

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

Interim Monitoring Report (SCR Docs, 20/002, 009, 046; SCS 20/06, 07, 09, 11, 13; SCS 21/08, 09, 06)

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 2020, total catch was estimated to be 655 t.

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

	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
TAC	ndf	ndf	ndf	1.0	2.2	2.2	1.1	1.2	1.2	1.2
STATLANT 21	0.3	0.3	0.3	0.4	1.0	0.6	0.6	0.9	0.7	
STACFIS	0.3	0.3	0.3	0.4	1.1	0.7	0.7	0.9	0.7	

ndf = no directed fishery.

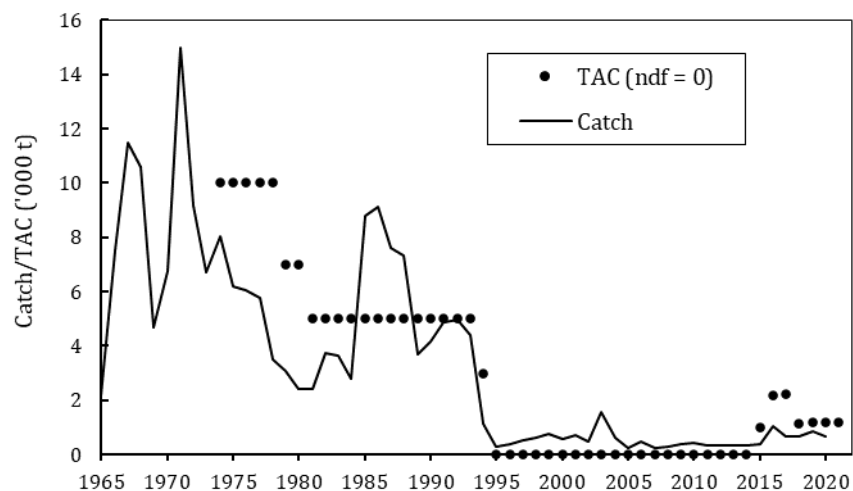


Figure 13.1. Witch flounder in Divs. 3NO (1960-2021): Catch and TAC ('000 tonnes).

b) Data Overview

i) Research survey data

Canadian spring RV survey. Due to substantial coverage deficiencies, values from 2006 are not presented, and there was no survey in 2020. 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).

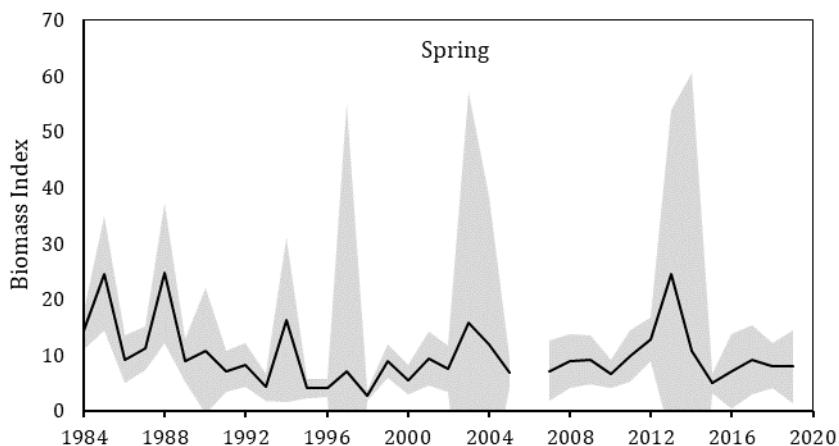


Figure 13.2. Witch flounder in NAFO Divs. 3NO: survey biomass indices from Canadian spring surveys 1984-2019 (95% confidence limits are given). Values are Campelen units or, prior to 1996, Campelen equivalent units. No survey was conducted in 2020.

Canadian autumn RV survey. 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.

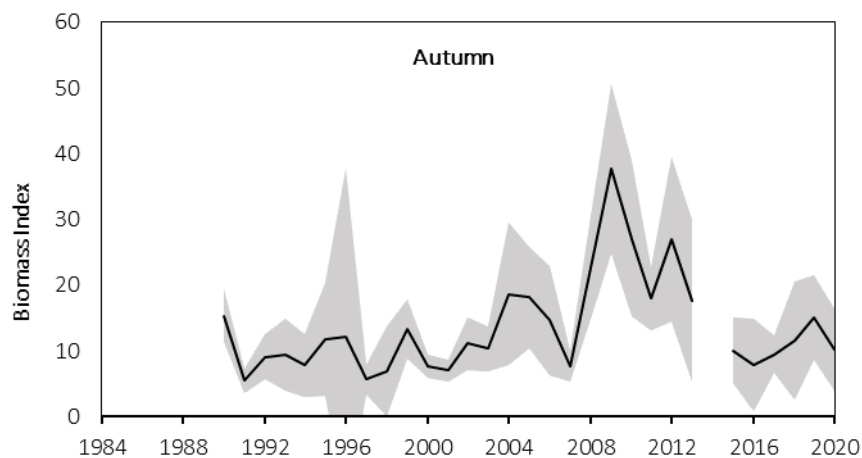


Figure 13.3. Witch flounder in Divs. 3NO: biomass indices from Canadian autumn surveys 1990-2020 (95% confidence limits are given). Values are Campelen units or, prior to 1996, Campelen equivalent units.

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 Mendiña*) 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 the 2019 estimate is the lowest in the series. No survey was conducted in 2020 (Figure 13.5).

