding was observed since the 1990s, but declines across multiple trophic levels and stocks occurred after 2014. Positive signals have been observed since these declines, with biomass approaching the early-mid 2010s level in recent years.

Fishery

Redfish are caught primarily in bottom trawl fisheries, but in the past, some landings were reported from mid-water trawl fisheries. The fishery likely captures a combination of all three species of redfish. In directed redfish fisheries, Atlantic cod, American plaice, witch flounder and other species are landed as bycatch. In turn, redfish are also caught as bycatch in fisheries directing for other species.

Recent catch estimates and TACs ('000 t) are:

	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
TAC	20	20	20	20	20	20	20	20	20	20
STATLANT 21	8.6	7.3	4.3	6.5	7.3	5.5	NA	NA	NA	
STACFIS	9.0	7.5	6.1	6.5	7.3	5.6	3.9	3.7	2.7	

NA - In 2022-2024, STATLANT 21 information is incomplete.

Ecosystem sustainability of catches

The impact of bottom fishing activities on VMEs in the NRA was last assessed in 2021. The risk of Significant Adverse Impacts (SAIs) on sponge and large gorgonian VMEs was assessed to be low, while this risk for sea pen VMEs has been assessed as intermediate. The risks of SAIs on small gorgonian, black coral, bryozoan and sea squirt VMEs were assessed as high. Some areas in the Grand Bank (3LNO) EPU have been closed to bottom fishing to protect sponge and coral species.

3O redfish is included in the piscivores guild of the Grand Bank (3LNO) Ecosystem Production Unit (EPU). Other NAFO managed stocks in this guild within the EPU include Divs. 3LN redfish, 3NO cod, 3NOPs white hake, and 2+3KLMNOPs Greenland halibut. The Catch/TCI for 2024 was below the 2TCI ecosystem reference point (3LNO Piscivore $Catch_{2024}$/TCI=1.54).

Special comments

Redfish are known to have variable and episodic recruitment, with potentially large periods of time between recruitment pulses and no strong relationships between stock size and recruitment.

Species separation methods are still under development for this stock.

Impacts of delineations of stock boundaries and synchronicity between adjacent stocks are unknown.

Sources of information

SCR Doc. 25/06, SCS Doc. 25/05, 08, 09.

White hake in Divs. 3LNO Advice June 2025 for 2026-2027

Recommendation for 2026-2027

The lack of Designated Expert for this stock prevented the Scientific Council from being able to carry out a full assessment. Advice for white hake in Div. 3NO is provided based on an Interim Monitoring Report which indicates that there is no significant change in the status of this stock. However, there is increased uncertainty in current stock trends given recent survey challenges and a lack of complete conversion factors for the Canadian surveys.

Scientific Council reiterates the advice of last year that the catches of white hake in 3NO should not increase above recent catches (the average of most recent five years is around 500 tones).

During the 2024 Annual meeting, the Commission requested that in June 2025, advice should be provided for 2026-2027 for Divs. 3NO white hake. During the year, the Designated Expert position for this stock became vacant, and so a full assessment could not be performed.

An Interim Monitoring Report updating the indices for the current year was prepared by the Scientific Council and presented in plenary. Based on current information there is no significant change in the status of this stock. However, there is increased uncertainty in current stock trends given recent survey challenges and a lack of complete conversion factors for the Canadian surveys. No large recruitments have been observed since 2000.

A full assessment can only be carried out if a Designated Expert is appointed.

b) Monitoring of Stocks for which Multi-year Advice was Provided in 2022, 2023 or 2024

Interim monitoring updates of these stocks were conducted, and Scientific Council reiterates its previous advice as follows:

Recommendation for redfish in Division 3M for 2025-2026: Given the life history of this stock, considering that the current F levels are below $F_{0.1}$, and to try to maintain the stock around the long-term average, Scientific Council advises that catches do not exceed the F corresponding to the current TAC (17 503 t in 2025 and 15 636 t in 2026).

Recommendation for American plaice in Division 3M for 2024-2026: The stock has recovered to the levels of the mid 1990s, however, recruitment has been poor since 2018. Scientific Council considers that there is not sufficient supporting evidence that the stock would be able to sustain a fishery at this time and recommends that there be no directed fishing in 2024, 2025 and 2026. Bycatch should be kept at the lowest possible level.

Recommendation for cod in Divisions 3NO for 2022 and beyond: No directed fishing from 2022 to allow for stock rebuilding. Bycatch of cod in fisheries targeting other species should be kept at the lowest possible level. Projections of the stock were not performed but given the poor strength of all year-classes subsequent to 2006, the stock will not reach B_{lim} in the next three years. There will be no full assessment until interim monitoring shows that conditions have changed.

Recommendation for redfish in Divisions 3LN for 2025-2026: The stock has decreased since 2015 and there is a 42% risk of the stock being below B_{lim} in 2023. Recruitment has been at or below the long-term average since the mid-2010s. To be consistent with the NAFO Precautionary Approach, Scientific Council advises that no directed fishery should occur in 2025 and 2026. Bycatch should be kept at the lowest possible level.

Recommendation for American plaice in Divisions. 3LNO for 2025 and beyond: Advice for American plaice in Divisions 3LNO is provided based on an Interim Monitoring Report which indicates no major changes in this stock. Scientific Council recommends that, in accordance with the rebuilding plan, there should be no directed fishing on American plaice in Divisions 3LNO until an assessment indicates a very low probability of being below B_{lim}. Bycatches of American plaice should be kept to the lowest possible level and restricted to unavoidable bycatch in fisheries directing for other species. There will be no full assessment until interim monitoring shows that conditions have changed.

Recommendation for witch flounder in Divisions 3NO for 2025 and 2026: In the projection period the probability of being below B_{lim} is very low (≤10%), however the probability of exceeding F_{lim} is projected to be above 30% for F greater than 75% F_{msy}. Scientific Council therefore recommends that F should be no higher than 75% F_{msy}.

Recommendation for capelin in Divisions 3NO for 2022 and beyond: No directed fishery. There will be no full assessment until interim monitoring shows that conditions have changed.

Recommendation for thorny skate in Divisions. 3LNO and Subdivision 3Ps for 2025 and 2026: No new survey information is available to determine stock status, however, given the low level of thorny skate catch in recent years (average 3 460 t, 2019 - 2023), it is unlikely that there have been major changes to the state of the stock. Given the low resilience to fishing mortality and higher historic stock levels, Scientific Council advises no increase in catches.

Recommendation for alfonsino stocks in Division 6G for 2022 and beyond: The substantial decline in CPUE and catches on the Kükenthal Peak in the past year indicates that the stock may be depleted. SC advises to close the fishery until biomass increases to exploitable levels. There will be no full assessment until interim monitoring shows that conditions have changed.

Recommendation for roughhead grenadier in Subareas 2 and 3: There will be no new assessment until monitoring shows that conditions have changed.

c) Ecosystem Components of the Stock Advice

As part of the stock advice, Annex A of the Commission's request for Scientific Advice requires: *In relation to Tier 1 of the Roadmap, Scientific Council should provide annually catch information in relation to 2TCI, including recent cumulative catch levels and a scoping of expected cumulative catch levels*. While not formally part of Annex A, the implementation of Tier 1 of the Roadmap also involves the production of Ecosystem Summary Sheets (ESSs) which complement the annual evaluations of cumulative catch in relation to 2TCI. ESSs provide a synoptic view on the state of NAFO ecosystems and their management regime, and constitute a tool for strategic assessment, advice and planning. ESSs are nominally scheduled to be updated every 5 years, with interim monitoring in the intervening years.

Interim monitoring of Ecosystem Conditions in the Grand Bank (3LNO) and Flemish Cap (3M) Ecosystem Production Units (EPUs)

Scientific Council responded:

The interim monitoring of the ecosystem conditions in the Grand Bank (3LNO) and Flemish Cap (3M) Ecosystem Production Units (EPUs) indicate that the changes observed in these EPUs are in line with already identified patterns and trends for these ecosystems, and therefore, do not meet the "significant ecological changes" criterion required to trigger an update of the Ecosystem Summary Sheets (ESSs) out of schedule.

Due to workload issues and the postponement of the assessment of Significant Adverse Impacts on Vulnerable Marine Ecosystems, compounded with the ongoing reduced support for SC work by CPs (e.g. the Ecosystem Designated Expert position for the Grand Bank remains unfilled), SC **requests** the Commission to delay the next update of the ESSs, currently scheduled for 2027, until 2028.

The Ecosystem Summary Sheets (ESSs) for the Grand Bank (3LNO) and Flemish Cap (3M) Ecosystem Production Units (EPUs) are scheduled for a regular update in 2027, unless changes in these ecosystems warrant an earlier update. The evaluation of these changes is done through an annual interim monitoring process.

The ESS interim monitoring is aimed at detecting "significant ecological changes". The evaluation is focused on: a) trends in ocean climate and oceanographic features, b) trends and structure of the fish community, and c) trends in trophic relationships (e.g. diet composition, stomach content weights). Based on these elements, SC determines if "significant ecological changes" have occurred and an out-of-schedule ESS update needs to be triggered. At the 2025 SC June meeting it was deemed that the changes observed in these EPUs are in line with already identified patterns and trends for these EPUs, and therefore, do not meet the "significant ecological change" criterion required to trigger an update of the ESSs out of schedule.

In relation to the planned update of ESSs in 2027, SC **requests** that the Commission postpone this update to 2028 due to a) the one-year delay in the assessment of Significant Adverse Impacts on Vulnerable Marine Ecosystems (SAI-VME), now scheduled for 2027, and b) the continued vacancy of the Ecosystem Designated Expert position for the Grand Bank (3LNO). SC also reiterates to the Commission that ongoing reductions in support to SC work by CPs are expected to continue undermining SC ability to deliver on its commitments, both in terms of what SC can do, as well as the timelines within which the work is expected to be completed.

Report on Ecosystem Sustainability of Catches

Scientific Council responded:

Since 2005 the Grand Bank (3LNO) and the Flemish Cap (3M) Ecosystem Production Units (EPUs) have shown aggregate catch levels by functional guild which are consistent with the productivity of the EPUs and the avoidance of a high risk of ecosystem overfishing.

Scoped catch levels for 2025-2026 remain below the 2TCI Ecosystem Reference Point for the Grand Bank. However, piscivore guild catches in the Flemish Cap (3M) are scoped to exceed the 2TCI boundary in 2026, indicating a high risk of ecosystem overfishing.

Approach:

Total Catch Index (TCI): This index is an indicator of the level of aggregated catch for a given functional guild (aggregate of species) that is consistent with the current productivity of the ecosystem (ecosystem sustainability). The comparison of aggregate catches with TCI is informative of the risk of ecosystem overfishing (EO).

NAFO has adopted 2TCI as an ecosystem reference point to inform on ecosystem overfishing.

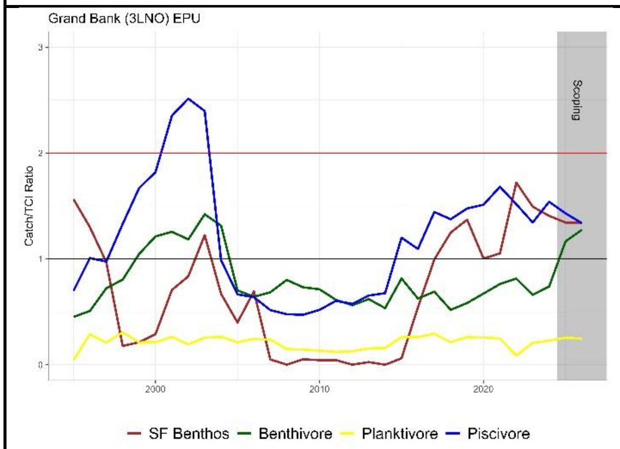
Analysis includes reported catches up to 2024, and scoping of likely catches for 2025-2026. To be consistent with the new PA, the following adjustments were made to the established scoping protocol for stocks where new advice is provided in 2025 and for use going forward:

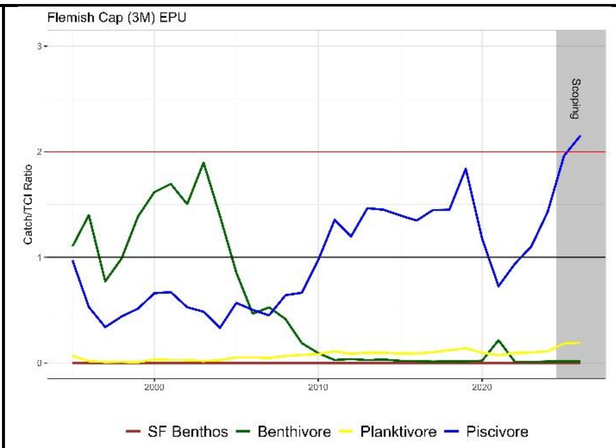
Generally,

- for stocks in the Heathy zone, catch is assumed at F_{target},

- for stocks in the Cautious zone, catch is assumed at $F_{upper\ leaf}$,

- for stocks where SC recommended catches differ from these definitions, it is assumed the recommendation is followed.





Summary:

During the 1960-1995 period, Ecosystem Production Units (EPUs) in the Newfoundland and Labrador, and Flemish Cap bioregions experienced sustained catch levels consistent with ecosystem overfishing.

Since 2005 aggregated catches for all functional guilds have been below the 2TCI Ecosystem Reference Point in the Grand Bank (3LNO) and the Flemish Cap (3M) EPUs.

The catch levels for 2024 indicate an intermediate risk of ecosystem overfishing on both the Flemish Cap (3M) and the Grand Bank (3LNO) EPUs.

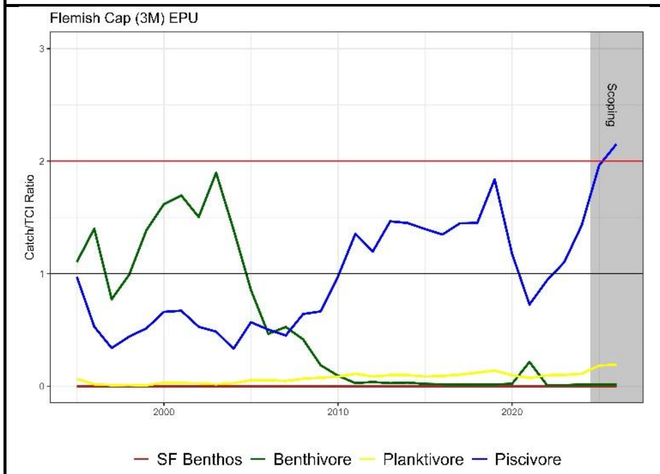
The scoping exercise indicates that catch levels in 2025-2026 would be below 2TCI, and consistent with an intermediate risk of ecosystem overfishing, for the Grand Bank (3LNO) EPU.

However, the piscivore guild catches in the Flemish Cap (3M) are scoped to exceed the 2TCI Ecosystem Reference Point in 2026, indicating a high risk of ecosystem overfishing in this EPU.

Risk of ecosystem overfishing:

Catch > 2TCI: high risk of ecosystem overfishing
Catch between 1 and 2 TCI: intermediate risk of ecosystem overfishing
Catch < TCI: low risk of ecosystem overfishing

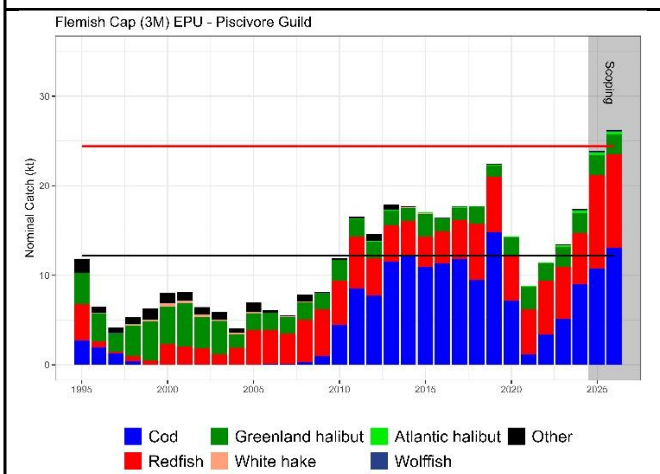
Flemish Cap (3M) Ecosystem Production Unit (EPU)



Overview

2024 catches for all functional guilds were below 2TCI, indicating that fishing levels have been consistent with preventing a high risk of ecosystem overfishing.

Piscivore guild catches for 2025-2026 are scoped to exceed the 2TCI Ecosystem Reference Point in 2026, indicating a high risk of ecosystem overfishing.



Piscivores Guild: intermediate risk of EO

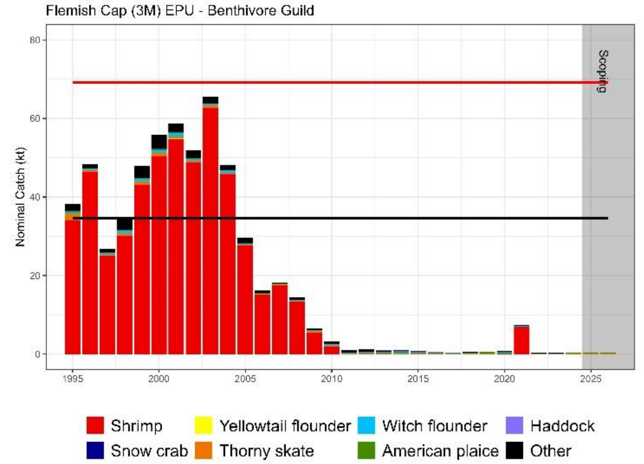
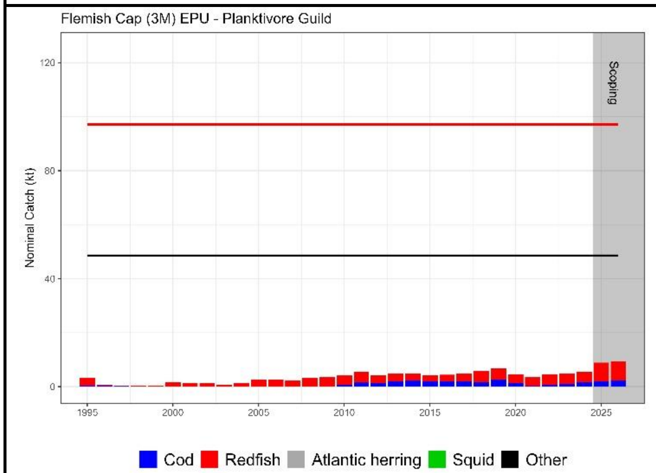
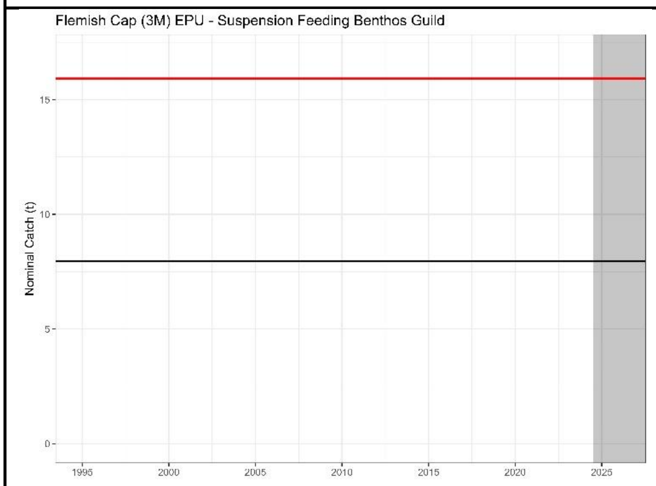
Current 2TCI=24kt

Catches are dominated by redfish, Greenland halibut and Atlantic cod.

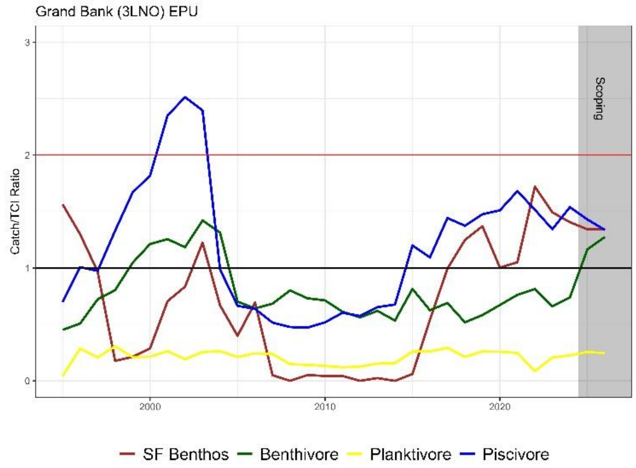
Redfish (3M), Greenland halibut (2+3KLMNO) and Atlantic cod (3M) stocks are managed by NAFO.

The scoped catch of Div. 3M cod for 2026 assumes the F that had a 50% probability of maintaining this stock in the Healthy Zone. This F is below F_{target}.

Catches are scoped to be near 2TCI in 2025 and exceed the 2TCI Ecosystem Reference Point in 2026.

	**Benthivores Guild: low risk of EO** Current 2TCI=69kt Catches are dominated by shrimp. Shrimp (3M) stock (moratorium) is managed by NAFO. Catches for 2025-2026 are scoped to be below TCI.
	**Planktivore Guild: low risk of EO** Current 2TCI=97kt There are no fisheries directed to planktivores in this EPU. Catches are dominated by younger ages of Atlantic cod and redfish. A fraction of Atlantic cod and redfish catches is assigned to this functional guild to account for the planktivore production of these stocks during the early part of their life histories. Catches for 2025-2026 are scoped to be below TCI.
	**Suspension Feeding Benthos Guild: low risk of EO** Current 2TCI=159kt There are no fisheries directed to Suspension Feeding Benthos in this EPU.

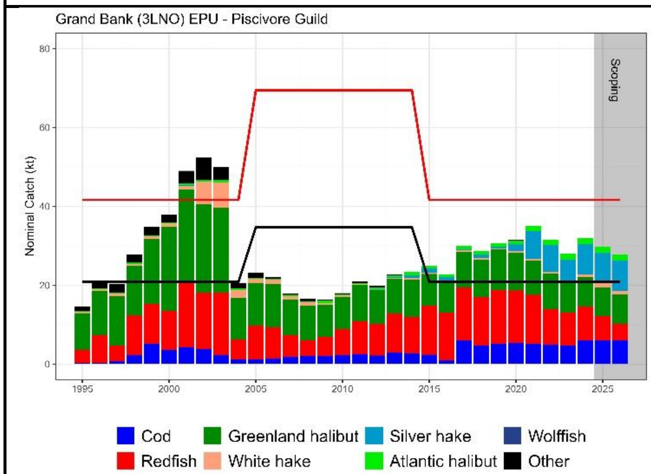
Grand Bank (3LNO) Ecosystem Production Unit (EPU)



Overview

2024 catches for all functional guilds were below 2TCI, indicating that fishing levels have been consistent with preventing a high risk of ecosystem overfishing.

Piscivore, Suspension Feeding Benthos and Benthivore guild catches for 2025-2026 are scoped to be between 1 and 2 TCI indicating an intermediate risk of ecosystem overfishing.



Piscivores Guild: intermediate risk of EO

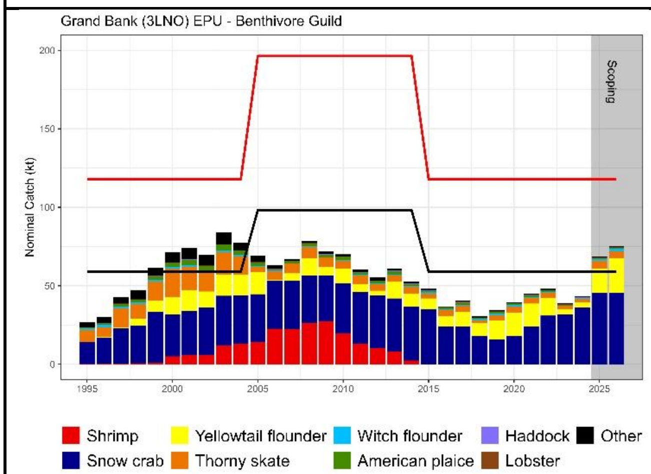
Current 2TCI=42kt

Catches are dominated by redfish, Greenland halibut, Atlantic cod and Silver hake.

Redfish (3LN and 3O), Greenland halibut (2+3KLMNO) and Atlantic cod (3NO -moratorium-) stocks are managed by NAFO, while the Atlantic cod (2J3KL) stock is managed by Canada.

Catches of silver hake have been increasing since 2018 (silver hake catch of 7 686t in 2024), likely linked to ecosystem changes related to warming trends.

Catches for 2025-2026 are scoped to be between 1 and 2 TCI.



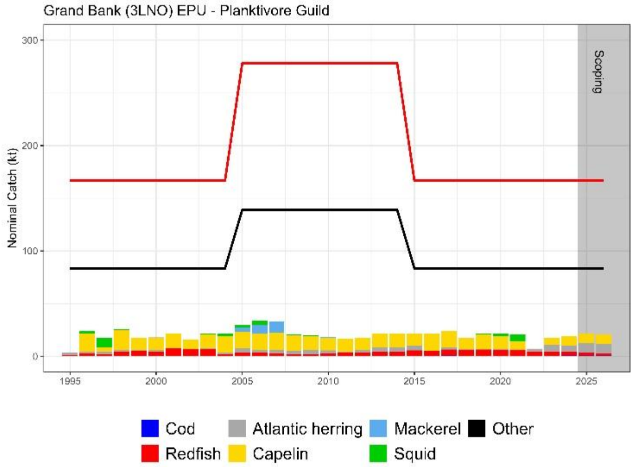
Benthivores Guild: low risk of EO

Current 2TCI=118kt

Catches are dominated by yellowtail flounder and snow crab.

Yellowtail flounder (3LNO) and shrimp (3LNO) stocks are managed by NAFO, while witch flounder (2J3KL -moratorium-) and snow crab (3LNO) stocks are managed by Canada.

Catches for 2025-2026 are scoped to be between 1 and 2 TCI.



Planktivore Guild: low risk of EO

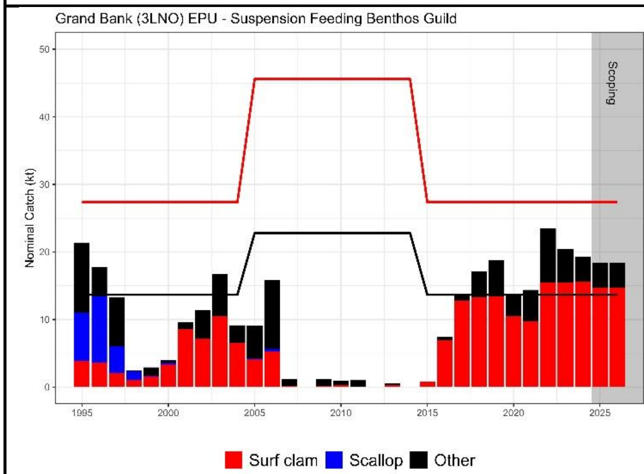
Current 2TCI=167kt

Catches are dominated by capelin (2J3KL).

Capelin (3NO -moratorium-) stock is managed by NAFO, and capelin (2J3KL) stock is managed by Canada.

A fraction of Atlantic cod and redfish catches is assigned to this functional guild to account for the planktivore production of these stocks during early part of their life histories.

Catches for 2025-2026 are scoped to be below 1 TCI.



Suspension Feeding Benthos Guild: intermediate risk of EO

Current 2TCI=27kt

Catches are dominated by surf clam.

The surf clam fishery is managed by Canada.

Catches for 2025-2026 are scoped to be between 1 and 2 TCI.

d) Special Requests for Management Advice

i) Monitor the status of Greenland halibut in Subarea 2 + Divisions 3KLMNO annually to compute the TAC using the agreed Management Procedure and determine whether exceptional circumstances are occurring. If exceptional circumstances are occurring, the exceptional circumstances protocol will provide guidance on what steps should be taken (request #2, Commission priority).

Commission request #2) *(Commission priority): The Commission requests the Scientific Council to monitor the status of Greenland halibut in Subarea 2 + Divisions 3KLMNO annually to compute the TAC using the agreed Management Procedure and determine whether exceptional circumstances are occurring. If exceptional circumstances are occurring, the exceptional circumstances protocol will provide guidance on what steps should be taken.*

Scientific Council responded:

Exceptional Circumstances are occurring due to recent gaps in the EU-Spain 3L series. However, sensitivity analyses indicate that the application of the Management Procedure (MP) adopted in 2024 will still be appropriate. The TAC for 2026 derived from the MP is 14 729 t.

A Management Procedure (MP) for Greenland halibut in Subarea 2+Div. 3KLMNO was adopted by the Commission in 2024. The MP combines a “target based” and “slope based” rule, detailed below. Inputs normally include five surveys; however, in terms of the Exceptional Circumstances protocol, there were insufficient observations from the EU-Spain 3L survey to utilize that series in the MP computations last year and this year (Table i.1). Sensitivity analyses last year indicated minimal impact on the MP outputs (<6%; SCR Doc. 24/033). Scientific Council therefore decided to exclude this survey from the MP computations in 2025 to provide TAC advice for 2026. Equations below are modified accordingly from those in the formal MP description, referring to four rather than to five surveys. The full set of control parameters for the adopted MP are shown in Table i.2. All data inputs used to calculate the TAC for 2026 are shown in Table i.3.

Table i.1. Survey indices available for use in the most recently adopted MP.

	2020	2021	2022	2023	2024
Canada Autumn 2J3K	✓	✓	✗	✓	✓
Canada Autumn 3LNO	✓	✗	✗	✓	✓
EU-Spain 3L	✗	✗	✗	✓	✓
EU-Spain 3NO	✗	✓	✓	✓	✓
EU 3M 0-1400m	✓	✓	✓	✓	✓

*Target based (**t**)*

The target rule is:

$$\text{TAC}_{y+1}^{target} = \text{TAC}_y \left(1 + \gamma\left(J_y - 1\right)\right) \qquad (1)$$

where TAC_y is the TAC recommended for year y, γ is the “response strength” tuning parameter, J_y is a composite measure of the immediate past level in the mean weight per tow from surveys (I_y^i) that are available to use for calculations for year y; four survey series are used, with i = 1, 2, 3, and 4 corresponding respectively to Canada Autumn 2J3K, Canada Autumn 3LNO, EU-Spain 3NO, and EU 3M 0-1400m:

$$J_y = \sum_{i=1}^{4} \frac{1}{(\sigma^i)^2} \frac{J_{current,y}^i}{J_{target}^i} / \sum_{i=1}^{4} \frac{1}{(\sigma^i)^2} \qquad (2)$$

With $(\sigma^i)^2$ being the estimated variance for index i (estimated in the SCAA model fitting procedure),

$$J^i_{current,y} = \frac{1}{q}\sum_{y'=y-q}^{y-1} I^i_{y'} \qquad (3)$$

$$J^i_{target} = \alpha\frac{1}{5}\sum_{y'=2011}^{2015} I^i_{y'} \quad \text{(where } \alpha \text{ is a control/tuning parameter for the MP)} \qquad (4)$$

and q indicating the period of years used to determine current status. Note the assumption that when a TAC is set in year y for year $y+1$, indices will not at that time yet be available for the current year y. Missing survey values are treated as missing in the calculation using the rule, as was done in the MSE testing. In such cases, q in equation (3) is reduced accordingly.

*Slope based (**s**)*

The slope rule is:

$$\text{TAC}^{slope}_{y+1} = \text{TAC}_y\left[1 + \lambda_{up/down}\left(s_y - X\right)\right] \qquad (5)$$

where $\lambda_{up/down}$ and X are tuning parameters, s^i_y is a measure of the immediate past trend in the survey-based mean weight per tow indices, computed by linearly regressing lnI^i_y, vs year y' for $y' = y-5$ to $y' = y-1$, for each of the four surveys considered, with:

$$s_y = \sum_{i=1}^{4}\frac{1}{(\sigma^i)^2}s^i_y \Big/ \sum_{i=1}^{4}\frac{1}{(\sigma^i)^2} \qquad (6)$$

with the standard error of the residuals of the observed compared to model-predicted logarithm of survey index i (σ^i) as estimated in the SCAA base case operating model. Missing survey values are treated as missing in the calculation using the rule, as was done in the MSE. In such cases, the slope for each index, s^i_y, in equation (6) is calculated from the available values within the last five years.

*Combination Target and Slope based (**s+t**)*

For the target and slope based combination:

1) $\text{TAC}^{target}_{y+1}$ is computed from equation (1),
2) TAC^{slope}_{y+1} is computed from equation (5), and
3) $\text{TAC}_{y+1} = \mu\left(\text{TAC}^{target}_{y+1} + \text{TAC}^{slope}_{y+1}\right)/2$, where μ is a tuning parameter.

Finally, constraints on the maximum allowable annual change in TAC are applied, viz.:

$$\text{if} \quad \text{TAC}_{y+1} > \text{TAC}_y\left(1+\Delta_{up}\right) \quad \text{then} \quad \text{TAC}_{y+1} = \text{TAC}_y\left(1+\Delta_{up}\right) \qquad (7)$$

and

$$\text{if} \quad \text{TAC}_{y+1} < \text{TAC}_y\left(1-\Delta_{\text{down}}\right) \quad \text{then} \quad \text{TAC}_{y+1} = \text{TAC}_y\left(1-\Delta_{\text{down}}\right) \qquad (8)$$

During the MSE process, this inter-annual constraint was set at 10%, for both TAC increases and decreases, and these constraints were adopted as part of the adopted MP.

Following the MP using the agreed survey data, the recommended TAC for 2026 is 14 729 t (Table i.3). This is similar (<1% different) to the TAC for 2025 of 14 791 t.

Table i.2. Control parameter values for the adopted MP. The parameters μ, α, and X were adjusted to achieve a median biomass equal to B_{msy} for the exploitable component of the resource biomass in 2044 for the Base Case SCAA Operating Model.

μ	0.963
γ	0.15
q	3
α	0.972
λ_{up}	1
λ_{down}	2
X	-0.0056
Δ_{up}	0.1
Δ_{down}	0.1

Table i.3. Data used in the calculation of the TAC for 2026. The weights given to each survey in obtaining composite indices of abundance (target rule) and composite trends (slope rule) are proportional to the inverses of the squared values of the survey error standard deviations σ^i listed below.

	Canada Autumn 2J3K	**Canada Autumn 3LNO**	**EU-Spain 3NO**	**EU 3M 0-1400m**
2011	26.736	2.206	7.093	26.152
2012	23.504	1.712	7.373	19.198
2013	29.792	2.531	5.463	19.110
2014	33.336		6.239	23.921
2015	22.290	0.869	9.486	47.517
2016	18.541	1.314	8.796	28.298
2017	15.104	1.246	16.627	42.665
2018	17.054	1.887	7.875	29.803
2019	16.285	1.872	8.824	16.887
2020	15.840	2.714		13.230
2021	21.170		8.090	16.310
2022			10.284	13.492
2023	19.972	1.736	10.926	27.457
2024	35.880	1.930	7.922	20.615
s^i_{2025}	0.1577	-0.1000	-0.0002	0.1408
$J^i_{current,2025}$	27.926	1.833	9.711	20.522
J^i_{target}	26.372	1.778	6.931	26.418
σ^i	0.230	0.254	0.405	0.299
$1/(\sigma^i)^2$	18.904	15.500	6.097	11.186
	TAC_{2025}	14 791 t	$\text{TAC}^{target}_{2026}$	14 857 t
	s_{2025}	0.058	$\text{TAC}^{slope}_{2026}$	15 734 t
	J_{2025}	1.030	TAC_{2026}	14 729 t

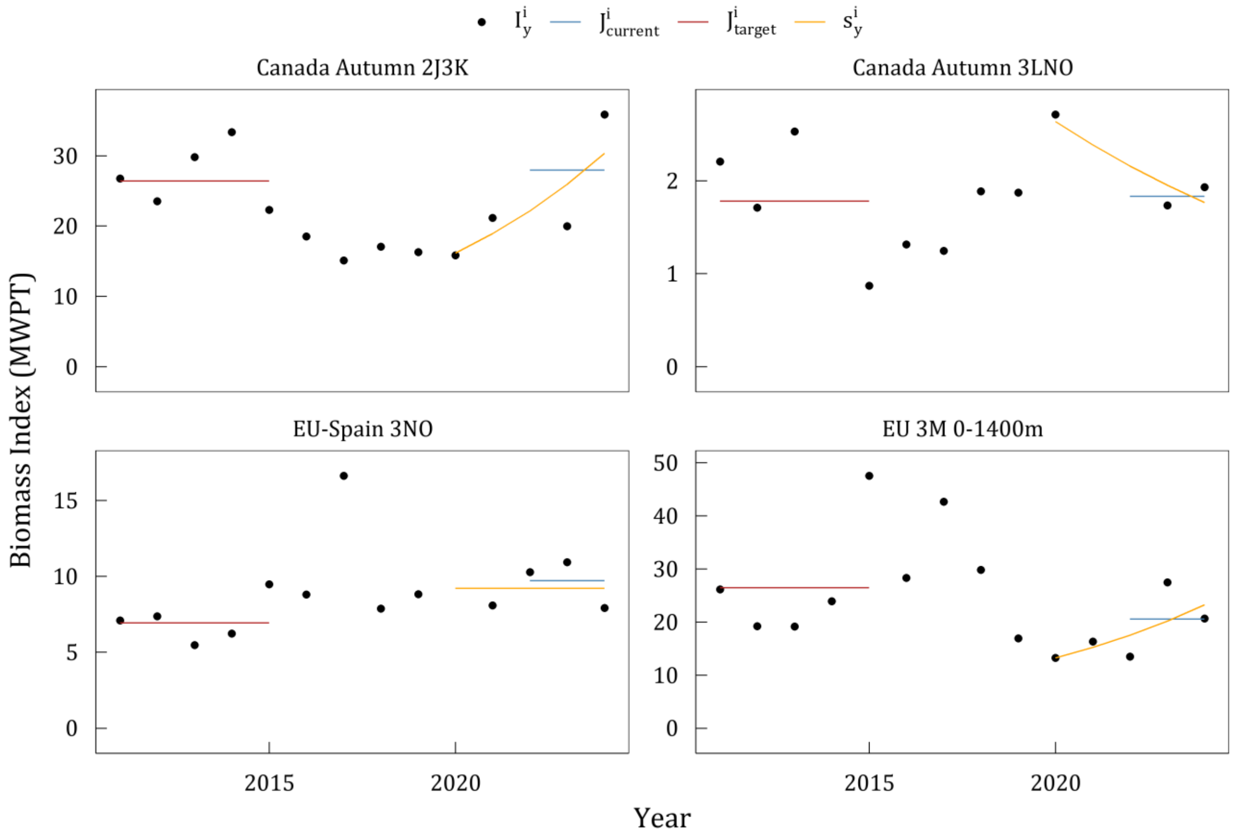


Figure i.1. Input for the Greenland halibut in Subarea 2 + Divisions 3KLMNO MP along with visual representation of the target and slope based components of the rule. The red line represents the target (2011-2015 average; J_{target}^i), the blue line the current levels (2022 - 2024 average; $J_{current}^i$), and the orange line depicts recent log-linear trends (2020 - 2024 slope; s_y^i). Survey data are provided from Canadian Autumn surveys in Divs. 2J3K, Canadian Autumn surveys in Divs. 3LNO, EU-Spain surveys in 3NO, and EU Flemish Cap surveys (to 1400m depth) in Div. 3M. Missing values within the last five years are not used in the calculation of the TAC using the MP.

a) Exceptional Circumstances

In 2025, the SC evaluated each of the criteria indicated in the Exceptional Circumstances Protocol, as described below.

The following criteria provide the basis to determine whether Exceptional Circumstances apply:

1. Missing survey data:

- *More than two values missing, in a five-year period, from a survey used in the MP;*
- *Missing more than two of the five survey indices from the terminal year*[1]*;*

As in 2024, Exceptional Circumstances are occurring due to three missing values in the EU-Spain 3L series over the past five years, resulting in insufficient data to incorporate this series in the MP. Sensitivity tests conducted in 2024 indicated that applying the MP based on the remaining survey data provided a reasonable basis for TAC advice, as historical deviations from the agreed MP would have been minimal without this series (<6%; SCR Doc. 24/033). Accordingly, it was concluded that the MP could still be applied to calculate the TAC for 2025,

[1] Terminal year refers to the most recent year with survey data, currently 2024.

with the exclusion of the EU-Spain 3L series. The WG-RBMS recommended that the same approach be applied to calculate the TAC for 2026 (COM-SC Doc. 25-02).

2. The composite survey index used in the MP, in a given year, is above or below the 90 percent probability envelopes projected by the base case operating models from SSM and SCAA under the MS;

The composite survey index (excluding the EU-Spain 3L survey) for 2025 falls within the 90% probability envelopes from the base case SCAA and SSM operating model (**Figures i.2 and i.3**). SC concludes that this does not constitute Exceptional Circumstances.

3. TACs are established that are not generated from the MP.

The TAC established for 2025 was generated from the MP adopted in 2024. This does not constitute Exceptional Circumstances.

The following elements will require application of expert judgment to determine whether Exceptional Circumstances are occurring:

1. the five survey indices relative to the 80, 90, and 95 percent probability envelopes projected by the base case operating models (SSM and SCAA) for each survey;

All survey indices from 2023 and 2024 fall within the 95% probability envelopes from both the SCAA and SSM base case operating models, and most (16 out of 20 comparisons) fall within the 80% envelopes (Figures i.2 and i.3). SC concludes that this does not constitute occurrence of Exceptional Circumstances.

2. survey data at age four (the age before recruitment to the fishery) compared to its series mean to monitor the status of recruitment;

This Exceptional Circumstance is not occurring as recent recruitment indices are near to the average (Figure i.4).

3. discrepancies between catches and the TAC calculated using the MP.

The TAC for 2024 was 15 153 t. The catch in 2024 was 14 822 t (<3% difference). SC concludes that this does not constitute Exceptional Circumstances as catches have been tracking the MP outputs closely (Figure i.5).

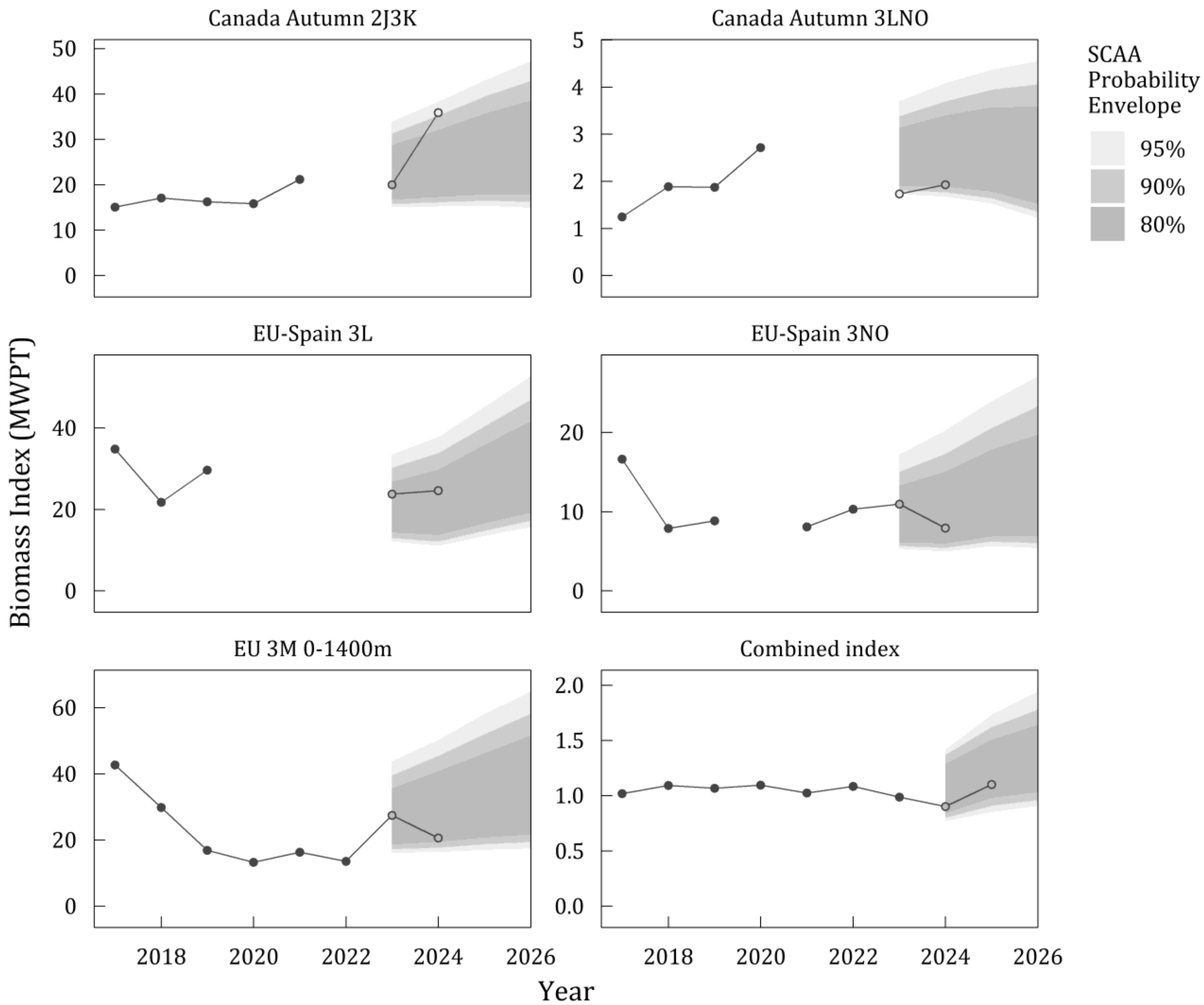


Figure i.2. Greenland halibut in Subarea 2 + Divisions 3KLMNO. Mean weight per tow from Canadian Autumn surveys in Divs. 2J3K, Canadian Autumn surveys in Divs. 3LNO, EU-Spain surveys in 3L, EU-Spain surveys in 3NO, and EU Flemish Cap surveys (to 1400m depth) in Div. 3M. The figure also shows the combined index[2] used in the target based component of the MP. For the survey and combined indices, 80%, 90% and 95% probability envelopes from the **SCAA** base case simulation are shown. Index values observed from 2023 onward are shown using open circles.

[2] The probability envelopes for the combined index (shaded regions) includes the EU-Spain 3L series, however, the observed combined index (point) for 2024 and 2025 excludes the EU-Spain 3L series.

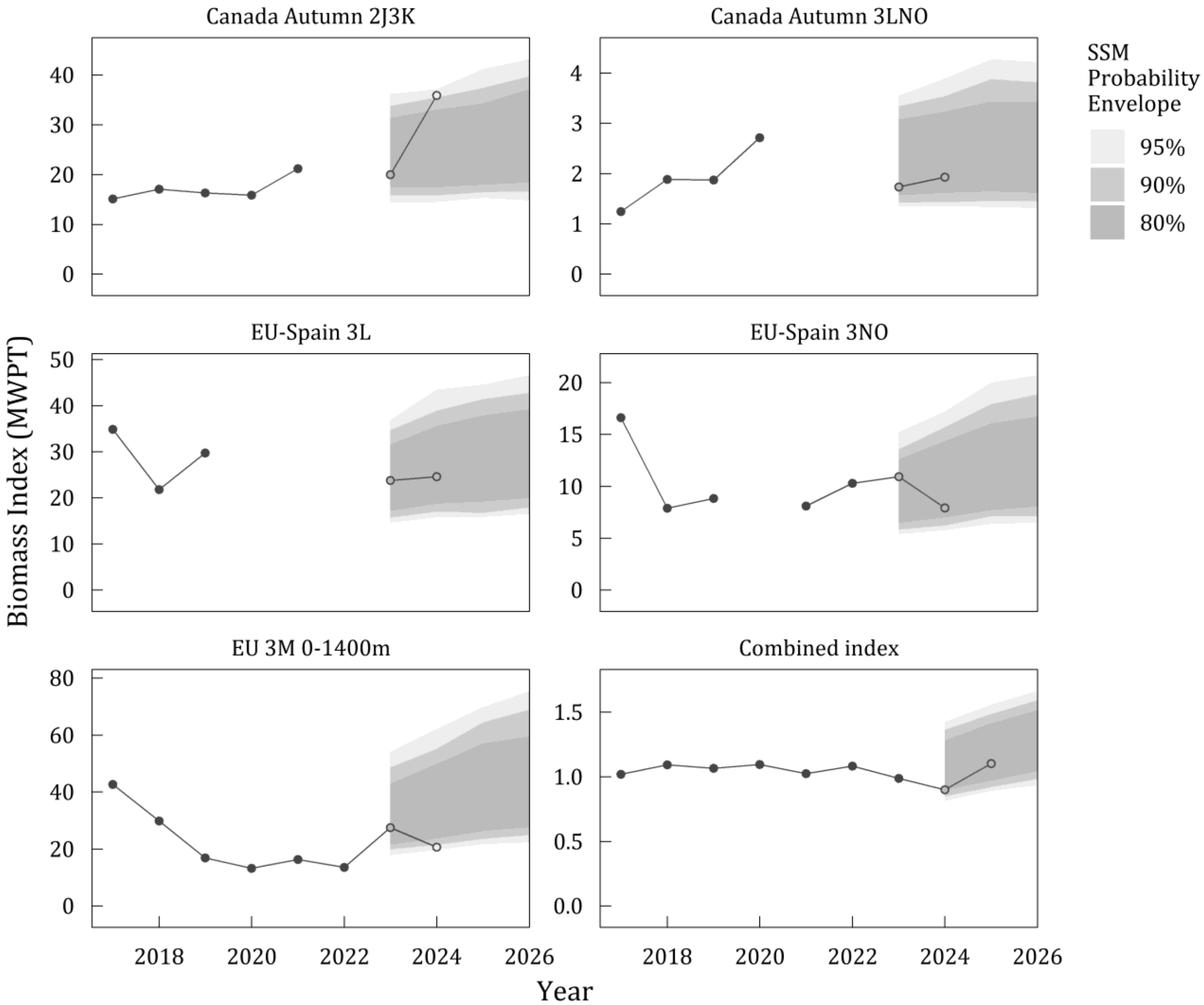


Figure i.3. Greenland halibut in Subarea 2 + Divisions 3KLMNO. Mean weight per tow from Canadian Autumn surveys in Divs. 2J3K, Canadian Autumn surveys in Divs. 3LNO, EU-Spain surveys in 3L, EU-Spain surveys in 3NO, and EU Flemish Cap surveys (to 1400m depth) in Div. 3M. The figure also shows the combined index[2] used in the target based component of the MP. For the survey and combined indices, 80%, 90% and 95% probability envelopes from the **SSM** base case simulation are shown. Index values observed from 2023 onward are shown using open circles.

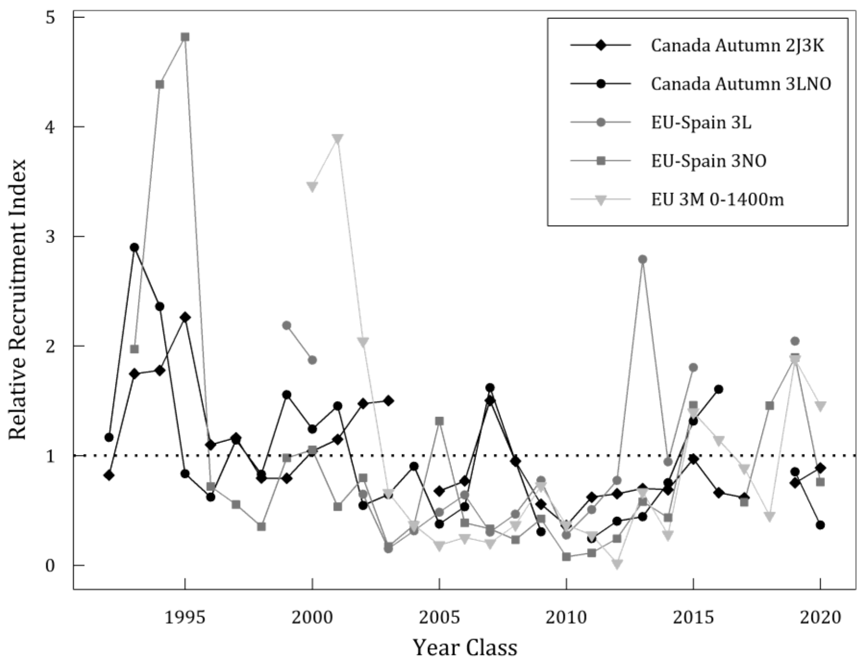


Figure i.4. Greenland halibut in Subarea 2 + Divisions 3KLMNO. Relative recruitment (age 4) indices, shown in relation to year class, from Canadian autumn surveys in Div. 2J3K, Canadian spring surveys in Div. 3LNO, Canadian autumn surveys in Div. 3LNO, EU-Spain survey in 3NO, EU-Spain in 3L, and EU survey of Flemish Cap. Each series is scaled to its average, which then corresponds to the horizontal dotted line at 1.

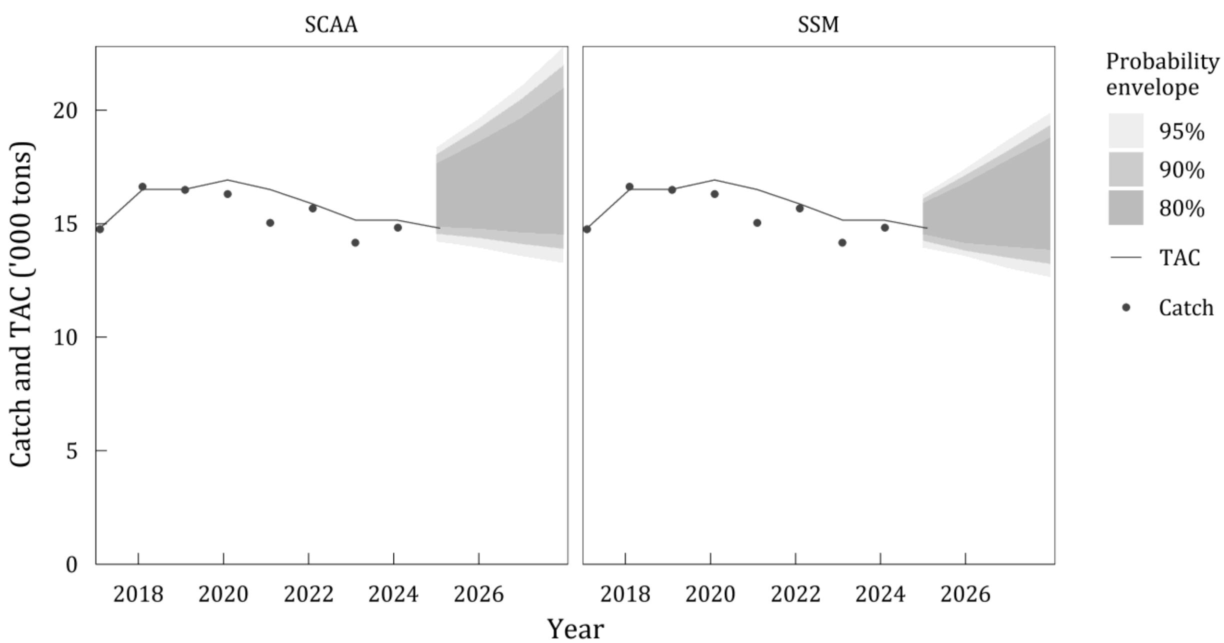


Figure i.5. Greenland halibut in Subarea 2 + Divisions 3KLMNO: TACs and catches. The figure also shows 80%, 90% and 95% probability envelopes from the **SCAA** and **SSM** base case simulation projections of future TACs.

ii) Continue to advance work on the 3LN redfish MSE processes during 2024-2025 (request #3, Commission priority).

COM Request #3*. (Commission priority): The Commission requests that Scientific Council continue to advance work on the 3LN redfish MSE processes during 2024-2025.*

Scientific Council responded:

SC examined the results of the most recent modelling effort towards developing operating models for the Divs. 3LN redfish Management Strategy Evaluation (MSE). While the additional work presented at the meeting was useful to inform potential paths forward, it was not considered acceptable as yet to provide operating models for the MSE.

Developing acceptable operating models for the Divs. 3LN redfish is the main challenge at the moment. Without viable operating models, the MSE cannot be completed. Efforts need to be focused on this task to determine if viable operating models can be developed.

Based on the reasons given below, the SC considers that it is worthwhile to continue to explore the development of operating models. Divs. 3LN redfish remains a difficult stock to develop an operating model for. Progress on this work will be reviewed and discussed at the 2026 SC June meeting. Recommended next steps for the Divs. 3LN redfish MSE exercise will be provided at that time.

At the January 2025 interim SC meeting, the Scientific Council agreed that moving forward with an Management Strategy Evaluation (MSE) for Divs. 3LN redfish at that stage may not be worth the time and capacity required given the results shown. Subsequently, in a following WG-RBMS meeting, update on ongoing work to develop a simple production model for use as an operating model for the Divs. 3LN redfish MSE was presented. A preliminary document was circulated, and it was agreed that details would be presented and discussed at the following Scientific Council Meetings.

SC examined the results of the most recent modelling effort towards developing operating models for the Divs. 3LN redfish MSE. While the additional work presented at the meeting was useful to inform potential paths forward, it was not considered acceptable as yet to provide operating models for the MSE. Building on the collective experience of this and earlier modelling exercises (NAFO SCS-25/02), SC agreed on the following:

1) Developing acceptable operating models for the Divs. 3LN redfish is the main challenge at the moment. Without viable operating models, the MSE cannot be completed. Efforts need to be focused on this task to determine if viable operating models can be developed.
2) The basic data series deemed appropriate for developing the operating model remain the same as identified in SCR Doc. 23/001. Data-related items agreed were:
    a. CPUE data should not be used for fitting the operating models (SCR Doc. 22/016).
    b. Survey series need to be split by fish size to evaluate the potential impact of the mix of species within redfish (e.g. a lack of (lagged) positive correlations could indicate species split differences by fish size).
    c. While less relevant for the operating models development *per se,* consideration needs to be given to the fact that the original Campelen series will not continue into the future. This has implications for potential Management Procedures down the road.
3) As was done previously, information on biological parameters published should be considered as part of the modelling efforts to inform model parameterization and/or checks of estimated model parameters (Cadigan *et al.*, 2022; Cadigan & Campana 2017; SCR 22/07).
4) The models explored to date have shown that their fit to the data relied heavily on process error (this was the key reason why the MSE could not be completed). While some process error is expected to be needed in any model fit, especially for a species like redfish, viable operating models need to fit the data with minimum process error (e.g. fits which reflect the consequences of the past presence of only very few year-classes of exceptional size).

5) Another problematic feature in some of the models explored to date is related to unrealistically high estimates of catchability (q's) in the surveys (i.e. q's >1), which are incompatible with current understanding on the biology of redfish and how the surveys operate. Realistic q's provide another reality check that viable operating models need to pass.

6) Work on exploring operating models will continue. Progress on this work will be reviewed and discussed at the 2026 SC June meeting. Recommended next steps for the Divs. 3LN redfish MSE exercise will be provided at that time.

Based on all these bullets, the SC considers that it is worthwhile to continue to explore the development of operating models. Divs. 3LN redfish remains a difficult stock to develop an operating model for.

References

Cadigan, N. G., Duplisea, D. E., Senay, C., Parent, G. J., Winger, P. D., Linton, B., & Kristinsson, K. (2022). Northwest Atlantic redfish science priorities for managing an enigmatic species complex. *Canadian Journal of Fisheries and Aquatic Sciences*, *79*(9), 1572-1589.

Cadigan, N. G., & Campana, S. E. (2017). Hierarchical model-based estimation of population growth curves for redfish (Sebastes mentella and Sebastes fasciatus) off the Eastern coast of Canada. *ICES Journal of Marine Science*, *74*(3), 687-697.

iii) Develop stock summary sheets for NAFO managed stocks that are evaluated using MSE processes (request #4).

COM Request #4. *As practicable and taking into account Scientific Council capacity constraints, develop stock summary sheets for NAFO managed stocks that are evaluated using MSE processes.*

Scientific Council responded:

There was limited progress in the development of Stock Summary Sheets (SSSs) for stocks managed under MSE, due to workload issues. Work on this topic remains ongoing.

In terms of developing Stock Summary Sheets for stocks managed with Harvest Control Rules under Management Strategy Evaluation , Scientific Council could not advance in any substantive way due to current workload. Work on this topic remains ongoing.

iv) Develop a reference document detailing the ecosystem roadmap, for completion in the next 1-3 years (request # 5).

Scientific Council responded:

The NAFO Roadmap for an Ecosystem Approach to Fisheries (EAF) allows NAFO to deliver on the Convention commitment to implement an ecosystem approach for the management of fisheries resources. Although this framework has been described and/or acknowledged in multiple NAFO documents, there is no single, formally adopted document by the Commission that provides a detailed description of the Roadmap.

This lack of formal recognition of the Roadmap is creating challenges to communicate this work, both internally and externally.

Given these challenges, the Scientific Council (SC) has expedited the production of a draft of the detailed Roadmap document requested by the Commission and will seek feedback from managers at the 2025 WG-EAFFM meeting. The feedback from managers will be used during the September 2025 SC meeting to define the next steps in the development of this document.

The NAFO Roadmap for an Ecosystem Approach to Fisheries (EAF) is the framework NAFO is following to deliver on the Convention commitment to implement an ecosystem approach for the management of fisheries resources. This framework has been described and/or acknowledged in multiple NAFO documents, from Scientific Council (SC) and Commission (COM) reports to the Terms of Reference of the Joint COM-SC Working Group on the Ecosystem Approach Framework to Fisheries Management (WG-EAFFM) and NAFO Performance

Reviews, as well as in the scientific literature (Koen-Alonso *et al.*, 2019). Despite its broad presence and influence on NAFO work, there is no single NAFO document formally adopted by COM that provides a detailed description of the Roadmap.

While work on the Roadmap continues to advance, the lack of such a document describing the Roadmap is becoming a growing limitation. This shortcoming has led, for example, to the removal of information on the Roadmap from the NAFO website, which makes communication and engagement on issues related to the implementation of the ecosystem approach in NAFO more difficult, both internally within NAFO (i.e. among NAFO bodies, CPs, Secretariat) as well as externally with international bodies (e.g. UNGA, FAO), and the marine fisheries and conservation communities.

To address these issues, SC expedited the production of a draft of the detailed Roadmap document requested. The intent of this draft is to engage managers at the 2025 WG-EAFFM meeting to seek their feedback on the content and structure of the document, so that such feedback can be used to produce a final response to this request. This draft will be tabled as working paper at the 2025 WG-EAFFM meeting for discussion. The feedback from managers will be used during the September 2025 SC meeting to define the next steps in the development of this document.

References

Koen-Alonso, M., Pepin, P., Fogarty, M. J., Kenny, A., and Kenchington, E. 2019. The Northwest Atlantic Fisheries Organization Roadmap for the development and implementation of an Ecosystem Approach to Fisheries: structure, state of development, and challenges. Marine Policy, 100: 342-352.

v) Continue the development of a centralized data repository using ArcGIS online to host the data and data-products for scientific advice, in conjunction with the NAFO Secretariat (request #6a).

COM Request #6a. *In relation to the habitat impact assessment component of the Roadmap (VME and SAI analyses), the Commission requests that Scientific Council:*

a) Continue the development of a centralized data repository using ArcGIS online to host the data and data-products for scientific advice, in conjunction with the NAFO Secretariat.

Scientific Council responded:

In order to make the online ArcGIS data portal operational, further discussions and agreements are required to address: (i) financial planning, (ii) licensing agreements, (iii) privacy concerns, (iv) data storage and maintenance costs, (v) metadata standards, and (vi) data accessibility requirements.

SC concludes that standardized data reporting of research vessel (RV) survey data is essential for the integration of data into the NAFO hosted ArcGIS Online Data Portal. RV survey data submission protocols have been developed, however to implement the protocols for operational purposes, SC **recommends** *a comprehensive data-sharing agreement for VME and SAI assessments be established, on a five-year rolling basis, between the NAFO Secretariat, SC and each CP data providing institute.*

1. Update on the centralized data repository using ArcGIS online portal

An ArcGIS Online Creator license was issued to the SC data sub-group in 2024 to allow access to the NAFO ArcGIS Online Portal.

SC has now uploaded to the data portal, previously specified and standardised, data layers generated following procedures reported in 2024 (NAFO SCS Doc. 23/25 and NAFO SCS Doc. 24/20). A trial version of the NAFO Data Repository website, administrative tools, and the associated interactive mapping application was successfully demonstrated at WG-ESA in 2024.

To implement the data repository for routine operational use by the SC, further work is required to address: (i) financial planning – agreeing to the 2025 budget estimate for licensing and data storage costs for consideration in the 2026 budget, (ii) licensing – the NAFO Secretariat has requested more information on the license-management model to ensure it would be in compliance with the ESRI End User License Agreement

(EULA), (iii) privacy – access to the database will be controlled by the Secretariat and the SC data sub-group in accordance with the license agreements and data confidentiality requirements, (iv) data storage **-** it was noted that the cost of data storage varies depending on what layers are added and how they will be accessed by users. Specifically, files stored in their native format for direct download by users (e.g. shapefiles, .tiff, .gdb) or as imagery layers (e.g. raster files added for viewing in mapping applications) would be the least expensive. In contrast, feature layers (e.g. vector files added for viewing in mapping applications), would be more expensive. A full list of the data layers needed for SAI reassessments was used to estimate the data storage requirements and associated costs (NAFO SCS Doc. 24/20), (v) metadata – a simplified standard metadata form has been developed to reduce the burden on data owner/providers, whilst remaining effective for NAFO assessment and data reporting purposes, (vi) accessibility **-** issues such as the appropriate crediting of data products (e.g. Digital Object Identifiers – DOI), and ensuring FAIR principles (findability, accessibility, interoperability, and reusability) need to be agreed.

2. Data management plan for RV trawl data, and standard template for storing RV trawl data in the NAFO-hosted ArcGIS Online portal

Discussions in SC over 2021 – 2024 have highlighted the need to develop an agreed standard for preparation and presentation of different types of data (including catches of both fish and invertebrates) derived from research vessel (RV) trawl surveys. Trawl survey data submission protocols were presented in NAFO SCS Doc. 22/25 and NAFO SCS Doc. 23/25 for the integration of data into the NAFO hosted ArcGIS Online Data Portal. To implement the protocols for operational purposes, SC **recommends** *a comprehensive data-sharing agreement be established, on a five-year rolling basis, between the NAFO Secretariat, SC and each CP data providing institute.* The agreement should set out terms for the delivery and use of the RV data (set and catch information) within the strict confines of SC VME and SAI assessment activities, the specification of data fields for a RV data delivery template, and the data provision and storage formats (NAFO SCS Doc. 24/20). The structure and content of the current ad hoc data sharing agreements can provide the basis for the longer-term agreements.

vi) Work towards the reassessment of VMEs and impact of bottom fisheries on VMEs for 2027; including potential management options in the reassessment of bottom fisheries (request #6b).

COM Request #6b*. In relation to the habitat impact assessment component of the Roadmap (VME and SAI analyses), the Commission requests that Scientific Council:*

b) Work towards the reassessment of VMEs and impact of bottom fisheries on VMEs for 2027; including potential management options in the reassessment of bottom fisheries.

Scientific Council responded:

Analyses for the full review of VME and reassessment of bottom fisheries are progressing as planned. The review of VME will be completed in November 2025 while the reassessment of bottom fisheries, including SAI, will be undertaken in November 2026 along with preparations for undertaking the management options which will be completed before the SC meeting June 2027.

Review of VME: updated VME Species Distribution Models (SDMs) and Kernel Density Analyses (KDE) will be performed on the 7 VME functional groups with the addition of subgroups of some of these functional groups which now have sufficient data to warrant their independent analyses. New SDM predictions will be created for each taxon and for the first time will include maps of model uncertainty. For 2026, SDMs using climate projection data will be performed to determine if and where there are VME refugia in response to climate change, and identify vulnerable taxa and closures.

SAI assessment: The assessment of SAI will incorporate recently calculated NAFO thresholds for VME SAI, in addition to using the current 95% cumulative biomass threshold, as applied in the 1st and 2nd reassessments.

Management options: Will be evaluated using the same methodological approach as applied in 2021 (2nd reassessment) and presented to WG-EAFFM and the Commission in 2027. A development for the 3rd reassessment of management options will be the potential inclusion of information on climate change sensitivity, refugia status, and connectivity, along with consideration of long-term spatial fishing patterns and the inclusion of the Canadian snow crab fishery data.

It was agreed at the 2024 NAFO annual meeting that the 3rd reassessment of bottom fisheries (including the assessment of SAI) would be required in September 2027. This allows more time in 2025 to complete a review of the VMEs which requires an update of the SDMs developed and applied in the 1st reassessment, but not updated for the 2nd reassessment. This task will be completed for presentation at WG-ESA in 2025, including the finalisation of the VME polygon boundaries to be used in the reassessment of bottom fisheries in 2026/2027.

As in the 1st review of VMEs, two fundamentally different modelling approaches will be used to predict the distribution of the 7 VME functional groups (Large-Sized Sponges, Sea Pens, Large Gorgonian Corals, Small Gorgonian Corals, Black Corals, Erect Bryozoans, and Sea Squirts (*Boltenia ovifera*)) in the NAFO Regulatory Area: 1) identification of significant concentrations of VME indicator species using geospatial kernel density analyses (KDE) applied to research vessel trawl survey catch data, and 2) species distribution modelling (SDM) which predicts the distribution of a species from a suite of environmental variables thought to influence it. Furthermore, given the large number of VME indicator species trawl samples obtained since the 1st reassessment, it is now possible to produce VME distribution models for functional subgroups of Large-Sized Sponges, Sea Pens and Small Gorgonian Corals. These will be compared to the models produced for the wider functional groups to examine differential impacts of bottom fisheries through evaluation of the proportional protection afforded to these subgroups by the existing closed areas. SDMs for the Large-Sized Sponges, Sea Pens and Black Corals, along with their subgroups, have been completed (Murillo *et al.*, 2024) and document for the first time both model predictions and model uncertainty. New SDM predictions will be created for each taxon and for the first time will include maps of model uncertainty. For the 2026 WG-ESA, SDMs using climate projection data will be performed to determine if and where there are VME refugia in response to climate change and identify vulnerable taxa and closures.

With respect to the assessment of SAI, a newly published paper (Kenny *et al.*, 2025) described the methodology used by NAFO to define the SAI impact thresholds for the different functional types of VME recognised by NAFO. The published SAI threshold values, alongside the existing 95% cumulative biomass threshold as applied in the previous reassessments, will be used in the 3rd reassessment of bottom fisheries in 2027.

In addition, an SAI assessment method being developed and applied in the SPRFMO area, known as the "Relative Benthic Status Index" (RBS), was also reviewed. It is broadly based upon a dynamic modelling approach developed by Hiddink *et al.* (2023) which is widely applied in the ICES region for advice to the European Commission, where rates of depletion and recovery potential are modelled for different benthic species. In this respect, the RBS Index is a modelled equivalent of the empirical approach developed by NAFO to determine SAI impact thresholds.

With respect to the identification of potential management options, the approach applied in 2021 (to inform the selection of proposed VME closures), will be undertaken in 2026/2027 as part of the reassessment of bottom fisheries to be completed in September 2027. However, WG-ESA concluded that in addition to evaluating the trade-offs between VME biomass, areal extent and fishing opportunities (catch and landings), it would be helpful to include information on the ecological significance of each of the proposed closures. For example:

- to consider including information on the proposed area climate sensitivity, refugia status and connectivity,
- to include relevant information on the long-term fishing patterns in the NRA, e.g. the historic fishing patterns in the NRA described in Kulka and Pitcher (2001),
- to include, if possible, the Canadian snow crab fishery data (e.g. VMS, catch and landings data), which is especially relevant for the Bryozoan and *Boltenia sp*. VMEs on top of the tail of the Grand Bank.

In support of the first item, the connectivity networks for each of the VME functional groups have been published along with simulation models which evaluate the relative importance of each VME polygon to their respective networks (Wang *et al.*, 2024).

References

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vii) Develop materials on the potential of submitting NAFO coral bottom fishing closed areas as OECMs for discussion at the 2025 WG-EAFFM meeting (request #6c).

COM Request #6c. *In relation to the habitat impact assessment component of the Roadmap (VME and SAI analyses), the Commission requests that Scientific Council:*

c) Develop materials on the potential of submitting NAFO coral bottom fishing closed areas as OECMs for discussion at the 2025 WG-EAFFM meeting.

Scientific Council responded:

SC proposes that the coral OECM should include VME fishery closures on Flemish Cap for Sea Pens, Large and Small Gorgonians and Black Corals, comprising eleven closures (7, 7a, 8, 9, 10, 11, 11a, 12, 13, 14a and 14b).

The final scope and text for the coral OECM template submission will be developed during and following the 2025 WG-EAFFM meeting.

At WG-EAFFM in 2024 it was agreed that a template for a coral Other Effective Area-based Conservation Measures (OECMs) submission should be developed, to complement the submissions already developed (and now accepted: https://www.nafo.int/Fisheries/OECMs) for large sponge VME and seamount fishery closures for inclusion in the World Database on Protected Areas.

It is proposed that the coral OECM template should include all existing VME fishery closures for Sea Pens, Large Gorgonians and Black Corals, comprising in total eleven VME fishery closures (7, 7a, 8, 9, 10, 11, 11a, 12, 13, 14a and 14b), as shown in Figure 1. This is in addition to the OECMs already submitted for the Large-Size Sponges which overlap some Large Gorgonians and Black Corals VMEs, and hence cannot be included here to avoid duplication. Text for the coral OECM template will be developed in collaboration with the NAFO Secretariat, using a combination of information compiled from the Flemish Cap Ecologically or Biologically Significant Marine Areas (EBSA) (slopes of the Flemish Cap and Grand Bank), descriptions of the ecological significance of the Sea Pens, Large and Small Gorgonians and Black Corals VMEs (already drafted; NAFO, 2024), and text describing the management measures and governance used in support of the sponge and seamount OECMs.

The final scope and text for the coral OECM template submission will be developed both at and following the WG-EAFFM meeting in 2025.

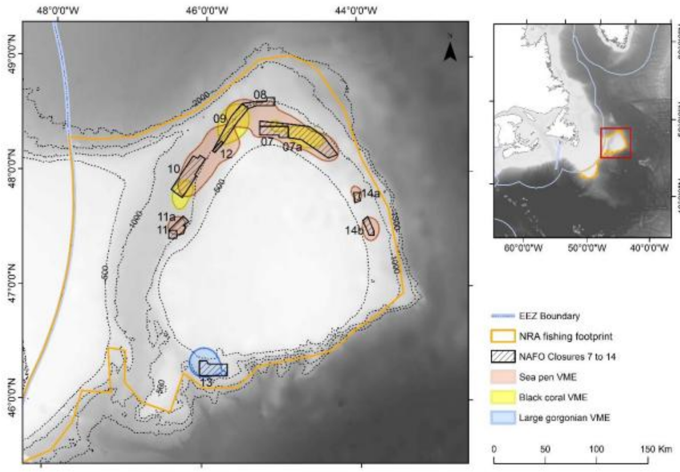


Figure vii.1. VME fishery closures which protect Sea Pens, Large and Small Gorgonian Corals and Black Corals in the NRA to be considered for inclusion in the coral OECM submission. Also, the extent of the corresponding VME polygons is shown. Note, not all of the VME fishery closures and VME polygons are shown on this map – e.g. it excludes Large-Size Sponges VME and fishery closures which were included in the sponge OECM and which protect Large Gorgonians coral VME in Flemish Pass (Area 2) and on the southeast slope of Flemish Cap (Area 4).

References

NAFO (2024). Report of the Scientific Council Working Group on Ecosystem Science and Assessment (WG-ESA), 12-21 November 2024. SCS Doc. 24/20. Serial No. N7604.

viii) Develop reference points to facilitate the implementation of the Revised NAFO Precautionary Approach Framework, for stocks that currently do not have them (request #7).

COM Request #7. *The Commission requests the Scientific Council to develop reference points to facilitate the implementation of the Revised NAFO Precautionary Approach Framework, for stocks that currently do not have them.*

Scientific Council responded:

Reference Points (RPs) for 3M cod, 3LNO yellowtail flounder, 3O redfish and Greenland halibut 0+1 offshore were set. No RPs could be set for 3NO white hake at this time.

For the stocks to be fully assessed in September, it was decided: 1) to estimate the RPs for the shrimp stocks during the September 2025 Scientific Council Shrimp Assessment Meeting and 2) regarding the 3+4 northern shortfin squid, until a Designated Expert is appointed for this stock, a full assessment and calculation of RPs cannot be addressed.

The PA-WG met in December 2024 and May 2025 to advance with the estimation of Reference Points (RPs) to fully implement the NAFO Precautionary Approach Framework (PAF) approved in September 2024.

During the December 2024 meeting, it was agreed that the Designated Experts (DEs) for the stocks that are scheduled to undergo a full assessment in a given year would work towards the development of RPs that can be used in the revised PAF that year. DEs should try to use different methods to estimate their RPs, based on the approaches proposed by Scientific Council (SCS Doc. 23/07).

In the meeting held in May 2025, the RPs for almost all the stocks that were scheduled for a full assessment in June 2025 were analyzed. Some of them were deferred to June due to additional analyses asked or ongoing work. In the June 2025 SC meeting, RPs under the new PAF were approved for 3M cod, 3LNO yellowtail flounder and 3O redfish. Preliminary analyses for white hake were presented, many of them promising, but the lack of DE and the need for further studies prevented having appropriate RPs for this stock at this time.

Regarding stocks included in the Coastal States requests, it was agreed to include them in the estimation of the RPs necessary for applying the PAF. For June 2025, only advice for Greenland halibut 0+1 offshore was requested. The RPs for this stock were accepted as presented. It was noted that the risk table to be presented would need to be modified to include the additional leaf scenarios in order to provide advice consistent with the new PAF.

There are some stocks that have a full assessment in September 2025. First, regarding the shrimp stocks (3LNO shrimp, and from the Coastal States requests, Northern shrimp in Denmark Strait and off East Greenland, and Northern shrimp in Subarea 0 and Subarea 1), it was proposed the RPs be calculated during the September 2025 Scientific Council Shrimp Assessment Meeting.

Second, regarding the 3+4 northern shortfin squid, until a DE is appointed for this stock, a full assessment and calculation of RPs cannot be addressed.

Following the practical implementation at this meeting of the PAF approved in September 2024, some decisions have been taken to implement the new PAF:

- State of the stock: from the biomass of the last year (for example in June 2025, this would be 2024).
- Fishing mortality (F) for the projections: The level of F used for projections to provide advice in a certain year is chosen by applying the PAF to the biomass at the beginning of the year for which the corresponding advice is given.
- In the event that more than one year of projections are made and the stock is in the Cautious Zone, the range of F to be applied each year of the projections will be determined by the position of the SSB in the leaf that year. So, in the Cautious Zone, the F will not be fixed across the projection years.

These decisions to implement the PAF have been made considering that it is the closest to how the PAF was tested. It is possible that in the coming years, as the PAF is applied to more stocks, new decisions may need to be taken to support further implementation.

ix) Continue to update the 3-5 year work plan, which reflects requests arising from the 2024 Annual Meeting, other multi-year stock assessments and other scientific inquiries already planned for the near future (request #8a).

Scientific Council responded:

NAFO Scientific Council (SC) updated the 2025-2026 annual plan and identified priorities and provided some early estimates of resource requirements and gaps.

While this plan is reviewed and updated twice a year, it has shown a limited capacity to solve the repeated concern about SC workload. While it was noted the identification of priorities in the last several years from the Commission has been helpful, SC and the Commission should have further dialogue into how to prioritize tasks based on SC comments and the Commission requests.

SC work continues to fall to a small number of scientists who are over-burdened with requests.

SC work in 2024-2025 included the 3LN redfish MSE, implementation of the revised PA framework review (requiring the development of new reference points and of new ways to develop and communicate advice), and the climate change impact request. These have required multiple inter-sessional meetings and reviews.

SC recommends prioritizing key benchmarks over MSE in the short term: the SC discussed the importance of completing benchmarks for various stocks in order to develop new assessment models to improve SC's ability to advise.

SC is deeply concerned about unfilled Chair positions for Working Groups and Standing Committees as well as about unfilled positions for Designated Experts.

SC updated the 2025-2026 annual plan.

This workplan is evergreen and is updated and reviewed each June and September to include all Commission and Coastal States requests as well as SC work carried out of its own accord. The most recent workplan is available on the Commission SharePoint (annual meeting /relevant documents).

