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Results for Greenland halibut, American plaice and Atlantic cod of the Spanish survey in NAFO Div. 3NO for the period 1997-2018

by

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Abstract

Greenland halibut (*Reinhardtius hippoglossoides*), American plaice (*Hippoglossoides platessoides*) and Atlantic cod (*Gadus morhua*) indices from the bottom trawl survey that Spain carries out in Spring since 1995 in Div. 3NO of the NAFO Regulatory Area are presented. Biomass, stratified mean catches and mean number per tow for the three species are presented since 1997, year in which the survey extended the depth strata. Mean catch per tow, length distribution and age distribution are presented for the last five years (2014-2018). Greenland halibut biomass and abundance estimates presented a decreasing trend since 1999, cut in 2007-2009 with a high increase. In 2011 the biomass drops under the 2008 value, being stable since then until 2014 with a slight increase in 2015-2018 comprising a big increase in 2017, reaching the maximum of the series. In last years it can be seen a presence of juveniles, mainly in 2004, but the greatest lengths have failed, although in 2009 there is a quite good presence of individuals of ages 6-7 and in 2010 between 5-7. In 2011-2018 the presence of all ages is poor, although in 2015-2016 an increase in the range of the length can be seen with regards to last years. For American plaice we can see a stable trend from 1999 to 2015, reaching a maximum of mean catch and number in 2006, and a severe decline since 2016. The greatest recruitment in the presented series occurred in 2004 and we can follow their mode along the years. No good recruitments were seen since then. The 2016 ALK for American plaice was not sexed. The 2017 and 2018 ALKs for American plaice are not available yet, so the 2016 ALK was used. In last years the level of all the ages is low. For Atlantic cod, it can be seen a low biomass until 2008, being higher and variable since then, reaching a historical maximum in 2014. From 2015, biomass decreased reaching in 2018 poor values at the level of the 2006 biomass. In 2007-2008 the youngest length classes were much over the rest of the length classes. With the 2006 cohort the series reaches the maximum number of its historical values at five years in 2011. There have been no good recruitments since 2009, although in 2015 and 2016 a discrete presence of individuals of age 1 can be seen.

Material and Methods

Since 1995, Spain carries out a Spring-Summer survey in the NAFO Regulatory Area of Div. 3NO. From 1995 to 2000, the survey was conducted on board the C/V *Playa de Menduñña* with a net trawl type *Pedreira*. In 2001 this vessel was replaced by the R/V *Vizconde de Eza*, using a trawl net type *Campelen*. For more details about the technical specifications of the surveys, see Walsh *et al.*, 2001 and González Troncoso *et al.*, 2004.



The catch of each haul was sorted and weighted into species and a sample of each species was taken in order to measure the length distribution. For Greenland halibut, American plaice and Atlantic cod each individual of the sample was measured to the total length to the nearest lower cm. As in 1995 and 1996 only depth less than 1000 m was surveyed, these years are not representative for these species, so only data from 1997 are presented. We present the total annual indices of biomass and abundance for the period 1997-2018.

The number of valid tows, the depth strata covered and the dates of the survey series (1997-2018) are presented in Table 1. Table 2 shows the swept area and number of hauls by stratum for the last five years (2014-2018). To know the results of the rest of the years, see González-Troncoso *et al.*, 2014.

For each species, we present all the transformed indices until 2000 and no-transformed from 2002 to 2018. In 2001 there are data transformed from the former vessel with original data from the new vessel. To know more about the transformation, see González-Troncoso *et al.*, 2005 and González-Troncoso *et al.*, 2006. We present the mean catch, the length distribution in number by sex and year; and the mean numbers with their mean length and mean weight by age for the years 2014-2018. To see the results of the rest of the years, see González-Troncoso *et al.*, 2014. For American plaice 2017 and 2018 ALKs are not available yet. For informative purposes, the 2016 ALK was used over the length distribution of 2017 and 2018 and the resulted numbers are shown here.

Figure 1 presents the maps with the distribution of the catches of the three species during the 2018 Spanish 3NO survey.

Results

Greenland halibut

The Greenland halibut stock in Subarea 2 and Div. 3KLMNO is considered to be part of a biological stock complex, which includes Subareas 0 and 1. Abundance and biomass indices were available from research vessel surveys by Canada in Div. 2J+3KLMNO (1978-2017), EU in Div. 3M (1988-2017), EU-Spain in Div. 3NO (1997-2017) and EU-Spain in Div. 3L (2003-2017). In 2003 the Fisheries Commission implemented a fifteen years rebuilding plan for this stock, establishing progressively decreasing TACs. The STACFIS estimated catches in 2004-2010 have exceeded the rebuilding plan TACs by 30% on average, despite reductions in fishing effort.

In 2010, Fisheries Commission implemented a survey-based harvest control rule to generate annual TACs over at least 2011-2014. 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. In 2013 Fisheries Commission extended this management approach to set the TACs for 2015 – 2017 but did not apply the HCR in 2017, rather setting the TAC equal to the 2016 TAC. The TAC in 2018 is based on the HCR adopted in 2017. Catch exceeded the TAC in every year from 2004 to 2014 but was similar to the TAC in 2015 through 2017. Over 1995-2007, indices from the majority of the surveys generally provided a consistent signal in stock biomass. 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 (Fig. 20.7). Results since 2007 show greater divergence which complicates interpretation of overall status. Since 2014 there is a clear divergence with the surveys in the NRA (including 3M) increased to well above their time series averages while the Canadian surveys have been lower than their respective time series average. The overall trend since 2007 is unclear, but the 3 of 4 surveys that start in the mid 1990s, are only about 70% of their average in 2016 (NAFO, 2018).

Mean catches and Biomass

Table 3 shows the mean catches and their variance per haul and year for Greenland halibut during the period 2014-2018. Biomass per stratum for the same period is presented in Table 4. Annual total biomass, as their corresponding biomass at ages 5+ and 10+, and mean catch per tow with the total variance per year are presented in Table 5 for years 1997-2018. In Figure 2, we compare the mean catch per tow with the mean number per town. Figure 3 presents the biomass per swept area per stratum and their total variance per year,

as the 5+ and 10+ biomass. In Table 6, we present the length-weight relationship parameters a and b for 2014-2018.

Greenland halibut total biomass increased from 1997 to 1999 and then decreased until 2002, reaching the lowest value of the whole time-series. From 2002 to 2007, it maintained almost constant values at low levels. It increased in 2009 and in 2010, and after decreasing in 2011 to a half of the 2010 value, it has maintained stable at higher values than before 2008, with a slight increase in 2015-2018 comprising a big increase in 2017, reaching the maximum of the series. The biomass 5+ has had the same trend as the total biomass with a marked increase from 2008, being 2017 the highest values of the series. Since 2007, 5+ biomass has represented more than 90% of total biomass, being 99% in 2015. In the case of the 10+ biomass, it has increased since 2006 onwards, reaching the maximum value of the time-series in 2017. Since 2012, 10+ biomass has represented more than 20% of total biomass. Despite of this, with respect to the mean number per tow, although in the 2008-2010 period there was a substantial increase in the numbers, this increase is not as the increase in mean catch, reaching the level of the 2001 numbers per tow, but still far of the values of the first years of our series. Without the peak of 2009 and 2010, the numbers had been stable since 2002. A high increase occurred in 2017, but the level is still below the first years of the series.

Length Distribution

Table 7 presents the mean number per tow by sex and year for 1997-2018. Table 8 shows this index by length, sex and year, with the number of samples in which there were length measures, the total number of individuals measured in these samples, the sampled catch and the range of lengths met, as the total catch of this species and the total hauls made in the survey, for years 2014-2018. In Figures 4 and 5 we can follow the evolution along the years. We can follow a mode since 1997 until 2001, but since then no high new values appear. The highest recruitments were in 1997, 2001 and 2004. In 2006 and 2007 the small individuals (around 12-14 cm, corresponding to 1 year of age) are the mode of the length distribution range, but all the length ranges were poor. The same occurred in 2011 and in 2017, with a mode in lengths 14-15, that corresponds to age 1. In 2009, 2010, 2017 and 2018 an increase in number for lengths between 38-52 cm (ages 5-7) can be seen. It seems that the high increase in the biomass in 2009-2010 was due to the higher presence of these length classes, while at the beginning of the series the presence of juveniles was stronger. From 2012 the presence of all the length classes has been poor, although a slight increase in the range of the length can be seen for years 2015 and 2016.

Age numbers

We present the mean number by age, sex and year in Table 9 for 2013-2017, and the total by year (for the entire series) in Figure 6. Individuals between 0 and 20 years were caught in the period 1997-2018 and since 2002 more number of younger individuals has been caught. It can be due to the change of gear and/or vessel. We can follow three conspicuous cohorts in our series, the 1994-1996 cohorts (ages 1, 2 and 3 in 1997). Cohorts from following years seem to be weaker than those ones, but more constant. 2001-2003 cohorts appear to be quite strong, as we can see in recent years, particularly 2002 one, and these cohorts seem to be present in year 2008 (ages 5 to 7) and in 2009 (ages 6 to 8). In 2010 the mode of the ages is between 5 and 7 years, which can imply that the cohorts of years 2004 and 2005 could be better than it can be seen in the graph. Over 2014-2017 the mode is at 7 years old, and 6 years old in 2018. Age 1 represents around 10% of the total numbers in 2015 and 2016 and more than 15% in 2017 and 2018.

Mean length and mean weight at age

Mean length and weight at age by sex for 2014-2018 are presented in Tables 10 and 11, and for the entire series in Figures 7 and 8. The greatest ages increased their mean length and weight until 2003, and fell in the youngest individuals. In 2012-2016 the mean length and weight were more or less constant, with a decrease since then. The total mean length and the total mean weight have increased slightly since 2006 onwards.

American plaice

There was no directed fishing of American plaice in 1994 and there has been a moratorium since 1995. Even under moratorium, catches increased substantially from 1995 to 2003 and then decreased. Biomass and SSB

are low compared to historic levels. SSB declined to the lowest estimated level in 1994 and 1995. It has increased since then but still remains very low. Recruitment has been low since the late 1980, but Canadian surveys indicate a large number of pre-recruits in Div. 3L in recent years. Current estimates of fishing mortality are low (NAFO, 2018).

Mean catches and Biomass

American plaice mean catches and SD by stratum are presented in Table 12 for 2014-2018. Biomass for stratum for the same period is presented in Table 13.

The annual entire time series (1997-2018) of biomass and stratified mean catches with their SD estimates for American plaice are presented in Table 14 and in Figures 9 and 10. Estimated parameters a and b values of length-weight distribution are presented in Table 15 for 2014-2018.

The American plaice indices show a general increasing trend along the years, agree with the results from the Canadian surveys. Biomass increased from a depressed value in 1997 to 2000. Since then, it has had a stable trend with a minimum in 2002 and maximum values in 2006 and 2008, showing a severe decline in 2016-2018.

Length Distribution

Table 16 shows the mean number per tow by sex and year for 1997-2017, and Table 17 the same index by length for 2013-2017, besides the sampled size and catch. Figures 11 and 12 show length distribution by sex and year for the entire period. Between years 2000 and 2004 we can follow a mode that then disappeared; probably the 1998 year-class. In 2004 there is a great presence of juveniles (8 cm) and in 2005 the mode appears around 14 cm, following with a mode of around 20 cm in 2006, 24 in 2007, 26 in 2008 and 28 in 2009. This mode can be seen around 30 cm in 2010, 32 cm in 2011 and 34 cm in 2012, but the mode length in those years is 28, as in 2009. In 2014, there is a mode around 28 cm, it can be follow in 2015 around 30 cm, and in 2016, with very few individuals, around 32 cm. In 2008 and 2010 there is a quite good presence of juveniles (individuals of 10-12 cm in 2008 and 12 cm in 2010) that does not appear in 2011-2013. A discrete occurrence of individuals of 12-20 cm appears in 2015, but not in 2016 and 2017.

Age numbers

The 2016 ALK for American plaice was not sexed; just the total ALK was used. The 2017 and 2018 ALKs for American plaice are not available yet, so the 2016 ALK was used in order to get the age distribution from the length distribution in that year. We present the mean number per tow at age by sex and by year from 2014 to 2018 in Table 18 and the total by year (1997-2018) in Figure 13. The ALK used for all years is the 3N Canadian one. We can follow a cohort without problems since the year 2000, starting in individuals of 2 years old (1998 cohort), reaching 17 year old in 2015 (almost disappeared); a second cohort, weaker, can be followed since 1999, starting in 2 years old (1997 cohort). Another cohort from the year 2002 (one year old in 2003), can be followed until 2016, reaching 14 years old, although it failed at 5 years old and is almost disappeared in 2018. And the 2003 cohort (one year in 2004) is a very strong cohort, reaching in 2008 five years old and the largest number in the whole series, and in 2015 twelve years old. In 2015-2018 the maximum is in 7 years old. Since 2016 the level of all the ages has been being low.

