Yellowtail flounder in Divisions 3LNO Advice June 2023 for 2024-25

Recommendation for 2024 to 2025
Scientific Council advises that fishing mortality up to 75% F_{msy}, corresponding to catches of 15 560 t and 15 810 t in 2024 and 2025, respectively, have risk of no more than 30% of exceeding F_{lim}, and are projected to maintain the stock around B_{msy} with a low risk of being below B_{lim}.

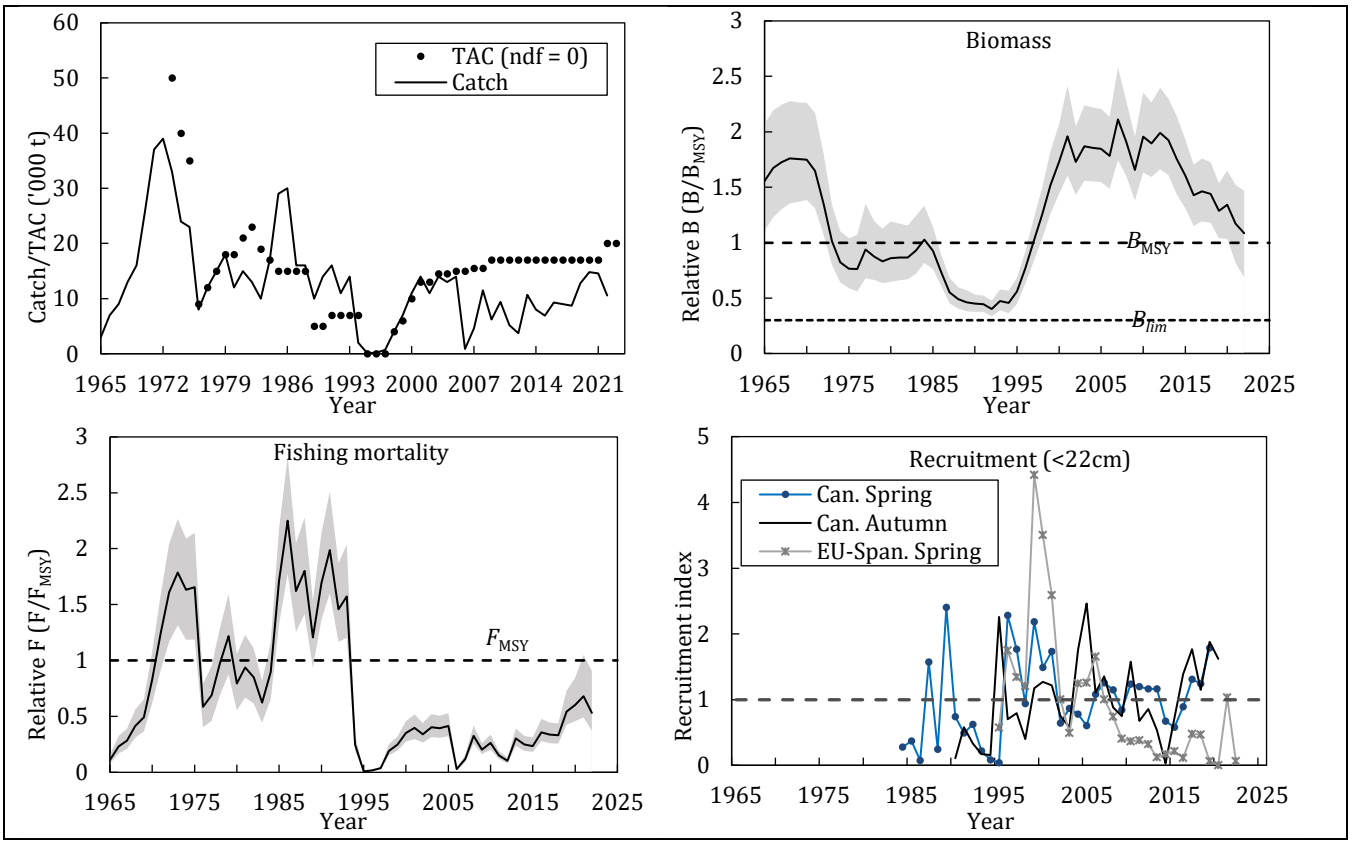
Management objectives
No explicit management plan or management objectives are defined by the Commission. Convention General Principles are applied.

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	Blim and Flim 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 size has decreased since 2012, but remains above B_{msy} with a probability of 0.61. There is very low risk (<1%) of the stock being below B_{lim} and a very low risk of F being above $F_{lim}=F_{msy}$ (7%). Recent recruitment is unknown.



Reference points

B_{lim} is 30% B_{msy} and F_{lim} is F_{msy} (STACFIS 2004 p 133).

Projections

Medium-term projections were carried forward to the year 2026 for $Catch_{2023}$=TAC=20 000 t. Constant fishing mortality was applied from 2023-2026 at several levels of F (F=0, $F_{status\ quo}$, 75% F_{msy}, 85% F_{msy}, and F_{msy}). At the end of the projection period, the risk of biomass being below B_{lim} is 6% or less in all cases.