The workplan was first requested by the Commission in 2018 in response to Scientific Council concerns over increased workload. SC identified an increase in requests as well as an increased number of SC and WG meetings in recent years in parallel to a decrease in SC members actively participating at the June meetings. The increases in requests have made it difficult to fully address all requests over the year. It was also noted that the requests in recent years are not only more numerous but more complex and with increased scope. More details on the challenges and constraints the SC is currently facing and for 2026 are reported in the response of the Request #8b.

The SC has reported a preliminary estimation of the resources required for that plan. Such estimation will serve as basis for monitoring of the resources required to carry out the workplan. The resources required and resource gaps will be estimated with more precision over time.

The SC has also outlined current priorities.

SC reiterates that the workplan should facilitate a more concrete discussion of trade-offs between effort dedicated to scientific activities, including addressing new versus the current/strategic requests. This rarely happens because the work falls to a small number of scientists who are over-burdened with recurring requests, often pressured to deliver, and therefore are incapable of delivering on new, strategic requests. This is in addition to other daily work they do unconnected to NAFO.

All SC attempts to organize its work commensurate to its capacity during the recent meetings have not been successful because (i) the observed increase in the regular work of the NAFO SC, (ii) the addition of the climate change request, a very complex subject, in addition to the two MSEs and Precautionary Approach review and (iii) the need to remain open to attend to unexpected non-recurrent requests.

While it was noted the identification of priorities in the last seven years from the Commission has been helpful, further thought is required into how to manage the dialogue on priorities between SC and the Commission regarding the Commission requests.

While this plan is reviewed and updated twice a year, it has shown a limit capacity to solve the repeated concern about NAFO SC workload. The main reason is that this workplan comes after the Commission requests every year and the only possible option is to incorporate new topics without any previous consideration on the capacity to address them (reactive approach, not proactive).

SC emphasized the importance of stability in the workplan, i.e. that new requests should be clearly justified as they will have impact on delivering existing workplan items.

The 2024-2025 workload included work on operating models for the 3LN redfish MSE, implementation of the PA framework and, most recently, the climate change request. Managing these concurrently has been a strain on individual scientists working on these requests in increasingly frequent intersessional meetings, in the annual June SC meeting and in between. It has also been a strain on the smooth running of SC more generally, with voluminous material to review. The number of intersessional SC meetings has been growing as a result of these parallel complex requests.

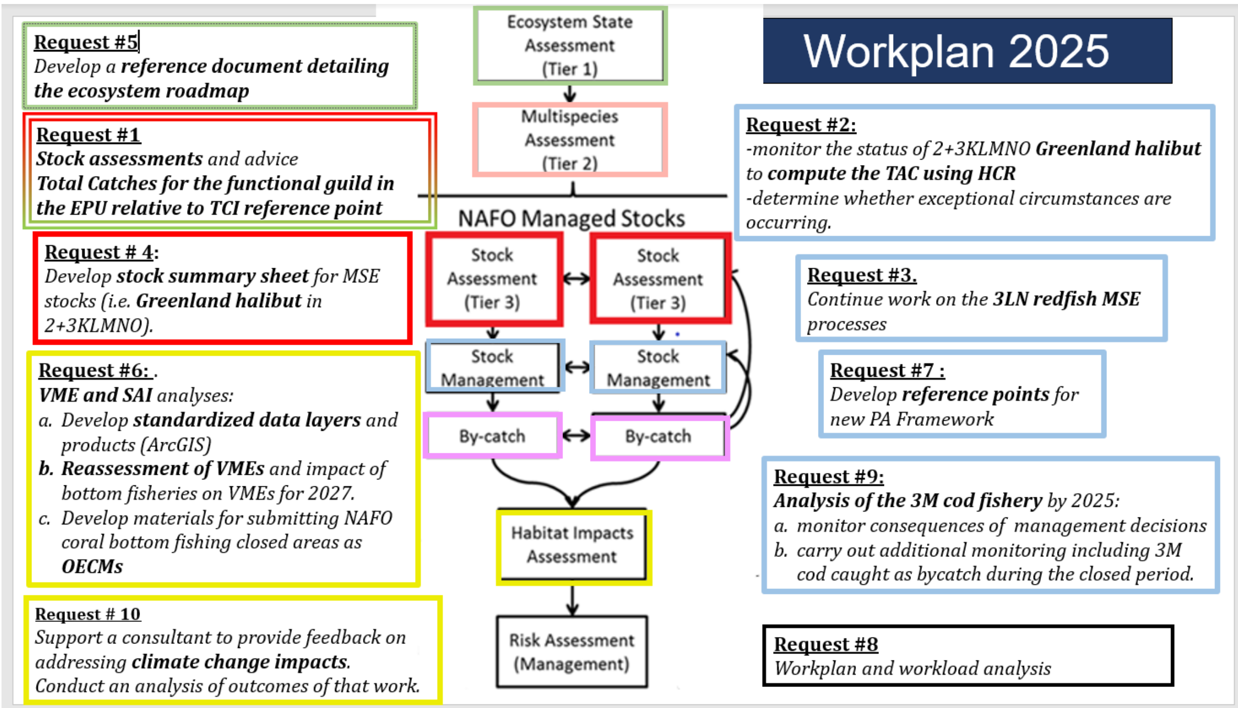
It was highlighted that the additional complex requests have made it impossible for SC to carry out benchmark assessment reviews for stocks that have models that require review and for stocks for which there is no model and development of a model should be explored (e.g. Divs. 3LNO American plaice and Divs. 3NO Atlantic cod). SC recommends that at least one benchmark be carried out before a new MSE is initiated.

- In terms of sequencing and timing of activities, SC is recommending: Prioritizing key benchmarks over MSE in the short term: the SC discussed the importance of completing benchmarks for various stocks in order to develop new assessment models to improve SC's ability to advise.
- Delaying the completion of the analyses required for the update of the Ecosystem Summary Sheets to 2028 to not coincide with the review of the VME protected areas.
- Given that Divs. 3LNO yellowtail flounder and Divs. 3LNO American plaice now have the same DE, the yellowtail flounder assessment will continue to be assessed every second year and American plaice

every four years instead of every 3 years (pending the timing of a Divs. 3LNO American plaice benchmark meeting).
- Div. 3M cod is recommended to be assessed every second year. To alternate with the Div. 3M cod management request and years with a heavy assessment load, two-year advice would start with the June 2027 assessment.

It was highlighted that SC could explore more efficient ways of drafting, reviewing and editing reports and advice.

SC is deeply concerned about unfilled Chair positions for Working Groups and Standing Committees as well as about unfilled positions for Designated Experts. See response to request #8b for more details.



x) Consider undertaking internal, or support external, assessments to inform the ongoing effort to address the Scientific Council workload. Such assessments could include how to optimize:

- ***i) the organization / structure and function of the Scientific Council, its standing committees and working groups,***
- ***ii) further development and implementation of the Scientific Council's workplan (request #8b).***

Scientific Council responded:

An additional day was added to the June 2025 meeting to have dedicated discussions about the structure and function of SC. Discussions were raised about: 1) organization of the SC Committees and Working Groups, 2) data, 3) workload, 4) requests and priorities and 5) SC coordinator responsibilities.

In general, the opinion of SC is that its current structure works well when properly resourced. However, the workload that SC has experienced over the past years combined with decreased capacity has prevented the SC from functioning as intended. The need for more expertise is reiterated.

Starting in September 2025, there will be three Committees and three Working Groups without Chairs, and four Designated Expert positions vacant that have to be filled. Stocks without a DE will not be assessed. If a STACFIS Chair is not appointed, it will be impossible to perform the assessments in June 2026.

During June 2024, Scientific Council noted a need to review the current Scientific Council structure and process for providing advice, and that an additional special session with dedicated time would be required to have those discussions. An additional day was added to the normal schedule of the SC June 2025 meeting to have those dedicated discussions. During that session, discussions were raised about: 1) organization of the SC Committees and Working Groups, 2) data, 3) workload, 4) requests and priorities and 5) SC coordinator responsibilities. The details of the discussions are in Section XII.4.b of this report.

In general, the opinion of SC is that its current structure works well when properly resourced. However, the workload that SC has experienced over the past years combined with decreased capacity has prevented the SC from functioning as intended. The need for more expertise is reiterated.

Starting in September 2025, there will be three Committees without Chairs (STACFEN, STACFIS and STACREC), three Working Groups without Chairs, two of them Joint COM/SC WGs (WG-RBMS, WG-CESAG and PA-WG), and four Designated Expert positions vacant (Divs. 3NO white hake, 3NOPs thorny skate, squid Subareas 3+4 and 3LNO EPU) that have to be filled. If a STACFIS Chair is not appointed, it will be impossible to perform the assessments in June 2026. Stocks without a DE will not be assessed. SC **recommends** that *all Contracting Parties provide Chairs and DEs for the NAFO SC.*

xi) Conduct ongoing analysis of the Division 3M cod fishery data by 2025 in order to (request #9):

a) Monitor the consequences of the management decisions (including the analysis of the redistribution of the fishing effort along the year and its potential effects on ecosystems, the variation of the cod catch composition in lengths/ages, and the bycatch levels of other fish species, benthos in general, and VME taxa in particular) (request #9a)

b) Carry out any additional monitoring that would be required, including Division 3M cod caught as bycatch in other fisheries during the closed period (request #9b).

Scientific Council responded:

After the implementation of the technical measures, the temporal and spatial pattern of the directed fishery for cod in Division 3M has changed. Since 2021 catches are mainly taken in the second quarter and they are concentrated in the central part of Flemish Cap bank for the longliners and in the southwest of Flemish Cap for the trawlers. No significant change has been observed in the catch composition and bycatch levels of the hauls directed to 3M cod by longline. Regarding the trawlers, an increase in the bycatch has been observed in sets targeting cod (mainly redfish). In both directed fisheries the percentage of catches and effort inside the VME polygons in 2021-2024 is much lower than in 2016-2020.

The bycatch of 3M cod in the longline hauls is negligible in the whole period 2016-2024. Cod bycatch in trawl hauls increased after the technical measures were implemented, mainly in 2022 and 2024. No major change has been observed in the spatial-temporal pattern of sets catching cod as bycatch. The effort of the trawl hauls catching cod as bycatch has increased within the VME polygons of sponges and large gorgonians in the 2021-2024 period. The potential impact of the longline sets catching cod as bycatch on VMEs is likely minimal in both periods.

After the implementation of the technical measures, no major changes have been observed in the size and age composition of the catches. A small decrease in the average number of individuals smaller than 41 cm (minimum landing size, fork length) was observed.

In the 2021-2023 period the TAC of 3M cod was reduced, which may confound the interpretation of this analysis.

(Note this response addresses request #9a and #9b)

In 2020 the Commission adopted technical measures that were put into force in January 2021, to try to protect the productivity of the Division 3M cod stock. These measures include the closure of the directed fishery for Div. 3M cod during the first quarter of the year, as well as the mandatory use of sorting grids in this fishery. In 2021, 2022 and 2024 the Commission requested SC to monitor the impact of these technical measures. In response to these requests, the SC agreed in previous years on the aspects to be studied before and after implementation to monitor the impact of the measures.

Haul by haul data provided by the NAFO Secretariat have been used to study the fishing patterns before (2016-2020) and after (2021-2024) the measures were in place in the 3M cod directed fisheries and in the fisheries catching cod as bycatch (SCR 25/034). It is noted that no bycatch of indicator species of Vulnerable Marine Ecosystems (VMEs) was recorded in the analyzed logbook data. No sets were registered within the closed areas throughout the entire period analyzed. The impact of technical measures on VMEs was determined by analyzing effort and cod catches within VME polygons outside the closed areas.

Following the CEM definition of target species, the main results of this study show that:

Prior to 2021, most of the cod catches from the directed fisheries were taken in the first quarter and in the east and southwest of the bank for the longliners and in the southwest for the trawlers. Since 2021, catches are mainly taken in the second quarter and they are concentrated in the central part of Flemish Cap bank for the longliners and in the southwest of Flemish Cap for the trawlers. Almost 100% of the cod catches made with longline gear, both before and after the technical measures were implemented, occurred in hauls targeting cod. In the case of cod catches from trawl hauls targeting cod, the percentage dropped from over 96% in the 2016-2020 period to 75-86% in the 2021-2024 period. In both directed fisheries, longliners and trawlers, the percentage of cod catches and effort inside the VME polygons in 2021-2024 is much lower than in 2016-2020.

The bycatch of cod in the longline hauls targeting other species is negligible in the whole period 2016-2024. Cod bycatch in trawl hauls increased significantly after the technical measures were implemented, mainly in 2022 and 2024. No major change has been observed in the spatial-temporal pattern of sets catching cod as bycatch before and after the implementation of the technical measures. The potential impact on VMEs of longline sets catching cod as bycatch is likely minimal in both periods. Regarding the trawl hauls catching cod as bycatch, it should be noted that there was an increase in effort carried out within the VME polygons of sponges and large gorgonians in the southwestern part of the Flemish Cap in 2022 and 2024. Most of this bycatch is from the redfish trawl fishery.

From the analysis of the total length and age distribution of the cod catches, no major changes were observed in the length distributions of longliners and trawlers before and after. In the lengths of the trawler catches, a small decrease in the average number of individuals smaller than 41 cm (minimum landing size, fork length) was observed. Age compositions are quite variable by year for both gears before implementing the technical measures. After the implementation of technical measures, the age composition of catches is more stable and does not show significant annual changes in both trawl and longline fisheries.

It should be noted that, apart from the technical measures implemented since 2021, in the 2021-2023 period the TAC of 3M cod experienced a large reduction due to the stock situation. This large reduction in the TAC may confound the interpretation of this analysis.

xii) Noting the voluntary contribution of the United States to support a consultant to provide feedback on NAFO's processes to address climate change impacts, requests the SC to conduct an analysis of progress and/or outcomes of that work (request #10).

Scientific Council responded:

An expert consultant was contracted to provide feedback on NAFO processes to address climate change impacts on stock assessment and management advice. Results and conclusions for this work can be found in the report of the contractor, with specific recommendations. Although the analyses are relevant, the limited time within the contract prevented deeper analysis.

Climate change impacts cannot be avoided, and need to be explicitly addressed in the work of SC and taken into account in the scientific advice. Specific operational elements of the way forward still need to be identified but a multidisciplinary approach is needed, including the expertise of biologists, oceanographers, modellers and stock assessment scientists. Therefore, SC **reiterates** the proposal of June 2024 of organizing a dedicated in-person meeting to evaluate the options and design an approach to integrate climate variables throughout SC operations.

An expert consultant was contracted to provide feedback on NAFO processes to address climate change impacts on stock assessment and management advice. This work was built on the information contained in the FAO-funded climate change consultant's report of June 2024 (SCR 24/009).

The objective was to examine two NAFO stock assessments (Div. 3M cod and Divs. 3NO witch flounder) as case studies with the goal of incorporating climate change covariates.

The consultant submitted a report to the SC (SCR 25/009) including the analyses, results, conclusions and recommendations and presented the findings during the 2025 June SC meeting via WebEx. The report addressed four main tasks:

1. Identify environmental variables that best explain yearly variability in recruitment for Div. 3M Atlantic cod and production in Divs. 3NO witch flounder models.

2. Demonstrate methods for incorporating selected environmental variables into current stock assessments for both species, to consider how estimates of life history parameters, stock status, and management related parameters (e.g., reference points) change when environmental covariates are included.

3. Project original and modified stock assessment models incorporating environmental covariates to compare stock responses to fishing.

4. Identify additional approaches or tools to support NAFO considering climate change impacts within Scientific Council and Commission's decision-making process.

SC notes the following summarizes the work of the contractors and is not necessarily the views of SC.

The main results of this study were:

For Div. 3M cod, the differences between model fits with and without environmental covariates on 30 year projections were negligible. Assuming that copepod abundance in the future matchedthe historical average led to outcomes that were similar to the base model. In general, biomass, recruitment, and catch under the copepod abundance model were 2.5% - 10% higher than same values under the base model. If copepod abundance increased by 20% over the next 30 years, mean recruitment increased by about 10% over the zero-trend model. Conversely, if copepod abundance decreased by about 20% over the next 30 years, biomass, recruitment and catch also went down. Productivity was lower when spring bloom timing moved 20% later than the historical average over the next 30 years and so was higher when spring bloom timing was 20% earlier than the historical average after 30 years.

For Divs. 3NO witch flounder, there were some notable differences from the original stock assessment model when fitted with the alternative model used by the contractors. Modeling the stock population with environmental indices had a larger effect on recent biomass dynamics than on model parameters. In recent years, the spring bloom timing and base models agreed on average trends in biomass, both recording a drop in biomass in 2015. In contrast, the sea ice model biomass declined on average since 2011 and ended at 16.7 kt in 2023, versus around 30 kt in the base and spring bloom timing models. The sea ice index covariate drove significant differences between the sea ice model and base model projections. Biomass estimates from the sea ice model were about 40% lower than the base model at the end of the historical period given low (lagged) sea ice index values at that time. Production increased when sea ice extent increased by about 20% on average over the next 30 years. The 2023 biomass estimates from the lagged spring bloom timing model and the base model were almost identical.

The main conclusions of this study were:

Overall, incorporating environmental indices into stock assessments and 30-year projections suggests potential long-term climate impacts on stock productivity, biomass, and catch. Projections for alternative environmental scenarios showed that the impacts of environmental indices on productivity behaved largely as expected.

Several conditions must occur if fishery outcomes are to be improved by incorporating environmental effects into stock assessment and management advice:

- There must be a consistent environmental effect on stock productivity that persists into the future (30-year projection), supported by reliable (robust model predictions) data for environmental covariates.
- Given that an environmental effect and reliable environmental index data are available, there must be sufficient statistical power to detect the effect while controlling the risk of spurious relationships.
- If an effect exists and can be reliably detected, it must have a reasonably strong influence on management outcomes over long term (30 year) projection. The potential for improved management performance will vary depending on uncertainty in assessment models and projections, environmental monitoring data and future trends, and the magnitude of environmental effects on stock productivity.

Without reliable forecasts (modeling) for environmental covariates, management outcomes will be contingent on speculative environmental scenarios rather than empirically supported forecasts, reducing the likelihood for improved results.

Additionally, there are other potential drivers of changing stock productivity not considered in this study that could be evaluated, such as impact of increased predator population on mortality rates.

Shifts in species distribution and suitable thermal habitats are probably one of the most detectable climate change impacts on NAFO stocks, whereby marine species are expected to move northward and into deeper waters relative to their historical ranges.

The report also detailed technical recommendations that may be considered for further work on incorporating environmental covariates into management advice. Specifically, the contractor gave five recommendations that should be considered before incorporating environmental covariates into management advice using long term (30-year) projections:

- Use closed-loop simulations to evaluate the extent to which incorporating environmental factors in stock assessment could improve management outcomes under climate change.
- Develop reliable projection models for environmental variables linked to productivity and would have a reasonable chance of improving management outcomes.
- Use meta-analysis informed by plausible biological mechanisms to reduce the risk of spurious relationships between environmental covariates and productivity.
- Investigate climate-driven shifts in species distribution that may influence migration rates between stock boundaries and estimates of stock-level productivity.
- Update stock assessment models to provide more information for evaluating links between environmental indices and indicators of stock productivity.

Although the analyses are relevant, the limited time prevented deeper analysis.

SC reiterates that climate change cannot be ignored. Specific operational steps on the way forward still need to be identified. Therefore, SC **reiterates** the proposal of June 2024 of organizing a dedicated in-person meeting to evaluate the options and design an approach to integrate climate change throughout SC operations. Such a meeting would require the participation of biologists, oceanographers, modellers and stock assessment scientists because a multidisciplinary approach is needed.

SC reiterates and emphasizes that dedicated resources will be required to advance with the effective and timely taking of climate variability impacts into account within SC work and advice.

2. Coastal States

a) Request by Denmark (Greenland) for Advice on Management in 2026 and 2027 (Annex 2)

Requests for management advice from Denmark (on behalf of Greenland) are presented in Annex 2 of Appendix V. Advice on stocks for which interim monitoring was requested is given in section 2c. below. Advice on *Pandalus borealis* is deferred to the September Scientific Council and STACFIS Shrimp Assessment Meeting.

b) Request by Canada and Greenland for Advice on Management in 2026 and 2027 (Annex 2, Annex 3)

Requests for management advice from Canada and Denmark (on behalf of Greenland) are presented in Annex 2 and 3 of Appendix V. Advice on stocks for which interim monitoring was requested is given in section 2c. below. Advice on *Pandalus borealis* is deferred to the September Scientific Council and STACFIS Shrimp Assessment Meeting.

Scientific Council responded:

Greenland halibut in Subarea 0+1 (offshore) Advice June 2025 for 2026 – 2027

Recommendation for 2026 and 2027

Scientific Council projected the fishing mortality scenarios defined for stocks in the Healthy Zone of the PA Framework, and three additional harvest levels requested by a Coastal State. For all these scenarios the probability that the stock falls below B_{lim} in 2028 was <1% and below $B_{trigger}$ was less than 10%.

F_{target} corresponds to catches of 30 243 t and 30 153t in 2026 and 2027, respectively. These catch levels have risks of 35% and 36% of exceeding F_{lim}, respectively.

Management objectives

Canada and Denmark (on behalf of Greenland) requested an assessment of stock status and advice consistent with NAFO's Precautionary Approach Framework (PAF).

Convention Principle	Status	Comment
Restore to or maintain at Bmsy	OK	B > Bmsy
Eliminate Overfishing (Stock)	OK	F < Flim
Eliminate Overfishing (Ecosystem)	Unknown	TCI undefined
Apply Precautionary Approach	OK	All PA reference points defined
Minimize harmful impacts on living marine resources and ecosystems	Intermediate	Directed fishery, VME closures in effect, Effectiveness of bycatch regulations uncertain
Preserve marine biodiversity	Unknown	Cannot be evaluated

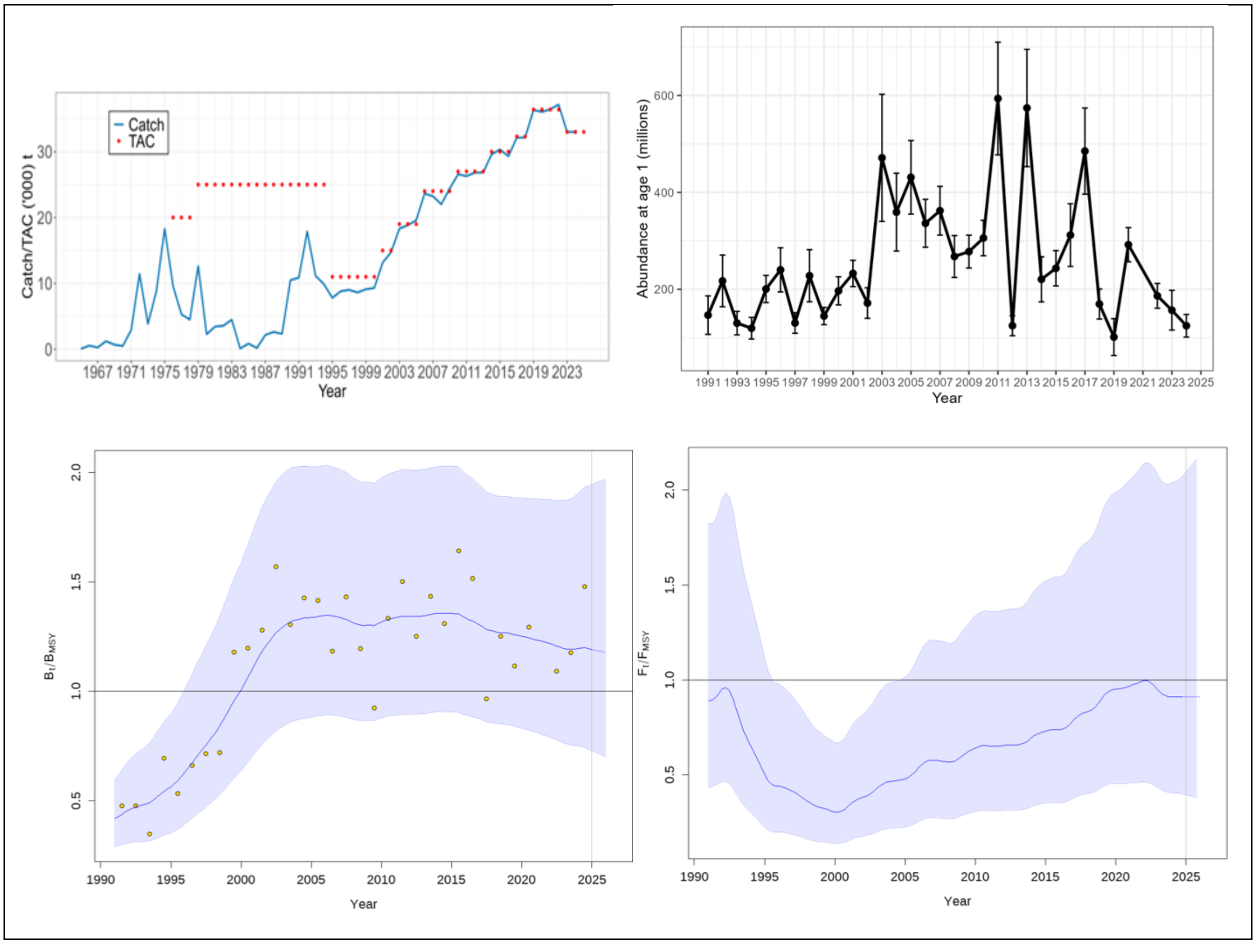
OK
Intermediate
Not accomplished
Unknown

Management unit

The Greenland halibut stock in Subarea 0 + 1 (offshore) is part of a larger population complex distributed throughout the Northwest Atlantic.

Stock status

Median biomass is above B_{msy} (B/B_{msy} = 1.2), the probability of being below B_{lim} (30% B_{msy}) is less than 1%, and the probability of being below $B_{trigger}$ (75% B_{msy}) is 3%. Fishing mortality is below F_{msy} (F/F_{msy} = 0.91), the probability of being above F_{lim} (F_{msy}) is 42%, and the probability of being above F_{target} (85% F_{msy}) is 57%.



Reference points

B_{lim} is 30% B_{msy}. $B_{trigger}$ is 75% B_{msy}. F_{lim} is F_{msy}. F_{target} is 85% F_{msy}.

Projections

Medium-term projections were carried forward to the year 2028 for catch scenarios with catch = TAC = 33 005 t for 2025. Constant *F* values were applied from 2026-2027 at several levels of F including F=0, the three levels suggested for stocks in the Healthy Zone (75% F_{msy}, 85% F_{msy}, and F_{msy},) and three catch levels requested by Coastal States ($F_{status\ quo}$, current TAC, and 2019-2022 TAC).

For the $F_{status\ quo}$ projections, the probability that F > F_{lim} in 2027 was 51%. At 75% F_{msy}, the probability that F > F_{lim} in 2027 was 26%. Projected at the level of 85% F_{lim}, the probability that F > F_{lim} in 2027 was 36% and for F_{msy} projections, this probability increased to 50%. For projections at the current TAC (33 005 t) and the 2019-2022 TAC (36 370 t) the probability that F > F_{lim} in 2027 was 44% and 54%, respectively. For biomass projections, in all scenarios the probability of biomass being below B_{lim} in 2028 was less than 1%. The probability of biomass being below $B_{trigger}$ in 2028 ranged from 4% to 9% for the six explored fishing scenarios, except the F=0 scenario. The probability that biomass in 2028 is greater than biomass in 2025 is between 27% and 52% for all projections, excluding the F=0 scenario.

Projections with $Catch_{2025}$ = 33 005 t		
Year	Yield ('000t) median	Projected Relative Biomass (B/Bmsy) median (80%CI)
F=0		
2025	33005	0.87 (1.19, 1.64)
2026	0	0.84 (1.18, 1.65)
2027	0	0.97 (1.30, 1.74)
2028	-	1.10 (1.42, 1.83)
$F = 0.75F_{msy}$		
2025	33005	0.87 (1.19, 1.64)
2026	26811	0.84 (1.18, 1.65)
2027	27043	0.84 (1.19, 1.67)
2028	-	0.85 (1.20, 1.69)
$F = 0.85F_{msy}$		
2025	33005	0.87 (1.19, 1.64)
2026	30243	0.84 (1.18, 1.65)
2027	30153	0.83 (1.17, 1.66)
2028	-	0.82 (1.17, 1.68)
$F = F_{msy}$		
2025	33005	0.87 (1.19, 1.64)
2026	35328	0.84 (1.18, 1.65)
2027	34618	0.80 (1.15, 1.65)
2028	-	0.77 (1.13, 1.65)
$F = F_{status\ quo}$		
2025	33005	0.87 (1.19, 1.64)
2026	35502	0.84 (1.18, 1.65)
2027	34768	0.80 (1.15, 1.65)
2028	-	0.77 (1.13, 1.65)
Current TAC		
2025	33005	0.87 (1.19, 1.64)
2026	33221	0.84 (1.18, 1.65)
2027	32789	0.81 (1.16, 1.65)
2028	-	0.79 (1.15, 1.66)
2019-2022 TAC		
2025	33005	0.87 (1.19, 1.64)
2026	36834	0.84 (1.18, 1.65)
2027	35906	0.81 (1.16, 1.65)
2028	-	0.79 (1.15, 1.66)

		Catch 2025 = 33 005 t						
		F=0	Healthy Zone			Coastal State Request		
			F = 0.75F_{msy}	F = 0.85F_{msy}	F = F_{msy}	F status quo	Current TAC	2019-2022 TAC
Yield (50%)	2025	33005	33005	33005	33005	33005	33005	33005
	2026	0	26811	30243	35328	35502	33005	36370
	2027	0	27043	30153	34618	34768	33005	36370
P(F>F_{lim})	2025	42%	42%	42%	42%	42%	42%	42%
	2026	<1%	25%	35%	50%	51%	44%	54%
	2027	<1%	26%	36%	50%	51%	44%	54%
P(B<B_{lim})	2025	<1%	<1%	<1%	<1%	<1%	<1%	<1%
	2026	<1%	<1%	<1%	<1%	<1%	<1%	<1%
	2027	<1%	<1%	<1%	<1%	<1%	<1%	<1%
	2028	<1%	<1%	<1%	<1%	<1%	<1%	<1%
P(F>F_{target})	2025	57%	57%	57%	57%	57%	57%	57%
	2026	<1%	39%	50%	65%	65%	59%	68%
	2027	<1%	39%	50%	64%	64%	59%	68%
P(B<$B_{trigger}$)	2025	3%	3%	3%	3%	3%	3%	3%
	2026	4%	4%	4%	4%	4%	4%	4%
	2027	<1%	4%	5%	6%	6%	6%	7%
	2028	<1%	4%	6%	8%	8%	7%	9%
P(B_{2028}>B_{2025})		96%	52%	42%	30%	29%	34%	27%
(B_{2028}-B_{2025})/B_{2025}		96%	1%	-12%	-31%	-32%	-23%	-37%
P(B_{2027}>=B_{2025})		89%	48%	42%	33%	33%	36%	31%
P(B_{2027}<B_{2025})		12%	52%	59%	67%	67%	63%	69%

Assessment

A Stochastic Production model in Continuous Time (SPiCT) was used for the assessment of this stock. Input to this model include landings data and a standardized index of exploitable stock biomass from combined survey data.

The next assessment is expected to be in 2027.

Human impact

Mainly fishery related mortality has been documented. Other sources (e.g. pollution, shipping, oil-industry) are undocumented.

Biology and Environmental interactions

No specific studies were reviewed during this assessment.

Ecosystem sustainability of catches

The impact of bottom fishing activities on VMEs in SA 0 was assessed in 2016. Three areas have been designated as marine refuges, that exclude bottom contact fisheries: Disko Fan, Davis Strait and Hatton Basin. Areas in SA 1 have also been closed to bottom fishing to protect benthic habitats.

Greenland halibut is included in the piscivore guild. There are no EPUs nor TCIs defined for this region. The ecosystem sustainability of catches cannot be evaluated. Greenland shark is a bycatch species of concern in the SA 0+1 (offshore) fishery given its low reproductive rate, slow growth rate and limited ecological information.

Fishery

Catches were first reported in 1965. Catches increased from 1989 to 1992 due to a new trawl fishery in Div. 0B with participation by Canada, Norway, Russia, and the Faroe Islands and an expansion of the Div. 1CD fishery with participation by Japan, Norway, and the Faroe Islands. Catch declined from 1992 to 1995 primarily due to a reduction of effort by non-Canadian fleets in Div. 0B. Since 1995 to 2024 catches were near the TAC and increased in step with increases in the TAC, with catches reaching a high in 2022. Catches decreased following a decrease in TAC in 2023.

	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
TAC	30.0	32.3	32.3	36.4	36.4	36.4	36.4	33.0	33.0	33.0
SA 0	14.1	15.9	16.0	18.3	17.9	19.1[2]	18.3[2]	16.4[2]	16.5[2]	
SA 1	15.2	16.2	16.2	18.0	18.1	17.3	18.8	16.6	16.5	
Total STACFIS[1]	29.3	32.1	32.2	36.3	36.0	36.4	37.2	33.0	33.0	

[1] Based on STATLANT, with information from Canada and Greenland authorities to exclude inshore catches.

[2] STACFIS estimate using 1.48 conversion factor for J-cut, tailed product.

Sources of information

SCR 25/020,021,030,031; SCS 25/012.

c) Monitoring of Stocks for which Multi-year Advice was provided in 2023 or 2024

Scientific Council recommends for:

Greenland halibut in Division 1A inshore – Disko Bay for 2025-2026: Following the application of the ICES guidance on data limited stocks (DLS) method 3.2, the Scientific Council advises that the TAC in 2025 and 2026 should not exceed 6 258 tons.

Greenland halibut in Division 1A inshore - Upernavik for 2025-2026: Following the application of the ICES guidance on data limited stocks (DLS) method 3.2, the Scientific Council recommends that catch should not exceed 5 801 t.

Greenland halibut in Division 1A inshore - Uummannaq for 2025-2026: Following the application of the ICES guidance on data limited stocks (DLS) method 3.2, the Scientific Council recommends that TAC in 2025 and 2026 should not exceed 4 674 t. A PA buffer is applied in 2024 for the first time.

Demersal redfish and deep-sea redfish (*Sebastes* spp.) in Subarea 1 for 2024 and beyond: Scientific Council advises that there should be no directed fishery until a significant improvement in stock status is detected.

Wolffish in Subarea 1 for 2024 – 2026:

Atlantic wolffish: The Scientific Council advises that there should be no directed fishery and bycatch should be kept to the lowest possible level.

Spotted wolffish: The Scientific Council advises that the TAC should not exceed mean catches from the period 2012 to 2015 when indices were increasing for both stocks. This corresponds to a catch of 775 tons.

VIII. REVIEW OF FUTURE MEETINGS ARRANGEMENTS

1. Scientific Council and STACFIS Shrimp Assessment Meeting, 9 – 11 September 2025

The Scientific Council and STACFIS Shrimp Assessment meeting will be held in Halifax, Canada, 9 - 11 September 2025.

2. Scientific Council, 15 – 19 September 2025

The Scientific Council September 2025 meeting will be held in Halifax, Canada, 15 - 19 September 2025.

3. WG-ESA, 4 – 13 November 2025

The Working Group on Ecosystem Science and Assessment will meet at the NAFO Secretariat, Halifax, Nova Scotia, Canada, 4 - 13 November 2025.

4. STACREC May 2026

The Standing Committee STACREC will meet by WebEx in May 2026. Date to be determined.

5. PA-WG Meeting May 2026

The Precautionary Approach Working Group will meet by WebEx in May 2026. Date to be determined.

6. Scientific Council, June 2026

The Scientific Council June meeting will be held in Halifax, Nova Scotia, 29 May - 11 June 2026. The NAFO Secretariat will look into alternate meeting venues.

7. Scientific Council (in conjunction with NIPAG), 2026

Dates and location to be determined.

8. Scientific Council, September 2026

The Scientific Council September 2026 meeting will be held in Lithuania, 21 - 25 September 2026.

9. WG-ESA, November 2026

Dates and location to be determined.

10. NAFO/ICES Joint Groups

a) NIPAG, 2026

Dates and location to be determined.

b) ICES – NAFO Working Group on Deep-water Ecosystem (WG-DEC)

Next WG-DEC is scheduled for the last week of March 2026. Exact dates and location to be determined.

c) WG-HARP

Dates and location to be determined.

11. Commission- Scientific Council Joint Working Groups

a) WG-EAFFM

The Joint Commission/Scientific Council Working Group on the Ecosystem approach to Fisheries Management will be held in Tallinn, Estonia, 14 - 16 July 2025.

b) WG-RBMS

The Joint Commission/Scientific Council Working Group on Risk Based Management Systems will be held in Tallinn, Estonia, 16 - 18 July 2025.

c) CESAG

The next meeting of the Catch Estimation Strategy Advisory Group will take place in Fall 2025 for reviewing the catch estimation method. The next meeting for providing the catches of 2025 may take place in Spring 2026.

IX. ARRANGEMENTS FOR SPECIAL SESSIONS

1. Topics for Future Special Sessions

a) Workshop on Cod Division 3M readers

The Scientific Council agreed that a review of the comparative age reading for Div. 3M cod should be carried out as there had not been a session on this since 2017. Currently, readers from Spain, Faroes and Norway read Div. 3M cod otoliths. An exchange between these readers would be very useful to try to establish a protocol.

b) Climate Change Meeting

Scientific Council does not have the capacity to develop an approach to effectively incorporate climate change considerations as part of its regular operations, but climate change cannot be ignored in the work of NAFO. As a first step towards the goal of developing climate-informed SC advice, Scientific Council **proposes** a dedicated in-person meeting to bring together the multidisciplinary experts required to evaluate the options and design an approach to integrate climate change considerations throughout Scientific Council operations.

2. Recently Attended Special Sessions

a) 11th Flatfish Symposium

Laura Wheeland (Canada) presented an overview of the 11th International Flatfish Symposium 2024 in Wageningen, the Netherlands, which she attended in November 2024. The symposium theme of "Reconnecting Horizons: Charting a course for flatfish research" brought together natural scientists, social scientists, economists and others to discuss flatfish research across five themes: environmental forcing of flatfish populations; socio-economic impacts of flatfish fisheries; spatial population structure; insights on life history patterns; and emergent issues. At the symposium, Laura presented her ongoing research on the movement and distribution of Greenland halibut and witch flounder in Newfoundland and Labrador and provided the symposium with information on the Journal of Northwest Atlantic Fishery Science. Laura thanks the NAFO Secretariat for its support in attending this Symposium as a representative of Scientific Council.

b) EAFM Symposium, 2025

The EAFM symposium was coordinated and sponsored by the FAO Deep-sea Fisheries Project, NAFO and ICES and held at the FAO Headquarters, Rome, Italy, on 11–13 March 2025. The programme, participants list, and links to the webcasts in English, French and Spanish are on the NAFO Symposium website[3]. The symposium had 21 presentations from scientists, managers and industry over the three days, with general discussions with participants within a panel format during the final afternoon. Anthony Thompson gave a short presentation on the symposium focusing on the outcomes and next steps for supporting deep-sea (general) RFMOs to further implement the EAFM.

The symposium participants supported FAO's EAFM approach with its three main components of which "ecological wellbeing" and "governance" were the most relevant to RFMOs. It was recognised that the social and economic drivers within the "human wellbeing" component were important drivers of fisheries but were primarily discussed by national delegations rather than at RFMO meetings. The NAFO SC was supportive of including the management of retained, non-retained (discarded) species and general ecosystem status based

[3] https://www.nafo.int/Science/Symposia/proceedings-from-the-symposium-faonafoices-applying-the-ecosystem-approach-to-fisheries-management-in-abnj

upon the best scientific advice within the overall EAFM remit. The SC noted this fits well with the Tier 1, 2 and 3 approach of the EAF roadmap used by NAFO.

SC were supportive of the DSF Project developing frameworks for overall guidance for the implementation of EAFM and **suggested** the project holds a follow-up 4-day workshop in 2026 with a focused group of participants representing managers, scientists and industry from all the ocean regions in the high seas to initiate this work.

The submitted papers for this symposium will be published as a special issue of JNAFS in 2026, as pointed out in the STACPUB report (Appendix II).

X. MEETING REPORTS

1. WG-ESA

The report of the meeting of the Working Group on Ecosystem Science and Assessment (WG-ESA), held at the NAFO Secretariat in Halifax, Nova Scotia, from 12-21 November 2024 (SCS Doc. 24/20), was presented by the co-Chairs, Mar Sacau Cuadrado (EU) and Alfonso Pérez-Rodríguez (EU).

WG-ESA work addressed two overarching goals: a) work intended to advance the Roadmap, which typically involves medium to long-term research and b) work intended to address specific requests from Scientific Council (SC) and/or Commission (COM), which typically involves short to medium-term analysis, aligned to Roadmap priorities.

In this context, the work carried out to support SC responses to COM requests was presented. The COM requests addressed by WG-ESA were:

- COM Request #1: (ANNEX A: Guidance for providing advice on Stocks Assessed). In relation to Tier 1 of the Roadmap, Scientific Council should provide annually catch information in relation to 2TCI, including recent cumulative catch levels and a scoping of expected cumulative catch levels. Regarding Ecosystem Summary Sheets, although they are not included in Annex A, Scientific Council considers that this is the correct place to inform about their monitoring and update. For that, the information of the monitoring held in WG-ESA 2024 meeting was incorporated along with the 2TCI information.
- COM Request #5: In relation to the Ecosystem Roadmap as a whole, the Commission requests that the Scientific Council develop a reference document detailing the Ecosystem Roadmap, for completion in the next 1-3 years.
- COM Request #6: In relation to the habitat impact assessment component of the Roadmap (VME and SAI analyses), the Commission requests that Scientific Council:
    a. Continue the development of a centralized data repository using ArcGIS online to host the data and data-products for scientific advice, in conjunction with the NAFO Secretariat.
    b. Work towards the reassessment of VMEs and impact of bottom fisheries on VMEs for 2027; including potential management options in the reassessment of bottom fisheries.
    c. Develop materials on the potential of submitting NAFO coral bottom fishing closed areas as OECMs for discussion at the 2025 WG-EAFFM meeting.
- COM Request #10: Given that an expert consultant was tasked to provide feedback on NAFO's processes to address climate change impacts on stock assessment and management advice, requests the SC to conduct an analysis of progress and/or outcomes of that work.

The work carried out by WG-ESA is described in full in the working group report.

Some of the work summarized in the WG-ESA report saw additional progress during the WG-ESA meeting. Details on this progress was also provided. This progress included:

- A brainstorming session was held during the WG-ESA meeting on approaches to incorporate ecosystem knowledge into single-species assessments and scientific advice. This brainstorming session aimed to start discussing ways of integrating ecosystem information into assessment models and Management Procedures (MPs), with the goal of accounting for environmental and ecological drivers in both tactical and strategic advice.

- A necessary first step of this process is to canvass information on these issues from stock Designated Experts (DEs). A questionnaire to gather information to allow identifying stocks whose dynamics show evidence of relationships with environmental factors, as well as to assess the availability of data and knowledge needed to support the development of models that integrate environmental and ecological drivers, was designed at WG-ESA. This questionnaire was circulated among the DEs after the meeting, and preliminary results of the analysis of the responses was presented at the SC June 2025 meeting.
- In 2022, NAFO adopted an Ecosystem Reference Point to inform on the Risk of Ecosystem Overfishing. This reference point is based on an Ecosystem Production Potential (EPP) modelling and analysis framework that generates the Total Catch Index (TCI) on which the Ecosystem Reference Point, two times TCI (2TCI) is based. During WG-ESA, work was conducted to identify the key elements that need to be updated and/or reviewed within the EPP-TCI framework. Since the WG-ESA meeting, a DFO Competitive Science Research Fund (CSRF) project to support this work was approved. A summary of this project, which includes contributions by STACFEN, WG-ESA and SC members, was presented at the 2025 SC June meeting. The results of this work are expected to be ready for the next update of the Ecosystem Summary Sheets (ESSs).
- While the initial schedule foresees an ESS update in 2027, the Scientific Council **recommends** *postponing it to 2028, to allow for a better distribution of the workload involved. This delay is still subject to approval by the Commission.*
- Moreover, currently no EDE for the 3LNO EPU is available, and that prevents finalization of the work needed beforehand.

2. CESAG

The report of the meeting of the Joint Commission/Scientific Council Working Group on Catch Estimation Strategy Advisory Group (CESAG), that took place by WebEx on 26th February 2025, was presented by the SC Chair, Diana González-Troncoso (EU). The main points discussed were the possible inclusion of the haul by haul data in the process of estimating the data, and the possible addition of all species in the CESAG method to facilitate the calculation of the Total Catch Index (TCI). The Working Group recommended that the NAFO Secretariat explores the feasibility of these possibilities, and a follow-up meeting will take place in Fall 2025.

3. WG-DEC

Javier Murillo (Canada) presented the results of the Joint ICES/NAFO Working Group on Deep-water Ecology (WG-DEC), chaired by Ana Colaço (Portugal), David Stirling (UK) and Javier Murillo (Canada), held in Santander (Spain) and online, from 24-28 March 2025. Following the review and adoption of the agenda, WG-DEC organized the work around six terms of reference and different break-out groups were created to work on them.

The group reviewed, validated and QA/QC-checked the new information on the occurrence and distribution of Vulnerable Marine Ecosystems (VMEs). Data were submitted for 5 ICES ecoregions (Celtic Seas, Greater North Sea, Norwegian Sea, Barents Sea and Oceanic Northeast Atlantic) by data providers from three ICES member countries (Ireland, Norway and the UK) in response to the VME data call of November 2024 – 31st January 2025. In total, 983 new VME indicator records (no habitat records) and 157 absence records were added to the database. Of the newly submitted records, 49 are within the NEAFC Regulatory Area (44 in RA1 & 5 in RA3) and the remaining 934 presence and all absence records are within the Exclusive Economic Zones of North Atlantic ICES member States. No records were submitted from the NAFO Regulatory Area in response to this call.

Vessel monitoring system (VMS) data were received from NEAFC, via the ICES Secretariat, to support the NEAFC request to ICES to provide information on the distribution of fisheries activities in and in the vicinity of VME habitats. Fishing effort is inferred from VMS data on the basis of speed. Similar to last year, a large proportion of the vessels had no gear specified (62%), and these were responsible for 89% of the fishing activity. The gridded NEAFC fishing activity data was shown for Hatton Bank, Rockall Bank and the Barents Sea. There was no reported activity for vessels using bottom trawl, static gears or by vessels with no registered gear type in 2024 for the areas southwest of Iceland, or to the west of Biscay, including the Mid-Atlantic Seamounts (Josephine Seamount), which have been reported on in previous years.

In preparation of the benchmark process for providing VME advice requested for 2027, the group continued working on the improvement of the VME index, the impacts of static gears on VMEs and the use of Predictive Habitat Models (PHMs) in ICES advice. A workshop is planned for 2026 to improve the current VME index which presents several limitations. This workshop will aim at combining multiple lines of evidence from a variety of data sources, including imagery surveys, trawl by-catches, high-resolution bathymetry, and eventually PHMs, in order to propose taxa-specific and a generic all-taxa VME likelihood Index. The new VME Index will focus on assessing the likelihood of VME occurrence, independently of the relative vulnerabilities of VME indicators, but making full use of trawl catch surveys. A second workshop aims to review and assess the impact of different gear types on VMEs across the ICES area. In preparation of this workshop, the group reviewed the available information on VME indicator species traits in order to use those traits as vulnerability and sensitivity indicators, to induced pressures and provide a framework to produce sensitivity maps, which would include the overlap of sensitivity layers with static gear fishing pressure layers. Lastly, the group helped with the preparation of a workshop on the Use of PHMs in ICES advice. Four case studies were selected to be presented during the workshop on May 12-16, 2025. The results of this workshop will provide future directions to facilitate the use of PHMs in the ICES advice framework.

Next WG-DEC is scheduled for the last week of March 2026.

4. WG-RBMS

The co-Chair of the NAFO Joint Commission-Scientific Council Working Group on Risk-Based Management Strategies (WG-RBMS), Fernando González-Costas (EU), presented an update from the meeting that took place in April 2025 (NAFO/COM-SC Doc. 25-02). At that meeting, the SC reported to the RBMS on the following points:

Progress on the Divs. 3LN redfish MSE. The RBMS was informed of the problems encountered in the progress of this MSE, as well as possible future solutions in this case. The WG-RBMS was also informed of Japan's work to present a possible Operating Model for future use.

It was also reported that the Commission did not require a full assessment of this stock in 2025. In July 2025, the WG-RBMS will review the results of the SC June interim monitoring report for this stock to consider how to proceed with producing the 2026 advice.

The existence of Exceptional Circumstances in 2024, similar to those observed in 2023, for implementing the MP for Greenland halibut Subarea 2+Div3KLMNO, was discussed. The WG-RBMS recommended to SC to address this Exceptional Circumstance in the same way it was addressed in 2024.

Decisions made to progress in estimating reference points for implementing the new PAF were reported to the WG-RBMS.

The WG-RBMS co-Chairs contribution and participation in various workshops and conferences to explain the new NAFO PAF were communicated to the SC.

The co-Chair informed the WG-RBMS that he will step down from his duties as the co-Chair of the joint working group representing the SC in September this year.

5. PA-WG

The Chair of the Precautionary Approach Framework Working Group (PA-WG), Fernando González-Costas (EU), presented an update from the meetings that took place in December 2024 (SCS Doc. 24/21) and May 2025 (SCS Doc. 25/10).

At the meeting in December 2024, it was decided how to move forward with estimating the PAF reference points (RPs). It was agreed that the DEs with a full assessment in a given year would work towards the development of RPs that can be used in the PAF that year. It was noted that the preference would be to use different methods to estimate the RPs based on available data and knowledge and in the methods guide proposed by the PA. The intention was to discuss and approve the final PA RPs at a meeting of the Scientific Council / PA-WG scheduled for 06th May 2025.

In the meeting held in May 2025, the RPs for almost all the stocks that were scheduled for a full assessment in June 2025 were analyzed. Some of them were deferred to June due to additional analyses asked or ongoing work.

Regarding stocks included in the Coastal States requests, it was agreed to include them in the estimation of the RPs necessary for applying the PA. For June 2025, only advice for Greenland halibut 0+1 offshore was requested. The RPs for this stock were accepted as presented.

It was also proposed that the RPs of the shrimp stocks (Divs. 3LNO shrimp, and from the Coastal States requests, Northern shrimp in Denmark Strait and off East Greenland, and Northern shrimp in Subarea 0 and Subarea 1) be estimated during the September 2025 Scientific Council Shrimp Assessment Meeting.

The Chair announced that he is leaving his duties as Chair of this working group.

XI. GENERAL PLAN OF WORK FOR SEPTEMBER 2025 ANNUAL MEETING

No new issues were raised that will affect the regular workplan for the September meeting.

XII. OTHER MATTERS

1. Designated Experts

SC noted that currently Designated Experts for Divs. 3NOPs white hake, 3LNO thorny skate and squid Subareas 3+4, as well as the 3LNO Ecosystem Designated Expert, are vacant. Stocks without a DE will not be assessed. Very few Contracting Parties (CPs) are providing DEs. SC encouraged CPs to fill those positions.

From the Science Branch, Northwest Atlantic Fisheries Centre, Department of Fisheries and Oceans, St. John's, Newfoundland & Labrador, Canada

Cod in Div. 3NO	Rick Rideout	rick.rideout@dfo-mpo.gc.ca
American Plaice in Div. 3LNO	Laura Wheeland	laura.wheeland@dfo-mpo.gc.ca
Witch flounder in Div. 3NO	Katherine Skanes	katherine.skanes@dfo-mpo.gc.ca
Yellowtail flounder in Div. 3LNO	Laura Wheeland	laura.wheeland@dfo-mpo.gc.ca
Greenland halibut in SA 2+3KLMNO	Paul Regular	paul.regular@dfo-mpo.gc.ca
Northern shrimp in Div. 3LNO	Nicolas Le Corre	nicolas.lecorre@dfo-mpo.gc.ca

From the Department of Fisheries and Oceans, Winnipeg, Manitoba, Canada

Greenland halibut in SA 0+1 (offshore)	Kevin Hedges	kevin.hedges@dfo-mpo.gc.ca

From the Department of Fisheries and Oceans, Ottawa, Ontario, Canada

Redfish Div. 3O	Danny Ings	danny.ings@dfo-mpo.gc.ca

From the Instituto Español de Oceanografía, Vigo (Pontevedra), Spain

Roughhead grenadier in SA 2+3	Fernando Gonzalez-Costas	fernando.gonzalez@ieo.csic.es
Splendid alfonsino in Subarea 6	Fernando Gonzalez-Costas	fernando.gonzalez@ieo.csic.es
Cod in Div. 3M	Irene Garrido Fernández	irene.garrido@ieo.csic.es
Northern Shrimp in Div. 3M	Jose Miguel Casas Sánchez	mikel.casas@ieo.csic.es
Ecosystem Designated Expert 3M	Diana González-Troncoso	diana.gonzalez@ieo.csic.es

From the Instituto Nacional de Recursos Biológicos (INRB/IPMA), Lisbon, Portugal

American plaice in Div. 3M	Ricardo Alpoim	ralpoim@ipma.pt
Golden redfish in Div. 3M	Ricardo Alpoim	ralpoim@ipma.pt
Redfish in Div. 3M	Ricardo Alpoim	ralpoim@ipma.pt
Redfish in Div. 3LN	Patricia Gonçalves	patricia@ipma.pt

From the Greenland Institute of Natural Resources, Nuuk, Greenland

Demersal Redfish in SA1	Rasmus Nygaard	rany@natur.gl
Wolfish in SA1	Rasmus Nygaard	rany@natur.gl
Greenland halibut in Div. 1 inshore	Rasmus Nygaard	rany@natur.gl
Northern shrimp in SA 0+1	AnnDorte Burmeister	anndorte@natur.gl
Northern shrimp in Denmark Strait	Tanja B. Buch	TaBb@natur.gl

From Knipovich Polar Research Institute of Marine Fisheries and Oceanography (PINRO), Russian Federation

Capelin in Div. 3NO	Konstantin Fomin	fomin@pinro.ru

Designated Expert Vacancies

Ecosystem Designated Expert 3LNO	VACANT
Northern Shortfin Squid in SA 3 & 4	VACANT
Thorny skate in Div. 3LNO	VACANT
White hake in Div. 3NO	VACANT

2. Election of Chairs

Mark Simpson will be the next Scientific Council Chair and Rick Rideout will continue as STACPUB Chair.

SC noted that starting in September 2025, Chair positions for the Committees STACFEN, STACFIS and STACREC (formerly filled by Miguel Caetano, Martha Krohn and Mark Simpson, respectively) are vacant, as well as for the WG-PA, and the Climate Change subgroup. In addition, the Science co-chair positions for the joint Commission and SC working groups WG-RBMS and WG-CESAG are also vacant. If a STACFIS Chair is not appointed, it will be impossible to carry out the assessments in June 2026. Very few CPs are providing Chairs. SC **recommends** that *all Contracting Parties provide Chairs for the NAFO Scientific Council*.

3. Budget Items

The Secretariat presented for consideration to the Scientific Council the draft budget for 2026, including the ArcGIS repository budget. No comments were raised, and the proposed budget was approved by SC.

4. Other Business

a) SOFIA State of the Stocks

FAO has published "The State of World Fisheries and Aquaculture" (SOFIA) every two years since the early 1970s. Status is based on species biomass relative to the biomass that produces the maximum sustainable yields (B_{msy}) within FAO major fishing areas (FAO, 2011). This is consistent with the requirement in UNCLOS: "*to maintain or restore populations of harvested species at levels which can produce the maximum sustainable yield*" (Articles 61 and 119).

In 2024 the Scientific Council (SC) reviewed the SOFIA preliminary classification of NAFO stocks for the 2026 SOFIA report. This discussion was continued at the SC meeting in June, where the following concerns were raised.

SOFIA classifies stocks by their biomass status relative to B_{msy}. NAFO SC agrees that these categories can be informative as indicators of biomass status.

The names chosen for these categories in SOFIA are, however, misleading as they refer to stocks "fished" state but not their biomass status.

The SC notes that information on stock biomass alone is insufficient to determine whether a stock is "Overfished", "Sustainably fished" or "Underfished" as the SOFIA report attempts to do. To determine the status of fishing on a stock, information regarding fishing pressure (F) is required.

The SC also notes that a stock might currently be "sustainably fished" according to information on fishing pressure although having a low biomass, or be "overfished" despite a high biomass if the fishing pressure is unsustainably high and causing the biomass to decline.

The current wording of referring to biomass status as "fished" status can therefore be completely misleading in some cases.

The SC hereby **requests** the SC Chair to convey these concerns to the Commission.

b) Scientific Council Process

During June 2024, Scientific Council noted a need to review the current Scientific Council structure and process for providing advice, and that an additional special session with dedicated time would be required to have those discussions. An additional day was added to the normal schedule of the SC June 2025 meeting to have those dedicated discussions in a special session.

Several questions that led to discussions through the SC were raised:

1. <u>Organization of the SC Committees and Working Groups</u>.

Although it was suggested to reduce the number of Committees inside the SC, this will lead to less participation in general in the SC and in the Executive in particular.

An alternate suggestion was to combine STACFEN and WG-ESA creating a new Committee that met in November each year. SC feels that the loss of information about the oceanographic conditions of the NRA during discussions of stock dynamics at the June meeting would be counter to the trend for an increased EAFM approach at NAFO. Moreover, although somewhat similar, the functions of the Committee (on Fisheries Environment) and the WG (on Ecosystem Science and Assessment) rely upon different foundations. Therefore, it was decided not to merge the Committee and the Working Group but to encourage joint participation when it makes sense to do so.

The option that STACFEN and STACPUB could meet prior to the June SC meeting, at the beginning of May, to save time during the June meeting was also discussed. However, this will not save too much time in the June meeting and will add more meetings to the SC schedule.

Progress in the STACFEN/STACFIS interaction is necessary in order to incorporate environmental and climate indices into the stock assessments. SC recommends the Chair of STACREC extend an invitation to an expert to the May 2026 STACREC meeting to discuss options for integrating environmental data into various stock assessments. This may bring light on inclusion of environmental variables to better support the stock assessments. Work on this topic is ongoing.

In the case of WG-ESA, it was proposed to convert it to a Joint SC WG, similar to the shrimp meeting. This would be similar to the September shrimp meeting and would allow the WG to directly respond to the Commission requests related to the WG-ESA work. As a first step, SC recommends that WG-ESA drafts the responses to the Commission requests in their November meeting that relies on this WG, and makes them available to be revised by the SC in June.

There is a necessity of creating a Working Group where the Climate Change work is addressed. It was decided that a specific group is not practical at this time, but that Climate Change should be considered throughout SC work. This is addressed in the response of the Commission Request #10.

2. Data. There are several challenges related with data availability, mainly related with the timely provision, privacy and transparency:

To accomplish the deadline for the submission of the data. SC considered that if any Contracting Party sends the data after the deadline, this data may not be included in the assessment.

Official commercial catches. The official commercial catches in NAFO are the STATLANT 21, but due to privacy restrictions in the last years some Contracting Parties have not submitted those data, so they are incomplete. The Secretariat presented to the SC all the official data that they received from the CPs, but the data sources have varying levels of completeness and the percentage of coverage depends on the type of data and the requirements in the NAFO CEM. Although in the last years the Joint COM/SC CESAG has provided good estimations for the catch data to enter in the assessments, there is no information on all the species fished. An effort should be made to have an amalgamated database in the Secretariat with the best possible data for addressing the Commission request of providing annually catch information in relation to 2TCI.

Currently, the Designated Expert of each stock has to ask in advance for the length distribution and biological information collected by the commercial vessels to each CP or Member State. While a centralized database for these data would be useful, further discussion is required on structure and feasibility.

3. Workload and priorities. Year by year, the SC is overloaded.

Over the last few years, SC has had fewer scientists while workload demands have increased, including reference point development, ecosystem considerations, and management strategy evaluations.

Starting in September 2025, there will be three Committees without Chair (STACFEN, STACFIS and STACREC), three Working Groups without Chair, two of them Joint COM/SC WGs (WG-RBMS, WG-CESAG and PA-WG), and four Designated Expert positions vacant (Divs. 3NOPs white hake, 3LNOPs thorny skate, SA 3+4 squid and 3LNO EPU) that have to be filled. It´s getting more and more difficult to find scientists to fill those positions. While challenges vary between individuals and CPs, they include things such as: being Chair or DE has no incentives but additional workload, domestic priorities are not necessarily aligned with SC priorities and lack of support from CPs. In general, the Chairs come from only a few CPs. If a STACFIS chair is not appointed, it will be impossible to perform the assessments in June 2026. Stocks without a DE will not be assessed. SC **recommends** that all Contracting Parties provide Chairs and DEs for the NAFO SC.

Inside the workload, it has to be taken into account that more and more ecosystem analyses will have to be done as the Ecosystem Approach Framework is implemented via the NAFO RoadMap.

4. Requests and priorities.

In June of each year, SC will set its priorities taking into account the Workplan and the workload. These priorities can be revisited in September after having the final requests. In the priorities, the scientists that are going to carry out the work needed to respond to each request have to be set. SC notes that the priorities of SC and the priorities of the Commission are not always aligned.

5. SC coordinator responsibilities.

The responsibilities of the SC coordinator include a paragraph saying: *Takes part in the Scientific Council work on stock assessments and/or ecosystem assessment. This can include, but is not limited to, assisting in annual stock assessment and/or ecosystem reviews, Management Strategy Evaluation work, reviewing Interim Monitoring Reports, data analysis, etc.* Some activities of the SC in which the SC coordinator could help (for example, to help cleaning and maintaining the data bases, to support MSE process, to help in the study of new assessment models, to contribute to peer review) were set, but it was decided to agree in which area the SC coordinator can help the SC each year depending on the priorities that are set.

Some issues have still to be addressed with respect to the time that the SC coordinator can dedicate to the SC work. So, it was decided that requests this year will be on an *ad-hoc* basis.

In general, the opinion of SC is that its structure as it is works well when properly resourced. However, the workload that SC has experienced in the last years, combined with decreased capacity, has prevented the SC to function as intended. The need of more expertise is reiterated.

c) Guidelines for Carrying Out an MSE

No progress.

While a lack of time prevented the development of clear guidelines for carrying out an MSE, SC did discuss the importance of completing benchmarks for key stocks in order to improve SC's ability to provide advice. Benchmarks might also be considered preparatory for MSE(s) development. A benchmark process should include, broadly:

- A thorough review of data availability (including survey indices, commercial data, aging, etc.).
- The development of candidate assessment models.
- Model evaluation and comparison.
- Adoption (if deemed appropriate) of an assessment model reference point definitions.
- Full assessment at the June meeting, if appropriate and /or scheduled

Benchmark processes are computationally intensive and require significant workload over multiple years. This work takes place primarily outside of the June and September meetings and involves several intersessional meetings and at least one in-person meeting. The participation of one to two external scientists is also recommended.

SC **recommends** that a prioritization exercise be undertaken by the end of June 2026 in order to identify 1-2 stocks for benchmark processes over the short term. This exercise should be led through SC but input from WG-RMBS may provide useful context. Consideration of stock prioritization may include criteria of data availability, stock signals, modelling framework considerations, and possible application to MSE development.

SC notes that additional resources would be required to facilitate this work (e.g. DE time, analytical support, intersessional work, in-person model review meetings), and this should be considered in NAFO budgetary discussions and work planning.

d) Greenland Shark

During the August 2024 WG-EAFFM meeting (COM-SC Doc. 24-02), the NAFO Secretariat was asked to provide a summary and analysis of the observer data related to Greenland shark to WG-EAFFM at its 2025 meeting. During the November 2024 WG-ESA meeting, it was noted that the Scientific Council would be interested to see the results of the analysis prior to the WG-EAFFM meeting. The NAFO Secretariat presented the preliminary results, noting the various changes that have been made to the observer reporting templates since 2019 to allow for collection of information relating to Greenland sharks. The Scientific Council noted that it would be useful to review SCR Doc. 19/037, which provided an overview of sources of uncertainty in reported catches of Greenland shark within the NAFO Convention Area, to determine if the latest available data would be able to address some of the areas of uncertainty identified in that paper. It was also noted that there is information available indicating that Greenland sharks may appear dead when they are not, and some areas have new requirements for handling of Greenland sharks on vessels. The Scientific Council thanked the NAFO Secretariat for the presentation, and it was noted that discussions will continue at the upcoming WG-EAFFM meeting in July 2025.

e) Oceanographic Data Inclusion in Stock Assessment Subgroup

A consultant (Landmark Fisheries) was contracted to provide feedback on NAFO's processes to address climate change impacts following the voluntary contribution of the United States. The objective of the contract is to use two NAFO stock assessments (3M cod and 3NO witch flounder) as case studies with the goal of incorporating climate change covariates. The NAFO SC established the following ToRs to guide the establishment of the Consultation:

1. Using two NAFO stocks as case studies selected by the Scientific Council, incorporate climate change indicators as covariates (e.g. environmental factors that impact recruitment, growth and maturation rates and distribution) in their assessments so that climate change can be considered to be incorporated in advice. The consultant shall provide the Scientific Council the annotated open source code used to accomplish this work, along with documentation of its use and outputs.

2. Identify potential additional approaches or tools to support NAFO effectively considering climate change impacts within the Scientific Council and Commission's decision-making processes.

The consultant will prepare a written report (i.e., an SCR Document) in time for its review by the Scientific Council at its 2025 June meeting, if possible. If not possible, the timetable will be revised during the Scientific Council 2025 June meeting. The consultant will also deliver a summary of the contents of the report via virtual presentation at the same meeting. Intersessionally, the Scientific Council can revise these Terms of References after reviewing this workplan together with the consultant.

A subgroup with several members of the SC and chaired by Katherine Sosebee (USA) and Diana González-Troncoso (EU) has been established to inform and support the consultant in their work. The subgroup met four times between December 2024 and May 2025. During those meeting, the timetable to fully address this item by June were set. From the first meeting (December 19th 2024), the data to be used in the analyses (stock assessment data and code, environmental and climate indices) were upload to the SC Share Point. During the second meeting (17th January 2025), the consultant made specific questions related to each of the stock assessments, which were answered by the SC participants. It was decided that any outstanding questions be discussed directly between Landmark and the appropriate SC member. During the third meeting (7th March 2025), Landmark provided an update of the objectives, deliverables and tasks for the work to evaluate oceanographic indicators for Divs. 3NO witch flounder and Div. 3M cod. A new stock assessment model for Divs. 3NO witch flounder was presented and approved by the subgroup. A projection period of thirty years for both stocks was selected with F scenarios F_{2024}, F_0 and F_{lim} based on the new NAFO Precautionary Approach Framework. During the last meeting (8th May 2025), the consultant provided a review and update of the objectives and deliverables for the work to evaluate oceanographic indicators for Divs. 3NO witch flounder and Div. 3M cod. The main goal of the meeting was to gather feedback on the work to date before the SC June meeting. Stock assessment models and environmental factors were reviewed, followed by details on the methods used to link the two. Recommendations for future work were provided.

Following the meetings, Landmark Fisheries provided the SC at Mid-May the final report to be presented to the SC in June, for revision of SC in advance of its presentation.

The Climate Change subgroup will continue discussing issues about how to incorporate climate change in the NAFO SC work. A new Chair has to be appointed for this subgroup. This subgroup can develop the ToRs and agenda of the intended Climate Change in-person meeting (Section IX.1).

f) NEREIDA Report

Recognizing the value of the NEREIDA report, SC recommends to publish it on the NAFO website in order to make it accessible.

g) USA Exploratory Fishing

SC was made aware of the communication from the USA on intended Exploratory fishing dated 12th June 2025. SC noted that the plan was received too late for SC to review it during the June meeting.

h) PA Leaf Script

It was highlighted at the May 2025 PA-WG meeting (SCS Doc. 25/10) that it would be good to have a template script available to produce plots for the Precautionary Approach Framework (PAF). The Secretariat presented progress on a standardized script for this purpose. The final script to produce the PAF plots has been integrated into the NAFOdown package (https://github.com/nafc-assess/NAFOdown) and can be run from the https://github.com/nafc-assess/NAFOdown/blob/master/inst/examples/make_pa_leaf.R file. The code is also available by contacting the NAFO Secretariat. It was noted that the script may be adjusted as needed during implementation to accommodate new stocks in the future.

i) Current Precautionary Approach Framework

In September 2024, the Commission endorsed the revised Precautionary Approach Framework (PAF). The new PAF is in the WG-RBMS report of August 2024 and in the 2025 NAFO CEM, but there is not a stand-alone document dedicated exclusively to the PAF as in the case of the former PAF (NAFO FC Doc 04/18).

For that, the Scientific Council **recommends** that the new PAF be published as single stand-alone Commission document.

j) 3LN Redfish Advice

In June 2024, SC provided advice for two years (2025-2026) for Div. 3LN redfish. In September 2024, the Commission established the TAC for this stock only for 2025 waiting for the development of the MSE. The MSE was discussed during the current meeting and SC considers that it is worthwhile to continue to explore the development of operating models for the 3LN redfish MSE, but in the medium term (see Section VII.1.d.ii of this report).

As the MSE is not ready to be completed by September 2025, and the Commission did not request a full assessment of this stock for 2025, SC provides in this report an update of the advice for 2026 based on the results of an Interim Monitoring Report (Section VII.1.b of this report).

As this year no full assessment was performed, the new Reference Points for the application of the current PAF were not estimated (B_{msy}, $B_{trigger}$, F_{lim} and F_{target}). The (reiterated) advice given was based on the former PAF.

k) Merit Awards

The Scientific Council would like to recognize the contributions that Katherine Sosebee (USA) has made through the Scientific merit award for her long career - 25 years of service - on the Council, eight years as Chair (SC, STACFIS and STACREC), as well as chairing CESAG and the Oceanographic Data Inclusion in Stock Assessment Subgroup. In her early years, Kathy would have been one of very few women on the Council. Kathy played a key role in the bycatch working group and the Scientific Council workplan. Kathy applied her deep knowledge of groundfish as the DE for 3NO white hake and 3NOPs thorny skate. Kathy's level-headed and common-sense approach along with her extensive institutional memory made her a most valued member of the Council. Her characteristic dry humour always added a light hearted spirit to our meetings. We will miss you Kathy (and your sneezes!!) and wish you a joyful retirement.

XIII. ADOPTION OF COMMITTEE REPORTS

The Scientific Council, during the course of this meeting, reviewed the Standing Committee recommendations. Having considered each recommendation and also the text of the reports, the Scientific Council **adopted** the reports of STACFEN, STACREC, STACPUB and STACFIS. It was noted that some text insertions and modifications as discussed at this Scientific Council plenary will be incorporated later by the Scientific Council Chair and the Secretariat.

XIV. SCIENTIFIC COUNCIL RECOMMENDATIONS TO THE COMMISSION

The Scientific Council Chair undertook to address the recommendations from this meeting and to submit relevant ones to the Commission.

XV. ADOPTION OF SCIENTIFIC COUNCIL REPORT

At its concluding session on 12 June 2025, the Scientific Council considered the draft report of this meeting and adopted the report with the understanding that the Chair and the Secretariat will incorporate later the text insertions related to plenary sessions and other modifications as discussed at plenary.

XVI. ADJOURNMENT

The Chair thanked the participants for their hard work and cooperation, noting particularly the efforts of the Designated Experts and the Standing Committee Chairs. The Chair thanked the Secretariat for their valuable support and Saint Mary's University for the excellent facilities. The meeting was adjourned at 10:31 on 12 June 2025.

Appendix I. Report on the Standing Committee on Fisheries Environment (STACFEN)

Chair: Miguel Caetano Rapporteur: Miguel Caetano

The Committee met on the 30th of May 2025 to discuss environment-related topics and to report on various matters referred to it by the Scientific Council. All STACFEN members, including the Chair, participate in-person or by Webex. Representatives attended from Canada, Denmark (in respect of the Faroe Islands and Greenland), European Union (Portugal, Spain and Estonia), Norway, Japan, the Russian Federation, Ukraine and the United Kingdom. The Executive Secretary and other members of the Secretariat were in attendance.

1. Opening

The Chair opened the meeting by welcoming participants to this June 2025 Meeting of STACFEN.

The Committee noted the following documents would be reviewed: SCR Doc. 25/007, 25/012, 25/013, 25/014 and 25/015.

2. Appointment of Rapporteur

Miguel Caetano (STACFEN chair) also acted as a rapporteur.

3. Adoption of the Agenda

The provisional agenda was adopted with no further modifications.

4. Review of Recommendations in 2024

STACFEN **recommended** *considering Secretariat support for an invited speaker to address emerging issues and concerns (Climate changes impact on fish stocks) for the NAFO Convention Area during the 2025 STACFEN meeting. Contributions from invited speakers may generate new insights and discussions within the committee regarding integrating environmental information into the stock assessment process.*

STATUS: STACFEN invited Frederic Cyr, a physical oceanographer from the Center for Fisheries and Ecosystem Research at the Fisheries and Marine Institute of Memorial University of Newfoundland and Labrador, to present his research. Fred's research focuses on physical-biogeochemical interactions, ocean climate, and fisheries. He presented his work entitled "Fisheries Environment in the Northwest Atlantic" focusing on environmental and ecological factors affecting fisheries and ecosystem productivity. His presentation sparked a broad discussion with stock assessment scientists about possible scenarios for the future inclusion of environmental information in stock assessments.

STACFEN **recommended** that *consideration be given to the participation of members in the NAFO/ICES/FAO symposium on "Applying the ecosystem approach to fisheries management in ABNJ" to be held in Rome in March/April 2025. The integration of environmental information into stock assessment is one of the important issues to be discussed at the symposium and is a topic for discussion in the NAFO Scientific Council.*

STATUS: STACFEN members participated in the NAFO/ICES/FAO symposium, focusing on the relevance of the link between climate and fisheries data. The meeting focused on the Ecosystem Approach to Fisheries Management and included several stakeholders, scientists, managers, and industry representatives. The main objective was to share the experiences of different RFMOs regarding the scientific, management, and implementation aspects of EAFM.

STACFEN **recommended** that *consideration be given to convening a meeting with STACFIS and WG-ESA members to evaluate the options and design an approach to integrate climate change considerations throughout Scientific Council operation.*

STATUS: The SC discussed several issues related to reorganizing the work more effectively. One issue was promoting timely discussions between DEs and STACFEN scientists to understand how environmental data could add value to stock assessments. One accepted suggestion was to participate in the STACREC meeting in May to explore the potential interaction between the two standing committees. Another decision was to participate in the WG-ESA meeting to evaluate options and design an approach to integrate climate change considerations into Scientific Council operations.

5. Plenary Presentation by the Invited Scientist Frederic Cyr "Fisheries Environment in the Northwest Atlantic"

Fisheries Environment refers to the ensemble of environmental and ecological factors affecting fisheries and/or ecosystem productivity. Sustainable fisheries management requires an understanding of fisheries environment, such as links between environmental conditions and fish populations, especially in the context of climate change. From this perspective, identifying the phases in which ocean climate fluctuations and changes in ecosystem productivity coincide could provide a powerful tool to help inform fisheries management. Using more than 70 years of climate and fisheries data, this study shows that cyclical changes in the Newfoundland and Labrador (NL) ecosystem productivity, from primary producers to piscivorous fish, coincide with changes in the climate of the northern hemisphere. This broad correspondence between climate and lower and higher trophic levels has not previously been documented in the Northwest Atlantic to this extent in the context of fisheries. This work advances ideas for incorporating environmental knowledge into fisheries management on the NL shelves or in other regions facing similar dynamics.

6. The Marine Environmental Data Section (MEDS) Report for 2024 - SCR 25/015

The Marine Environmental Data Section (MEDS) of the Oceans Science Branch of Fisheries and Oceans Canada serves as the Regional Environmental Data Center for NAFO. As part of this role, MEDS provides an annual inventory of environmental data collected in the NAFO Convention Area to the NAFO Committee for the environment (STACFEN), including inventories and maps of physical oceanographic observations such as ocean profiles, near surface thermosalinographs, drifting buoys, waves, tides and water level measurements for the 2024 calendar year. Reporting includes data and information from NAFO member countries where these are provided to the data center.

In order for MEDS to carry out its responsibility of reporting to the Scientific Council, the Designated National Representatives selected by STACFEN are requested to provide MEDS with all marine environmental data collected in the Northwest Atlantic for the preceding years. Provision of a meaningful report to the Council for its yearly meetings in May and June requires the submission to MEDS of a completed oceanographic inventory form for data collected in the previous calendar year, and oceanographic data pertinent to the NAFO Convention Area, for all stations occupied in the years prior to the meetings. The data of highest priority are those from the standard sections and stations, as described in NAFO SCR DOC. 88/01.

Data observed in NAFO Convention Area in 2024

Data Type	Platform Type	Counts/Duration
Oceanographic profiles	Argo	5334* profiles from 179 platforms
	Moorings (Viking)	1307* profiles from 4 platforms**
	Gliders	7951* profiles from 8 platforms
	Marine mammals	212* profiles from 2 animal tags
	Ship	8896 profiles (4970 CTD; 1239 CTD RT*; 2352 Bottle ; 197 XBT; 138 XBT RT*)
Surface/near-surface observations	Ship (thermosalinograph)	65167 obs. from 13 ships
	Drifting buoys	263717* obs. from 136 buoys
	Moored buoys	601583* obs. from 21 buoys**
	Fixed platforms	90610* obs. from 3 platforms
	Water level gauges	35 sites, avg. ~1 year each

*Data formatted for real-time transmission on the GTS.
**All Canadian wave buoys, and the moorings measuring CTD oceanographic profiles are also equipped with surface buoys measuring waves.

Data observed prior to 2024 in NAFO Convention Area and acquired or processed between January 2024 and May 2025

Data Type	Platform Type	Counts/Duration
Oceanographic profiles	Ship	4148 profiles (3963 CTD + 185 bottle) from 73 cruises

7. Highlights of Environmental Conditions in NAFO Subareas 0 to 4 for 2024 (SCR Doc. 25/012)

The composite physical and biological indices in NAFO subareas 0-4 to support of the Standing Committee on Fisheries Science (STACFIS) are presented. The information is organized in 4 sub-regions: Greenland and Davis Strait (NAFO subareas 0 and 1), Flemish Cap (NAFO division 3M), Grand Banks (NAFO Divisions 3LNO) and the northwest Atlantic as a whole (NAFO subareas 2, 3 and 4) for widely distributed stocks. When put in context with their long-term average, all ocean climate indicators were above normal in 2024, especially warm in NAFO Division 3LNO (Grand Banks). The composite climate indices for subareas 2, 3 and 4 altogether was at its 6th warmest value, with five or the six warmest years all occurred in the last five years (including the record warm in 2021). There has been a general trend toward earlier spring bloom timing across the Canadian Northwest Atlantic since the mid-2010s with near- to earlier-than-normal bloom timing across regions in 2024. Zooplankton abundance and biomass have remained primarily above normal since 2015 on the Grand Bank (3LNO) but have been more variable on the Flemish Cap (3M) during the same period. Environmental indices are available at: https://doi.org/10.5281/zenodo.15538217.

a) Ocean Climate and Ecosystem Indicators for Greenland and Davis Strait (NAFO Subareas 0 and 1)

The ocean climate index in Subarea 0-1 has been predominantly above or near normal since the early 2000s, except for 2015 and 2018 that were below normal. After 2021 (the second highest value since 2010), the index remained near normal in 2022 and 2023. 2024 was slightly above normal. Before the warm period of the last decade, cold conditions persisted between the mid-1980s and the mid-1990s. The timing of maximum spring phytoplankton concentration has been generally near or earlier than normal since 1998 except for 2009 and from 2012 to 2015 where it was later than average. Earlier timing is generally associated with a higher bloom intensity. The 2024 bloom was the second earliest and the most intense of the time series.

2024 Highlights in Ocean Climate and Lower Trophic Levels for SA 0-1

- The ocean climate index in Subarea 0-1 was slightly above normal in 2024.
- Second earliest timing and record-high intensity of the spring bloom for the NAFO 0B Greenland Halibut fishing grounds.

b) Ocean Climate and Ecosystem Indicators for Flemish Cap (NAFO Division 3M)

The ocean climate index in Division 3M has remained mostly positive between the late 1990s and 2013, and negative between 2014 and 2019, including in 2015 where it reached its lowest value since 1992. Since 2020, a warming phase is emerging, with years 2023 and 2022 ranking respectively as the warmest and second warmest years since the time series started in 1985. 2024 continued this warming phase, although lower than the previous 3 years. The timing of the spring bloom has shifted from earlier to later than normal every 2-5 years throughout the time series, while bloom intensity has generally remained near to below normal – except for a few years during the 2000s and a period of above-normal intensity from 2018 to 2020. In 2024, spring bloom timing returned to normal after two consecutive years of later-than-normal blooms. Spring bloom intensity has shown a decreasing trend since the late 2010s, reaching a below-normal level in 2024 for the first time since 2015.