Mean length and mean weight

Mean length and weight at age by sex for 2014-2018 are presented in Tables 19 and 20, and shown in Figures 14 and 15, for 1997-2018. The mean length is more or less stable in all ages, at least since 2002. The same occurs with the mean weight, although with more variations. The major variations appear in the oldest ages studied: 12+ years old individuals.

Biomass and biomass by Division

As part of some biological studies, the biomass and the abundance by age has been separated by Division. Age distribution by age can be seen in Table 21, and in Table 22 and Figure 16 the total biomass and abundance by Division. The majority of the abundance and biomass come from Division 3N.

Atlantic cod

Atlantic cod in Divisions 3NO has been under moratorium to directed fishing since 1994. According to the NAFO Scientific Council, the stock of Atlantic cod in Divisions 3NO declined dramatically during the mid-1980s. The spawning biomass increased noticeably between 2010 and 2015 but has subsequently declined and the 2018 estimate of 18,537 t represents only 31% of B_{lim} (60,000 t). The 2006 year class remains relatively strong and at age 12 in 2018 makes up more than half of the estimated SSB. Subsequent year classes are much weaker, suggesting that the medium-term prospects for the stock are not good. Fishing mortality values over the past decade have been low and well below F_{lim} (0.3) (NAFO, 2018).

Mean Catches and Biomass

Atlantic cod mean catches and SD by stratum are presented in Table 23 for 2014-2018. Biomass by stratum and year are presented in Table 24 for the same period.

The entire time series (1997-2018) of biomass and stratified mean catches with their SD estimates for Atlantic cod are presented in Table 25 and Figures 17 and 18. Estimated parameters a and b values of length-weight relationship are presented in Table 26 for 2014-2018.

Biomass of cod presents poor values between 1997 and 2005 with some fluctuations and a great deviation due to a few hauls in which the presence of that species was very high (e.g., 2001). Between 2006 and 2014 an increasing trend in the biomass of this species can be seen. Although the 2006 increase is above all for a single catch of almost 2 tons, in general the catches of Atlantic cod in the survey of 2006 were over the mean. In 2008 a quite high increase is shown, and in this case there is no haul with very high catches (the maximum was 585.5 kg). Since then the biomass has increased to values well above the years before, reaching the maximum of the series in 2014 after a decrease in 2012 and 2013, decreasing again since then. From 2015, biomass decreased reaching in 2018 poor values at the level of the 2006 biomass.

Length Distribution

Table 27 presents the mean number per tow by year for 1997-2018 and this index by length for the period 2014-2018 can be seen in Table 28, besides the sampled size and its catch. Figures 19 and 20 show the length distribution by year (1997-2018). The modal values used to be very low before 2006 except in 2001, and in general all lengths presence was very low, even it is very difficult to follow the modal values. In 2001 we had a good presence of individuals between 36 and 58 cm. From 2006 a series of great modal values along the length distribution can be seen. In 2006 there were two modes in the length distribution, one around 30 cm and another one around 40 cm. There was no good recruitment until 2004, in which the individuals between 12 and 16 cm correspond to the greatest presence in the series, and in 2005 between 24 and 32, with a new mode between 12 and 16 cm, as in last year. In 2007 the youngest lengths dominated the length range, with the highest mode in the lengths 12-16, that are between 2 and 4 times the abundance of the 48 cm length class, the following mode. In 2008-2015 we can follow the evolution of these lengths. In 2015 the mode is in 36 cm, with a discrete presence of individuals of lengths 6-8 cm. It must be note that, although the biomass has decrease from 2014 to 2015, the mean number is almost the same in both years, probably due to the presence of the smallest individuals. Since 2016 mean number per town sharply decreased, and modal values were very low. The mode in 2018 is between 34 and 38 cm.

Age numbers

The mean number per tow at age and year (2014-2018) is presented in Table 29 and the total by year (1997-2018) in Figure 21. In accordance with the length distribution, until 2006, the numbers are too low to follow any cohort. But between 2006 and 2008 there are three good cohorts that can be followed (2005-2007 cohorts). With the 2006 cohort the series reaches the maximum number of its historical values at five years in 2011. But it seems that no new good recruitments have occurred since 2009, although in 2015 and 2016 a discrete presence of individuals of age 1 can be seen.

Mean length and mean weight

Mean length and weight at age by sex over time are presented in Tables 30 and 31 (2014-2018), and shown in Figures 22 and 23 (1997-2018). For the central ages, the mean length and the mean weight seem to be more or less stable. That does not occur in the oldest ages, with the two parameters very scattered. The total mean length and mean weight presented no trend until 2006, increasing since then until 2014, decreasing afterwards.

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Table 1. Spanish spring bottom trawl surveys in NAFO Div. 3NO: 1997-2018.

Year	Vessel	Valid tows	Depth strata covered (m)	Dates
1997	C/V <i>Playa de Menduïña</i>	128	42-1263	April 26-May 18
1998	C/V <i>Playa de Menduïña</i>	124	42-1390	May 06-May 26
1999	C/V <i>Playa de Menduïña</i>	114	41-1381	May 07-May 26
2000	C/V <i>Playa de Menduïña</i>	118	42-1401	May 07-May 28
2001 ^(*)	R/V <i>Vizconde de Eza</i>	83	36-1156	May 03-May 24
	C/V <i>Playa de Menduïña</i>	121	40-1500	May 05-May 23
2002	R/V <i>Vizconde de Eza</i>	125	38-1540	April 29-May 19
2003	R/V <i>Vizconde de Eza</i>	118	38-1666	May 11-June 02
2004	R/V <i>Vizconde de Eza</i>	120	43-1539	June 06-June 24
2005	R/V <i>Vizconde de Eza</i>	119	47-1485	June 10-June 29
2005	R/V <i>Vizconde de Eza</i>	119	47-1485	June 10-June 29
2006	R/V <i>Vizconde de Eza</i>	120	45-1480	June 7-June 27
2007	R/V <i>Vizconde de Eza</i>	110	45-1374	May 29-June 19
2008	R/V <i>Vizconde de Eza</i>	122	45-1374	May 27-June 16
2009	R/V <i>Vizconde de Eza</i>	109	45-1374	May 31-June 18
2010	R/V <i>Vizconde de Eza</i>	95	45-1374	May 30-June 18
2011	R/V <i>Vizconde de Eza</i>	122	44-1450	June 5-June 24
2012	R/V <i>Vizconde de Eza</i>	122	44-1450	June 3-June 21
2013	R/V <i>Vizconde de Eza</i>	122	44-1450	June 1-June 21
2014	R/V <i>Vizconde de Eza</i>	122	44-1450	June 2-June 21
2015	R/V <i>Vizconde de Eza</i>	122	44-1450	May 31-June 19
2016	R/V <i>Vizconde de Eza</i>	115	44-1450	May 30-June 18
2017	R/V <i>Vizconde de Eza</i>	113	44-1450	May 23-June 11
2018	R/V <i>Vizconde de Eza</i>	114	44-1450	June 2-June 21

(*)For the calculation of the series, 83 hauls were taken from the R/V *Vizconde de Eza* and 40 hauls from the C/V *Playa de Menduïña* (123 hauls in total)

Table 2. Swept area and number of hauls by stratum. Spanish Spring Surveys in NAFO Div. 3NO: 2014-2018. Swept area in square miles. n.s. means stratum not surveyed.

Stratum	2014		2015		2016		2017		2018	
	Swept area	Tow number	Swept area	Tow number	Swept area	Tow number	Swept area	Tow number	Swept area	Tow number
353	0.0379	3	0.0401	3	0.0356	3	0.0360	3	0.0338	3
354	0.0394	3	0.0390	3	0.0345	3	0.0356	3	0.0341	3
355	0.0263	2	0.0263	2	0.0233	2	0.0225	2	0.0233	2
356	0.0266	2	0.0255	2	0.0225	2	0.0233	2	0.0225	2
357	0.0263	2	0.0233	2	0.0233	2	0.0233	2	0.0236	2
358	0.0390	3	0.0349	3	0.0338	3	0.0364	3	0.0345	3
359	0.0908	7	0.0855	7	0.0593	5	0.0596	5	0.0589	5
360	0.2629	20	0.2363	20	0.1995	17	0.2044	17	0.1939	17
374	0.0259	2	0.0229	2	0.0233	2	0.0236	2	0.0225	2
375	0.0390	3	0.0341	3	0.0360	3	0.0364	3	0.0356	3
376	0.1324	10	0.1159	10	0.0945	8	0.0975	8	0.0908	8
377	0.0259	2	0.0233	2	0.0233	2	0.0251	2	0.0233	2
378	0.0263	2	0.0225	2	0.0225	2	0.0236	2	0.0229	2
379	0.0255	2	0.0225	2	0.0229	2	0.0244	2	0.0225	2
380	0.0263	2	0.0229	2	0.0236	2	0.0236	2	0.0225	2
381	0.0259	2	0.0236	2	0.0229	2	0.0229	2	0.0225	2
382	0.0521	4	0.0458	4	0.0465	4	0.0360	3	0.0450	4
721	0.0266	2	0.0240	2	0.0225	2	0.0229	2	0.0229	2
722	0.0259	2	0.0259	2	0.0229	2	0.0233	2	0.0236	2
723	0.0259	2	0.0233	2	0.0225	2	0.0229	2	0.0240	2
724	0.0255	2	0.0236	2	0.0233	2	0.0240	2	0.0233	2
725	0.0255	2	0.0229	2	0.0229	2	0.0244	2	0.0233	2
726	0.0248	2	0.0229	2	0.0225	2	0.0233	2	0.0225	2
727	0.0259	2	0.0225	2	0.0225	2	0.0229	2	0.0225	2
728	0.0248	2	0.0225	2	0.0229	2	0.0229	2	0.0225	2
752	0.0240	2	0.0225	2	0.0236	2	0.0236	2	0.0233	2
753	0.0240	2	0.0233	2	0.0229	2	0.0233	2	0.0236	2
754	0.0225	2	0.0225	2	0.0225	2	0.0218	2	0.0225	2
755	0.0454	4	0.0450	4	0.0458	4	0.0338	3	0.0338	3
756	0.0229	2	0.0229	2	0.0225	2	0.0229	2	0.0229	2
757	0.0244	2	0.0229	2	0.0225	2	0.0225	2	0.0225	2
758	0.0221	2	0.0221	2	0.0221	2	0.0229	2	0.0225	2
759	0.0229	2	0.0229	2	0.0229	2	0.0225	2	0.0225	2
760	0.0364	3	0.0225	2	0.0229	2	0.0236	2	0.0356	3
761	0.0240	2	0.0240	2	0.0225	2	0.0236	2	0.0124	1
762	0.0229	2	0.0229	2	0.0225	2	0.0229	2	0.0225	2
763	0.0233	2	0.0341	3	0.0338	3	0.0353	3	0.0345	3
764	0.0259	2	0.0251	2	0.0225	2	0.0229	2	0.0225	2
765	0.0240	2	0.0236	2	0.0229	2	0.0225	2	0.0233	2
766	0.0221	2	0.0236	2	0.0229	2	0.0225	2	0.0229	2
767	0.0221	2	0.0229	2	0.0229	2	0.0229	2	0.0236	2

Table 3. Greenland halibut mean catch (kg) and SD by stratum. Spanish Spring Surveys in NAFO Div. 3NO: 2014-2018. n.s. means stratum not surveyed.

