Witch flounder in Divisions 3NO Advice June 2018 for 2019-2020

Recommendation for 2019 and 2020

The probability of being below B_{lim} in 2021 ranges from 15% to 24% amongst the tested scenarios. The NAFO PA framework specifies that there should be a very low probability of being below B_{lim}.

SC recommends that there be no directed fishing in 2019 and 2020.

Management objectives

The Commission adopted a total allowable catch (TAC) of 1,116 t in 2018. General convention objectives (GC Doc. 08/3) are applied.

Convention objectives	*Status*	*Comment/consideration*
Restore to or maintain at B_{msy}	🔴	$B_{2018} < B_{msy}$
Eliminate overfishing	🟢	$F < F_{msy}$
Apply Precautionary Approach	🟢	Increased risk of $B<B_{lim}$
Minimise harmful impacts on living marine resources and ecosystems	🟡	VME closures in effect, no specific measures.
Preserve marine biodiversity	⚪	Cannot be evaluated

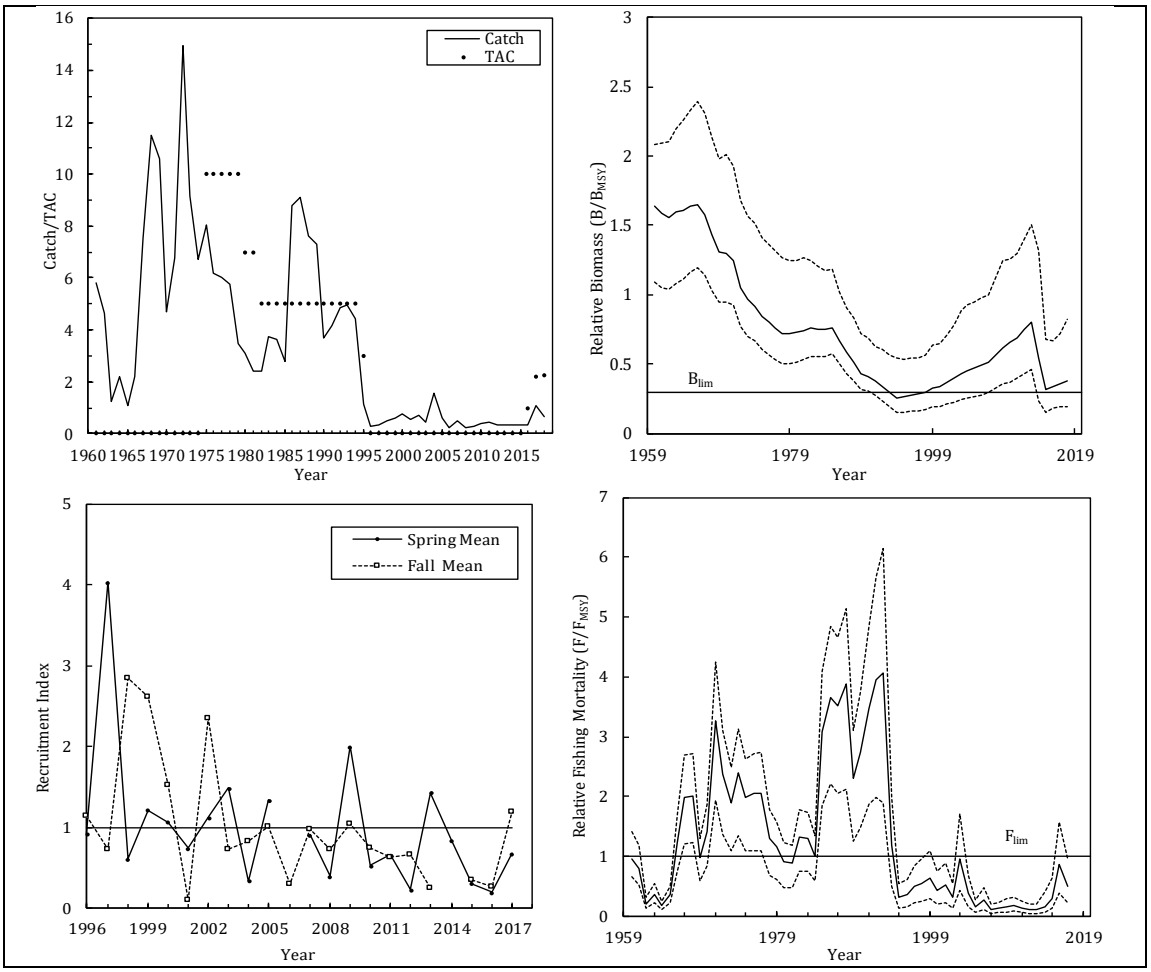
🟢 OK
🟡 Intermediate
🔴 Not accomplished
⚪ Unknown

Management unit

The management unit is NAFO Divisions 3NO. The stock mainly occurs 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, a higher percentage may be distributed in shallower water.

Stock status

The stock size increased since 1999 to about 2010 and then declined after 2013 and is now at 37% $B_{msy.}$ (B_{msy} = 60 000 t). There is presently a 29% risk of the stock being below B_{lim} and a 4% risk of F being above F_{lim}. Recruitment in 2017 surveys increased in the fall to a value just above the time series mean while those in the spring increased to a value approaching the time series mean.