Total copepod abundance increased relatively steadily between 1999 and 2010, with levels shifting from below to above normal levels in 2005. Since then, copepod abundance has been variable, fluctuating between below- and above-normal levels every 1 to 3 years. The abundance of non-copepod zooplankton – typically dominated by appendicularians and pteropods – was generally normal or below normal from 1999 to 2015, and primarily near or above normal since 2016. Total zooplankton biomass, an indicator of energy availability at lower trophic levels, was generally below normal during the late 1990s and early 2000s, and has remained near or above normal since 2006. In 2024, copepod abundance returned to a normal level after two years of being below normal, while non-copepod abundance and zooplankton biomass remained within the normal range for the second and third consecutive year, respectively.

2024 Highlights in Ocean Climate and Lower Trophic Levels for 3M

- The 3M warming climate phase starting in 2020 continued in 2024. 2023 and 2022 ranked as the warmest and second warmest years on record respectively.
- The timing of the spring bloom was near normal in 2024, following two years of delayed blooms. Bloom intensity continued its decreasing trend, reaching a lower-than-normal level for the first time since 2015.
- The abundance of copepods was normal in 2024 after two years of below-normal levels, while the abundance of non-copepods remained normal for a second consecutive year. Total zooplankton biomass has remained near normal since 2016, including in 2024.

c) Ocean Climate and Ecosystem Indicators for Grand Bank (NAFO Divisions 3LNO)

The ocean climate index in Divisions 3LNO was well below normal (indicative of cold conditions) between the mid-1980s and the mid-1990s. Following this cold period, the index was mostly normal to above normal between the late 1990s and 2013 (except for 2009 that was below normal), reaching a peak in 2011. The index returned to below normal conditions between 2014 and 2017 (except for 2016 that was normal). Years 2020 to 2024 were well above normal (except for 2023 that was normal), including 2021 and 2020, respectively the warmest and second warmest years on record for this time series started in 1985. Average spring bloom timing shifted from being primarily earlier than normal between 2005 and 2013 to later than normal from 2014 to 2019. Since 2020, bloom timing has remained within the normal range. Spring bloom intensity has been variable across the time series, fluctuating between below- and above-normal levels every 2-4 years. Both timing and intensity indices were normal in 2024.

The abundance of both copepods and non-copepods has exhibited a relatively steady increase over the time series and has remained above normal since 2016. Although still above normal in 2024, non-copepod abundance has been gradually declining since 2020. Total zooplankton biomass was variable during the 2000s, followed by a decline to below-normal levels during the early 2010s. Since 2017, biomass has remained at or above normal, with normal levels observed over the past three years.

2024 Highlights in Ocean Climate and Lower Trophic Levels for 3LNO

- The ocean climate was slightly warmer than normal in 2024 after being much warmer than normal from 2020 to 2022 and near normal in 2023.
- Spring bloom timing has remained normal since 2020, and the bloom intensity was normal for a second consecutive year in 2024.
- The abundance of both copepods and non-copepods were above normal in 2024, continuing a trend that started in the mid-2010s. Total zooplankton biomass remained normal for a third consecutive year.

d) Ocean Climate and Ecosystem Indicators for Newfoundland and Labrador Shelf, Scotian Shelf and Gulf of Maine (NAFO Subareas 2, 3 and 4)

The cumulative climate index for NAFO subareas 2, 3 and 4 (from the Labrador Shelf to the Scotian Shelf) highlights the different climate phases undergone by the ecosystem since the mid-1980s. After a period from the mid-1980s to the early 1990s, the index has remained relatively high since (all years since 1993 are normal or above normal). Since 2020, a warm phase has been emerging, which includes the three warmest years on record (respectively 2021, 2022 and 2020) and 2023 that ranks as the 5th warmest. The warm phase continued in 2024, although this year was closer to normal than the previous 4 years. This time series started in1950, although only shown here since 1985. Spring bloom timing shows generally consistent trends across NAFO Subareas 2-3-4 despite notable interannual variability. The earlier-than-normal blooms observed in recent years contrast with the normal timing recorded from 2013 to 2020. Spring bloom intensity has generally increased since 2015 but declined to near normal in 2024, following record-high values in 2020 and 2023.

Total copepod abundance remained normal across Subareas 2-3-4 for a third consecutive year, including record-high values in 2020 and 2021 that were mainly driven by high abundances in Subareas 2 and 3. The increase in the abundance of non-copepod zooplankton observed around 2015 was also driven by high values recorded in Subareas 2 and 3. Total zooplankton biomass, on the other hand, generally decreased from 2000 to 2015 and has remained primarily near normal since then. The primarily positive biomass anomalies observed in Subareas 2 and 3 since 2016 contrast with the negative anomalies recorded in Subarea 4 during the same period.

2024 Highlights in Ocean Climate and Lower Trophic Levels for Subareas 2, 3 and 4

- In 2024, the climate in subareas 2 and 3 was above normal while subarea 4 was close to normal. This continues the warming phase started in 2020 (years 2020-2022 were the three warmest years on record).
- Some of the earliest and most intense spring blooms in the time series have been observed since 2020, but both timing and intensity were closer to normal conditions in 2024.
- Copepod and non-copepod abundances have remained normal over the past 2-3 years, following a period of near- to above-normal levels during the mid-2010s and early 2020s.
- Zooplankton biomass was normal in 2024 but comparatively higher in Subareas 2-3 than in Subarea 4, a prevailing situation since 2016.

8. Review of the Physical, Biological and Chemical Environment in the NAFO Convention Area During 2024

a) Subarea 1. Report on Hydrographic Conditions off West Greenland May-June 2024 (SCR Doc. 25/007).

Hydrographic conditions were monitored along 9 hydrographic standard sections in May-June 2024 across the West Greenland continental shelf. Three offshore stations have been chosen to document changes in hydrographic conditions off the southern part of West Greenland. The salinity of the coastal and offshore surface waters was much lower than average and continued the recent ongoing freshening. The temperature in 2024 was much lower than average but likely linked to the early timing of the survey this year. Unfortunately, the offshore station Cape Desolation 3 was not occupied in 2024, so the state of the Subpolar Mode Water is unknown. Data from the remaining survey suggests a minor decrease in salinity and temperature in Subpolar Mode Water compared to June 2023.

b) Subarea 1 and 2. 2024 and 2025 Oceanographic Conditions in the Labrador Sea in the Context of Seasonal-to-Multidecadal Variability (SCR Doc. 25/013).

In the Labrador Sea, the coldest and freshest North Atlantic basin south of the Greenland-Scotland Ridge, high winter surface heat losses result in the formation of a cold, fresh and dense water mass, Labrador Sea Water, that sinks to the intermediate and deep layers and spreads across the ocean, contributing to the global ocean overturning circulation, and playing an important role in renewing and ventilating the deep ocean reservoir. This process – convective mixing – undergoes multi-year cycles of intensification (deepening) and relaxation (shoaling), which have been also shown to modulate long-term changes in the atmospheric gas uptake by the sea. The most recent convective cycle started in 2012, following two consecutive years of shallow winter mixing. Convection progressed deepening year by year until 2018, when it became the deepest for the entire 1996-2024 period. However, the highest winter cooling for the 1994-2024 period was in 2015, while the deepest convection occurred three years later. This time lag was due to the preconditioning of the water column by the 2012-2015 winter mixing events, making it susceptible to deep convection in three more years. The progressive deepening of winter convection from 2012 to 2018 (exceeding the depth of

2000 m in 2018) generated the largest, densest and deepest class of Labrador Sea Water since 1995. Convection weakened afterwards, rapidly shoaling by 800 m per year in the winters of 2021 and 2023 relative to 2020 and 2022, respectively. Distinct processes were responsible for these two convective shutdowns. In 2021, a collapse and an eastward shift of the stratospheric polar vortex, and a weakening and a southwestward shift of the Icelandic Low resulted in extremely low surface cooling and convection depth. In both 2023 and 2024, by contrast, convective shutdown was caused by extensive upper layer freshening originated from extreme Arctic sea-ice melt due to Arctic Amplification of Global Warming. In 2024, the central Labrador Sea experienced a near-normal cumulative surface heat loss, which was higher than in 2021. The 2024 winter (Dec-Mar) North Atlantic Oscillation, Arctic Oscillation and Stratospheric Polar Vortex indices were normal and above. However, in 2024, winter convection was shallower than in 2021, with below-normal winter cooling, and the shallowest since 2010, emphasising the prevailing role of freshening in control of winter convection in 2024. The central Labrador Sea was sufficiently covered with profiling Argo float measurements during the 2002-2024 period, allowing us, for the first time, to accurately define and analyze both seasonal and interannual changes in the upper 200 m layer. The resulting series reveal extreme cold states of the upper layer, and particularly its top half, in 2015 and 2018. Then, during 2019-2024, this layer started to warm to attain above-normal yearly averaged temperature anomalies, and, in 2024, to become the warmest for the 2011-2024 period. The intermediate, 200-2000 m, layer of the Labrador Sea started to cool immediately after 2011. This persistent 2012-2018 cooling trend was imposed on the intermediate layer by the progressive deepening of winter convection over the same period. The situation changed in 2019, with the depth of winter convection eventually reducing to 800 m in 2021, and then to less than 750 m in both 2023 and 2024. As a result, the intermediate layer has been warming since 2019, becoming the warmest for the 2015-2024 period in 2024. The corresponding annual density decreases contributed to a negative 2018-2024 density trend. Between 2018 and 2024, the annual mean density of the intermediate layer reduced by more than 0.025 kg/m^3. A sustained freshening of the upper 100 m layer started in 2017 and increased through 2025. The 300-700 m layer freshened over the same time at a record high rate, exhibiting a persistent eight-year, 2018-2025, freshening trend, attributed to the effect of Arctic freshwater discharge on the Labrador Sea combined with the reduced depths of winter mixing. With respect to the intermediate, 200-2000 m, layer as a whole, the period of 2017-2023 also showed a monotonic freshening trend, which rebounded afterwards. The recent shoaling of winter convection inhibited renewal of the deeper waters reducing, as a result, the concentrations of dissolved gases below 700 m.

c) Subarea 1 and 2. Physical, Chemical, and Biological Oceanographic Conditions in the Labrador Sea in 2024 (SCR Doc. 25/014).

The Atlantic Zone Off-Shelf Monitoring Program (AZOMP) samples the AR7W line annually, extending from the Labrador Shelf to the Greenland Shelf. The work summarises the results from 2024 for three distinct regions: AR7W-W (Labrador shelf and slope), AR7W-C (central Labrador Sea), and AR7W-E (Greenland shelf and slope). The winter 2024 NAO index was slightly below normal. Air temperature anomalies in the central Labrador Sea were positive, while sea surface temperatures were near normal in winter and spring, below normal in summer, and above normal in fall. Sea ice extent and concentration were generally lower than normal, with an unusually high concentration on the Greenland coast in winter and spring. Argo profiles revealed that surface and deep water were warmer and fresher than average. Surface (0-100 m) nutrients were mainly below normal in 2024 in all regions, which could be attributed to mission timing. However, the below-average deep nutrients (>100 m, less impacted by sampling timing) in all three regions, which has persisted since 2019, suggests a profound change in the biogeochemistry of the Labrador Sea. This shift in nutrient budget coincides with a shift in Phytoplankton Apparent Absorption Wavelength toward positive anomalies, suggesting a possible change in overall biomass and cell structure, though this metric was negative again on the Labrador Shelf in 2024. Integrated (0-100 m) chlorophyll-*a* was slightly below normal in all three regions in 2024. Satellite data revealed a late spring bloom in AR7W-E and early elsewhere, late fall blooms on the shelves and early in the basin, and higher than normal concentrations of chlorophyll-*a* year-round.

9. Formulation of Recommendations Based on Environmental Conditions During 2025

STACFEN **recommends** *providing Secretariat support for an invited speaker to address emerging issues and concerns in the NAFO Convention Area at the 2026 STACFEN meeting.*

STACFEN **recommends** *considering convening a meeting with STACFIS members regarding their potential participation in the May 2026 STACREC meeting to evaluate options for integrating environmental data into various stock assessments.*

STACFEN **recommends** *to participate in the WG-ESA meeting to evaluate options and design an approach to integrate climate change considerations into Scientific Council operations.*

10. National Representatives

The National Representatives for hydrographic data submissions are: E. Valdes (Cuba), A. Tran (Canada), **Vacant** (Denmark), **Vacant** (France), **Vacant** (Germany), **Vacant** (Japan), H. Sagen (Norway), **Vacant** (Portugal), **Vacant** (Russian Federation), E. Tel (Spain), L. J. Rickards (United Kingdom) and P. Fratantoni (USA).

11. Other Matters

SC thanked the Chair for his many years of hard work.

12. Adjournment

The chair thanked the SC members for their excellent contributions, as well as the Secretariat for their support.

The meeting was adjourned at 09:56 on 07 June 2025.

APPENDIX II. REPORT OF THE STANDING COMMITTEE ON PUBLICATIONS (STACPUB)

Chair: Rick Rideout Rapporteur: Andrea Perreault

The Committee met at Saint Mary's University, 903 Robie St. Halifax, NS, on 06 June 2025 at 2:00 p.m., to consider publications and communications related topics and report on various matters referred to it by the Scientific Council. Representatives attended from Canada, Denmark (in respect of Faroe Islands and Greenland), Norway, the European Union, Japan, the Russian Federation, Ukraine, and the United Kingdom.

1. Opening

The Chair opened the meeting by welcoming the participants.

2. Appointment of Rapporteur

The NAFO Secretariat was appointed rapporteur.

3. Adoption of Agenda

The agenda was presented and adopted at the beginning of the meeting.

4. Review of the Recommendations in 2024

There were two recommendations from the 2024 STACPUB meeting: 1) removing the note 'NOT TO BE CITED WITHOUT PRIOR REFERENCE TO THE AUTHOR(S)' from SCR documents, 2) including a citation in SCR documents beneath the address field. It was noted that a new SCR template has been developed that addresses both recommendations and also includes the new NAFO logo. This new template is to be used for all NAFO SCR documents in 2025.

During the presentation of the new template it was noted that the new citation provided on the document cites the document as "Scientific Council Research Document, SCR Doc. 25/XXX". The recommendation was made that the citation should clearly identify that these are "NAFO" Scientific Council Research Documents.

STACPUB **recommends** *changing the citation on SCR documents from "Scientific Council Research Document, SCR Doc. 25/XXX" to "NAFO Scientific Council Research Document, NAFO SCR Doc. 25/XXX"*

5. Update on NAFO Publications

The NAFO Scientific Council Reports (Redbook) volume 46 for 2024 was published online in May 2025, and five copies were printed. There were no NAFO Scientific Council Studies submissions published in 2024. There was one request to upgrade an SCR to the Studies but that request was not accepted (see below). The reports of the NAFO Joint Commission-Scientific Council meetings are found in the Meeting Proceedings for September 2023- August 2024, which was published online in November 2024, and two copies were printed. The Journal of Northwest Atlantic Fishery Science Volume 55 was published online in December 2024 and included four articles. Volume 56 is in progress with three submissions thus far. The Secretariat reported that all NAFO published documents for 2024 have been submitted to ASFA (Aquatic Science & Fisheries Abstracts) as of May 2025.

The STACPUB Chair noted that in 2025 there was a request to upgrade SCR 24/062 "Protocol of the Faroese longline survey of Flemish Cap (Div. 3M)" to be included in the NAFO SC Studies. It was noted that this was the subject of lengthy conversation among the Chairs and it was agreed that the SC Studies would be an excellent outlet to publish this survey protocol (other survey protocols have been published in the Studies in the past), however, there was strong concern that the survey had not yet been conducted with a consistent survey protocol. The Chairs concluded that the survey should be successfully conducted with this same protocol for at least a couple of years before the protocol gets published in the Studies. This should reduce the potential for the realization that further modifications are needed to the survey protocol and cause issues with the version of the protocol that is published. The SC chair communicated this decision to the authors.

6. Other Matters

a) JNAFS Profile

The STACPUB Chair briefly noted that any efforts/strategy to improve the JNAFS profile should involve or even be led by the new JNAFS General Editor. Areas of focus previously identified by STACPUB included 1) working towards getting JNAFS into Web of Science, 2) improving the digital experience/JNAFS website, 3) the production of promotional material for distribution at science meetings, 4) support for topical symposia and the publication of symposium proceedings as JNAFS special issues.

1. **Web of Science** – it was noted that the previous submission of JNAFS to Web of Science in 2023 was not successful and that efforts should go into increasing submissions before considering resubmitting.
2. **JNAFS Website** – it was noted that alternative options for hosting the JNAFS website were previously presented but no further progress has been made. It was noted that, although new guidelines for review papers were added to the special guidelines for the JNAFS special issue dedicated to the EAFM Symposium (see below), there were still no clear guidelines for review papers on the main JNAFS page. This has been an issue communicated by authors that recently submitted review papers to the journal. It was recommended that clear guidelines be provided on the website.

STACPUB **recommends** *adding clear guidelines for review/synthesis type papers to the JNAFS website*.

3. **Promotional Material** – it was previously noted that promotional material was developed for circulation at science meetings attended by SC members. One member of SC that was supported by NAFO to attend the International Flatfish Symposium included promotional JNAFS material in her presentation and reported that there was interest in JNAFS as a potential free publication outlet for their meeting proceedings in future meetings.
4. **Symposia/Special Issue of JNAFS** – in 2025, NAFO co-sponsored (along with FAO and ICES) the symposium on Applying the Ecosystem Approach to Fisheries Management in ABNJ. The submitted papers for this symposium will be published as a special issue of JNAFS in 2026. Further details on the symposium special issue are provided below.

The STACPUB chair brought forward a fifth item to be discussed within the context of raising the JNAFS profile. It was suggested that the journal profile (e.g. the number of submissions) can only be improved if authors are familiar with the journal. Currently the journal has no process in place to digitally distribute notifications of new papers or table of contents for new issues. It was noted that most scientists today rely on getting notification of relevant research and or journals via email or via social media. The journal would have to develop a distribution list for journal updates and/or a link or button on the JNAFS website for readers to sign up for notifications from the journal. It was also noted that other journals have an active social media presence that helps to promote their organization/journal. The statement was made that if people are not seeing the journal they are surely not going to be reading and/or submitting papers to the journal. It was noted by the Secretariat that the current website structure might make it difficult to incorporate any sort of 'sign up for updates' button. It was suggested that the ability to digitally reach out to authors (especially those less familiar with NAFO) with journal updates should be a priority for the Secretariat to explore.

STACPUB **recommends** *exploring options for delivering JNAFS notifications digitally to scientists in order to promote a broader familiarity with the journal and to potentially attract future paper submissions. This should include the development of a 'sign up for updates' link on the JNAFS website, but could also include the development of an email distribution list, and/or exploring ways to reach out via social media.*

b) EAFM Symposium

The STACPUB Chair noted that a summary presentation of the EAFM Symposium was given by a representative from FAO earlier in the June meeting, so those details were not repeated during STACPUB. But the Chair did take the opportunity to comment that NAFO was well represented at the Symposium and thanked NAFO and the Secretariat for the support to attend this meeting on behalf of all NAFO SC participants.

NAFO participants at the EAFM Symposium in Rome, Italy. Back row (left to right): Kate Johnson, Xosé Tubío Rodríguez, Ellen Kenchington, Rick Rideout, Frédéric Cyr, Paul Regular, Mariano Koen-Alonso, Andrea Perreault, Miguel Caetano, Diana González Troncoso, Dayna Bell MacCallum, Patrícia Gonçalves. Front row: Deirdre Warner-Kramer, Jana Aker, Brynhildur Benediktsdóttir, Mar Sacau Cuadrado, Andrew Kenny, Irene Garrido Fernández.

STACPUB discussions focused on the steps to producing the special issue of JNAFS, including progress up to date and ways forward. The Chair noted that the symposium took place in Rome, Italy, during March 11-13. The deadline for paper submissions to JNAFS has been set as October 3 and this has been communicated to potential authors. It was noted that the editorial duties for the special issue will be handled by the current JNAFS editorial team. At this point there is no estimate of the number of expected submissions but the Secretariat/journal editors were encouraged to reach out to presenters as soon as possible to gage their interest in submitting a paper to the special issue, and to encourage them to do so if they are having any reservations. It was noted that both scientists and managers gave presentations at the symposium and that it would be particularly interesting to have submissions for the special issue not only from scientists but also from those managers that gave presentations.

Discussions around the symposium highlighted that NAFO has made significant advancements relative to other RFMOs in terms of the ecosystem approach and congratulations were offered to everyone that has been involved in advancing that work.

c) JNAFS Editorial Team

STACPUB was updated on changes to the JNAFS editorial team, including the addition of a new General Editor, the loss of two associate editors due to retirement and the loss of a third associate editor due to workload issues. During the June meeting, Patrícia Gonçalves agreed to join the group as a new associate editor and efforts will continue to identify and attract additional associate editors.

d) NAFO Website

The STACPUB Chair reminded the Committee of an issue raised at the 2024 STACPUB meeting regarding the lack of, or in some cases removal of some science content from the NAFO website (e.g. pertaining to the NAFO Roadmap, PA framework, etc.) and that the Secretariat had indicated it would report back to SC on any progress related to the content of the website. In response, the Secretariat noted that there was little progress on this while efforts were focused on recruiting the new Senior Science coordinator but that efforts will be allocated to this going forward. However, it was also noted that the Secretariat would like to prioritize website content related to official NAFO documents and that some of the items/topics in question were not supported by official NAFO documentation. This raised questions and discussions about what constitutes an official/accepted NAFO document and it was explained that annexes that are attached to meeting reports but were not reviewed and endorsed/adopted at that meeting, are still considered to be of 'draft' status and can not be officially adopted by the Commission. It was communicated that this was the situation with the Roadmap documentation. In terms of website content, it was also noted that the Secretariat requested input from SC members regarding any additional content and linkages to SC documentation they would like to see on the website. The website updates continue to be a work in progress and will continue to be advanced as Secretariat resources permit. The Secretariat will be seeking input from SC members, working groups, etc. in order to advance this work.

e) Figure Formats

The STACPUB Chair acknowledged that the need to develop updated figure standards has been on the to-do list for several years, but no meaningful progress has been made. It was suggested that the fact that SC documents are no longer printed in large numbers should make the use of colour feasible and would provide a way to more effectively present figures. The current SCR guidelines call for black and white figures, but it is noted that those regulations are not necessarily abided by if colour figures are submitted to the Secretariat. A small subgroup met during the June SC meeting to discuss how to begin formulating new figure standards that can be applied going forward. The subgroup agreed to begin developing new figure guidelines that could be utilized across a range of applications (e.g. Excel, R, NAFOdown) and to provide options to be reviewed by STACPUB in 2026.

In the meantime, the Chair also encouraged members to closely examine their figures for clarity of labels, etc. before the submission of final documents, noting that some of the figures presented during SC had illegibly small axis labels, etc.

f) SCR Submission Process

The STACPUB Chair asked the Secretariat for their preferred protocol for SCR submission when it is known that there are still large additions or revisions that need to be made to the document. The Secretariat stated that for such documents that are not close to their final version, the preference would be to submit those documents as working papers and then upgrading them to SCR documents once the document is finalized.

7. Adjournment

The Chair thanked the participants for their valuable contributions and the Secretariat for their support.

APPENDIX III. REPORT OF THE STANDING COMMITTEE ON RESEARCH COORDINATION (STACREC)

Chair: Mark Simpson Rapporteur: Andrea Perreault

1. Opening

The Committee met on two occasions. First a virtual meeting was conducted on May 5th, during which information on biological surveys carried out in 2024 in the NAFO Regulatory Area were presented, availability of catch data was reviewed and surveys from 2024 were discussed. Secondly the Committee met on various occasions throughout the June Scientific Council meeting at the Atrium Building, Saint Mary's University, to discuss matters pertaining to statistics and research referred to it by the Scientific Council. Representatives attended from Canada, Denmark (in respect of the Faroe Islands and Greenland), Norway, European Union, Japan, Russian Federation, Ukraine, and the United Kingdom.

2. Appointment of Rapporteur

The meetings were preceded by the Appointment of a Rapporteur. The NAFO Secretariat was nominated as rapporteur.

3. Review of Recommendations in 2024 and 2025

Review of previous recommendations from 2024 and new recommendations from 2025:

a) Recommendation about Survey Coverage

In 2015, STACREC **recommended** that *an analysis of sampling rates be conducted to evaluate the impact on the precision of survey estimates*. As a separate aspect, in September 2017 STACREC discussed *possibilities for combining multiple surveys in different areas and at different times of the year to produce aggregate indices*. A Canadian scientist attended the ICES WKUSER (Workshop on Unavoidable Survey Effort Reduction) in January 2020 and presented information on survey coverage issues. Feedback from this meeting was presented to STACREC in May 2021. A follow-up WKUSER was held in September 2022. The same Canadian scientist attended the meeting and presented the results during the June 2023 STACREC meeting. The conclusion was that by implementing the recommendations from the workshop, scientists and survey managers can make informed decisions and maintain the integrity of survey time series data. SC recommends that a scientist attend the next WKUSER meeting that is relevant to this recommendation.

Linked with this, in June 2019 and June 2020 STACREC **recommended** *specific actions for future years whenever survey coverage issues arise.* These actions can be found in the 2020 STACREC report which was tabled in September in NAFO SCS Doc. 20-19.

b) Recommendation about Shrimp Spatio-Temporal Models

In June 2022, STACREC **recommended** to *explore in the future the spatio-temporal models used during the Joint ICES/NAFO shrimp benchmark in January 2022 to handle gaps in the surveys.* This recommendation is deferred to the September 2025 SC shrimp meeting in Halifax.

c) Recommendations about Redfish

Most of the surveys conducted (except for the EU-3M survey in recent years) record redfish without separating by species and STACREC **recommended** in 2018 that *all surveys should aim to examine redfish composition at the species level, while recognizing that this may not always be achievable due to trade-offs between different activities and aims of surveys.*

STACREC continues to discuss this recommendation. There are difficulties to achieve this task that were noted in 2018 (such as the lack of an agreed methodology for species identification that all surveys would use in a consistent manner and lack of time and resources in some surveys to take on additional tasks). It was **agreed** that, as a first step, an attempt could be made at separating golden (*S. norvegicus*) from beaked (*S. mentella* and *S. fasciatus*) redfish for fish above a certain length, as this seems a relatively easy task.

A preliminary compilation of information on the stock structure of redfish in Division 3O in relation to adjoining redfish stocks (Units 2, 3Ps and 3LN) was presented in the June 2019 SC meeting. It was concluded that the initial basis for delineating stock structure was weak. STACREC **recommends** *a comprehensive study to investigate redfish stock structure in NAFO Divisions 2 and 3, with consideration of species splitting and recent approaches to studying redfish stock structure in other RFMOs.*

Canada is carrying out genetic studies across Subareas 2 and 3, and preliminary results were expected to be presented during the June 2024 SC meeting, however this presentation has been deferred until a future time.

d) Recommendations about Silver Hake

Canada is carrying out genetic and related population studies of silver hake throughout the NAFO Divisions 4VWXRST, subdivision 3Ps and Divisions 3NO. The results of these studies will be presented to SC in June 2026. SC has noted that significant catches (an average of 5 100 t over 2021-2024) of silver hake have occurred in recent years in Div. 3NO in a fishery prosecuted primarily by EU-Spain but also Russia, EU-Estonia and Canada.

e) Recommendations about Reviewers

During the June 2023 meeting it was recommended that an expert reviewer on data limited stocks attend the June 2024 meeting. An invitation was not made for the June 2024 meeting given the ongoing workloads related to the two MSE processes, the PA renewal, comparative fishing and climate change requests, however an invitation was made to José de Oliveira (CEFAS) for the June 2025 meeting to provide a presentation on providing advice based on survey indices such as those used by ICES (WKLIFE; see abstract in Other matters below).

SC reiterated the **recommendation** that *an external reviewer be invited to provide an independent peer review of the data and assessment methodology used for full stock assessments on an annual basis.*

f) STATLANT 21B

The NAFO Secretariat highlighted that the STATLANT 21B reporting template was outdated and cumbersome for Contracting Parties to complete. The NAFO Secretariat also noted that the database structure on the NAFO Website was also outdated, and that it could be updated for better functionality. Additionally, it was highlighted that the STATLANT 21A and 21B databases on the NAFO Website do not have any indication of completeness, and that information is found within the various June reports.

STACREC **recommends** that *the NAFO Secretariat review the STATLANT 21B reporting template with the goal of providing an updated reporting template for Scientific Council review.*

STACREC **recommends** that *the NAFO Secretariat work to include the STATLANT 21 submission rate information, currently available in the STACREC reports, on the NAFO website with the STATLANT 21 databases.*

During this discussion, the European Union also noted that they are working with the NAFO Secretariat to be able to provide STATLANT data as the Contracting Party of the European Union rather than by flag State. It was noted that this would alleviate the confidentiality issues that have been leading to the incompleteness of the STATLANT 21 database.

4. Fishery Statistics

a) Progress Report on Secretariat Activities in 2024/2025

i) Presentation of Catch Estimates from the CESAG, Daily Catch Reports and STATLANT 21A and 21B

The NAFO Secretariat presented the catch estimates developed by CESAG based on the strategy outlined in Annex 1 of COM-SC Doc. 17-08, amended following a recommendation from STACFIS in 2018, to include catch estimates of broken down by quarter and gear type.

In accordance with Rule 4.4 of the Rules of Procedure of the Scientific Council, as amended by Scientific Council in June 2006, the deadline dates for this year's submission of STATLANT 21A data and 21B data for the preceding year are 1 May and 31 August, respectively. The Secretariat produced a compilation of the countries that have submitted to STATLANT and made this available to the meeting.

Due to legal issues regarding the confidentiality of data provided to the European Commission by member States, some member States of the EU were not able to provide STATLANT 21A data in time for the June 2025 Scientific Council meeting. Canada also did not meet the requirements for data submission with only two of five regions submitting the required data in a timely fashion.

The Chair stressed the importance of submitting data on schedule, since DEs need complete data for their assessments at the Scientific Council June meeting. It was also noted that the 2TCI calculations cannot be updated until the complete CESAG data are available.

Table 1. Dates of receipt of STATLANT 21A reports for 2022-2024 and 21B reports for 2021-2023. Received as of 11 June 2025.

Country/ component	STATLANT 21A (deadline, 1 May)			STATLANT 21B (deadline, 31 August)		
	2022	2023	2024	2021	2022	2023
CAN-CA	28 May 24	28 May 24	11 Jun 25			
CAN-SF	24 Apr 23	03 May 24	30 Apr 25			
CAN-G	26 Apr 23	10 May 24	09 May 25	6 Sep 22	28 Aug 23	30 Aug 24
CAN-NL	28 Apr 23	30 Apr 24	30 Apr 25		31 Aug 23	09 Sep 24
CAN-Q						
CUB						
E/BUL						
E/EST	21 Apr 23	29 Apr 24	25 Apr 25	26 Aug 22		26 Aug 24
E/DNK	9 Jun 23	30 Apr 24	06 May 25	15 Aug 22		13 Aug 24
E/FRA						
E/DEU	9 Jun 23	30 Apr 24	12 May 25	25 Aug 22		15 Aug 24
E/LVA	5 Apr 23	30 Apr 24				
E/LTU	9 Jun 23	23 Apr 24	28 Apr 25			31 May 24
EU/POL						
E/PRT				30 Sep 22		
E/ESP	9 Jun 23	24 Apr 24	28 Apr 25	15 Jun 22		23 Aug 24
GBR			30 Apr 25			
FRO	5 Jun 23	30 Apr 24	16 May 25	6 Apr 22	07 Jun 23	30 Apr 24
GRL	1 May 23	01 May 24	23 May 25	25 Aug 22	22 Aug 23	30 Aug 24
ISL						
JPN	28 Apr 23	24 Apr 24	22 Apr 25	30 Aug 22	30 Aug 23	29 Aug 24
KOR						
NOR	9 Jun 23	29 May 24 updated: 8 Aug 24	19 May 25	2 Sep 22		23 Aug 24
RUS	28 Apr 23	23 Apr 24	28 Apr 25	25 Aug 22	8 Sep 23	13 Sep 24
USA	31 May 23 updated: 7 May 24	7 May 24 updated: 29 Apr 25	29 Apr 25			
FRA-SP	27 Apr 23	26 Apr 24	28 May 25	25 Aug 22		
UKR						

5. Research Activities

a) Biological Sampling

i) Report on Activities in 2024/2025

STACREC reviewed the list of Biological Sampling Data for 2024 prepared by the Secretariat and noted that any updates will be inserted during the summer. The SCS Document will be finalized for the September 2025 Meeting.

ii) Report by National Representatives on Commercial Sampling Conducted

Canada-Newfoundland (SCS Doc. 25/11): Information was obtained from the various fisheries taking place in all areas from Subareas 0, 2, 3 and portions of Subarea 4. Information was included on fisheries for the following stocks/species: American plaice (SA 2 + Division 3K, Divs. 3LNO, Subdiv. 3Ps), Atlantic cod (Divs. 2GH, Divs. 2J3KL, Divs. 3NO, Subdiv. 3Ps), Atlantic salmon (SA 2, SA 3, SA4), capelin (SA 2 + Div. 3KL, Divs. 3NO), Greenland halibut (SA 2 + Divs. 3KLMNO), haddock (Divs. 3LNO, Subdiv. 3Ps), Iceland scallop (Divs. 2HJ, Divs. 3LNO, Subdiv. 3Ps, Div. 4R), American lobster (Div. 3K, Div. 3L, Div. 3Pn, Div. 3Ps, Div. 4R), pollock (Divs. 3LNO, Subdiv. 3Ps), Northern shrimp (SA 2 + Div. 3K, Divs. 3LNO), redfish (SA 2 + Div. 3K, Divs. 3LN, Div. 3O, Divs. 3P4VW), sea scallop (Divs. 3KLNO, Subdiv. 3Ps, Div. 4R), snow crab (Divs. 2HJ, Divs. 3KLNO, Subdiv. 3Ps, Div. 4R), squid (SA 2+3), capelin (Divs. 2J3KL), thorny skate (Divs. 3LNO, Subdiv 3Ps) and white hake (Divs. 3NO, Subdiv. 3Ps). Additionally, a summary of the recent environmental indices, some recent stock assessments and research projects for several of marine species are included in this report.

Denmark/Faroe Islands (SCS 25/07): The Faroese fishery targets mainly cod in Subarea 3, with other species, such as Greenland halibut and redfish, being caught to a lesser extent. A total of 2 567.4 t of cod were recorded in 2024. The fishery is conducted exclusively by longliners since 2017. Biological samples of cod are collected since 2014 (length and weight measurements). The total number of length measurements taken in 2024 was 2399. The Faroese quota of cod in 3M is 22.35% of the total.

Denmark/Greenland (SCS 25/12): Data on catch rates from STATLANT were obtained from trawl, gillnet and longline fisheries in NAFO Div. 1A-F for Atlantic halibut, Atlantic cod, black dogfish, capelin, Greenland cod, Greenland halibut, haddock, roundnose grenadier, roughhead grenadier, redfish, Greenland shark, northern prawn, northern rays, tusk and wolffish. Length frequencies from Greenland were available for Greenland halibut from trawl offshore fishery in 1AB and 1CD, longline fishery in 1A, 1D, and 1F inshore, gillnet fishery in 1A inshore. A total of 8 011 otoliths in Div. 1A-F from cod, redfish, and Greenland halibut were collected.

EU-Germany: No biological sampling was conducted in commercial fisheries in 2024.

EU-Portugal (SCS Doc 25/08): Data on catch rates were obtained from trawl catches for: cod (Div. 3M); redfish (Divs. 3LMNO; Atlantic halibut (Divs. 3LMO); Greenland halibut (Divs. 3LM); thorny skate (Divs. 3LNO); roughhead grenadier (Div. 3M); white hake (Div. 3O); haddock (Div. 3O); monkfish (Div. 3O); silver hake (Divs. 3NO) and squid (Div. 3O). Data on length composition of the catch were obtained for; cod (Divs. 3MNO); redfish (*S. mentella*) (Divs. 3LMNO); American plaice (Divs. 3MNO); Greenland halibut (Divs. 3LM); white hake (Div. 3O) and thorny skate (Divs. 3LMO).

EU-Spain (SCS 25/05): A total of 9 Spanish trawlers operated in Divs. 3LMNO NAFO Regulatory Area (NRA) during 2024, amounting to 1 356 days (21 137 hours) of fishing effort. Total catches for all species combined in Divs. 3LMNO were 20 708 tons. In addition to NAFO observers (NAFO Observers Program), seven IEO scientific observer was onboard Spanish vessels during 2024, comprising a total of 257 observed fishing days, around 19% coverage of the total Spanish effort. Besides recording catches, discards and effort, these observers carried out biological sampling of the main species taken in the catch. For Greenland halibut, roughhead grenadier, American plaice and cod this includes recording weight at length, sex-ratio, maturity stages, performing stomach contents analyses and collecting material for reproductive studies. Otoliths of these four species were also taken for age determination. In 2024, 330 length samples were taken, with 44 844 individuals of different species examined to obtain the length distributions. Length distributions presented in this paper are based on sampling carried out by these observers. During 2024 there was no fishing activity of the Spanish fleet in in NAFO Division 6G.

Japan (SCS Doc. 25/06): One Japanese otter trawler operated in Divisions 3L and 3O in 2024. The total catch including discards was 740 tons in 2024. The main target species and stock area in 2024 was Greenland halibut (676 tons) in Division 3L. Following a recommendation from the 2023 September Scientific Council meeting, aggregated total catch length distributions for five stocks were calculated by Division based on the designated protocol. The aggregated total catch length distributions of Subarea 2+3KLMNO GHL in Division 3L formed unimodal in each year. The mean total length gradually decreased from 50 to 46cm during 2016-2021 but gradually increased from 46 to 48cm during 2021-2023. The length in 2024 was a bit smaller than that in 2023.

Russia (SCS Doc. 25/09REV): Catch rates are available from Greenland halibut (Divs. 3LMN, with bycatch statistics), Atlantic cod (Div. 3M with bycatch statistics, 3LNO), redfish (Divs. 3LN, 3M, 3O, with bycatch statistics), yellowtail flounder (Div. 3N), skates (Divs. 3LMNO), American plaice (Divs. 3LMNO), roughhead grenadier (Divs. 3LMN), roundnose grenadier (Divs. 3LM), white hake (Divs. 3NO), Atlantic halibut (Divs. 3LMNO).

Length frequencies were obtained from Greenland halibut (Divs. 3LMNO), Acadian redfish (*Sebastes fasciatus)* (Divs. 3LMNO), beaked redfish (*Sebastes mentella)* (Divs. 3LMN), golden redfish (*Sebastes norvegicus)* (Divs. 3LMNO), Atlantic cod (Divs. 3LMNO), roughhead grenadier (Divs. 3LMN), roundnose grenadier (Divs. 3LMN), blue wolffish (Divs. 3LMNO), spotted wolffish (Divs. 3LMN), Atlantic wolffish (Divs. 3LMNO), Atlantic halibut (Divs. 3LMNO), yellowtail flounder (Div. 3N), American plaice (Divs. 3LMNO), blue antimora (*Antimora rostrata*) in Divs. 3LM, black dogfish (*Centroscyllium fabricii*) in Divs. 3LMN, Boreal shark in Divs. 3LM, deepwater catshark in Divs. 3LM, longnose velvet dogfish in Div. 3M, white-spotted dogfish in Divs. 3NO, porbeagle shark in Divs. 3NO, white hake in Divs. 3NO, red hake in Divs. 3LMO, longfin hake in Divs. 3LMNO, three-bearded rockling in Divs. 3LM, Arctic eelpout in Divs. 3LN, glacial eelpout in Divs. 3LM, snub-nosed spiny eel in Divs. 3LMNO, starry skate (*Raja radiata*) in Divs. 3LMNO, spinytail skate (*Raja spinicauda*) in Divs. 3LMN, nezumia (*Nezumia bairdii*) in Divs. 3LMNO, greater eelpout (*Lycodes esmarkii*) in Divs. 3LMNO, silver hake in Divs. 3NO. Age-length distribution for Greenland halibut in Divs. 3LMNO, Acadian redfish in Divs. 3LN, 3M and 3O, beaked redfish in Divs. 3LN and 3M, as well as statistics on marine mammal occurrences and VME indicator species catches, are also available.

USA: No biological sampling was reported in commercial fisheries in 2024.

iii) Report on Data Availability for Stock Assessments (by Designated Experts)

It was flagged that the 2023 and 2024 Div. 3M cod age length keys and maturity ogives from the EU Flemish Cap survey were not available for the 2024 and 2025 assessments (SCR Doc. 24/016, SCR Doc. 25/32). The average of the three last available years data was used in the assessment of this year, but this added uncertainty to the results of the assessment. It is not clear when this situation will be solved and the data will be available to the SC.

b) Biological Surveys

i) Review of Survey Activities in 2024 and Early 2025 (by National Representatives and Designated Experts)

On May 5th 2025, a STACREC meeting reviewed the survey activity and data by contracting parties prior to the Scientific Council meeting in June. Information from recent surveys is summarized below:

Canada – Newfoundland and Labrador (SCR Doc. 25/27, 25/28):

For the first time in 2024 the Canadian multispecies bottom trawl surveys were conducted entirely by the new research vessels CCGS Capt. Jacques Cartier and CCGS John Cabot. These vessels have replaced the longstanding vessels CCGS Alfred Needler and CCGS Teleost. Over the past 10+ years there have been consistent survey coverage issues in these surveys primarily related to vessel breakdowns/availability and more recently the need to conduct comparative fishing trials between the new and old vessels. The 2024 spring survey was an improvement over recent years but still had a reduced set allocation prior to the survey and had a small number of incomplete strata. The 2024 autumn survey had major coverage issues, especially in Div. 2H and the deep strata (>750m) of Divs. 2J3KL. Spatial coverage issues in the 2024 surveys indicate that the introduction of the new research vessels has not immediately improved the capacity to cover the entire survey design. Surveys are beginning with already reduced set allocations and even these reduced allocations are generally not being achieved.

Canada – Subarea 0 (SCR Doc. 25/030):
During 1999-2017 surveys were completed in Div. 0A-south (to 72N) using the R.V. Pâmiut with an Alfredo III trawl. In 2018 the R.V. Pâmiut was retired and a replacement vessel was not available. In 2019 the F.V. Helga Maria with the Alfredo III trawl and trawl doors from the R.V. Pâmiut was used as an interim vessel, but data analyses detected significant differences in catchability below 700 m, therefore the survey was not used to assess stock status. Surveys in Subarea 0 were completed during 2022-2024 using the RV Tarajoq with a Bacalao trawl; this vessel and trawl will be used for the survey in future years. Survey stratification was expanded in 2022 relative to previous years, adding a 200-400 m depth stratum and expanding the survey to include all of Div. 0B. The survey now fishes the following depth strata in each of Divs. 0A-south and 0B: 201-400, 401-600, 601-800, 801-1000, 1001-1200, 1201-1400, 1401-1500 m. The survey was planned with 30 days at-sea to complete 79 stations in Div. 0A-south and 110 stations in Div. 0B. The 2024 survey completed all 79 stations in Div. 0A-south and 103 stations in Div. 0B. Survey biomass and abundance indices were calculated but cannot be directly compared to previous indices calculated from data collected using the R.V. Pâmiut with an Alfredo III trawl.

Denmark/Greenland (SCS 25/12, SCR 20/015, 23/032, 25/007, 25/020, 25/021, 25/017, 25/018, 25/019, 25/011: Hydrographic conditions were monitored across the continental shelf off West Greenland along 10 standard sections onboard RV Tarajoq during the period 29 May to 24 June 2024 and onboard the Royal Danish Navy vessel HDMS Ejnar Mikkelsen during the period 19 to 23 May 2024 (NAFO 1B-F). Data from three offshore stations were taken to document changes in hydrographic conditions off Southwest Greenland (NAFO Div. 1D-F). Results were presented as a Scientific Council Research Document.

The Greenland Shrimp and Fish trawl survey in West Greenland in NAFO Divs. 1A-F (50 - 600 m) was initiated in 1988. From 1988 to 1900, several vessels conducted the survey. From 1991 to 2017, the surveys were conducted on board RV Paamiut. In 2018 and 2019-2020, two different charter vessels were used, Sjurdarberg and Helga Maria, respectively. No survey was conducted in 2021. From 2022, the annual trawl survey was conducted with a new research vessel, RV Tarajoq. An examination of gear parameters found that these vessel changes had a minimal effect on trawl performance (Nogueira and Treble 2020, Nogueira et al., 2023). The survey follows a buffered stratified random sampling. A total of 344 valid hauls were conducted in 2024. Survey results including biomass and abundance indices for Greenland halibut, cod, deep-sea redfish, golden redfish, American plaice, Atlantic wolfish, spotted wolfish and thorny skate were presented as a Scientific Council Research Document.

The Greenland deep-sea survey in NAFO Div. 1CD (400-1500 m) was initiated in 1997, following a buffered stratified random sampling. From 1997 to 2017, surveys were conducted on board RV Paamiut. No surveys were conducted in 2018, 2020 and 2021. In 2019, a charter vessel was used, CV Helga Maria, which used all the standard gear from the research vessel Paamiut (cosmos trawl, doors, all equipment such as bridles etc., and Marport sensors on doors and headlines). The performance of the gear and the length frequencies from the two different vessels have been examined. Results suggest that the performance of the trawl gear is different at depths > 700 m, which could affect abundance estimates. In contrast, the length frequencies remained stable suggesting that the catchability may have not been affected. In 2022, a new time series survey started with the new RV Tarajoq, using a new gear Bacalao 476. The survey was conducted between October 3 – October 12 in 2024. A Bacalao 476 trawl with a mesh size of 136 mm and a 30-mm mesh-liner in the cod-end was used. A total of 80 valid hauls were conducted. Survey results including mean catch, mean number, biomass and abundance indices, and length frequencies for Greenland halibut, roundnose grenadier, roughhead grenadier and deep-sea redfish were presented as a Scientific Council Research Document.

The Greenland halibut gillnet surveys in 1A inshore were initiated in 2001, in the Disko Bay. The survey normally covers four transects and each gillnet set is compiled of five different nets with different mesh size (46, 55, 60, 70 and 90 mm half mesh). From 2013 to 2015, the surveys in Uummannaq and Upernavik gradually changed from longline surveys to gillnet surveys. Surveys are conducted with RV Sanna. In 2024, 41, 44 and 44 gillnet stations were set in Disko Bay, Uummannaq and Upernavik, respectively. Results are presented as three Scientific Council Research Documents.

The Greenland halibut bottom trawl survey in 1D inshore (Nuuk, Ameralik and Qarajat fjords) was initiated in 2015. The survey has been conducted with RV Sanna equipped with a 1440 mesh bacalao trawl. The survey is bottom-stratified with fixed stations (stations were selected where bottom conditions allow bottom trawling). A total of 19 valid stations were conducted in 2024. Survey results, including biomass and abundance indices for Greenland halibut, shrimp, deep-sea redfish and golden redfish, were presented as a Scientific Council Research Document.

EU-Spain and EU-Portugal (SCR 25/005):

The EU bottom trawl survey in Flemish Cap (Div. 3M) was carried out on board R/V Vizconde de Eza using the usual survey gear (Lofoten) from July 4th to August 6th 2024. The area surveyed was Flemish Cap Bank to depths up to 800 fathoms (1460 m) following the same procedure as in previous years. The number of hauls was 186 and five of them were null. Survey results including abundance indices of the main commercial species and age distributions for cod, redfish, American plaice, roughhead grenadier and Greenland halibut are presented as a Scientific Council Research document. Flemish Cap survey results for Northern shrimp (*Pandalus borealis*) were presented in SCR 24/059 and SCR 24/060. Samples for histological assessment of sexual maturity of cod, redfish, Greenland halibut and roughhead grenadier were taken. Oceanography studies continued to take place.

The Spanish bottom trawl survey in NAFO Regulatory Area Divs. 3NO was conducted from 5th of June to 4th of July 2024 on board the R/V Vizconde de Eza. The gear was a Campelen otter trawl with 20 mm mesh size in the cod-end. Following the method used last year, a total of 113 valid hauls were taken within a depth range of 45-1460 m according to a stratified random design and 113 hydrographic profiles. Furthermore, a stratified sampling by length class and sex was used to sample otoliths of Atlantic cod, American plaice, Greenland halibut and silver hake for growth studies. Also, gonads of Atlantic cod and silver hake were sampled from histological maturity and fecundity studies. The results of this survey, including biomass indices with their errors and length distributions, as well as the calculated biomass based on conversion of length frequencies for Greenland halibut, American plaice, Atlantic cod, yellowtail flounder, redfish, witch flounder, roughhead grenadier, thorny skate and white hake are presented as Scientific Council Research Documents. In addition, age distributions are presented for Greenland halibut and Atlantic cod.

Since 1995, Spain carries out annually a Spring-Summer survey in the NAFO Regulatory Area of Divs. 3NO. In 2003 it was decided to extend the Spanish 3NO survey toward Div. 3L (Flemish Pass). In 2024, the bottom trawl survey in Flemish Pass (Div. 3L) was carried out on board R/V Vizconde de Eza using the usual survey gear (Campelen 1800) from August 8th to 27th. The area surveyed was Flemish Pass to depths up 800 fathoms (1463 m) following the same procedure as in previous years. The number of hauls was 95 and 1 of them was null. Survey results, including abundance indices and length distributions of the main commercial species, are presented as Scientific Council Research documents. Survey results for Divs. 3LNO of northern shrimp (*Pandalus borealis*) were presented in SCR 24/061. Samples for histological (Greenland halibut and roughhead grenadier) and aging (Greenland halibut, American plaice, roughhead grenadier and cod) studies were taken. Ninety-six hydrographic profile samplings were made in a depth range of 108-1386 m.

VME data from the 2024 EU; EU-Spain and Portugal bottom trawl groundfish surveys in NAFO Regulatory Area (Divs. 3LMNO):

During 2024, R/V Vizconde de Eza carried out the three surveys described above. In total there were 397 bottom trawl tows, ten of them considered invalid due to technical problems during the fishing operation. 139 hauls out of 387 valid tows have shown zero catches (i.e. no presence) of VME indicator species groups. This represents 35.92% of the total valid hauls.

Sponges were recorded in 142 of the 387 valid tows (36.7% of the valid tows analyzed), with depths ranging between 45 - 1482 m. There were four significant catches of sponges (≥ 100 kg/tow) in these tows, two of them fell within the VME polygons for sponges. Inside VME closures, sponges were recorded in 3 of the 7 valid tows (43%), one of which had a significant catch of sponges.

Large gorgonians were recorded in 9 of the 387 valid tows (2.3% of valid tows analyzed), at mean depths between 228 and 1332 m. There was one significant catch of large gorgonians (≥ 0.6 kg/tow) in these tows, which fell outside the VME polygons for large gorgonians. No large gorgonians were recorded inside VME closures during the EU 2024 surveys.

Small gorgonians were recorded in 67 of the 387 valid tows (17.3% of valid tows analyzed), at mean depths between 65 and 1440 m. There were five significant catches of small gorgonians (≥ 0.2 kg/tow) in these tows, two of them fell within the VME polygons for small gorgonians. Inside VME closures, small gorgonians were recorded in 4 of the 7 valid tows (57%), and there was one significant catch, with specimens identified as *Radicipes* sp. and *Acanella arbuscula*.

Sea pens were recorded in 156 of the 387 valid tows (40.3% of valid tows analyzed), at mean depths between 103 and 1482 m. There was one significant catch of sea pens (≥ 1.3 kg/tow) in these tows, which fell within the VME polygons for sea pens. Inside VME closures, sea pens were recorded in 4 of the 7 valid tows (57%), and there were no significant catches of sea pens in these tows.

Black corals were recorded in 49 of the 387 valid tows (12.7% of valid tows analyzed), at mean depths between 212 and 1460 m. There were no significant catches of black corals (≥ 0.4 kg/tow) in these tows. No black corals were recorded inside VME closures or VME polygons for black corals during the EU 2024 surveys.

Sea squirts were recorded in 9 of the 387 valid tows (2.3% of valid tows analyzed), at mean depths between 50 and 228 m. There were three significant catches of *Boltenia* sp. (≥ 0.35 kg/tow) in these tows, two of them fell within the VME polygons for *Boltenia* sp. No *Boltenia* sp. were recorded inside VME closures during the EU 2024 surveys.

Bryozoans were recorded in 32 of the 387 valid tows (8.3% of valid tows analyzed), at mean depths between 112 and 1227 m. There were no significant catches of bryozoans (≥ 0.2 kg/tow) in these tows. Inside VME closures, bryozoans were recorded in 2 of the 7 valid tows conducted inside VME closures (29%), and there were no significant catches of bryozoans in these tows.

Above information, including distribution maps of VME species groups, is further detailed in SCR Doc. 24/064.

NEREIDA

An update on seabed macro litter in NAFO Regulatory Area was provided, building on the information presented during the Scientific Council in June 2024. The update included a reviewed protocol for data collection during the EU groundfish surveys, as well as results from the analysis on the sources and drivers of the spatial distribution of seabed macro litter in the NRA.

Reviewed protocol for data collection in the EU groundfish surveys: Given the need for standardized protocols to collect data on seabed macro litter and ensure high-quality information, a revised protocol was proposed based on the revision and improvement of the previous methodology used by the IEO during its groundfish surveys in the NRA. The aim of this revised protocol was to establish common criteria for the surveys across different divisions, promoting a "common practice" and enabling standardized data recording. The review of the available data and information led to the development of a standardized master file, that includes all updated categories and specific codes for records collected by the IEO in the NRA to date. This standardized master file has been an essential first step for subsequent data analysis and has been crucial for the correct categorization of sampled items. Additionally, as part of the revised protocol, an improved seabed macro litter data collection form was developed and tested during the EU groundfish in 2024. Furthermore, a visual guide for seabed macro litter data collection, designed to assist in categorizing litter items onboard, and a decalogue of good practices for scientific bottom trawl surveys are in preparation.

Update on seabed macro litter. Sources and drivers of distribution.: Data collected from EU groundfish surveys (Divisions 3LMNO: 2018-2023 period) was analyzed. A total of 1936 valid hauls were examined, with 528 macro litter items found in 16.7% of these hauls. Using the source-specific indicator items from the OSPAR Commission (2007), following García-Alegre et al. (2020), the main sources of seabed macro litter were identified. The primary source was fisheries (44.8% of recorded items); followed by non-operational galley waste from shipping, fisheries and offshore activities (3.9% of recorded items); and operational waste from shipping and offshore activities (3.2 % of recorded items). Significant differences in density of items were found among Divisions for all sources except non-operational waste. To elucidate the drivers of seabed macro litter distribution, the data was analyzed separately for different trawl gear types (Campelen 1800 in Divisions 3LNO; Lofoten in Division 3M). Environmental variables that could influence seabed macro litter distribution were considered. Overall, the GAM models explained only a small portion of the variability, with limited predictive power. The best models for both areas considered only presence data and explained approximately 11% of the variability in standardized item abundance. Important variables influencing the spatial distribution of seabed macro litter included slope, depth, bottom sea current speed, roughness, and sediment texture. Slope was significant in Divisions 3LNO, while bottom trawl fishing effort and sediment texture were significant in Division 3M. Despite the low explanatory power of the models, these results provide preliminary insights into the distribution of seabed macro litter, though accurate modelling remains challenging.

USA: No surveys results for 2024 were reported.

Faroes 3M: The Faroes survey did not occur in 2024 due to technical and regulatory issues. It is expected that the survey will resume in 2025.

c) Tagging Activities

Telemetry Insights for the Assessment and Management of Greenland Halibut in NAFO SA2+Divs. 3KLMNO (SCR 25/029)

Laura Wheeland delivered a presentation on the results of a telemetry study by Fisheries and Oceans Canada – Newfoundland and Labrador Region (DFO-NL). The Greenland halibut stock in NAFO SA 2+Divs. 3KLMNO is widely distributed, and no single survey covers the whole stock area. Rather, partial indices are used to inform the management procedure for this stock. Movement between survey areas and to depths poorly represented in survey indices have been identified as sources of uncertainty for the assessment of this stock. In 2022, Scientific Council recommended additional telemetry studies to help elucidate movements of this species. DFO-NL has been conducting such studies since 2021 using acoustic telemetry and pop-off satellite archival tags (PSATs) deployed on Greenland halibut.

Acoustic telemetry data show deep-water use by large Greenland halibut and broad scale movement within the stock area. Movement into other stock areas was not observed during this work, however, the ability to detect large scale movements may be limited by tag deployment durations and the distribution of acoustic receivers. Acoustic transmitters have battery life up to 5-10 years, and ongoing monitoring is expected to improve our understanding of the long-term movement patterns of these fish.

PSAT data indicate that the strata of the research vessel trawl surveys used to monitor this stock cover the depths used by Greenland halibut, with very few records occurring deeper than 1500m. Between 68 to 100% of the depth records for fish tagged offshore (70cm+) were deeper than 750m, supporting the previous conclusion that surveys with incomplete deep strata (>750m) impair our ability to monitor older fish in this stock. Results are expected to enhance interpretations of survey data and their application in future assessments (e.g. informing catchability).

Data were also reported from three Greenland sharks (*Somniosus microcephalus*) opportunistically tagged with PSATs during research programs by DFO-NL in 2022 and 2023 in collaboration with Oceans North Canada. As a bycatch concern in some Greenland halibut fisheries, understanding habitat overlap is important. Results indicate that PSAT tags can measure overlap in habitat use between Greenland shark and Greenland halibut, and further work may help identify periods when Greenland shark are more likely to be in Greenland halibut fishing areas, potentially informing mitigation strategies.

Information sources: **SCS Doc. 22/18, 24/16, SCR Doc. 23/014**

d) Other Research Activities

There were no other research activities.

6. Review of SCR and SCS Documents

There were no documents to be revised.

7. Other Matters

Invited speaker: José De Oliveira

Abstract: ICES framework for applying catch advice rules for data-limited stocks

The ICES approach to advice on fishing opportunities is to integrate the precautionary approach with the objective of Maximum Sustainable Yield (MSY), unless otherwise requested (e.g. through development of a management plan/strategy evaluated through Management Strategy Evaluation, or MSE, which is precautionary and agreed by relevant management authorities). In order to identify appropriate rules for advice on fishing opportunities, ICES classifies stocks into six main categories on the basis of available knowledge, ranging from Categories 1 and 2 (data-rich end of the spectrum) to Categories 3-6 (data limited end). Through a series of workshops and peer-reviewed publications, ICES has developed a framework for applying catch advice rules for data-limited stocks (initially Category 3, for which survey, trends-based assessment, or other indices and life history information are available). This framework applies catch rules of different forms (rfb, chr, rb) and with different multipliers depending on available information and the value of the life-history parameter, von Bertalanffy k. All three of the currently-used rules rely on survey, trends-based assessment (such as from survey-only model SURBAR), or other indices (e.g. could be fishery-dependent) to operate, as a minimum. Mostly, survey data are used to derive the indices (either through a basic mean-density calculation, through more sophisticated statistical models, or combined in a simple trends-based assessment). There are also rules to deal with short-lived stocks, but these were not covered in the presentation. Indices are used directly in the rules as a “2 over 3”-type ratio (average of last two years relative to the preceding three years) in the “r” component of rfb and rb rules, or as the index to which the target harvest rate is applied in the chr rule. Length data play a key role in identifying MSY-based targets in the rfb and chr rules, by comparing mean length to an MSY proxy for the mean length you would expect when fishing at MSY. This is done directly in the “f” component of the rfb rule by comparing the mean length to the MSY proxy (ratio of mean length to the MSY proxy), or indirectly in the way the target harvest rate is derived for the chr rule (those historic catch-to-index ratios associated with a mean length relative to the MSY proxy greater than 1 are selected and averaged to form the target harvest rate). All three rules have a “b” component, the biomass safeguard, which reduces the advice linearly to zero when the index falls below a trigger value; this trigger value is calculated as 1.4 times Iloss, where the Iloss is generally the lowest observed historical index (or some percentile of the historical time-series, e.g. 20^{th} percentile). These rules have been tested in a generic MSE framework with generically developed operating models covering a wide range of life-history types (based on actual life-history data) and fishing histories; multipliers have been used to tune the rules so that they meet the ICES precautionary criterion (no more than 5% probability of falling below Blim in the long term). It is also possible to tune the rules for specific cases that have the available data, and this has been demonstrated through the development of a specifically-tuned chr rule for plaice in the western English Channel, where the tuned chr-rule was shown to outperform both the previously-used generic rfb rule, and the ICES MSY approach rule (if the stock was treated as a Category 1 stock for the latter). ICES have recently been looking at expanding testing for catch rules that can be used for Categories 4-6 stock, and these have included spatial indicators, some of which (occupancy and aggregation-type indicators) have shown good performance in identifying stock status.

8. Adjournment

The meeting was adjourned on 12 June 2025.

APPENDIX IV: REPORT OF THE STANDING COMMITTEE ON FISHERIES SCIENCE (STACFIS)

Chair: Martha Krohn Rapporteur: Andrea Perreault

I. OPENING

The Committee met from 29 May – 12 June 2025 to consider and report on matters referred to it by the Scientific Council, particularly those pertaining to the provision of scientific advice on certain fish stocks. Representatives attended from Canada, Denmark (in respect of Faroe Islands and Greenland), the European Union, Japan, Norway, the Russian Federation, Ukraine, and the United Kingdom. Observers from the Food and Agriculture Organization (FAO), Atlantic Groundfish Council, Oceans North, and Sargasso Sea Commission were also present. The Executive Secretary and other members of the Secretariat were in attendance. The Chair, Martha Krohn (Canada) opened the meeting by welcoming participants. The agenda was reviewed, and a plan of work developed for the meeting in accordance with the Scientific Council plan of work. The provisional agenda was adopted. Owing to the limited time available during the meeting, it was not possible to consider drafts of all report sections in plenary. As in previous years, designated reviewers were assigned for each stock for which an interim monitoring update was scheduled (see SC Report). Following presentation and discussion of full assessments, Designated Experts produced drafts of their respective report sections which were reviewed in plenary.

II. GENERAL REVIEW OF CATCHES AND FISHING ACTIVITY

1. Review of Recommendations

STACFIS agreed that relevant stock-by-stock recommendations from previous years would be considered during the review of a stock assessment or noted within interim monitoring report as the case may be and the status presented in the relevant sections of the STACFIS report.

2. General Review of Catches and Fishing Activity

The NAFO Secretariat presented the catch estimates developed by CESAG and made the supplementary data that went into the analyses available for the Scientific Council to review. The Secretariat noted that the catches were estimated based on the strategy outlined in Annex 1 of COM-SC Doc. 17-08, amended following a recommendation from STACFIS in 2018, to include catch estimates broken down by quarter and gear type. It was also noted that some Contracting Parties had not submitted catch for 2024 at the time of the meeting, therefore many of the STATLANT 21A catches reported in the catch tables in this report are stated as not available (NA).

3. Invited Speaker and External Review

Dr. José de Oliveira served as an external reviewer for two stocks at the June 2025 Scientific Council meeting. During the meeting it was decided to examine cod Div. 3M and yellowtail flounder Div. 3NO.

The reviews were conducted as part of a more widely focused meeting. Consequently, time was somewhat limited, and the reviews were more thorough and involved than the process for the non-reviewed stocks but not as thorough as might occur in something like an ICES benchmark. The reviews were of what was presented at the meeting, there was not any time spent on investigating if different formulations of the models might have produced a better assessment. The reviews specifically comment on if the model can be considered to provide a viable basis for the advice, if the modelling approaches are appropriate to the stock and data, and then go on to make specific recommendations for future work.

All assessments were endorsed by the external reviewer.

The reviews are as follows:

Cod in Division 3M

The Spanish commercial length frequencies were found to be unrepresentative for 2024 due to low sampling levels (highly skewed to small fish), so it was decided not to use these unrepresentative Spanish samples for raising length frequencies to catches. An initial idea was to use the Portuguese length frequency samples to raise the Spanish catches, but this would have given too much weight to the Portuguese length frequencies, which may not be representative of Spanish catches anyway, and this idea was abandoned. The reviewer agrees this approach is sensible. ALKs (and maturity estimates) from the EU survey were not available for 2023 and 2024 due to administrative problems, so stock assessors used the average ALK over the years 2020-2022 for these two missing years. An analysis was conducted replacing the true ALKs for 2020, 2021 and 2022 in turn with the 2020-2022 average, and rerunning the assessment for each of these, and the assessment was found to be relatively insensitive to these changes, providing some assurance that the use of the 2020-2022 average for 2023 and 2024 was a reasonable approach. There was some discussion about whether to update the assessment with a further year of data, given some issues with the input data (such as the ALKs), or to simply extend the forecast from the last assessment assuming realised catches and the set TAC. The final decision was to update the assessment with new data, and this showed that the two most recent recruitments are among the lowest in the time series, which is useful for managers to be aware of. In terms of the actual assessment fits and model diagnostics, a suggestion to report Mohn's rho statistic with retrospective patterns (Figure 26 of scwp25-012), and not just rely on visual representation, because quantitative comparisons can then more easily be made from year to year. Furthermore, since uncertainty around ALKs has become an issue for this assessment, stock assessors may usefully consider introducing ageing error into this assessment, if it is possible to do so, to better accommodate this uncertainty. Regarding some of the outputs shown in scwp25-012, the Yield and Spawner per recruit plot (Figure 25) did not make sense (one would expect the vertical line at Fbar=0.17=F35%SPR [and not F30%SPR indicated in the Figure caption] to coincide with the red SPR line at 35% on the secondary y-axis, and this does not appear to be the case). Regarding description of the model (Annex 1, scwp25-012), some attention needs to be paid to this to ensure equations correctly describe the model (e.g. mu.CPUE.EU[y,a] is clearly not correct).

Yellowtail flounder in Divisions 3LNO

How best to represent a pre-recruit index was discussed, with the final decision being <22cm, despite the data sometimes showing a clear peak below 12cm (e.g. in the CAN-fall survey). The reviewer agreed with the stock assessor that it would be useful to track both <12cm and 12-22cm, and to possibly combine this information with any information on growth to help characterise the nature of any peaks in the length-frequency data. The stock assessor noted problematic autocorrelation in parameters when sampling from chains, and this was appropriately dealt with by increased thinning. In terms of the model formulation, currently a strict Schaefer form is used, and it may be useful to explore a relaxation of this assumptions (e.g. to the more general Pella-Tomlinson formulation), given implications for stock productivity. The model description also indicates that exploitable biomass is modelled, yet survey data uses all the data; greater consistency between model assumption and data used may be better achieved by filtering the survey data to better reflect exploitable biomass. The assessment may also benefit through considering a broader range of model diagnostics, such as retrospective analyses (including calculating Mohn's rho for comparison across different assessments), sensitivity to leaving out entire survey series one-at-a-time, and other useful diagnostics (such as those considered by Carvalho et al. 2021 [https://doi.org/10.1016/j.fishres.2021.105959] and Li et al. 2024 [https://doi.org/10.1016/j.fishres.2024.106968]). It may also be useful to consider other modelling frameworks, such as SPiCT, which may be quicker to run [useful for e.g. closed-loop simulation testing] and may provide a different perspective.

III. STOCK ASSESSMENTS

STOCKS OFF GREENLAND AND IN DAVIS STRAIT: SA 0 AND SA 1

Environmental Overview

Hydrographic conditions in this region depend on a balance of ice melt, advection of polar and sub-polar waters and atmospheric forcing including the major winter heat loss to the atmosphere that occurs in the central Labrador Sea. The cold fresh polar waters carried south by the Baffin Island Current are counter-balanced by relatively warmer waters, carried northward by the offshore branch of the West Greenland Current (WGC). The water masses constituting the WGC originate from the western Irminger Basin where the East Greenland Currents (EGC) meets the Irminger Current (IC). While the EGC transports ice and cold fresh Surface Polar Water south along the eastern coast of Greenland, the IC, a branch of the North Atlantic current, transports relatively warm salty Atlantic Waters northwards along the Reykjanes Ridge. After the currents converge, they turn around the southern tip of Greenland, forming the WGC that propagates northward along the western coast of Greenland. The WGC is important for Labrador Sea Water formation, which is an essential element of the Atlantic Meridional Overturning Circulation. At the northern edge of the Labrador Sea, after receiving freshwater input from Greenland and Davis Strait, part of the WGC bifurcates southward along the Canadian shelf edge as the Labrador Current.

1. Greenland halibut (*Reinhardtius hippoglossoides*) in Subareas 0+1 offshore

Full assessment (SCR Doc.25/020, 021, 030, 031, SCR Doc. 24/020, 021; SCS Doc. 25/12)

a) Introduction

The Greenland halibut stock in Subareas 0 and 1 (offshore) is part of a larger population complex distributed throughout the Northwest Atlantic. The fishery distribution includes Canadian (SA0) and Greenland (SA1) offshore waters. Canada and Greenland manage the fisheries and request advice from NAFO SC. In 1994 analysis of tagging and other biological information resulted in the creation of separate management areas for inshore Division 1A, and in 2020 studies of parasites, analysis of historic tagging and fishery data resulted in the creation of separate management areas for inshore Divs. 1B-F.

b) Fisheries and Catches

Bottom otter trawl gear is used by most fleets in the SA 1 fishery. Longline vessels occasionally fish in the offshore, however gillnet gear is not allowed. The SA 0 fishery is a mix of trawl and gillnet (between 30-40% of the catch in recent years) with the occasional use of longline. Trawlers in both SAs have used both single and double trawl configurations since about 2000. The gillnet fishery in SA 0 began in 2005; use of baited gillnets began around 2015 and has increased since. Baiting gillnets is known to increase catch rates.

Catches were first reported in 1965 and rose to 20 027 t in 1975 before declining to 2 031 t in 1986. Catches increased from 1989 to 1992 (reaching a level of 17 888 t) due to a new trawl fishery in Div. 0B with participation by Canada, Norway, Russia, and the Faroe Islands and an expansion of the Divs. 1CD fishery with participation by Japan, Norway, and the Faroe Islands. Catch declined from 1992 to 1995 primarily due to a reduction of effort by non-Canadian fleets in Div. 0B. From 1995 to 2023, catches have been near the TAC (Table 1.1). Over this period catches increased in step with increases in the TAC, until 2019. Catches decreased in 2023, after a decrease was advised by NAFO SC (Figure 1.1).

Table 1.1. Annual total allowable catch and landings.

	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
TAC	30.0	32.3	32.3	36.4	36.4	36.4	36.4	33.0	33.0	33.0
SA 0	14.1	15.9	16.0	18.3	17.9	19.1[2]	18.3[2]	16.4[2,3]	16.5[2,3]	
SA 1	15.2	16.2	16.2	18.0	18.1	17.3	18.8	16.6[3]	16.5[3]	
Total STACFIS[1]	29.3	32.1	32.2	36.3	36.0	36.4	37.2	33.0	33.0	

[1] Based on STATLANT, with information from Canada and Greenland authorities to exclude inshore catches.

[2] STACFIS estimate using 1.48 conversion factor for J-cut, tailed product.

[3]Based on official catches from the Greenland Fisheries and Hunting Control Authority (GFJK) because STATLANT were not available.

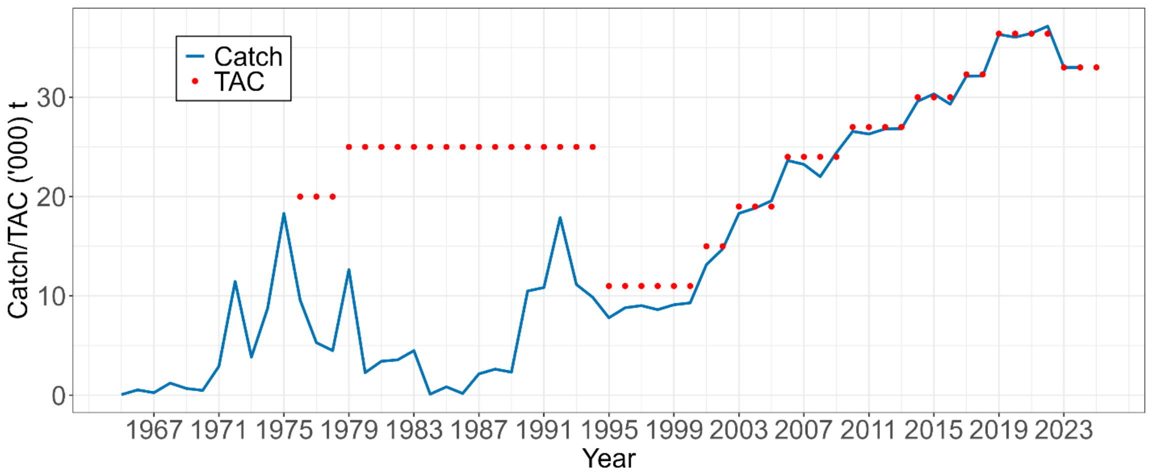


Figure 1.1. Greenland halibut in Subarea 0 and 1 (offshore): catches (line) and TACs (points).

c) Research Surveys

Shallow survey in 1AF: The shallow survey in Divs. 1A-F covers the continental shelf from Cape Farewell in the south to latitude 72°30'N including Disko Bay. This survey covers depths from 50 to 600 m for the period 1991-2024 (no survey was conducted in 2021). The survey has been carried out with four different vessels (1991-2017: R/V Paamiut, 2018: CV Sjurdarberg, 2019-2020: Helga Maria and 2022-2024: RV Tarajoq). All vessels were of similar size, used the same fishing gear from 2005 onward (door, gear trawl, and sensors) and same crew. Examination of gear parameters found that these vessel changes had a minimal effect on trawl performance in this survey (Nogueira and Treble 2020 and Nogueira and Christiansen, 2023). The survey used a Skjervoy gear until 2004, and in 2005 the gear was replaced by a Cosmos trawl.

The biomass indices increased gradually through the 1990's and until the last year with the old Skjervoy trawl in 2004. From 2005 to 2014 the biomass index decreased. Since 2014 the index biomass has been gradually increasing (Figure 1.2). Clear modes can be observed in the length distribution at 12-15 cm and 19-23 cm every year corresponding to ages 1 and 2 (Figure 1.3). In 2023, age 2 biomass was higher than age 1 for the first time in the whole time-series.

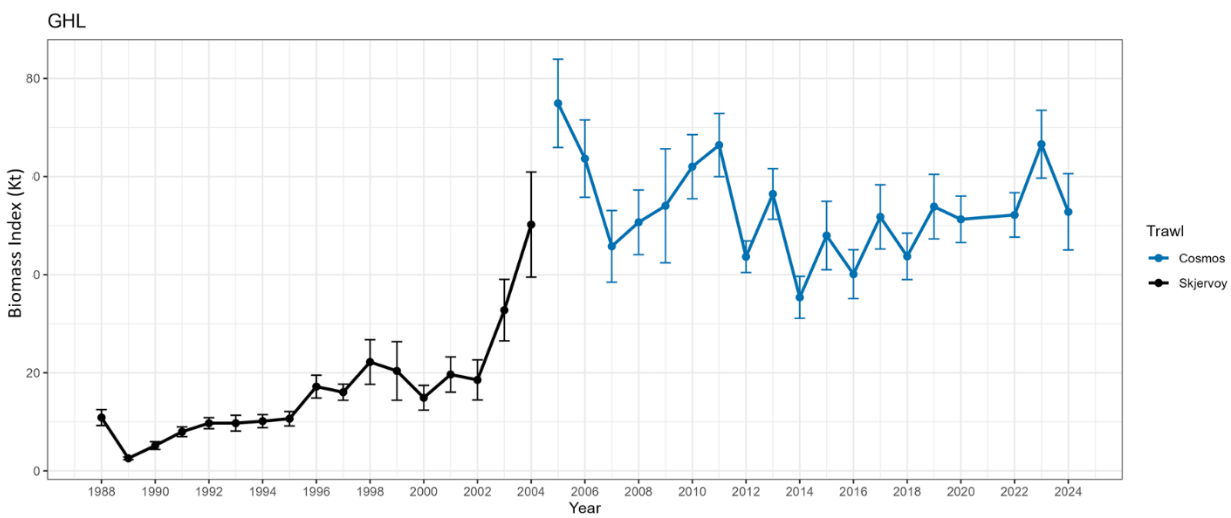


Figure 1.2. Greenland halibut in Subarea 0+1 (offshore): 1A-F biomass index from surveys with the Skjervoy gear (1991-2004, black points and line) and Cosmos gear (2005-2024, blue points and line). Error bars indicate 95% confidence intervals.

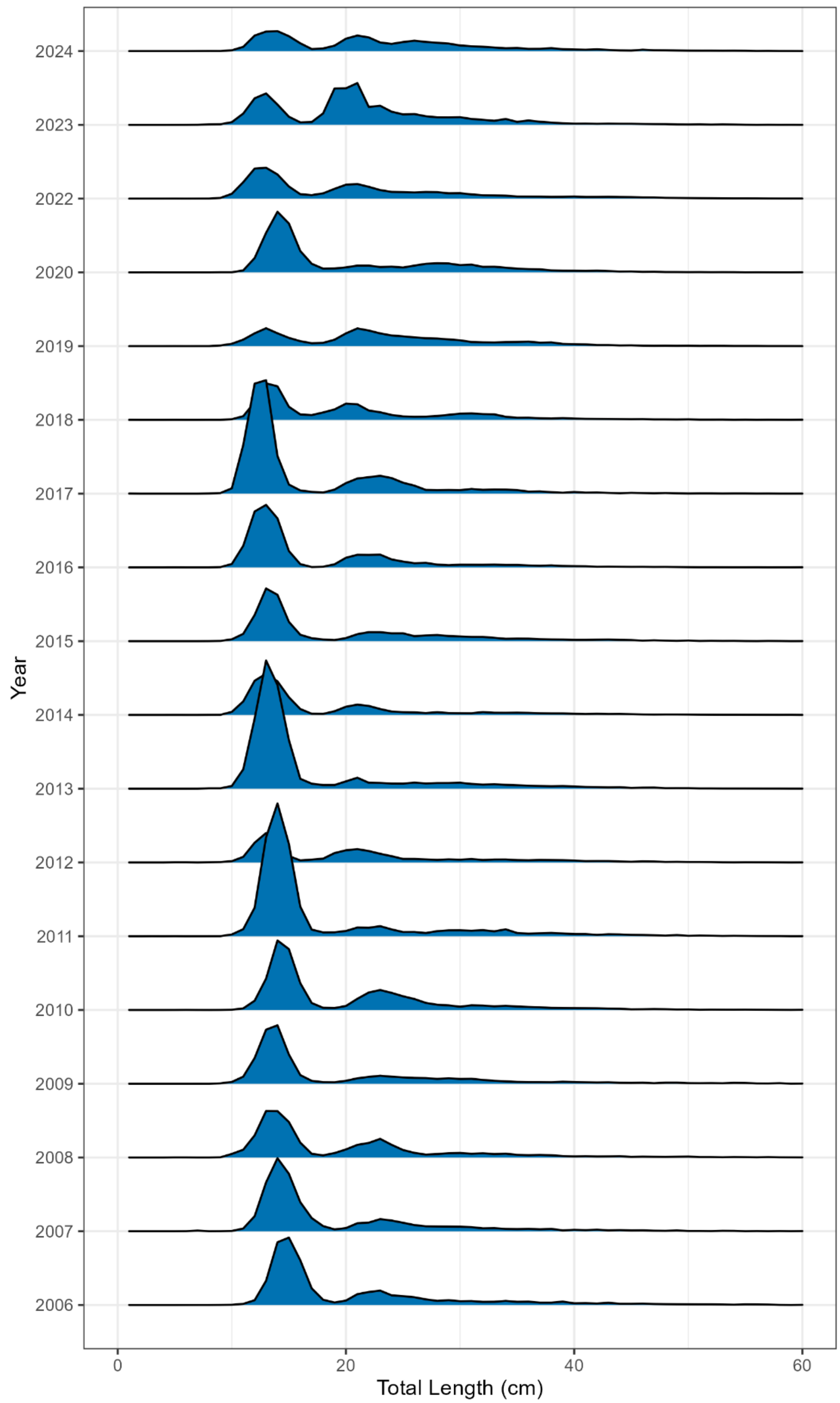


Figure 1.3. Greenland halibut in Subarea 0+1 (offshore): length frequency distribution for fish caught during shallow surveys with the gear Skjervoy (2004) and Cosmos gear (2005-2024) in Divs. 1A-F.