Stratum	2014		2015		2016		2017		2018	
	GHL Mean catch	GHL SD	GHL Mean catch	GHL SD	GHL Mean catch	GHL SD	GHL Mean catch	GHL SD	GHL Mean catch	GHL SD
353	0.25	0.25	0.11	0.18	0.03	0.03	0.03	0.01	3.46	2.19
354	0.08	0.12	0.61	0.87	0.19	0.16	1.10	0.54	0.29	0.24
355	0.22	0.15	5.04	7.00	0.15	0.08	0.60	0.09	1.38	1.14
356	0.33	0.30	1.10	1.43	0.32	0.33	0.08	0.02	0.30	0.16
357	0.37	0.49	0.47	0.54	0.18	0.13	0.67	0.90	0.08	0.11
358	0.09	0.15	0.02	0.03	0.00	0.00	0.00	0.00	0.53	0.40
359	0.33	0.86	0.00	0.00	0.02	0.02	0.21	0.33	0.46	0.60
360	0.01	0.05	0.00	0.01	0.00	0.01	0.03	0.04	0.06	0.15
374	0.00	0.00	0.00	0.00	0.00	0.00	0.23	0.25	0.00	0.00
375	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00
376	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00
377	0.01	0.01	0.15	0.21	0.14	0.20	0.05	0.02	0.71	0.44
378	0.22	0.31	0.03	0.05	0.03	0.02	1.73	1.76	0.79	0.05
379	1.21	0.88	0.02	0.02	0.00	0.00	0.01	0.01	0.13	0.15
380	0.92	1.24	2.38	0.88	1.20	1.69	16.02	2.71	10.69	7.25
381	0.04	0.06	0.91	1.13	0.48	0.68	1.59	1.01	0.07	0.08
382	0.01	0.01	0.12	0.14	0.06	0.08	0.15	0.06	0.03	0.03
721	0.27	0.31	2.34	0.04	0.83	1.18	3.93	5.56	6.54	4.61
722	12.80	4.75	24.22	13.02	6.56	6.28	9.50	11.58	15.95	8.63
723	1.16	1.47	5.58	0.09	0.03	0.02	2.87	4.00	3.17	3.23
724	11.96	13.26	20.72	15.86	9.91	4.51	3.45	0.85	1.44	2.03
725	1.29	0.09	2.51	1.24	0.31	0.43	4.77	0.74	5.18	4.07
726	7.93	3.61	22.88	15.06	10.45	6.32	22.78	5.63	8.24	0.92
727	21.39	3.03	9.78	1.80	6.98	3.62	57.93	45.29	32.23	7.67
728	14.94	5.95	20.21	20.51	26.86	30.76	135.45	125.16	20.70	24.41
752	29.69	8.04	50.45	10.96	62.16	32.16	92.18	11.84	23.80	20.65
753	37.60	28.28	21.65	5.73	46.35	5.30	41.55	6.09	14.70	15.77
754	19.95	5.02	22.35	2.33	57.60	16.55	59.06	38.12	35.99	12.35
755	26.00	19.72	25.70	21.22	28.07	14.22	35.47	18.06	16.18	11.22
756	35.19	9.88	44.67	2.59	20.06	4.73	102.82	10.66	27.20	5.65
757	31.02	7.87	51.77	19.99	59.35	10.96	149.78	60.42	38.70	17.63
758	33.94	7.50	35.70	4.25	33.81	13.71	159.00	174.37	74.63	54.48
759	12.35	5.97	44.64	14.75	41.68	44.72	75.48	19.13	17.45	2.55
760	18.42	10.50	37.97	28.68	27.91	18.80	46.29	32.61	33.03	4.42
761	36.81	7.44	50.94	23.95	37.46	1.64	23.26	7.22	32.80	-
762	19.16	3.79	58.78	6.02	37.16	19.57	80.02	35.79	33.30	19.02
763	10.58	2.68	28.55	19.86	31.24	19.73	55.06	56.85	24.19	9.60
764	21.79	5.40	28.98	0.53	14.29	3.56	37.14	1.86	31.38	15.60
765	10.94	12.62	23.60	6.05	15.46	2.08	15.48	7.04	49.22	32.19
766	12.70	2.36	16.88	0.82	8.91	1.08	29.16	17.40	10.72	1.27
767	9.93	0.54	10.82	12.01	9.00	5.01	23.30	16.68	8.39	9.36

Table 4. Greenland halibut survey biomass (t) by stratum in NAFO Div. 3NO: 2014-2018. n.s. means stratum not surveyed.

Strata	2014	2015	2016	2017	2018	Strata	2014	2015	2016	2017	2018
353	5	2	1	1	83	725	11	23	3	41	47
354	2	12	4	23	6	726	46	144	67	141	53
355	1	28	1	4	9	727	159	83	60	486	275
356	1	4	1	0	1	728	94	140	183	924	144
357	5	7	2	9	1	752	324	587	689	1022	268
358	2	0	0	0	10	753	432	257	559	493	172
359	11	0	1	7	16	754	319	358	922	977	576
360	3	1	1	6	13	755	883	880	945	1214	554
374	0	0	0	4	0	756	311	394	180	908	240
375	0	0	0	0	0	757	260	462	538	1358	351
376	0	0	0	1	0	758	304	319	303	1376	657
377	0	1	1	0	6	759	137	496	463	852	197
378	2	0	0	20	10	760	234	520	376	603	428
379	10	0	0	0	1	761	525	726	569	337	453
380	7	20	10	130	91	762	355	1089	700	1483	627
381	0	11	6	20	1	763	237	655	725	1223	549
382	0	4	2	4	1	764	168	231	127	325	279
721	1	13	5	22	37	765	113	248	168	171	525
722	83	157	48	69	113	766	165	206	112	373	135
723	14	74	0	39	41	767	142	149	124	322	112
724	116	217	106	36	15						

Table 5. Greenland halibut survey biomass (t) with SD and stratified mean catch per tow (kg) and SD by in NAFO Div. 3NO: 1997-2018.

Year	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Biomass	6859	11305	11246	9331	7721	2380	4701	3437	3071	2720	3286
SD	546	860	973	707	790	410	575	373	325	379	363
Biomass 5+	4303	6284	6367	8785	6700	2011	3386	2318	2585	2151	3057
Biomass 10+	406	504	660	1111	741	279	495	318	380	182	343
MCPT	7.73	11.73	12.00	9.48	8.17	2.64	5.10	3.68	3.39	3.03	3.98
SD	0.62	0.89	1.00	0.75	0.84	0.45	0.61	0.40	0.36	0.42	0.44

Year	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Biomass	7272	12927	12462	6483	6830	4959	5482	8519	8002	15026	7099
SD	708	1506	1197	593	631	606	465	664	700	1728	658
Biomass 5+	6908	11971	12057	6091	6297	4697	5322	8397	7784	14521	6656
Biomass 10+	798	1134	1158	1163	1587	1319	1529	1759	1945	2436	1217
MCPT	7.66	14.78	14.80	7.09	7.37	5.46	6.24	9.49	8.80	16.63	7.88
SD	0.74	1.73	1.40	0.63	0.69	0.47	0.53	0.73	0.78	1.92	0.72

Table 6. Greenland halibut length weight relationships in Spanish Spring Surveys in NAFO Div. 3NO: 2014-2018. E(x) means Error of the parameter x.

	Males						Females						Total					
	a	b	E(a)	E(b)	R2	N	a	b	E(a)	E(b)	R2	N	a	b	E(a)	E(b)	R2	N
2014	0.00449	3.14211	0.0825	0.0239	0.997	444	0.0045	3.1576	0.0994	0.0272	0.995	719	0.0047	3.1452	0.0913	0.0251	0.996	1164
2015	0.00354	3.20453	0.0962	0.0281	0.996	441	0.0034	3.2296	0.0638	0.0172	0.998	789	0.0028	3.2852	0.0692	0.019	0.998	1239
2016	0.00353	3.20496	0.0725	0.0207	0.998	383	0.0031	3.2581	0.066	0.0177	0.998	697	0.0029	3.2736	0.063	0.0169	0.998	1086
2017	0.00440	3.14204	0.0813	0.0233	0.999	501	0.0031	3.2499	0.0605	0.0164	0.999	667	0.0032	3.2393	0.0529	0.0144	0.999	1184
2018	0.00423	3.15622	0.071	0.02	0.998	611	0.0034	3.2294	0.052	0.014	0.999	821	0.0036	3.2137	0.06345	0.01735	0.99901	1447

Table 7. Greenland halibut mean number per tow by year in Spanish Spring Surveys in NAFO Div. 3NO: 1997-2018. Indet. means indeterminate.

	1997				1998				1999				2000				2001				2002			
	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total
MNPT	11.087	16.467	1.445	28.999	14.270	19.987	0.239	34.496	14.821	21.726	0.251	36.799	6.364	11.103	0.286	17.753	9.894	14.977	1.036	25.907	3.262	4.718	0.111	8.092
	2003				2004				2005				2006				2007				2008			
	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total
MNPT	5.077	8.101	0.111	13.288	6.738	8.459	0.087	15.284	3.381	5.359	0.012	8.752	3.683	4.765	0.007	8.455	2.895	4.803	0.048	7.746	3.698	7.075	0.051	10.825
	2009				2010				2011				2012				2013				2014			
	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total
MNPT	8.980	14.667	0.128	23.775	6.657	13.979	0.010	20.646	3.849	6.847	0.107	10.802	3.453	6.618	0.010	10.081	2.234	4.463	0.049	6.746	2.614	4.853	0.004	7.472
	2015				2016				2017				2018											
	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total								
MNPT	2.785	6.951	0.046	9.782	2.632	6.586	0.040	9.259	6.436	14.333	0.852	21.621	4.891	7.869	0.231	12.991								

Table 9. Greenland halibut mean number per tow by age, sex and year. Spanish Spring Survey in NAFO 3NO: 2014-2018. Indet. means indeterminate.

Age	2014				2015				2016				2017				2018			
	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total
0																				
1	0.31	0.20	0.00	0.51	0.53	0.36	0.05	0.93	0.54	0.50	0.04	1.08	1.45	1.08	0.85	3.37	1.00	1.12	0.23	2.35
2	0.46	0.83		1.28	0.28	0.33		0.62	0.19	0.35		0.54	0.66	1.00	0.01	1.66	0.78	1.22		2.00
3	0.14	0.12		0.26	0.10	0.11		0.20	0.15	0.19		0.34	0.40	0.48		0.88	0.43	0.54		0.97
4	0.04	0.11		0.14	0.04	0.18		0.21	0.19	0.26		0.45	0.55	0.55		1.10	0.36	0.44		0.80
5	0.26	0.29		0.54	0.26	0.21		0.47	0.22	0.29		0.51	0.63	1.75		2.38	0.84	0.80		1.64
6	0.69	0.96		1.65	0.55	1.26		1.81	0.54	1.32		1.86	1.21	3.17		4.38	0.67	1.21		1.88
7	0.60	1.14		1.74	0.86	2.52		3.38	0.48	2.07		2.55	1.10	3.52		4.62	0.64	0.97		1.61
8	0.10	0.35		0.45	0.14	0.80		0.94	0.28	0.62		0.90	0.28	1.39		1.68	0.09	0.85		0.94
9	0.03	0.18		0.21	0.03	0.40		0.44	0.03	0.19		0.22	0.14	0.37		0.51	0.06	0.23		0.29
10		0.23		0.23		0.35		0.35	0.01	0.27		0.28	0.03	0.35		0.38	0.02	0.20		0.22
11		0.18		0.18		0.19		0.19	0.01	0.11		0.12		0.23		0.23		0.14		0.14
12		0.11		0.11		0.10		0.10		0.17		0.17		0.22		0.22		0.04		0.04
13		0.05		0.05		0.03		0.03		0.08		0.08		0.11		0.11		0.04		0.04
14		0.03		0.03		0.04		0.04		0.05		0.05		0.05		0.05				
15		0.03		0.03		0.02		0.02		0.03		0.03		0.01		0.01		0.02		0.02
16		0.03		0.03		0.03		0.03		0.03		0.03		0.02		0.02		0.01		0.01
17						0.02		0.02		0.01		0.01		0.01		0.01				
18										0.00		0.00						0.02		0.02
19																				
20										0.01		0.01								
Total	2.61	4.85	0.00	7.47	2.79	6.95	0.05	9.78	2.63	6.59	0.04	9.26	6.44	14.33	0.85	21.62	4.89	7.86	0.23	12.98

Table 10. Greenland halibut mean length (cm) per tow by age, sex and year. Spanish Spring Survey in NAFO 3NO: 2014-2018. Indet. means indeterminate.