Reference points

Reference points are estimated from the surplus production model. 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 for stocks where a production model is used.

Projections and risk analyses.

All projections assumed that the catch in 2018 was equal to the TAC of 1,116 t (which produces F_{2018}). This assumption was based on reported catches to the end of April 2018 of almost 600 t. The probability that F > F_{lim} in 2018 is 30% at a catch of 1 116 t. The probability of F>F_{lim} ranged from 7 to 50% for the catch scenarios tested. The population is projected to grow under all scenarios and the probability that the biomass in 2021 is greater than the biomass in 2018 is greater than 60% in all scenarios. The population is projected to remain below B_{MSY} for all levels of F examined with a probability of greater than 90%. The probability of projected biomass being below B_{lim} by 2021 was 19 to 24% in all catch scenarios examined and was 15% by 2021 in the F=0 scenario.

	Projections with catch in 2018 = 1 116 t	
	Median	Median (90% CI)
F=0	Projected Yield (t)	Projected Relative Biomass (B_y /B_{msy})
2019	0	0.39 (0.19, 0.91)
2020	0	0.43 (0.21, 1.02)
2021		0.48 (0.23, 1.12)
F_{2017}=0.03	Projected Yield (t)	Projected Relative Biomass (B_y /B_{msy})
2019	740	0.39 (0.19, 0.91)
2020	792	0.42 (0.20, 1.00)
2021		0.45 (0.20, 1.09)
2/3 F_{msy}=0.04	Projected Yield (t)	Projected Relative Biomass (B_y /B_{msy})
2019	979	0.39 (0.19, 0.91)
2020	1035	0.42 (0.19, 0.99)
2021		0.44 (0.19, 1.08)
85% F_{msy}=0.05	Projected Yield (t)	Projected Relative Biomass (B_y /B_{msy})
2019	1248	0.39 (0.19, 0.91)
2020	1306	0.41 (0.19, 0.99)
2021		0.43 (0.19, 1.06)
F_{msy}=0.06	Projected Yield (t)	Projected Relative Biomass (B_y /B_{msy})
2019	1468	0.39 (0.19, 0.91)
2020	1522	0.41 (0.19, 0.98)
2021		0.42 (0.18, 1.05)

Projected yield (t) and the risk of F> F_{lim}, B<B_{lim} and B<B_{MSY} and probability of stock growth (B2021>B2018) under projected F values of F=0, F2017, 2/3 F_{MSY}, 85% F_{MSY}, and F_{MSY}.

	Yield	Yield	P(F>F_{lim})		P(B<B_{lim})			P(B<B_{MSY})			P(B_{2021}>B_{2018})
	2019	2020	2019	2020	2019	2020	2021	2019	2020	2021	
F=0	0	0	0	0	26%	20%	15%	96%	95%	93%	72%
F2017=0.03	740	792	7%	8%	26%	22%	19%	96%	95%	93%	67%
2/3 Fmsy=0.04	979	1035	19%	20%	26%	23%	21%	96%	95%	94%	65%
85%Fmsy=0.05	1248	1306	36%	37%	26%	24%	23%	96%	95%	94%	63%
Fmsy=0.06	1468	1522	50%	50%	26%	25%	24%	96%	95%	94%	61%

Assessment

This stock is assessed utilizing a surplus production model in a Bayesian framework. A full assessment was conducted in 2017 and 2018.

The input data were catch from 1960-2017, Canadian spring survey series from 1984-1990, Canadian spring survey series from 1991-2017 (no 2006) and the Canadian autumn survey series from 1990-2017 (no 2014).

The next assessment is planned for 2020.

Human impact

Mainly fishery related mortality. Other potential sources (e.g. pollution, shipping, and oil-industry) are undocumented.

Biological and environmental interactions

Witch flounder in NAFO Divs 3NO are distributed mainly along the tail and southwestern slopes of the Grand Bank. The Southern Grand Bank (3NO) EPU is currently experiencing low productivity conditions and biomass has declined across multiple trophic levels and stocks since 2014.

Fishery
The fishery was reopened to directed fishing in 2015 and is exploited by otter trawl. Prior to the reopening, witch flounder were caught primarily as bycatch in bottom otter trawl fisheries for yellowtail flounder, redfish, skate and Greenland halibut.

Recent catch estimates and TACs are:

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
TAC	ndf	ndf	Ndf	ndf	ndf	ndf	ndf	1.0	2.2	2.2	1.1
STATLANT 21	0.2	0.1	0.4	0.4	0.3	0.3	0.3	0.4	1.0	0.6	
STACFIS	0.3	0.4	0.4	0.4	0.3	0.3	0.3	0.4	1.1	0.7	

*ndf = no directed fishing

Effects of the fishery on the ecosystem
No specific information available. General impacts of bottom trawl gear on the ecosystem should be considered.

Special comments

This advice is given by SC on its own accord in light of the special comment in 2017 (*Because of the uncertainty and proximity to limit reference points the next full assessment is rescheduled for 2018*).

Sources of Information
SCR Docs 18/14, 18/03, 18/05, 18/25; SCS Docs. 18/05, 18/06, 18/07, 18/08 ; NAFO/GC Doc 08/3.