Deep surveys in 0AB and 1CD were conducted by Greenland and Canada, respectively, but given the common survey protocols (same vessels, gear, and sampling design), a combined index for Divs. 0A and 1CD was used to give advice for the years where both surveys were carried out: 1999, 2001, 2004, 2008, 2012, 2014-2017 with RV Paamiut using an Alfredo trawl. The index remained stable at a relatively high level during 1999-2012. The index increased between 2014 and 2016 and declined in 2017 as a result of an observed decline in the 0A-South survey biomass. The combined index was also estimated in 2019 using data collected by the CV Helga Maria using the same Alfredo trawl, but it was not comparable with the rest of the time-series. From 2022-2024, a new time-series started with the RV Tarajoq and a Bacalao trawl, without the possibility of conducting calibration experiments between the 2 vessels and gears; the surveys also expanded to include Div. 0B. No surveys were carried out in 2018, 2020, and 2021. Starting in 2023, a standardized combined index for the exploitable biomass of the stock (biomass > 35 cm fork length; Figure 1.4) was produced with a Delta-Lognormal Generalized Additive Model (Delta-GAM). The model uses density, depth, and distribution data on Greenland halibut from three buffered stratified random surveys: the shallow survey in Divs. 1A-F, deep surveys in Divs. 0A and 1CD; in 2025 the delta-GAM was expanded to include survey data from Div. 0B. Overlap in years between Skjervoy and Alfredo, between Cosmos and Alfredo, and finally between Cosmos and Bacalao, made estimation of gear effects possible. Following the change to the Bacalao trawl in 2022, the survey length frequency distribution has a similar range to preceding years but there were higher numbers of small fish in the catch, likely because of the change to using a Bacalao trawl (Figure 1.5).

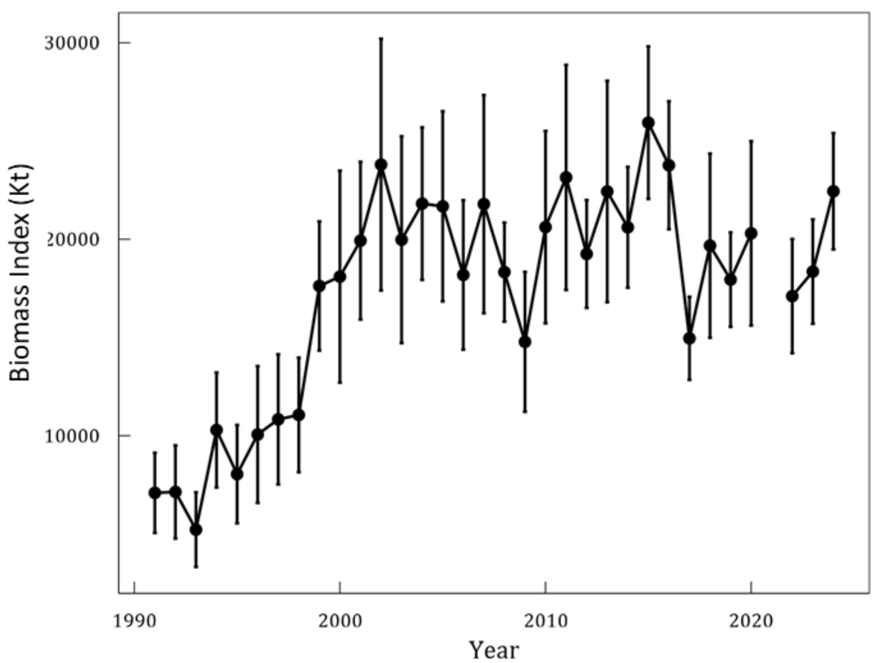


Figure 1.4. Greenland halibut in Subarea 0+1 (offshore): Divs. 0AB+1A-F combined biomass index from offshore surveys with the R/V Paamiut and Alfredo 3 gear, C/V Helga Maria and Alfredo 3 gear, and R/V Tarajoq and Bacalao 476 gear (upper bar) and inshore surveys with the R/V Paamiut and Skjervoy gear (1991-2004), R/V Paamiut and Cosmos gear (2005-2017), C/V Sjurdarberg and Cosmos gear (2018), C/V Helga Maria and Cosmos gear (2019-2020), and R/V Tarajoq and Cosmos gear (2022-2024). Error bars indicates 95% confidence intervals.

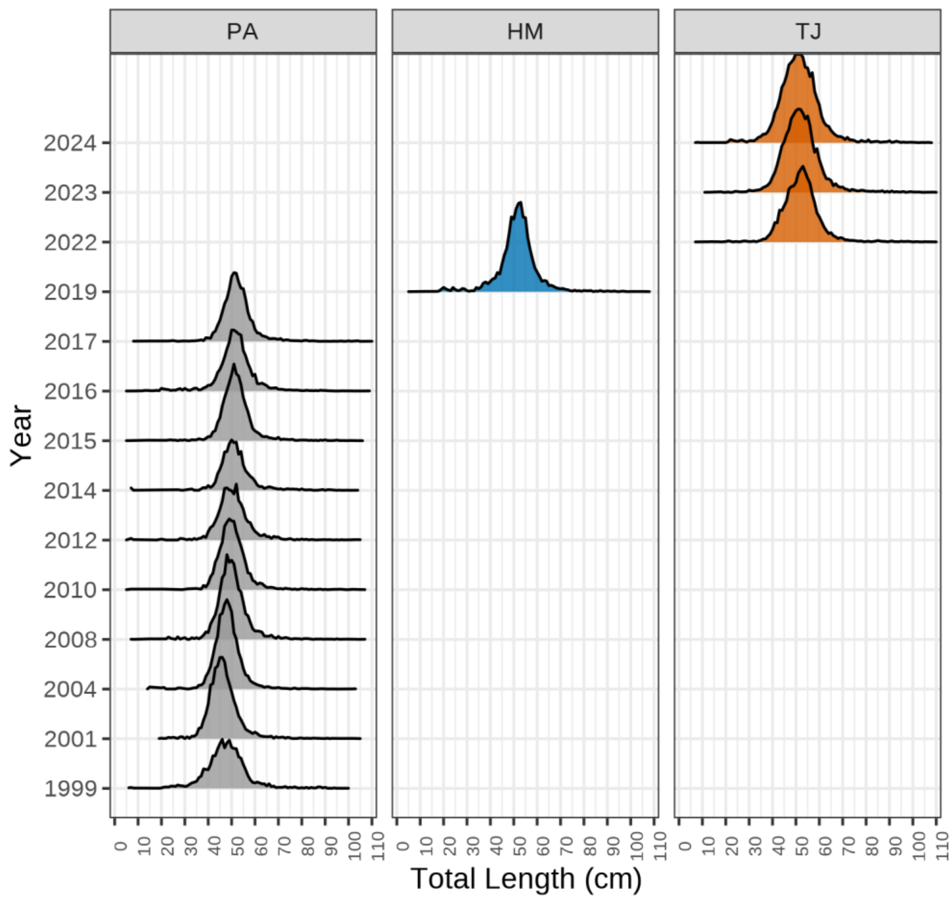


Figure 1.5. Greenland halibut in Subarea 0+1 (offshore): length frequency distribution for fish caught during surveys with the R/V Paamiut and Alfredo gear (left panel), C/V Helga Maria and Alfredo gear (middle panel) and R/V Tarajoq and Bacalao gear (right panel).

d) Recruitment

An Age-1 abundance index is estimated from the shallow survey in 1AF. The index was generally stable from 1991 to 2002, and then increased in 2003, it has been highly variable since and has been below average in the last 2 years (Figure 1.6).

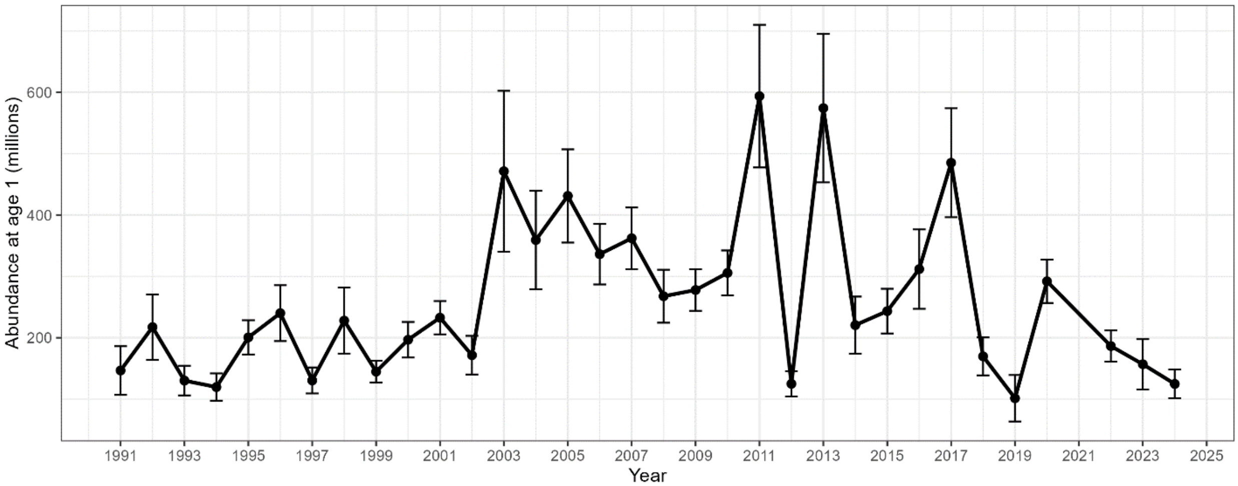


Figure 1.6. Greenland halibut in Subarea 0 and 1 (offshore): index at age 1 derived from the Greenland Shrimp and Fish Survey. A conversion factor for the times series 1991-2004 was applied. Horizontal line is the average abundance for the period 1991-2023. The abundance at age 1 index was not updated in 2024. Error bars indicate 95% confidence intervals.

e) Assessment Results

During the 2024 SC June meeting a Surplus Production in Continuous Time (SPiCT) model was presented and accepted as an assessment tool for this stock. The SPiCT model used as input data a standardized combined index for the exploitable biomass of the stock (biomass> 35 cm fork length), as well as commercial catch data. The index combined the shallow survey in Divs. 1A-F and the deep surveys in Divs. 0A-1CD with a Delta-Lognormal Generalized Additive Model (Delta-GAM). In 2025 the combined index calculation was expanded to include survey data from Div. 0B.

The relative B/B_{msy} was 1.20, and the relative F/F_{msy} was 0.91 (Figure 1.7) in 2024.

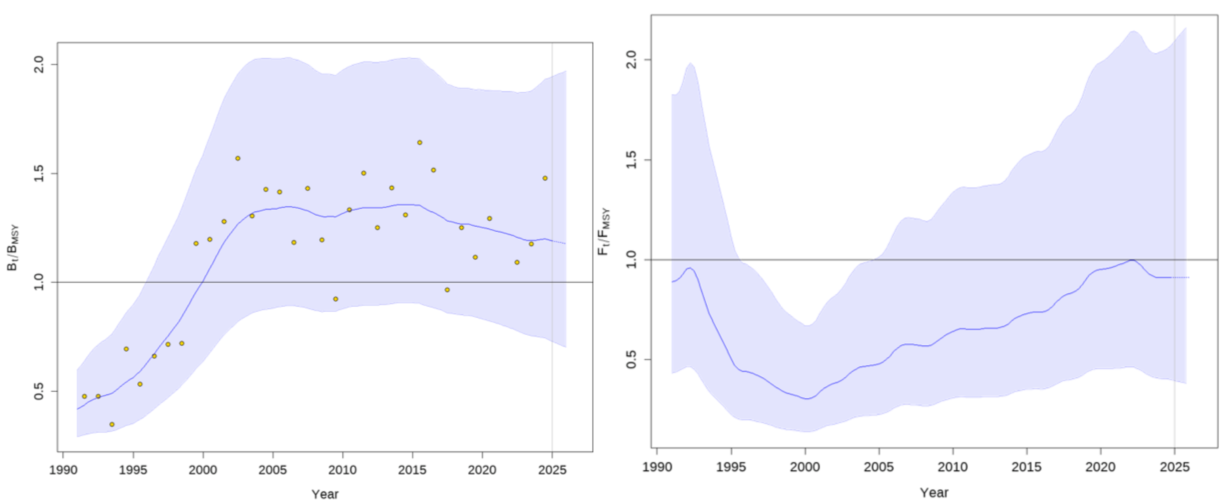


Figure 1.7. Relative biomass and fishing mortality for Greenland halibut in 0+1 offshore. Shaded regions indicate 80% confidence intervals.

Estimates of stock dynamic parameters from the SPiCT model are given in Table 1.2.

Table 1.2. Parameters from SPiCT.

Parameter	Estimate	Lower CI	Upper CI
alpha	3.11	1.43	6.76
beta	0.44	0.23	0.85
r	0.26	0.19	0.36
rc	0.26	0.19	0.36
rold	0.26	0.19	0.36
m	30617	21037	44562
K	470500	281105	787499
q	0.08	0.04	0.18
sdb	0.05	0.03	0.10
sdf	0.14	0.09	0.20
sdi	0.16	0.12	0.21
sdc	0.06	0.04	0.10
Relative reference points			
B/Bmsy, end current year (proj.) (%)	1.20	0.77	1.94
F/Fmsy, end current year (proj.) (%)	0.91	0.40	2.07

f) Retrospective analysis

A five-year retrospective analysis was performed (Figure 1.9). and results were found to be consistent for biomass and fishing mortality with respect to the removal of successive years.

The model tends to under-estimate biomass and over-estimate fishing mortality, but this directional pattern is reduced for relative biomass and fishing mortality. Interannual changes are well within levels of uncertainty estimated in the model.

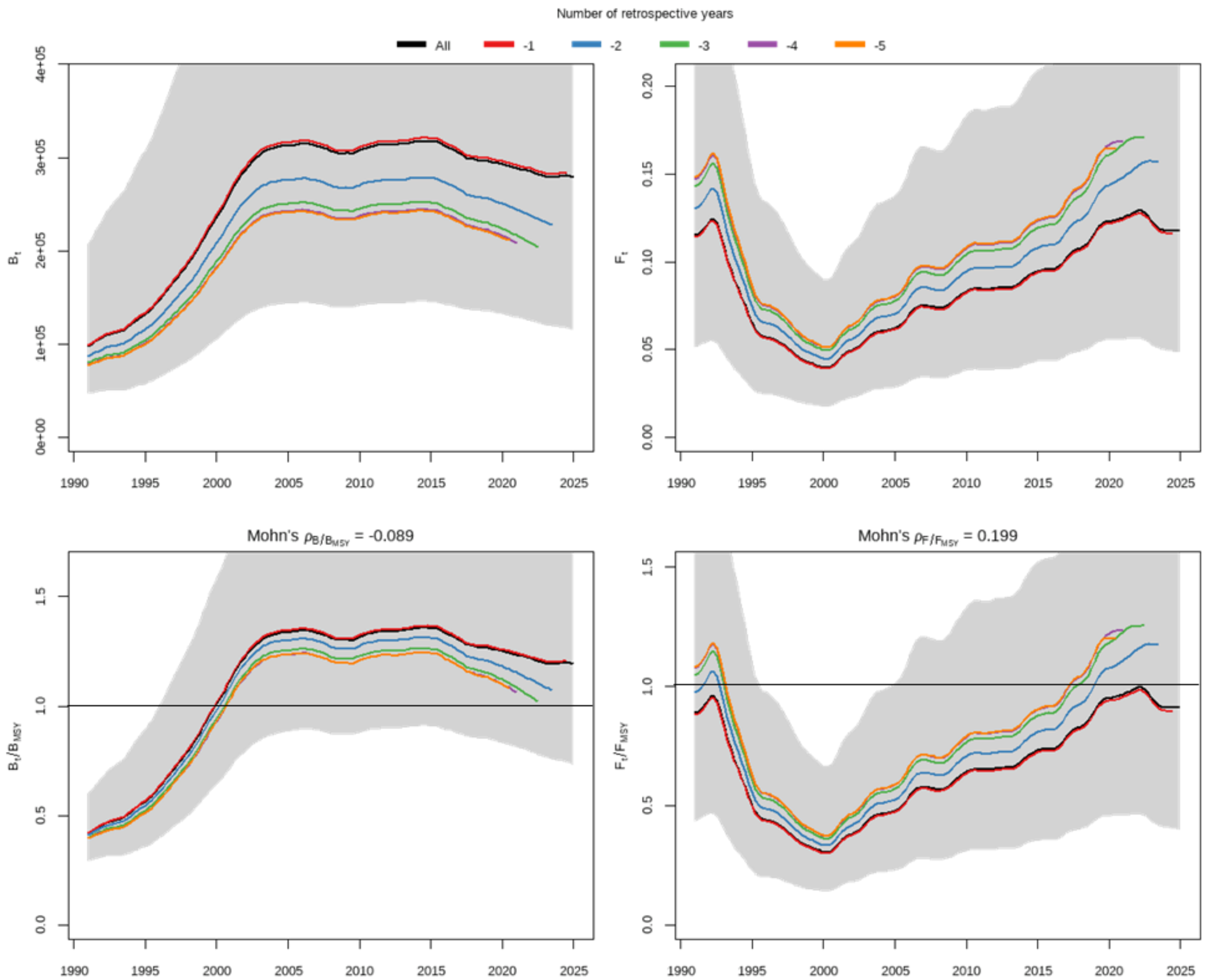


Figure 1.9. Five-year retrospective plots of fishing mortality and fishable biomass. Upper left: absolute biomass; upper right: absolute F; lower left: relative biomass; lower right: relative F. Mohn's rho values were calculated for relative values. Shaded regions indicate 80% confidence intervals.

g) Reference Points

The SPiCT model was used to derive reference points for the stock. Scientific Council considers that 30% B_{msy} is a suitable biomass limit reference point (B_{lim}) and F_{msy} a suitable fishing mortality limit reference point (F_{lim}) for stocks where a production model is used. At present, the risk of the stock being below B_{lim} is less than 1% and the risk of being above F_{lim} is 41.7%. The NAFO PA Framework also established reference points $B_{trigger}$ as 75% B_{msy} and F_{target} as 85% F_{msy}. At present, the risk of the stock being below $B_{trigger}$ is 3.1% and the risk of being above F_{target} is 57%.

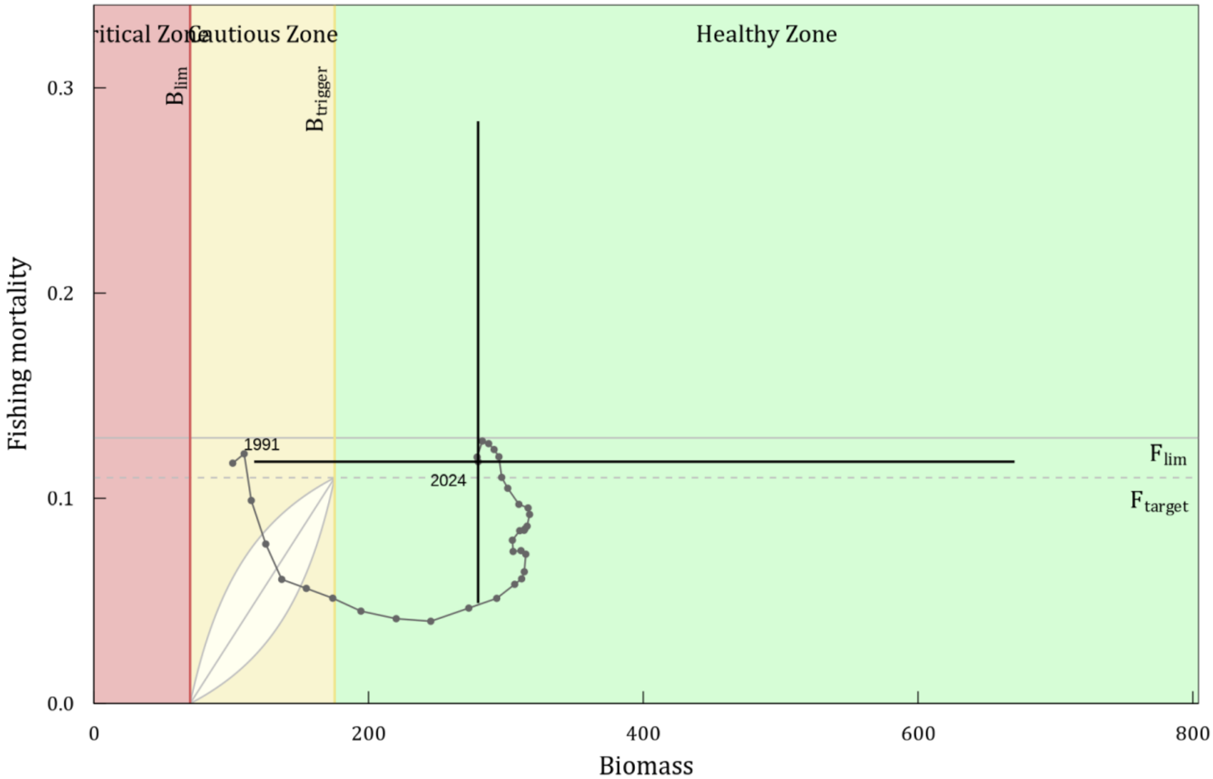


Figure 1.10. Biomass (000's t) vs fishing mortality during 1991 – 2024. Stock trajectory estimated in the SPiCT model under a precautionary approach framework. Error bars indicate the 80% confidence interval for 2024.

h) State of the stock

Biomass: Biomass is currently above B_{msy} (B/B_{msy} = 1.20). The probability of being below B_{lim} is currently < 1%. The probability of being below $B_{trigger}$ is currently 3.1%.

Fishing mortality: Fishing mortality is currently below F_{msy} (F/F_{msy} = 0.91). The probability of being above F_{msy} is currently 41.7%. The probability of being above F_{target} is currently 57%.

Recruitment: The index of age 1 abundance has been below the timeseries average (1991-2023) in the last two years. However, it is unclear if age-1 abundance is representative of future recruitment.

i) Projections: / Medium Term Considerations:

Medium-term projections were carried forward to the year 2028 for catch scenarios with catch = TAC = 33 005 t for 2025. Constant F values were applied from 2026-2028 at several levels of F including F=0, the three levels defined for stocks in the Healthy Zone (75% F_{msy}, 85% F_{msy}, and $F_{msy,}$) and three catch levels requested by Coastal States ($F_{status\ quo}$, current TAC, and 2019-2022 TAC).

For the $F_{status\ quo}$ projections, the probability that F > F_{lim} in 2027 was 50.5%. At 75% F_{msy}, the probability that F > F_{lim} in 2027 was 26.4%. Projected at the level of 85% F_{lim}, the probability that F > F_{lim} in 2027 was 36.1% and for F_{msy} projections, this probability increased to 50%. For projections at the current TAC (33 005 t) and the 2019-2022 TAC (36 370 t) the probability that F > F_{lim} in 2027 was 44.4% and 53.8%, respectively. For biomass projections, in all scenarios the probability of biomass being below B_{lim} in 2028 was less than 1%. The probability of biomass being below $B_{trigger}$ in 2028 ranged from 4.2% to 9.2% for the six explored fishing scenarios, except the F=0 scenario. The probability that biomass in 2028 is greater than biomass in 2025 is between 26.8% and 51.9% for all projections, excluding the F=0 scenario.

Table 1.2. Medium-term projections for Greenland halibut. Estimates for yield and relative biomass (B/B_{msy}) with 80% confidence interval are shown, for projected F values of F=*0*, $F_{status\ quo}$, 75%F_{msy}, 85%F_{msy} and F_{msy}, the Current TAC and the TAC during 2019-2022. Catches in 2025 were assumed at 33 005 t (TAC).

		Catch 2025 = 33 005 t						
		F=0	Healthy Zone			Coastal State Request		
			F = 0.75F_{msy}	F = 0.85F_{msy}	F = F_{msy}	F status quo	Current TAC	2019-2022 TAC
Yield (50%)	2025	33005	33005	33005	33005	33005	33005	33005
	2026	0	26811	30243	35328	35502	33005	36370
	2027	0	27043	30153	34618	34768	33005	36370
P(F>F_{lim})	2025	42%	42%	42%	42%	42%	42%	42%
	2026	<1%	25%	35%	50%	51%	44%	54%
	2027	<1%	26%	36%	50%	51%	44%	54%
P(B<B_{lim})	2025	<1%	<1%	<1%	<1%	<1%	<1%	<1%
	2026	<1%	<1%	<1%	<1%	<1%	<1%	<1%
	2027	<1%	<1%	<1%	<1%	<1%	<1%	<1%
	2028	<1%	<1%	<1%	<1%	<1%	<1%	<1%
P(F>F_{target})	2025	57%	57%	57%	57%	57%	57%	57%
	2026	<1%	39%	50%	65%	65%	59%	68%
	2027	<1%	39%	50%	64%	64%	59%	68%
P(B<$B_{trigger}$)	2025	3%	3%	3%	3%	3%	3%	3%
	2026	4%	4%	4%	4%	4%	4%	4%
	2027	<1%	4%	5%	6%	6%	6%	7%
	2028	<1%	4%	6%	8%	8%	7%	9%
P(B_{2028}>B_{2025})		96%	52%	42%	30%	29%	34%	27%
(B_{2028}-B_{2025})/B_{2025}		96%	1%	-12%	-31%	-32%	-23%	-37%
P(B_{2027}>=B_{2025})		89%	48%	42%	33%	33%	36%	31%
P(B_{2027}<B_{2025})		12%	52%	59%	67%	67%	63%	69%

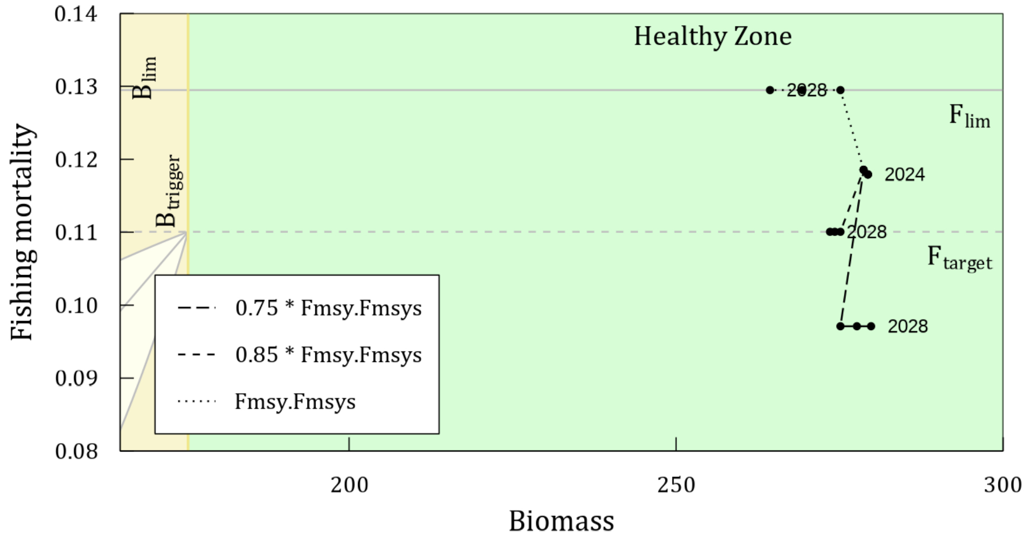


Figure 1.11. Greenland halibut 0+1 offshore: stochastic projections in the NAFO Precautionary Approach Framework from 2026-2028 at three levels of removals (0.75F_{msy}, 0.85F_{msy}, F_{msy},) with catch equal to 33 005 t for 2025. Biomass units are 000's t.

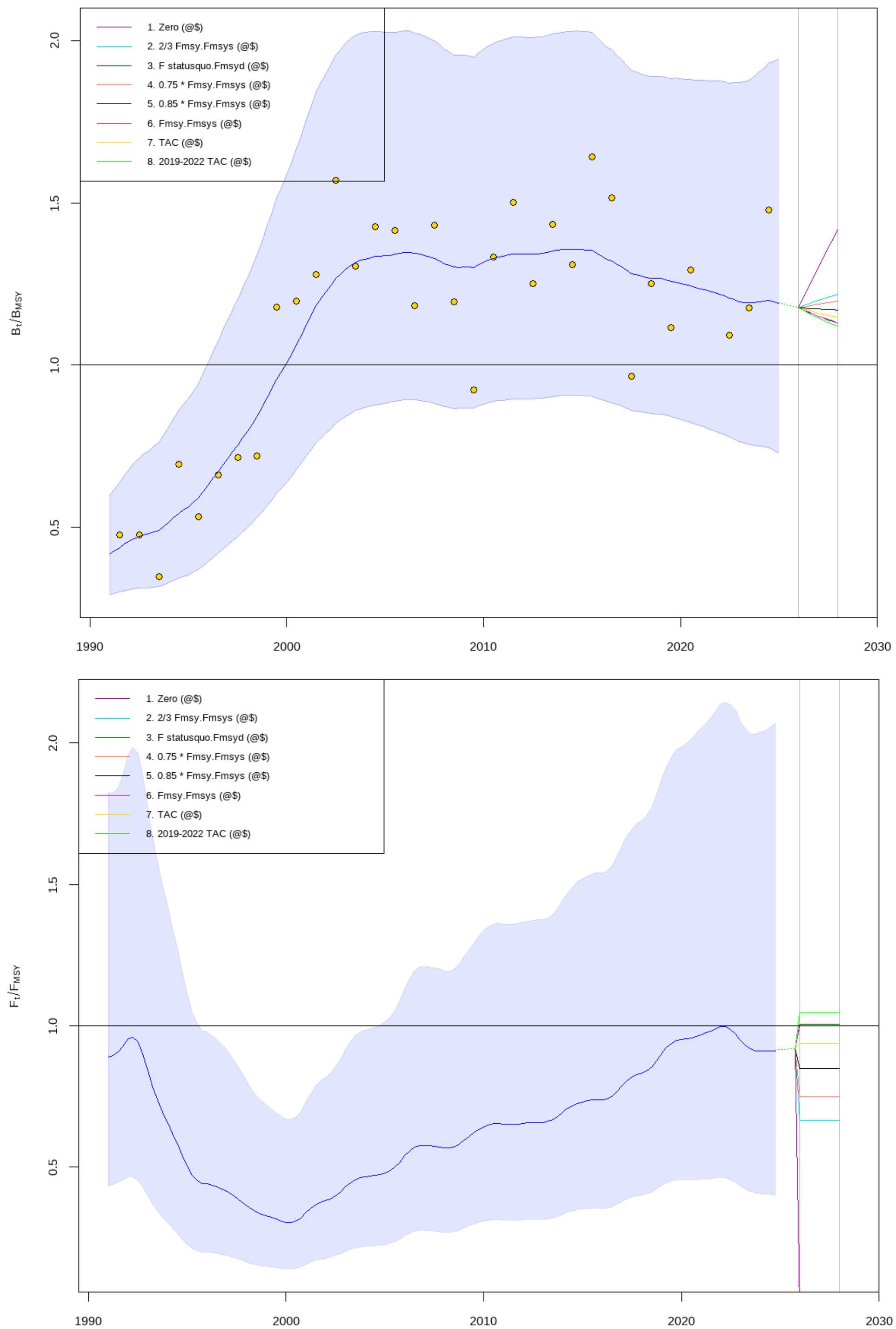


Figure 1.12. Greenland halibut 0+1 offshore: stochastic projections from 2026-2028 at eight levels of removals (F=0, 2/3F, $F_{\text{status quo}}$, 0.75F_{msy}, 0.85F_{msy} , F_{msy}, TAC, 2019-2022 TAC) with catch equal to 33,005 t for 2025. Top plot shows projected relative biomass ratios (B/B_{msy}), and lower plot is projected relative fishing ratios (F/F_{msy}). Shaded regions indicated 80% confidence intervals.

j) Research Recommendations:

STACFIS **recommends** *to further explore the reasons for the observed uncertainty in the assessment model.*

STACFIS **recommends** *to explore alternative methods for setting* F_{target} *(e.g. ICES WKLIFE XIII workshop).*

The next full assessment of this stock is expected to be in 2027.

2. Greenland halibut (*Reinhardtius hippoglossoides*) Division 1A inshore Divisions 1BC inshore, Division 1D inshore and Divisions 1EF inshore

Interim monitoring report (SCR Doc. 25/017, 018, 019, 022, 023, 024; SCS Doc. 25/12)

a) Introduction

The fishery targeting Greenland halibut developed in the Disko Bay and south Greenland in the beginning of the twentieth century. The fishery is conducted with longlines or gillnets from small vessels, open boats and through holes in the sea ice during the winter months. The fishery gradually spread from the Disko Bay to Uummannaq and Upernavik, but the catches remained low until the 1980s. The inshore stocks in West Greenland are believed to depend on recruits from the offshore stock and adults are considered isolated from the stock in Davis Strait and Baffin Bay. Inshore stocks south of division 1A were separated from the offshore stock in 2020. Advice is given for each of the three areas in division 1A on a two-year basis and a separate TAC is set for each of the inshore areas.

Disko Bay

b) Fisheries and Catches

Catches increased in the 1980s, peaked from 2004 to 2006 at more than 12 000 t, but then decreased substantially to just above 6 000 t in 2009. From this level, catches gradually increased reaching 10 760 t in 2016. In 2017, catch rates were unusually low and only 6 409 t were caught in Disko Bay. Since then, catches have gradually increased reaching 11 435 t in 2023 and 9 644 t in 2024 (Table. 2.1 and Figure 2.1.1).

Table 2.1.

	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
1A Disko Bay – TAC	9.6	9.1	9.2	11.1	10.6	10.3	11.4	12.7	13.500	10.6
1A Disko Bay - Catch	10. 8	6.4	8.4	8.8	7.6	9.0	10.3	11.4	9.6	
STACFIS Total	10. 8	6.4	8.4	8.8	7.6	9.0	10.3	11.4	9.6	

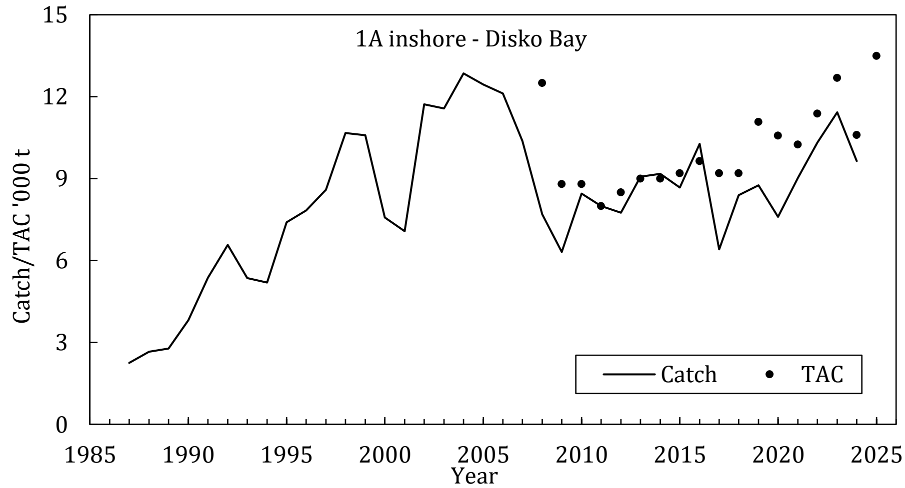


Figure 2.1.1. Greenland halibut in Division 1A inshore: Greenland halibut catches and TAC in t in Disko Bay.

c) Data overview

i) Commercial fishery data

Mean length in the landings gradually decreased for more than a decade in both the winter and summer longline fishery and in the overall mean length weighted by gear and fishing ground (Figure 2.1.2).

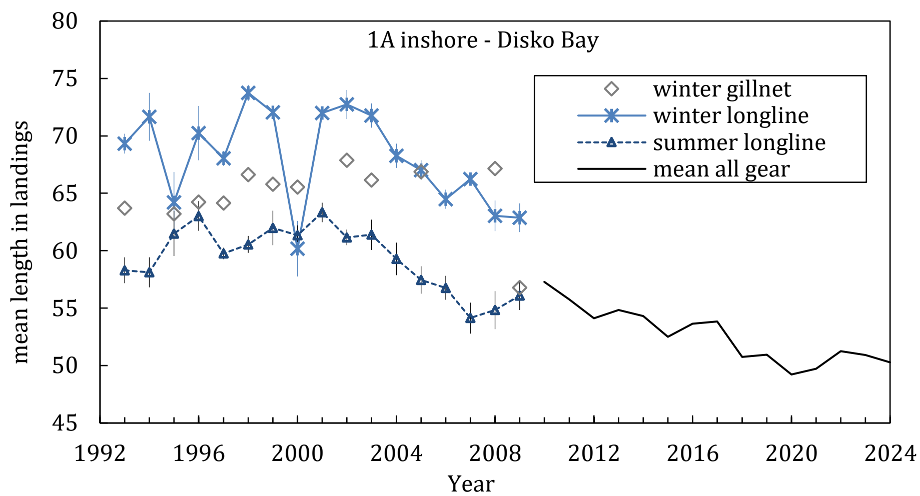


Figure. 2.1.2. Greenland halibut in Division 1A inshore: Mean length in landings from longline fishery by season (summer and winter) and overall mean taking account of fishing ground, season and gear.

ii) CPUE indices from the commercial catch

Two commercial CPUE indices are presented for the stock, one based on logbooks and one based on factory landings data (Figure 2.1.3). These indices decreased from 2007 to 2017, before increasing to 2023 and declining again in 2024.

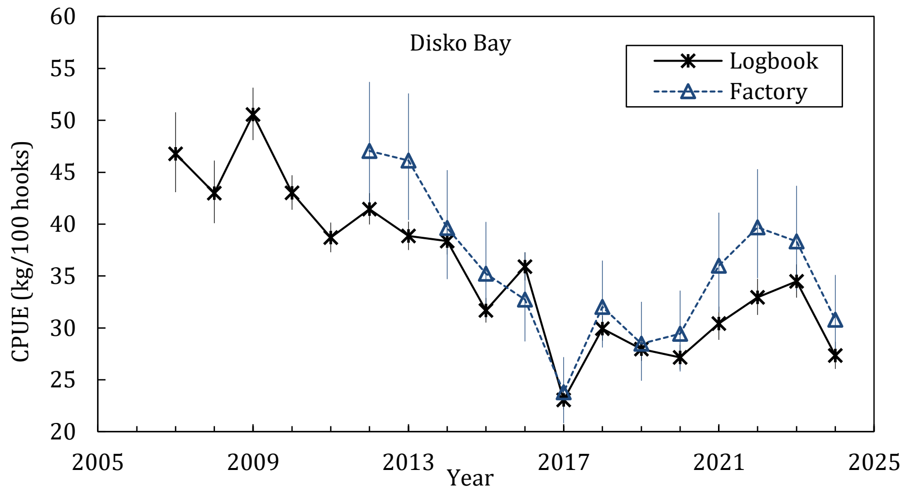


Figure. 2.1.3. Greenland halibut in Division 1A inshore: Commercial CPUE from logbooks (vessels) and factory data (vessels, boats and ice fishery) fishing in Disko Bay.

In each individual area an ALK based on age readings the surveys were combined with commercial landings and length frequencies accounting for month and gear, to create the Catch At Age bubble plot (Figure 2.1.4). The CAA indicates a gradual shift towards younger Greenland halibut in the catches and the fishery in 2024 was dominated by ages 5-9.

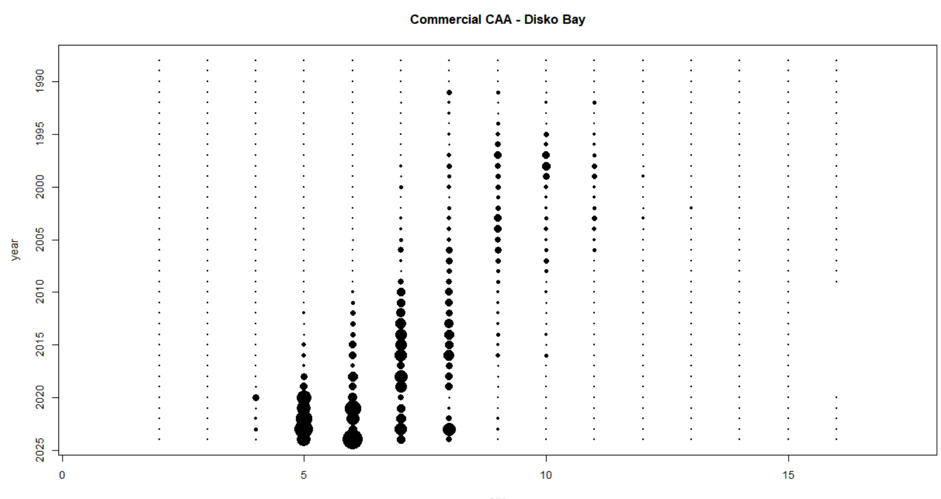


Figure. 2.1.4. Greenland halibut in Division 1A inshore: Disko Bay commercial CAA.

iii) Research surveys

The Disko Bay part of Greenland Shrimp and Fish Survey (Figure 2.1.4) indicated an increasing biomass and abundance trends during the 1990s. After the gear change in 2005, the biomass and abundance indices gradually decreased and then stabilized after 2014. The biomass indices conducted with the vessel Tarajoq started at a higher level in 2022, but has decreased since then. Ages 1 and 2 dominate in this survey leading to a fluctuating abundance index.

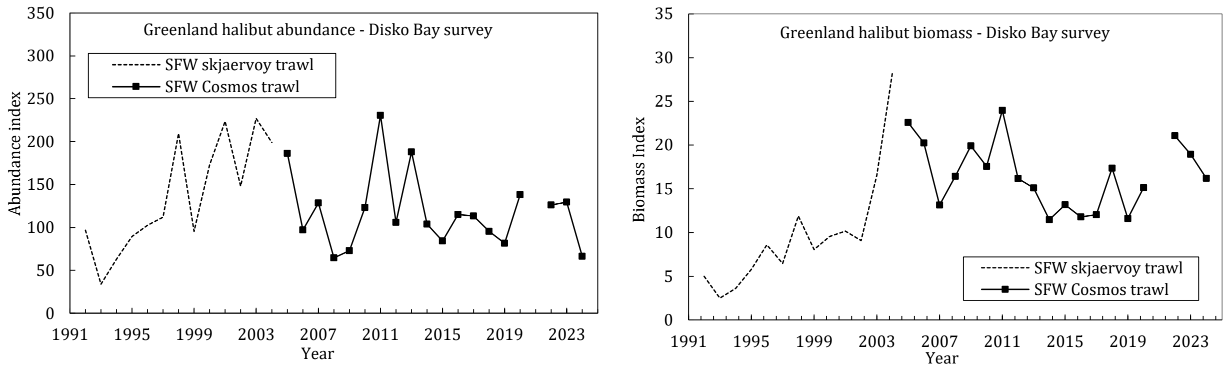


Figure 2.1.4. Greenland halibut in Division 1A inshore: Abundance and biomass indices in the Disko Bay from the Greenland Shrimp Fish trawl survey.

For the Disko Bay gillnet survey, catch in Numbers-Per-Unit-Effort (NPUE) can be taken as an index of abundance and the gillnet Catch-Per-Unit-Effort can be taken as an index of biomass (Figure 2.1.5). The NPUE slowly decreased from 2001 to 2017. After 2017 the NPUE gradually increased and has been above average since 2019. The NPUE index shows a similar trend as the abundance of Greenland halibut larger than 35 cm from the Shrimp and fish trawl survey. The increasing numbers of Greenland halibut is related to good recruitment. The gillnet survey CPUE time series show a similar trend.

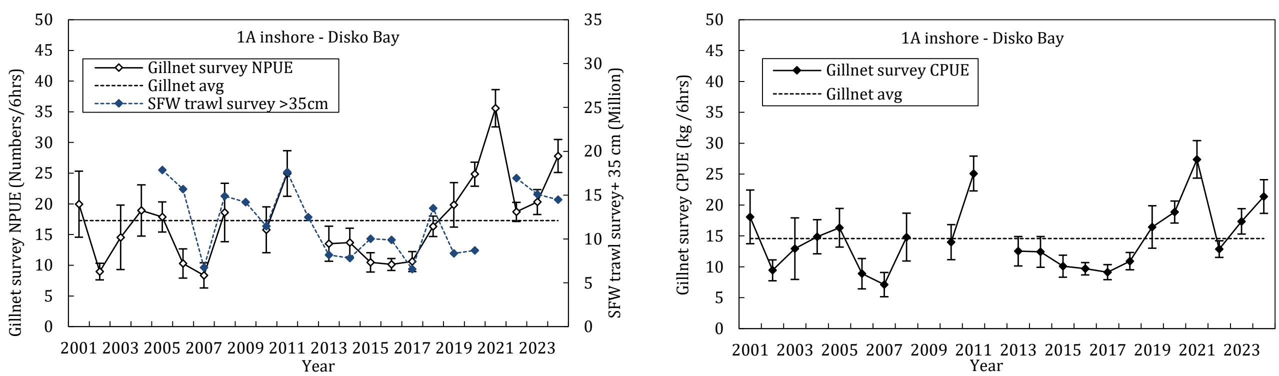


Figure 2.1.5. Greenland halibut in Division 1A inshore: Gillnet survey NPUE and CPUE +/-SE.

d) Conclusion

The ICES Harvest Control Rule 3.2 for data limited stocks combined with the survey index from the Greenland shrimp and fish survey has been used to formulate the advice since 2016. In 2024, catch advice was increased to 6 258 t.

Based on the updated indices there is no change in the perception of the stock.

Subarea 1A - Uummannaq

a) Fisheries and Catches

Catches in the Uummannaq fjord gradually increased from the 1980's, reaching 8 425 t in 1999 but then decreased to ~ 5 000 t in 2002. Since 2004, catches gradually increased reaching 10 670 t in 2020. Since then, catches have gradually decreased to 8028 t in 2024 (Table 2.2.1 and Figure 2.2.1).

Table 2.2.1

	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
1A Uummannaq - TAC	9.9	9.5	9.5	9.9	9.5	9.6	9.8	9.6	9.7	9.7
1A Uummannaq - catch	10.3	9.0	8.8	10.2	10.7	9.6	9.0	8.3	8,0	
STACFIS Total	10.3	9.0	8.8	10.2	10.7	9.6	9.0	8.3	8,0	

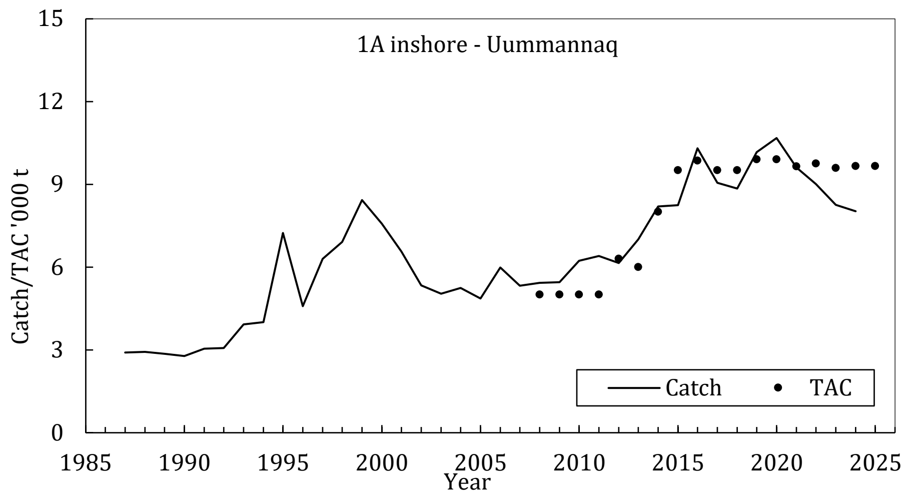


Figure 2.2.1. Greenland halibut in Division 1A inshore: catches and TAC in t in Uummannaq.

b) Data overview

i) Commercial fishery data

In Subarea 1A Uummannaq**,** the length distributions in the commercial landings have gradually decreased since 1993 (Figure 2.2.2). Since 2020 the mean size has decreased by close to 6 cm.

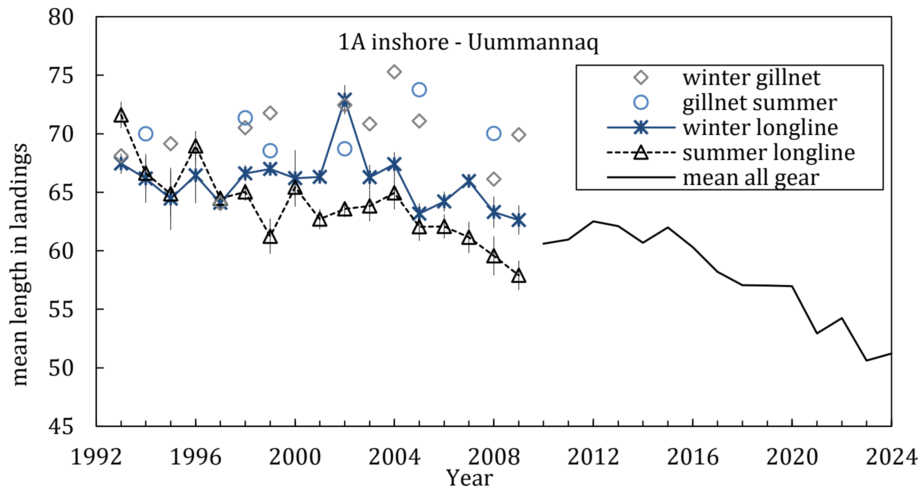


Figure 2.2.2. Greenland halibut in Division 1A inshore: Mean length in landings from longline and gillnet fishery by season and overall mean weighted by gear.

ii) CPUE indices from the commercial catch

The standardized CPUE based on logbooks and factory landings have declined since around 2014 and in 2024 they were the lowest for both series (Figure 2.2.3).

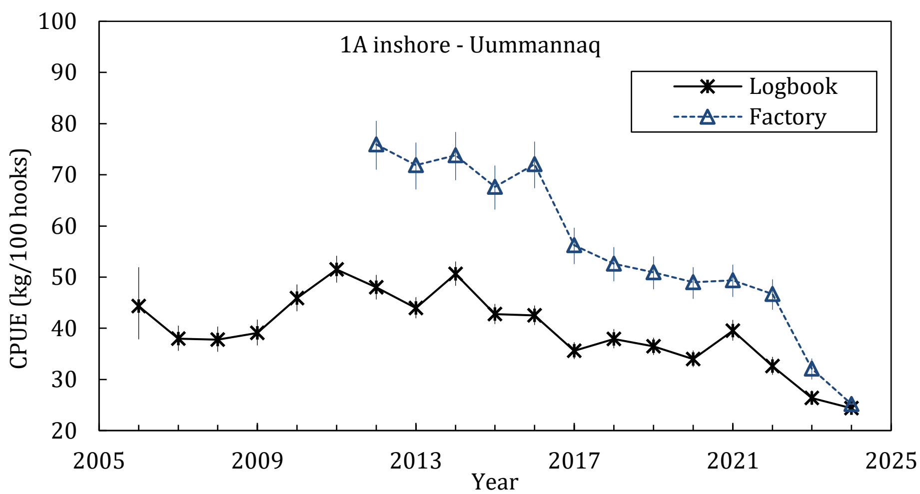


Figure 2.2.3. Greenland halibut in Division 1A inshore: Commercial CPUE from logbooks (vessels) and factory data (vessels, boats and ice fishery) fishing in Uummannaq.

The CAA indicate a gradual shift towards younger Greenland halibut in the catches and that the fishery in 2024 was mainly based on ages 5 -9 (Figure 2.2.4).

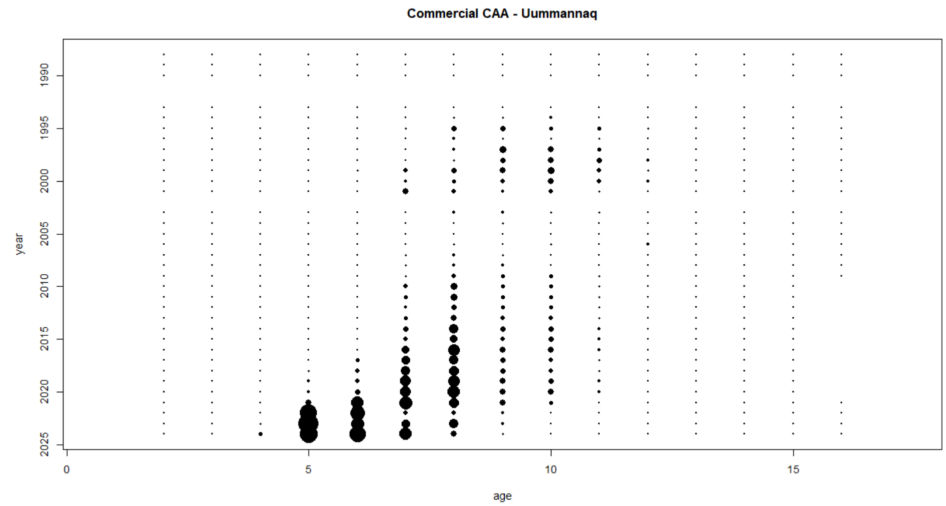


Figure 2.2.4. Greenland halibut in Division 1A inshore: Uummannaq commercial CAA.

iii) Research surveys

The Uummannaq gillnet survey indices declined from 2015-2018, increased until 2021 and have declined in the last three years (Figure 2.2.4).

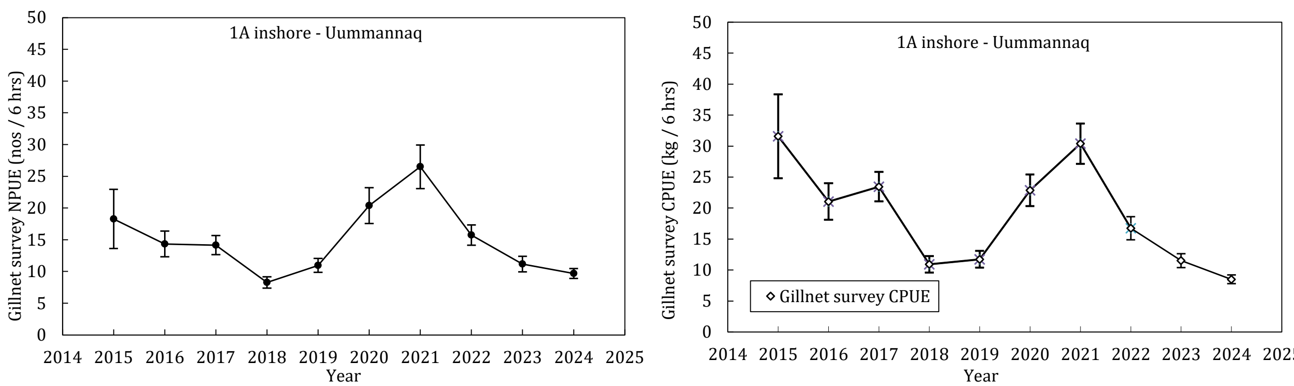


Figure 2.2.4. Greenland halibut in Division 1A inshore: Gillnet survey NPUE and CPUE +/-SE.

c) Conclusion

This stock underwent a full assessment in 2024. The ICES Harvest Control Rule 3.2 for data limited stocks combined with the Uummannaq gillnet survey index was used to formulate the advice. In 2024 a PA buffer was applied for the first time. For 2025-2026 annual catch advice was not to exceed 4 674 t.

The updated indices do not indicate a significant change in the status of the stock.

Subarea 1A - *Upernavik*

a) Fisheries and Catches

Catches increased from the mid-1980s and peaked in 1998 at a level of 7 000 t but then decreased. From 2001 catches gradually increased to a level between 7 500 and 9 000 t. In 2024 catches decreased to just 5 379 t (Table 2.3.1 and Figure 2.3.1).

Table 2.3.1 Recent catches and advice ('000 t) are as follows:

	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
1A Upernavik - TAC	9.6	9.7	9.5	8.5	8.5	9.9	10.0	9.5	9.3	9.3
1A Upernavik - Catch	7.4	6.8	7.5	9.0	7.6	8.5	7.7	7.3	5.4	
STACFIS Total	7.4	6.8	7.5	9.0	7.6	8.5	7.7	7.3	5.4	

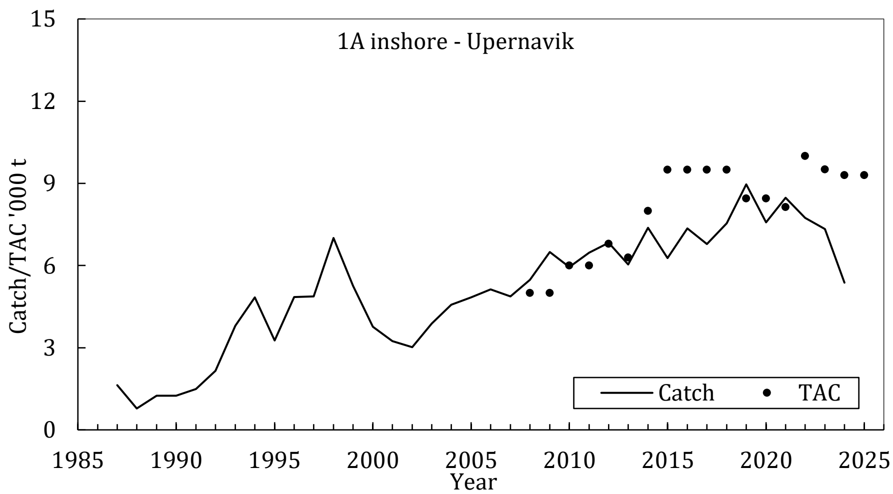


Figure 2.3.1. Greenland halibut in Division 1A inshore: Catches and TAC in t in Upernavik.

b) Data overview

i) Commercial fishery data

The mean length in the commercial landings decreased from 1993 to 1998. From 1999 to 2009, the mean length in the longline fishery remained constant, but has since decreased further. The mean length is uncertain in 2024 due to low numbers of length measurements in the commercial landings.

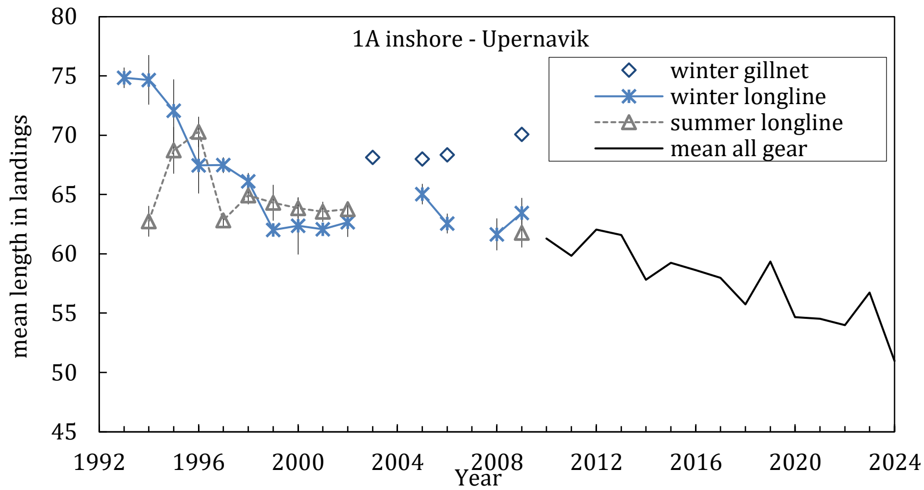


Figure 2.3.2. Greenland halibut in Division 1A inshore: mean length in landings from longline fishery by season (summer and winter) and after 2010 overall mean taking account of fishing ground, season and gear.

ii) CPUE indices from the commercial catch

CPUE based on logbooks gradually decreased from 2006. The CPUE based on factory landings data show an identical trend from 2012 to 2022 (Figure 2.3.3). The difference between the indices beginning in 2023 may be caused by differences in fishing grounds.

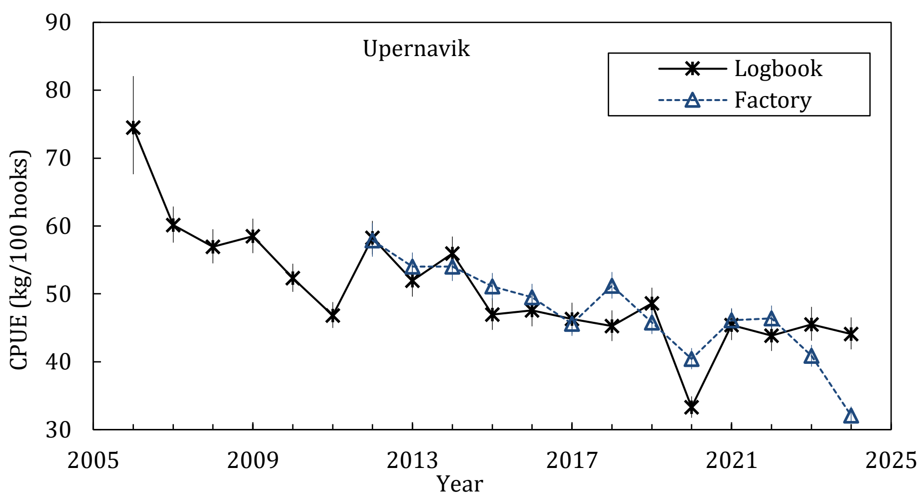


Figure 2.3.3. Greenland halibut in Division 1A inshore: Commercial CPUE from logbooks (vessels) and factory data (vessels, boats and ice fishery) fishing in Upernavik.

The CAA indicates a gradual shift towards younger Greenland halibut in the catches and that the fishery in 2024 was mainly based on ages 5-7 (Figure 2.3.4).

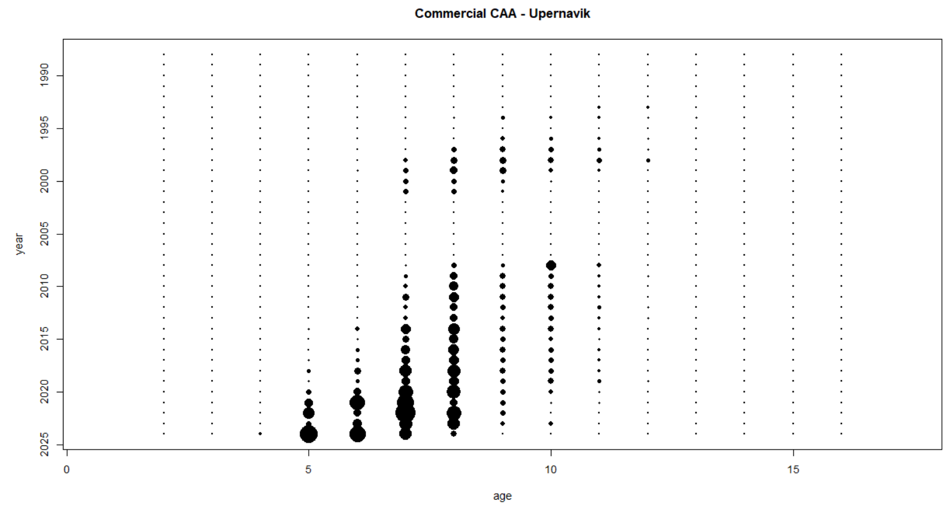


Figure 2.3.4. Greenland halibut in Division 1A inshore: Upernavik commercial CAA.

c) Research surveys

The Upernavik gillnet survey NPUE and CPUE increased in 2020 but has gradually decreased since then (Figure 2.2.4).

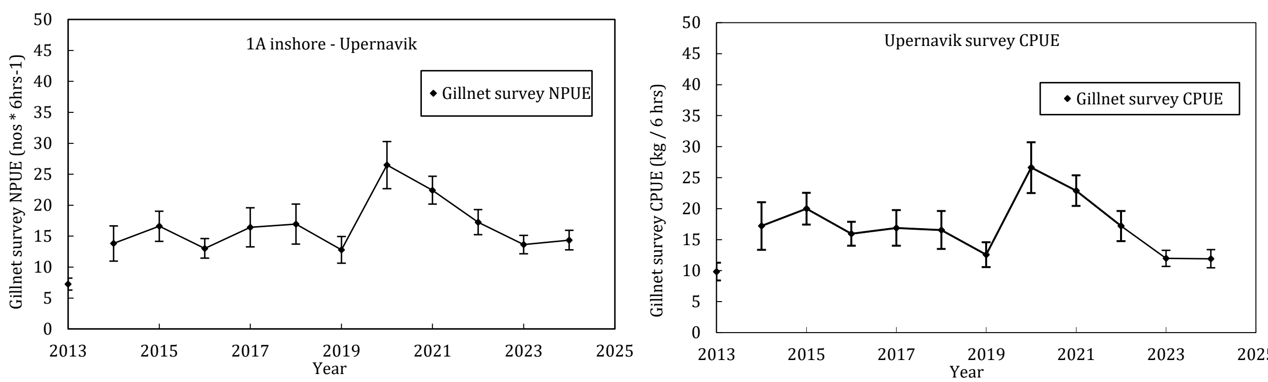


Figure 2.3.4. Greenland halibut in Division 1A inshore: gillnet survey NPUE (left) and CPUE (right) +/-SE.

d) Conclusion:

This stock underwent a full assessment in 2024. The ICES Harvest Control Rule 3.2 for data limited stocks combined with the survey gillnet survey index was formulate the advice. For 2025-2026 annual catch advice was not to exceed 5 801 t.

The updated indices do not indicate a change in the status of the stock.

e) Research recommendation

STACFIS **recommended** that *work continue on the surplus production model in a Bayesian framework or SPiCT.*

STATUS: ongoing work on SPiCT model development occurred and future work is expected.

STACFIS **recommends** *investigation of mesh size selectivity on abundance biomass indices in the gillnet survey.*

These stocks will next be assessed in 2026.

3. Demersal redfish and deep-sea redfish (*Sebastes* spp.) in Subarea 1

Interim monitoring report (SCR Doc. 20/052, 23/039, 25/020, 021; SCS Doc. 25/12)

a) Introduction

There are two demersal redfish species of commercial importance in NAFO Subarea 1, golden redfish (*Sebastes norvegicus*) and demersal deep-sea redfish (*Sebastes mentella*). Connectivity to other redfish stocks off East Greenland, the Irminger Sea, the Newfoundland and Labrador Shelf, and Iceland is unclear.

b) Fisheries and Catches

Both redfish species (*S. norvegicus* and *S. mentella*) are included as redfish in the catch statistics. The fishery targeting demersal redfish in SA1 increased during the 1950s and peaked in 1962 at more than 60 000 t. Catches then decreased and have remained below 1 000 tons per year after 1986 with few exceptions. Recent catches of redfish in subarea 1 is (excluding beaked pelagic redfish) is a mixture of bycatches of recruits small enough to pass through the sorting grids in shrimp trawls and a by-catches in other fisheries (Figure 3.1).

Recent catches ('000 tons) are as follows:

	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
TAC	1	1	1	0	0	0	0	0	0	0
STATLANT 21	0.2	0.2	0.2	0.1	0.2	0.4	0.3	0.3	0.3	
STACFIS	0.2	0.2	0.2	0.1	0.2	0.3	0.3	0.3	0.3	

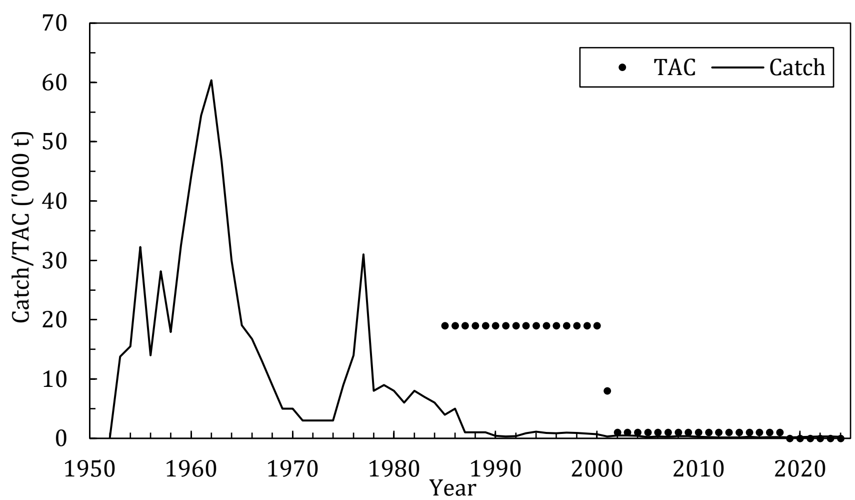


Figure 3.1. Demersal redfish in Subarea 1: catches and TAC.

c) Data overview

i) Research surveys

There are 5 surveys of relevance for the stocks of demersal redfish in Subarea 1.

Golden redfish (*Sebastes norvegicus*)
The EU-Germany survey biomass index decreased in the 1980's and was at a very low level in the 1990s (Figure 3.2). Increasing biomass indices of golden redfish were observed from 2005 to 2015, but the updated indices in 2016 and 2020 were at a lower level.

The Greenland shrimp and fish survey biomass index increased gradually from 2006 to 2016 and decreased thereafter. High indices in 2016 and 2019 were due to single hauls of large adult Golden redfish (45-70 cm) that provided the majority of the total biomass estimate in those years. The EU-Germany survey and the Greenland shrimp and fish survey show similar overall trends with decreasing indices in the most recent decade. The Greenland deep-sea survey and the historic Greenland-Japan survey is less informative due to limited survey depth overlap with the depth distribution of Golden redfish.

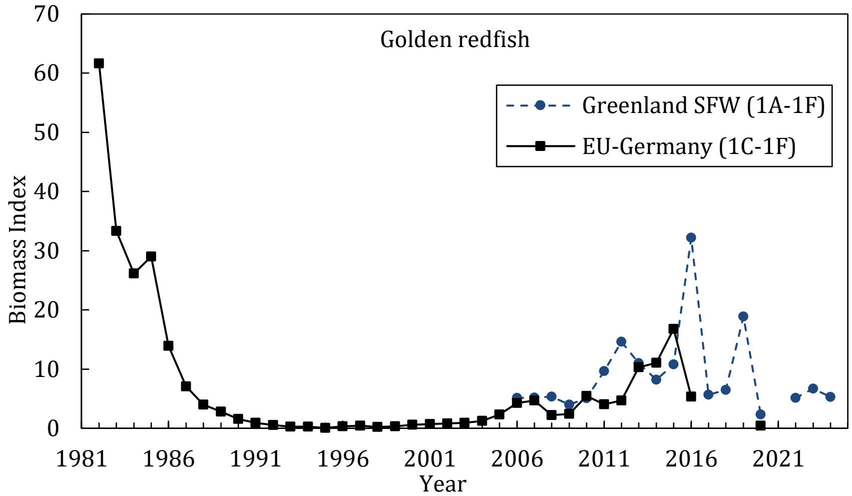


Figure 3.2. Golden redfish biomass indices in the EU-Germany survey and the Greenland shrimp and fish survey (no surveys in 2021).

Demersal deep-sea redfish (*Sebastes mentella*)
The Greenland-Japan survey (1BCD 400-1500m) biomass index gradually decreased from 1987 to 1995 (Figure 3.3). The Greenland deep-sea survey (1CD 400-1500m) had low biomass indices from 1997 to 2006 (Figure 3.3). After 2006, the Greenland deep-sea survey and the Greenland shrimp and fish survey biomass indices show similar increasing trends (Figure 3.3). Both surveys had decreasing biomass indices since 2013 (excluding outlier years in 2016 and 2023). The high 2016 biomass index in the Greenland shrimp and fish survey was caused by a single haul in division 1D of adult deep-sea redfish between 25 and 40 cm and is not considered reflective of population trends. The EU-Germany survey is less informative due to limited survey depth overlap with the depth distribution of deep-sea redfish.

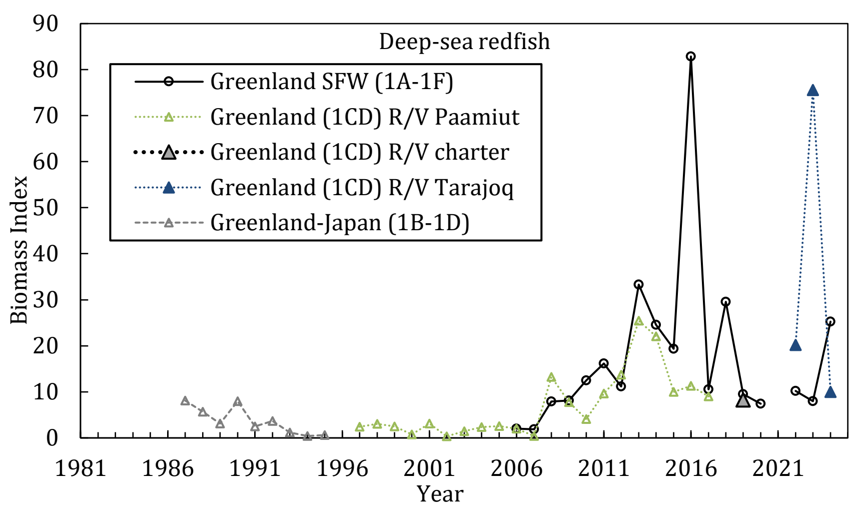


Figure 3.3. Demersal deep-sea redfish survey biomass from the Greenland shrimp and fish survey, the Greenland deep-sea survey and the Greenland-Japan survey.

Juvenile redfish (<17cm both species combined)
The EU-Germany survey regularly found juvenile redfish from 1984 to 2000. From 2001 to 2011, the abundance of juvenile redfish in the survey gradually decreased to a low level and from 2012 to 2015 no redfish less than 17 cm were identified in the survey (Figure 3.4). Recent increasing recruitment is not comparable to past recruitment due to lack of historic separation of redfish species and recruits in the Greenland shrimp and fish survey.

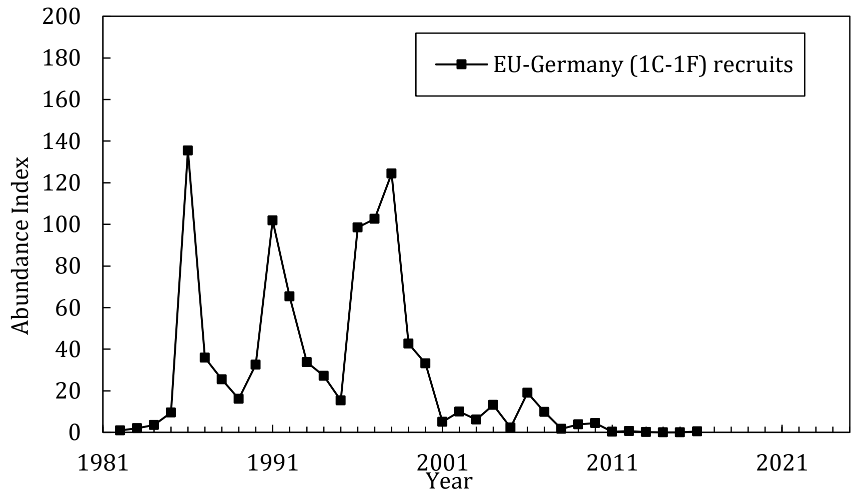


Figure 3.4. Juvenile redfish abundance indices for the EU-Germany survey (*Sebastes sp.* <17cm).

d) Conclusion

Golden redfish - *Sebastes norvegicus*

The stock was assessed in 2023 for the 2024-2026 period and current advice is "No directed fishery". With the updated indices there is no basis for a reassessment. Recruitment has been at a low level from 2008-2018 and the biomass indices in the surveys remain low.

Deep-sea redfish - *Sebastes mentella*

The stock was assessed in 2023 for the 2024-2026 period and current advice is "No directed fishery". With the updated indices there is no basis for a reassessment. Recruitment has increased in the recent 5 years but has been at a low level from 2008-2018 and the biomass indices in the surveys remain low.

e) Research Recommendations

SC **recommends** that *species composition and length-frequency distribution data from the Greenland shrimp and fish survey should be re-analysed to inform on recruitment for this stock.*

This stock will be monitored by interim monitoring report until such time as monitoring suggests a change in stock status.

4. Wolffish in Subarea 1

Interim monitoring report (SCR Doc. 20/052, 25/020; SCS Doc. 25/12)

a) Introduction

Three species of wolffish are common in Greenland. Only Atlantic wolffish (*Anarhichas lupus*) and spotted wolffish (*Anarhichas minor*) are of commercial interest. Northern wolffish (*Anarhichas denticulatus*) is an unwanted discarded bycatch. Atlantic wolffish has a more southern distribution and seems more connected to the offshore banks and the coastal areas. Spotted wolffish can be found further north in West Greenland than Atlantic wolffish both in the fjords and offshore.

b) Fisheries and catches:

Wolffish are primarily taken as a bycatch in other fisheries. The commercial fishery for wolffish in West Greenland occurred from the 1950s to 1979 with catches of around 5 000 t per year (Figure 4.1). After 1980, the cod fishery gradually stopped in West Greenland and catches of wolffish also decreased during this period. To minimize by-catch in the shrimp fishery, offshore trawlers targeting shrimp have been equipped with 22mm grid separators since 2002 and inshore (Disko Bay) trawlers since 2011. Since 2015, reported catches have been at a lower level.

Recent nominal catches (000 t) for Atlantic wolffish and spotted wolffish.

	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Atlantic wolffish TAC	1.0	1.0	1.0	0	0	0	0	0	0	0
Spotted wolffish TAC	1.0	1.0	1.0	0	0	0	0	0	0	0
Combined wolffish TAC	2.0	2.0	2.0	0	0	0	0	0	0	0
STATLANT 21	0.2	0.2	0.3	0.2	0.2	0.3	0.2	0.2	0.2	
STACFIS	0.2	0.2	0.3	0.2	0.2	0.3	0.2	0.2	0.2	

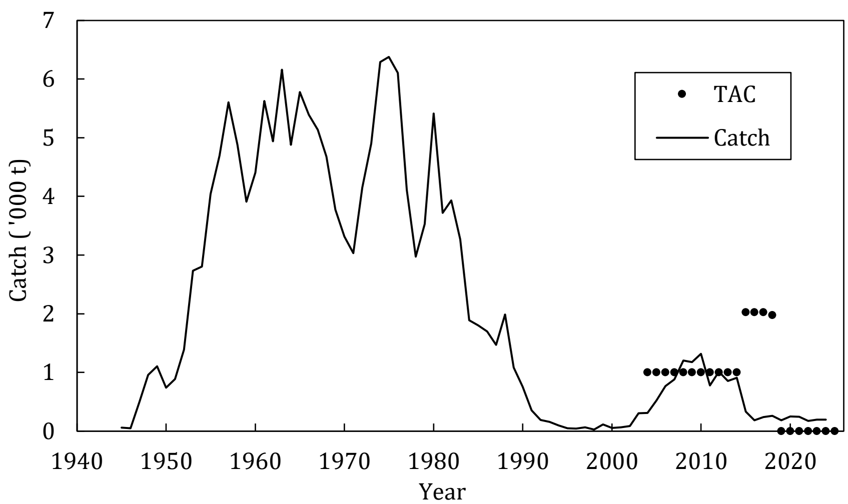


Figure 4.1. Wolffish in NAFO Subarea 1: Catches and TACs for Atlantic wolffish and spotted wolffish combined.

c) Data Overview

i) Research surveys

Indices for Atlantic wolffish and spotted wolffish are derived the EU-Germany survey and the Greenland shrimp and fish survey.

Atlantic wolffish:

The biomass index decreased substantially from 1982 to 1984 and continued to decrease until the late 1990's. Biomass was low from 1995 to 2015 (Figure 4.2). The EU-Germany abundance index of Atlantic wolffish was stable from 1982 to 2005 and then gradually decreased (Figure 4.2). However, the decrease may be related to a gradual reduction of the surveyed area. The Greenland Shrimp and fish survey biomass index slowly increased both before and after the gear change in 2005 (Figure 4.2) The abundance index has gradually increased throughout the time series (disregard the two extreme outlier years 2005 and 2015) (Figure 4.2). The increasing abundance and biomass in the Greenland SFW survey has partly been observed in divisions 1A-B, thus outside the EU-Germany survey area.

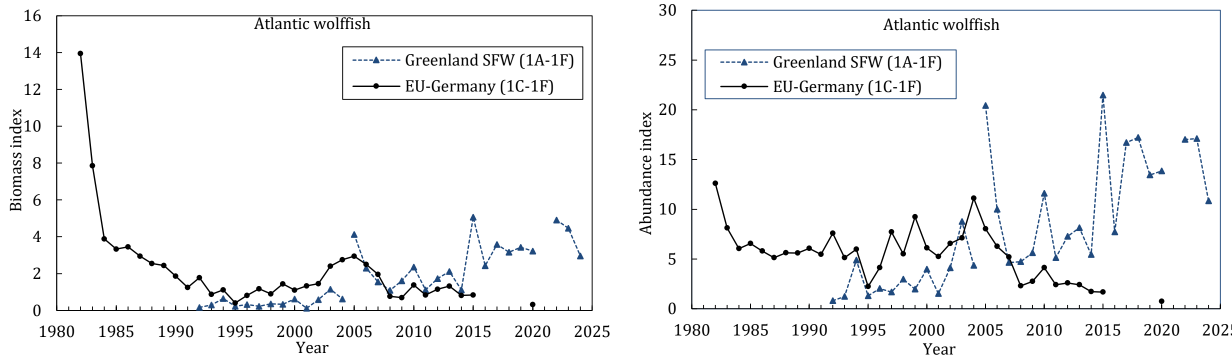


Figure 4.2. Atlantic wolffish survey biomass index (left) and abundance index (right) from the surveys.