Age	2014				2015				2016				2017				2018			
	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total
0																				
1	13.15	12.75	9.50	12.96	12.19	12.69	9.44	12.25	12.16	12.19	11.35	12.14	13.75	13.19	12.27	13.20	13.37	13.32	12.15	13.23
2	21.35	22.28		21.95	21.15	20.87		21.00	21.74	21.74		21.74	21.32	21.38	19.50	21.35	20.35	20.41	14.50	20.38
3	24.48	24.88		24.66	26.32	28.59		27.52	28.30	29.44		28.95	26.57	28.10		27.41	26.79	25.76		26.22
4	31.78	34.53		33.80	31.07	32.71		32.43	33.85	32.95		33.32	31.60	32.53		32.07	32.21	32.48		32.36
5	38.51	39.07		38.80	37.83	40.01		38.81	38.83	38.08		38.41	37.70	39.66		39.14	38.69	39.63		39.15
6	43.97	44.98		44.56	44.08	45.61		45.14	44.27	45.58		45.19	44.30	46.01		45.54	45.39	45.60		45.52
7	51.07	50.95		50.99	51.25	51.21		51.22	49.95	52.50		52.02	50.10	53.15		52.42	51.12	52.81		52.14
8	56.10	54.58		54.91	55.92	55.02		55.15	55.47	55.49		55.49	55.94	56.78		56.64	54.66	55.86		55.75
9	57.50	57.47		57.47	57.50	57.28		57.30	58.14	58.86		58.76	58.52	59.76		59.43	58.57	60.67		60.25
10		60.91		60.91		60.46		60.46	58.50	59.16		59.15	61.20	62.40		62.30	63.12	62.42		62.49
11		64.75		64.75		63.70		63.70	65.50	63.35		63.50		65.34		65.34		64.63		64.63
12		67.25		67.25		66.82		66.82		64.56		64.56		66.39		66.39		66.81		66.81
13		74.39		74.39		72.71		72.71		69.42		69.42		71.72		71.72		70.70		70.70
14		73.34		73.34		72.45		72.45		70.39		70.39		74.67		74.67		72.50		72.50
15		74.91		74.91		75.21		75.21		75.89		75.89		71.50		71.50		77.80		77.80
16		76.20		76.20		77.99		77.99		78.54		78.54		79.38		79.38		72.79		72.79
17						86.05		86.05		81.02		81.02		77.50		77.50		88.50		88.50
18										95.50		95.50						91.60		91.60
19																				
20										88.73		88.73								
Total	36.84	44.22	9.50	41.62	37.34	47.91	9.44	44.72	36.45	46.30	11.35	43.35	34.16	44.51	12.32	40.16	32.20	38.13	12.16	35.43

Table 11. Greenland halibut mean weight (g) per tow by age, sex and year. Spanish Spring Survey in NAFO 3NO: 2014-2018. Indet. means indeterminate.

Age	2014				2015				2016				2017				2018				
	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total	
0																					
1	16	15	6	15	11	13	5	12	11	11	8	11	18	14	11	15	16	15	11	15	
2	70	84		79	64	66		65	69	73		72	68	67	48	67	60	62	19	61	
3	105	119		111	128	177		154	163	193		180	135	160		149	141	127		133	
4	237	326		302	213	267		258	284	278		280	229	257		243	246	261		254	
5	442	483		463	410	511		456	440	443		442	402	499		473	442	503		472	
6	661	755		716	661	782		745	679	797		762	670	788		756	729	779		761	
7	1056	1119		1098	1063	1137		1118	988	1256		1206	975	1257		1190	1064	1255		1179	
8	1408	1392		1396	1397	1432		1426	1375	1497		1459	1368	1546		1516	1301	1493		1476	
9	1519	1628		1615	1524	1622		1615	1597	1811		1782	1590	1825		1763	1609	1935		1870	
10		1959		1959		1932		1932	1625	1848		1842	1809	2100		2075	2038	2124		2115	
11		2380		2380		2288		2288	2335	2305		2307		2446		2446		2379		2379	
12		2677		2677		2673		2673		2462		2462		2577		2577		2650		2650	
13		3690		3690		3510		3510		3148		3148		3321		3321		3184		3184	
14		3512		3512		3462		3462		3260		3260		3806		3806		3438		3438	
15		3772		3772		3919		3919		4150		4150		3259		3259		4329		4329	
16		3966		3966		4414		4414		4673		4673		4588		4588		3503		3503	
17						6030		6030		5128		5128		4235		4235		6547		6547	
18										8752		8752						7438		7438	
19																					
20										6900.12		6900.12									
Total	551	989	6	835	602	1124	5	970	569	1108	8	950	473	947	11	769	409	746	11	606	

Table 12. American plaice mean catch (kg) and SD by stratum. Spanish Spring Surveys in NAFO Div. 3NO: 2014-2018. n.s. means stratum not surveyed.

Stratum	2014		2015		2016		2017		2018	
	A. Plaice	A. Plaice	A. Plaice	A. Plaice	A. Plaice	A. Plaice	A. Plaice	A. Plaice	A. Plaice	A. Plaice
	Mean catch	SD	Mean catch	SD	Mean catch	SD	Mean catch	SD	Mean catch	SD
353	55.51	13.19	73.66	18.18	23.23	24.97	14.96	5.64	49.04	28.87
354	56.70	76.25	78.85	81.90	42.63	32.66	84.16	68.30	6.17	5.88
355	5.34	4.13	3.96	3.35	8.66	3.17	24.68	1.87	1.65	0.57
356	0.00	0.00	1.09	1.54	0.10	0.14	3.14	0.88	1.19	1.32
357	0.64	0.90	0.18	0.25	0.01	0.02	0.69	0.98	0.00	0.00
358	18.71	18.22	50.48	74.16	145.62	53.39	93.22	130.18	5.69	2.22
359	61.36	54.21	222.91	98.41	50.75	47.15	96.70	90.20	100.26	67.33
360	268.10	280.43	262.51	231.68	63.87	81.60	57.13	88.03	110.80	109.78
374	681.86	206.84	301.29	239.68	32.03	15.03	1.06	1.21	86.12	54.42
375	118.37	51.35	56.90	61.60	14.22	10.12	5.92	4.50	28.14	30.59
376	46.20	41.87	51.41	31.11	29.99	20.60	17.76	16.93	33.15	49.97
377	205.18	106.95	207.38	7.64	67.83	48.01	8.91	8.26	108.30	21.64
378	14.44	20.41	67.52	64.74	79.65	77.57	84.05	79.17	47.92	20.67
379	0.00	0.00	0.00	0.00	1.85	0.49	42.03	59.43	0.69	0.97
380	7.74	5.90	0.78	0.69	269.90	204.64	50.50	26.73	254.89	252.10
381	143.99	12.46	506.96	18.72	87.31	77.48	4.39	0.72	62.86	80.13
382	95.91	110.71	368.11	166.21	11.63	7.91	3.38	1.22	27.52	24.32
721	0.00	0.00	0.01	0.02	0.00	0.00	0.16	0.22	0.00	0.00
722	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
723	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
724	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
725	0.00	0.00	0.21	0.30	0.87	1.22	0.54	0.76	0.04	0.06
726	0.00	0.00	0.00	0.00	0.00	0.00	0.65	0.92	0.00	0.00
727	0.07	0.10	0.00	0.00	61.38	60.13	16.75	1.63	2.93	4.14
728	0.00	0.00	0.00	0.00	14.77	18.71	0.00	0.00	1.36	1.26
752	0.00	0.00	0.00	0.00	0.00	0.00	1.72	1.05	0.00	0.00
753	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
754	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
755	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
756	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
757	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
758	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
759	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
760	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
761	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-
762	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
763	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
764	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
765	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
766	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
767	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table 13. American plaice survey biomass (t) by stratum in NAFO Div. 3NO: 2014-2018. n.s. means stratum not surveyed.

Strata	2014	2015	2016	2017	2018	Strata	2014	2015	2016	2017	2018
353	1183	1481	526	335	1173	725	0	2	8	5	0
354	1063	1492	912	1743	133	726	0	0	0	4	0
355	30	22	55	162	10	727	1	0	524	141	25
356	0	4	0	13	5	728	0	0	101	0	9
357	8	3	0	10	0	752	0	0	0	19	0
358	324	977	2912	1730	111	753	0	0	0	0	0
359	1993	7683	1803	3414	3585	754	0	0	0	0	0
360	56766	61846	15147	13224	27037	755	0	0	0	0	0
374	11279	5637	590	19	1638	756	0	0	0	0	0
375	2468	1356	321	132	642	757	0	0	0	0	0
376	4655	5919	3387	1944	3898	758	0	0	0	0	0
377	1586	1784	583	71	932	759	0	0	0	0	0
378	153	834	984	989	582	760	0	0	0	0	0
379	0	0	17	366	6	761	0	0	0	0	0
380	57	7	2193	410	2175	762	0	0	0	0	0
381	1603	6180	1099	55	805	763	0	0	0	0	0
382	2525	11039	343	97	839	764	0	0	0	0	0
721	0	0	0	1	0	765	0	0	0	0	0
722	0	0	0	0	0	766	0	0	0	0	0
723	0	0	0	0	0	767	0	0	0	0	0
724	0	0	0	0	0						

Table 14. American plaice survey biomass (t) with SD and stratified mean catch per tow (kg) and SD by in NAFO Div. 3NO: 1997-2018.

Year	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Biomass	21827	64635	110010	152997	101137	69511	116842	129432	123227	170910	112086
SD	4495	5946	5825	16740	10841	7097	9777	12335	11396	24806	13032
MCPT	25.80	72.25	128.72	175.49	115.95	77.77	127.17	143.93	138.77	202.84	141.82
SD	5.09	6.51	6.85	19.24	12.31	7.46	10.79	13.03	12.92	29.01	15.31

Year	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Biomass	172735	93025	112247	151160	137964	155264	85691	106267	31506	24885	43607
SD	17696	10258	18089	29753	27395	29284	14019	13432	5257	5713	6971
MCPT	193.67	106.59	134.33	172.05	155.11	176.26	108.50	121.19	35.55	28.88	48.14
SD	20.39	11.31	22.27	34.95	30.53	31.60	17.41	14.89	5.84	6.38	7.92

Table 15. American plaice length weight relationships in Spanish Spring Surveys in NAFO Div. 3NO: 2014-2018. E(x) means Error of the parameter x.

	Males						Females						Indet.					
	a	b	E(a)	E(b)	R2	N	a	b	E(a)	E(b)	R2	N	a	b	E(a)	E(b)	R2	N
2014	0.00471	3.17431	0.0782	0.998	0.998	495	0.0044	3.2026	0.0679	0.0194	0.998	804	0.0046	3.1909	0.0742	0.0217	0.997	1338
2015	0.00585	3.09893	0.0495	0.0157	0.999	742	0.0036	3.2490	0.0439	0.0126	0.999	1105	0.0043	3.2033	0.062	0.018	0.998	1861
2016	0.00492	3.13599	0.0965	0.0304	0.997	551	0.0037	3.2299	0.0572	0.0162	0.999	810	0.0033	3.2565	0.0616	0.0178	0.998	1365
2017	0.00432	3.17842	0.1382	0.0427	0.997	361	0.0033	3.2539	0.073	0.0207	0.999	546	0.0034	3.2508	0.0644	0.0186	0.999	912
2018	0.00412	3.20039	0.10951	0.0336	0.99852	419	0.0034	3.2589	0.06802	0.01943	0.99913	640	0.0037	3.2419	0.06183	0.01766	0.99927	1059

Table 16. American plaice mean number per tow by year in Spanish Spring Surveys in NAFO Div. 3NO: 1997-2018. Indet. means indeterminate.

	1997				1998				1999				2000				2001				2002			
	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total
MNPT	40.511	38.798	0.023	79.332	56.883	108.124	0.000	165.008	122.141	183.012	10.273	315.426	222.117	359.467	0.348	581.933	252.254	261.936	5.053	519.242	149.083	175.044	0.319	324.447
	2003				2004				2005				2006				2007				2008			
	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total
MNPT	245.522	236.752	0.407	482.682	206.765	241.817	64.714	513.296	279.087	280.604	2.603	562.294	443.600	423.144	0.191	866.936	249.539	242.885	3.602	496.025	351.426	361.373	12.541	725.340
	2009				2010				2011				2012				2013				2014			
	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total
MNPT	134.548	186.163	4.328	325.039	281.719	234.732	0.195	516.645	385.477	286.713	0.010	672.200	350.620	246.778	0.684	598.083	376.247	261.170	3.239	640.655	172.242	155.876	0.596	328.714
	2015				2016				2017				2018											
	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total								
MNPT	241.001	182.255	0.633	423.888	64.051	56.961	0.156	121.168	52.599	38.981	0.051	91.631	75.548	70.562	0.017	146.127								

Table 18. American plaice mean number per tow by age, sex and year. Spanish Spring Survey in NAFO 3NO: 2014-2018. Indet. means indeterminate. In 2016, the ALK is not sexed. The 2017 and 2018 ALKs are not available yet, so the 2016 ALK was used.

