Figure 12.9.   Yellowtail flounder in Div. 3LNO: stock trajectory estimated in the surplus production analysis, under a precautionary approach framework (80%CL on 2022).

The next assessment is planned for 2025.

13. Witch Flounder (*Glyptocephalus cynoglossus*) in Divisions 3N and 3O

Interim Monitoring Report (SCR Docs, 22/005, 007, 014, 23/002; SCS 22/06, 09, 10, 13, 23/5, 9, 10, 12)

a)   Introduction

From 1972 to 1984, reported catch of witch flounder in NAFO Divs. 3NO ranged from a high of about 9 200 t in 1972 to a low of about 2 400 tonnes (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 a 1 000 t TAC for 2015 and in 2015 set a TAC for 2016, 2017, and 2018 at 2 172 t, 2 225 t, and 1 116 t respectively. 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 2022, total catch was estimated to be 622 t.

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

	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
TAC	ndf	1.0	2.2	2.2	1.1	1.2	1.2	1.2	1.2	1.2
STATLANT 21	0.3	0.4	1.0	0.6	0.6	0.9	0.6	0.8	N/A*	
STACFIS	0.3	0.4	1.1	0.7	0.7	0.9	0.7	0.6	0.6	

  ndf = no directed fishery.

 * STATLANT 21a data for 2022 were not yet available at the time of writing
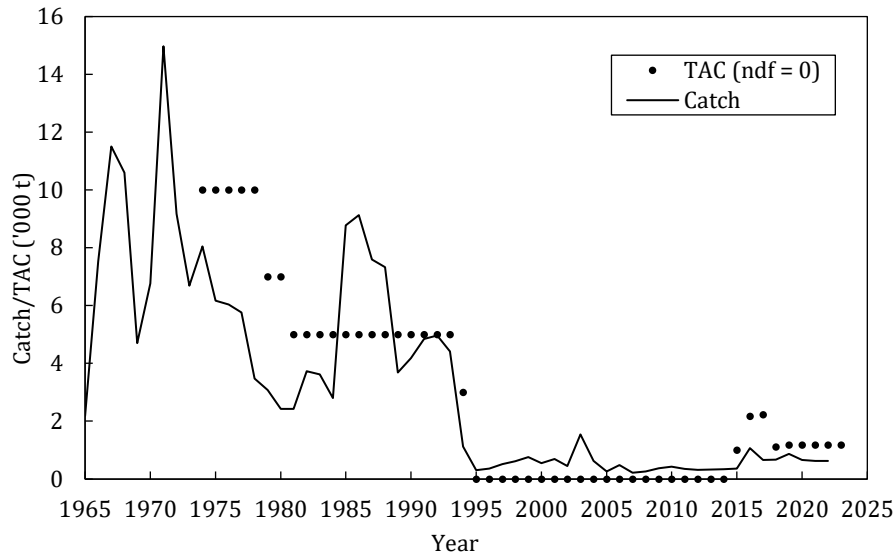
Figure 13.1.　　Witch flounder in Divs. 3NO: Catch and TAC ('000 tonnes).

b)　Data Overview

i)　*Research survey data*

Recent surveys are as follow:

	Div.	2018	2019	2020	2021	2022
Canadian-Spring	3N	●	●	–	–	o
	3O	●	●	–	–	o
Canadian - Autumn	3N	●	●	●	–	–
	3O	●	●	●	–	–
EU	3N	●	●	–	●	●
	3O	●	●	–	●	●