Spotted wolffish:

The EU-Germany survey biomass index decreased from 1982 to 1984 and remained at low levels during the 1990s (Figure 4.3). From 2004, the survey biomass increased, and the recent indices in 2013 to 2015 and 2020, were at the level observed at the beginning of the 1980s (Figure 4.3). The Greenland SFW survey biomass index, was at low levels during the 1990s. During the two most recent decades, the survey biomass index has gradually increased, although slightly decreasing since 2020 (Figure 4.3).

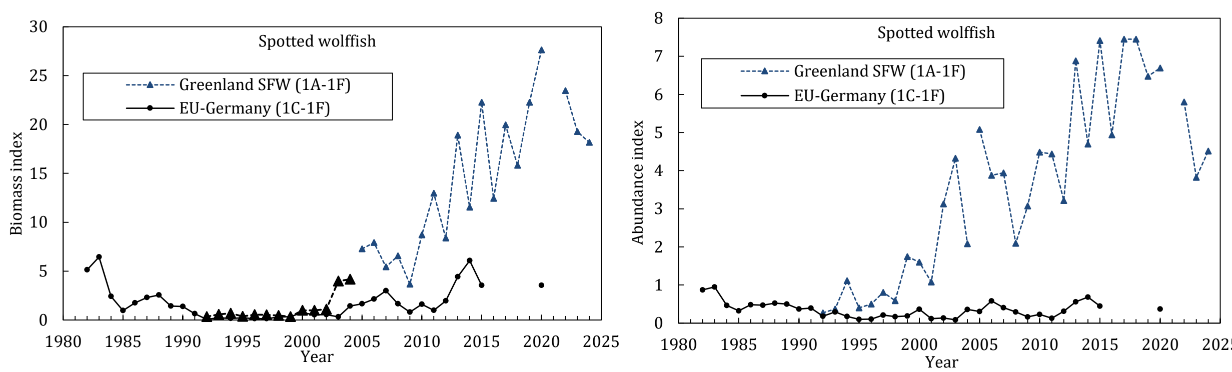


Figure 4.3. Spotted wolffish survey biomass index (left) and abundance index (right) from the Greenland SFW and the EU-Germany survey.

d) Conclusion

Atlantic wolffish

The biomass index of the EU-Germany survey was below the long term average in 2020. The survey biomass and abundance indices continue to increase in the Greenland Shrimp and fish survey. However, based on the updated indices here is no indication of any change in the stock.

Spotted wolffish

Recent advice is 775 tonnes of Spotted wolffish. The biomass index decreased slightly in the Greenland shrimp and fish survey and the abundance also decreased slightly. Based on the updated indices there is no indication of any major change in the stock.

e) Research Recommendations

SC **recommends** *investigation of fishing mortality and recruitment proxies*.

These stocks will next be assessed in 2026.

STOCKS ON THE FLEMISH CAP (NAFO DIVISION 3M)

Environmental Overview

The waters around Flemish Cap are a mixture of Labrador Current Slope Water and North Atlantic Current water. With temperatures ranging from 3-4°C and salinities between 34 and 34.75, these waters are generally warmer and saltier than the polar waters of the Newfoundland Shelf. The general circulation in the vicinity of the Flemish Cap consists of the offshore branch of the Labrador Current, which flows through the Flemish Pass, and a jet that flows eastward north of the Cap and then southward east of the Cap. To the south, the Gulf Stream flows to the northeast to form the North Atlantic Current and influences waters around the southern areas of the Cap (Figure 1). In the absence of strong wind forcing the circulation over the central Flemish Cap is dominated by a topographically induced anti-cyclonic (clockwise) gyre. Variability in the abiotic environment affects the distribution and biological productivity of Newfoundland and Labrador Shelf and Slope waters where arctic, boreal, and temperate species coexist. The elevated temperatures on the Flemish Cap result in relatively ice-free conditions potentially allowing for longer phytoplankton growth seasons compared to the cooler Grand Banks. Additionally, the entrainment of nutrient-rich North Atlantic Current water around the Flemish Cap generally supports higher primary and secondary production compared to adjacent shelf waters. The stability of the circulation pattern may also promote retention of ichthyoplankton over the Grand Bank which could influence year-class strength of various fish and invertebrate species.

5. Golden redfish (*Sebastes norvegicus*) in Division 3M

Interim monitoring report (SCR Doc. 25/004, 24/032; SCS Doc. 25/05, 07, 08, 09)

a) Introduction

There are three species of redfish that are commercially fished on the Flemish Cap: deep-sea redfish (*Sebastes mentella*), golden redfish (*Sebastes norvegicus*) and Acadian redfish (*Sebastes fasciatus*). The term beaked redfish refers to *S. mentella* and *S. fasciatus* combined. Due to difficulties with identification and separation, all three species are reported together as 'redfish' in the commercial fishery. All species have both pelagic and demersal concentrations. Redfish species are long lived with slow growth.

The separation of the three species is conducted in the EU research survey. This requires extensive sampling efforts by trained experts to examine internal features of individual redfish. The percentage per depth range of the three species in the EU Flemish Cap surveys is used to separate the reported (reported together as redfish) Div. 3M commercial catches into golden and beaked redfish. This method is also applied in assessments of beaked redfish.

b) Fisheries and Catch

Catches of golden redfish in Division 3M increased from 1 158 t in 2006 to a peak of 7 662 t in 2009. In 2010, catches decreased and remained relatively stable until 2014 between 2 000 and 3 000 t. After 2014, catches decreased continuously to low levels over 2016 to 2024. EU-Portugal, EU-Spain, the Russian Federation and EU-Estonia are responsible for the majority of the redfish landings.

Recent catches and TACs ('000 t) are as follows:

	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
TAC[1]	7.0	7.0	10.5	10.5	8.6	8.4	10.9	11.2	17.5	17.5	15.6
STATLANT 21[1]	6.6	7.1	10.5	10.5	8.6	8.6	NA[3]	NA[3]	NA[3]		
STACFIS Total catch[1]	6.6	7.1	10.5	10.5	8.8	8.3	10.0	9.7	9.5		
STACFIS Catch[2]	0.4	0.3	0.1	0.3	0.1	0.1	0.6	0.3	0.2		

[1] TAC, STATLANT 21 and STACFIS Total catch refer to all three redfish species combined.
[2] STACFIS golden redfish catch estimate, based on golden redfish proportions on observed catch.
[3] NA - In 2022-24, STATLANT 21 information is incomplete.

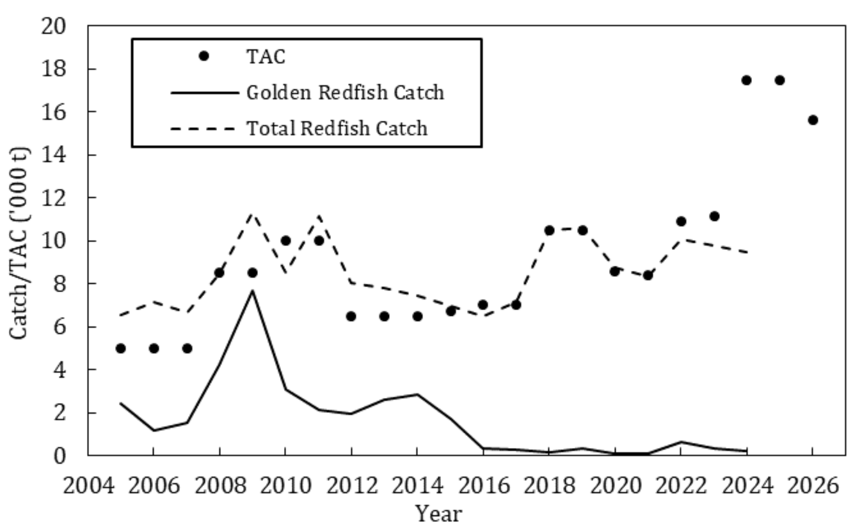


Figure 5.1. Golden redfish in Div. 3M: Catches of golden redfish, combined TACs and catches of all three redfish species.

c) Data Overview

i) Research surveys

The 1988-2024 EU survey biomass and abundance indices for golden redfish are presented in Figure 5.2. Besides some sporadic small peaks, the survey abundance and biomass oscillated since the beginning (1988) of the series until 2003 at low levels. From 2004 to 2008 both measured a huge increase that could not be explained only by recruitment. Since then, biomass and abundance have declined and in 2024 are at low levels. Survey results are noisy, with the characteristic variance of redfish indices, but broad trends show through the noise.

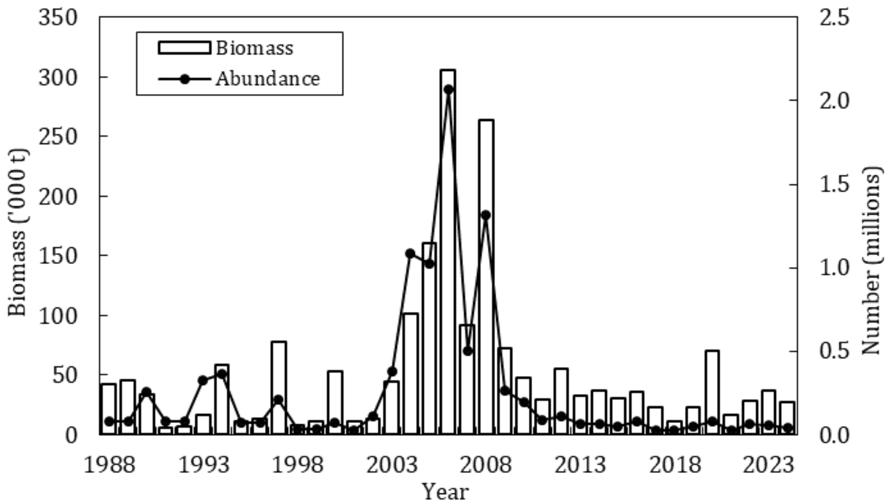


Figure 5.2. Golden redfish in Div. 3M: EU biomass and abundance indices, 1988-2024.

d) Conclusions

The perception of the stock status has not changed.

Given the current state of the stock, it was not considered appropriate to apply any assessment model or to give advice for golden redfish separately. Nevertheless, as in previous years, advice for golden redfish is given indirectly based on the Div. 3M beaked redfish assessment. A percentage corresponding to the golden redfish is added to the advice for beaked redfish. This percentage is calculated as the average of the percentages of golden redfish found in the total redfish catches of the last 3 years. Scientific Council will continue to monitor the golden redfish stock status and provide advice as part of the beaked redfish advice.

The next assessment of the stock is planned when the dynamic of the stock changes.

6. Cod (*Gadus morhua*) in Division 3M

Full assessment (SCS Doc. 25/05REV, 07, 08, 09; SCR Doc. SCR 25/004, 032)

a) Introduction

The cod fishery on the Flemish Cap has traditionally been a directed fishery by Portuguese trawlers and gillnetters, Spanish pair-trawlers and Faroese longliners. Since the reopening of the fishery in 2010, the fleet has been composed exclusively by trawlers and longliners. Cod has also been taken as bycatch in the directed redfish fishery.

The mean reported catch was 32 000 t from 1963 to 1979 with high inter annual variability. Reported catches declined after 1980, when a TAC of 13 000 t was established, but Scientific Council regularly expressed its concern about the reliability of some catches between 1963 and 1988. Alternative estimates of the annual total catch since 1988 were made available in 1995 (Figure 6.1), including non-reported catches and catches from non-Contracting Parties.

The fishery was under moratorium between 1999 and 2009. Annual bycatches between 2000 and 2005 were estimated to be below 60 t, increasing since then until the reopening of the fishery in 2010 with a TAC of 5 500 t. Since 2013, catches have remained at the level of the TAC; except in 2024, when catches were 91% of the TAC.

Recent catches ('000 t) are as follow:

	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
TAC	13.9	13.9	11.1	17.5	8.5	1.5	4.0	6.1	11.7	12.6
STATLANT 21[1]	13.3	13.9	11.2	17.4	8.5	1.9	NA	NA	NA	
STACFIS	14.0	13.9	11.5	17.5	8.5	2.1	4.0	6.0	10.6	

[1]NA - In 2022-2024, STATLANT 21 information is incomplete.

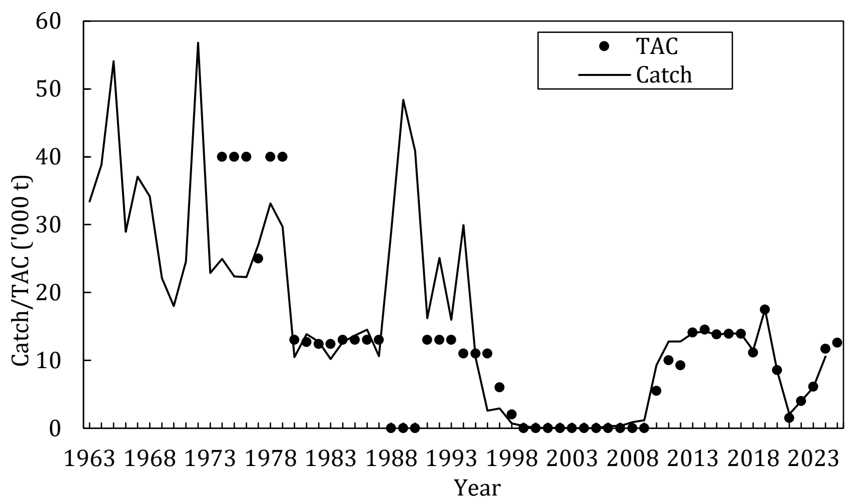


Figure 6.1. Cod in Division 3M: STACFIS catches and TAC.

b) Data Overview

i) Commercial Fisheries

In 2024 six countries fished cod in Div. 3M: trawlers from EU-Portugal, EU-Spain, United Kingdom and Russia and longliners from Faroes and Norway.

Length and age compositions from the commercial catches are available from 1972 to 2024 with the exception of the 2002 to 2005 period. In 2024 there were commercial length distributions from EU-Portugal, EU-Spain, Russia, United Kingdom, Faroes and Norway. Given the low level of sampling by EU-Spain, the samples were not considered to be representative of the total catch of that fleet. For this reason, those samples were not considered (Figure 6.2). In 2024, the total commercial length distribution presents the mode around 54 cm. Since 2013, the commercial catch at age data has been generated using Age Length Keys (ALK) from the EU survey. In 2023 and 2024, the ALK from the EU survey is not available, so the average of the last three years available (2020-2022) was used. Since 2015, ages 5 to 8+ have been the most abundant in the catch. In 2024, the most fished age was 4 (Figure 6.3).

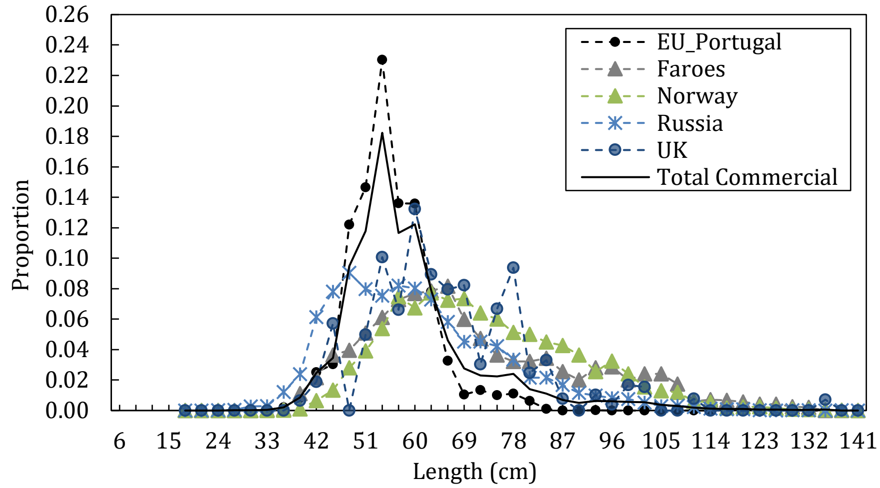


Figure 6.2. Cod in Division 3M: Length distribution of the commercial catches that were used in the assessment in 2024.

Figure 6.3. Cod in Division 3M: Commercial catch proportions at age.

ii) Research surveys

Canadian survey. Canada conducted research surveys on the Flemish Cap from 1978 to 1985 on board the R/V Gadus Atlantica, fishing with a lined Engels 145 otter trawl. The surveys were conducted annually in January-February covering depths between 130 and 728 m. From a high value in 1978, a general decrease in biomass and abundance can be seen until 1985, reaching the lowest level in 1982 (Figure 6.4).

EU survey. The EU Flemish Cap survey has been conducted since 1988 in the summer with a Lofoten gear type. The survey indices showed a general decline in biomass going from a peak value in 1989 to the lowest observed level in 2003. The biomass index increased from 2004 to 2014 and decreased until 2019. The growth of several strong year classes over 2005 to 2012 contributed to the increase in the biomass. Abundance rapidly increased between 2005 and 2011, declined from 2012 to 2019. These low levels in 2019 were followed by a slight increase in both indices, which has become more pronounced in 2023 and 2024, when biomass increased to the level of 2014. The difference in timing of the peaks in biomass and abundance over 2011-2018 is driven by the very large 2009 and 2010 year classes.

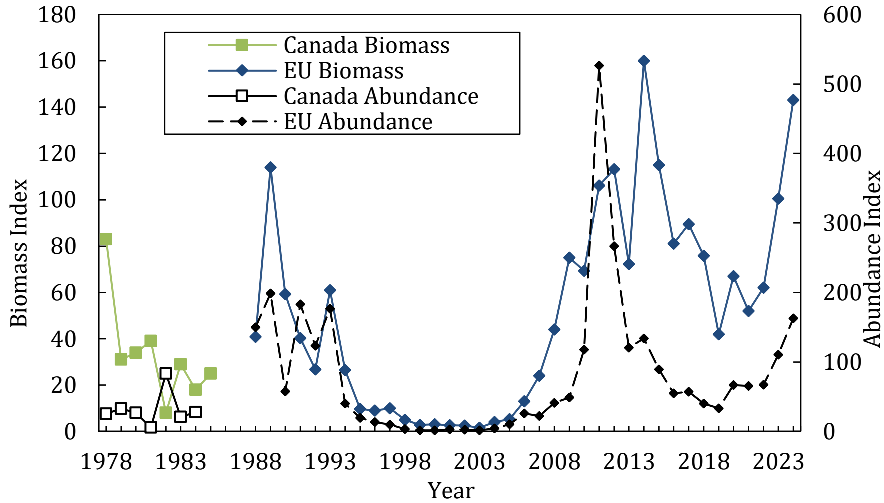


Figure 6.4. Cod in Division 3M: Survey abundance and biomass estimates from Canadian survey (1978-1985) and EU Flemish Cap survey (1988-2024).

c) Recruitment

Three peaks in recruitment can be seen in 1982-1983, 1991-1992 and 2010-2012. Since 2019, recruitment has increased slightly after a period of 4 years with very low values, although in 2022-2024 recruitment was low (Figure 6.5).

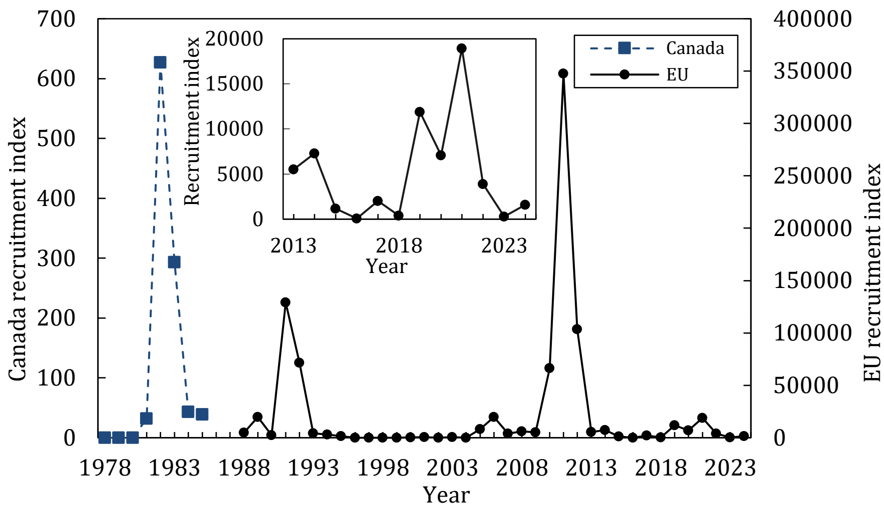


Figure 6.5. Cod in Division 3M: Number at age 1 in the Canadian survey (1978-1985) and EU survey (1988-2024). Inset plot depicts recruitment since 2013.

i) Biological parameters

The 2023 and 2024 age indices were derived from the average ALK from the EU survey for the period 2020 to 2022. Mean weight-at-age in the stock and in the catch had been decreasing continuously after the reopening of the fishery, until 2017-2019. Since then, both remain more or less stable (Figures 6.6 and 6.7).

Maturity ogives are available from the EU Flemish Cap survey for almost all years between 1988 and 2022. These were modelled using a Bayesian framework with missing values replaced with interpolations from adjacent years. Since 2023, the maturity ogive is not available, so the average of the last three available years was used (2020-2022). There was a continuous decline of the A50 (age at which 50% of fish are mature), going from above 5 years old in the late 1980s to just below 3 years old in 2002 and 2003. An upward trend is present in A50 from 2005 to 2016, remaining since then quite stable around 5 years old (Figure 6.8).

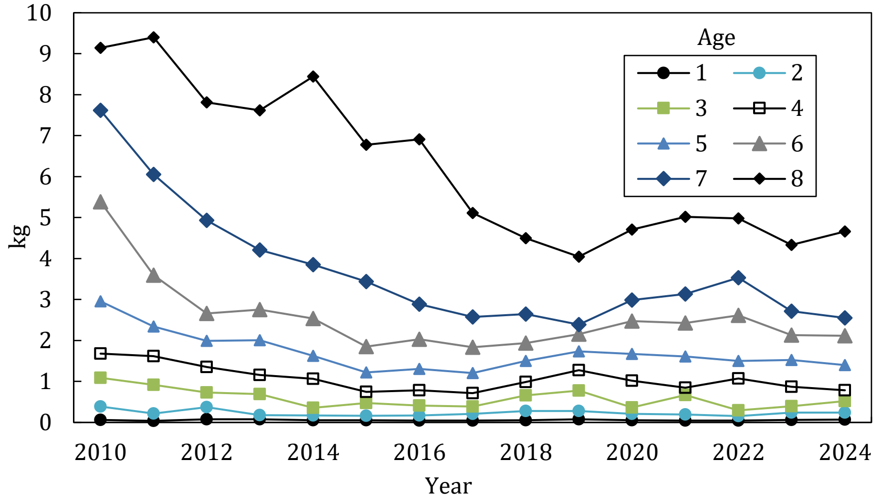


Figure 6.6. Cod in Division 3M: Mean weight-at-age in the stock for the 2010-2024 surveys.

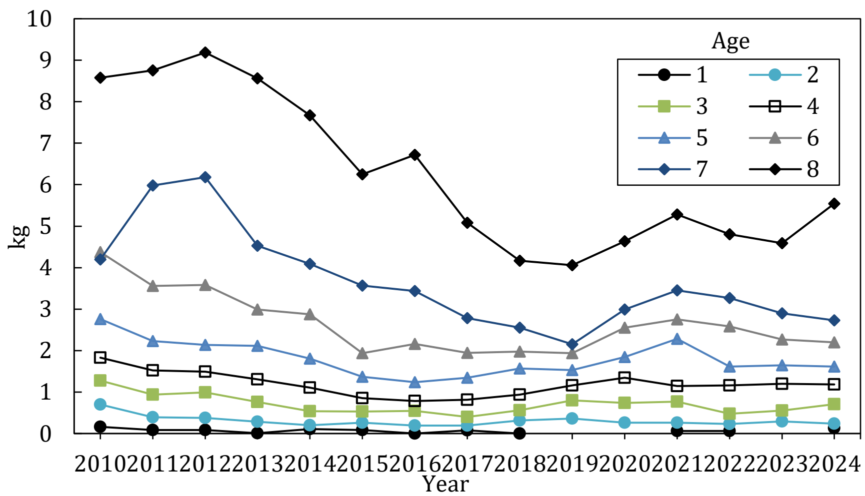


Figure 6.7. Cod in Division 3M: Mean weight-at-age in the catch for 2010-2024.

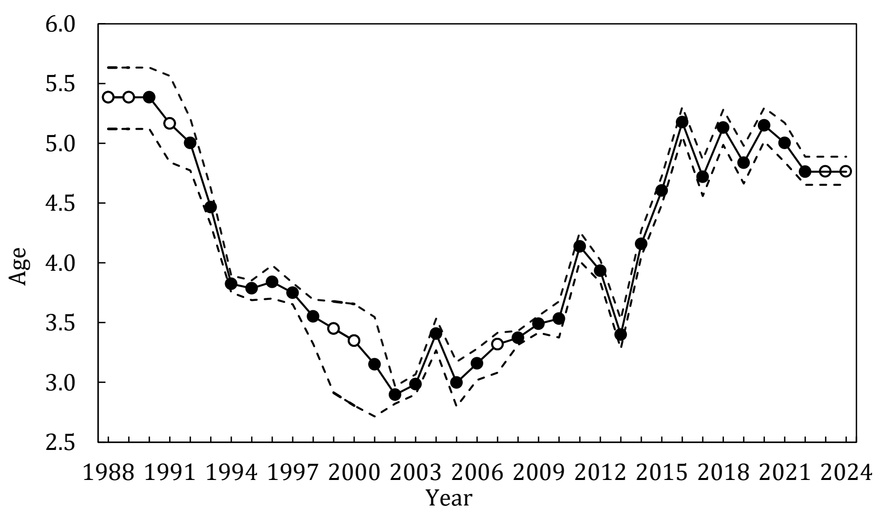


Figure 6.8. Cod in Division 3M: Age at 50% maturity (median and 90% confidence intervals) EU-Flemish Cap survey (1988-2024). Interpolated years are represented in white circles.

d) Estimation of Parameters

A Bayesian SCAA model, introduced at the 2018 benchmark, was used as the basis for the assessment of this stock with data from 1988 to 2024. Input data and settings are as follows:

Catch data: catch numbers and mean weight at age for 1988-2024, except for 2002-2005, for which only total catch is available. STACFIS estimates for total catch were used.

Tuning: numbers at age from EU Flemish Cap survey (1988-2024).

Ages: from 1 to 8+

Catchability analysis: dependent on stock size for age 1, estimated independently for ages 1 to 3 and for 4+ as a group.

Natural Mortality: M was set via a lognormal prior constant over years and variable through ages. Prior median is the same as last year assessment.

Additional priors: for recruitment in all the years, for the number-at-age for ages 2-8+ in the first year, for a year factor for F (f), for selectivity (rC), and for the natural mortality.

Likelihood components: for total catch, for catch numbers-at-age and numbers-at-age of the survey.

The model components are defined as follows:

Input data	Model component	Parameters
R 1988-2024	$LN(medrec, cvrec)$	*medrec*=45000, *cvrec*=10
N(1988,a), a=2-8+	Ages 2-7 $LN\left(median = medrec \times e^{-\sum_{age=1}^{a-1} M(age)+medFsurv(age)}, cv = cvsurv\right)$ Ages 8+ $LN\left(median = medrec \times \frac{e^{-\sum_{age=1}^{A-1}(M(age)+medFsurv(age))}}{1-e^{-M(A+)+medFsurv(A+)}}, cv = cvsurv\right)$	*medFsurv*(1,…,7)={0.0001, 0.1, 0.5, 0.7, 0.7, 0.7, 0.7} *cvsurv*=10
f(y) y=1988-2024	Year 1988 $LN(median = medf,\ cv = cvf)$ Years 1989-2024 $LN(median = AR(1)\ over\ f,\ cv = cvf)$	*medf*=0.2, *cvf*=4
rC(y,a), a=2,8+ 1988-2024	Year 1988 $LN(median = medrC(a),\ cv = cvrC(a))$ Years 1989-2024 $LN(median = last\ year\ rC,\ cv = cvrCcond)$	*medrC*(a)=c(0.01,0.3,0.6,0.9,1,1,1), *cvrC*(a)=c(4,4,4,4,4,4) *cvrCcond*=0.2
Total Catch 1988-2024	$LN\left(median = \sum_{age=1}^{A+} mu.C(y,age)\, wcatch(y,age), cv = cvcW\right)$ $mu.C(y,a) = N(y,a)\left(1-e^{-Z(y,a)}\right)\frac{F(y,a)}{Z(y,a)}$	*cvCW=0.077*

Catch Numbers at age, a=2,8+ 1988-2024	$LN\left(median = mu.C\left(y,a\right),\ cv = cv.C\right)$	*cv.C*=0.2
EU Survey Indices (I) 1988-2024	$I(y) \sim LN\left(median = \mu(y,a),\ cv = cvEU\right)$ $\mu(y,a) = q(a)\left(N(y,a)\dfrac{e^{-\alpha Z(y,a)} - e^{-\beta Z(y,a)}}{(\beta-\alpha)Z(y,a)}\right)^{\gamma(a)}$ $\gamma(a)\begin{cases} \sim N(\text{mean}=1, \text{variance}=0.25),\ if\ a=1 \\ =1,\ if\ a \geq 2 \end{cases}$ $\log(q(a)) \sim N(\text{mean}=0, \text{variance}=5)$	I is the survey abundance index q is the survey catchability at age N is the stock abundance index *cvEU*=0.3 α = 0.5, β = 0.58 (survey made in July) Z is the total mortality
M	$M \sim LN(medM, cvM)$	*MedM*=c(1.26,0.65,0.44,0.35,0.30,0.27,0.24,0.24) *cvM*=0.15

e) Assessment Results

Total Biomass and Abundance: The median total abundance declined between 2012 and 2016 by 78%. In 2021 a steep increase is observed, declining since then. Median biomass also declined by 58% over 2012 to 2020, and remained quite stable for the last five years (Figure 6.9).

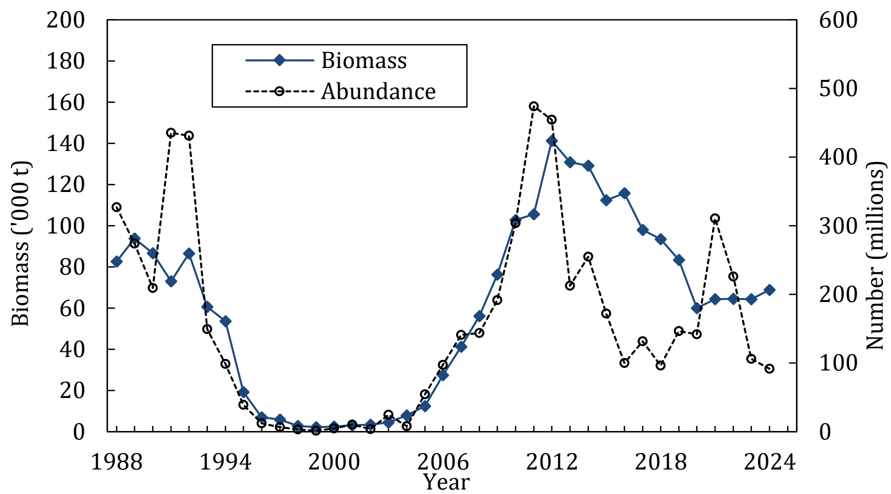


Figure 6.9. Cod in Div. 3M: Biomass and Abundance estimates.

Spawning stock biomass: Estimated median SSB (Figure 6.10) increased from 2005 to 2017, decreased until 2021 and has since been stable. The probability of being below B_{lim} in 2024 is very low (<1%). The SSB has been below $B_{trigger}$ since 2020 (Cautious Zone).

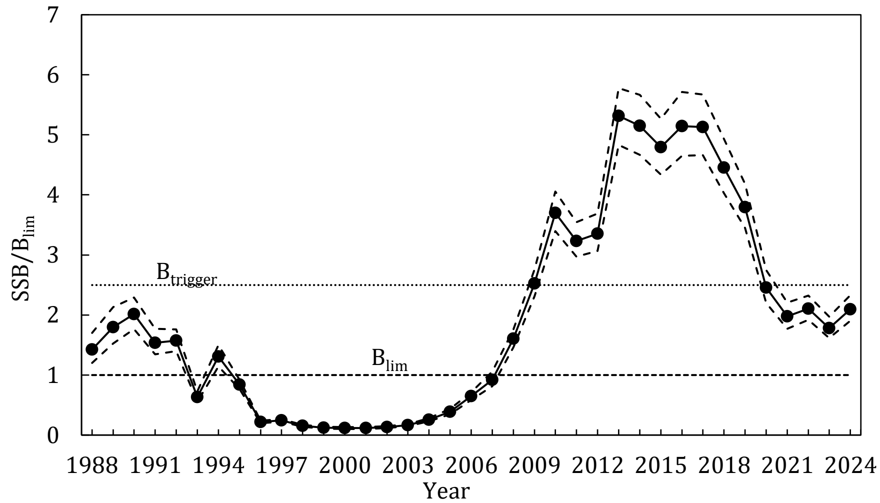


Figure 6.10. Cod in Div. 3M: Median and 80% probability intervals SSB/B_{lim} estimates. The horizontal dashed lines correspond to SSB = $B_{trigger}$ and SSB = B_{lim}.

Recruitment: Since 2013 the recruitment has oscillated around intermediate levels, much lower than those in 2011-2012 (Figure 6.11). In 2021, a good recruitment was observed, while in 2023 and 2024 has been at a very low level.

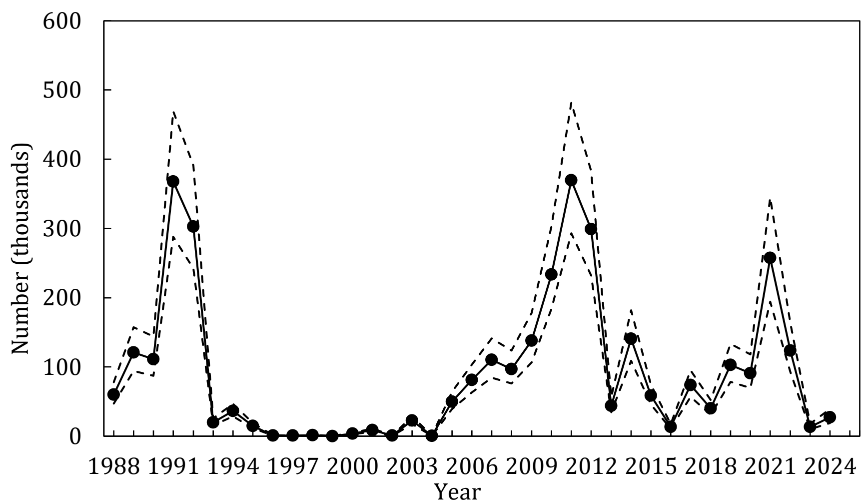


Figure 6.11. Cod in Div. 3M: Recruitment (age 1) estimates and 80% probability.

Fishing mortality: F increased in 2010 with the re-opening of the fishery but remained below F_{lim}. The F has been below F_{target} during that period except in 2011. In 2021, the minimum level of F since the re-opening was reached, increasing since then. In 2024 F is below F_{lim} and F_{target} with a high probability (Figure 6.12).

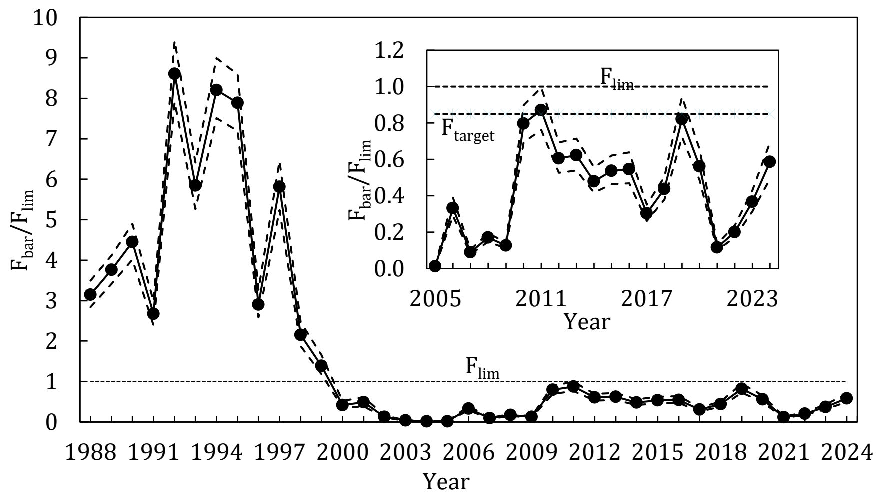


Figure 6.12. Cod in Div. 3M: F_{bar} (ages 3-5) estimates and 80% probability intervals. The horizontal dashed line corresponds to F = F_{lim}. Inset plot, depicts F_{bar}/F_{lim}, F_{bar}=F_{lim} and F_{bar}=F_{target} since 2005.

Natural mortality: The posterior median of M by age estimated by the model was:

Age	1	2	3	4	5	6	7	8
Posterior	1.35	0.59	0.33	0.23	0.25	0.38	0.34	0.36

f) Retrospective analysis

A five-years retrospective analysis with the Bayesian model was conducted by eliminating successive years of catch and survey data. Figures 6.13 to 6.16 present the retrospective estimates for age 1 recruitment, total biomass, SSB and F_{bar} at ages 3-5.

Retrospective analysis shows revisions in the recruitment, mainly regarding the highest values of recruitment in the years 2009 to 2011 and 2021. These corrections lead to subsequent revisions in the total biomass and SSB. No directional patterns in retrospective analysis are evident in recent years (Figures 6.13 to 6.15). There is very little evidence of a retrospective pattern in F, although the 2018 and 2019 values were revised downwards (Figure 6.16).

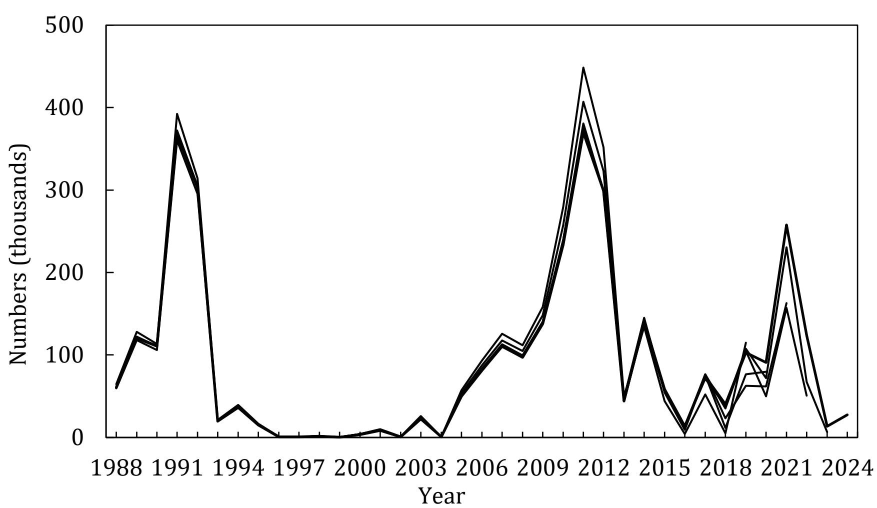


Figure 6.13. Cod in Div. 3M: Retrospective results for recruitment.

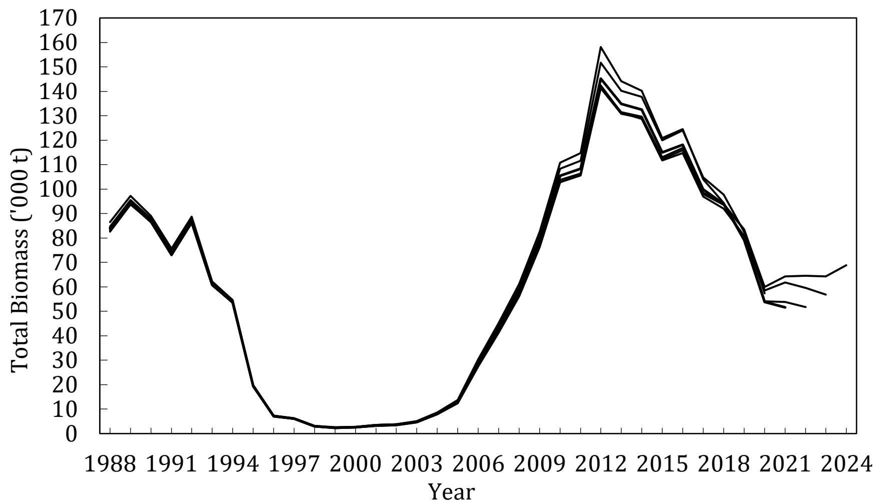


Figure 6.14. Cod in Div. 3M: Retrospective results for total biomass.

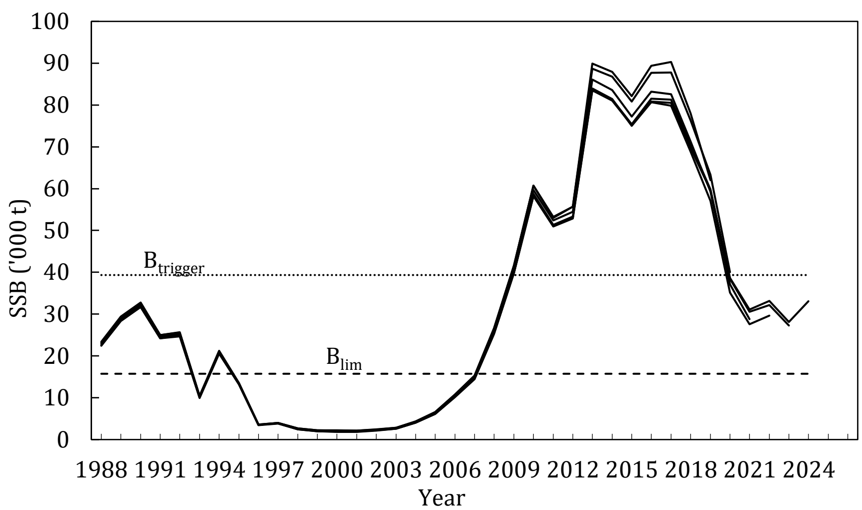


Figure 6.15. Cod in Div. 3M: Retrospective results for SSB.

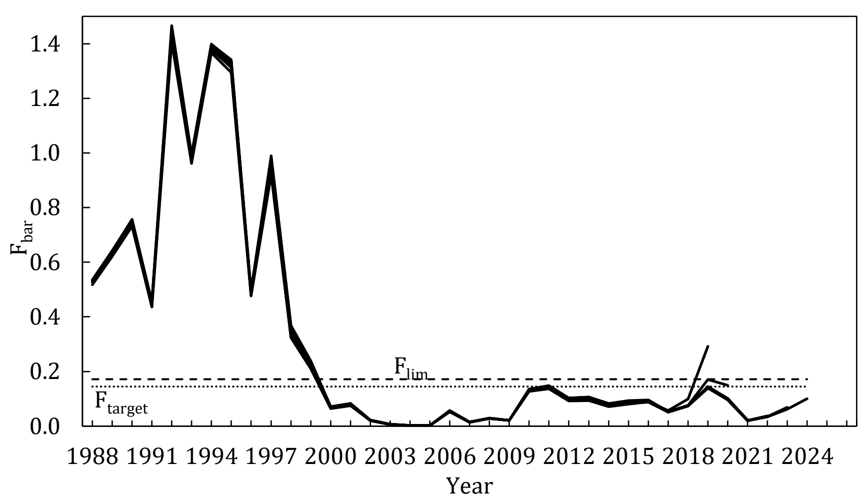


Figure 6.16. Cod in Div. 3M: Retrospective results for average fishing mortality.

g) Reference Points

In 2025, SC approved the reference points to be applied under the new Precautionary Approach Framework. B_{msy} is defined for this stock as the equilibrium SSB that corresponds to the $F_{35\%SPR}$. B_{lim} is 30% B_{msy} (B_{lim} = 15 724 t). $B_{trigger}$ is approved to be 75% B_{msy} ($B_{trigger}$ = 39 310 t). F_{lim} corresponds to $F_{35\%SPR}$ (F_{lim} = 0.171) and F_{target} is the 85% of F_{lim} (F_{target} = 0.145).

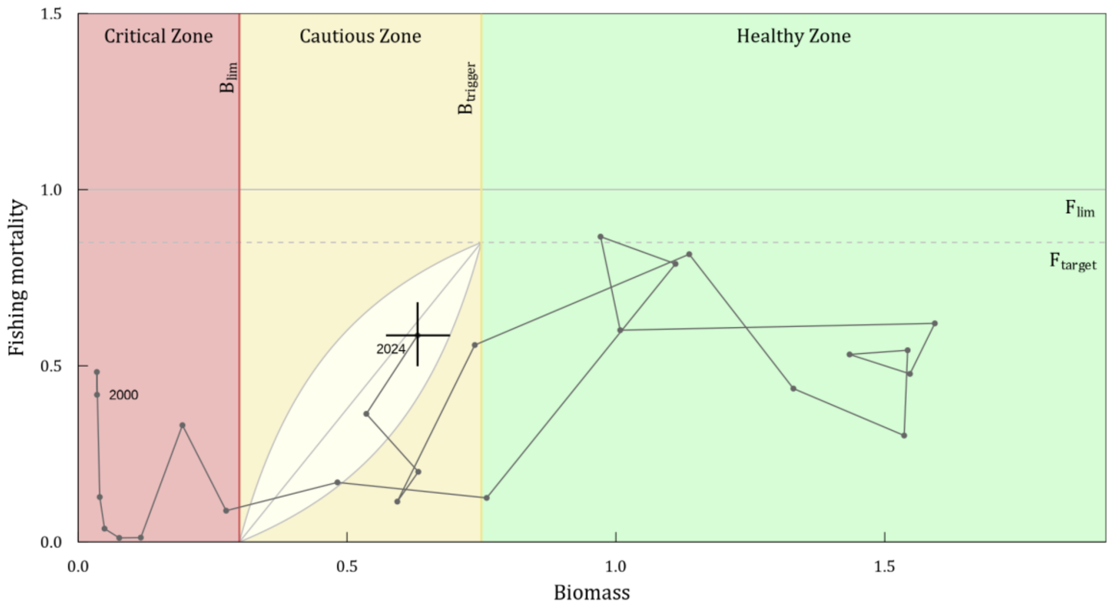


Figure 6.17. Cod in Div. 3M: Stock- F_{bar} (3-5) (posterior medians) plot in the NAFO Precautionary Approach Framework. Points plotted are from years 2000-2024.

h) State of the stock

SSB declined rapidly since 2017 but has remained stable during the last 4 years and is estimated to be above B_{lim} and below $B_{trigger}$ (Cautious Zone) in 2024. Since 2013, recruitment has varied at intermediate levels but much lower than those observed in 2011-2012. In 2021, a good recruitment was observed, while in 2023 and 2024 is at a very low level. Fishing mortality has remained below F_{lim} since the fishery reopened in 2010. The F has been below F_{target} during that period except in 2011. In 2021, the minimum level of F since the re-opening was reached, increasing since then. In 2024, F is below F_{lim} and F_{target} with high probability.

i) Stock projections

Stochastic projections were conducted. The variability in the input data is taken from the results of the Bayesian assessment. Input data for the projections are as follows:

Numbers aged 2 to 8+ in 2025: estimated from the assessment.

Recruitments for 2025-2027: recruits per spawner were drawn randomly from 2021-2023.

Maturity ogive for 2025-2027: mean of the last three years available (2020-2022) maturity ogive.

Natural mortality for 2025-2027: 2024 natural mortality from the assessment results.

Weight-at-age in stock and weight-at-age in catch for 2025-2027: mean of the last three years (2022-2024) weight-at-age.

PR at age for 2025-2027: mean of the last three years (2022-2024) PR.

F_{bar} (ages 3-5): F_{bar} = 0, the three levels defined for stock in the Healthy Zone (F_{bar} = 75% F_{lim}, F_{bar} = 85% F_{lim} and F_{bar} = F_{lim}) and an additional scenario that identified F that gave 50% probability of being in the Healthy Zone at the end of the projection period ($F_{50\%HZ}$).

All scenarios assumed that the yield for 2025 is the established TAC (12 613 t).

F_{bar} is the mean of the F at ages 3-5 and used as the indicator of overall fishing mortality.

The stock is projected to be in the Healthy Zone starting in 2025. Under the scenarios with $F_{bar} \leq F_{50\%HZ}$, SSB during the projected years will remain at the Healthy Zone (above $B_{trigger}$) with a probability higher than 50% (Tables 6.1 and 6.2 and Figures 6.18 to 6.21).

Under all scenarios, the probability of F_{bar} exceeding F_{lim} is less than or equal to 16% in 2026.

Table 6.1. Medium-term projections

	B		SSB		Yield
F_{bar}=0					
2025	72781	(64190 - 84672)	42110	(37010 - 47199)	12613
2026	70715	(59492 - 86463)	49894	(42995 - 57342)	0
2027	74739	(60797 - 93900)	54593	(47562 - 61647)	
F_{bar}= $F_{50\%HZ}$ (median=0.114)					
2025	72781	(64190 - 84672)	42110	(37010 - 47199)	12613
2026	70715	(59492 - 86463)	49894	(42995 - 57342)	15360
2027	59027	(45109 - 78281)	39297	(32323 - 46311)	
F_{bar}=0.75F_{lim} (median=0.128)					
2025	72781	(64190 - 84672)	42110	(37010 - 47199)	12613
2026	70715	(59492 - 86463)	49894	(42995 - 57342)	16948
2027	57413	(43514 - 76682)	37782	(30770 - 44755)	
F_{bar}=0.85F_{lim} (median=0.145)					
2025	72781	(64190 - 84672)	42110	(37010 - 47199)	12613
2026	70715	(59492 - 86463)	49894	(42995 - 57342)	18774
2027	55556	(41684 - 74838)	35939	(28998 - 42910)	
F_{bar}=F_{lim} (median=0.171)					
2025	72781	(64190 - 84672)	42110	(37010 - 47199)	12613
2026	70715	(59492 - 86463)	49894	(42995 - 57342)	21362
2027	52942	(39067 - 72241)	33433	(26520 - 40388)	

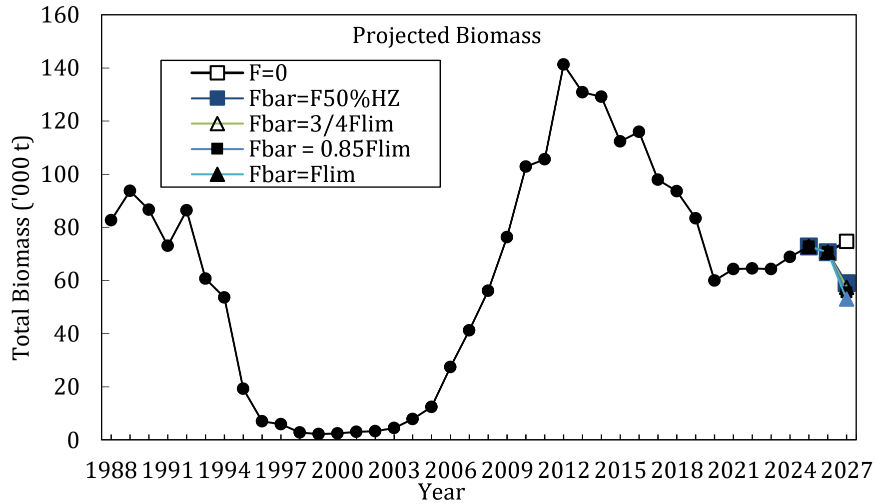


Figure 6.18. Cod in Div. 3M: Projected Total Biomass under all the Scenarios.

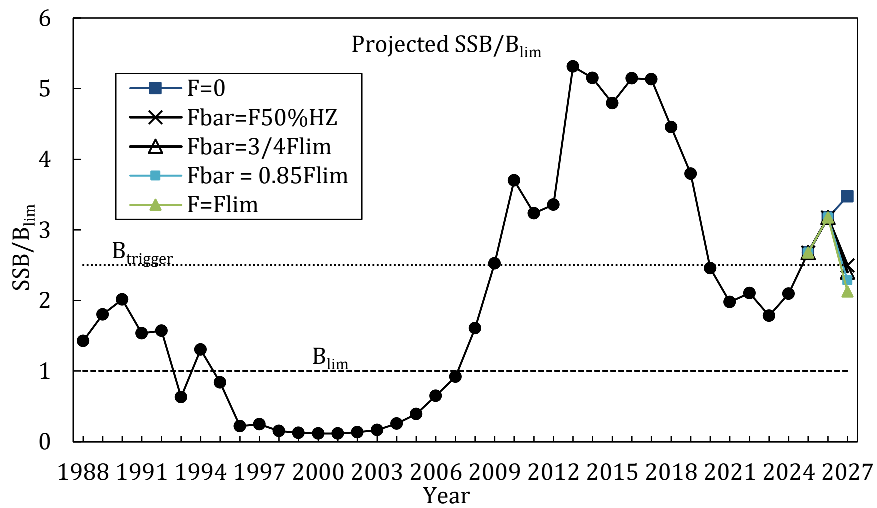


Figure 6.19. Cod in Div. 3M: Projected SSB under all the Scenarios

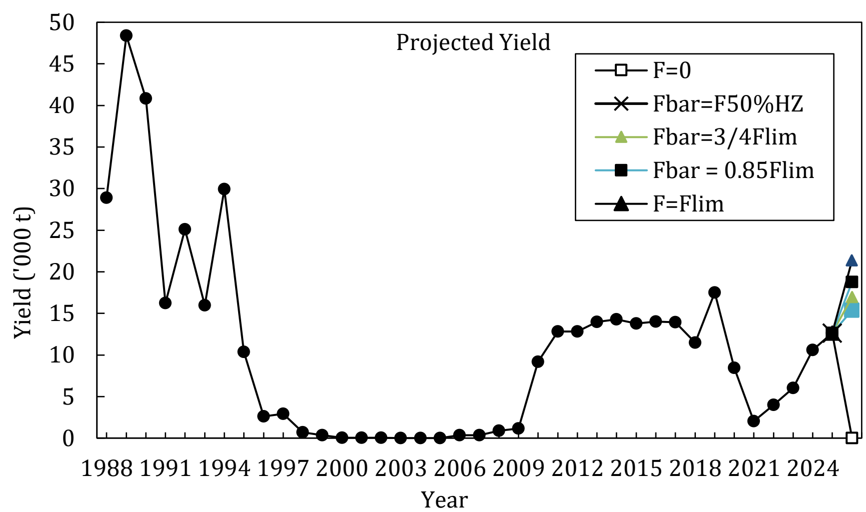


Figure 6.20. Cod in Div. 3M: Projected removals under all the Scenarios

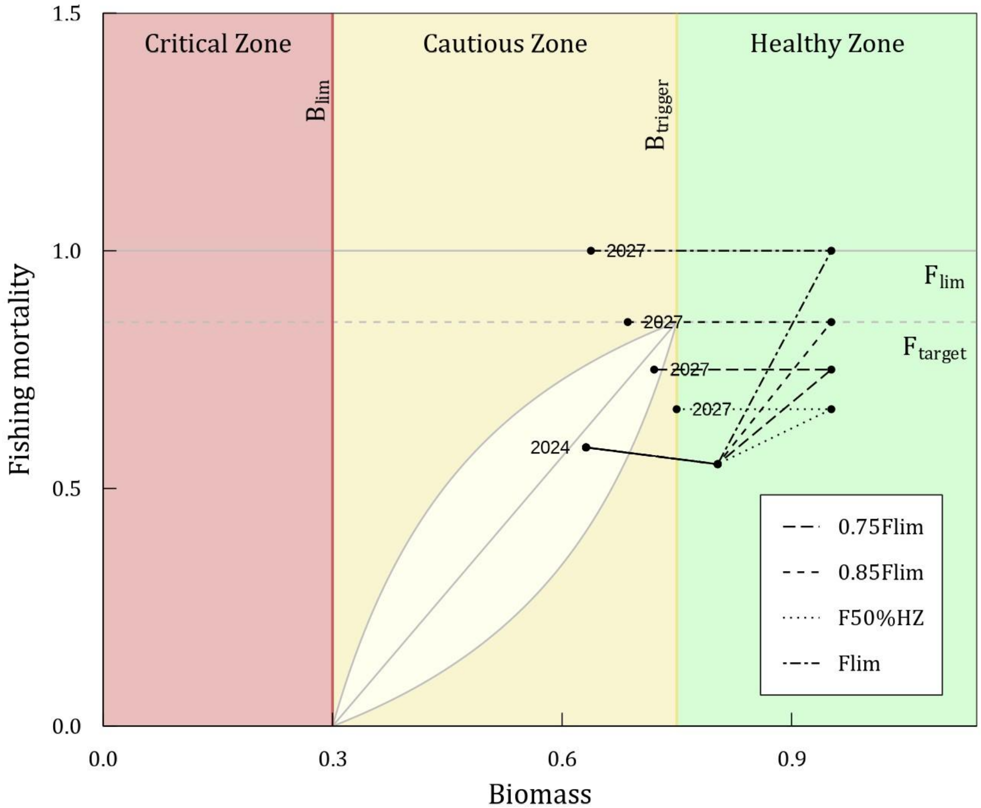


Figure 6.21. Cod in Div. 3M: stochastic projections in the NAFO Precautionary Approach Framework from 2026-2028 at four levels of F (75% F_{msy}, 85% F_{msy}, $F_{50\%HZ}$ and F_{lim}) assuming $Catch_{2025}$ = 12 613 t.

Table 6.2 Projected yield (t), probabilities of SSB < B_{lim} , SSB < $B_{trigger}$, F_{bar} > F_{lim} and F_{bar} > F_{target}, and probability of stock growth (P(SSB_{2027} > SSB_{2025}) and (B_{2027}-B_{2025})/B_{2025}) under the projected F values.

				Healthy zone		
		F=0	F = $F_{50\%HZ}$	F = 0.75F_{msy}	F = 0.85F_{msy}	F_{lim} = F_{msy}
Yield (50%)	2025	12613	12613	12613	12613	12613
	2026	0	15360	16948	18774	21362
P(F>F_{lim})	2025	<1%	<1%	<1%	<1%	<1%
	2026	<1%	1%	5%	16%	50%
P(B<B_{lim})	2025	<1%	<1%	<1%	<1%	<1%
	2026	<1%	<1%	<1%	<1%	<1%
	2027	<1%	<1%	<1%	<1%	<1%
P(F>F_{target})	2025	<1%	<1%	<1%	<1%	<1%
	2026	<1%	7%	21%	50%	83%
P(B<$B_{trigger}$)	2025	27%	27%	27%	27%	27%
	2026	3%	3%	3%	3%	3%
	2027	<1%	50%	61%	73%	85%
P(B_{2027}>B_{2025})		100%	20%	10%	4%	1%
(B_{2027} -B_{2025}) /B_{2025}		29.5%	-7.3%	-11%	-15.2%	-21.1%

i) Research recommendations

STACFIS **recommended** that *an age reader intercalibration exercise be conducted.*

STATUS: An age-readers Workshop was held in November 2017 in order to reconcile the differences among age-readers of this stock. Much progress in understanding where the differences between the commercial and survey ALKs come from was made but still needs more research to completely know the problem. No progress since then was made. NAFO reiterates this recommendation.

STACFIS **encouraged** all Contracting Parties to continue to provide length distribution samples from the commercial vessels fishing 3M cod.

STACFIS **recommended** that *the ALK and maturity ogive for this stock is provided annually.*

j) Special comments

Scientific Council reiterates the proposal to conduct a full assessment of cod in Div. 3M every two years, since biological parameters have remained reasonably stable in recent years and projections proved to be robust over two years. SC proposes that this new two-year cycle begins with the June 2027 assessment based on assessment schedule of other stocks.

Scientific Council notes the increased uncertainty in the assessment and projections due to the lack of data (Age Length Keys and Maturity Ogives) in the years 2023 and 2024.

The next full assessment for this stock will be in 2026.

7. Redfish (*Sebastes mentella* and *Sebastes fasciatus*) in Division 3M

Interim monitoring report (SCR Doc. 25/004, 24/032; SCS Doc. 25/05, 07, 08, 09)

a) Introduction

There are three species of redfish that are commercially fished on Flemish Cap: deep-sea redfish (*Sebastes mentella*), golden redfish (*Sebastes norvegicus*) and Acadian redfish (*Sebastes fasciatus*). The term beaked redfish is used for *S. mentella* and *S. fasciatus* combined. Because of difficulties with identification and separation, all three species are reported together as 'redfish' in the commercial fishery. All stocks have both pelagic and demersal concentrations. Redfish species are long lived with slow growth.

i) Fisheries and catches

The redfish fishery in Division 3M increased from 20 000 tons in 1985 to 81 000 tons in 1990, falling continuously since then until 1998-1999, when a minimum catch of around 1 000 tons was recorded as by-catch of the Greenland halibut fishery. In the 2000s catches recorded a stepwise increase, from an average level of 3 000 tons (2000-2004) to 8 000 tons (2005-2017). In 2022 -2024, the catches were between 9 477 tons and 10 043 tons. Since 2011 to 2023 catches were associated with the changes in TACs, but in 2024 catches were below the TAC. EU-Portugal, EU-Spain, the Russian Federation and EU-Estonia states are responsible for the bulk of the redfish landings over the last two decades.

Since the mid 2000's, the fishery is a blend of by-catch from cod fishery (depths above 300m, a mixture of golden and beaked redfish), catch from bottom trawl directed fishery (depths between 300-700m, primarily beaked redfish), and by-catch again from Greenland halibut fishery (bellow 700m, 100% deep sea redfish). The separation of the three species is made in the EU research survey. This requires extensive sampling effort by trained experts to examine internal features of individual redfish. The percentage per depth range of the three species in the EU Flemish Cap surveys, was used to separate the Div. 3M commercial catches into golden and beaked redfish. This method is also applied in assessments of golden redfish.

STACFIS catch estimates were available till 2010. Over 2006-2010 an average annual bias of 15% plus was recorded between STACFIS catch estimate and STATLANT nominal catch. In order to mitigate the lack of independent catch data a 15% surplus has been added to the STATLANT catch of each fleet between 2011 and 2014. For 2015 the annual catch was given by the Daily Catch Reports (DCR's) by country provided by the NAFO Secretariat. For 2016 catch was calculated using the CDAG Estimation Strategy (NAFO Regulatory Area Only). The 2017 - 2024 catch estimates were obtained with the application of the CESAG method. The 1989-2024 catch estimates from those different sources are accepted as the 3M redfish catches.

Recent catches and TACs ('000 t) are as follows:

	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
TAC[1]	7.0	7.0	10.5	10.5	8.6	8.4	10.9	11.2	17.5	17.5	15.6
STATLANT 21[1]	6.6	7.1	10.5	10.5	8.6	8.6	NA[3]	NA[3]	NA[3]		
STACFIS Total catch[1]	6.6	7.1	10.5	10.5	8.8	8.3	10.0	9.7	9.5		
STACFIS Catch[2]	6.2	6.9	10.3	10.2	8.7	8.3	9.4	9.4	9.2		

[1] TAC, STATLANT 21 and STACFIS Total catch refer to all three redfish species combined.
[2] STACFIS beaked redfish catch estimate, based on beaked redfish proportions on observed catch.
[3] NA - In 2022-24, STATLANT 21 information is incomplete.

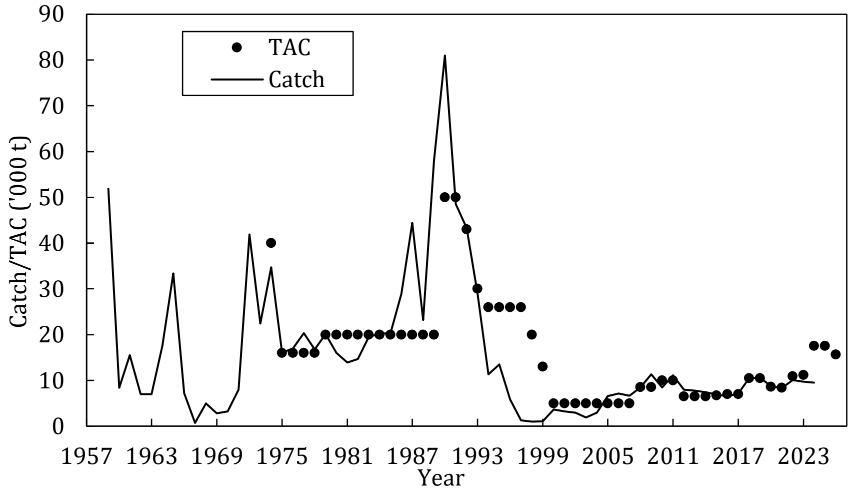


Figure 7.1. Redfish in Div. 3M: catches and TACs.

b) Data Overview

i) Research surveys

Flemish Cap Survey: The survey biomass index declined in the first years of the survey and remained low until 2003. A sequence of above average year classes with high survival rates brought the beaked redfish biomass to a maximum in 2006. Biomass was high in mid 2000s early 2010s. While the biomass index declined from 2012 to 2018, it has generally increased since then (Figure. 7.2).

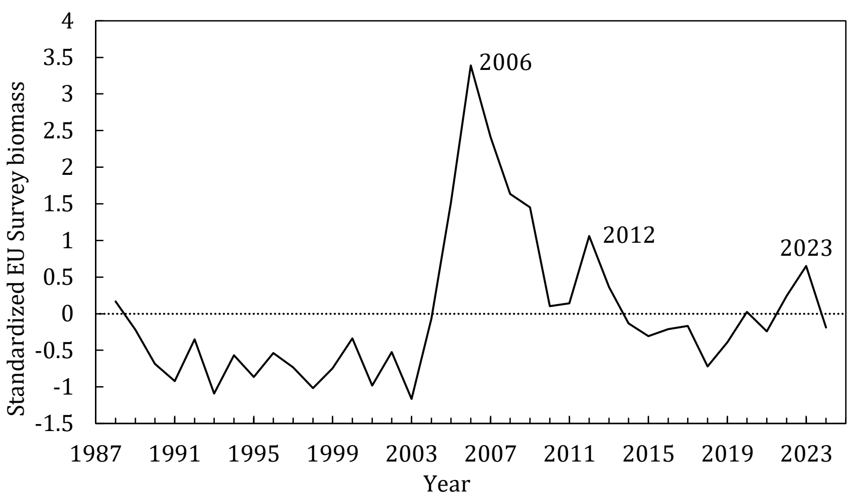


Figure 7.2. Beaked redfish in Div. 3M: survey standardized total biomass index (1988-2024).

c) Conclusions

The perception of the stock status has not changed.

d) Research recommendations

STACFIS **recommends** that *other assessment models, such as those used in mixed species redfish stocks, in the Gulf of St. Laurence (eg. in NAFO Subdivisions 3Pn and 4Vn) and NAFO Subarea 0, should be explored.*

STACFIS **recommends** *exploring alternatives to the Medium-Term Stochastic Projections (Mterm) package for making projections.*

The next full assessment for this stock is planned to be in 2026

8. American plaice (*Hippoglossoides platessoides*) in Division 3M

Interim monitoring report (SCR Doc. 25/004, 20/039, 02/62; 23/024; SCS Doc. 25/05, 08, 09)

a) Introduction

The stock declined during the late 1980s and since 1996 there has been no directed fishing. Total estimated STACFIS/CESAG bycatch in 2024 was 201 tons (Figure 8.1).

	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
TAC	ndf	ndf	ndf	ndf	ndf	ndf	ndf	ndf	ndf	ndf
STATLANT 21	0.2	0.2	0.2	0.3	0.2	0.04	NA[1]	NA[1]	NA[1]	
STACFIS	0.2	0.2	0.2	0.3	0.2	0.1	0.1	0.1	0.2	

ndf No directed fishing.

[1] NA - In 2022-24, STATLANT 21 information was not available

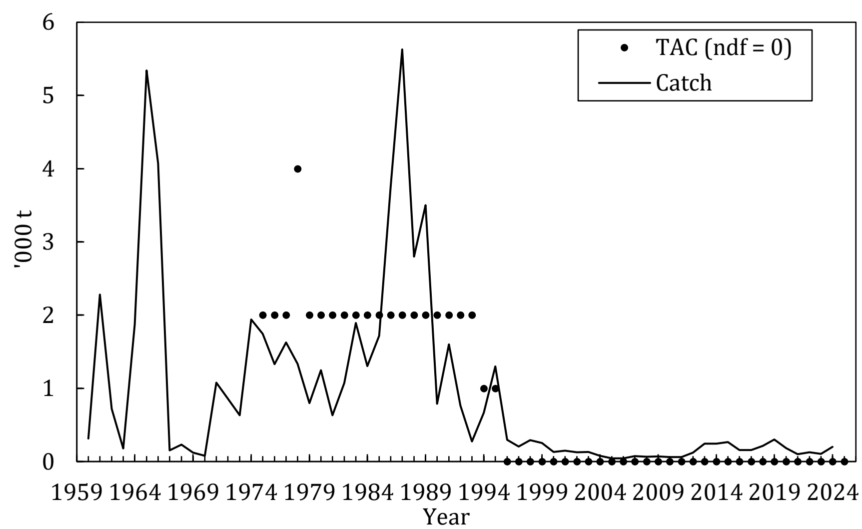


Figure 8.1. American plaice in Div. 3M: STACFIS catches and TACs. No directed fishing is plotted as 0 TAC.

b) Data Overview

The EU bottom trawl survey on the Flemish Cap was conducted during 2024. The biomass estimate, after a relatively stable period (2017-2023) at levels observed in the mid 1990´s, prior to the fishery closure, increased in 2024 (Figure 8.2).

In order to have the same age reading criteria for all the EU bottom trawl survey series a combined age length key (1993-2001) was used for the period 1988-1992. Since 2001 the age reading criteria used are the same as 1993-2001 (SCR 02/62). All of the 1991 to 2005 year-classes are estimated to be weak. Since 2006 recruitment improved, particularly the 2006, 2012, 2015 and 2018 year classes (Figure 8.3).

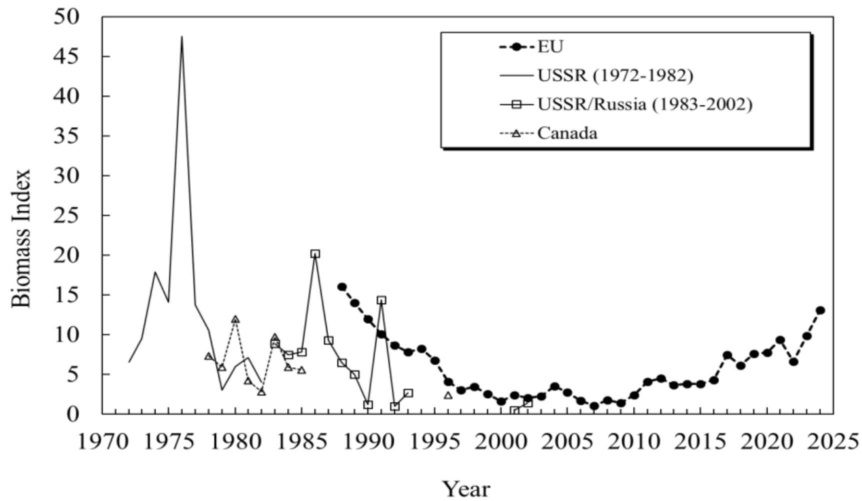


Figure 8.2. American plaice in Div. 3M: trends in survey biomass indices. EU survey data prior to 2003 have been converted to *RV Vizconde Eza* equivalents.

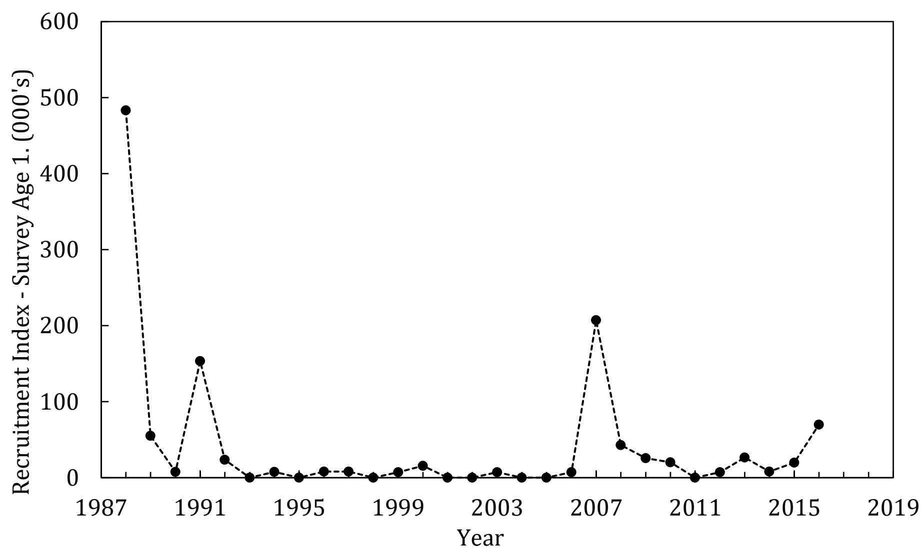


Figure 8.3. American plaice in Div. 3M: Recruitment index, trends in survey age 1 abundance. Converted series to the same age reading criteria.

c) Conclusion

Catches since 1996 have been low, below 300 t, and survey biomass has been gradually increasing with signs of improvement in recruitment since 2007 (2006 year-class was particularly strong). The recent increase needs to be confirmed in the coming years. The 2024 biomass estimate is not enough to change the perception of the stock status and the previous advice of no directed fishing is still valid.

d) Research Recommendations

STACFIS **recommends** that *other types of models should also be explored, and that the Div. 3M American plaice stock is a candidate for an assessment benchmark together with the Div. 3LNO American plaice stock or other flatfish stocks.*

STACFIS **recommends** *further investigation into whether current bycatch F levels are impeding stock recovery.*

This stock will be fully assessed in 2026.

STOCKS ON THE GRAND BANKS (NAFO DIVISIONS 3LNO)

Environmental Overview

The characteristics of the Grand Banks water mass are typical of sub-polar waters, with a cold intermediate layer (CIL) formed during winter, which lasts throughout the year until the late fall. The CIL (defined as water <0°C) extends to the ocean bottom in the northern areas of 3LNO, covering the bottom with sub-zero temperatures. The CIL properties are reliable indices of ocean climate conditions in this area. Bottom temperatures are higher in southern regions of 3NO reaching 1 - 4°C, mainly due to atmospheric forcing and along the slopes of the banks below 200 m depth due to the presence of Labrador Slope Water. On the southern slopes of the Grand Bank in NAFO Division 3O bottom temperatures may reach 4 - 8°C due to the influence of warm slope water from the Gulf Stream. The general circulation in this region consists of the relatively strong offshore Labrador Current at the shelf break and a considerably weaker branch near the coast in the Avalon Channel. Currents over the banks are very weak and the variability often exceeds the mean flow.

9. Cod (*Gadus morhua*) in NAFO Divisions 3NO

Interim monitoring report (SCR Doc. 25/006, 027, 028; SCS Doc. 25/05, 06, 07, 08, 09, 11)

a) Introduction

This stock has been under moratorium to directed fishing since February 1994. Total bycatch during the moratorium increased from 170 t in 1995, peaked at about 4 800 t in 2003 and has been between 200 t and 1100 t since that time. The bycatch in 2024 was 242 t.

Recent TACs and catches ('000 tons) are as follows:

	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
TAC	ndf	ndf	ndf	ndf	ndf	ndf	ndf	ndf	ndf	ndf
STATLANT 21	0.5	0.6	0.4	0.5	0.3	0.3	NA[1]	NA[1]	NA[1]	
STACFIS	0.7	0.6	0.4	0.5	0.6	0.5	0.4	0.3	0.2	

ndf : No directed fishery

[1] NA - In 2022-24, STATLANT 21 information was not available

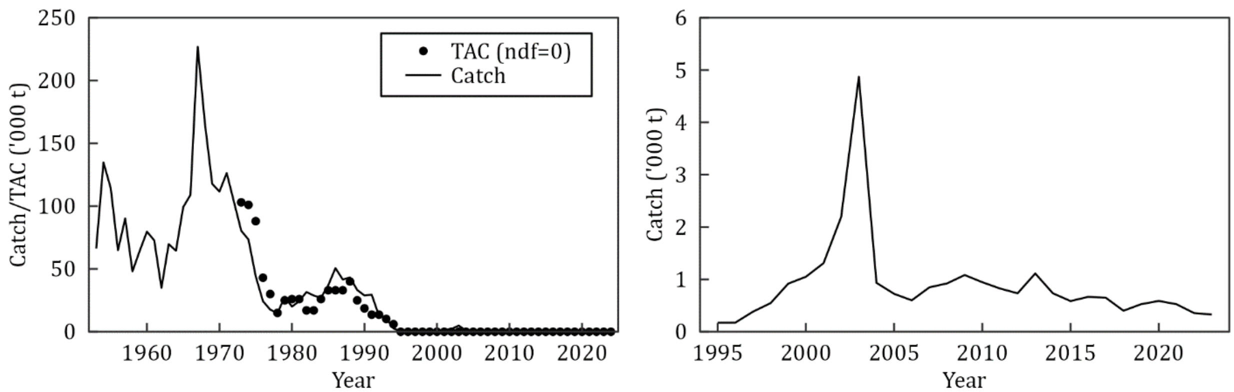


Figure 9.1. Cod in Divs. 3NO: total catches and TACs. Panel at right highlights catches during the moratorium on directed fishing.

b) Data Overview

Canadian bottom trawl surveys. There were no Canadian surveys in Divs. 3NO in spring 2020 and 2021 or autumn 2021 and 2022. The most recent surveys were completed with new research vessels and a modified trawl. Results for those surveys are directly comparable with previous surveys without the need to apply a conversion factor. The spring survey biomass index declined from 1984 to 1995 and has generally remained low since that time (Figure 9.2). There was an increase in biomass during 2011-2014 but indices have subsequently declined again and the 2024 biomass indices were among the lowest in the time series. The trend in the autumn survey biomass index was similar to the spring series (Figure 9.2).

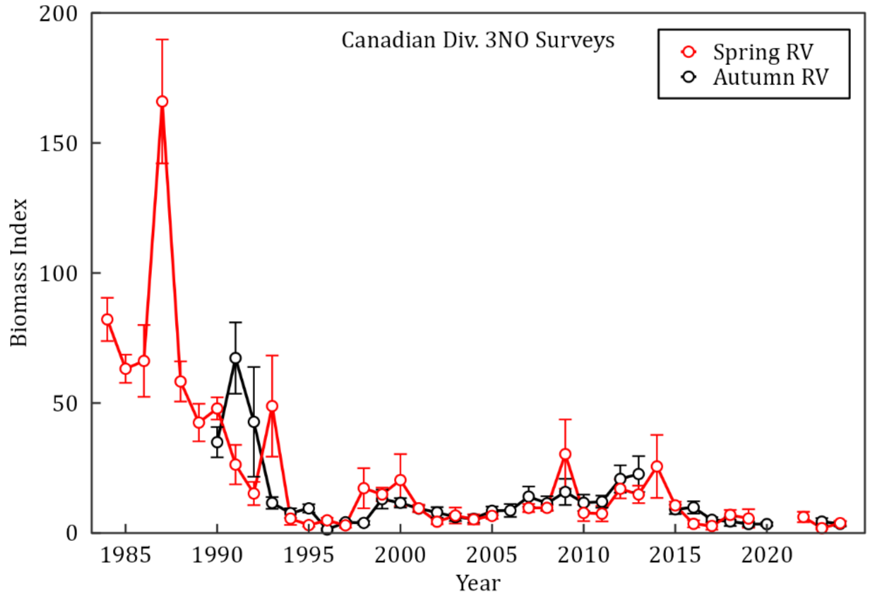


Figure 9.2. Cod in Divs. 3NO: survey biomass index (+ 1 sd) from Canadian spring and autumn research surveys.

EU-Spain Divs. 3NO surveys. The biomass index was relatively low and stable from 1997-2008 with the exception of 1998 and 2001 (Figure 9.3). There was a considerable increase in the index from 2008-2011, followed by a decline to 2013. In 2014, the index increased to the highest value in the time series but has continually decreased in subsequent years. There was no EU-Spain survey in Divs. 3NO in 2020 but the index remained low in the 2021 to 2024 surveys.