Age	2014				2015				2016				2017				2018			
	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total
1	0.02	0.05	0.25	0.32	0.04	0.19	0.20	0.43												
2	0.81	1.67	0.24	2.73	4.35	1.67	0.43	6.45		0.01	0.00	0.01			0.03	0.03			0.01	0.01
3	8.61	5.40	0.09	14.10	30.99	29.61		60.61	2.17	2.40	0.13	4.70	0.93	1.12	0.03	2.07	0.77	0.76	0.01	1.54
4	7.42	2.18	0.01	9.61	9.59	10.05		19.64	9.35	10.74	0.02	20.11	6.17	5.97		12.14	7.02	6.96		13.98
5	5.31	4.38		9.69	12.10	1.76		13.86	3.81	3.32		7.13	3.34	3.03		6.37	4.53	4.46		9.00
6	42.75	18.20		60.94	65.55	11.54		77.09	8.42	2.59		11.01	6.89	3.15		10.04	10.57	7.92		18.49
7	42.54	24.96		67.50	103.99	53.47		157.46	22.33	8.06		30.38	18.46	5.35		23.81	27.41	14.77		42.18
8	37.89	36.75		74.63	12.96	26.04		39.00	12.34	10.14		22.48	11.49	5.18		16.67	17.08	10.87		27.95
9	16.95	25.31		42.27	1.35	26.39		27.75	4.35	6.54		10.89	4.16	3.95		8.11	6.21	7.51		13.71
10	6.45	15.96		22.41	0.06	10.93		10.99	0.98	6.36		7.34	0.88	4.52		5.39	1.45	8.10		9.55
11	3.45	11.41		14.86		6.05		6.05	0.24	3.04		3.28	0.23	2.54		2.77	0.40	4.32		4.72
12	0.02	3.62		3.64	0.00	2.09		2.10	0.06	1.88		1.94	0.05	1.98		2.02	0.08	2.70		2.78
13	0.02	1.70		1.71	0.00	0.70		0.71	0.01	0.64		0.65	0.01	0.80		0.81	0.01	0.95		0.96
14	0.02	1.86		1.88	0.00	0.38		0.38	0.00	0.73		0.73	0.00	0.94		0.94		0.83		0.83
15		1.12		1.12	0.00	0.23		0.23		0.09		0.09		0.11		0.11		0.10		0.10
16		0.38		0.38		0.10		0.10		0.05		0.05		0.09		0.09		0.04		0.04
17		0.53		0.53		0.37		0.37		0.24		0.24		0.17		0.17		0.15		0.15
18		0.23		0.23		0.07		0.07		0.01		0.01		0.05		0.05		0.01		0.01
19		0.11		0.11		0.16		0.16				0.00								
20		0.04		0.04		0.07		0.07		0.07		0.07		0.04		0.04		0.10		0.12
21		0.02		0.02		0.24		0.24				0.00								
22						0.06		0.06		0.02		0.02								
23												0.00								
24						0.08		0.08		0.01		0.01		0.01		0.01		0.01		0.01
Total	172.24	155.88	0.60	328.71	241.00	182.25	0.63	423.89	64.05	56.96	0.16	121.17	52.60	38.98	0.05	91.63	75.55	70.56	0.02	146.13

Table 19. American plaice mean length (cm) per tow by age, sex and year. Spanish Spring Survey in NAFO 3NO: 2014-2018. Indet. means indeterminate. In 2016, the ALK is not sexed. The 2017 and 2018 ALKs are not available yet, so the 2016 ALK was used.

Age	2014				2015				2016				2017				2018			
	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total
1	8.21	8.71	7.79	7.96	9.00	8.95	6.74	7.90												
2	11.91	12.83	9.84	12.29	12.54	11.82	9.50	12.15		9.00	9.00	9.00			9.00	9.00			9.00	9.00
3	14.16	15.21	11.65	14.55	17.06	16.95		17.01	17.08	17.32	12.01	17.06	19.27	18.42	9.00	18.69	21.10	20.16	9.00	20.57
4	26.87	19.17	15.00	25.11	20.98	20.65		20.81	20.69	20.08	13.95	20.36	22.33	22.02		22.18	23.54	23.37		23.46
5	27.04	26.86		26.96	27.57	23.35		27.04	24.10	22.54		23.37	24.60	24.11		24.37	25.22	25.31		25.27
6	29.49	28.75		29.27	30.21	29.50		30.11	29.86	28.92		29.64	29.58	27.79		29.02	29.47	28.57		29.08
7	29.99	32.97		31.09	32.02	33.15		32.41	31.75	33.48		32.21	31.92	31.93		31.92	31.89	31.67		31.82
8	30.90	35.13		32.98	35.07	37.48		36.68	33.57	36.20		34.75	33.91	35.94		34.54	34.01	35.18		34.47
9	32.08	36.17		34.53	38.51	38.91		38.89	34.21	38.45		36.76	34.34	39.30		36.75	34.47	38.73		36.80
10	33.38	39.72		37.90	42.80	42.46		42.46	36.34	40.59		40.02	36.38	41.30		40.50	36.56	41.17		40.47
11	34.41	41.38		39.76		44.80		44.80	37.97	41.75		41.47	38.25	42.64		42.28	37.96	42.43		42.05
12	53.00	46.31		46.34	45.00	48.56		48.56	40.13	43.99		43.87	40.49	45.24		45.13	40.20	43.84		43.73
13	45.00	45.29		45.28	45.00	52.66		52.62	41.14	47.00		46.91	42.01	48.08		48.04	41.33	46.46		46.39
14	53.00	47.99		48.04	45.00	52.90		52.85	45.00	50.66		50.66	45.00	49.37		49.37	45.00	48.69		48.69
15		52.23		52.23	45.00	53.00		52.93		51.87		51.87		51.64		51.64		51.45		51.45
16		53.46		53.46		57.71		57.71		55.66		55.66		59.02		59.02		56.90		56.90
17		57.51		57.51		59.68		59.68		59.93		59.93		60.78		60.78		60.56		60.56
18		58.26		58.26		58.28		58.28		63.00		63.00		63.00		63.00		63.00		63.00
19		61.92		61.92		56.99		56.99												
20		65.00		65.00		63.70		63.70		61.98		61.98		62.78		62.78	61.00	61.00		61.00
21		65.90		65.90		60.75		60.75												
22						62.21		62.21		67.00		67.00								
23																				
24						65.00		65.00		65.00		65.00		65.00		65.00		65.00		65.00
Total	29.39	34.57	9.35	31.81	28.79	32.17	8.61	30.21	29.56	32.66	12.20	30.99	30.54	33.89	9.00	31.95	31.10	34.04	9.00	32.52



Table 22. American plaice total biomass (tons) and abundance (thousands) by Division and year.

		1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Biomass	3N	19459	49503	96478	139759	84270	49787	85031	114533	112952	160980	107880	162423	87890	108349	146205	135241	148896	83415	103267	30013	22630	42286
	3O	2368	15132	13532	13238	16867	19724	31811	14900	10275	9930	4207	10312	5135	3898	4954	2723	6368	2276	3000	1494	2255	1322
	3NO	21827	64635	110010	152997	101137	69511	116842	129432	123227	170910	112086	172735	93025	112247	151160	137964	155264	85691	106267	31506	24885	43607
Abundance	3N						182878	307604	379035	435559	637371	365626	592035	254367	425707	592428	527797	557749	258008	360664	102612	72559	133240
	3O						94237	123905	79081	55246	57398	18372	51232	20474	29511	26698	14162	28060	9302	11429	5350	7916	5560
	3NO						277115	431509	458117	490805	694769	383998	643267	274841	455218	619126	541959	585809	267309	372093	107962	80476	138800

Table 23. Atlantic cod mean catch (kg) and SD by stratum. Spanish Spring Surveys in NAFO Div. 3NO: 2014-2018. n.s. means stratum not surveyed.

Stratum	2014		2015		2016		2017		2018	
	Cod Mean catch	Cod SD	Cod Mean catch	Cod SD	Cod Mean catch	Cod SD	Cod Mean catch	Cod SD	Cod Mean catch	Cod SD
353	5.13	8.89	70.81	104.76	12.22	9.54	23.86	31.61	7.81	10.64
354	75.46	99.83	180.78	213.46	125.13	96.34	28.55	15.60	1.12	1.95
355	0.00	0.00	21.53	30.44	29.56	39.65	13.90	13.60	0.00	0.00
356	1.25	1.76	5.47	4.32	4.84	3.17	30.60	10.26	1.45	2.05
357	3.52	4.98	5.31	6.04	1.01	1.43	26.98	12.21	31.88	18.55
358	213.36	233.77	1268.78	2109.79	430.29	527.16	1197.25	1491.99	5.88	4.90
359	1676.53	2880.87	196.07	362.84	14.56	24.02	17.52	17.14	3.11	2.67
360	220.65	711.44	50.46	119.32	111.17	302.23	39.55	136.60	12.80	20.72
374	271.12	302.52	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
375	54.57	94.51	4.85	3.13	0.15	0.26	0.10	0.10	3.71	6.29
376	11.38	24.32	18.63	39.72	0.15	0.16	0.25	0.51	2.81	3.59
377	754.88	259.76	549.79	14.52	26.82	37.93	0.66	0.94	299.10	146.37
378	1989.05	2779.71	1286.60	1620.13	178.50	147.64	137.19	106.98	116.98	99.88
379	10.03	4.49	1.56	2.21	28.86	29.20	48.47	64.53	4.25	6.01
380	47.61	26.88	23.10	28.99	201.32	263.77	38.66	24.53	49.43	2.23
381	216.67	196.91	400.87	196.56	341.10	482.39	2.64	3.73	119.06	163.82
382	12.07	4.02	183.58	118.93	0.02	0.02	0.00	0.00	7.01	8.15
721	0.00	0.00	5.09	4.41	0.00	0.00	0.00	0.00	0.00	0.00
722	0.85	1.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
723	2.98	4.21	0.00	0.00	0.00	0.00	0.00	0.00	2.75	0.08
724	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
725	0.00	0.00	0.00	0.00	3.74	5.29	10.89	15.39	0.00	0.00
726	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
727	0.00	0.00	0.00	0.00	8.83	8.02	1.74	1.51	0.00	0.00
728	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
752	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
753	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
754	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
755	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
756	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
757	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
758	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
759	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
760	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
761	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-
762	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
763	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
764	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
765	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
766	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
767	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00



Table 24. Atlantic cod survey biomass (t) by stratum in NAFO Div. 3NO: 2014-2018. n.s. means stratum not surveyed.

Strata	2014	2015	2016	2017	2018	Strata	2014	2015	2016	2017	2018
353	1381	1424	277	535	187	725	0	0	34	94	0
354	18564	3421	2677	591	24	726	0	0	0	0	0
355	0	121	188	91	0	727	0	0	75	15	0
356	59	20	20	124	6	728	0	0	0	0	0
357	577	75	14	381	443	752	0	0	0	0	0
358	48007	24557	8606	22217	115	753	0	0	0	0	0
359	705820	6758	517	618	111	754	0	0	0	0	0
360	614072	11888	26364	9157	3124	755	0	0	0	0	0
374	58019	0	0	0	0	756	0	0	0	0	0
375	14788	115	3	2	85	757	0	0	0	0	0
376	15180	2145	17	28	331	758	0	0	0	0	0
377	75488	4729	231	5	2573	759	0	0	0	0	0
378	276478	15897	2205	1614	1422	760	0	0	0	0	0
379	1063	15	267	422	40	761	0	0	0	0	0
380	4571	194	1636	314	422	762	0	0	0	0	0
381	31200	4887	4295	33	1524	763	0	0	0	0	0
382	4141	5505	1	0	214	764	0	0	0	0	0
721	0	28	0	0	0	765	0	0	0	0	0
722	71	0	0	0	0	766	0	0	0	0	0
723	462	0	0	0	35	767	0	0	0	0	0
724	0	0	0	0	0						

Table 25. Atlantic cod survey biomass (t) with SD and stratified mean catch per tow (kg) and SD by in NAFO Div. 3NO: 1997-2018.