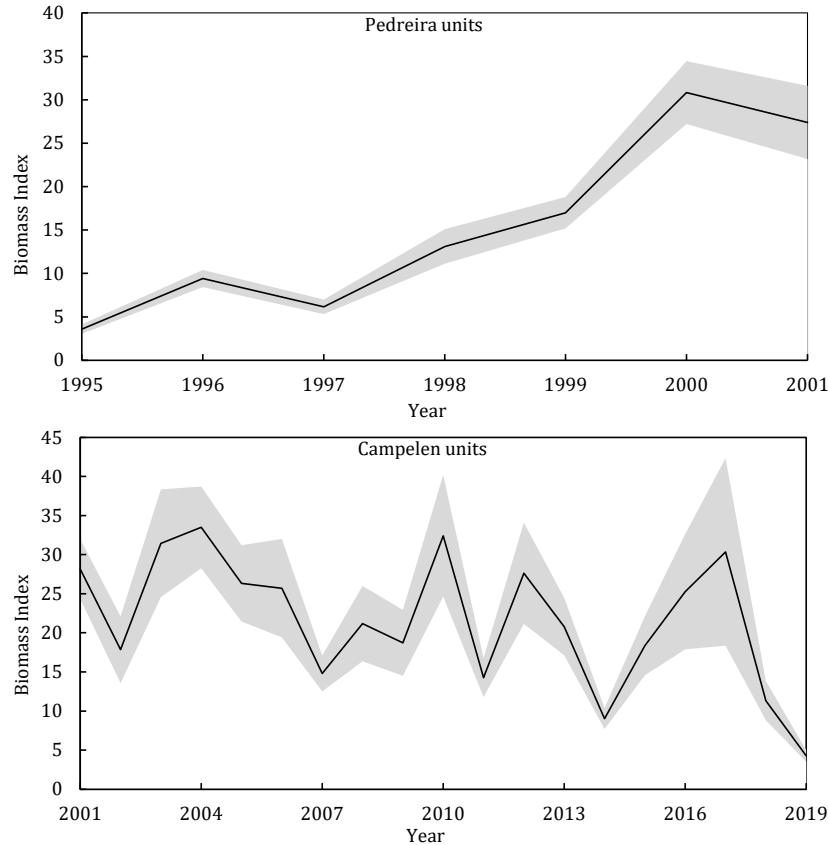


Figure 13.4. Witch flounder in Divs. 3NO: biomass indices from EU-Spanish Div. 3NO spring surveys (± 1 standard deviation). Data from 1995-2001 is in Pedreira units; data from 2001-2019 are Campelen units. Both values are presented for 2001. No survey was conducted in 2020.

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. A 2014 analysis of Canadian biomass proportions by depth aggregated across survey years (spring 1984-2014 and autumn 1990-2014) indicated that in Div. 3N both spring and autumn biomass proportions were fairly evenly distributed over a depth range of 57-914 m while those in 3O were more restricted to a shallower depth range of 57-183m. Distributions of juvenile fish (less than 21 cm) were slightly more prevalent in shallower water during autumn surveys. It is possible however, that the juvenile distribution may be more related to the overall pattern of witch flounder being more widespread in shallower waters during the post-spawning autumn period, although other stocks show a pattern of juvenile fish occupying shallow and/or inshore areas. In years where all strata were surveyed to a depth of 1462 m in the autumn survey, generally less than 5% of the Divs. 3NO biomass was found in the deeper strata (731-1462 m).

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.

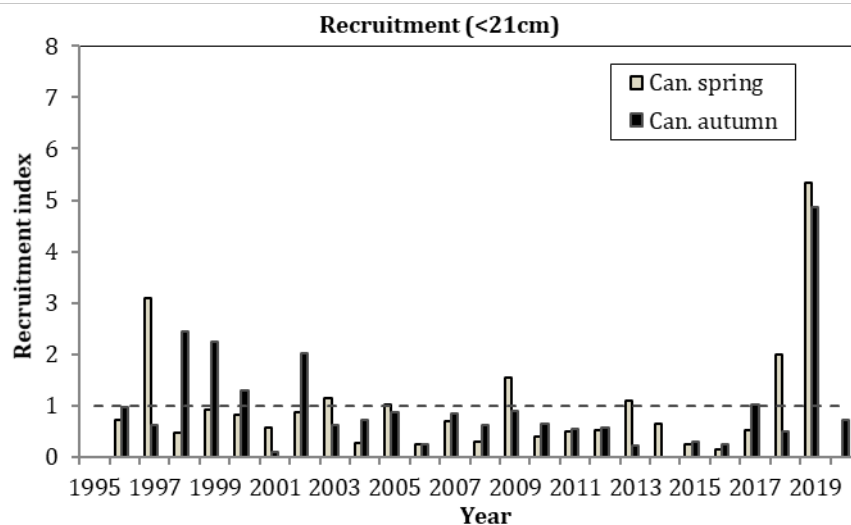


Figure 13.5. Recruitment index of witch flounder (<21cm) from spring and autumn Canadian RV surveys in NAFO Divs.3NO 1996-2020. No survey data available in autumn 2014 or spring 2006 or 2020.

c) Conclusion:

The most recent (2020) 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 2020 the stock was at 44% B_{msy} . (59 880t). There was 14% risk of the stock being below B_{lim} and a 4% risk of F being above F_{lim} ($F_{msy}=0.063$). Although only the fall survey of NAFO Divs. 3NO was conducted in 2020, and the survey index showed a slight decline, it does not indicate a significant change in the status of the stock.

The next full assessment of this stock is planned for 2022.