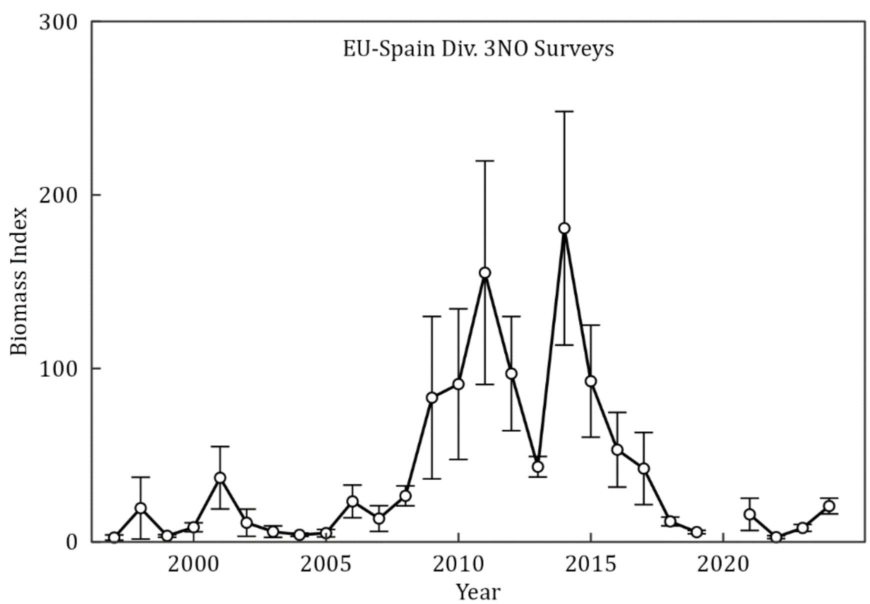


Figure 9.3. Cod in Divs. 3NO: survey biomass index (+ 1 sd) from EU-Spain Divs. 3NO surveys.

c) Conclusion

The most recent analytical assessment (2021) concluded that SSB was well below B_{lim} (60 000 t) in 2020. Canadian RV surveys in 2024 remained among the lowest in the time series. The EU-Spain survey index remained low in 2024. Overall, the 2024 indices are not considered to indicate a significant change in the status of the stock.

The next full assessment of this stock was planned to be in 2025. However, until such time as a benchmark meeting has occurred or monitoring shows that conditions have changed, this stock will be monitored by interim monitoring reports.

10. Redfish (*Sebastes mentella* and *Sebastes fasciatus*) in Divisions 3L and 3N

Interim monitoring report (SCR Doc 24/037, 048, 25/001, 004, 006; SCS Doc. 25/05, 08, 09, 11)

a) Introduction

There are two species of redfish in Divisions 3L and 3N, the deep-sea redfish (*Sebastes mentella*) and the Acadian redfish (*Sebastes fasciatus*) that have been commercially fished and reported collectively as redfish in fishery statistics. Both species, occurring in Divs. 3LN, are managed as a single stock and are thought to belong to a large Northwest Atlantic complex ranging from the Gulf of Maine to south of Baffin Island.

Between 1959 and 1960 reported catches dropped from 44 600 to 26 600 t, oscillating over the next 25 years (1960-1985) around an average level of 21 000 t. Catches increased to a 79 000 t high in 1987 and declined steadily to a 450 t minimum in 1996. The NAFO Commission implemented a moratorium on directed fishing for this stock in 1998. Catches remained at relatively low levels (450 - 3 000 t) until 2009. The Commission endorsed the Scientific Council recommendations from 2011 onwards and catches steadily increased to 13 050 t in 2019, the highest level recorded since 1993. In 2024, total catch was estimated to be 9 403 t.

Recent nominal catches and TACs ('000 t) for redfish are as follows:

	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
TAC	10.4	14.2	14.2	18.1	18.1	18.1	18.1	18.1	18.1	6
STACFIS	8.5	11.8	11.3	13.0	11.1	10.2	9.0	8.2	9.4	
STATLANT 21	8.5	11.8	11.3	13.1	11.7	11.8	NA[1]	NA[1]	NA[1]	

[1]NA- In 2022 - 2024, STATLANT 21 information is incomplete.

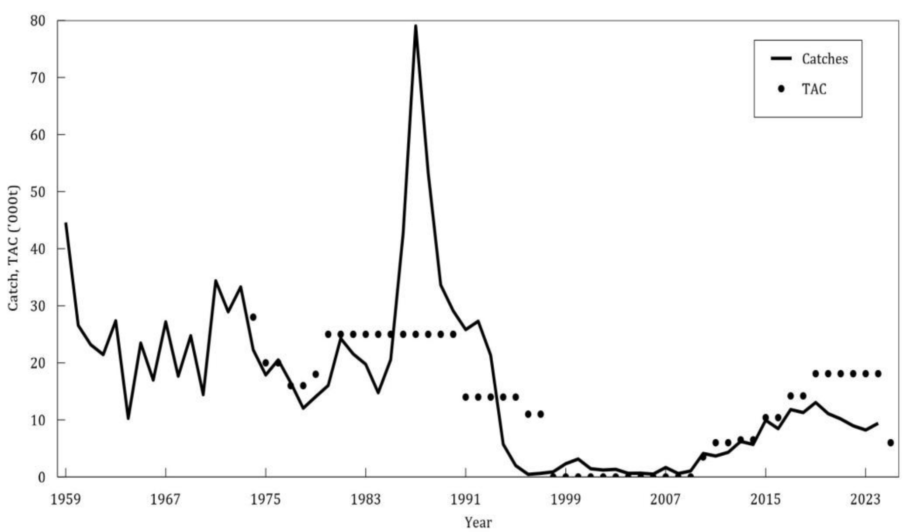


Figure 10.1. Redfish in Divs. 3LN: catches and TACs (No directed fishing is plotted as zero TAC).

i) Research surveys

Canadian RV surveys

New vessel time series – Modified Campelen series.

Beginning in 2022, new survey vessels have been used to conduct the Canadian multi-species surveys. For redfish in NAFO Divs. 3LN, conversion factors that would allow data from the new vessels to extend existing time series data from the former primary research vessels (CCGS Wilfred Templeman and CCGS Alfred Needler) were only available for the Spring Teleost series. As a result, the spring Canadian Campelen series (1984-2019) and the autumn Canadian Campelen series (1990-2020) have ended.

Throughout the survey time series the CCGS Teleost was used to compliment or replace the primary vessels, with the assumption that catches were directly comparable. However, during the comparative fishing trials with the new vessels it was determined that the Teleost is not comparable for some species. Sensitivity analyses indicated that for Redfish in Divs. 3LN, use of the Teleost in the autumn had minimal impact on indices, as very little of the total biomass was represented in sets by this vessel in most year.

For the spring series, comparative fishing indicated that the Teleost is comparable to the new time series for Redfish in Divs. 3LN. Years with complete/near-complete coverage with the Teleost (2016, 2018) have been removed from the 1984-2019 Campelen series, and included in a new spring time series which also includes the new survey series (modified Campelen).

Canadian stratified-random surveys that cover the entire stock area began in 1991. The survey was incomplete in spring 2006 and 2017, and autumn 2014. There was no spring survey in Divs. 3LN in 2021, or in fall in 2021 or 2022. The spring and fall surveys were complete in Divs. 3LN in 2023 and 2024.

EU RV surveys

In 1995 EU-Spain started a stratified-random bottom trawl spring (May-June) survey in the NAFO Regulatory Area of Divs. 3NO. All strata within the NRA were covered every year following the standard stratification. Early surveys were completed to a depth of 732m and were extended to 1464 m in 1998 (NAFO SCR Doc. 20/09). In 2003, this survey was extended northwards to include strata in Div. 3L, but it has only been since 2006 that an adequate coverage of 3L has been accomplished in this survey (NAFO SCR Doc. 20/14). The EU-Spain survey was not completed in 3N in 2020 or 3L in 2020-2022 (Figure 10.2).

Combined Biomass Index

A combined mean standardized biomass was calculated based on the series from the 3L and 3N EU-Spain, Canadian Fall Campelen and Spring Campelen standardized indices. The uncertainty estimates take into account the number of surveys available in any given year. The mean of the standardized survey biomass indices indicates that biomass has declined from time series highs in the mid-2010s, and B_{2024}/B_{lim} is estimated at 1.19. There is a 23% risk of the stock being below B_{lim} in 2024. Uncertainty in recent stock size remains high due to gaps in the survey series (Figure 10.3).

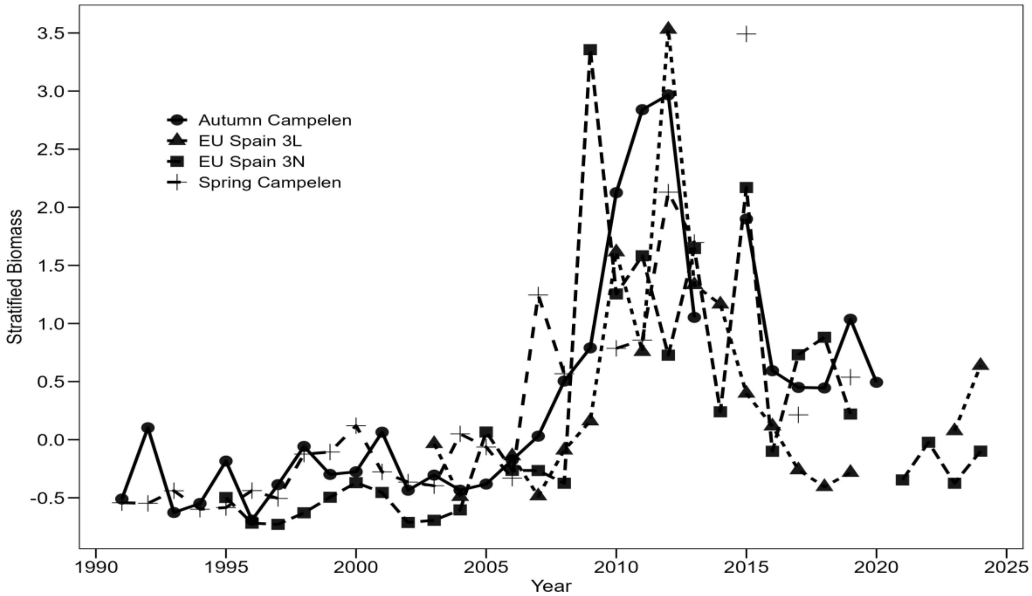


Figure 10.2. Redfish in Divs. 3LN: mean standardized survey biomass from the Canadian and EU-Spain RV surveys. Indices were normalized to its mean of 2003-2019.

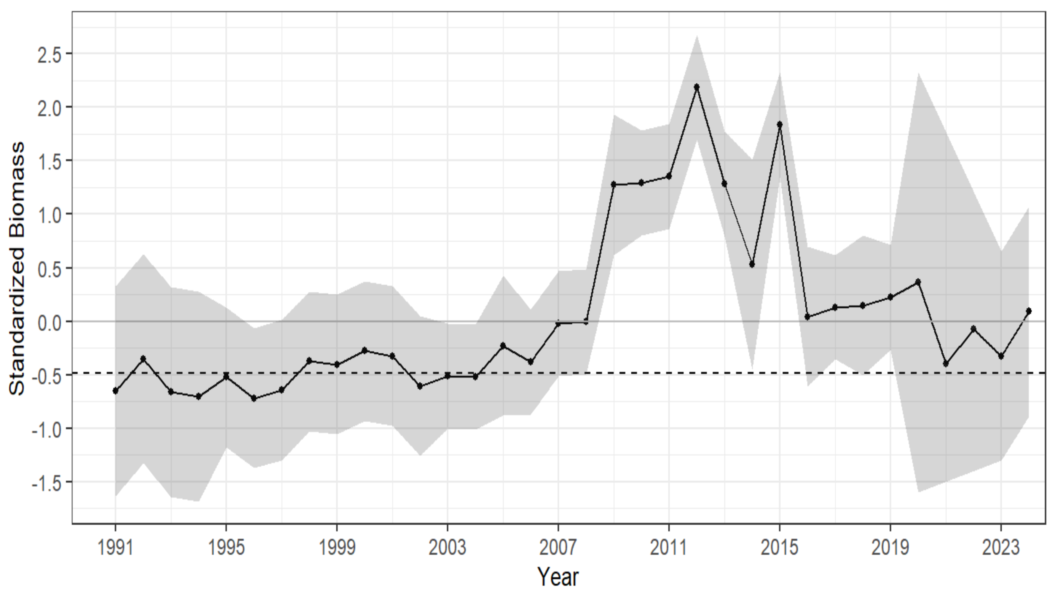


Figure 10.3. Redfish in Divs. 3LN: Combined biomass index based on Canadian spring and autumn Campelen surveys and EU-Spain 3L and 3N surveys with 95% confidence intervals. Horizontal dashed line indicates B=B_{lim} and solid grey line is the time series mean standardized at zero.

b) Conclusion

In 2024 the stock was identified as to be above the interim limit reference point (B_{lim}).

The stock has decreased since 2015 and B_{2024}/B_{lim} is estimated at 1.19. There is a 23% risk of the stock being below B_{lim} in 2024. Given the slow growth of redfish and interpretation of year-over-year index fluctuations there is nothing to indicate a change in the status of the stock since the 2024 assessment.

c) Research Recommendations

STACFIS **recommends** that *changes in maturity be explored for this stock*.

STACFIS **recommends** that *stock boundaries and definitions as well as synchronicity with adjacent stocks be explored for this stock.*

STACFIS **recommends** that *methods for species identification and delineation be applied for this stock.*

The next full assessment of this stock will be in 2026.

11. American plaice (*Hippoglossoides platessoides*) in NAFO Divisions 3LNO

Interim monitoring report (SCR 21/025, 032, 035, 24/037, 25/006, 008, 026, 027, 028; SCS 25/05, 06, 08, 09, 11)

a) Introduction

American plaice supported large fisheries from the 1960s to the 1980s. However, due to the collapse of the stock in the early 1990s, there was no directed fishing in 1994 and a moratorium was put in place in 1995. Landings from by-catch increased until 2003, after which they began to decline. STACFIS agreed catches were 571t in 2023 and 376t in 2024 (Figure 11.1). Bycatch in 2023 and 2024 was primarily taken in EU-Portugal trawl fishery, EU-Spain skate, Canadian and French (SPM) yellowtail flounder, and Russian fisheries.

Commercial sampling (length, age) has been very low in recent years and is likely to be a challenge for age- and length-based analyses in future assessments.

Recent catches and TACs ('000 tonnes) are as follows:

	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
TAC	ndf	ndf	ndf	ndf	ndf	ndf	ndf	ndf	ndf	ndf
STATLANT 21	1.0	1.1	0.9	1.2	1.1	0.9	0.6	0.3	0.2	
STACFIS	1.7[1]	1.2	1.0	1.2	1.2	1.6	NA[2]	NA[2]	NA[2]	

ndf No directed fishing.
[1] Catch was estimated using STATLANT 21 data for Canadian fisheries and Daily Catch Records for fisheries in the NRA.
[2]NA- In 2022 - 2024, STATLANT 21 information is incomplete.

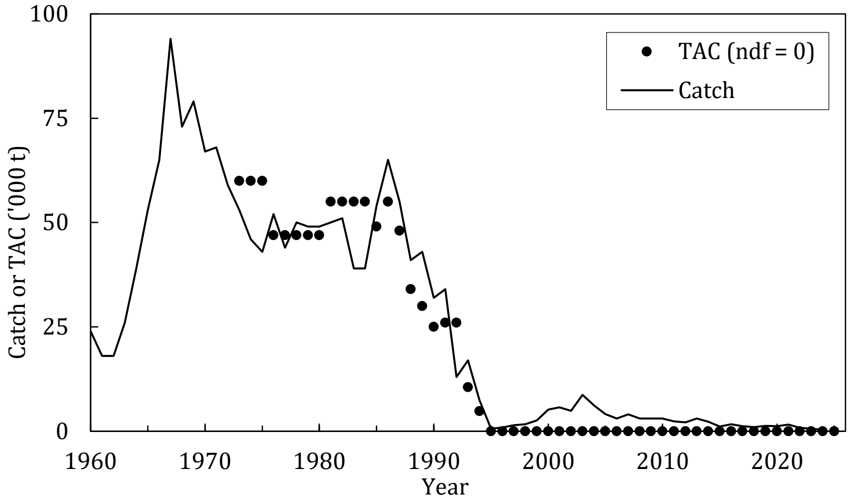


Figure 11.1. American Plaice in Divs. 3LNO: estimated catches and TACs. No directed fishing is plotted as 0 TAC.

b) Research Surveys

Canadian spring survey. Due to coverage issues in the Canadian spring survey, indices are not available from 2006, 2015, 2017, 2020, 2021, and 2022. Multiple vessels have been used to complete the Canadian spring survey. The 2023 survey was completed with the CCGS John Cabot using the modified Campelen trawl and the CCGS Teleost. Comparative fishing indicates these two vessels have equivalent catchability for American plaice in Divs. 3LNO in the spring; this starts a new modified Campelen series including 2016 (survey completed by the CCGS Teleost) and for 2023 onwards. The 2024 survey was completed with the CCGS John Cabot.

The CCGS Wilfred Templeman and CCGS Alfred Needler are sister ships, with catches directly comparable with each other. While also previously assumed interchangeable with the CCGS Teleost, differences in trawl performance and conversion factors to the CCGS John Cabot reported during the CAN-NL comparative fishing program indicate differences in catchability for American plaice; indices from the CCGS Wilfred Templeman and CCGS Alfred Needler cannot be directly compared to those of the CCGS Teleost and CCGS John Cabot. For this report, survey indices from the 1983-2021 Campelen series are presented as previously reported (with the exception of 2016 which has been converted to the new series) with sensitivity analysis indicating overall survey trends were robust to mixing of CCGS Teleost, CCGS Alfred Needler, and CCGS Wilfred Templeman in this period. However, this should be re-evaluated – including for size- and age-based indices – in the next assessment.

Biomass and abundance estimates declined during the late 1980s-early 1990s. Biomass indices generally increased from the mid-1990s to 2014 but declined sharply after that (Figure 11.2). The abundance index follows a similar trend. The 2024 survey abundance and biomass indices are higher than the previous points in the modified Campelen series.

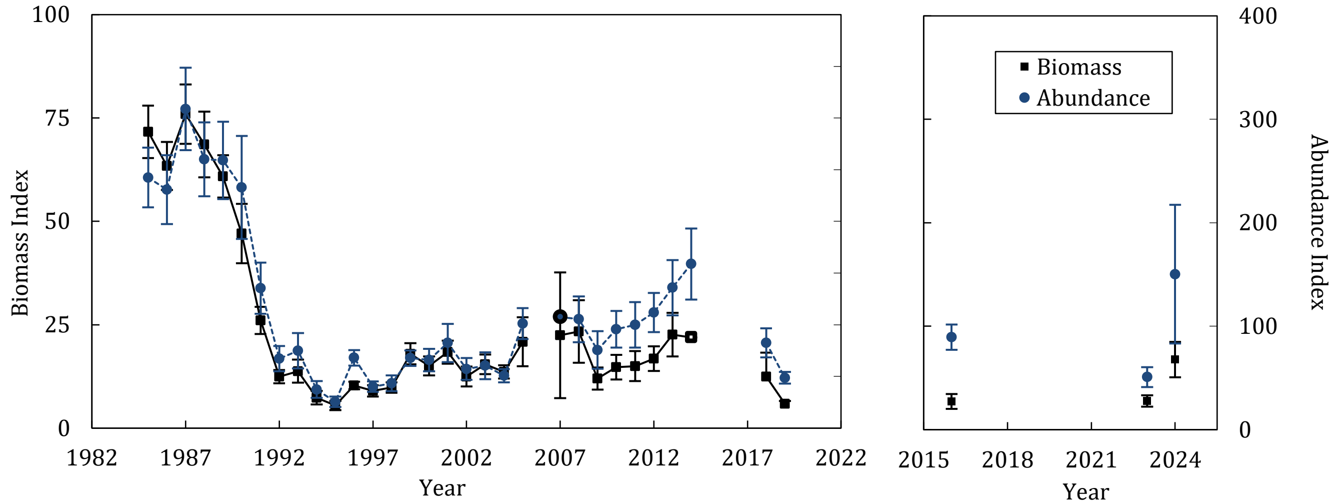


Figure 11.2. American Plaice in Divs. 3LNO: biomass and abundance indices with approximate 95% confidence intervals from Canadian spring surveys during the Campelen series (left) and Modified Campelen (right). Open symbols represent years where CIs extend to negative values.

Canadian autumn survey. Autumn survey points for 2004 and 2014 are excluded due to incomplete coverage of Divs. 3L and 3NO, respectively. There was no autumn survey in Divs. 3LNO in 2021 to 2022. As with the spring, multiple vessels have been used to complete the Canadian fall survey, with indices presented here to 2020 as previously reported. Biomass and abundance indices (Figure 11.3) from the autumn survey declined rapidly from 1990 to the mid-1990s, and indices have generally been below average since. There was an increase in biomass to 2013 but this trend did not persist.

Comparative fishing data were insufficient to inform on conversion factors to the new survey vessels in fall for Divs. 3LNO American plaice, therefore a new survey series starts in 2023. The 2024 indices of biomass and abundance are slightly higher than the 2023 indices. These cannot be directly related to the earlier time series.

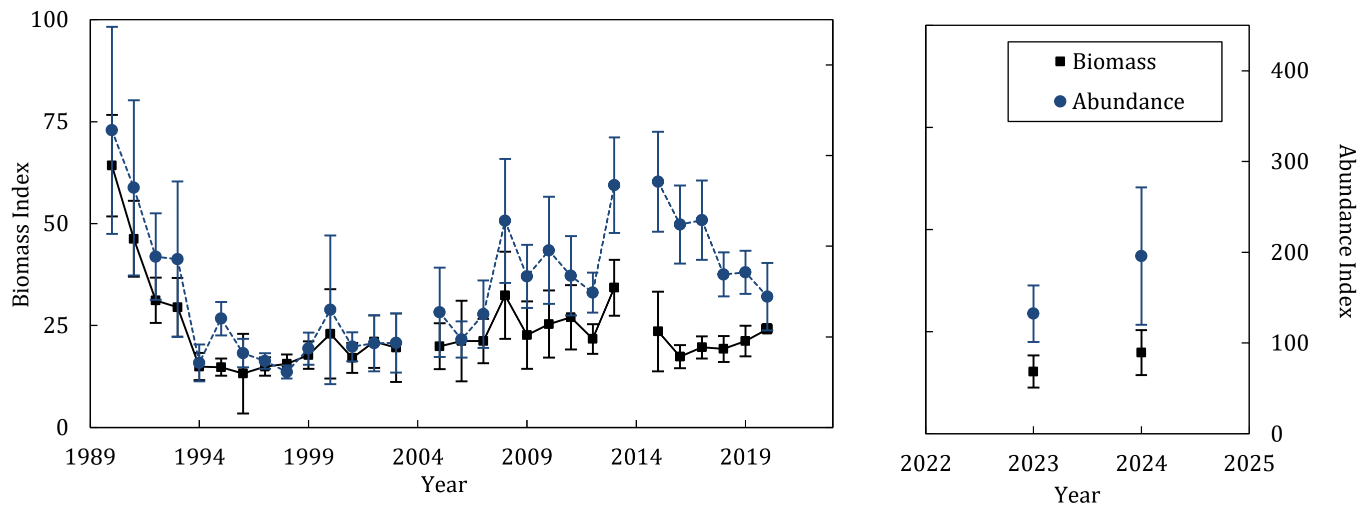


Figure 11.3. American Plaice in Divs. 3LNO: biomass and abundance indices with approximate 95% confidence intervals from Canadian autumn surveys. In the first panel (left), data prior to 1996 are Campelen equivalents and since then are Campelen. In the second panel (right), data are modified Campelen units.

EU-Spain Divs. 3NO Survey. From 1998-2024, surveys have been conducted annually by EU-Spain in the Regulatory Area in Divs. 3NO. There was no survey in Divs. 3NO in 2020. The biomass and abundance indices varied without trend for most of the time series but then subsequently declined and have remained low since 2016 (Figure 11.4).

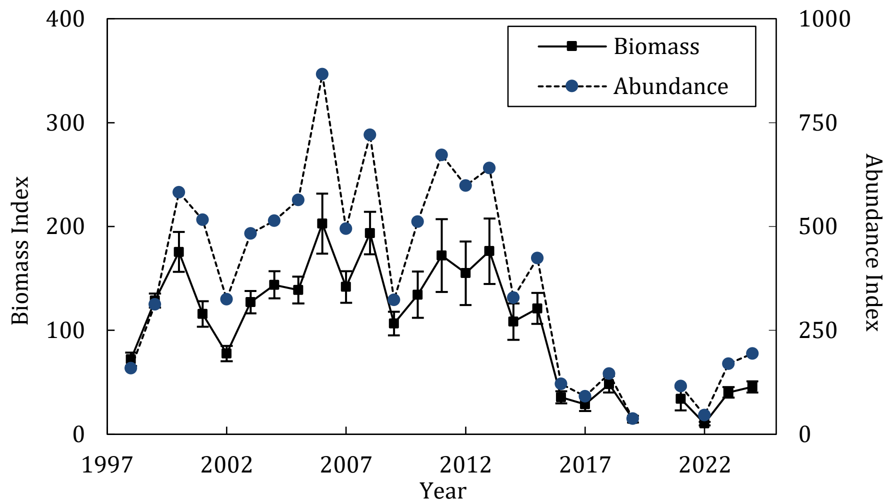


Figure 11.4. American Plaice in Divs. 3LNO: biomass and abundance indices from the EU-Spain Divs. 3NO survey (data prior to 2001 are Campelen equivalents and since then are Campelen).

EU-Spain Div. 3L Survey. Since 2003 surveys have been conducted annually by EU-Spain in the Regulatory Area in Div. 3L. Surveys in 3L were not completed in 2005 or 2020 to 2022. The biomass and abundance indices increased from 2010 to 2015 and subsequently declined to 2019. Biomass in 2024 is similar to that observed from 2017 to 2019, while abundance indicates a continued decline and it is the lowest observed since 2011 (Figure 11.5).

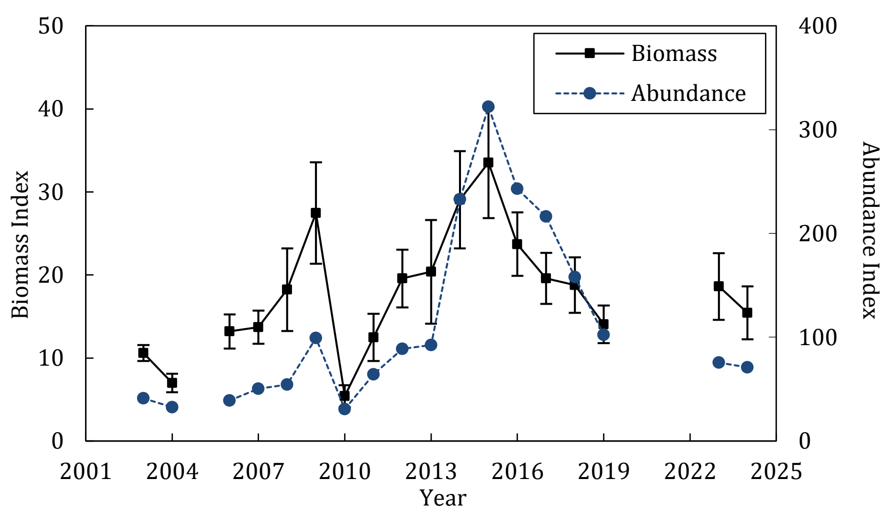


Figure 11.5. American Plaice in Divs. 3LNO: biomass and abundance indices from the EU-Spain Div. 3L survey.

c) Conclusion

The most recent Canadian surveys cannot be directly compared to previous series due to a lack of conversion factors. However, given the overall scale of recent Canadian indices and continued low levels of American plaice reported in the EU-Spain surveys there is nothing to indicate a change in the status of the stock since the 2021 assessment.

d) Research Recommendations

STACFIS **recommended** that *a benchmark be undertaken for this stock, including investigations be undertaken to reexamine which survey indices are included in the model.*

STACFIS **recommends** that *investigations be undertaken to examine the impact of past vessel mixing in the Canadian surveys on length- and age-based indices.*

STACFIS **recommends** that *investigations be undertaken to compare ages obtained by current and former Canadian age readers.*

STATUS: Work is ongoing. This recommendation is reiterated.

STACFIS **recommends** that *analyses be completed to update on bycatch of American plaice in the Yellowtail flounder fishery.*

STATUS: Completed. An update on bycatch of American plaice was examined in the 2025 assessment of yellowtail flounder (SCR 25/026). Bycatch remains low.

There will be no new assessment until monitoring shows that conditions have changed.

12. Yellowtail Flounder (*Myzopsetta ferruginea*) in Divisions 3L, 3N and 3O

Full assessment (SCR 25/027, 028, 029, 006, 24/037; SCS 25/05, 09, 11)

a) Introduction

There was a moratorium on directed fishing from 1994 to 1997, and small catches were taken as by-catch in other fisheries. The fishery was re-opened in 1998 and catches increased from 4 400 t to 14 100 t in 2001 (Figure 12.1). Catches from 2001 to 2005 ranged from 11 000 t to 14 000 t. Since 2006 catches have generally been below the TAC. Recent highs from 2019 to 2022 which ranged from 10 600 t to 14 800 t are followed by two years with catches well below the TAC at 3 250 t in 2023 and 3 020 t in 2024, influenced by industry and economic related factors.

Recent catches and TACs ('000 tons) are as follows:

	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
TAC	17	17	17	17	17	17	20	20	15.6	15.8
STATLANT 21	8.3	9.2	8.6	12.3	14.0	14.7	NA[1]	NA[1]	NA[1]	
STACFIS	9.3	9.2	8.7	12.8	14.8	14.6	10.6	3.3	3.0	

[1] NA - In 2022-2024, STATLANT 21 information is incomplete.

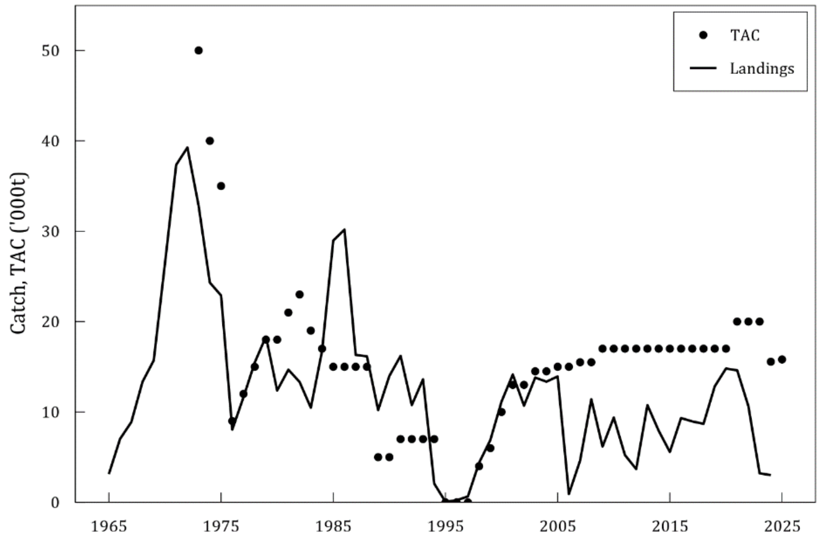


Figure 12.1. Yellowtail flounder in Divs. 3LNO: catches (line) and TACs (points). No directed fishing is plotted as 0 TAC.

b) Data Overview

i) Research surveys

Canadian stratified-random spring surveys. Although variable, the spring survey biomass index increased from 1995 to 1999 and since fluctuated at a high level to 2012 with a general decline thereafter. The 2006 and 2015 surveys did not cover the stock area and are not considered representative. There were no spring surveys of Divs. 3LNO from 2019-2021. Following a recent low in 2016, indices have increased to 2024. Surveys since 2022 have been completed on new vessels with a modified Campelen trawl. Conversion factors have been applied to previous survey data. Indices are now presented in modified Campelen units.

Canadian stratified-random autumn surveys. The autumn survey biomass index for Divs. 3LNO increased steadily from the early-1990s to 2001, and although variable, it was relatively high (Figure 12.) and showed a general decline from 2007-2024. The 2014 survey was incomplete due to problems with the research vessel, and results are not considered representative. There was no autumn survey in Divs. 3LNO from 2020-22. Surveys since 2023 have been completed on new vessels with a modified Campelen trawl. Conversion factors have been applied to previous survey data. Indices are now presented in modified Campelen units.

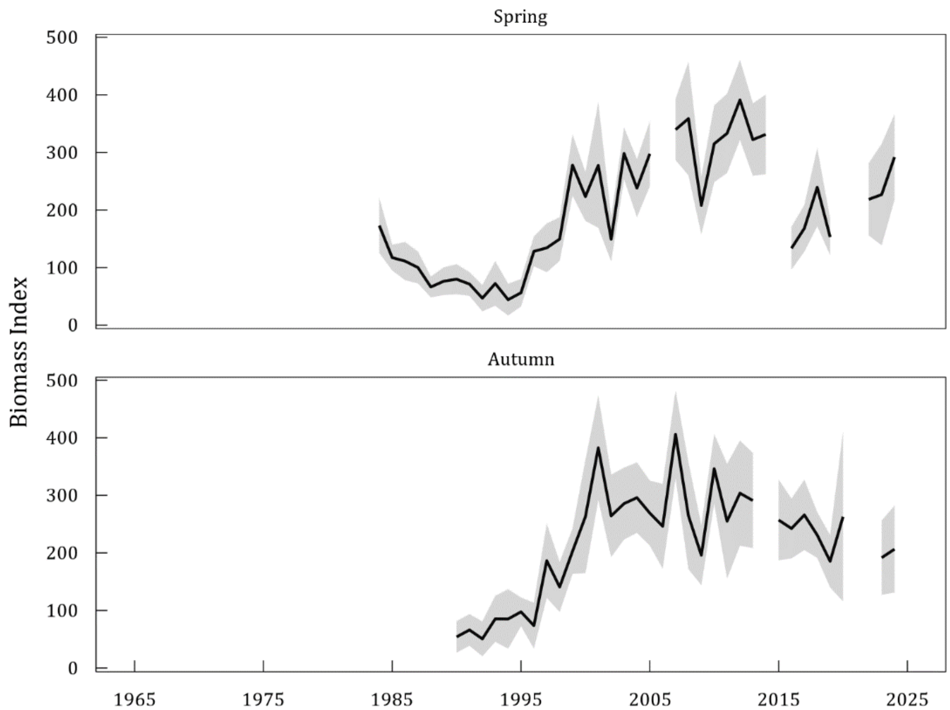


Figure12.2. Yellowtail flounder in Divs. 3LNO: indices of biomass with 95% confidence intervals, from Canadian spring and autumn surveys. Values are modified Campelen units. The Canadian autumn series does not include 2014 nor 2021-22. The 2015, 2016 and 2020-21 spring surveys were incomplete.

EU-Spain stratified-random spring surveys in the NAFO Regulatory Area of Divs. 3NO. The biomass index of yellowtail flounder increased sharply up to 1999 and remained relatively stable until 2013. Biomass estimates declined sharply after that, with the 2022 estimate being the second lowest in the time series (Figure 12.3). While biomass increased to 2023 and 2024, the index remains relatively low. The EU-Spain survey covers only about 9 percent of the total stock area, however, analyses indicate that survey trends are in general agreement with Canadian surveys.

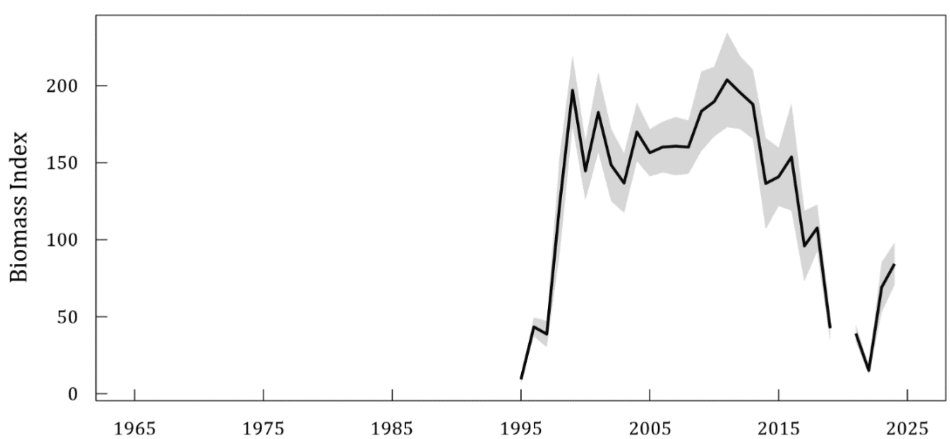


Figure 12.3. Yellowtail flounder in Divs. 3LNO: index of biomass from the EU-Spain spring survey in the Regulatory Area of Divs. 3NO ±1SD. Values are Campelen units. There was no survey in 2020.

Stock distribution. In all surveys yellowtail flounder were most abundant in Div. 3N in the vicinity of the Southeast Shoal. The vast majority of the stock is found in waters shallower than 93 m in both seasons. Distribution metrics examined at the 2025 assessment indicate yellowtail flounder distribution on the Grand Bank has been relatively stable since the early 1990s, though small year-to-year variations are evident and likely linked to oceanographic conditions.

Estimation of Parameters. A Schaefer surplus production model in a Bayesian framework was used for the assessment of this stock. The input data were catch from 1965-2024, Canadian spring survey series from 1984-2024 (no 2006, 2015, 2020-2022), Canadian autumn survey series from 1990-2024 (no 2014, 2021-22), Canadian Yankee survey series (1971-1982), Russian survey series (1984-1991) and Divs. 3NO Spanish survey (1995-2024; no 2020). The model set up was similar to that used in the 2023 assessment; to address small autocorrelation within the model both thinning and iterations were increased. The model results and fit remained very similar to the previous assessment, though biomass trends indicate that the stock decline in the 2023 assessment was overestimated, likely due to the absence of Canadian survey data in the terminal years.

The priors used in the model were:

Initial population size	Pin~dunif(0.5, 1)	uniform(0.5 to 1)
Intrinsic rate of natural increase	r ~ dunif(0.01,1)	uniform (0.01 to 1)
Carrying capacity	K~dlnorm(2.703,0.2167)	lognormal (mean, precision)
Survey catchability	q ~dgamma(1,1)	gamma(shape, rate)
Process error	sigma ~ dunif(0,5) isigma2= $sigma^{-2}$	uniform(0 to 5)
Observation error	tau~dgamma(1,1) itau2 = 1/tau	gamma(shape, rate)

Assessment Results

Recruitment: Total numbers of juveniles (<22 cm) from spring and autumn surveys by Canada are given in Figure 12.4 scaled to each series mean. Recruitment has been generally above average since the late 2010s. The spring survey by EU-Spain is no longer included in the recruitment index; recruitment values from this survey may reflect year-over-year changes in distribution rather than the magnitude of recruitment given the small area sampled.

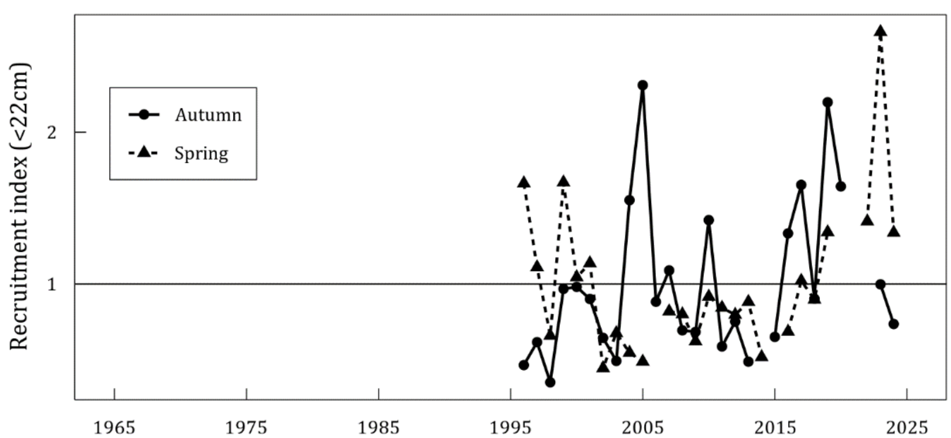


Figure 12.4. Yellowtail flounder in Divs. 3LNO: Juvenile abundance indices from spring and autumn surveys by Canada. Each series is scaled to its mean (horizontal line).

Bayesian Stock Production Model: The surplus production model results indicate that stock size increased rapidly after the moratorium in the mid-1990s, levelled off from 2001-2012, and although it declined from 2013 to 2016, in recent years it has been between 1.3x and 1.5xB_{msy}. Estimates from the model suggests that a maximum sustainable yield (*MSY*) of 18 410 tons can be produced by total stock biomass of 86 420 tons (B_{msy}) at a fishing mortality rate (F_{msy}) of 0.21.

Biomass: Relative biomass increased from 1994 to 2001, remained stable near 2xB_{msy} until 2013 and then declined to 2016. Since then, stock biomass has been relatively stable averaging near 1.4xB_{msy}, and in 2024 is 1.5xB_{msy} (Figure 12.5), above $B_{trigger}$ with a probability >99%.

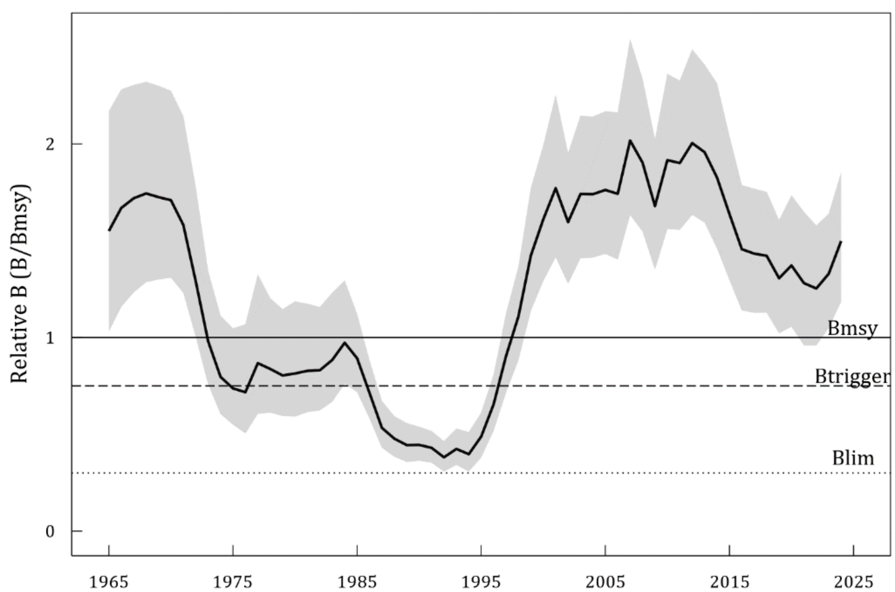


Figure 12.5. Yellowtail flounder in Divs. 3LNO: relative biomass trends with 90% confidence intervals.

In some years since the moratorium, the catch remained below the estimated surplus production levels and was low enough to allow the stock to grow. Catches in a number of years (2000-2005; 2010-2014) have also exceeded surplus production and declines in stock size towards B_{msy} have been noted. Since 2015 the catch has been less than the estimated surplus production (Figure 12.6).

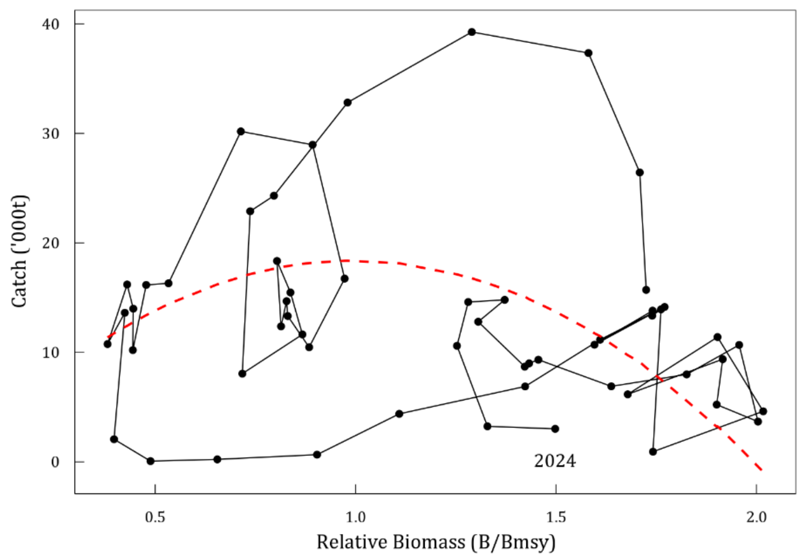


Figure 12.6. Yellowtail flounder in Divs. 3LNO: catch trajectory (black line) in relation to estimated surplus production (red dashed).

Fishing Mortality: Relative fishing mortality has been below F_{lim}=F_{msy} and F_{target} since 1993 (Figure 12.7). Following an increasing period from 2015 to 2021, F has decreased in recent years as catches declined.

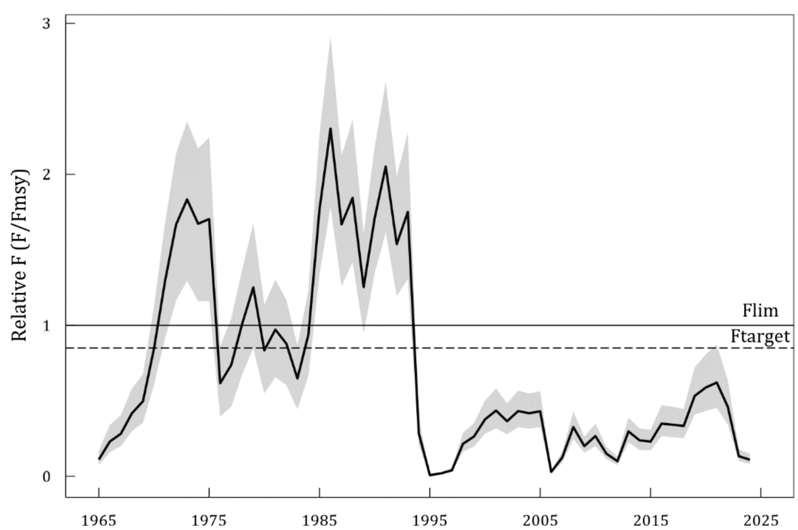


Figure 12.7. Yellowtail flounder in Divs. 3LNO: relative fishing mortality trends with 90% confidence intervals.

c) Medium Term Considerations:

Stochastic projections were conducted under two catch scenarios for 2025: (1) $Catch_{2025}$ = average of 2023-2024 = 3 135 t, and (2) $Catch_{2025}$ = TAC_{2025} = 15 810 t. Constant fishing mortality was applied from 2026-2027 at four levels of F*:* F=0, and the three levels defined for stocks in the Healthy Zone (75% F_{msy}, 85% F_{msy}, and F_{msy}). Results were similar for both catch scenarios (Figure 12.8). Median yield and risk levels within the NAFO PA Framework are shown in Table 12.1 and 12.2, and projected trajectory in the PA in Figure 12.9.

At 75% F_{msy}, the probability that F > F_{lim} was between 0.11 and 0.12 in the medium term (2026, 2027). Projected at the level of 85% F_{lim}, the probability that F > F_{lim} ranges between 0.24 and 0.25 and for F_{msy} projections, this probability increases to 0.50.

The probability that biomass in 2028 is greater than B_{2025} is 0.70, 0.21, 0.16, and 0.11 for projections of F=*0*, 75% F_{msy}, 85% F_{msy}, and F_{msy} respectively, in the $Catch_{2025}$ = TAC = 15 810 scenario. At 75% F_{msy} to F_{msy} biomass declines towards B_{msy} are expected, with decreases from 2025 to 2028 estimated at 15 to 23%. Through 2028 the risk of biomass being below B_{lim} or $B_{trigger}$ 4% or less in all cases.

Table 12.1. Medium-term projections for yellowtail flounder with two catch options in 2025. Estimates for yield and relative biomass (B/B_{msy}) with 80% credible intervals are shown for projected F values of F=0, 75%F_{msy}, 85%F_{msy} and F_{msy}. Catch in 2025 was assumed at 15 810 t (TAC 2025) or 3 135 t (average catch 2023-2024).

Catch 2025 = 15 810 t		
Year	Yield ('000t) median	Projected Relative Biomass (B/B_{msy}) median (80%CI)
F=0		
2025	15.81	1.62 (1.26, 2.03)
2026	0	1.55 (1.19, 1.96)
2027	0	1.69 (1.31, 2.12)
2028	-	1.79 (1.39, 2.22)
F = $0.75F_{msy}$		
2025	15.81	1.62 (1.26, 2.03)
2026	21.43	1.55 (1.19, 1.96)
2027	19.88	1.44 (1.09. 1.84)
2028	-	1.37 (1.02, 1.77)
F = $0.85F_{msy}$		
2025	15.81	1.62 (1.26, 2.03)
2026	24.29	1.55 (1.19, 1.96)
2027	22.00	1.41 (1.80, 1.06)
2028	-	1.32 (0.97, 1.72)
F = F_{msy}		
2025	15.81	1.62 (1.26, 2.03)
2026	28.58	1.55 (1.19, 1.96)
2027	24.96	1.36 (1.02, 1.74)
2028	-	1.24 (0.89, 1.64)

Catch 2025 = 3 135 t		
Year	Yield ('000t) median	Projected Relative Biomass (B/B_{msy}) median (80%CI)
F=0		
2025	3.125	1.62 (1.26, 2.03)
2026	0	1.70 (1.32, 2.13)

2027	0	1.80 (1.40, 2.23)
2028	-	1.85 (2.29, 1.47)
$F = 0.75F_{msy}$		
2025	3.125	1.62 (1.26, 2.03)
2026	23.47	1.70 (1.32, 2.13)
2027	21.00	1.52 (1.17, 1.91)
2028	-	1.42 (1.07, 1.82)
$F = 0.85F_{msy}$		
2025	3.125	1.62 (1.26, 2.03)
2026	26.60	1.70 (1.32, 2.13)
2027	23.23	1.48 (1.14, 1.87)
2028	-	1.37 (1.02, 1.76)
$F = F_{msy}$		
2025	3.125	1.62 (1.26, 2.03)
2026	31.29	1.70 (1.32, 2.13)
2027	26.31	1.43 (1.09, 1.81)
2028	-	1.29 (0.95, 1.68)

Table 12.2. Yield (000 t) and risk (%) at projected F values of F=0, 75% F_{msy}, 85% F_{msy} and F_{msy}. Catch in 2025 was assumed at 15 810 t (average catch 2021-2022) or 20 000 t (TAC). Catch in 2025 was assumed at 15 810 t (TAC 2025) or 3 135 t (average catch 2023-2024).

		Catch 2025 = 15 810 t			
		F=0	Healthy Zone		
			$F = 0.75F_{msy}$	$F = 0.85F_{msy}$	$F = F_{msy}$
Yield ('000t) (50%)	2025	15.81	15.81	15.81	15.81
	2026	0	21.43	24.29	28.58
	2027	0	19.88	22.00	24.96
$P(F>F_{lim})$	2025	<1%	<1%	<1%	<1%
	2026	<1%	11%	24%	50%
	2027	<1%	12%	25%	50%
$P(B<B_{lim})$	2025	<1%	<1%	<1%	<1%
	2026	<1%	<1%	<1%	<1%
	2027	<1%	<1%	<1%	<1%
	2028	<1%	<1%	<1%	<1%
$P(F>F_{target})$	2025	3%	3%	3%	3%
	2026	<1%	29%	50%	78%
	2027	<1%	30%	50%	76%

$P(B<B_{trigger})$	2025	<1%	<1%	<1%	<1%
	2026	<1%	<1%	<1%	<1%
	2027	<1%	<1%	<1%	1%
	2028	<1%	1%	2%	4%
$P(B_{2028}>B_{2025})$		70%	21%	16%	11%
$(B_{2028}-B_{2025})/B_{2025}$		+10.8%	-15.0%	-18.2%	-22.9%

		Catch 2025 = 3 135 t			
		F=0	Healthy		
			F = $0.75F_{msy}$	F = $0.85F_{msy}$	F = F_{msy}
Yield (50%)	2025	3.135	3.135	3.135	3.135
	2026	0	23.47	26.60	31.29
	2027	0	21.0	23.23	26.31
$P(F>F_{lim})$	2025	<1%	<1%	<1%	<1%
	2026	<1%	11%	23%	50%
	2027	<1%	11%	24%	50%
$P(B<B_{lim})$	2025	<1%	<1%	<1%	<1%
	2026	<1%	<1%	<1%	<1%
	2027	<1%	<1%	<1%	<1%
	2028	<1%	<1%	<1%	3%
$P(F>F_{target})$	2025	<1%	<1%	<1%	<1%
	2026	<1%	28%	50%	79%
	2027	<1%	29%	50%	78%
$P(B<B_{trigger})$	2025	<1%	<1%	<1%	<1%
	2026	<1%	<1%	<1%	<1%
	2027	<1%	<1%	<1%	<1%
	2028	<1%	<1%	1%	<1%
$P(B_{2028}>B_{2025})$		76%	26%	21%	15%
$(B_{2028}-B_{2025})/B_{2025}$		+15.4%	-11.9%	-15.2%	-20.2%

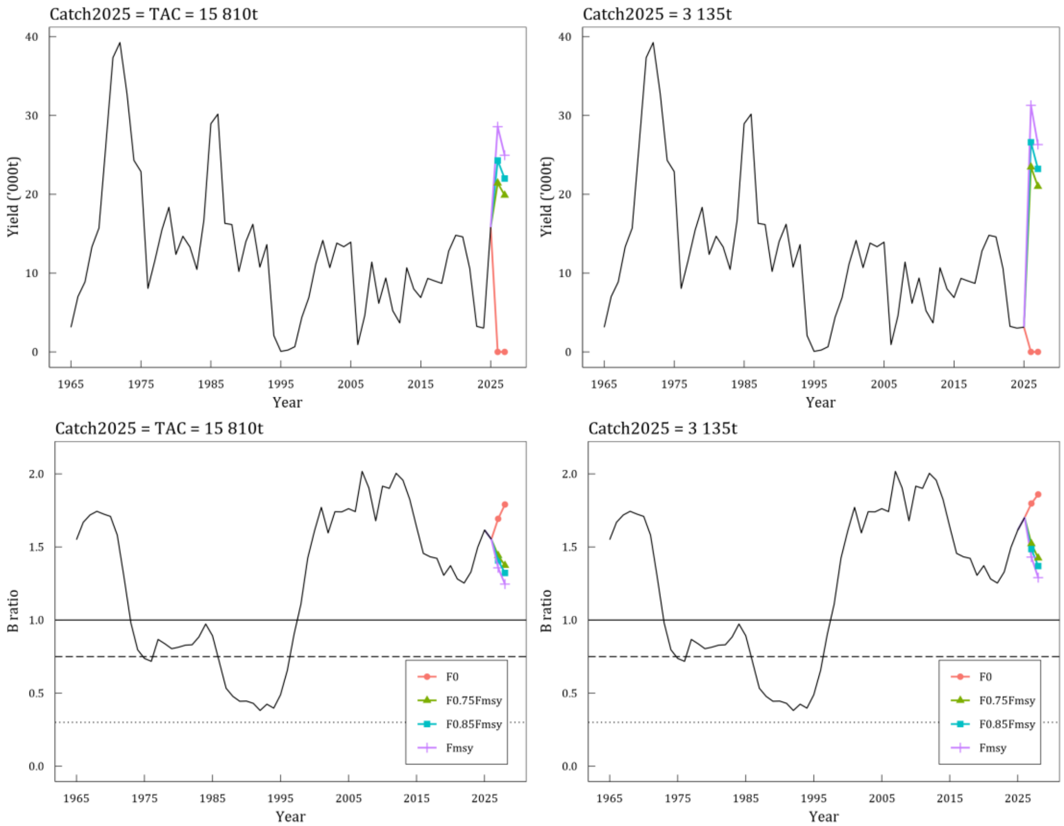


Figure 12.8. Yellowtail flounder in Divs. 3LNO: stochastic projections from 2026-2028 at four levels of F (F=0, 75% F_{msy}, 85% F_{msy} and F_{msy}) for two $Catch_{2025}$ scenarios ($Catch_{2025}$ = TAC_{2025} = 15 810 t and $Catch_{2025}$ = average of 2023-2024 = 3 135 t). Top panels show projected yield and lower panels are projected relative biomass ratios (B/B_{msy}).

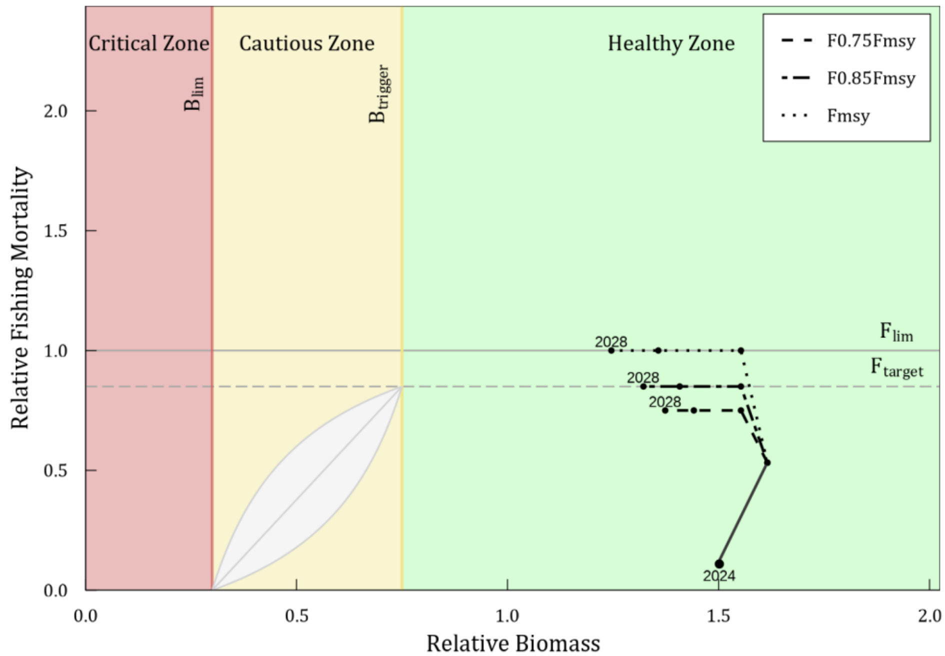


Figure 12.9. Yellowtail flounder in Divs. 3LNO: stochastic projections in the NAFO Precautionary Approach Framework from 2026-2028 at three levels of F (75% F_{msy}, 85% F_{msy} and F_{msy}) assuming Catch_{2025} = 15 810 t.

d) Reference Points:

The stock is presently 1.5 times B_{msy} (B_{msy}=86.4 kt) and F is below F_{msy} (Figure 12.10). B_{lim} is defined at 30% B_{msy}, $B_{trigger}$ is defined at 0.75B_{msy}, F_{lim} is defined at F_{msy}, and F_{target} is defined at 0.85F_{msy}. At present, the risk of the stock being below B_{lim} or $B_{trigger}$ is very low (<1%) and risk of the stock being above F_{lim} is very low (<1%). The stock is in the Healthy Zone as defined in the NAFO Precautionary Approach Framework.

e) State of the Stock

The stock is in the Healthy Zone. The stock size remains above B_{msy} with a probability >99% and has been between 1.3x and 1.5x B_{msy} since 2016. There is a very low risk (<1%) of the stock being below $B_{trigger}$ and a very low risk of F being above F_{lim}=F_{msy} or F_{target} (<1%). Recruitment has been generally above average since the late 2010s.

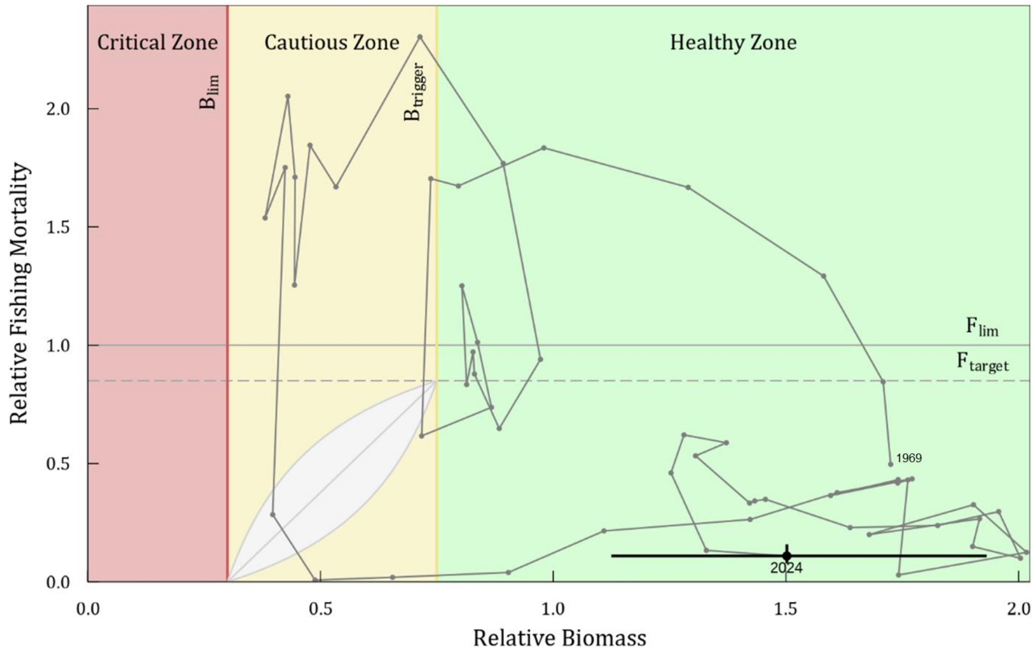


Figure 12.10. Yellowtail flounder in Divs. 3LNO: stock trajectory estimated in the surplus production analysis, under a precautionary approach framework (80%CI on 2024).

f) Research Recommendations

STACFIS **recommends** *further work on identifying cohorts from length frequencies. Survey length frequencies suggest a relatively strong year class entered the Canadian autumn survey in 2019, though in the absence of aging this cohort can not be reliably tracked into the exploitable biomass. A pre-recruit index was explored but has not been accepted.*

g) Special comments

American plaice is the most common bycatch species in the directed yellowtail flounder fishery. Data from Canadian directed yellowtail fishing reports indicate that catch of American plaice has not exceeded 5% of yellowtail catch in any year over the last five years (2020-2024).

The next full assessment of this stock will be in 2027.

13. Witch Flounder (*Glyptocephalus cynoglossus*) in Divisions 3N and 3O

Interim monitoring report (SCR Docs 24/018, 007, 036, 037; SCR 25/006, 009, 012, 028; SCS Docs 25/05, 08, 11)

a) Introduction

From 1972 to 1984, reported catch of witch flounder in NAFO Divs. 3NO ranged from a high of about 9 200 tonnes (t) in 1972 to a low of about 2 400 t in 1980 and 1981 (Figure 13.1). Catches increased to around 9 000 t in the mid-1980s but then declined steadily to less than 1 200 t in 1995. A moratorium on directed fishing was imposed in 1995 and remained in effect until 2014. During the moratorium, bycatch averaged below 500 t. The NAFO Fisheries Commission reintroduced TACs in 2015. Not all Contracting Parties with quota resumed directed fishing for witch flounder until 2019, when participation in the fishery was more representative. Catch since 2015 has been below the TAC. In 2024, total catch was estimated to be 248 t.

Recent catches and TACs ('000 tones) are as follows:

	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
TAC	2.2	2.2	1.1	1.2	1.2	1.2	1.2	1.2	1.4	1.4
STATLANT 21	0.6	0.6	0.7	0.9	0.6	0.6	NA[1]	NA[1]	NA[1]	
STACFIS	1.1	0.7	0.7	0.9	0.7	0.6	0.6	0.3	0.2	

[1] NA= In 2022-2024, STATLANT 21 information is incomplete

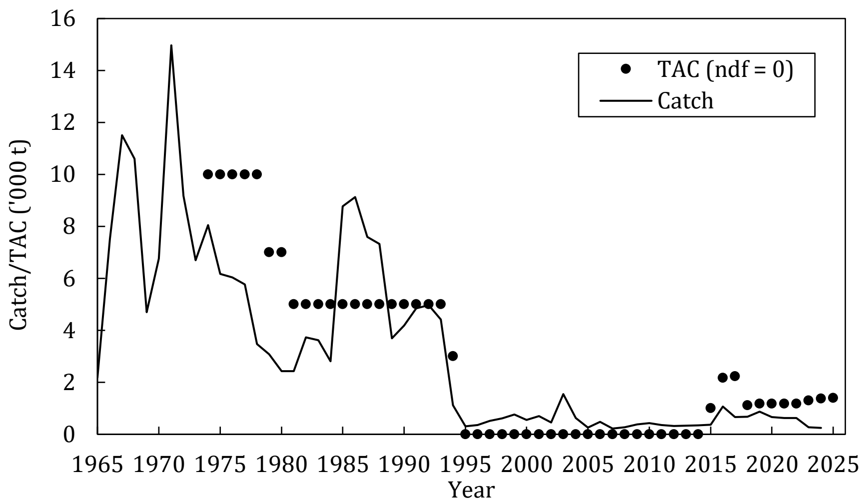


Figure 13.1. Witch flounder in Divs. 3NO (1960-2025): Catch and TAC ('000 tonnes).

b) Data Overview

i) Research surveys

Canadian spring RV surveys.

1984-2019 Campelen series. Due to substantial coverage deficiencies, values from 2006 are not presented. Due to COVID-19 restrictions and operational difficulties, respectively, the spring survey was not conducted in 2020 or 2021. The spring Campelen biomass index, although variable, had shown a general decreasing trend from 1985 to 1998, a general increasing trend from 1998 to 2003, and a general decreasing trend from 2003 to 2010. From 2010 to 2013 the index increased to values near the series high (Figure 13.2). Biomass indices declined substantially from 2013 to a value 51% of the time series average in 2015. Biomass indices remained relatively stable from 2015 to 2019 (Figure 13.2).

2014-2024 Modified Campelen series. Biomass estimates from the modified Campelen series, which are not comparable to the 1984-2019 Campelen series, have declined since 2022, but with wide error bars in some years.

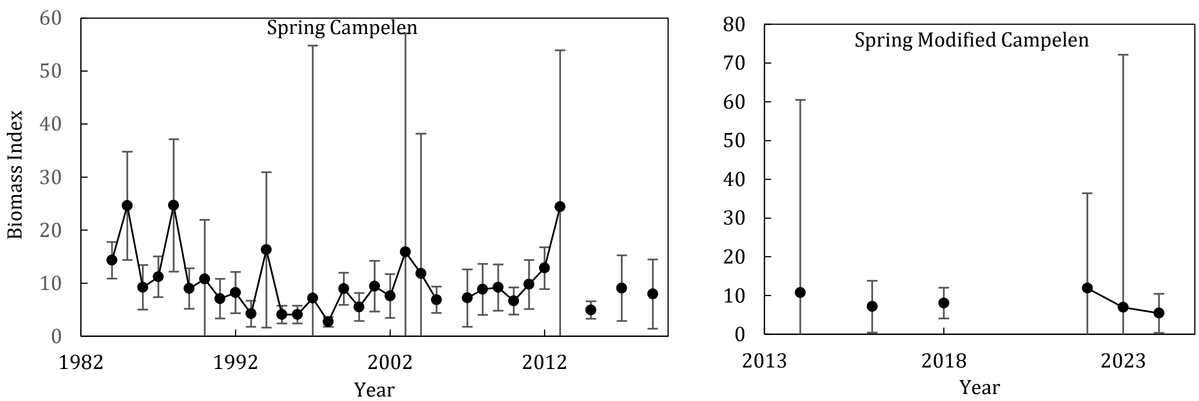


Figure 13.2. Witch flounder in NAFO Divs. 3NO: Left - survey biomass indices from Canadian Campelen spring surveys 1984-2019 and right – biomass indices from the modified Campelen spring surveys 2014-2024; 95% confidence limits are shown.

Canadian autumn RV surveys.

1990-2020 Campelen series. Due to operational difficulties there were no 2014 or 2021 autumn surveys and, due to targeted comparative fishing exercises, there was no survey in autumn 2022. The biomass indices showed a general increasing trend from 1996 to 2009 but declined to 54% of the time series average in 2016 (Figure 13.3). Biomass indices increased slightly from 2016 to 2019, then decreased in 2020.

2023-2024 Modified Campelen series. There were only two surveys, in autumn 2023 and 2024, with the new Canadian research vessel (no conversion factor available) (Figure 13.3).

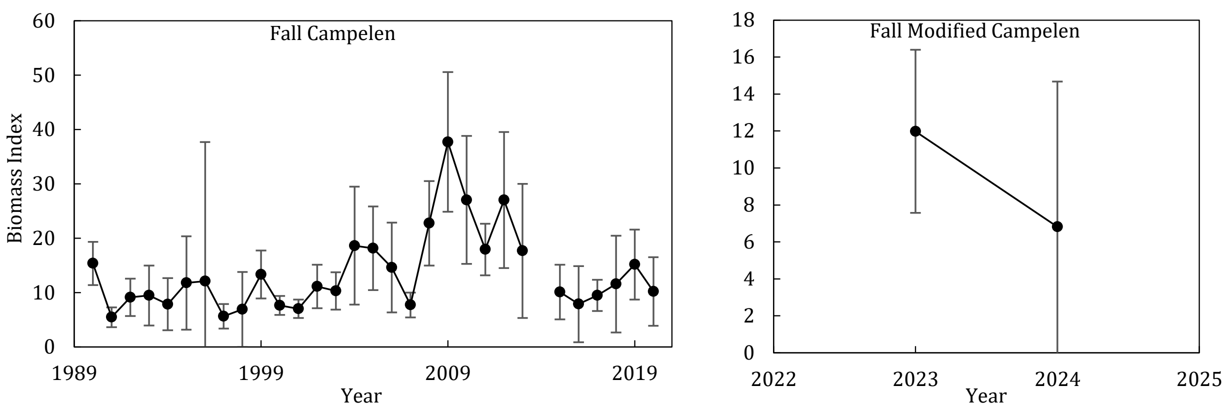


Figure 13.3. Witch flounder in Divs. 3NO: Left – survey biomass indices from Canadian Campelen autumn surveys 1990-2020 and right - biomass indices from the modified Campelen autumn surveys 2023-2024; 95% confidence limits are shown.

EU-Spain RV spring survey. Surveys have been conducted annually from 1995 to 2024 by EU-Spain in the NAFO Regulatory Area in Divs. 3NO to a maximum depth of 1450 m (since 1998). In 2001, the vessel (*Playa de Menduiña*) and survey gear (Pedreira) were replaced by the R/V *Vizconde de Eza* using a Campelen trawl (NAFO SCR 05/25). Data for witch flounder prior to 2001 have not been converted and therefore data from the two time series cannot be compared. In the Pedreira series, the biomass increased from 1995-2000 but declined in 2001. In the Campelen series, the biomass has been variable and has increased slightly since 2022 to about the mean after a period of general decrease. No survey was conducted in 2020 (Figure 13.4).

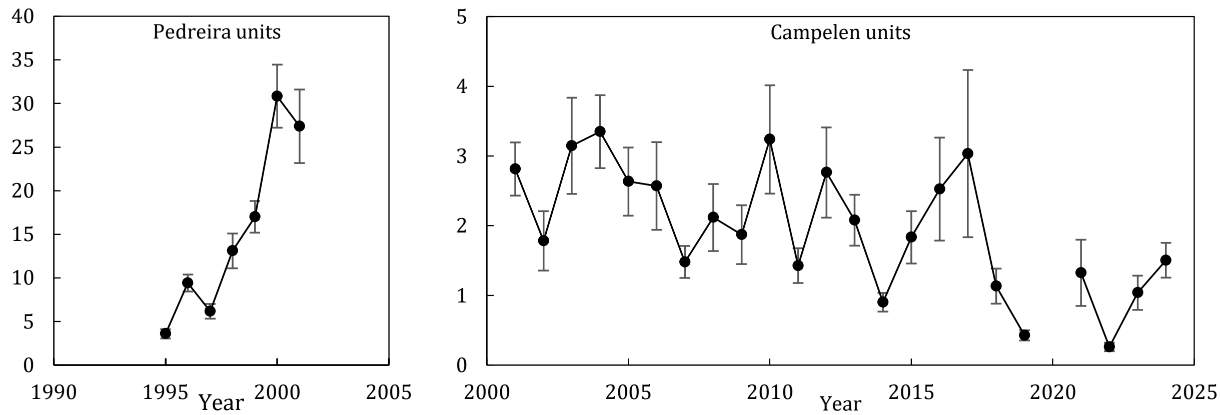


Figure 13.4. Witch flounder in Divs. 3NO: biomass indices from EU-Spanish DivS. 3NO spring surveys (± 1 standard deviation). Data from 1995-2001 is in Pedreira units; data from 2002-2024 are Campelen units. Both values are presented for 2001. No survey was conducted in 2020.

Stock distribution*. Analysis of distribution data from the surveys show that this stock is mainly distributed in Div. 3O along the southwestern slopes of the Grand Bank. In most years the distribution is concentrated toward the slopes but in certain years, an increased percentage may be distributed in shallower water.*

Recruitment: *With the exception of the growth of the stock following improved recruitment in the late 1990s, it is unclear if the recruitment index (survey number of fish<21 cm; Figure 13.5) is representative. Nevertheless, the recruitment index in 2019 was the highest in the time series. The small fish did not appear in the 2020 Canadian autumn survey, however, and the recruitment index was again below average. The number of small fish in the Canadian modified Campelen survey was about average in 2014, lower than average in 2022, and above average in 2018 and 2023-2024. While uncertain, recent recruitment appears about average.*

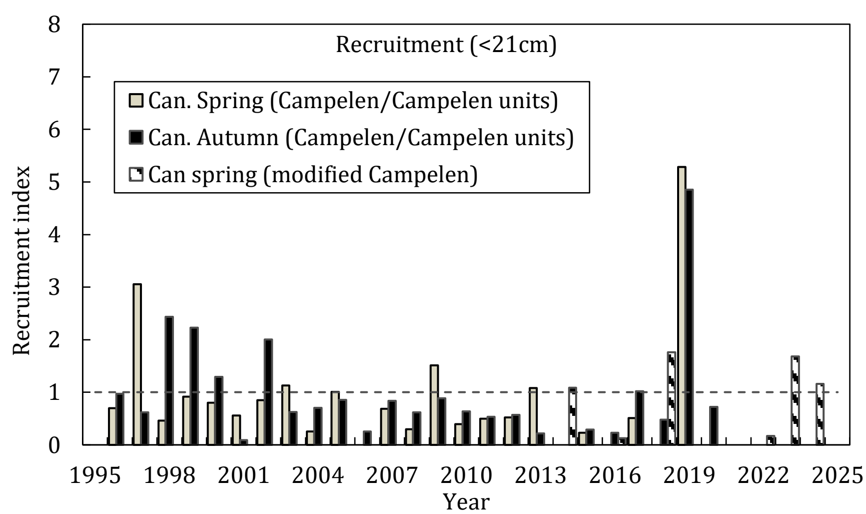


Figure 13.5. Recruitment index of witch flounder (<21cm) from spring Campelen (1996-2005, 2007-2013, 2015, 2017, 2019), autumn Campelen (1996-2013, 2014-2020) and spring Modified Campelen (2014, 2016, 2018, 2022-2024) Canadian research vessel surveys in NAFO Divs. 3NO.

c) Conclusion:

The most recent (2024) analytical assessment using a Bayesian stock production model concluded that the stock size increased from 1994 to 2013 and then declined during 2013-2015 and has since increased slightly.

In 2024 the stock was at 48% B_{msy} (60 730 t). There was 11% risk of the stock being below B_{lim} and a <1% risk of F being above F_{lim} (F_{msy}=0.061).

The 2024 survey biomass estimates indicate that the perception of stock status is unchanged and the previous advice is still valid.

The next full assessment of this stock is planned for 2026.

14. Capelin (*Mallotus villosus*) in Divisions 3NO

Interim monitoring report (SCR 25/006; SCS 25/05, 11)

a) Introduction

Fisheries and Catches The fishery for capelin started in 1971 and catches were high in the mid-1970s with a maximum catch of 132 000 t in 1975 (Figure 14.1). The stock has been under a moratorium to directed fishing since 1992. No catches have been reported from 1993 to 2013. Small catches (mostly discards) occurred from 2016 to 2020.

Recent catches and TACs (t) are as follows:

	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Recommended TAC	na	na	na	na	na	na	na	na	na	na
Catch, t (STACFIS)	5	1	2	2	1	0	0	0	0	

na = no advice possible

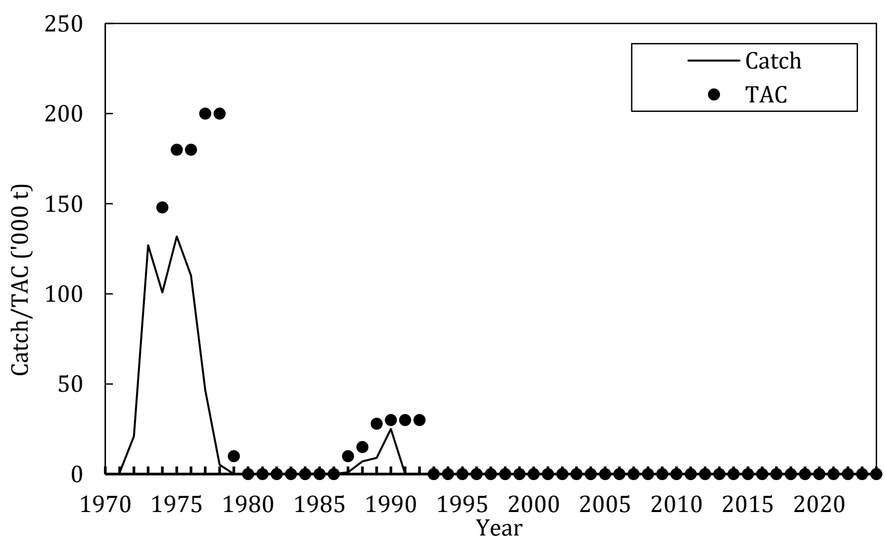


Figure 14.1. Capelin in Div. 3NO: catches and TACs.

b) Data Overview

i) *Research surveys*

Trawl acoustic surveys of capelin on the Grand Bank previously conducted by Russia and Canada on a regular basis have not been repeated since 1995. In recent years, STACFIS has repeatedly recommended the investigation of the capelin stock in Divs. 3NO utilizing trawl-acoustic surveys to allow comparison with historical time series. However, this recommendation has not been acted upon. Available indicators of stock dynamics currently include the capelin biomass index from Canadian spring stratified-random bottom trawl surveys. This index varied greatly from 1996-2019 without any clear trend (Figure 14.2). In 2014, the historical maximum of biomass index (227.5 thousand tons) has been recorded. However, in 2016, the biomass index declined to the historical minimum of 3.8 thousand tons. Due to the COVID-19 pandemic, no data from spring surveys for 2020 and 2021 is available. In recent years, the biomass index has shown a decrease to 14.7 thousand tons in 2023, followed by an increase to 29.3 thousand tons in 2024.

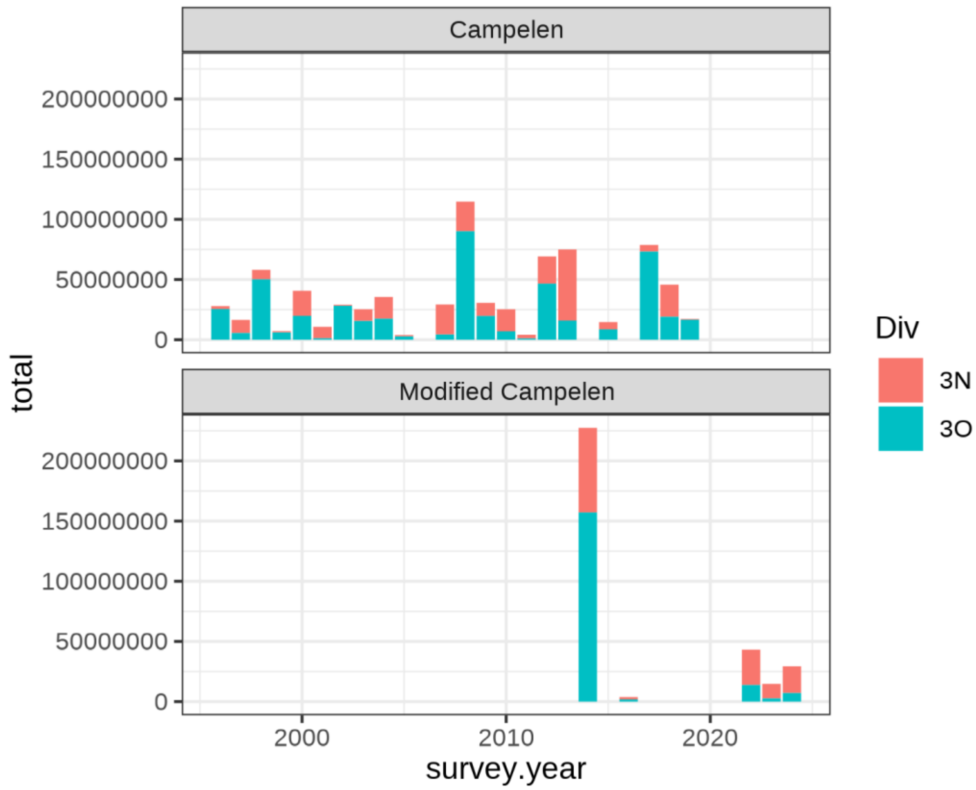


Figure 14.2. Capelin in Divs. 3NO: survey biomass index (bottom trawl) from Canadian spring survey in 1996-2024.