Year	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Biomass	2131	19444	3054	7576	32548	10502	5455	3712	4509	19921	10592
SD	1322	18206	655	2566	15903	7971	3016	848	1984	8109	5853
MCPT	2.50	19.47	3.50	8.46	36.96	11.07	5.93	4.09	5.06	23.35	13.47
SD	1.54	17.82	0.75	2.58	17.97	7.82	3.29	0.95	2.16	9.39	7.44
Year	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Biomass	23817	72757	76856	137378	87436	37945	143299	81780	47429	36241	10655
SD	5221	40466	37369	54393	30292	5114	54386	28297	19188	17444	2307
MCPT	26.55	80.73	90.96	155.16	97.02	43.33	180.81	92.64	53.13	42.28	11.80
SD	5.71	46.81	43.41	64.42	32.90	5.90	67.34	32.30	21.51	20.79	2.54

Table 26. Atlantic cod length weight relationships in Spanish Spring Surveys in NAFO Div. 3NO: 2014-2018. E(x) means Error of the parameter x.

	a	b	E(a)	E(b)	R2	N
2013	0.00586	3.09132	0.0670	0.0170	0.997	1853
2014	0.00434	3.16276	0.0551	0.0139	0.998	2554
2015	0.00514	3.11990	0.0452	0.0116	0.999	2733
2016	0.00419	3.16019	0.0446	0.0112	0.999	1375
2017	0.00379	3.18329	0.0829	0.0209	0.9979	942
2018	0.00476	3.14187	0.0453	0.0117	0.9994	1110

Table 27. Atlantic cod mean number per tow by year in Spanish Spring Surveys in NAFO Div. 3NO: 1997-2018. Indet. means indeterminate.

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
MNPT	1.997	12.378	8.847	9.220	41.290	12.930	4.684	9.035	9.005	40.718	32.605
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
MNPT	49.717	131.444	118.451	139.982	79.685	26.421	82.688	83.149	22.871	36.521	11.026

Table 28.- Atlantic cod mean number per tow by length class and year. Spanish Spring Survey in NAFO 3NO: 2014-2018.

Lenght (cm.)	2014	2015	2016	2017	2018
	Total	Total	Total	Total	Total
6	0.000	0.039	0.000	0.000	0.000
8	0.000	0.013	0.000	0.000	0.000
10	0.027	0.026	0.000	0.018	0.015
12	0.058	0.091	0.024	0.052	0.056
14	0.048	0.229	0.149	0.150	0.108
16	0.105	0.358	0.445	0.139	0.186
18	0.165	0.179	0.314	0.171	0.095
20	0.203	0.142	0.405	0.167	0.057
22	0.308	0.711	0.806	0.285	0.051
24	0.233	2.836	1.189	1.109	0.164
26	0.528	4.258	1.082	1.886	0.403
28	0.469	3.838	0.721	1.954	0.499
30	0.510	2.722	0.627	1.649	0.479
32	0.501	3.328	0.629	1.440	0.659
34	0.969	5.313	0.629	1.573	0.735
36	1.135	7.129	0.455	2.585	0.917
38	1.131	4.582	0.307	2.454	0.860
40	1.585	4.773	0.439	2.461	0.808
42	1.575	4.396	0.392	2.018	0.780
44	2.098	4.105	0.333	1.688	0.578
46	2.377	3.406	0.319	1.471	0.509
48	3.219	2.181	0.328	1.451	0.411
50	3.263	3.019	0.287	2.111	0.271
52	3.855	2.460	0.375	0.917	0.265
54	4.588	2.697	0.549	0.775	0.193
56	4.616	2.535	0.654	0.801	0.185
58	4.332	2.458	0.644	0.506	0.136
60	4.987	2.265	0.782	0.302	0.185
62	5.393	1.677	0.579	0.719	0.077
64	5.866	1.953	0.675	0.433	0.111
66	5.383	1.390	0.568	0.894	0.089
68	4.021	1.096	0.679	0.604	0.092
70	4.384	1.084	0.533	0.324	0.081
72	3.238	1.099	0.527	0.458	0.089
74	2.517	0.804	0.535	0.263	0.121
76	2.456	0.566	0.398	0.315	0.105
78	1.425	0.502	0.566	0.284	0.075
80	0.967	0.549	0.564	0.166	0.068
82	0.934	0.498	0.774	0.347	0.118
84	0.957	0.408	0.725	0.313	0.107
86	0.350	0.331	0.581	0.255	0.122
88	0.456	0.237	0.560	0.228	0.029
90	0.420	0.114	0.359	0.146	0.000
92	0.224	0.199	0.254	0.112	0.031
94	0.186	0.197	0.390	0.164	0.020
96	0.331	0.125	0.212	0.150	0.031
98	0.085	0.044	0.031	0.025	0.000
100	0.078	0.088	0.155	0.064	0.031
102	0.052	0.026	0.055	0.025	0.000
104	0.026	0.027	0.084	0.042	0.015
106	0.000	0.000	0.040	0.025	0.000
108	0.013	0.031	0.037	0.009	0.000
110	0.012	0.013	0.099	0.000	0.009
112	0.000	0.000	0.007	0.009	0.000
114	0.000	0.000	0.000	0.000	0.000
116	0.000	0.000	0.000	0.000	0.000
118	0.000	0.000	0.000	0.000	0.000
120	0.013	0.000	0.000	0.017	0.000
122	0.012	0.000	0.000	0.000	0.000
124	0.000	0.000	0.000	0.000	0.000
126	0.000	0.000	0.000	0.000	0.000
128	0.000	0.000	0.000	0.000	0.000
130	0.000	0.000	0.000	0.000	0.000
132	0.000	0.000	0.000	0.000	0.000
Total	82,688	83,149	22,871	36,521	11,026
N° samples:	55	61	49	47	47
N° Ind.:	4700	4728	2255	1709	1747
Sampled catch:	8988	7607	3959	0	1553
Range:	10-122	6-110	13-113	10-121	10-110
Total catch:	23952	12477	5317	5135	1589
Total hauls:	122	122	115	114	114

Table 29. Atlantic cod mean number per tow by age and year. Spanish Spring Survey in NAFO 3NO: 2014-2018.

Age	2014	2015	2016	2017	2018
1	0.15	0.96	0.71	0.28	
2	2.51	13.89	4.56	5.14	0.46
3	5.00	23.68	2.26	8.41	1.16
4	8.10	14.29	1.53	7.99	3.83
5	31.29	5.04	1.40	5.58	1.50
6	12.21	10.62	0.74	1.93	1.71
7	1.53	4.45	4.48	1.03	0.57
8	16.69	1.26	2.61	1.78	0.46
9	1.93	8.29	0.26	1.81	0.14
10	2.53	0.21	3.82	0.16	0.31
11	0.70	0.36	0.24	2.05	0.38
12	0.01	0.09	0.07	0.07	0.06
13	0.01	0.01	0.12	0.19	0.38
14	0.01		0.06	0.08	0.05
15				0.01	0.02
16					
17					
18					
19					
20					
Total	82.69	83.15	22.87	36.52	11.03

Table 30. Atlantic cod mean length (cm) per tow by age and year. Spanish Spring Survey in NAFO 3NO: 2014-2018.

Age	2014	2015	2016	2017	2018
1	13.86	15.98	16.60	15.24	16.38
2	26.29	27.61	25.66	26.88	27.28
3	38.44	36.90	33.53	34.71	36.43
4	47.42	44.63	43.35	42.04	42.81
5	58.26	52.27	51.25	49.08	46.08
6	62.97	59.86	60.02	56.20	54.90
7	73.54	61.79	71.50	61.92	60.56
8	72.87	64.69	73.17	69.15	64.10
9	73.76	69.76	76.90	71.81	75.10
10	83.93	88.22	80.81	77.75	78.15
11	92.39	90.55	103.52	80.05	85.39
12	122.50	92.05	99.77	102.97	81.84
13	103.50	103.50	99.10	93.68	84.48
14	120.50		107.52	91.90	105.50
15				108.50	
16					
17					
18					
19					
20					
Total	60.34	45.76	55.89	46.00	43.97

Table 31. Atlantic cod mean weight (g) per tow by age and year. Spanish Spring Survey in NAFO 3NO: 2014-2018.

Age	2014	2015	2016	2017	2018
1	19	33	31	24	33
2	146	165	126	142	159
3	460	408	287	320	399
4	898	740	649	576	662
5	1730	1220	1095	938	830
6	2207	1914	1847	1462	1434
7	3546	2191	3239	2012	1967
8	3470	2544	3580	2943	2300
9	3667	3142	4132	3284	3880
10	5430	6493	4793	4410	4466
11	7245	6788	9859	4584	5818
12	17443	7061	8751	10051	5100
13	10236	9937	8635	7474	5511
14	16558		11085	6778	10832
15				11439	
16					
17					
18					
19					
20					
Total	2187	1114	2323	1158	1070

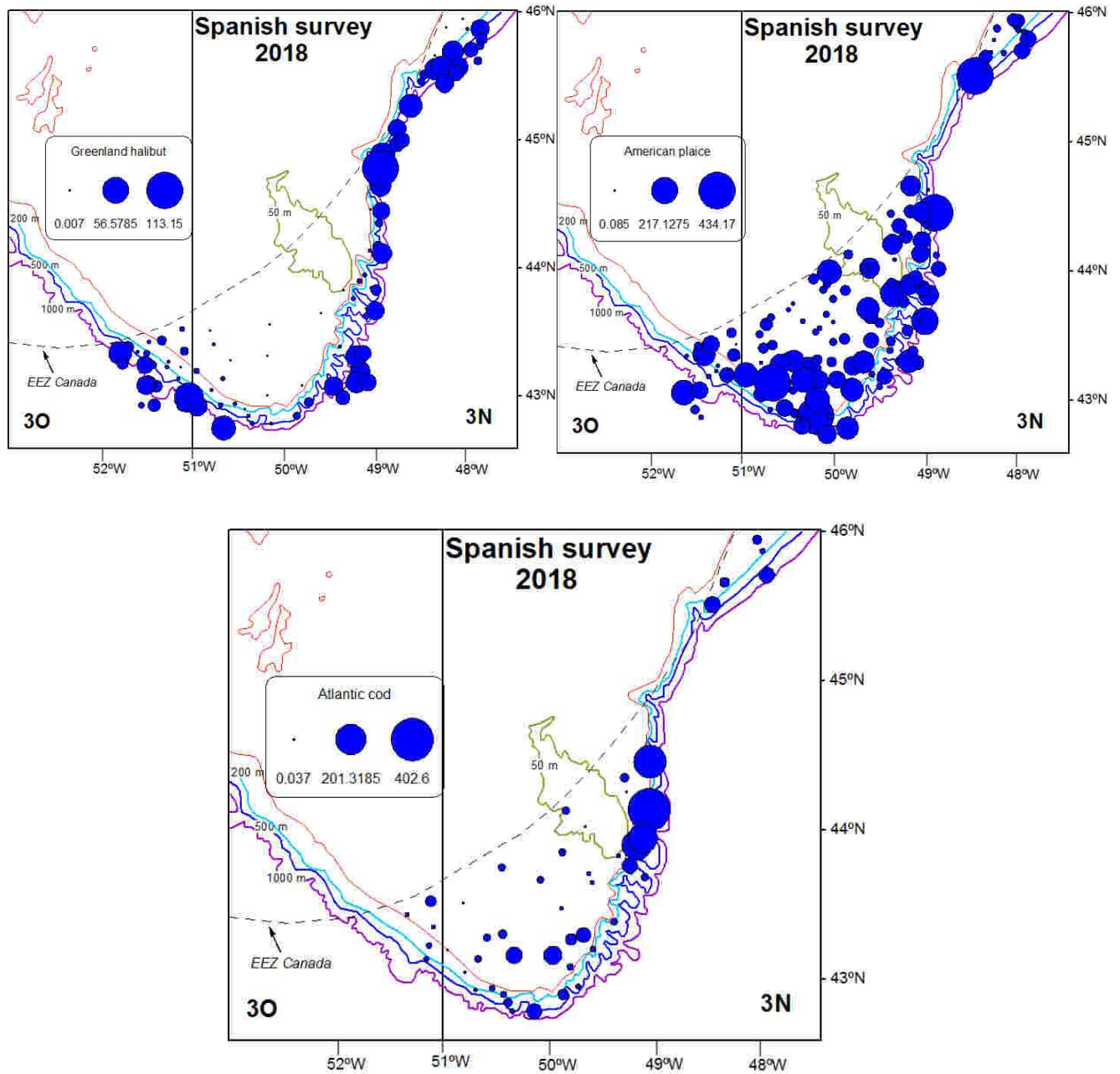


Figure 1. Position of the hauls and the catch of Greenland halibut, American plaice and Atlantic cod during the 2018 Spanish 3NO survey. Note that the scale is different in the three graphs.