For the $F_{status\ quo}$ projections, probability that F > F_{lim}=F_{msy} in 2025-2026 was from 0.11 to 0.12 and at 75% F_{msy}, that probability was between 0.27 and 0.28. Projected at the level of 85% F_{lim}, the probability that F > F_{lim} was 0.36 and for F_{msy} projections, this probability increased to 0.50. For biomass projections, in all scenarios for 2024-2026, the probability of biomass being below B_{lim} was 0.06 or less. The probability that biomass in 2026 is greater than B_{2023} is 0.60, 0.49, 0.44 and 0.38 for projections of $F_{status\ quo}$, 75% F_{msy}, 85% F_{msy}, and F_{msy} respectively.

Projections with $Catch_{2023}$= 20 000 t (TAC)		
Year	Yield ('000t) median	Projected relative Biomass(B/B_{msy}) median (80% CL)
F =0		
2024	0.00	1.13 (0.61, 1.62)
2025	0.00	1.32 (0.74, 1.84)
2026		1.49 (0.86, 2.02)
$F_{status\ quo}$ = 0.107		
2024	10.79	1.13 (0.61, 1.62)
2025	11.37	1.2 (0.63, 1.71)
2026		1.26 (0.65, 1.77)
75% F_{MSY} =0.151		
2024	15.56	1.13 (0.61, 1.62)
2025	15.81	1.15 (0.59, 1.65)
2026		1.16 (0.56, 1.67)
85% F_{MSY} =0.173		
2024	17.63	1.13 (0.61, 1.62)
2025	17.56	1.13 (0.57, 1.62)
2026		1.12 (0.52, 1.63)
F_{MSY} =0.202		
2024	20.74	1.13 (0.61, 1.62)
2025	20.03	1.09 (0.54, 1.58)
2026		1.06 (0.46, 1.56)

	Yield ('000t)		P(F>F_{lim})			P(B<B_{lim})			P(B<B_{MSY})			
$Catch_{2023}$=20 000t	2024	2025	2024	2025	2026	2024	2025	2026	2024	2025	2026	P(B_{2026}<B_{2023})
F =0	0	0	<1%	<1%	<1%	2%	1%	<1%	37%	23%	15%	16%
$F_{status\ quo}$ = 0.107	10.79	11.37	11%	11%	12%	2%	2%	3%	37%	32%	28%	40%
75% F_{MSY} = 0.151	15.56	15.81	26%	27%	28%	2%	3%	4%	37%	36%	35%	51%
85% F_{MSY} =0.173	17.63	17.56	35%	36%	36%	2%	3%	4%	37%	38%	39%	56%
F_{MSY} =0.202	20.74	20.03	50%	50%	50%	2%	4%	6%	37%	41%	44%	62%

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 last available survey that covered the complete stock area was in autumn 2020. New vessels are being used to conduct the Canadian surveys and information from 2022 onwards are being examined for comparability to the previous survey indices used in this assessment.

The next assessment is planned for 2025.

Human impact

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

Biology and Environmental interactions

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 after 2014, and has not yet returned to the early-mid 2010s level.

Ecosystem sustainability of catches
Fishing intensity on yellowtail flounder has impacts on Div. 3NO cod and Div. 3LNO American plaice through by-catch. General impacts of fishing gears on the ecosystem should also be considered. Areas within Divs. 3LNO have been closed to bottom fishing to protect sponge and coral species.

Yellowtail flounder is included in the benthivore guild of the Grand Bank (3LNO) Ecosystem Production Unit (EPU). Other NAFO managed stocks in this guild within the EPU include 3LNOPs thorny skate, 3NO witch flounder, 3LNO American plaice, and 3LNO shrimp. The Catch/TCI is below the 2TCI ecosystem reference point (3LNO Benthivore $Catch_{2022}$/TCI=0.80) indicating a low risk of ecosystem overfishing.

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. Catches in several years were low due to industry-related factors, but in recent years catches were higher, and in 2021 and 2022 were 86% and 53% of the TAC respectively. American plaice and 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 catch estimates and TACs ('000 tonnes) are as follows:

	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
TAC	17	17	17	17	17	17	17	17	20	20
STATLANT 21	8.0	6.7	8.3	9.2	8.6	12.3	14.0	16.1	NA*	
STACFIS	8.0	6.9	9.3	9.2	8.7	12.8	14.8	14.6	10.6	

* STATLANT 21a data for 2022 were not yet available at the time of writing

Special comments
Management of yellowtail flounder should take into consideration impacts on other stocks. By-catch in the yellowtail flounder fishery may be impeding recovery of Div. 3NO cod and American plaice in Div. 3LNO, which have both been below B_{lim} for many years. Measures to reduce by-catch of American plaice in the yellowtail flounder fishery, in particular, which currently has a 15% limit, could reduce the impact of fishing on the recovery of that stock.

Sources of information
SCR 22/018, 23/002, 23/016, 21/019; SCS 23/05, 23/06, 23/09, 23/13; NAFO/GC Doc 08/3 NAFO/FC 04/18