Data from EU-Spain trawl surveys in Divs. 3NO for 1995-2024 are also available (Figure 14.3). Data from 1995-2000 are from the C/V "Playa de Menduíña", transformed to be comparable with the 2001-2024 R/V "Vizconde de Eza" data. It should be noted there is a gap in data for 2020, because of the pandemic.

Capelin biomass was at a maximum level in 2012 (151.4 thousand tons). During 2014-2017 biomass sharply declined from 85.5 thousand tons to 5.2 thousand tons. In 2018-2019, biomass rose to a level similar to that observed in the early 2000s (27.8-19.8 thousand tons). For 2022, a notable increase (up to 86.4 thousand tons) in biomass has been recorded, followed by a decrease to 11.4 thousand tons in 2023 and an increase to 82.0 thousand tons in 2024.

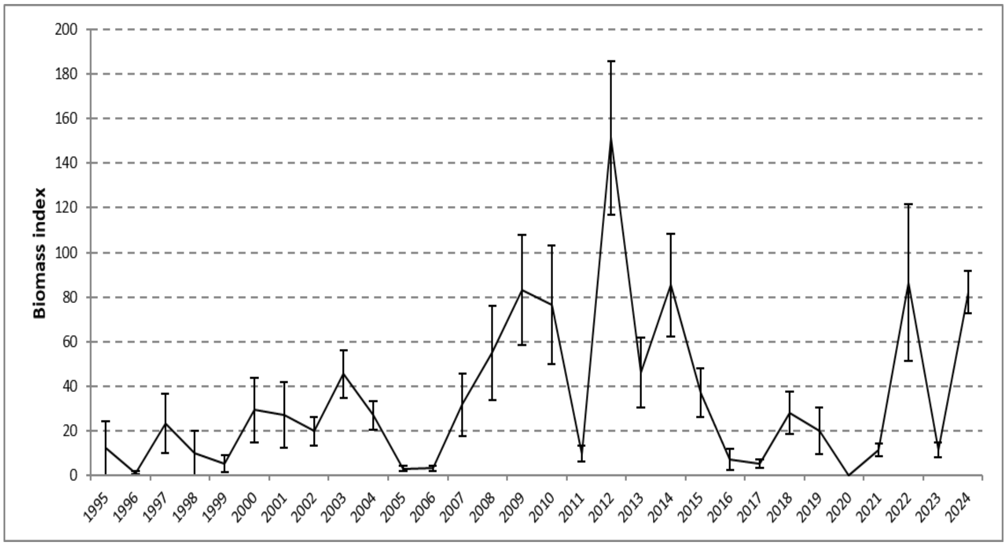


Figure 14.3. Biomass index and standard deviations of capelin (1995-2024) based on EU-Spain trawl Divs. 3NO surveys.

c) Conclusion

An acoustic survey series that terminated in 1994 indicated that the stock was at a low level. Biomass indices from bottom trawl surveys since that time have not indicated any change in stock status, although the validity of such surveys for monitoring the dynamics of pelagic species is questionable.

d) Research recommendations

STACFIS reiterates its **recommendation** that *initial investigations to evaluate the status of capelin in Divs. 3NO should utilize trawl acoustic surveys to allow comparison with the historical time series.*

Commission has excluded the capelin from its triennial request for full assessment unless surveys indicate a significant change in the state of the stock.

15. Redfish (*Sebastes mentella* and *Sebastes fasciatus*) in Division 3O

Full assessment (SCR Doc. 25/006;SCS Doc. 25/05, 08, 09)

a) Introduction

There are two species of redfish that have been commercially fished in Div. 3O: the deep-sea redfish (*Sebastes mentella*) and the Acadian redfish (*Sebastes fasciatus*). The external characteristics are very similar, making them difficult to distinguish, and as a consequence they are reported collectively as "redfish" in the commercial fishery statistics. Most studies the Scientific Council has reviewed in the past have suggested a closer connection between Divs. 3LN and Div. 3O, for both species of redfish, within this stock. Valentin *et al.* (2015) showed that some juvenile *S. fasciatus* sampled in the Gulf of St. Lawrence had the genetic signature of adult redfish from Divs. 3LNO and southern 3Ps. These findings suggest that stock structure is not well understood for not only Div. 3O but also neighbouring redfish stocks. However, differences observed in population dynamics between Divs. 3LN and Div. 3O suggested that it would be prudent to keep Div. 3O as a separate management unit.

Fishery and catches The redfish fishery within the Canadian portion of Div. 3O has been under TAC regulation since 1974 and a minimum size limit of 22 cm has been in place since 1995. Catch in the NRA portion of Div. 3O during that same time was regulated only by mesh size, and a TAC was adopted by NAFO in September 2004. The TAC has been 20 000 t since 2005 and applies to the entire area of Div. 3O. Nominal catches have ranged between 2 700 t and 35 000 t since 1960 and have been in the range of 2 700 to 9 000 t since 2009 (Figure 15.1). Catches have been steadily declining since 2016.

The redfish fishery in Div. 3O occurs primarily in the last three quarters of the year. Canadian, Portuguese, Russian and Spanish fleets, and since 2007 Estonian, have accounted for most of the catch. Bottom trawling accounts for greater than 90% of landings. Catch by midwater trawls is predominantly by Russia but there has been limited activity using this gear since 2004.

Nominal catches and TACs ('000 t) for redfish in the recent period are as follows:

	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
TAC	20	20	20	20	20	20	20	20	20	20
STATLANT 21	8.6	7.3	4.3	6.5	7.3	5.5	NA[1]	NA[1]	NA[1]	
STACFIS	9.0	7.5	6.1	6.5	7.3	5.6	3.9	3.7	2.7	

[1] NA - In 2022-2024, STATLANT 21 information is incomplete.

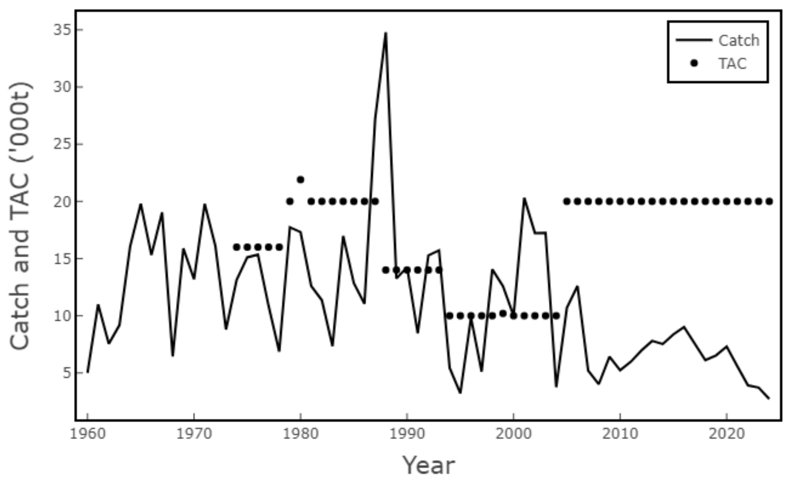


Figure 15.1. Redfish in Div. 3O: catches and TACs. TACs from 1974 to 2004 applied to Canadian fisheries jurisdiction, from 2005 for entire Div. 3O area.

b) Data Overview

i) Commercial fishery data

Since 2022, sampling of the redfish trawl fisheries was conducted in all years by EU-Spain and EU-Portugal, by Canada in 2022, and by Russia in 2023 and 2024. Size composition of the catch prior to 1998 consisted of a larger proportion of fish >25cm, but since has been relatively stable with the majority of the catch consisting of fish 15 to 30cm and few fish reported greater than 35cm (Figure 15.2).

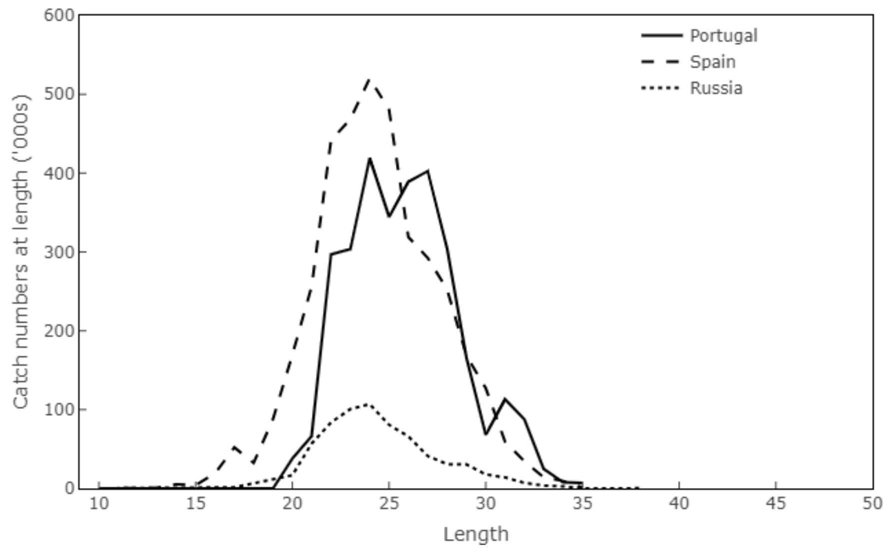


Figure 15.2. Redfish in 3O: Length frequencies for the 2024 catch.

ii) Research surveys

Canadian RV surveys

Canadian stratified-random surveys that cover the entire stock area began in 1991. The survey was incomplete in spring 2006, 2017 and 2021, and autumn 2014, 2021 and 2022. Beginning in 2022, new survey vessels have been used to conduct the Canadian multi-species surveys. For redfish in Div. 3O, conversion factors that would allow data from the new vessels to extend existing time series data from the former primary research vessels (CCGS Wilfred Templeman and CCGS Alfred Needler) were only available for the spring Teleost series. As a result, the spring Canadian Campelen series (1984-2019) and the autumn Canadian Campelen series (1990-2020) have ended.

For the spring series, comparative fishing indicated that the Teleost is comparable to the new time series for redfish in Div. 3O. Years with complete/near-complete coverage with the Teleost (2014, 2016, 2018) have been removed from the 1984-2019 Campelen series, and included in a new spring time series which also includes the new survey series (modified Campelen).

To develop a standardized spring biomass series (Figure 15.3), Campelen data were rescaled to be comparable to modified Campelen data using the ratio of the means of survey values (modified Campelen / Campelen) during a period of overlap (2013-2019).

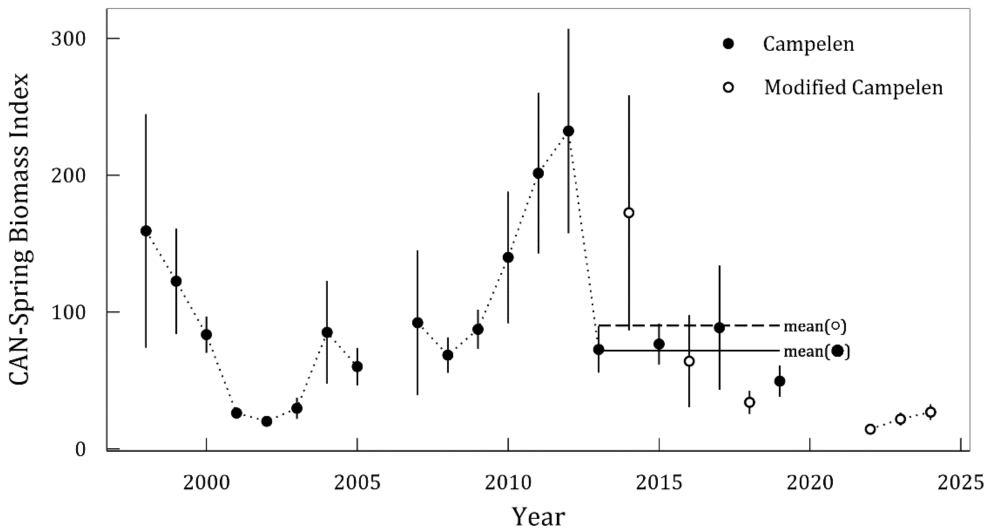


Figure 15.3. Redfish in Div. 3O: Canadian spring survey indices of redfish in Div. 3O from the Campelen and modified Campelen series. Campelen data were rescaled using the mean ratio of modified to original survey values from 2013–2019 to ensure comparability.

The spring and autumn surveys were completed in Div. 3O in 2023 and 2024 (Figures 15.4). However, Canadian autumn data for 2023 and 2024 are not comparable to the earlier years due to absence of conversion factors and inability to rescale fall Campelen data.

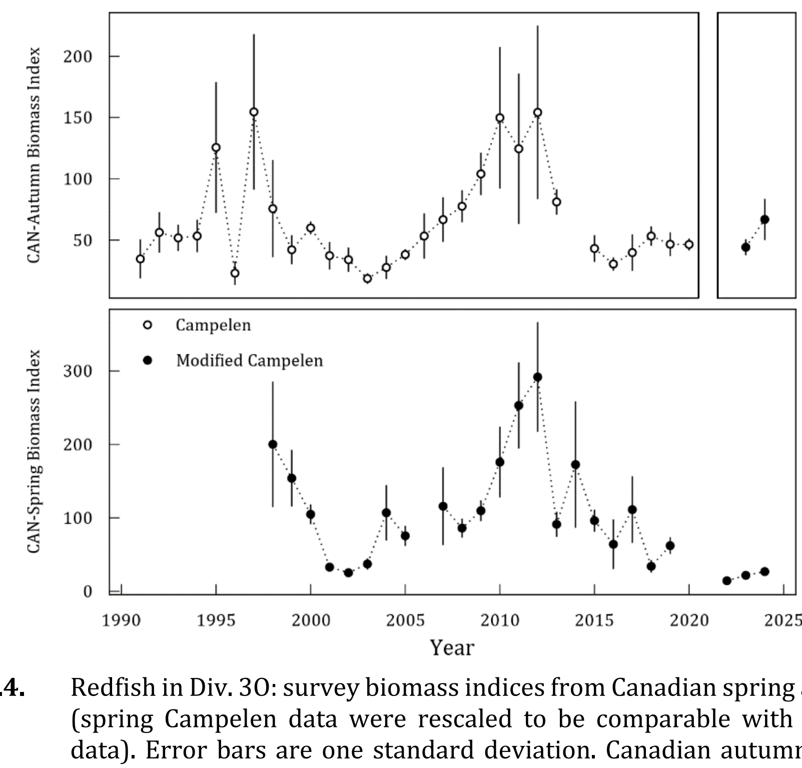


Figure 15.4. Redfish in Div. 3O: survey biomass indices from Canadian spring and autumn surveys (spring Campelen data were rescaled to be comparable with modified Campelen data). Error bars are one standard deviation. Canadian autumn data for 2023 and 2024 are not comparable to the earlier years due to absence of conversion factors and inability to rescale fall Campelen data.

EU RV surveys
Data were available from EU-Spain spring surveys conducted in the NAFO Regulatory Area (NRA) of Div. 3O from 1995 to 2019 and in 2021 to 2024. These surveys use the same stratification scheme as the Canadian surveys. The area of redfish habitat in Div. 3O that is covered by the EU-Spain survey is estimated at less than 8% of that covered by Canadian surveys. During many years, less than 20% of the biomass in the Canadian surveys is observed in the NRA and therefore, the EU-Spain survey may not reflect stock trends. The EU-Spain surveys covered depths to 1500m (800 fathoms) with the exception of 1995-1996 when complete coverage was not achieved. Until 2001, these surveys were conducted using a Pedreira type bottom trawl and thereafter with a Campelen trawl similar to that used in Canadian surveys. The data prior to 2001 were converted into Campelen equivalent units.

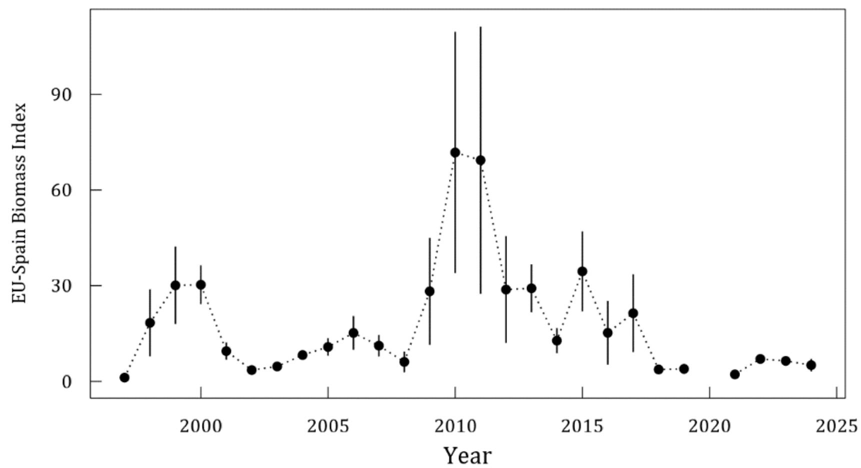


Figure 15.5. Redfish in Div. 3O: survey biomass indices (error bars are one standard deviation) from EU-Spain spring surveys in Campelen equivalent units for surveys prior to 2002.

Biomass indices

Results of bottom trawl surveys for redfish in Div. 3O have shown a considerable amount of variability, making it difficult to interpret year to year changes. However, trends across the three survey series are consistent and show indices generally at or above the time-series mean during two periods: the mid to late 1990s, and during 2009 to 2015. All available surveys since 2018 have been below their long term mean (Figures 15.4, 15.5 and 15.6). The converted Canadian spring series is used to determine the state of the stock (see reference points section).

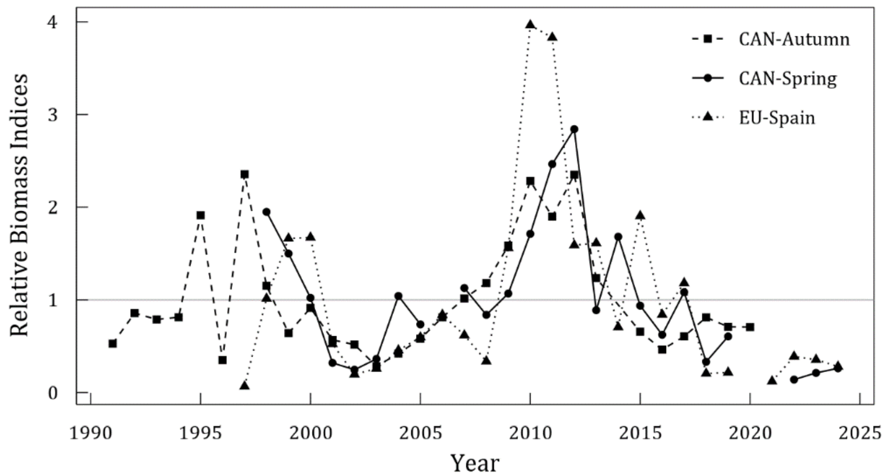


Figure 15.6. Redfish in Div. 3O: survey biomass indices from Canada (spring and autumn) and EU-Spain. Indices were normalized by dividing each series by its mean. The Canadian autumn 2023 and 2024 indices were excluded as they could not be made relative.

Recruitment index

Recruitment for 3O redfish, measured as the abundance of fish 10-15cm in the Canadian spring surveys, was above the median of modified Campelen survey values in 2024 (Figure 15.7). However, the time series is limited to just six observations, making it difficult to determine whether this represents a meaningful change. Redfish < 15cm are not consistently caught in the EU-Spain survey in Div. 3O, therefore this survey was not considered appropriate for quantifying recruitment. Fishery catch is typically between 15 and 30cm, therefore the recruitment index represents the abundance of fish in sizes close to those recruiting to the fishery. The last indication of good recruitment was in 2010-2011. STACFIS noted that pulses of recruitment sometimes fail to track through to sizes caught in the fishery and uncertainty remains about potential contributions to recruitment from areas outside of Div. 3O.

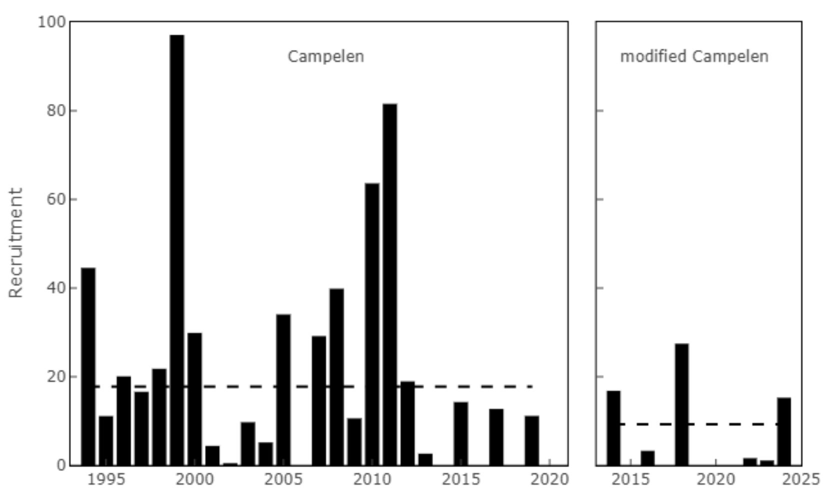


Figure 15.7. Redfish in Div. 3O: Recruitment indices defined as the abundance of redfish 10-15cm in the Canadian Spring surveys. Horizontal dashed lines are time-series medians.

c) Assessment Results

Biomass: Spring survey indices from 2022 to 2024 were below B_{lim} and among the lowest recorded. Although the stock has declined below B_{lim} in the past (e.g., 2002), moderate probabilities of being below B_{lim} had not persisted for more than one year. This contrasts with the most recent observations (2022-2024) which all indicate that the stock is below B_{lim} with >50% probability (Figure 15.8).

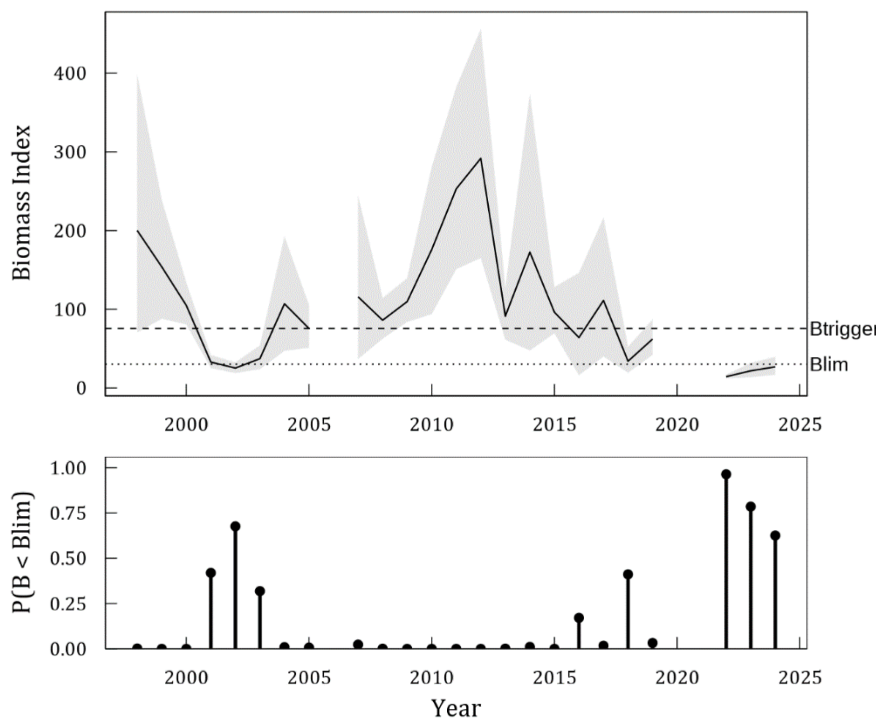


Figure 15.8. Redfish in Div. 3O: Canadian spring biomass index with 80% confidence intervals calculated using a gamma distribution. Horizontal thin and thick dashed lines indicate B_{lim} =0.3 B_{msy} -proxy and $B_{trigger}$ = 0.75 B_{msy} -proxy, respectively. Probability of By < B_{lim} is presented below.

Fishing mortality: A fishing mortality proxy was derived from catch to biomass ratios. As most of the catch is generally taken in the last three quarters of the year, catch was divided by the rescaled Campelen or modified Campelen biomass estimates from the Canadian Spring survey, which should represent relative biomass before the catch was taken. Prior to 1998, the catch was composed of fish greater than 25cm which are not well represented in the survey catch. Since 1998, the fishery size composition more closely resembled the survey size composition. Accordingly, catch/biomass ratios were only calculated for the surveys from 1998-2024.

Relative fishing mortality was among the highest in the series from 2001 to 2003, before declining to the lowest levels between 2007-2012 (Figure 15.9). Subsequently, relative fishing mortality generally increased. During 2022 to 2024, relative fishing mortality was higher than or comparable to values over 2015 to 2019, remaining well below the highest values observed. Relative fishing mortality was at or above F_{target} over the period 2015 to 2024.

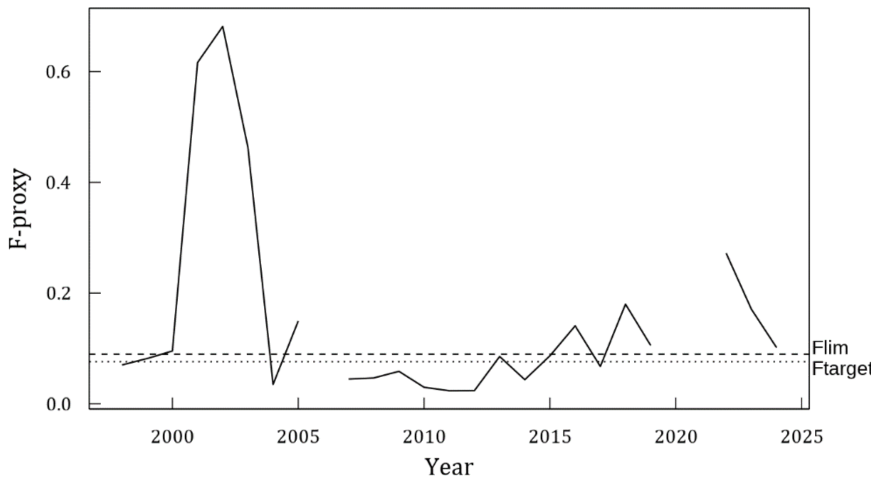


Figure 15.9. Redfish in Div. 3O: catch/survey biomass ratios. F_{target} and F_{lim} are shown as thin and thick dashed lines respectively (see reference points section for details).

c) Reference Points:

The biomass limit reference point for this stock was updated from that accepted at the 2022 assessment given the lack of conversion factors for the Canadian autumn survey and the inability to rescale autumn Campelen data. The rescaled Canadian spring survey is now used as the basis for this reference point, with the average of the survey time series being considered a proxy for B_{msy}. B_{lim} is defined at 30% of the proxy-B_{msy} level and $B_{trigger}$ is defined as 75% of the proxy-B_{msy} level. The corresponding average of the F_{proxy} time-series represents F_{msy}. While uncertainty around annual estimates could not be calculated, the mean and variance of the F_{proxy} time-series were used to characterize uncertainty around the reference point using the gamma distribution. The median of this distribution was defined as $F_{msy} = F_{lim}$ and, following the new PA, a target reference point (F_{target}) was set as 85% of F_{lim}. Probabilities of differing from these reference points were estimated from the gamma distribution.

The reference points described above should be reviewed as new information becomes available and/or as analytical methods advance for this stock. The stock has been in the Critical Zone and fished above F_{lim} since 2022 (Figure 15.10).

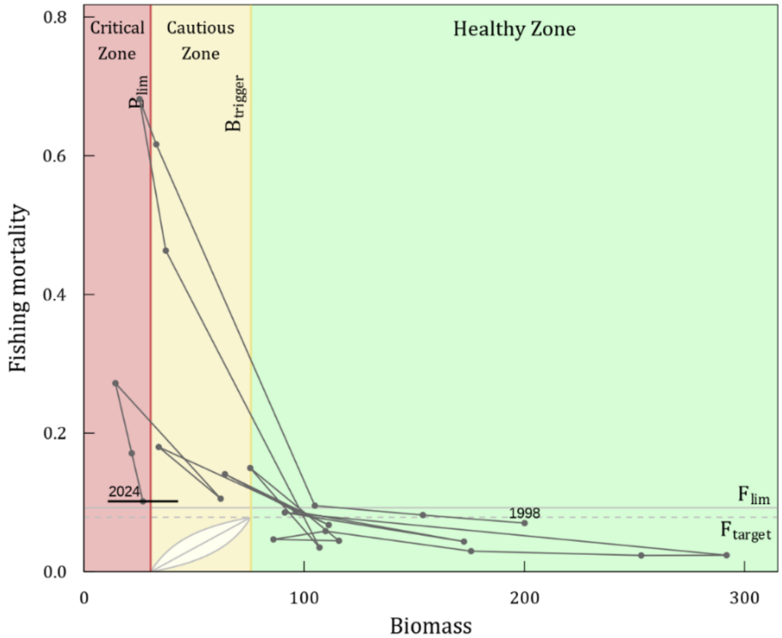


Figure 15.10. Redfish in Div. 3O: Stock trajectory estimated using the Canadian spring biomass and F_{proxy} indices, under the Precautionary Approach Framework (80% CL on 2024).

d) State of the Stock:

Redfish in Div. 3O is in the Critical Zone. Biomass in 2024 was below the limit reference point (B_{lim} =0.3 B_{msy} proxy) with a moderate probability [P(B_{2024}> B_{lim})> 0.62]. The fishing mortality proxy was above F_{target} [P(F_{2024}>F_{target})>0.58] and above F_{lim} [P(F_{2024}>F_{lim})>0.53.

Recruitment in 2024 was above the median of comparable survey values since 2014, but the short time series limits confidence in interpreting this as a meaningful trend.

e) Recommendations

STACFIS **recommended** that *for redfish in Div. 3O, work continue on developing an assessment model for the stock.*

STATUS: this recommendation is reiterated.

STACFIS **recommended** that *stock boundaries and definitions as well as synchronicity with adjacent stocks be explored.*

STATUS: this recommendation is reiterated and STACFIS further **recommends** *exploration of methods to delineate species.*

STACFIS **recommended** that *the reference point for this stock be reviewed at the 2028 assessment, or earlier if there are considerable advances in an analytical approach for this stock, or a significant change in available data or the understanding of stock dynamics*.

STATUS: this recommendation is reiterated.

STACFIS **recommends** that *work continue on developing a standardized recruitment index.*

The next full assessment will be in 2028.

16. Thorny skate (*Amblyraja radiata*) in Divisions 3LNO and Subdivision 3Ps

Interim monitoring report (SCR Doc. 25/006, 008; SCS Doc. 25/05REV, 08, 09, 11, 28)

a) Introduction

Thorny skate in Subdiv. 3Ps and Divs. 3LNO have a continuous distribution and are considered a single stock unit. A portion of the stock is managed by Canada and France (3Ps) and a portion is managed by NAFO (3LNO).

b) Fisheries and Catch

Commercial catches of skates contain a mix of skate species. However, thorny skate dominates, comprising about 95% of skate species taken in Canadian and EU-Spain catches. Thus, the skate fishery on the Grand Banks can be considered a fishery for thorny skate. The TAC has been 7 000 t over the period 2013-2025. In Subdiv. 3Ps, Canada established a TAC of 1 050 tons in 1997, which has not changed.

Catches from the NRA of Divs. 3LNO increased in the mid-1980s with the commencement of a directed fishery for thorny skate. The main participants in this new fishery were EU-Spain, EU-Portugal, USSR, and the Republic of Korea. Catches from all countries in Divs. 3LNOPs over 1985-1991 averaged 17 058 t; with a peak of 28 408 t in 1991 (STATLANT-21). From 1992-1995, catches of thorny skate declined to an average of 7 554 t; however, there are substantial uncertainties concerning reported skate catches prior to 1996. Average STACFIS-agreed catch for Divs. 3LNO in 2018-2023 was 3 460 t and 614 t in Subdiv. 3Ps. STACFIS catch in 2024 totaled 2 385 t for Divs. 3LNO and 457 t for Subdiv. 3Ps.

Recent nominal catches and TACs (000 tons) in Divs. 3LNO and Subdiv. 3Ps are as follows:

	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Divs. 3LNO:										
TAC	7	7	7	7	7	7	7	7	7	7
STATLANT-21	3.5	4.2	0.1	3.7	4.0	4.0	NA[1]	NA[1]	NA[1]	
STACFIS	3.5	4.5	2.4	3.7	4.3	3.7	3.5	2.1	2.4	
Subdiv. 3Ps:										
TAC	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	
STATLANT-21	0.7	0.6	1.1	0.9	0.8	0.7	0.2	<0.1s	.5	
Divs. 3LNOPs:										
STATLANT-21	4.1	4.8	2.3	4.6	4.8	4.7	NA[1]	NA[1]	NA[1]	
STACFIS	4.1	5.1	3.5	4.6	5.1	4.4	3.7	2.1	2.9	

[1]NA- In 2022-2024, STATLANT 21 information was not available for 3LNO.

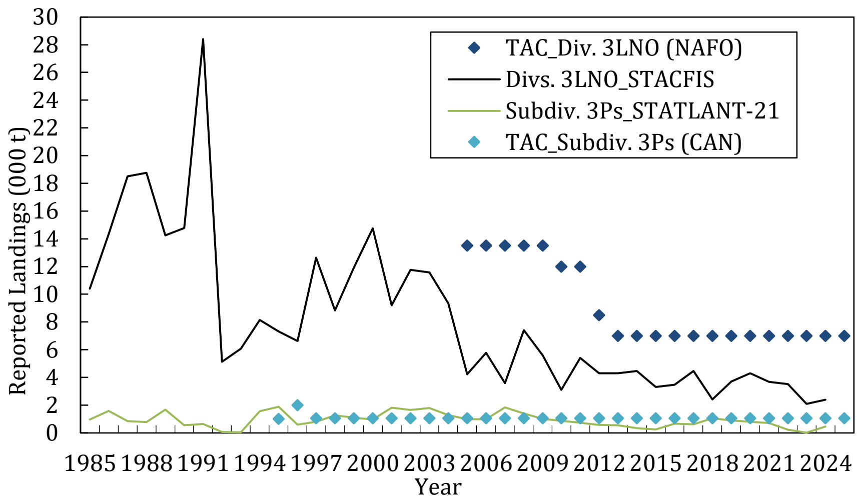


Figure 16.1. Thorny skate in Divs. 3LNO and Subdiv. 3Ps, 1985-2025: reported landings and TAC.

c) Data Overview

i) Research surveys

New vessel time series – Modified Campelen series. Beginning in 2022, new survey vessels have been used to conduct the Canadian multi-species surveys. For thorny skate in NAFO Divs. 3LNO and Subdivision 3Ps, data from comparative fishing experiments were insufficient to provide conversion factors for past primary research vessels CCGS Wilfred Templeman and CCGS Alfred Needler. As a result, the spring Canadian Campelen series (1984-2019) and the autumn Canadian Campelen series (1990-2020) have ended. For the spring series, conversion factors allow the CCGS Teleost sets in Divs. 3LNO to be converted to the new survey vessels using a length-based conversion, however data are insufficient to convert indices in Subdivision 3Ps.

Throughout the survey series the CCGS Teleost was used to compliment or replace the primary vessels, with the assumption that catches from the Teleost were directly comparable to those vessels. However, during the comparative fishing trials with the new vessels it was determined that the Teleost was not directly comparable to the Wilfred Templeman and Alfred Needler for some species. For Thorny Skate in Divs. 3LNO and Subdivision 3Ps, sensitivity analyses showed most years were not impacted by use of the Teleost, however spring surveys with complete/near-complete coverage by the Teleost (2014, 2016, 2018) have been removed from the 1984-2019 Campelen series.

Canadian spring surveys. 1984-2019 Campelen series. Stratified-random research surveys were conducted by Canada in Divs. 3LNO and Subdiv. 3Ps in the spring; using a Yankee 41.5 otter trawl in 1972-1982, an Engel 145 otter trawl in 1984-1995, and a Campelen 1800 shrimp trawl in 1996-2019. Subdiv. 3Ps was not surveyed in 2006, nor was the deeper portion (>103 m) of Divs. 3NO in that year, due to mechanical difficulties on Canadian research vessels. In 2015 and 2017, several strata were not sampled in Div. 3L, thus impacting biomass and abundance estimates of thorny skate. There were no spring surveys in Divs. 3LNO from 2020-2021.

Total survey biomass in Divs. 3LNOPs fluctuated, but remained stable at low levels from 2007 to 2019.

Modified Campelen spring series. There have been three surveys in NAFO Divs. 3LNO in the spring over 2022-2024 with the new vessel, indicating a stable trend over the short time series. Subdivision 3Ps was not sampled in 2023 (Figure 16.2), but indications are that there was no significant difference in that subdivision between 2022 and 2024.

Due to lack of comparable Canadian spring surveys in Divs. 3LNOPs since 2019 current status relative to B_{lim} cannot be determined (Figure 16.2).

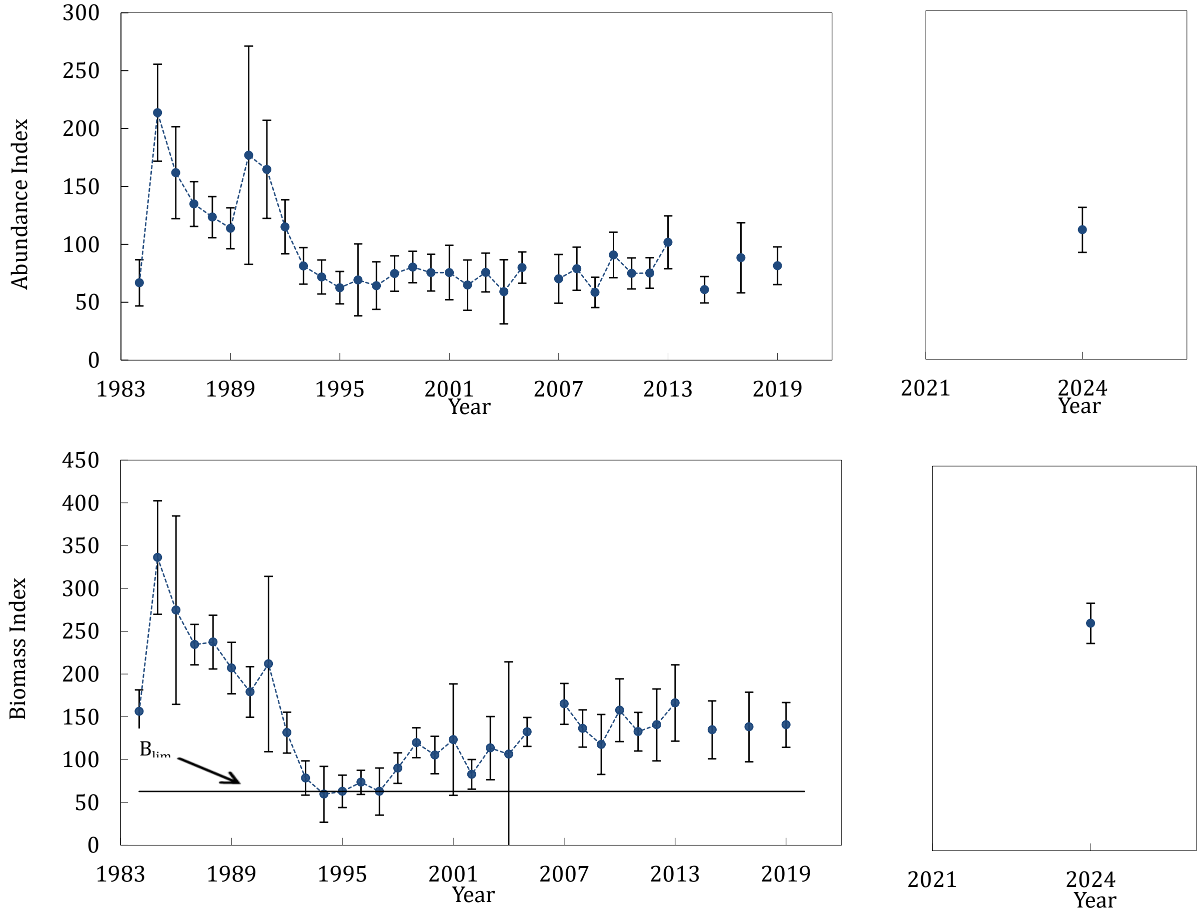


Figure 16.2. Thorny skate in Divs. 3LNOPs, 1984-2024: abundance (top panel) and biomass (bottom panel with B_{lim} shown [blue horizontal line]) indices from Canadian spring surveys. The survey in NAFO Div. 3L was incomplete in 2015 and 2017. The surveys were partially completed on the Teleost in 2014, 2016 and 2018 and are not comparable. The value in 2024 is not comparable to earlier values.

Canadian autumn surveys. 1990-2020 Campelen series. Stratified-random research surveys have been conducted by Canada in Divs. 3LNO in the autumn, using an Engel 145 otter trawl in 1990-1994 and a Campelen 1800 shrimp trawl in 1995-2020, to depths of ~1 450 m. Due to operational difficulties there were no 2014 or 2021 autumn surveys and, due to targeted comparative fishing exercises, there was no survey in autumn 2022.

Autumn survey indices, similar to spring estimates, declined during the early 1990s. Catch rates have been stable at very low levels since 1995 (Figure 16.2). Biomass and abundance indices for the autumn 2020 survey were similar to those observed in 2019, but were highly uncertain. Autumn indices of abundance and biomass are, on average, higher than spring estimates. This is expected, because thorny skates are found deeper than the maximum depths surveyed in spring (~750 m), and are more deeply distributed during winter/spring.

Modified Campelen series. There have been only two surveys (autumn 2023 & 2024) with the new vessel, however no conversion factor available. The 2023 biomass estimate has high uncertainty, and there is no significant difference between 2023 and 2024.

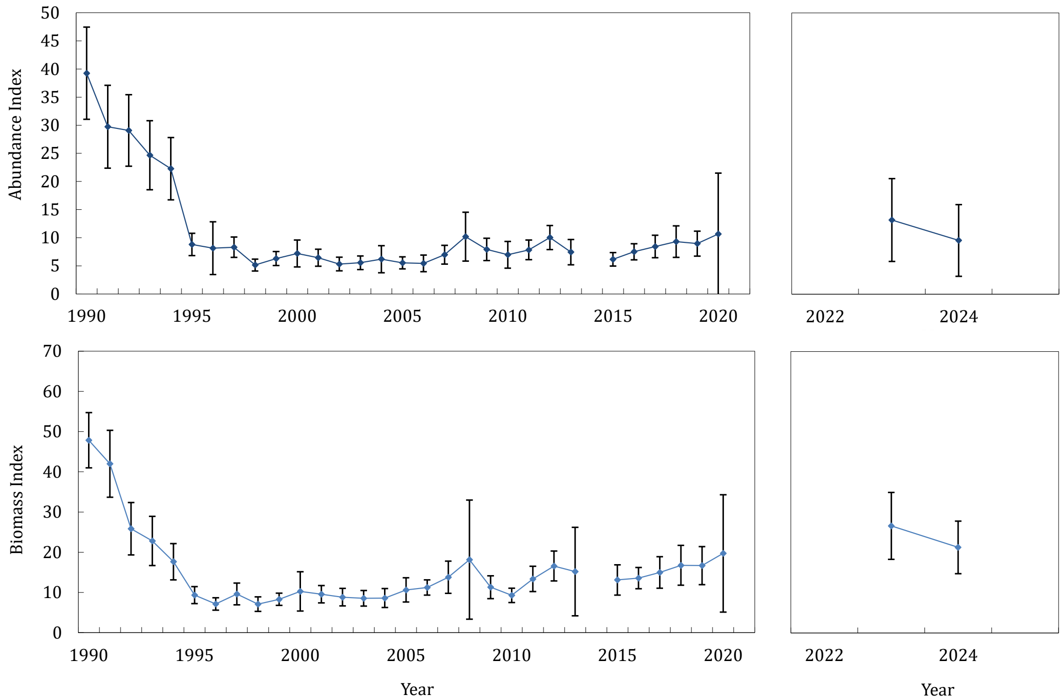


Figure 16.3. Thorny skate in Divs. 3LNOPs: 1990-2024: abundance (top panel) and biomass (bottom panel) indices from Canadian autumn surveys in Divs. 3LNO. The survey was not conducted in 2021 or 2022.

EU-Spain Divs. 3NO Survey. EU-Spain survey indices (Campelen or equivalent) are available for 1997-2024 (except for 2020). The survey only occurs in the NAFO Regulatory Area, thus not sampling the entire divisions. The biomass trajectory from the EU-Spain surveys was similar to that of the Canadian spring surveys until 2006 (Figure 16.3). Since 2007, the two indices diverged with the Canadian survey remaining stable and the EU-Spain declining, reaching its lowest level in 2022. Both indices increased over 2022-2024.

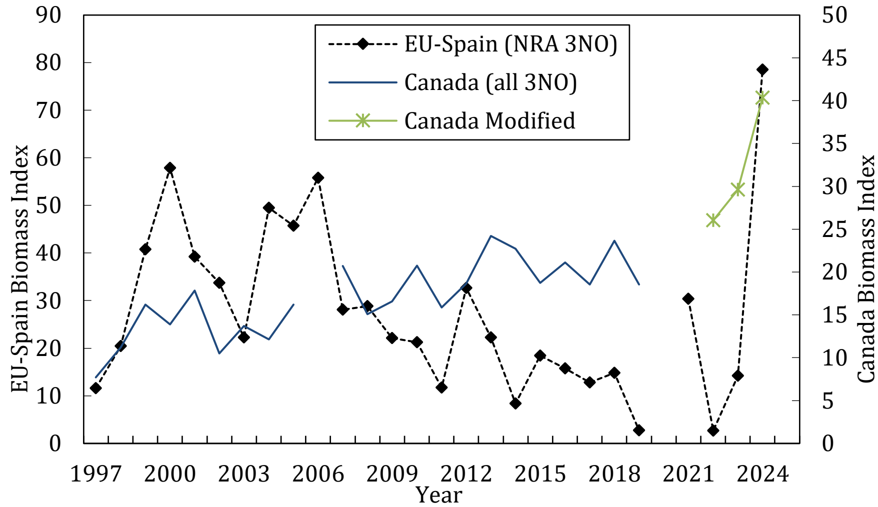


Figure 16.4. Thorny skate in Divs. 3NO: biomass indices from the EU-Spain survey and the Canadian spring survey (1997-2024). The Canadian spring surveys conducted in 2022-2024 are not comparable to the earlier time series.

EU-Spain Div. 3L survey. EU-Spain survey indices (Campelen trawl) are available for 2003-2024 (excluding 2005/2020-2022). The survey only occurs in the NAFO Regulatory Area (Flemish Pass), thus not sampling the entire division. Both the EU-Spain and Canadian autumn Div. 3L biomass indices generally declined from 2007-2011, while the Canadian spring index was more variable during this period (Figure 16.4). The Canadian autumn biomass index followed an increasing trend since 2011, while the Canadian spring index fluctuated at lower levels (Figure 16.5). Both the EU -Spain 3L and Canadian spring index increased from 2022-2024.

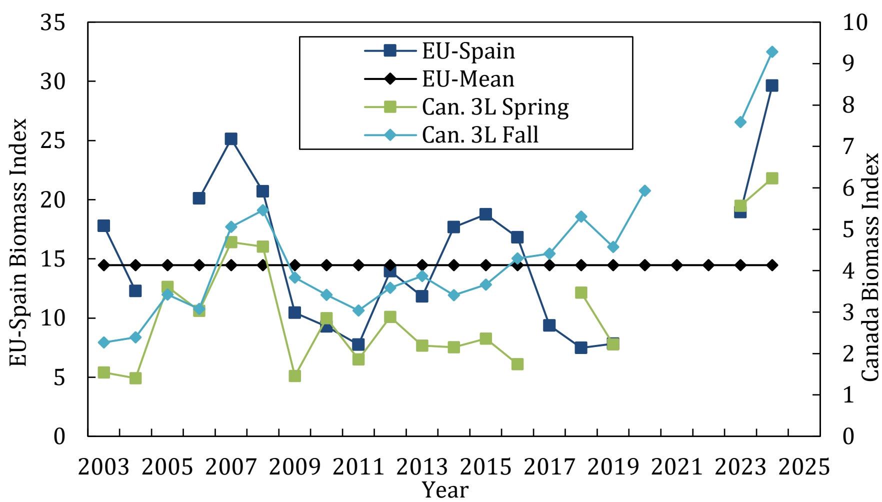


Figure 16.5. Thorny skate in Div. 3LNOPs: Biomass indices from EU-Spain Div. 3L survey and the Canadian spring and autumn surveys of Div. 3L in 2003-2024. The Canadian spring and fall surveys conducted in 2023-2024 are not comparable to the earlier time series.

d) Conclusion

Due to a lack of reference points and limited recent surveys the current status of the stock is unknown. Catches remain stable.

The next full assessment is planned for 2026.

e) Research Recommendations

STACFIS **recommended** that *the EU-Spain 3L and 3NO surveys be combined into a single index and that a recruitment index be developed from the survey. STACFIS also recommends the addition of the Canadian Fall 3NO index to the EU-Canadian comparisons.*

STACFIS **recommended** that *further work be conducted on development of a quantitative stock model.*

STATUS: An Age-Structure Catch-at-Length model for NAFO 3LNOPs thorny skate that is fitted to length-based survey indices and fishery total catch weight information was presented by Dr. Noel Cadigan at the June 2024 assessment. Further investigations of the application of this model are supported by STACFIS.

STACFIS reiterates the **recommendation** to *conduct further work on the development of a quantitative stock model.*

STACFIS **recommends** that *the stock structure of Thorny Skate in NAFO 3LNOPs be reevaluated to consider if this stock structure is valid or if NAFO 3LNO and subdivision 3Ps should be considered as separate stock units.*

17. White hake (*Urophycis tenuis*) in Divisions 3NO and Subdivision 3Ps

Interim monitoring report (SCR Doc. 25/006,008, 028; SCS Doc. 25/05REV, 08, 09, 11)

a) Introduction

Canada commenced a directed fishery for white hake in 1988 in Divs. 3NO and Subdiv. 3Ps. All Canadian landings prior to 1988 were as bycatch in various groundfish fisheries. EU-Spain and EU-Portugal commenced a directed fishery in 2002, and Russia in 2003, in the NAFO Regulatory Area (NRA) of Divs. 3NO.

A TAC in Divs. 3NO for white hake was first implemented by the Fisheries Commission in 2005 at 8 500 tons, and then reduced to 6 000 t for 2010-2011. The TAC in Divs. 3NO for 2012 was 5 000 t, and 1 000 t for 2013-2025. Canada has implemented a TAC of 500 t for Subdiv. 3Ps for 2018-2025.

Landings peaked in 1987 at approximately 8 100 t (Figure 17.1). With the restriction of fishing by other countries to areas outside Canada's 200-mile limit in 1992, non-Canadian landings fell to zero. Landings were low in 1995-2001 (422 t average), then increased to 6 718 t in 2002 and 4 823 t in 2003; following recruitment of the large 1999 year-class. Catches averaged 385 t in 2019-2021, and in 2023 and 2024 were 494 t and 682 t respectively.

Commercial catches of white hake in Subdiv. 3Ps were less variable than 3NO, averaging 1 114 t in 1985-93, then decreasing to an average of 619 t in 1994-2002 (Figure 17.1). Subsequently, catches increased to an average of 1 174 t in 2004-2007, then decreased to a 263 t average in 2009-2023. Catch averaged 218 t over 2019-2022. Catch in 2023 and 2024 were 178 t and 172t respectively.

Recent reported landings and TACs (000 tons) in NAFO Divs. 3NO and Subdiv. 3Ps are as follows:

	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Div. 3NO:										
TAC	1	1	1	1	1	1[1]	1[1]	1[1]	1[1]	1[1]
STATLANT-21	0.4	0.5	0.4	0.3	0.3	0.5	NA[2]	NA[2]	NA[2]	
STACFIS	0.4	0.5	0.4	0.3	0.3	0.5	0.5	0.5	.7	
Subdiv. 3Ps:										
TAC			0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
STATLANT-21	0.4	0.3	0.3	0.3	0.2	0.1	0.1	0.2	.2	

[1]May change in-season. See NAFO FC Doc. 19/01

[2]NA- In 2022-2024, complete STATLANT 21 information was not available for Division 3NO.

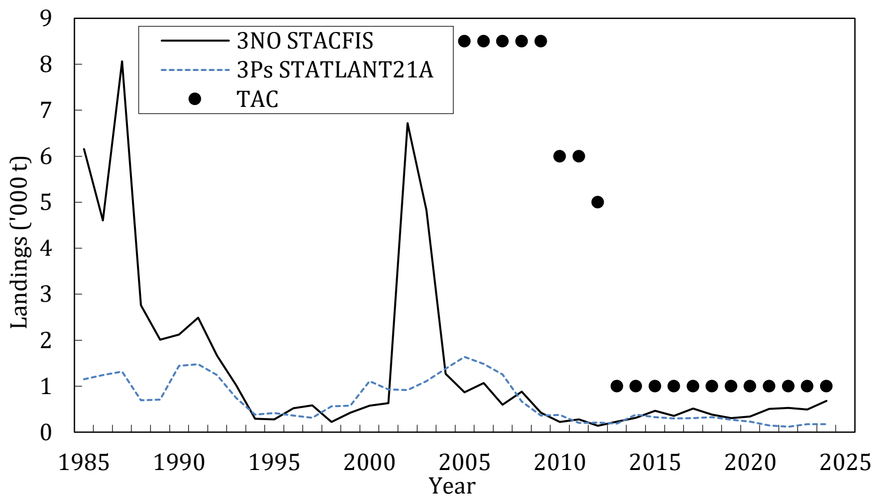


Figure 17.1. White hake in Divs. 3NO and Subdiv. 3Ps: Total reported landings of white hake in the NRA of NAFO Division 3NO (STACFIS), and Subdivision 3Ps (STATLANT-21A). The Total Allowable Catch (TAC) in the NRA of Div. 3NO is also indicated on this graph.

b) Data Overview

i) Research surveys

Canadian stratified-random bottom trawl surveys.

Canadian spring surveys have been conducted using different trawls: a Yankee 41.5 bottom trawl prior to 1984, an Engel 145 bottom trawl from 1984 to 1995, and a Campelen 1800 trawl thereafter. Canadian autumn surveys in Divs. 3NO employed an Engel 145 trawl from 1990 to 1994, followed by a Campelen 1800 trawl from 1995 to 2020. Due to the absence of survey catch rate conversion factors for white hake, each gear type is treated as a separate time-series.

Beginning in 2022, new survey vessels have been used to conduct the Canadian multi-species surveys. For white hake in NAFO Divs. 3NO and Subdivision 3Ps, data from comparative fishing experiments were insufficient to provide conversion factors that would allow data from the new vessels to extend existing time series data from the former primary research vessels (CCGS Wilfred Templeman and CCGS Alfred Needler). As a result, the spring Canadian Campelen series (1984-2019) and the autumn Canadian Campelen series (1990-2020) have ended.

Throughout the survey time series the CCGS Teleost was used to compliment or replace the primary vessels, with the assumption that catches were directly comparable. However, during the comparative fishing trials with the new vessels it was determined that the Teleost is comparable for some species. Sensitivity analyses indicated that for white hake in Divs. 3NO and Subdivision 3Ps, use of the Teleost in the autumn had minimal impact on indices, with most years were not impacted.

For the spring series, comparative fishing indicated that the Teleost is comparable to the new time series for white hake in Divs. 3NOPs. In Divs. 3NO, Spring 2014 and 2018, had a significant mixing of Teleost and Needler and are therefore not comparable to either the new or the old series and are no longer presented.

Survey information is available for 3Ps in 1972-2024, but missing from 2006 and 2020, while 2022 was carried out with a new vessel. Data is from Canadian spring Divs. 3NO is missing in 2006, 2020, 2021, while 2022 was carried out at a reduced allocation of sets with a new vessel. Canadian fall surveys were carried out from 1990-2024 with 2021 and 2022 missing.

Abundance and biomass indices of white hake from the Canadian spring research surveys in Divs. 3NOPs are presented in Figure 17.2a. From 2007-2019, the population remained at a level similar to that previously observed in the Campelen time series for 1996-1998. The dominant feature of the white hake abundance time-series was the very large peak observed over 2000-2001. In recent years, spring abundance of this species increased in 2011, but declined to relatively stable levels over 2012-2018. Biomass of this stock increased in 2000, generated by the very large 1999 year-class. Subsequently, the biomass index decreased until 2009, then increased to 2014, and remained stable over 2015- 2019. The new modified Campelen series is not long enough to make any conclusions on stock status.

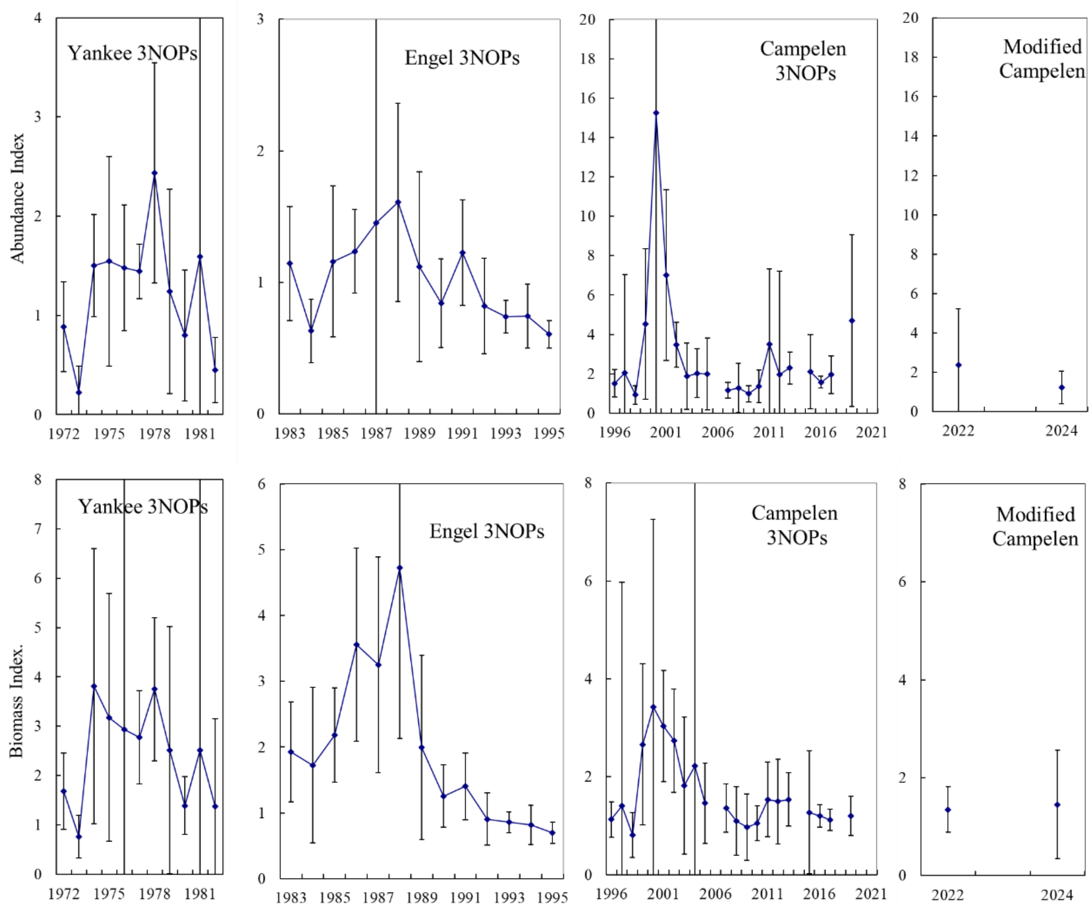


Figure 17.2a. White hake in Divs. 3NO and Subdiv. 3Ps: abundance (top panels) and biomass (bottom panels) indices from Canadian spring research surveys, 1972-2024. Estimates from 2006 are not shown, since survey coverage in that year was incomplete. Yankee, Engel, Campelen, and Modified Campelen time series are not standardized, and thus are presented on separate panels. Error bars are 95% confidence limits. The bounds of the error bars in 1976, 1981, 1987, 2000, 2012, and 2015 in some panels extend above/below the graph limits.

Canadian autumn surveys of Divs. 3NO have the peak in abundance represented by the very large 1999 year-class (Figure 17.2b). Autumn indices then declined to levels similar to those observed during 1996-1998 until 2010. In 2011-2013, both biomass and abundance appear to have slightly increased then declined over 2015-2018. This survey was not completed in 2014, or 2021-2022; the new modified Campelen series is not long enough to make any conclusions on stock status.

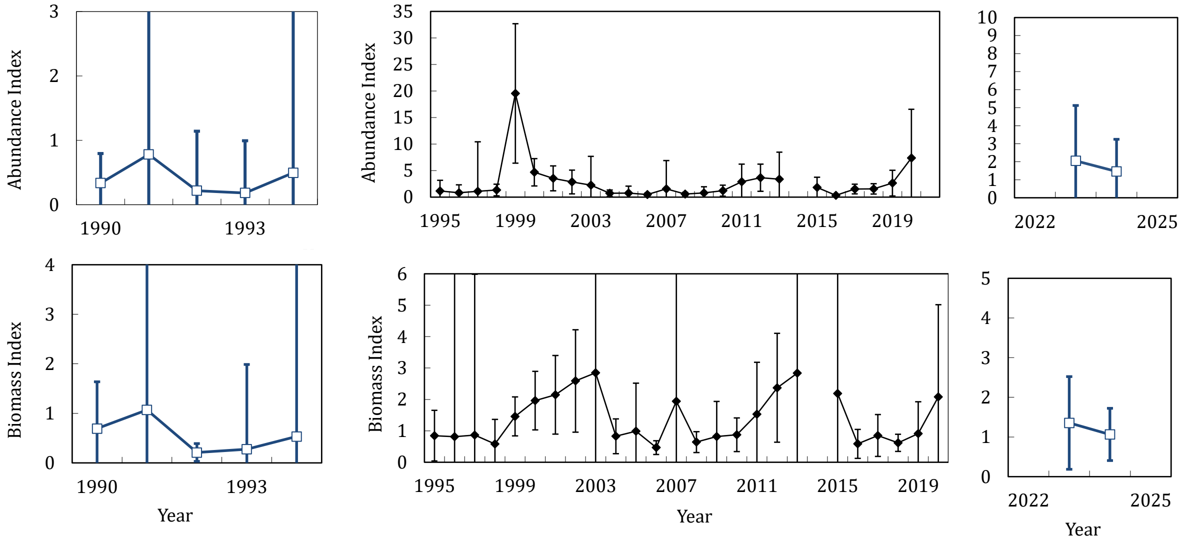


Figure 17.2b. White hake in Divs. 3NO: abundance (top panels) and biomass indices (bottom panels) from Canadian autumn surveys, 1990-2024. Engel (☐, 1990-1994), Campelen (♦, 1995-2020), and Modified Campelen (2023-2024) time series are not standardized. Estimates from 2014 are not shown, since survey coverage in that year was incomplete. Error bars are 95% confidence limits. The bounds of the error bars in 1990-1994, 2002-2009, 2013, 2015, 2019, and 2020 in some panels extend above/below the graph limits. This survey was not conducted in 2021 or 2022.

EU-Spanish stratified-random bottom trawl surveys in the NRA. EU-Spain biomass indices in the NAFO Regulatory Area (NRA) of Divs. 3NO were available for white hake from 2001 to 2022; although this survey was not conducted in 2020 due to COVID-19 (Figure 17.3). EU-Spain surveys were conducted with Campelen gear (similar to that used in Canadian surveys) in the spring to a depth of 1400 m. This survey covers only 10% of the total stock area. The EU-Spain biomass index was highest in 2001, then declined to its lowest level in 2008 and has remained variable since then (Figure 17.3). The overall trend is similar to that of the Canadian spring survey index with a time lag.

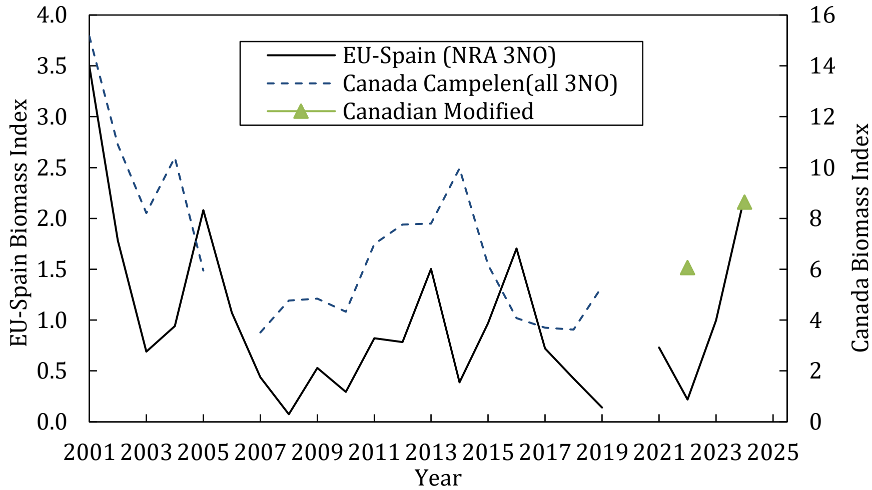


Figure 17.3. White hake in the NRA of Divs. 3NO: Biomass indices from EU-Spain Campelen spring surveys in 2001-2024 compared to Canadian spring survey indices in all of Div. 3NO. Estimates from 2006 Canadian survey are not shown, since survey coverage in that year was incomplete.

c) Conclusion

Based on current information there is no significant change in the status of this stock. However, there is increased uncertainty in current stock trends given recent survey challenges and a lack of complete conversion factors for the Canadian surveys. No large recruitments have been observed since 2000.

d) Research Recommendations

STACFIS **recommended** that *age determination should be conducted on otolith samples collected during annual Canadian surveys (1972-2019); thereby allowing age-based analyses of this population.*

Otoliths are being collected, and aging has begun. STACFIS reiterates this recommendation.

STACFIS **recommended** that *survey conversion factors between the Engel and Campelen gear be investigated for this stock.*

No progress. STACFIS reiterates this recommendation.

STACFIS **recommended** that *work continue on the development of population models and reference point proxies.*

Various formulations of a surplus production model were explored in a state-space (SPICT) and in a Bayesian framework, and work is continuing.

The next full assessment of this stock is planned for 2027.

WIDELY DISTRIBUTED STOCKS: SUBAREA 2, SUBAREA 3 AND SUBAREA 4

Environmental Overview

The water mass characteristics of Newfoundland and Labrador Shelf are typical of polar and subpolar waters with a sub-surface temperature range of -1-2°C and salinities of 32-33.5. Labrador Slope Water flows southward along the shelf edge and into the Flemish Pass region. This water mass is generally warmer and saltier than the polar shelf waters with a temperature range of 3-4°C and salinities in the range of 34-34.75. On average bottom temperatures remain < 0°C over most of the northern Grand Banks but increase to 1-4°C in southern regions and along the slopes of the banks below 200 m. North of the Grand Bank, in NAFO Division 3K, bottom temperatures are generally warmer (1-3°C), except for the shallow inshore regions where they are mainly <0°C. In the deeper waters of the Flemish Pass and across the Flemish Cap bottom temperatures generally range from 3-4°C. Throughout most of the year the cold, relatively fresh water overlying the shelf is separated from the warmer higher-density water of the continental slope region by a strong temperature and density front. This winter-formed water mass is generally referred to as the Cold Intermediate Layer (CIL) and is considered a robust index of ocean climate conditions. In general, shelf water masses undergo seasonal property changes due to the seasonal cycles of air-sea heat flux, wind-forced mixing and ice formation and melt, leading to intense vertical and horizontal gradients particularly along the frontal boundaries separating the shelf and slope water masses.

Temperature and salinity conditions in the Scotian Shelf, Bay of Fundy and Gulf of Maine regions are determined by many processes: heat transfer between the ocean and atmosphere, inflow from the Gulf of St. Lawrence supplemented by flow from the Newfoundland Shelf, exchange with offshore slope waters, local mixing, freshwater runoff, direct precipitation, and melting of sea-ice. The Nova Scotia Current is the dominant inflow, originating in the Gulf of St. Lawrence and entering the region through the Cabot Strait. The Current, whose path is strongly affected by topography, has a general southwestward drift over the Scotian Shelf and continues into the Gulf of Maine where it contributes to the counterclockwise mean circulation. The properties of shelf waters are modified by mixing with offshore waters from the continental slope. These offshore waters are generally of two types, Warm Slope Water, with temperatures in the range of 8-13°C and salinities from 34.7-35.6, and Labrador Slope Water, with temperatures from 3.5°C to 8°C and salinities from 34.3 to 35. Shelf water properties have large seasonal cycles, east-west and inshore-offshore gradients, and vary with depth.

18. Roughhead Grenadier (*Macrourus berglax*) in Subareas 2 and 3

Interim monitoring report (SCR Doc. 98/057, 25/004, 006, 008, 028; SCS Doc. 25/05, 09; COM-SC CESAG-WP 25-01)

a) Introduction

This stock was last fully assessed in 2019. The stock structure of this species in the North Atlantic remains unclear because there is little information on the number of different populations that may exist and the relationships between them. Roughhead grenadier is distributed throughout NAFO Subareas 0 to 3 in depths between 300 and 2 000 m. However, for assessment purposes, NAFO Scientific Council considers the population of Subareas 2 and 3 as a single stock.

A substantial part of the grenadier catches in Subarea 3 previously reported as roundnose grenadier was actually roughhead grenadier. To correct the catch statistics, STACFIS revised and approved the roughhead grenadier catches from 1987 - 1997. In the period 2007-2012, catches for Subarea 2+3 roughhead grenadier were stable and averaged 900 tons. In the period 2013-2024, catches decreased to their lowest levels since 1987 and averaged around 400 tons (Figure 18.1). Most of the catches were taken in Divs. 3KLMN by the fleets of EU-Spain, Canada, EU-Portugal, Japan and Russia as bycatch in the Greenland halibut fishery. This stock is assessed by the Scientific Council but it is not managed by the NAFO Commission. There is no TAC for this stock.

Recent catches ('000 t) are as follows:

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
STATLANT 21A	0.2	0.1	0.1	0.1	0.2	0.2	0.2	NA[1]	NA[1]	NA[1]
STACFIS	0.2	0.3	0.4	0.5	0.4	0.4	0.4	0.5	0.4	0.4

[1] NA - In 2022-2024, STATLANT 21 information is incomplete.

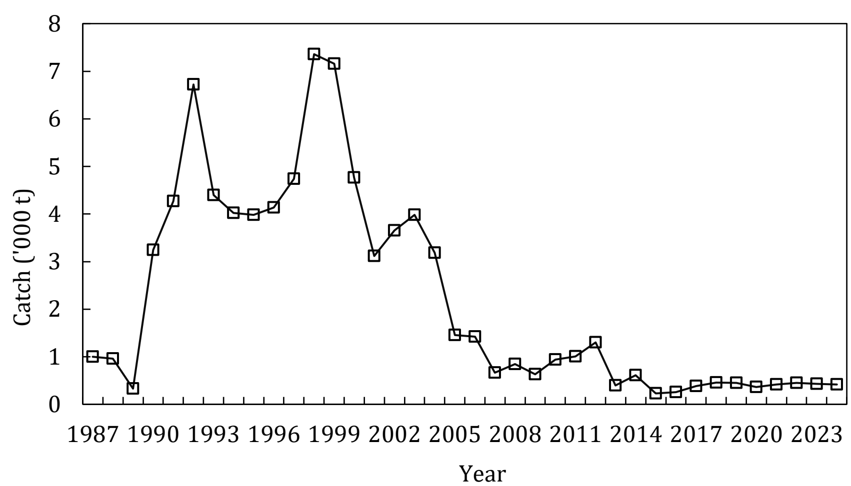


Figure 18.1. Roughhead grenadier in Subareas 2+3: STACFIS catches.

b) Data Overview

i) Research Surveys

There are no survey indices available covering the total distribution, in depth and area, of this stock. According to the literature, the species predominately inhabits depths ranging from 800 to 1500 m, therefore the best survey indicators of stock biomass are the series extending to 1500 m depth as they cover the depth distribution of roughhead grenadier fairly well. Figure 18.2 presents the biomass indices for the following series extending to 1500 m depth: Canadian fall 2J+3K Engel (1978-1994) and Canadian fall 2J+3K Campelen (1995-2024), EU-Spain 3NO (1997-2024), EU-Spain 3L (2006-2024) and EU Flemish Cap (to 1400 m; 2004-2024). Survey coverage deficiencies within Divs. 2J+3K were such that the 2008, 2018, 2019, 2021 and 2024 indices from the Canadian fall Divs. 2J+3K surveys were not considered comparable to the rest of the series. The survey was not carried out in 2022. The EU-Spain 3NO survey was cancelled in 2020 due to the pandemic situation and the EU-Spain 3L survey was not carried out from 2020 to 2022 due to the pandemic situation and other survey issues. Since 2023, the Canadian fall survey was carried out with a new vessel but the catchability for roughhead grenadier between the old and new vessels was found to be comparable.

Survey biomass indices showed a general increasing trend in the period 1995-2004. During 2005-2019, the Canadian 2J+3K survey indices continued to increase whereas the other three time series showed a general drop. During 2020-2024, there were multiple data gaps in the time series particularly in the Can 2J+3K and EU-Spain 3L indices. The biomass indices available remained near their time series low in 2021-2022 but increased in 2023 and especially in 2024 to near record highs.

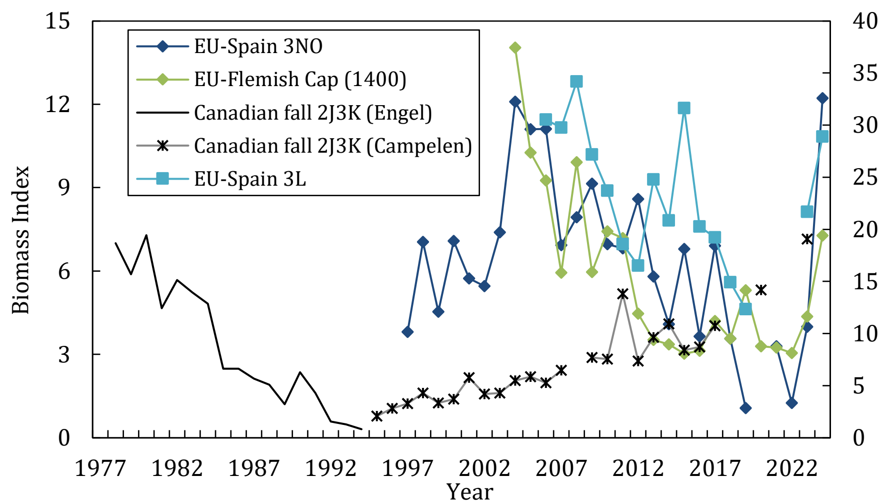


Figure 18.2. Roughhead grenadier in Subareas 2+3: Survey biomass indices.

The catch-biomass (C/B) ratios showed a clear declining trend from 1995 to 2005 and since then stable at low levels with the exception of the of the EU-Spain 3NO survey index in both 2019 and 2022 (Figure 18.3). The C/B ratio of the Flemish Cap series shows a slightly increasing trend during 2019 - 2022. In 2023 and 2024, the available indices were generally low and similar to the values observed in the 2013-2017 period.

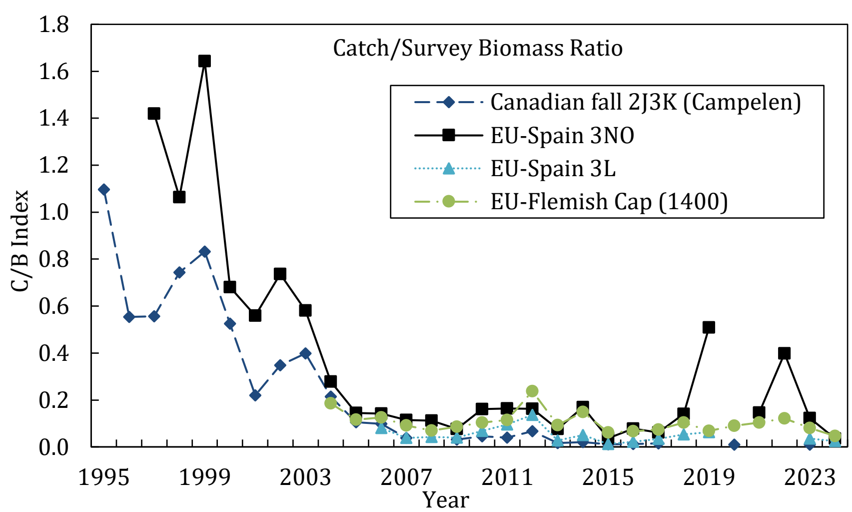


Figure 18.3. Roughhead grenadier in Subareas 2+3: catch/biomass indices based upon Canadian Autumn (Campelen series), EU-Spain Divs. 3NO, EU-Spain Div. 3L and EU-Flemish Cap (to1400 m depth) surveys.

c) Conclusion

The lack of survey indices in the period 2020-2022 limits the understanding of stock status since 2019, but the available biomass indices indicate that there was a general decrease over the 2007-2022 period although the Canadian 2J3K survey shows an opposing trend. The available indices showed substantial recovery in the 2023-2024 period compared to that observed in 2022. Fishing mortality indices have remained at low levels since 2005 with the exception of the EU-Spain 3NO survey indices in 2019 and 2022. The 2023-2024 fishing mortality indices were close to the minimum of the series. Based on available information it appears that the stock biomass has increased substantially in recent years (2023-2024) from the low levels observed in the 2020-2022 period. Proxy for fishing mortality continues at low levels.

The stock will be monitored in the future by interim monitoring reports until such time that conditions change to warrant a full assessment.

19. Greenland halibut (*Reinhardtius hippoglossoides*) in Subarea 2 + Divisions 3KLMNO

Interim monitoring report (SCS 25/11, 05, 08, 09; SCR Doc. 24/001REV2, 002REV2, 037; SCR Doc. 25/004, 006, 008, 025, 028; FC Doc. 03/13, 10/12, 13/23, 16/20; Com Doc 17/17, 24/16)

a) Introduction

TACs prior to 1995 were set autonomously by Canada; subsequent TACs have been established by NAFO Fisheries Commission (FC). Catches increased sharply in 1990 due to a developing fishery in the NAFO Regulatory Area in Divs. 3LMNO and continued at high levels during 1991-94. The catch was only 15 000 to 20 000 t per year in 1995 to 1998. The catch increased after 1998 and by 2001 was estimated to be 38 000 t, the highest since 1994. The estimated catch for 2002 was 34 000 t. The 2003 catch could not be precisely estimated, but was believed to be within the range of 32 000 t to 38 500 t. In 2003, a fifteen year rebuilding plan was implemented by FC for this stock (FC Doc. 03/13). Though much lower than values of the early 2000s, estimated catch over 2004-2010 exceeded the TAC by considerable margins. TAC over-runs have ranged from 22%-64%, despite considerable reductions in effort. The STACFIS estimate of catch for 2010 was 26 170 t (64% over-run). In 2010, FC implemented a survey-based Management Procedure, which incorporates a harvest control rule (HCR) (FC Doc. 10/12) to generate annual TACs over at least 2011-2014, through which period the catch exceeded the TAC in every year. In 2013 FC extended the 2010 management approach to set the TACs for 2015–-2017 (FC Doc. 13/23), but did not apply the HCR in 2017, rather setting the TAC equal to the 2016 TAC (FC Doc. 16/20). TACs between 2018–2024 were based on the HCR adopted in 2017 (Com Doc 17/17), and TACs since 2025 have been based on the HCR adopted in 2024 (Com Doc 24/16). Catches have closely tracked TACs since 2015. The TAC in 2024 was 15 153 t and 14 822 t were caught. The TAC for 2025 is 14 791 t.