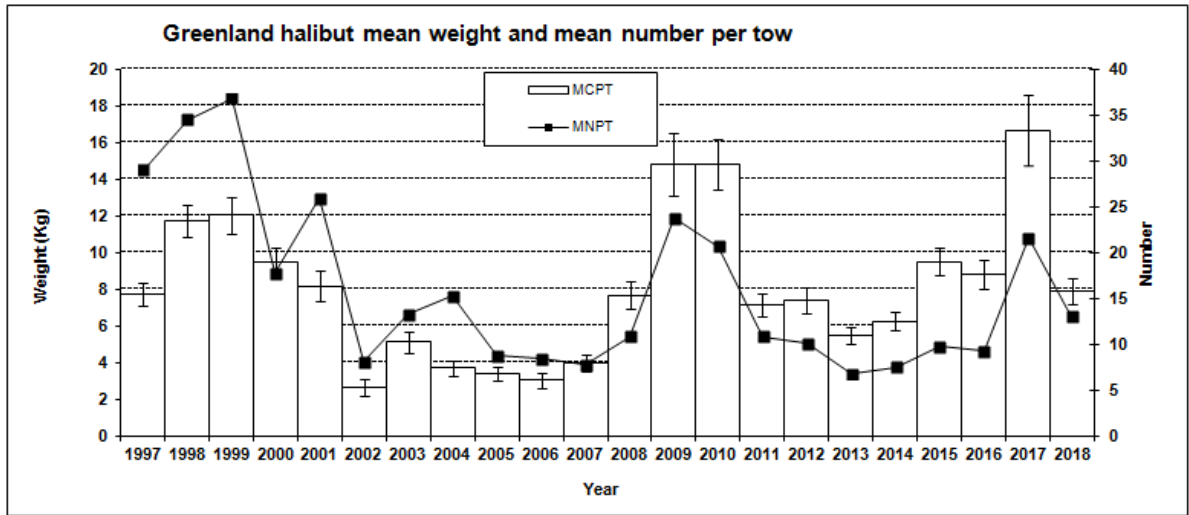


Figure 2. Greenland halibut stratified mean catches in Kg and \pm SD by year and mean number by year. Spanish Spring surveys in NAFO Div. 3NO: 1997-2018.

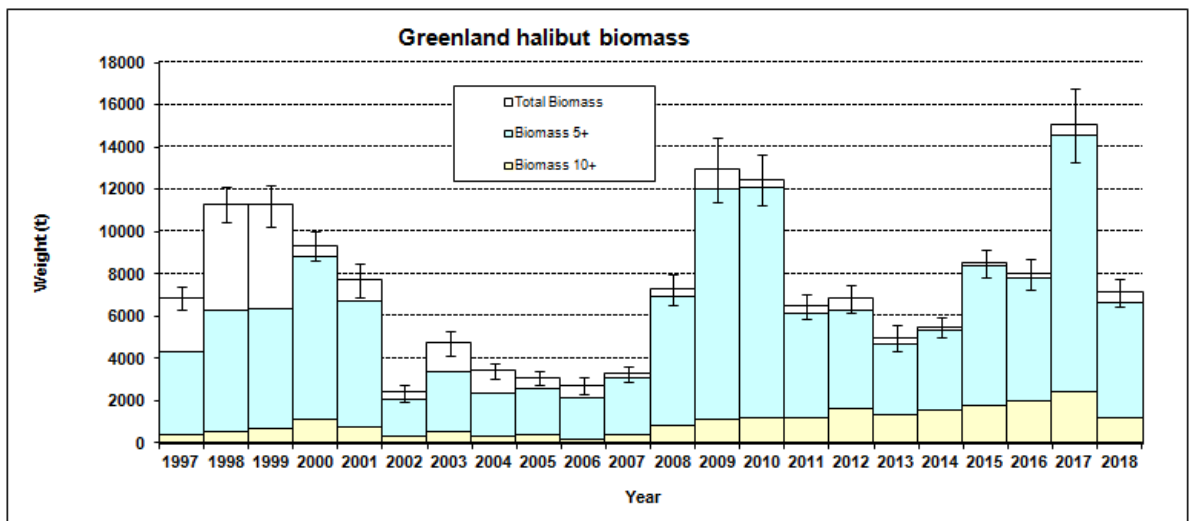


Figure 3. Greenland halibut biomass calculated by the swept area method in tons and \pm SD by year. Spanish Spring surveys in NAFO Div. 3NO: 1997-2018.

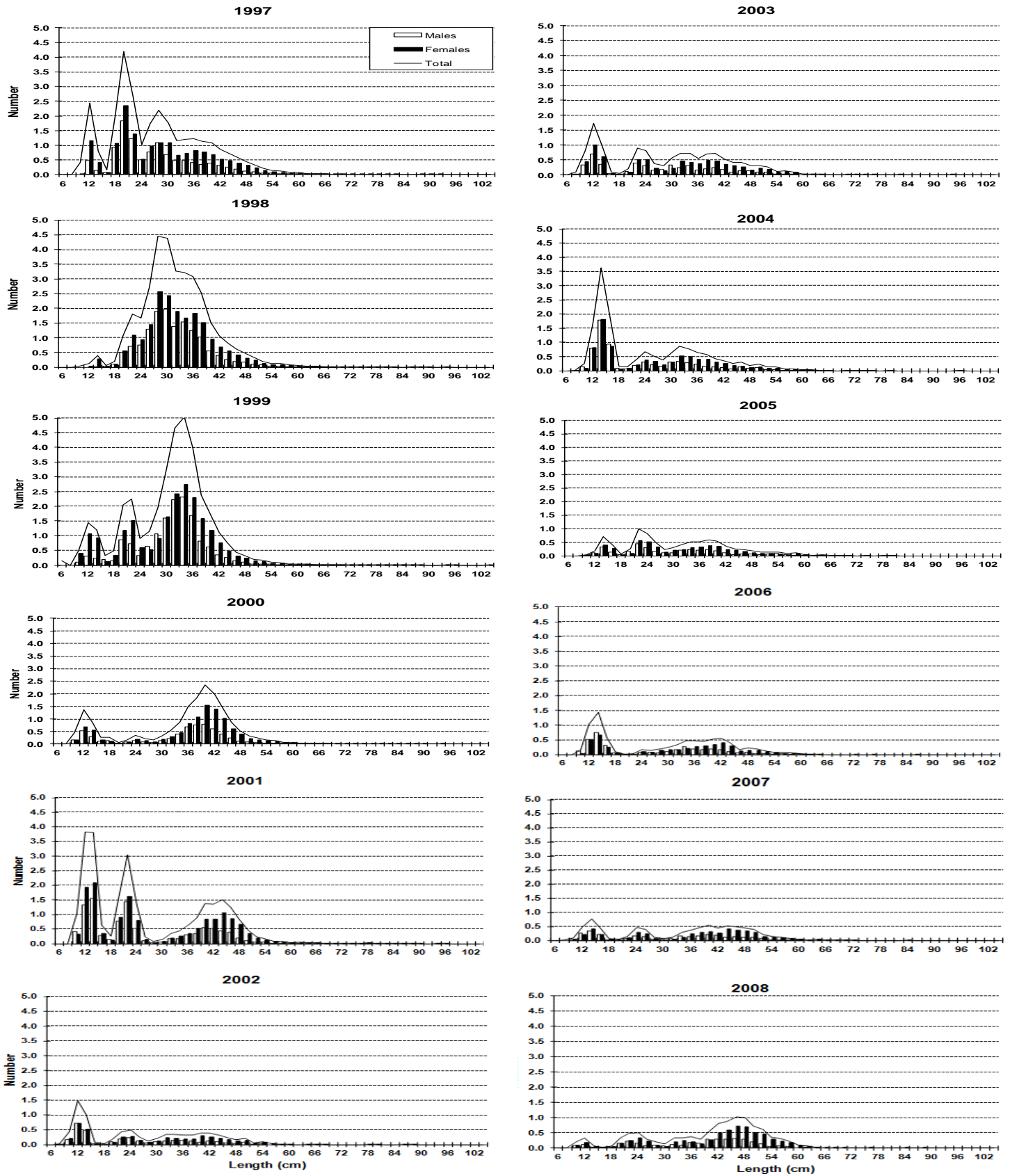


Figure 4. Greenland halibut length distribution (cm) on NAFO 3NO: 1997-2018. Mean catches per tow number. Data from 2014 to 2018 are in Table 8; data for 1997-2013 can be seen in SCR Doc 14/005.

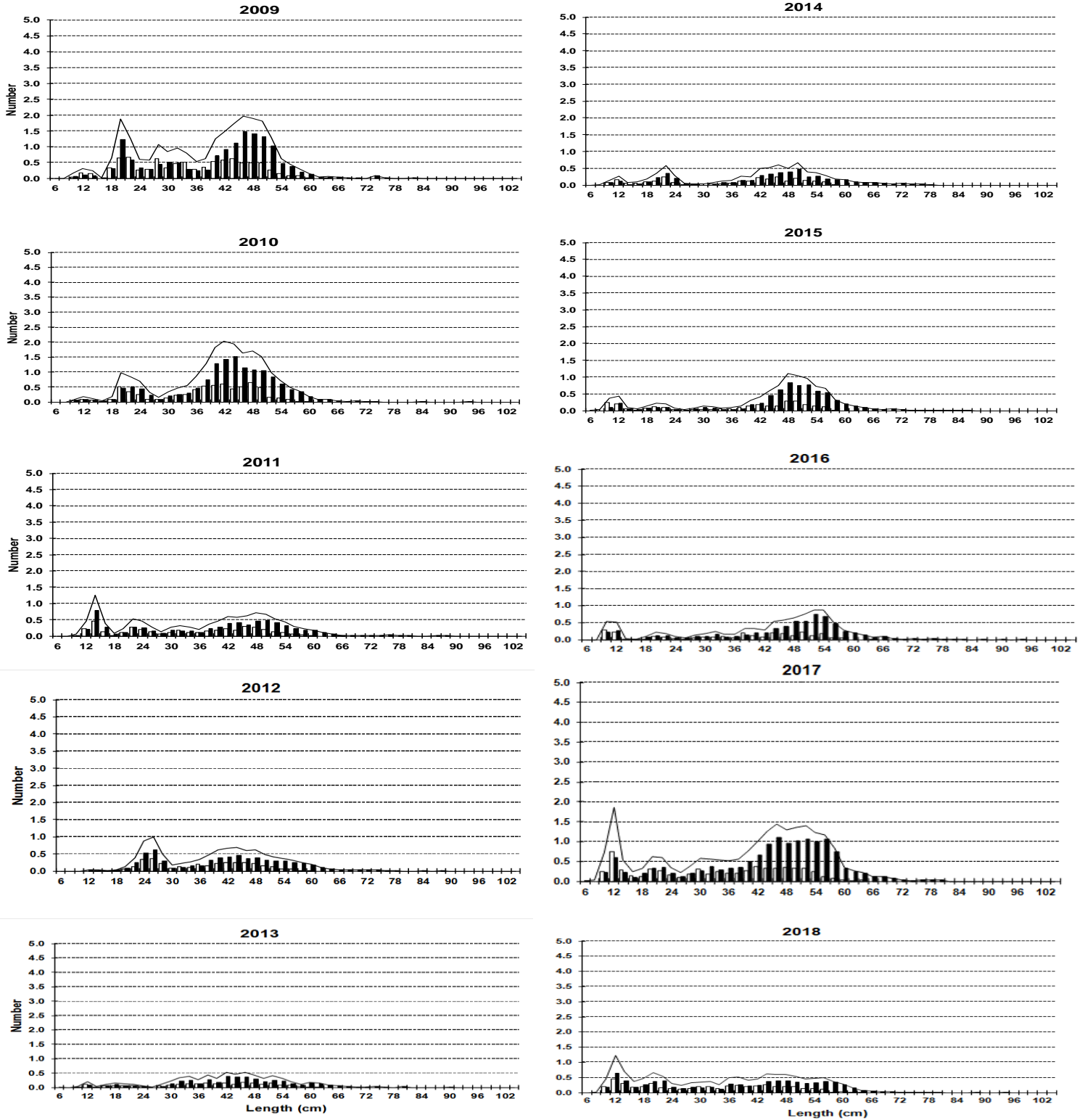


Figure 4 (cont.). Greenland halibut length distribution (cm) on NAFO 3NO: 1997-2018. Mean catches per tow number. Data from 2014 to 2018 are in Table 8; data for 1997-2013 can be seen in SCR Doc 14/005.