● = complete, o = uncalibrated, – = incomplete

Canadian spring RV survey.　Spring surveys were not conducted between 2019-2021. The survey in 2022 was carried out on a new vessel and calibration information is not yet available. Due to substantial coverage deficiencies, values from 2006 are not presented, and there was no survey in 2021. The 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 from 1987 (Figure 13.2). Biomass indices declined substantially from a high in 2013 to a value 51% of the time series average in 2015. Biomass indices have been relatively stable since 2015 (Figure 13.2).
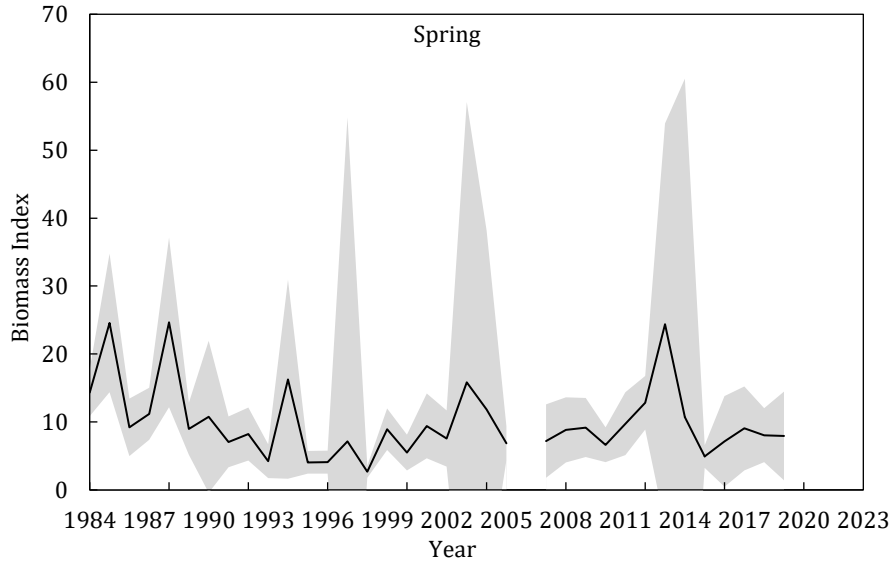
Figure 13.2.   Witch flounder in NAFO Divs. 3NO: survey biomass indices from Canadian spring surveys 1984-2019 (95% confidence limits are given). Values are Campelen units or, prior to 1996, Campelen equivalent units. Surveys have not been conducted since 2019.

Canadian autumn RV survey. Autumn surveys have not been conducted since 2020. Due to operational difficulties there was no 2014 autumn survey. The biomass indices showed a general increasing trend from 1996 to 2009 but declined to 54% of the time series average in 2016 (Figure 13.4). Biomass indices increased slightly from 2016 to 2019, then decreased in 2020.
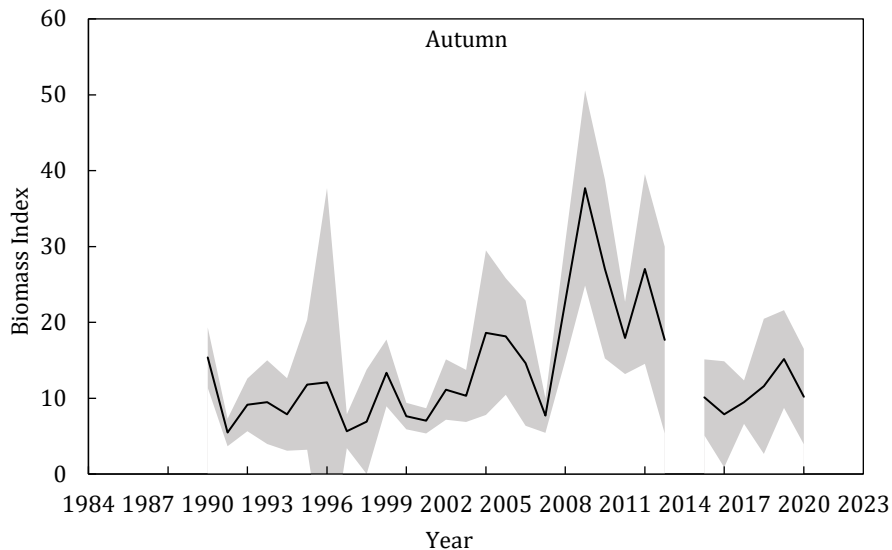

Figure 13.3.   Witch flounder in Divs. 3NO: biomass indices from Canadian autumn surveys 1990-2020 (95% confidence limits are given). Values are Campelen units or, prior to 1996, Campelen equivalent units. Surveys have not been conducted since 2020.