Recent catches and TACs ('000 t) are as follows:

	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
TAC	14.80	14.80	16.50	16.52	16.93	16.50	15.86	15.16	15.15	14.79
STATLANT 21	13.04	14.69	16.23	16.30	16.25	14.99	NA[1]	NA[1]	NA[1]	--
STACFIS	14.88	14.76	16.63	16.48	16.31	15.04	15.67	14.16	14.82	--

[1] NA - In 2022-2024, STATLANT 21 information is incomplete.

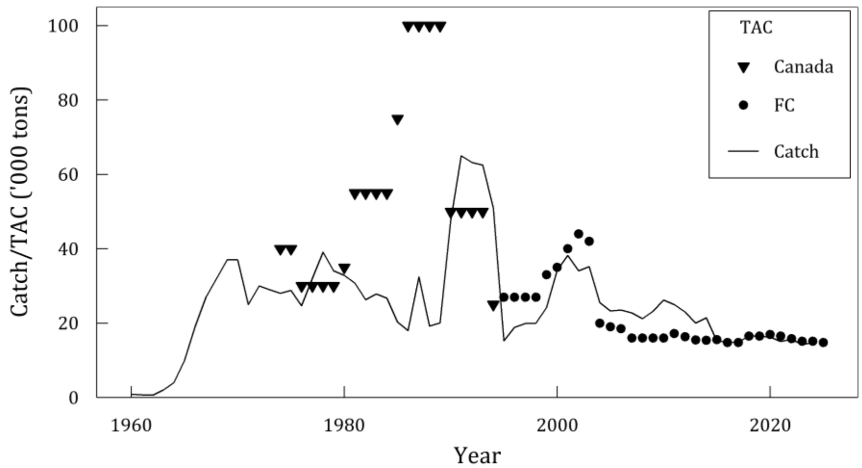


Figure 19.1. Greenland halibut in Subarea 2 + Divs. 3KLMNO: TACs and STACFIS catches.

b) Data Overview

Abundance and biomass indices were obtained from research vessel surveys conducted by Canada, the EU, and EU-Spain. While indices are available for most years, some were excluded or unavailable due to coverage issues, interruptions from the COVID-19 pandemic, or the prioritization of comparative fishing experiments. The remaining years were analyzed to represent population trends from the various surveys.

For the Canadian autumn survey in Divs. 2J3K, data were available from 1996–2024; from the Canadian spring survey in Divs. 3LNO from 1996–2024; and for the Canadian autumn survey in Divs. 3LNO to 730 m from 1996–2024. Since 2023, Canadian surveys have been conducted using new research vessels and a modified trawl. Since 2023, Canadian surveys have been conducted using new research vessels and a modified trawl. Indices from the Canadian spring survey in 3LNO are not shown due to the absence of a conversion factor. Conversion factors have been applied to the Canadian autumn surveys in 2J3K and 3LNO, and the effect of a bias in these factors have been tested under the latest management strategy evaluation simulations.

For the EU survey in Div. 3M to 700 m, data are available from 1988–2024, and to 1400 m from 2004–2024; for the EU-Spain survey in Divs. 3NO from 1997–2024 and in 3L from 2003–2024.

i) Research surveys

A single survey series which covers the entire stock area is not available. A subset of standardized (depth and area) stratified random survey indices have been used to monitor trends in resource status and are described below.

Canadian stratified-random autumn surveys in Divs. 2J and 3K: Abundance and biomass indices from the Canadian autumn survey of Divs. 2J3K have shown a series of increases and decreases since 1996 (Figure 19.2). The abundance index decreased between 1996–2005, increased between 2005–2011 and, following a decrease in 2012, the index has remained relatively low and stable. The biomass index has fluctuated since 1996, with local maxima around 1999, 2007 and 2014, and local minima around 2002, 2010 and 2017; the index has been relatively low since 2017, with a potential increase in 2024.

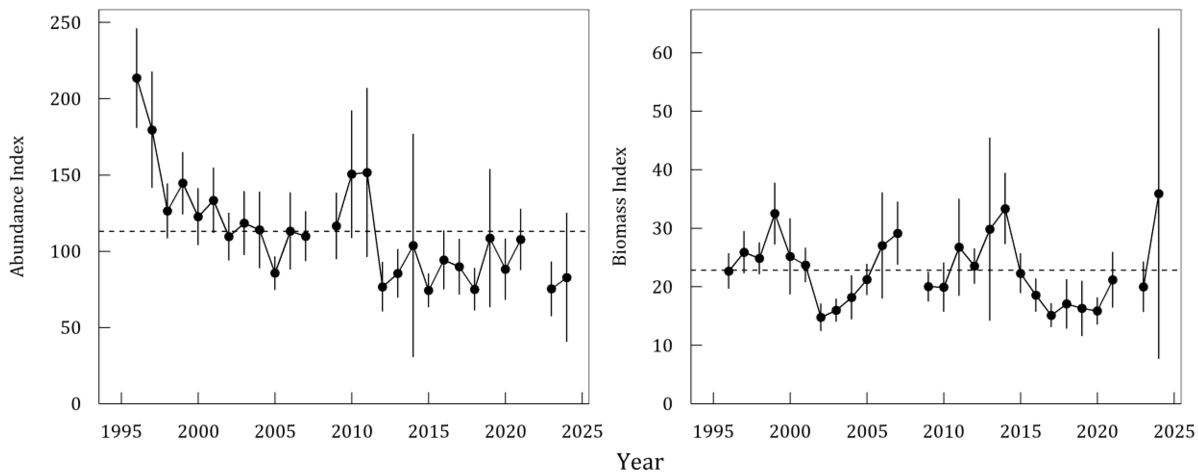


Figure 19.2. Greenland halibut in Subarea 2 + Divs. 3KLMNO: abundance (left) and biomass (right) indices (with 95% CI) from Canadian autumn surveys in Divs. 2J and 3K. The dotted line represents the time-series average.

Canadian stratified-random spring surveys in Divs. 3LNO: Abundance and biomass indices from the Canadian spring surveys in Divs. 3LNO (Figure 19.3) declined from relatively high values in the late 1990s and has been relatively low in most years thereafter. Abundance and biomass indices from 2018 and 2019 have increased from 2016 levels. Trends since 2019 are unknown due to recent survey interruptions and the lack of a conversion factor for this series.

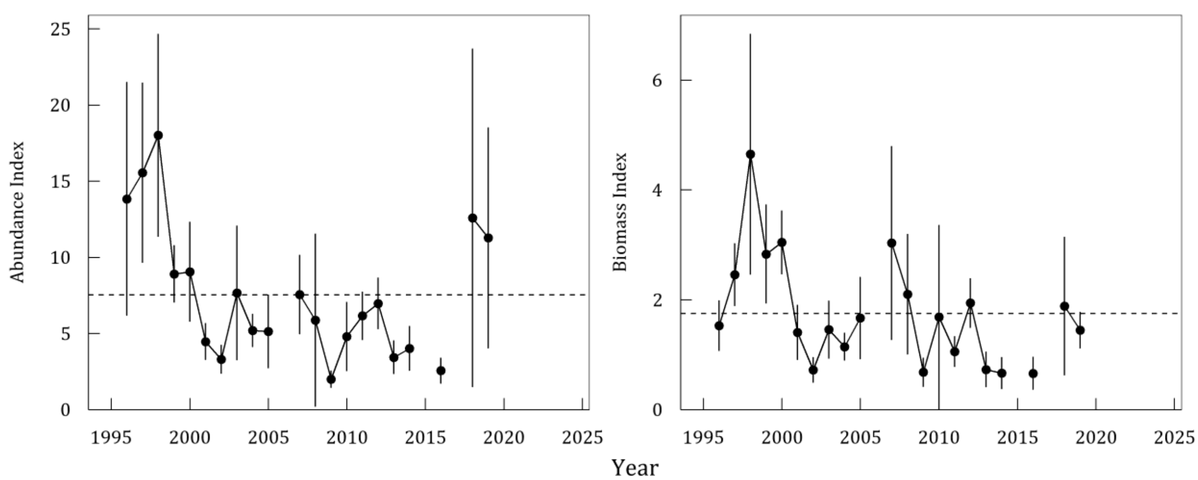


Figure 19.3. Greenland halibut in Subarea 2 + Divs. 3KLMNO: abundance (left) and biomass (right) indices (with 95% CI) from Canadian spring surveys in Divs. 3LNO. The dotted line represents the time-series average.

Canadian stratified-random autumn surveys in Divs. 3LNO: Time series of abundance and biomass were developed from the Canadian autumn surveys from 1996–2024 to a depth of 730 m. The abundance index from the Canadian autumn surveys in Divs. 3LNO (Figure 19.4) declined from relatively high values in the late 1990s then varied without trend until 2015 when the index began to increase. Like the abundance index, the biomass index increased between 2015–2020. Both the abundance and biomass indices appear to have decreased in 2023 to below-average levels.

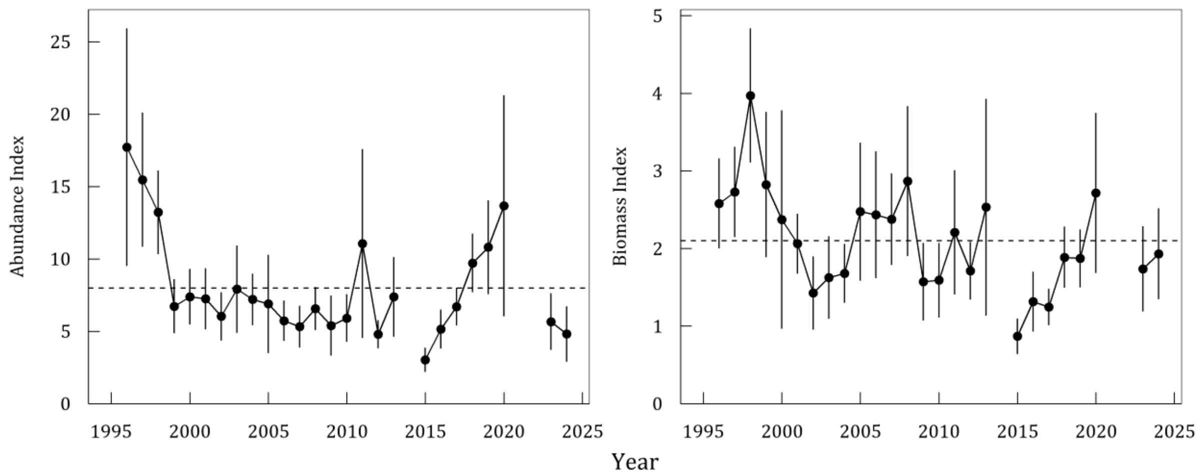


Figure 19.4. Greenland halibut in Subarea 2 + Divs. 3KLMNO: abundance (left) and biomass (right) indices (with 95% CI) from Canadian autumn surveys in Divs. 3LNO. The dotted line represents the time-series average.

EU stratified-random surveys in Divs. 3M (Flemish Cap): Surveys conducted by the EU in Div. 3M during summer indicate that the Greenland halibut biomass index in depths to 730 m increased to a maximum value in 1998, after which the index declined to a time-series minimum in 2013 (Figure 19.5). This index has remained below the series average since 2010. The Flemish Cap survey was extended to cover depths down to 1460 m beginning in 2004, and this index has been relatively stable but more variable than the shallower series. The deep index was above the time-series average in 2023 and dropped below the time-series average in 2024.

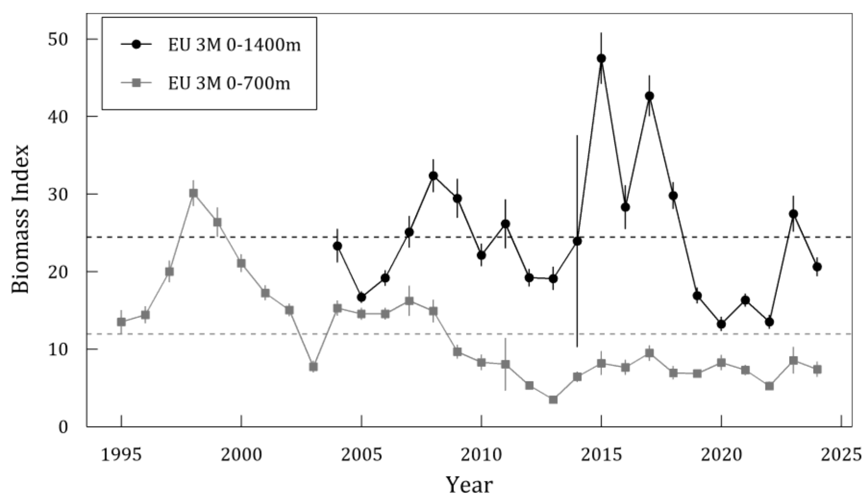


Figure 19.5. Greenland halibut in Subarea 2 + Divs. 3KLMNO: Biomass index (± 1 S.E.) from EU Flemish Cap surveys in Div. 3M. Grey squares: biomass index for depths <730 m. Black circles: biomass index for all depths <1460 m. Dotted lines represent time-series averages.

EU-Spain stratified-random surveys in NAFO Regulatory Area of Divs. 3LNO: The biomass index for the survey of the NRA in Divs. 3NO generally declined from 1999–2006 (Figure 19.6) but has gradually increased since (Figure 19.6). Likewise, the biomass index for the survey of the NRA in Div. 3L has generally increased since 2003.

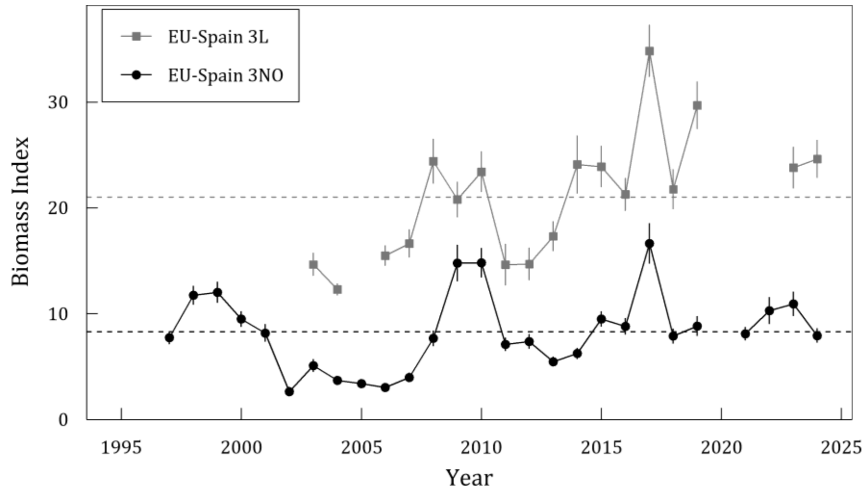


Figure 19.6. Greenland halibut in Subarea 2 + Divs. 3KLMNO: biomass index (±1 SE) from EU-Spain spring surveys in the NRA of Divs. 3NO and Div. 3L. Dotted lines represent time-series averages.

Summary of research survey data trends.

These surveys provide coverage of the majority of the spatial distribution of the stock and the area from which the majority of catches are taken. Over 1995–2007, indices from the majority of the surveys generally provided a consistent signal in stock biomass (Figure 19.7). Results since 2007 show greater divergence which complicates interpretation of overall status; the overall trend since 2007 is unclear.

Though divergent trends in the survey indices complicate interpretations of the state of the stock, the survey indices are not deviating significantly from expectations under the management procedure. Most survey indices are within the 95% probability envelopes from the base case SCAA (Figure 19.8) and SSM simulations (Figure 19.9). The composite index suggests that the stock is stable and the most recent value is within the 80% probability envelope from both models.

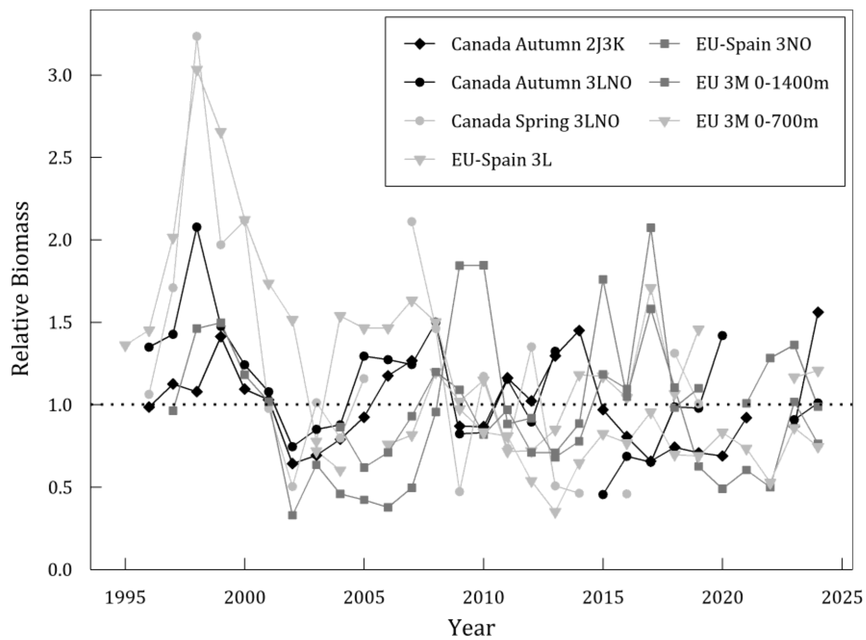


Figure 19.7. Greenland halibut in Subarea 2 + Divs. 3KLMNO: Relative biomass indices from Canadian autumn surveys in Divs. 2J3K, Canadian spring surveys in Divs. 3LNO, Canadian autumn surveys in Divs. 3LNO, EU survey of Div. 3M, and EU-Spain surveys of the NRA of Divs. 3NO. Each series is scaled to its average and the average line is shown as thin dotted line.

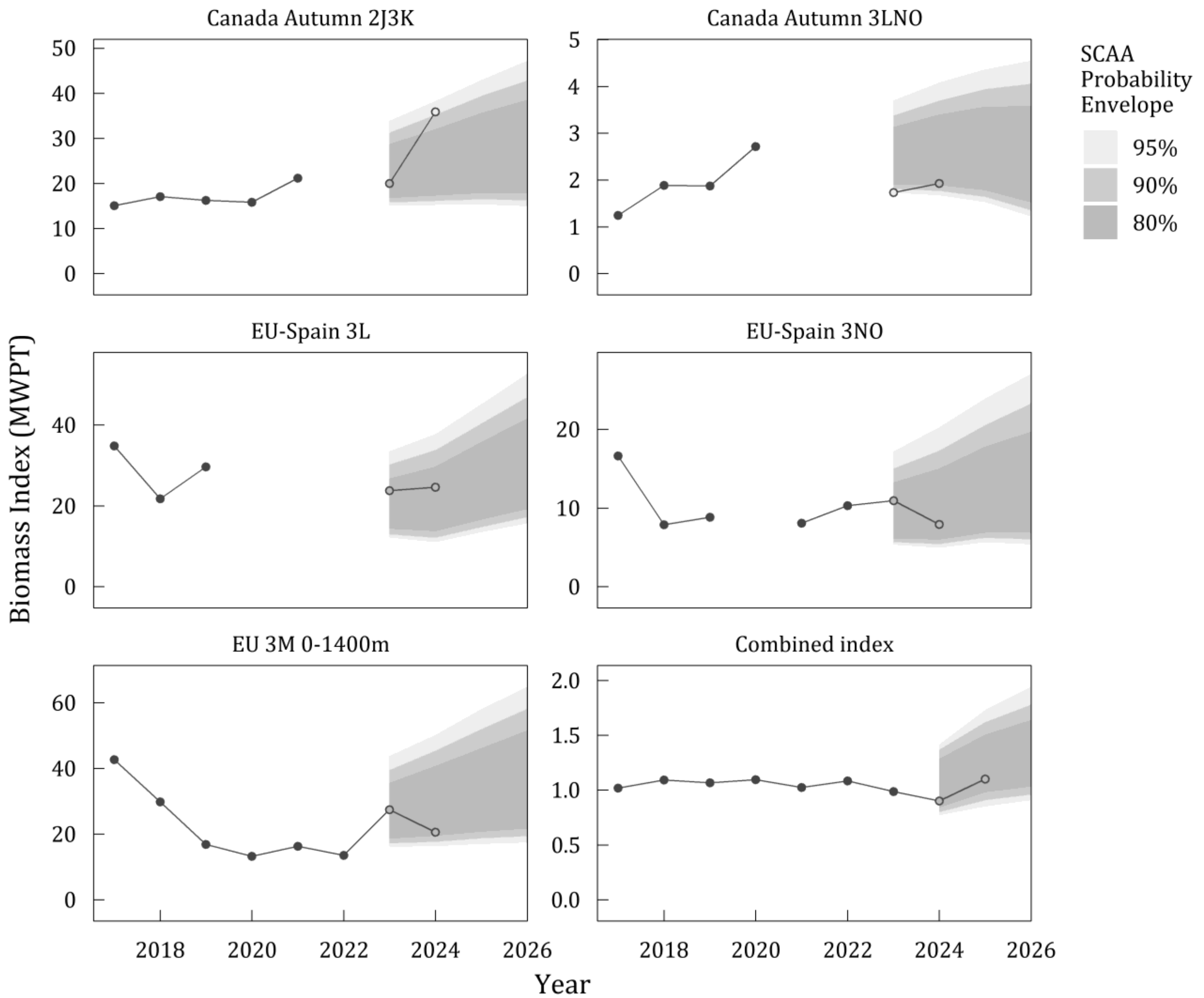


Figure 19.8. Greenland halibut in Subarea 2 + Divs. 3KLMNO. Mean weight per tow from Canadian autumn surveys in Divs. 2J3K, Canadian spring surveys in Divs. 3LNO, Canadian autumn surveys in Divs. 3LNO, EU Flemish Cap surveys (to 1400m depth) in Div. 3M and EU-Spain surveys in 3NO. The figure also shows the combined index used in the target based component of the HCR. For the survey and combined indices, 80%, 90% and 95% probability envelopes from the SCAA base case simulation are shown. Index values observed from 2017 onward are shown using open circles.

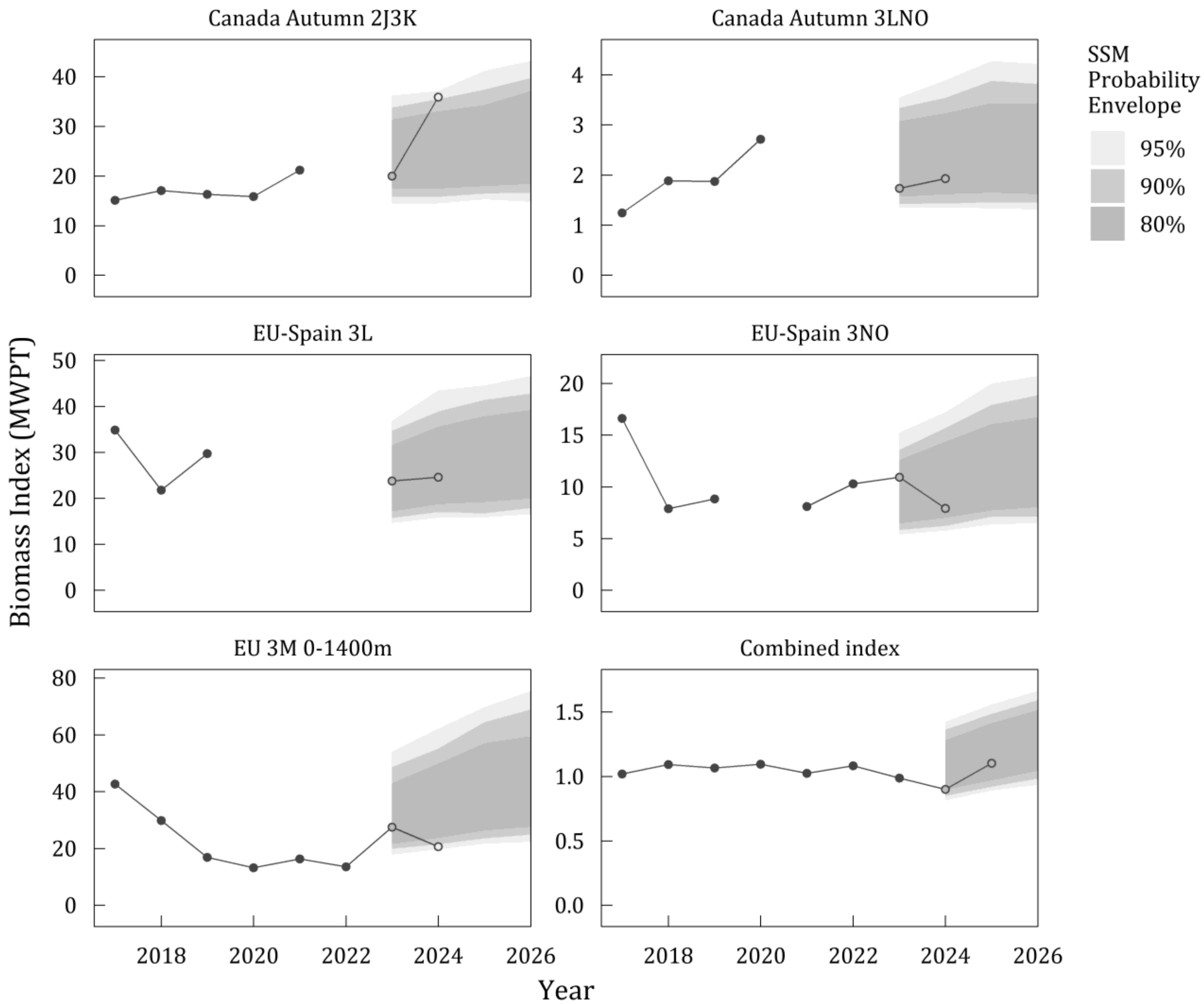


Figure 19.9. Greenland halibut in Subarea 2 + Divs. 3KLMNO. Mean weight per tow from Canadian autumn surveys in Divs. 2J3K, Canadian spring surveys in Divs. 3LNO, Canadian autumn surveys in Divs. 3LNO, EU Flemish Cap surveys (to 1400m depth) in Div. 3M and EU-Spain surveys in 3NO. The figure also shows the combined index used in the target based component of the HCR. For the survey and combined indices, 80%, 90% and 95% probability envelopes from the SSM base case simulation are shown. Index values observed from 2017 onward are shown using open circles.

Recruitment from surveys.

Abundance indices at age 4 from surveys were examined as a measure of recruitment. Year classes from all surveys were above average between 1993–1994 and below average between 2009–2013. After three very large year classes of 2000–2002 in the EU survey of Div. 3M, abundance at age 4 fell below average for 12 years. There are some positive signals in recent years as estimates of the most recent year class (2015–2019) are near or above the time series average.

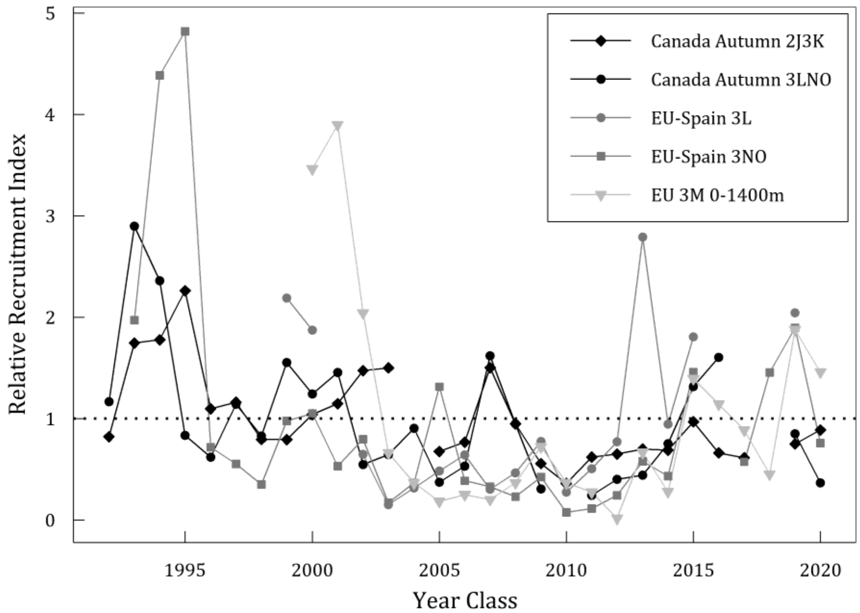


Figure 19.10. Greenland halibut in Subarea 2 + Divs. 3KLMNO: Relative recruitment indices from Canadian autumn surveys in Divs. 2J3K, Canadian spring surveys in Divs. 3LNO, EU survey of Div. 3M. Each series is scaled to its average, which is shown using a dotted line.

c) Conclusion

The most recent survey indices remain consistent with expectations under the current Management Procedure.

d) Research recommendation

The divergence in survey indices could be the result of movement of fish or because of transient age effects as a result of changing recruitment when different surveys cover differing age-ranges. STACFIS **recommends** that *tagging and/or telemetry studies be undertaken to help elucidate movement of 2+3KLMNO Greenland halibut.*

STATUS: an update of telemetry research was presented in 2025, providing new insights on the spatial and depth distribution of Greenland halibut. Results are consistent with previous research and assessments and are expected to enhance interpretations of survey data and their application in future assessments.

20. Northern shortfin squid (*Illex illecebrosus*) in Subareas 3+4

Deferred to the NAFO Annual Meeting in September 2025.

21. Splendid alfonsino (*Beryx splendens*) in Subarea 6

Interim monitoring report (SCR 15/06, 20/36; COM-SC CESAG-WP 25-01)

a) Introduction

Alfonsino is distributed over a wide area which may be composed of several populations. Alfonsino is an oceanic demersal species that forms distinct aggregations, at 300–950 m depth, on top of seamounts in the North Atlantic. The stock structure in NAFO Area is unknown. Until more complete data on stock structure is obtained it is considered that separate populations live on each seamount of Div 6G.

Most published growth studies suggest a maximum life span between 10 and 20 years. The observed variability in the maximum age and length depends on the geographic region. Sexual maturation was found to begin at age

2, with a mean length of 18 cm. By age 5–6 years, all individuals are mature at 25–30 cm fork length. On the Corner Rise Seamounts, alfonsino have been observed to spawn from May-June to August-September.

As a consequence of the species' association with seamounts, their life-history, and their aggregation behaviour, this species is easily overexploited and can only sustain low rates of exploitation.

b) Fisheries and Catches

Historically, catches of alfonsino in the NAFO Regulatory Area (NRA) have been reported from Divs. 6E-H, although the bulk of those catches were made in the Corner Rise area Div. 6G. The development of the Corner Rise fishery was initiated in 1976. Commercial aggregations of alfonsino on the Corner Rise have been found on three seamounts. Two of them named "Kükenthal" (also known as "Perspektivnaya") and "C-3" ("Vybornaya") are located in NRA. One more bank, named "Milne Edwards" ("Rezervnaya") is located in the Central Western Atlantic.

Russian vessels fished these areas during some periods between 1976 and 1999 using pelagic trawls. A directed commercial fishery has been conducted between 2005 and 2019 by Spanish vessels. Since 2006, virtually all the effort has been made in the Kükenthal seamount with pelagic trawl gear.

Fishery was closed in 2020 based on scientific advice that the stock was depleted.

The Russian fishery started in 1976 with a catch of 10 200 t (Figure 21.1). Thereafter, the catches ranged between 10 and 3 500 t. There was no fishing effort from 1988 - 1993, 1998 and 2000 - 2003. From 2005 to 2019, an alfonsino-directed fishery in Kükenthal seamount was conducted by Spanish vessels using pelagic trawl gear, where catches ranging between 1 to 1 187 t, with no fishery in 2008. In the 2020-2024 period, the fishery has been closed and alfonsino catches were zero.

Table 21.1. Recent catches (tonnes), effort and CPUE (Kg/hr fished) for the alfonsino fishery on Kukenthal Peak.

Year	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
TAC	NA	NA	NA	NA	ndf	ndf	ndf	ndf	ndf	ndf
Catch (t)	127	51	2	1	0	0	0	0	0	
Effort (days on ground)	16	12	8	8	0	0	0	0	0	
Effort (hours fished)	116	68	33	33	0	0	0	0	0	
CPUE (Kg/hour)	1095	750	61	42						
Effort (vessels)	1	1	1	1	0	0	0	0	0	

ndf No directed fishing.
NA Not regulated

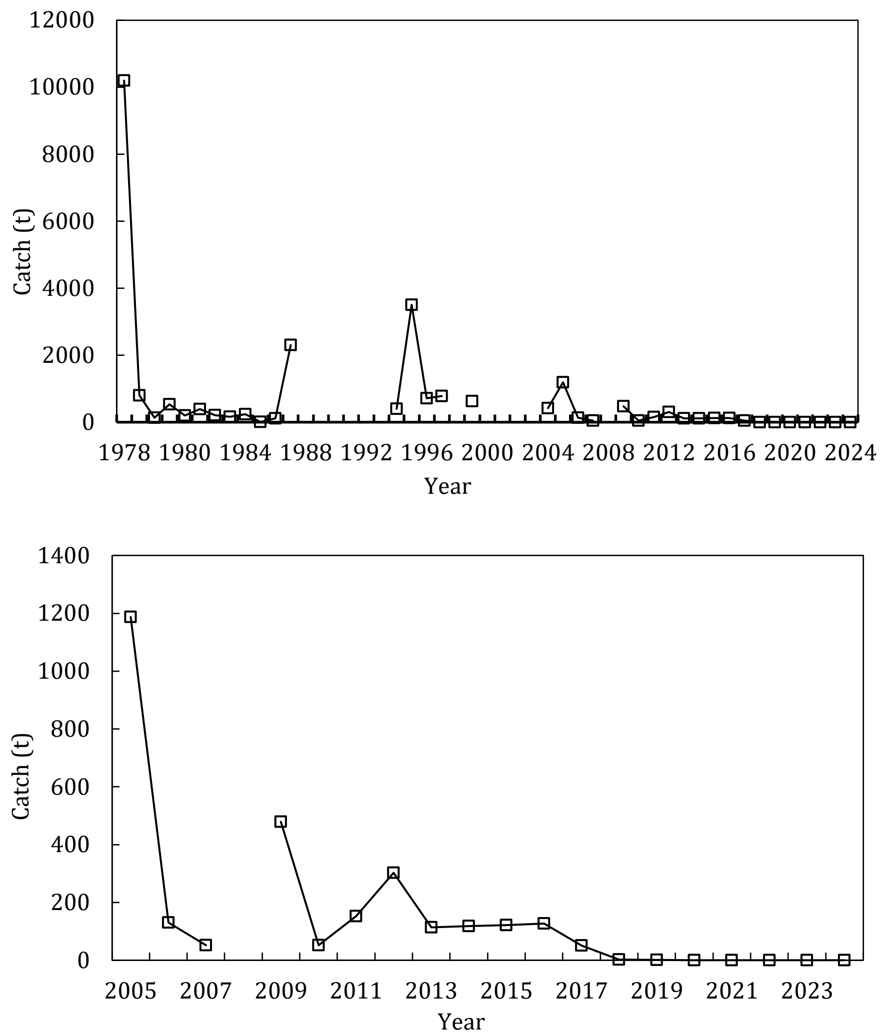


Figure 21.1. Alfonsino catches from Div. 6G. Top panel illustrates the whole catch series (1978-2024) and bottom panel illustrates the catch series since 2005.

The available commercial length distributions and their density plots by year (2007, 2009, 2012 and 2016-2019) are presented in Figure 21.2. It can be observed in the period 2007-2018, these length distributions show a slight decrease in the mode over time. Catches in this period are in the 30-50 cm range with a mode around or bigger than 40 cm. The 2019 length distribution shows a smaller range with a mode around 38 cm.

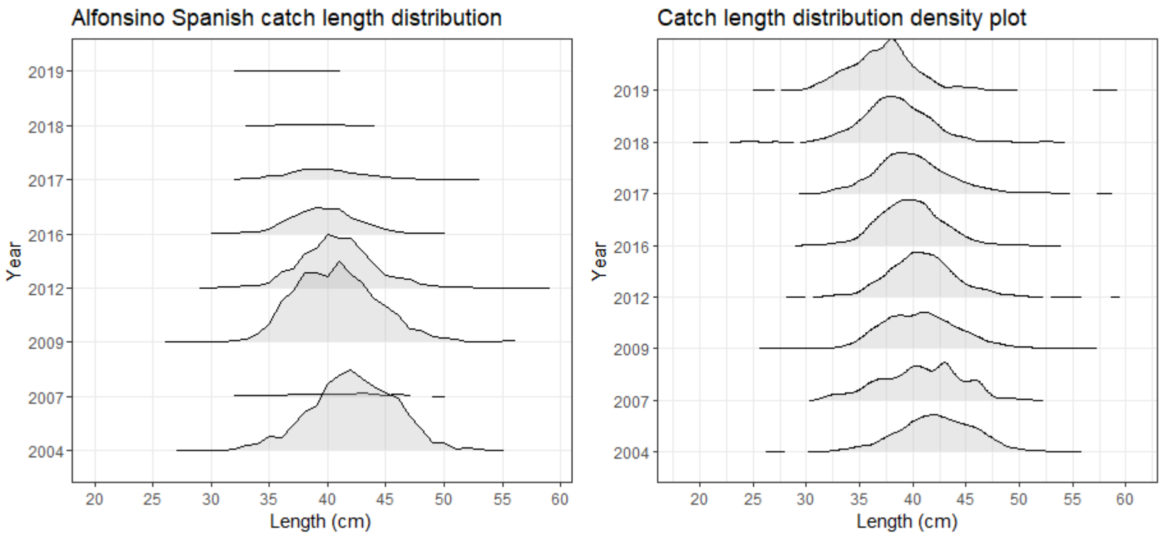


Figure 21.2. Length distributions and density length distributions of alfonsino catches from Div. 6G.

c) Data Overview

i) Research Surveys

The only information available is the retrospective data from Russian research, exploratory and fishing cruises presented by Vinnichenko (2015). This data covers the period ending in 1995. The alfonsino biomass estimated on Corner Rise with this data was around 11 000-12 000 t. It should be taken into consideration that the data with a time limitation of mainly 20-30 years were used for the calculations mentioned above. Based on this information; the greatest biomass of mature alfonsino (distribution depths of 400-950 m) was registered on the "Kükenthal" seamount. On the "C-3" and "Milne Edwards" seamounts, the biomass was much lower.

An acoustic survey plan to collect alfonsino data and estimate its biomass has been presented in 2021 to the SC for discussion. The SC concluded that the presented acoustic survey plan could be appropriate to recollect fishery-independent information that can help the future evaluation of this stock.

d) Conclusion

No analytical or survey-based assessment were possible. The most recent assessment, in 2019, concluded that the stock appears to be depleted. There is no new information available to update the evaluation carried out in 2019 and ratified in the IMR of 2020. The fishery was closed during the 2020-2024 period.

e) Special comments

Periods of decline in catches have been observed several times in the past after several years of fishing. In the past, catches have increased after a period of low/no removals however, it is unknown if this corresponded to stock recovery. In the absence of new data (e.g. from an exploratory fishery or survey) there will be no basis to update the assessment made in 2020.

f) Research Recommendations

SC **recommended** in 2019 that *fishery-independent information should be collected on this stock. This is especially important given that the fishery has been closed since 2020, and there will not be CPUE or any other fishery-dependent or independent information to monitor whether there is any recovery.*

IV. OTHER MATTERS

1. FIRMS Classification for NAFO Stocks

Scientific Council reiterates that the Stock Classification system is not intended as a means to convey the scientific advice to the Commission and should not be used as such. Its purpose is to respond to a request by FIRMS to provide such a classification for their purposes. The category choices do not fully describe the status of some stocks. Scientific advice to the Commission is to be found in the Scientific Council report in the summary sheet for each stock.

Stock Size (incl. structure)	**Fishing Mortality**			
	None–Low	**Moderate**	**High**	**Unknown**
Virgin–Large		3LNO Yellowtail Flounder		
Intermediate		3M Redfish[1] SA2+3KLMNO Greenland halibut 3M cod SA 0+1 (Offshore) Greenland halibut	SA0+1 Northern shrimp East Greenland Northern shrimp	SA1 American Plaice SA1 Spotted Wolffish
Small	3NOPs White hake 3NO Witch flounder 3LN Redfish			
Depleted	3M American plaice 3LNO American plaice 3NO Cod 3LNO Northern shrimp 3M Northern shrimp[1] 6G Alfonsino		3O Redfish	SA1 Redfish SA1 Atlantic Wolffish
Unknown	SA2+3 Roughhead grenadier 3NO Capelin	1B-C Greenland halibut Inshore	1D Greenland halibut Inshore 1E-F Greenland halibut Inshore	SA3+4 Northern shortfin squid 3LNOPs Thorny skate Greenland halibut in Uummannaq Greenland halibut in Disko Bay Greenland halibut in Upernavik

[1] Fishing mortality may not be the main driver of biomass for this stock.
For many stocks, lack of surveys in recent years has impacted assessments.

2. Vacant Designated Experts

SC notes that four Designated Expert positions are vacant (3NOPs white hake, 3LNOPs thorny skate, SA 3+4 squid and 3LNO EPU) and need to be filled.

3. Interim Monitoring Reports (IMRs)

The Chair raised a discussion on whether it would be valuable to see interim monitoring reports (IMRs) in plenary as had been the practice in previous years. Specifically, two points were raised 1) for stocks with regular assessments should the IMRs be seen in plenary, and 2) for stocks that are no longer regularly assessed, should the IMRs be presented in plenary every few years. It was concluded that the current approach of bringing IMRs to plenary when there were major changes in the understanding of the stock worked well and SC did not see any reason to change the approach.

4. Other Business

There was no other business.

V. ADJOURNMENT

The meeting was adjourned on 12 June 2025.

APPENDIX V. AGENDA – SCIENTIFIC COUNCIL MEETING, 29 MAY – 12 JUNE 2025

Scientific Council Meeting, 29 May -12 June 2025

I. Opening (Scientific Council Chair: Diana González-Troncoso)
   1. Appointment of Rapporteur
   2 Presentation and Report of Proxy Votes
   3. Adoption of Agenda
   4. Attendance of Observers
   5. Appointment of Designated Experts
   6. Plan of Work
   7. Housekeeping issues

II. Review of Scientific Council Recommendations in 2024

III. Fisheries Environment (STACFEN Chair: Miguel Caetano)
   1. Opening
   2. Appointment of Rapporteur
   3. Adoption of Agenda
   4. Review of Recommendations in 2024
   5. Invited speakers
   6. Department of Fisheries and Oceans Canada, Oceans Science Branch, Marine Environmental Data Section (MEDS) Report for 2024
   7. Review of the physical, biological and chemical environment in the NAFO Convention Area during 2024
   8. Formulation of recommendations based on environmental conditions during 2024
   9. Other Matters
      a) Analysis of progress and/or outcomes of work for Commission request #10 “Addressing the Impacts of Climate Change on NAFO Fisheries and Ecosystems”
   10. Adjournment

IV. Publications (STACPUB Chair: Rick Rideout)
   1. Opening
   2. Appointment of Rapporteur
   3. Adoption of Agenda
   4. Review of Recommendations in 2024
   5. Review of Publications
      a) Annual Summary
         i) Journal of Northwest Atlantic Fishery Science (JNAFS)
         ii) Scientific Council Studies
         iii) Scientific Council Reports
   6. Other Matters

   7. Adjournment

V. Research Coordination (STACREC Chair: Mark Simpson)
   1. Opening
   2. Appointment of Rapporteur
   3. Review of Recommendations in 2024
   4. Invited speaker
   5. Fishery Statistics
      a) Progress report on Secretariat activities in 2024/2025
         i) Presentation of catch estimates from the CESAG, daily catch reports and STATLANT 21A and 21B
         ii) Review of STATLANT 21B submission form
   6. Research Activities

a) Biological sampling
   i) Report on activities in 2024/2025
   ii) Report by National Representatives on commercial sampling conducted
   iii) Report on data availability for stock assessments (by Designated Experts)
b) Biological surveys
   i) Review of survey activities in 2024 and early 2025 (by National Representatives and Designated Experts)
   ii) Surveys planned for 2025 and early 2026
c) Tagging activities
d) Other research activities

7. Review of SCR and SCS Documents
8. Other Matters
9. Adjournment

VI. Fisheries Science (STACFIS Chair: Martha Krohn)

I. Opening
II. General Review of Catches and Fishing Activity
III. Stock Assessments

1. Greenland halibut (*Reinhardtius hippoglossoides*) in SA 0+1 offshore (full assessment)
2. Greenland halibut (*Reinhardtius hippoglossoides*) Div. 1A inshore Divs. 1BC inshore, Div. 1D inshore and Divs. 1EF inshore (monitor)
3. Demersal redfish and deep-sea redfish (*Sebastes* spp.) in SA 1 (monitor)
4. Wolffish in SA 1 (monitor)
5. Golden redfish (*Sebastes norvegicus* aka *S. marinus*) in Div. 3M (monitor)
6. Cod (*Gadus morhua*) in Div. 3M (full assessment)
7. Redfish (*Sebastes mentella* and *Sebastes fasciatus*) in Div. 3M (monitor)
8. American plaice (*Hippoglossoides platessoides*) in Div. 3M (monitor)
9. Cod (*Gadus morhua*) in Divs. 3NO (monitor)
10. Redfish (*Sebastes mentella* and *Sebastes fasciatus*) in Divs. 3L and 3N (monitor)
11. American plaice (*Hippoglossoides platessoides*) in Divs. 3LNO (monitor)
12. Yellowtail flounder (*Limanda ferruginea*) in Divs. 3LNO (full assessment)
13. Witch flounder (*Glyptocephalus cynoglossus*) in Divs. 3NO (monitor)
14. Capelin (*Mallotus villosus*) in Divs. 3NO (monitor)
15. Redfish (*Sebastes mentella* and *Sebastes fasciatus*) in Div. 3O (full assessment)
16. Thorny skate (*Amblyraja radiata*) in Divs. 3LNO and Subdiv. 3Ps (monitor)
17. White hake (*Urophycis tenuis*) in Divs. 3NO and Subdiv. 3Ps (full assessment/monitor)
18. Roughhead grenadier (*Macrourus berglax*) in SA 2 and 3 (monitor)
19. Greenland halibut (*Reinhardtius hippoglossoides*) in SA 2 + Divs. 3KLMNO (in MSE process: monitor, COM requests #2 and 4)
20. Northern shortfin squid (*Illex illecebrosus*) in SA 3+4 (full assessment)
21. Splendid alfonsino (*Beryx splendens*) in SA 6 (monitor)

IV. Other Matters
   a) FIRMS Classification for NAFO Stocks
   b) Vacant Designated Experts
   c) Interim Monitoring Reports (IMRs)
   d) Other Bussiness

V. Adjournment

VII. Management Advice and Responses to Special Requests (See Annex 1)

1. Commission (Annex 1)

a) Request for Advice on TACs and Other Management Measures (request #1, Annex 1)

For 2026

- cod in Div. 3M

For 2026 and 2027

- yellowtail flounder in Divs. 3LNO
- white hake in Divs. 3NO (to discuss)
- northern shrimp in Divs. 3LNO

For 2026, 2027 and 2028

- redfish in Div. 3O
- northern shortfin squid in Subareas 3+4

b) Monitoring of Stocks for which Multi-year Advice was provided in 2023 or 2024 (request #1)

- golden redfish in Div. 3M
- redfish in Div. 3M
- american plaice in Div. 3M
- cod in Divs. 3NO
- redfish in Divs. 3LN
- american plaice in Divs. 3LNO
- witchflounder in Divs. 3NO
- capelin in Divs. 3NO
- thorny skate in Divs. 3LNO and Subdiv. 3Ps
- alfonsino stocks in the NAFO Regulatory Area
- roughhead grenadier in Subareas 2 and 3

c) Special Requests for Management Advice

i) The Commission requests the Scientific Council to monitor the status of Greenland halibut in Subarea 2 + Divisions 3KLMNO annually to compute the TAC using the agreed Management Procedure and determine whether exceptional circumstances are occurring. If exceptional circumstances are occurring, the exceptional circumstances protocol will provide guidance on what steps should be taken (request #2, Commission priority).

ii) The Commission requests that Scientific Council continue to advance work on the 3LN redfish MSE processes during 2024-2025 (request #3, Commission priority).

iii) As practicable and taking into account Scientific Council capacity constraints, develop stock summary sheets for NAFO managed stocks that are evaluated using MSE processes (request #4).

iv) In relation to the Ecosystem Roadmap as a whole, the Commission requests that the Scientific Council develop a reference document detailing the ecosystem roadmap, for completion in the next 1-3 years (request # 5).

v) In relation to the habitat impact assessment component of the Roadmap (VME and SAI analyses), the Commission requests that Scientific Council:

a) Continue the development of a centralized data repository using ArcGIS online to host the data and data-products for scientific advice, in conjunction with the NAFO Secretariat (request #6a).

b) Work towards the reassessment of VMEs and impact of bottom fisheries on VMEs for 2027; including potential management options in the reassessment of bottom fisheries (request #6b).

c) Develop materials on the potential of submitting NAFO coral bottom fishing closed areas as OECMs for discussion at the 2025 WG-EAFFM meeting (request #6c).

vi) The Commission requests the Scientific Council to develop reference points to facilitate the implementation of the Revised NAFO Precautionary Approach Framework, for stocks that currently do not have them (request #7).

vii) In relation to its workload, the Commission requests the Scientific Council to:

a) Continue to update the 3-5 year work plan, which reflects requests arising from the 2024 Annual Meeting, other multi-year stock assessments and other scientific inquiries already planned for the near future. The work plan should identify what resources are necessary to successfully address these issues, gaps in current resources to meet those needs and proposed prioritization by the Scientific Council of upcoming work based on those gaps (request #8a).

b) Consider undertaking internal, or support external, assessments to inform the ongoing effort to address the Scientific Council workload. Such assessments could include how to optimize:

i) the organization / structure and function of the Scientific Council, its standing committees and working groups,

ii) further development and implementation of the Scientific Council's workplan (request #8b).

viii) The Commission requests Scientific Council to conduct ongoing analysis of the Division 3M cod fishery data by 2025 in order to:

a) monitor the consequences of the management decisions (including the analysis of the redistribution of the fishing effort along the year and its potential effects on ecosystems, the variation of the cod catch composition in lengths/ages, and the bycatch levels of other fish species, benthos in general, and VME taxa in particular) (request #9a); and

b) carry out any additional monitoring that would be required, including Division 3M cod caught as bycatch in other fisheries during the closed period (request #9b).

ix) Noting the voluntary contribution of the United States to support a consultant to provide feedback on NAFO's processes to address climate change impacts, requests the SC to conduct an analysis of progress and/or outcomes of that work (request #10).

2. Coastal States
   a) Request by Denmark (Greenland) for Advice on Management in 2026 (Annex 2)
      i) Monitoring of Stocks for which Multi-year Advice was provided in 2023 or 2024
         - demersal redfish and deep-sea redfish (*Sebastes* spp.) in SA 1
         - wolffish in SA 1
         - Greenland halibut SA 1 (inshore)

   b) Request by Canada and Greenland for Advice on Management in 2025 and 2026 (Annex 2, Annex 3)
      i) Greenland Halibut, offshore.

VIII. Review of Future Meetings Arrangements
1. Scientific Council and STACFIS Shrimp Assessment Meeting, 9-11 September 2025
2. Scientific Council, 15-19 September 2025
3. WG-ESA, 4-13 November 2025
4. Scientific Council, June 2026

5. Scientific Council and STACFIS Shrimp Assessment Meeting, 2026
6. Scientific Council, Sep. 2026
7. WG-ESA, Nov. 2026
8. NAFO/ICES Joint Groups
    a) NIPAG
    b) WG-DEC
    c) WG-HARP

IX. Arrangements for Special Sessions
1. Topics for future special sessions
2. Recently attended special sessions
    a) 11th International flatfish symposium
    b) EAFM Symposium, 2025

X. Meeting Reports
1. Working Group on Ecosystem Science and Assessment (WG-ESA), 12-21 November 2024
2. NAFO Joint Commission-Scientific Council Catch Estimation Strategy Advisory Group (CESAG) meeting, 26 Febraury 2025.
3. Report from ICES-NAFO Working Group on Deepwater Ecosystems (WG-DEC), 24-28 March 2025
4. NAFO Joint Commission-Scientific Council Working Group on Risk-Based Management Strategies (WG-RBMS), 8 April 2025.
5. Precautionary Approach Working Group (PA-WG), 6 May 2025.
6. Meetings attended by the Secretariat

XI. Review of Scientific Council Working Procedures/Protocol
1. General Plan of Work for September 2025 Annual Meeting

XII. Other Matters
1. Designated Experts
2. Election of Chairs
3. Budget items
4. Other Business
    a) SOFIA State of the Stocks
    b) Scientific Council Process
    c) Guidelines for carriying out an MSE
    d) Greenland shark

XIII. Adoption of Committee Reports
1. STACFEN
2. STACREC
3. STACPUB
4. STACFIS

XIV. Scientific Council Recommendations to Commission

XV. Adoption of Scientific Council Report

XVI. Adjournment

ANNEX 1. COMMISSION'S REQUEST FOR SCIENTIFIC ADVICE ON MANAGEMENT IN 2025 AND BEYOND OF CERTAIN STOCKS IN SUBAREAS 2, 3 AND 4 AND OTHER MATTERS

(from NAFO SCS Doc. 25/01)

Following a request from the Scientific Council, the Commission agreed that items 1, 2, and 3 should be the priority for the June 2025 Scientific Council meeting subject to resources.

1. The Commission requests that the Scientific Council provide advice for the management of the fish stocks below according to the assessment frequency presented below. In line with the Revised NAFO Precautionary Approach Framework (Annex 4 of COM-SC Doc. 24-03) the Commission should be informed by the range of options and associated risks provided by the Scientific Council. The Commission will decide upon the acceptable risk level in the context of the entirety of the Scientific Council advice for each stock guided and as foreseen by the NAFO Precautionary Approach.

Yearly basis	Two-year basis	Three-year basis	Interim Monitoring Only
Cod in Division 3M	Redfish in Division 3M Thorny skate in Divisions 3LNO Witch flounder in Divisions 3NO Redfish in Divisions 3LN Yellowtail flounder in Divisions 3LNO Northern shrimp in Divisions 3LNO Northern shrimp in Division 3M White hake in Divisions 3NO	American plaice in Division 3M Northern shortfin squid in Subareas 3+4 Redfish in Division 3O Cod in Divisions 3NO American plaice in Divisions 3LNO	Subarea 6 Alfonsino Subareas 2-3 Roughhead Grenadier Capelin in Divisions 3NO

Advice should be provided using the guidance provided in **Annex A**, or using the predetermined Management Procedure in the cases where they exist (currently Greenland halibut 2+3KLMNO). For Division 3M shrimp supplementary advice in terms of fishing-days could also be considered as appropriate.

To implement this schedule of assessments, the Scientific Council is requested to conduct a full assessment of these stocks as follows:

- In 2025, advice should be provided for 2026 for: Cod in Division 3M
- In 2025, advice should be provided for 2026 and 2027 for: Yellowtail flounder in Divisions 3LNO, White hake in Divisions 3NO, Northern shrimp in Divisions 3LNO
    - With respect to Northern shrimp in Divisions 3LNO, Scientific Council is requested to provide its advice to the Commission prior to the 2025 Annual Meeting based on the survey data up to and including 2025.
- In 2025, advice should be provided for 2026, 2027 and 2028 for: Redfish in Division 3O, Northern shortfin squid in Subareas 3+4.

The Commission also requests the Scientific Council to continue to monitor the status of all other stocks annually and, should a significant change be observed in stock status (e.g. from surveys) or in bycatch in other fisheries, provide updated advice as appropriate.

2. The Commission requests the Scientific Council to monitor the status of Greenland halibut in Subarea 2 + Divisions 3KLMNO annually to compute the TAC using the agreed Management Procedure and determine whether exceptional circumstances are occurring. If exceptional circumstances are occurring, the exceptional circumstances protocol will provide guidance on what steps should be taken.
3. The Commission requests that Scientific Council continue to advance work on the 3LN redfish MSE processes during 2024-2025.

4. As practicable and taking into account Scientific Council capacity constraints, develop stock summary sheets for NAFO managed stocks that are evaluated using MSE processes.
5. In relation to the Ecosystem Roadmap as a whole, the Commission requests that the Scientific Council develop a reference document detailing the ecosystem roadmap, for completion in the next 1-3 years.
6. In relation to the habitat impact assessment component of the Roadmap (VME and SAI analyses), the Commission requests that Scientific Council:
    a. Continue the development of a centralized data repository using ArcGIS online to host the data and data-products for scientific advice, in conjunction with the NAFO Secretariat
    b. Work towards the reassessment of VMEs and impact of bottom fisheries on VMEs for 2027; including potential management options in the reassessment of bottom fisheries.
    c. Develop materials on the potential of submitting NAFO coral bottom fishing closed areas as OECMs for discussion at the 2025 WG-EAFFM meeting.
7. The Commission requests the Scientific Council to develop reference points to facilitate the implementation of the Revised NAFO Precautionary Approach Framework, for stocks that currently do not have them.
8. In relation to its workload, the Commission requests the Scientific Council to:
    a. Continue to update the 3-5 year work plan, which reflects requests arising from the 2024 Annual Meeting, other multi-year stock assessments and other scientific inquiries already planned for the near future. The work plan should identify what resources are necessary to successfully address these issues, gaps in current resources to meet those needs and proposed prioritization by the Scientific Council of upcoming work based on those gaps.
    b. Consider undertaking internal, or support external, assessments to inform the ongoing effort to address the Scientific Council workload. Such assessments could include how to optimize:
        i. the organization / structure and function of the Scientific Council, its standing committees and working groups,
        ii. further development and implementation of the Scientific Council's workplan.
9. The Commission requests Scientific Council to conduct ongoing analysis of the Division 3M cod fishery data by 2025 in order to:
    a. monitor the consequences of the management decisions (including the analysis of the redistribution of the fishing effort along the year and its potential effects on ecosystems, the variation of the cod catch composition in lengths/ages, and the bycatch levels of other fish species, benthos in general, and VME taxa in particular); and
    b. carry out any additional monitoring that would be required, including Division 3M cod caught as bycatch in other fisheries during the closed period.
10. Noting the voluntary contribution of the United States to support a consultant to provide feedback on NAFO's processes to address climate change impacts, requests the SC to conduct an analysis of progress and/or outcomes of that work.

ANNEX A: Guidance for providing advice on Stocks Assessed

The Commission requests the Scientific Council to consider the following in assessing and projecting future stock levels for those stocks listed above. These evaluations should provide the information necessary for the Commission to consider the balance between risks and yield levels, in determining its management of these stocks:

Stochastic short-term projections (3 years) should be performed with the F levels that are included in the risk table from the Revised PA Framework (Table 1 below), based on the point estimate of biomass. The first year of the projection should assume a catch equal to the agreed TAC for that year. In instances where Scientific Council expects catches to be significantly different from the agreed TAC, an additional projection could be provided based on the best available catch estimation.

In relation to Tier 1 of the Roadmap Scientific Council should provide annually catch information in relation to 2TCI, including recent cumulative catch levels and a scoping of expected cumulative catch levels.

For stocks assessed with a production model, the advice should include updated time series or plots of:

- Catch and TAC of recent years
- Catch to relative biomass
- Relative Biomass
- Relative Fishing mortality
- Stock trajectory against precautionary approach reference points

For stock assessed with an age-structured model, information should be provided on stock size, spawning stock sizes, recruitment prospects, historical fishing mortality. Graphs and/or tables should be provided for all of the following for the longest time-period possible:

- historical yield and fishing mortality;
- spawning stock biomass and recruitment levels;
- Stock trajectory against precautionary approach reference points

For stocks for which only general biological and/or catch data are available, few standard criteria exist on which to base advice. The stock status should be evaluated in the context of management requirements for long-term sustainability and the advice provided should be consistent with the precautionary approach.

The following graphs should be presented for the longest time-period possible:

- catch and TAC of recent years
- length distributions
- time trends of survey abundance estimates
- an age or size range chosen to represent the spawning population
- an age or size-range chosen to represent the exploited population
- recruitment proxy or index for an age or size-range chosen to represent the recruiting population.
- fishing mortality proxy, such as the ratio of reported commercial catches to a measure of the exploited population.
- stock trajectory against precautionary approach reference points

In all cases any additional information the Scientific Council deems appropriate should be provided.

Table 1. The Revised NAFO Precautionary Approach Framework risk table.

y current year (year in which the assessment is made, data until year y-1)

	Yield			$P(F>F_{lim})$			$P(B<B_{lim})$				$P(F>F_{target})$			$P(B<B_{trigger})$				$P(B_{y+3} > B_y)$	$(B_{y+3}-B_y)/B_y$
F in y+1 and following years	Yield y (50%)	Yield y+1 (50%)	Yield y+2 (50%)	y	y+1	y+2	y	y+1	y+2	y+3	y	y+1	y+2	y	y+1	y+2	y+3		
Critical Zone																			
F=0	t	t	t	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
F=X% current*	t	t	t	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
F current	t	t	t	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
Cautious Zone																			
F lower edge leaf	t	t	t	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
F midrib leaf	t	t	t	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
F upper edge leaf	t	t	t	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
Healthy Zone																			
$F=0.75F_{msy}$	t	t	t	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
$F_{target}=0.85F_{msy}$	t	t	t	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
$F_{lim}=F_{msy}$	t	t	t	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%

*X% may vary stock by stock. In the future, this framework may be modified to include F bycatch.
The number of years in the risk projections table will be the same as the years of advice.

ANNEX 2. DENMARK (ON BEHALF OF GREENLAND) REQUESTS FOR SCIENTIFIC ADVICE ON MANAGEMENT IN 2026 AND BEYOND OF CERTAIN STOCKS IN SUBAREA 0 AND 1

(from SCS Doc. 25/03)

Denmark (on behalf of Greenland) Coastal State Request for Scientific Advice – 2026

Denmark (on behalf of Greenland) hereby request scientific advice on management in 2026 of certain stocks in NAFO Subareas 0 and 1. Denmark (on behalf of Greenland) requests the Scientific Council for advice on the following species:

1. Golden Redfish and Demersal Deep-Sea Redfish

Advice on Golden redfish (*Sebastes marinus*) and demersal deep-sea redfish (*Sebastes mentella*) in Subarea 1 was in June 2023 given for 2024-2026. The Scientific Council is requested to continue its monitoring of the above stocks and provide updated advice as appropriate in the event of significant changes in stock levels.

2. Atlantic Wolffish and Spotted Wolffish

Advice on Atlantic Wolffish (*Anarhichas lupus*) and Spotted Wolffish (*Anarhichas minor*) in Subarea 1 was in June 2023 given for 2024-2026. The Scientific Council is requested to continue its monitoring of the above stocks and provide updated advice as appropriate in the event of significant changes in stock levels.

3. Greenland Halibut, Offshore

Advice on Greenland Halibut, Offshore in Subareas 0 and 1 was given in 2024 for 2025 and 2026. Denmark (on behalf of Greenland) request the Scientific Council to provide catch advice according to the NAFO Precautionary Approach Framework (PAF). The advice should also include a range of risk-based catch options for 2026-2027. Specifically, Denmark (on behalf of Greenland) recommends that for each option a clear technical basis is provided and that a table with defined reference points is provided in the advice. Catch options that are in accordance with the NAFO PAF should be highlighted.

The advice shall remain a two-year advice, but Denmark (on behalf of Greenland) recommends the advice cycle to start at even years (starting with the 2026-2027 advice) to follow a request by the Scientific Council with the purpose of better distributing the workload of the Scientific Council.

4. Greenland Halibut, Inshore, West Greenland

Advice on the inshore stocks of Greenland Halibut in Subarea 1 was given in 2024 for 2025-2026. Denmark (on Behalf of Greenland) requests the Scientific Council to continue its monitoring of the above stocks and provide updated advice in the event of significant changes in stock levels.

5. Northern Shrimp, West Greenland

Subject to the concurrence of Canada as regards to Subareas 0 and 1, Denmark (on behalf of Greenland) requests the Scientific Council before December 2025 to provide advice on the scientific basis for management of Northern Shrimp (*Pandalus borealis*) in Subareas 0 and 1 in 2026 in line with Greenland's stated management objective of maintaining a mortality risk of no more than 35% in the first year prediction and to provide a catch option table ranging with 5,000 t increments. Future catch options should be provided for as many years as data allows for.

6. Northern Shrimp, East Greenland

Furthermore, the Scientific Council is in cooperation with ICES requested to provide advice on the scientific basis for management of Northern Shrimp (*Pandalus borealis*) in Denmark Strait and adjacent waters east of southern Greenland in 2026 and for as many years ahead as data allows for.

ANNEX 3. REQUESTS FROM CANADA AND FOR COASTAL STATE ADVICE IN 2026

(from SCS Doc. 25/04)

Canada would like to submit its request to the Scientific Council for advice on the following species:

1. Greenland halibut (Subarea 0 + 1 (offshore))

The Scientific Council is requested to provide an overall assessment of status and trends in the total stock area throughout its range and to specifically provide risk-based advice on a range of TAC options for 2026 and 2027. The stock status should be evaluated in the context of management requirements for long-term sustainability and the advice provided should be consistent with NAFO's Revised (2024) Precautionary Approach Framework (PAF).

Specifically, Canada requests that, in addition to the risk table inputs provided in Table 2 of NAFO Revised PAF, the following options also be included:

- $F_{status\ quo}$
- Current TAC
- the 2019-2022 TAC level (36,370 t)

For each of the projections, please include the probabilities that biomass will increase or remain the same (P(B2027 ≥ B2025)); and the probability that biomass will decrease (P(B2027 < B2025).

Canada also requests that the NAFO Scientific Council define, in a table within the assessment document, stock reference points/indicators such as maximum sustainable yield (MSY), biomass at MSY (B_{MSY}), limit reference point (B_{lim}), and $B_{trigger}$.

Canada encourages the Scientific Council to continue to advance a model-based approach to bridge survey time series (i.e. data from the RV Paamiut and RV Tarajoq).

2. Northern shrimp (Subarea 1 and Division 0A)

Canada requests that the Scientific Council consider the following options in assessing and projecting future stock levels for Northern shrimp (*Pandalus borealis*) in Subarea 1 and Division 0A:

The status of the stock should be determined and risk-based advice provided for catch options corresponding to Z_{msy} in 5,000t increments with forecasts for 2026 to 2028 (inclusive). These options should be evaluated in relation to Canada's Harvest Strategy (2022 revised version attached) and NAFO's Revised Precautionary Approach Framework.

Presentation of the results should include graphs and/or tables related to the following:

- Historical and current yield, biomass relative to B_{msy}, total mortality relative to Z_{msy}, and recruitment (or proxy) levels for the longest time period possible;
- Total mortality (Z) and fishable biomass for a range of projected catch options (as noted above) for the years 2026 to 2028. Projections should include both catch options and a range of effective cod predation biomass levels considered appropriate by the Scientific Council. Results should include risk analyses of falling below: B_{msy}, 80% B_{msy} and B_{lim} (30% B_{msy}), and of being above Z_{msy} based on the 3-year projections, consistent with the Harvest Decision Rules in Canada's Harvest Strategy; and
- Total area fished for the longest time period possible.

Please provide the advice relative to Canada's Harvest Strategy as part of the formal advice (i.e., grey box in the advice summary sheet).

PROVISIONAL TIMETABLE

Scientific Council Meeting, 29 May -12 June 2024

Date	Time	Schedule
29 May (Thursday)	1000	Registration, network connection
	1000-1030	SC Executive
	1100-1130	SC Opening
	1130-1200	STACFIS (Catch WG report, status of documentation, interim monitoring reports)
	1200-1330	Break
	1330-1600	STACPUB
	1600-1800	SC/STACFIS
30 May (Friday)	0900-1800	STACFEN
31 May (Saturday)	0900-1800	SC: Scientific Council Process
01 June (Sunday)	No meetings	
02 June (Monday)	0900-1200	STACREC
	1330-1800	STACFIS/SC
03 June (Tuesday)	0900-1800	STACFIS/SC
04 June (Wednesday)	0900-1800	STACFIS/SC
	1830-2030	Scientific Council Reception/event
05 June (Thursday)	0900-1800	STACFIS/SC
06 June (Friday)	0900-1800	STACFIS/SC
07 June (Saturday)	0900-1800	STACFIS Reports
08 June (Sunday)	No meetings	
9 June (Monday)	0830-0900	Scientific Council Executive
	0900-1800	Scientific Council (Standing Committee Reports)
10 June (Tuesday)	0900-1800	Scientific Council
11 June (Wednesday)	0900-1800	Scientific Council
12 June (Thursday)	0900-1200	Scientific Council (advice and adoption of reports)

APPENDIX VI. EXPERTS FOR PRELIMINARY ASSESSMENT OF CERTAIN STOCKS

Designated Experts for 2025:

From the Science Branch, Northwest Atlantic Fisheries Centre, Department of Fisheries and Oceans, St. John's, Newfoundland & Labrador, Canada

Cod in Div. 3NO	Rick Rideout	rick.rideout@dfo-mpo.gc.ca
American Plaice in Div. 3LNO	Laura Wheeland	laura.wheeland@dfo-mpo.gc.ca
Witch flounder in Div. 3NO	Katherine Skanes	katherine.skanes@dfo-mpo.gc.ca
Yellowtail flounder in Div. 3LNO	Laura Wheeland	laura.wheeland@dfo-mpo.gc.ca
Greenland halibut in SA 2+3KLMNO	Paul Regular	paul.regular@dfo-mpo.gc.ca
Northern shrimp in Div. 3LNO	Nicolas Le Corre	nicolas.lecorre@dfo-mpo.gc.ca

From the Department of Fisheries and Oceans, Winnipeg, Manitoba, Canada

Greenland halibut in SA 0+1 (offshore)	Kevin Hedges	kevin.hedges@dfo-mpo.gc.ca

From the Department of Fisheries and Oceans, Ottawa, Ontario, Canada

Redfish Div. 3O	Danny Ings	danny.ings@dfo-mpo.gc.ca

From the Instituto Español de Oceanografía, Vigo (Pontevedra), Spain

Roughhead grenadier in SA 2+3	Fernando Gonzalez-Costas	fernando.gonzalez@ieo.csic.es
Splendid alfonsino in Subarea 6	Fernando Gonzalez-Costas	fernando.gonzalez@ieo.csic.es
Cod in Div. 3M	Irene Garrido Fernández	irene.garrido@ieo.csic.es
Northern Shrimp in Div. 3M	Jose Miguel Casas Sánchez	mikel.casas@ieo.csic.es
Ecosystem Designated Expert 3M	Diana González-Troncoso	diana.gonzalez@ieo.csic.es

From the Instituto Nacional de Recursos Biológicos (INRB/IPMA), Lisbon, Portugal

American plaice in Div. 3M	Ricardo Alpoim	ralpoim@ipma.pt
Golden redfish in Div. 3M	Ricardo Alpoim	ralpoim@ipma.pt
Redfish in Div. 3M	Ricardo Alpoim	ralpoim@ipma.pt
Redfish in Div. 3LN	Patricia Gonçalves	patricia@ipma.pt

From the Greenland Institute of Natural Resources, Nuuk, Greenland

Demersal Redfish in SA1	Rasmus Nygaard	rany@natur.gl
Wolfish in SA1	Rasmus Nygaard	rany@natur.gl
Greenland halibut in Div. 1 inshore	Rasmus Nygaard	rany@natur.gl
Northern shrimp in SA 0+1	AnnDorte Burmeister	anndorte@natur.gl
Northern shrimp in Denmark Strait	Tanja B. Buch	TaBb@natur.gl

From Knipovich Polar Research Institute of Marine Fisheries and Oceanography (PINRO), Russian Federation

Capelin in Div. 3NO	Konstantin Fomin	fomin@pinro.ru

Designated Expert Vacancies

Ecosystem Designated Expert 3LNO	VACANT
Northern Shortfin Squid in SA 3 & 4	VACANT
Thorny skate in Div. 3LNO	VACANT
White hake in Div. 3NO	VACANT

APPENDIX VII. LIST OF SCR AND SCS DOCUMENTS

SCR Documents			
Serial No.	Doc. No.	Author(s)	Title
N7616	SCR Doc. 25/001	Andrea Perreault and Fatemeh Hatefi	Dynamic Factor Analysis for 3LN redfish survey indices
N7617	SCR Doc. 25/002	Andrea Perreault and Fatemeh Hatefi	Update to 3LN Redfish Operating Models
N7621	SCR Doc. 25/003	F. González-Costas, D. González-Troncoso and I. Garrido.	NAFO Div. 3M Cod Precautionary Approach Framework (PAF) reference points proxies
N7622	SCR Doc. 25/004	Diana González-Troncoso, Jose Miguel Casas Sánchez, Irene Garrido, Esther Román and Ricardo Alpoim	Results from Bottom Trawl Survey on Flemish Cap of June-July 2024
N7623	SCR Doc. 25/005	D S Butterworth and R A Rademeyer	OUTLINE OF A SIMPLE APPROACH TO DEVELOP A MSE FOR 3LN REDFISH - EXTENDED
N7625	SCR Doc. 25/006	Irene Garrido, Diana González-Troncoso, Fernando González-Costas, Esther Román and Lupe Ramilo	Results of the Spanish survey in NAFO Div. 3NO
N7627	SCR Doc. 25/007	John Mortensen	Report on hydrographic conditions off West Greenland May-June 2024
N7628	SCR Doc. 25/008	E. Román-Marcote, I. Garrido and G. Ramilo	Results for the Spanish Survey in the NAFO Regulatory Area of Division 3L for the period 2003-2024
N7632	SCR Doc. 25/009	Samuel D. N. Johnson, Beau Doherty, Scarlett Wang, and Sean P. Cox	An approach for assessing potential climate change impacts on stock assessment and management advice with application to NAFO 3M Cod and 3NO Witch Flounder
N7635	SCR Doc. 25/010	D S Butterworth and R A Rademeyer	Outline of a Simple Approach to Develop a MSE for 3LN Redfish – Now Modified to Incorporate Density Dependent Productivity and to Fit to a Longer Time Series of Historical Data
N7636	SCR Doc. 25/011	Rasmus Nygaard, Inuk Petersen and Henrik Christiansen	Biomass and Abundance of Demersal Fish Stocks in the Nuuk fjord and Ameralik fjord derived from the GINR Shrimp and fish inshore (SFI) survey
N7639	SCR Doc. 25/012	David Bélanger, Jonathan Coyne and Frédéric Cyr	Environmental indices for NAFO subareas 0 to 4 in support of the Standing Committee on Fisheries Science (STACFIS) – 2024 update
N7640	SCR Doc. 25/013	Igor Yashayaev	2024 and 2025 Oceanographic Conditions in the Labrador Sea in the Context of Seasonal, Interannual and Multidecadal Changes
N7641	SCR Doc. 25/014	S. Clay, M. Ringuette, E. Devred, K. Azetsu-Scott, Z. Wang, B. Greenan, C. Gordon, D. Childs, and C. Layton	Physical, Chemical, and Biological Oceanographic Conditions in the Labrador Sea in 2024
N7642	SCR Doc. 25/015	Jenny Chiu	Inventory of Environmental Data in the NAFO Convention Area - Report 2024
	SCR Doc. 25/016		*RETRACTED*
N7644	SCR Doc. 25/017	Rasmus Nygaard, Henrik Christiansen & Inuk Petersen.	The Upernavik gillnet survey
	SCR Doc. 25/018	Rasmus Nygaard, Henrik Christiansen & Inuk Petersen.	The Uummannaq Gillnet survey

N7646	SCR Doc. 25/019	Rasmus Nygaard, Henrik Christiansen & Inuk Petersen.	The Disko bay trawl and gillnet survey results for Greenland halibut
N7647	SCR Doc. 25/020	Inuk Petersen, Henrik Christiansen and Rasmus Nygaard	Biomass and Abundance of Demersal Fish Stocks off West and East Greenland estimated from the Greenland Institute of Natural Resources (GINR) Shrimp and Fish Survey (SFW), 1990-2020, and 2022-2024.
N7648	SCR Doc. 25/021	Henrik Christiansen1, Adriana Nogueira2	Results for Greenland halibut survey in NAFO Divisions 1C-1D for the period 1997-2017, 2019 and 2022-2024
N7649	SCR Doc. 25/022	Rasmus Nygaard	Disko Bay - Commercial data from the Greenland halibut fishery
N7650	SCR Doc. 25/023	Rasmus Nygaard, Inuk Petersen, & Henrik Christiansen	The Uummannaq fjord - commercial data from the Greenland halibut fishery.
N7651	SCR Doc. 25/024	Rasmus Nygaard, Inuk Petersen, & Henrik Christiansen	Upernavik area - commercial data from the Greenland halibut fishery.
	SCR Doc. 25/025		*Retracted
N7654	SCR Doc. 25/026	Laura Wheeland, Rick Rideout and Jonathan Coyne	2025 Assessment of Yellowtail Flounder in NAFO Divisions 3LNO
N7655	SCR Doc. 25/027	R.M. Rideout, S. Trueman, L. Wheeland	A Detailed Stock by Stock Overview of the Impacts of Comparative Fishing Results on the Availability of Canadian-NL Multispecies Survey Data for Stock Assessments and other Science Advisory Processes
N7656	SCR Doc. 25/028	R.M. Rideout, L. Wheeland, A. Perreault, P. Regular, K. Skanes, S. Trueman, L. Simms, J. Makrides	Canadian (Newfoundland and Labrador Region) Multi-Species Research Vessel Bottom Trawl Survey Report for Surveys Conducted in 2024
N7657	SCR Doc. 25/029	L. Wheeland1, B. Bales2, B. Devine3, B. Misiuk2, E. Novaczek1, and P. Regular1	Telemetry insights for the assessment and management of Greenland halibut in NAFO SA2+Div. 3KLMNO (Newfoundland and Labrador)
N7658	SCR Doc. 25/030	Kevin Hedges	Report on Greenland halibut (*Reinhardtius hippoglossoides*) caught during the 2024 trawl survey in Subarea 0 DRAFT
N7659	SCR Doc. 25/031	K.J. Hedges1 and H. Christiansen	Assessment of the Greenland Halibut Stock Component in NAFO Subarea 0 + 1 (Offshore) DRAFT
N7660	SCR Doc. 25/032	Irene Garrido, Diana González-Troncoso and Fernando González-Costas	Assessment of the Cod Stock in NAFO Division 3M
N7661	SCR Doc. 25/033	Mariano Koen-Alonso and Hannah Munro	Catch levels for the scoping of the ecosystem sustainability of catches in 2025-2026
N7662	SCR Doc. 25/034	Irene Garrido, Fernando González-Costas and Diana González-Troncoso	Analysis of the Flemish Cap cod fishery: monitoring of the consequences of the management decisions

SCS Documents			
Serial No.	**Doc. No.**	**Author**	**Title**
N7613	SCS Doc. 25/01	NAFO	The Commission's Request for Scientific Advice on Management in 2026 and Beyond of Certain Stocks in Subareas 2, 3 and 4 and Other Matters
N7615	SCS Doc. 25/02	NAFO	Report of the Scientific Council Intersessional Meeting: 3LN Redfish MSE, 30 January 2025
N7618	SCS Doc. 25/03	Denmark (in respect of Faroe Islands and Greenland)	Denmark (on behalf of Greenland) Coastal State Request for 2026
N7619	SCS Doc. 25/04	Canada	Canada Coastal State Request for 2026
N7624	SCS Doc. 25/05	F. González-Costas, G. Ramilo, E. Román, J. Lorenzo, D. González-Troncoso, M. Sacau, P. Duran, J. L. del Rio, M. Casas and I. Garrido.	Spanish Research Report for 2024
N7626	SCS Doc. 25/06	Japan Fisheries Research and Education Agency	National Research Report of Japan (2025)
N7631	SCS Doc. 25/07	Luis Ridao Cruz	Faroese Research Report 2024
N7633	SCS Doc. 25/08	R. Alpoim, S. Dores and P. Gonçalves	Portuguese Research Report for 2024
N7634	SCS Doc. 25/09	K.Yu. Fomin, M.V. Pochtar	Russian Research Report for 2024
N7637	SCS Doc. 25/10	NAFO	Report of the NAFO Precautionary Approach Working Group (PA-WG)
N7638	SCS Doc. 25/11	Katherine Skanes and Mark Simpson	Canadian Research Report (Newfoundland and Labrador Region) for 2024
N7652	SCS Doc. 25/12	Greenland Institute of Natural Resources	Denmark/Greenland Research Report for 2024

APPENDIX VIII. LIST OF PARTICIPANTS

CHAIR	
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