EU-Spain RV spring survey. Surveys have been conducted annually from 1995 to 2019 by EU-Spain in the NAFO Regulatory Area in Divs. 3NO to a maximum depth of 1,450 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, but relatively stable over the time series, however biomass declined over 2017 to 2022, and in 2022 the estimate was the lowest in the series. No survey was conducted in 2020 (Figure 13.5).
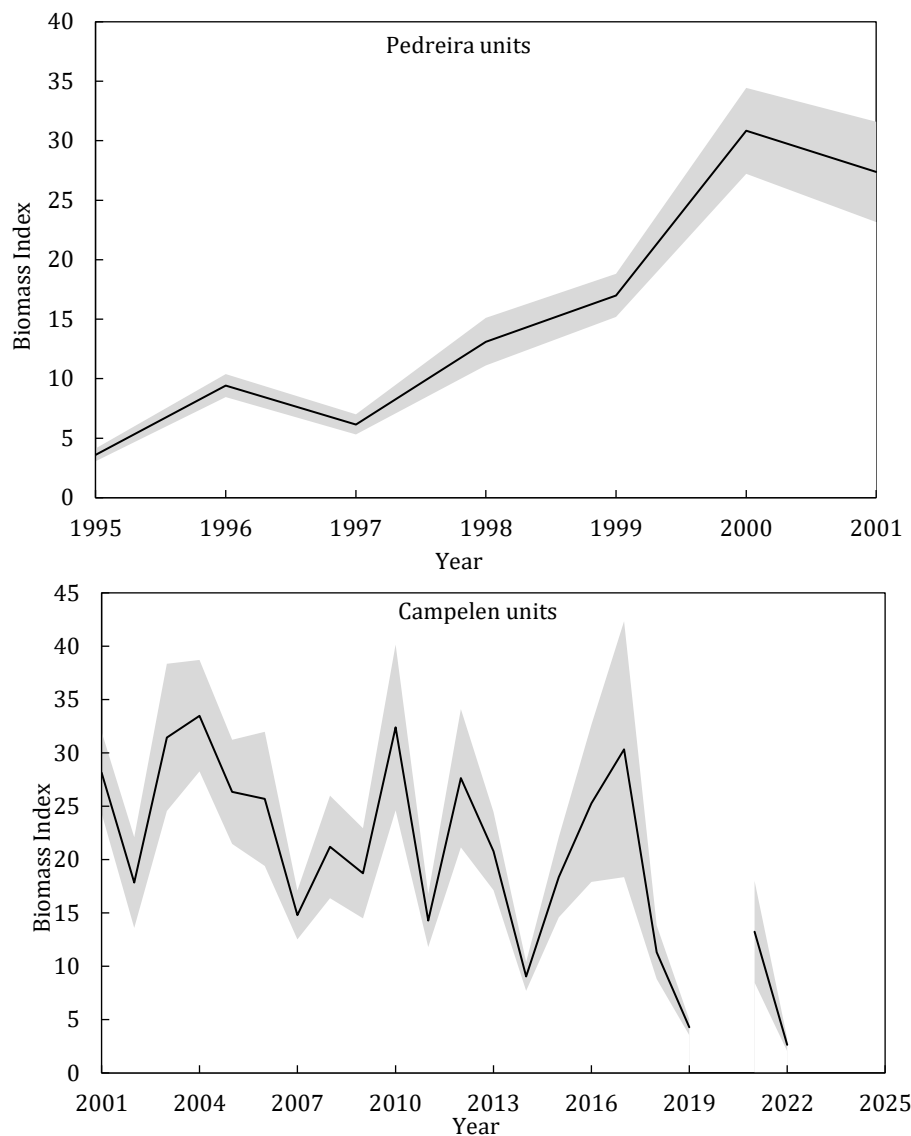

Figure 13.4.   Witch flounder in Divs. 3NO: biomass indices from EU-Spanish Div. 3NO spring surveys (± 1 standard deviation). Data from 1995-2001 is in Pedreira units; data from 2001-2022 are Campelen units. Both values are presented for 2001. No survey was conducted in 2020.

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. In the absence of surveys that cover the entire stock area since 2020, stock distribution in relation to previous years is unknown.

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 recruitment index could not be updated for 2021 or 2022.
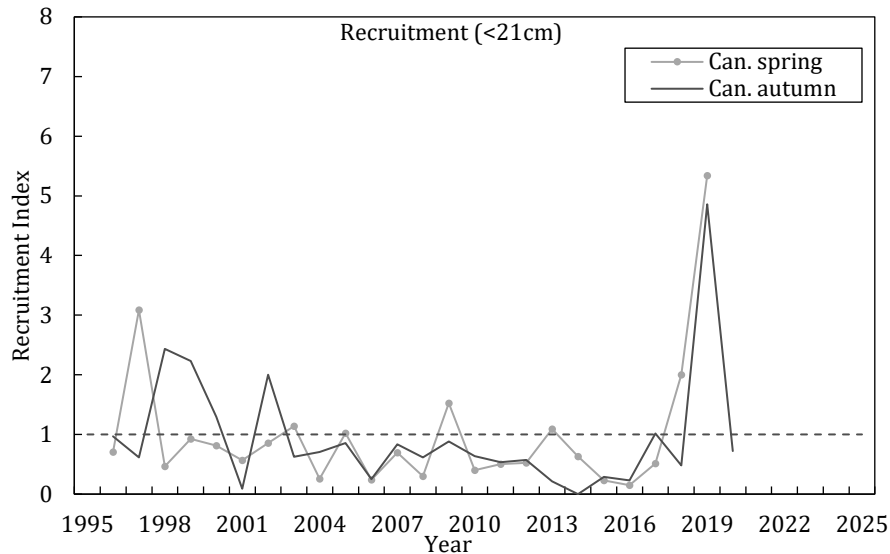

Figure 13.5.   Recruitment index of witch flounder (<21cm) from spring and autumn Canadian RV surveys in NAFO Divs.3NO 1996-2020. No survey data available in autumn 2014, 2020-2022, nor for spring 2006, 2019-2022.

c)   Conclusion

The most recent (2022) 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 2022 the stock was at 49% B_{msy}. (60 510 t). There was 9% risk of the stock being below B_{lim} and a <1% risk of F being above F_{lim} (F_{msy} =0.062). There were no Canadian surveys in spring 2019-2021 nor autumn 2021-2022. Data from a spring survey on a new vessel in 2022 was not available for this assessment. The only information available are the 3NO Spanish spring survey outside of the EEZ and catch. The Spanish survey estimate is the lowest in the time series and catch is about half of the TAC.

The next full assessment of this stock is planned for 2024.

14. Capelin (*Mallotus villosus*) in Divisions 3NO

Interim Monitoring Report (SCR 22/007, 23/002; SCS 23/06, 23/09, 23/12)

a)   Introduction

The fishery for capelin started in 1971. 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 reported from 1993 to 2013. Small catches (mostly discards) occurred from 2016 to 2020.

Recent catches and TACs (tonnes) are as follows:

	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
TAC	ndf	ndf	ndf	ndf	ndf	ndf	ndf	ndf	ndf	ndf*
STATLANT 21A	0	0	5	0	0	0	0	0	N/A	
Catch (STACFIS)	1	0	4	1	2	2	1	0	0	

* ndf = no directed fishing