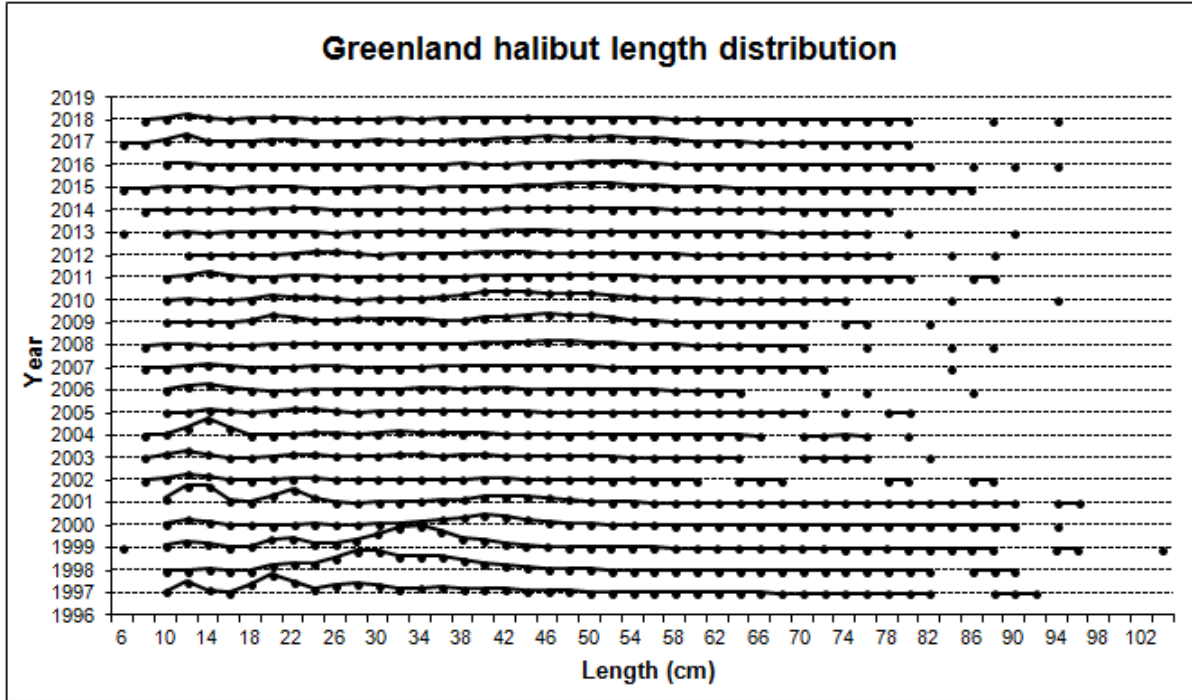


Figure 5. Greenland halibut mean number per tow by length (cm) on NAFO 3NO: 1997-2018. Data from 2014 to 2018 are in Table 8; data for 1997-2013 can be seen in SCR Doc 14/005.

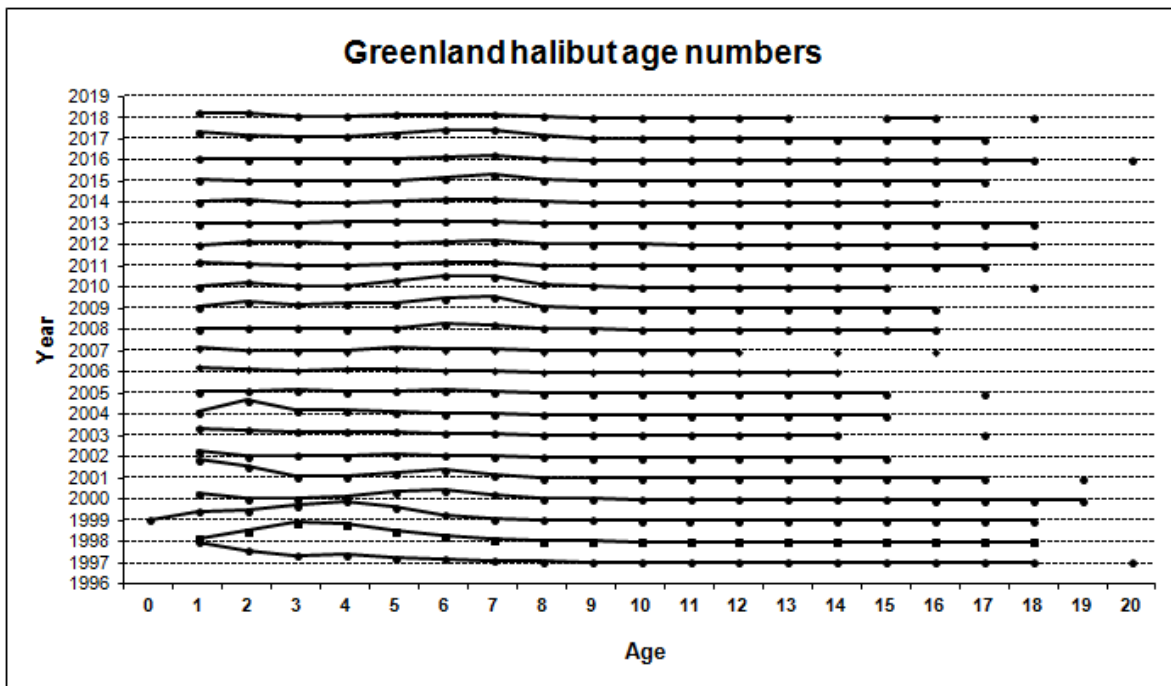


Figure 6. Greenland halibut mean numbers per tow by age on NAFO 3NO: 1997-2018. Data from 2014 to 2018 are in Table 9; data for 1997-2013 can be seen in SCR Doc 14/005.

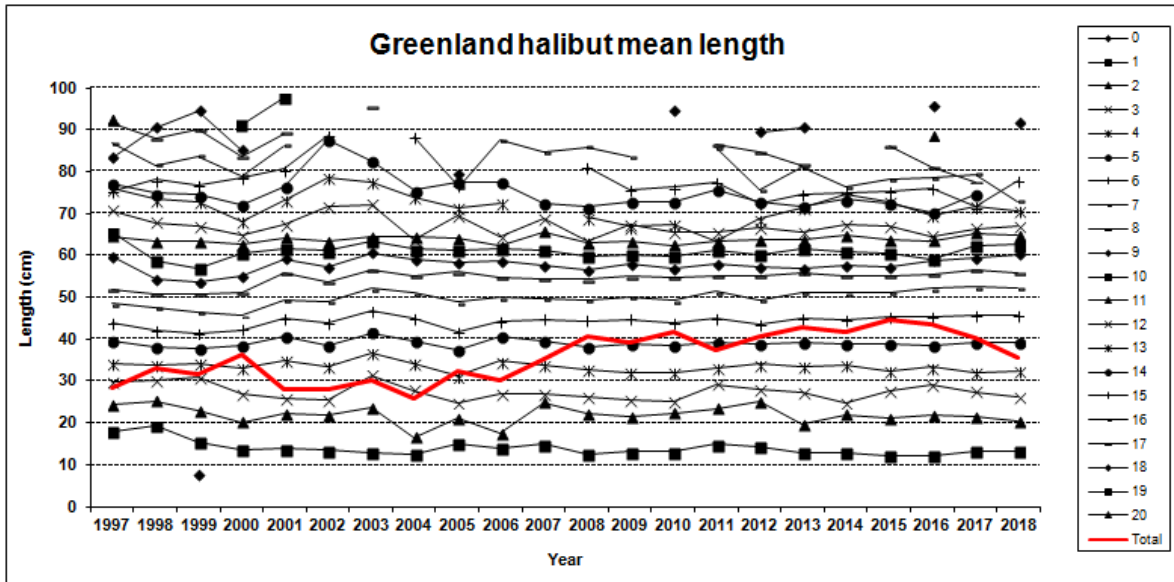


Figure 7. Greenland halibut mean length (cm) at age on NAFO 3NO: 1997-2018. Data from 2014 to 2018 are in Table 10; data for 1997-2013 can be seen in SCR Doc 14/005.

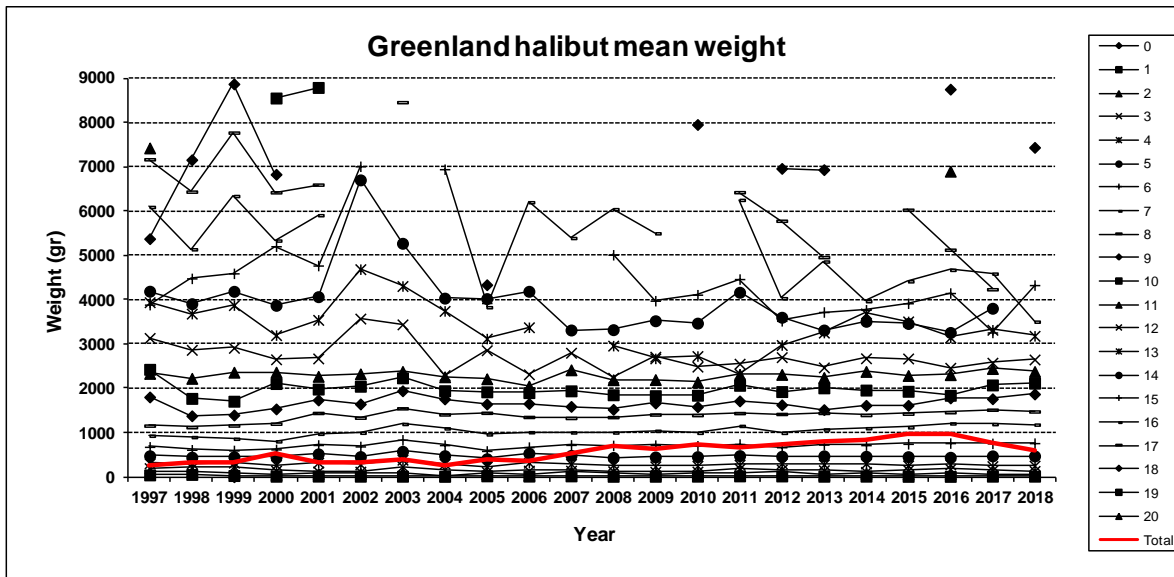


Figure 8. Greenland halibut mean weight (gr) at age on NAFO 3NO: 1997-2018. Data from 2014 to 2018 are in Table 11; data for 1997-2013 can be seen in SCR Doc 14/005.

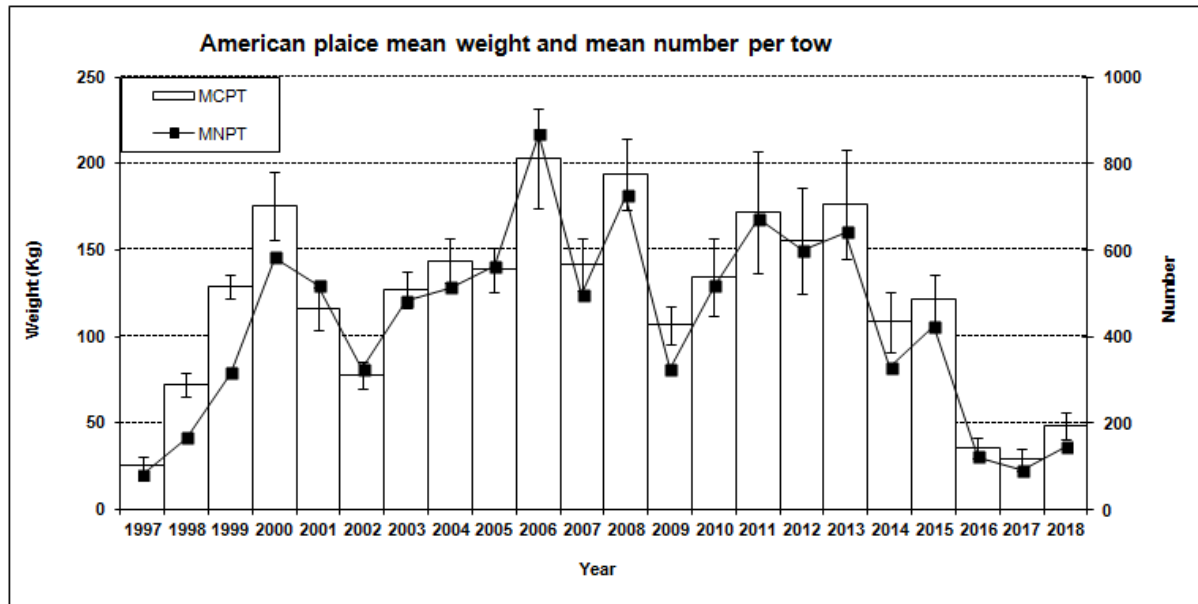


Figure 9. American plaice stratified mean catches in Kg and \pm SD by year and mean number by year. Spanish Spring surveys in NAFO Div. 3NO: 1997-2018.

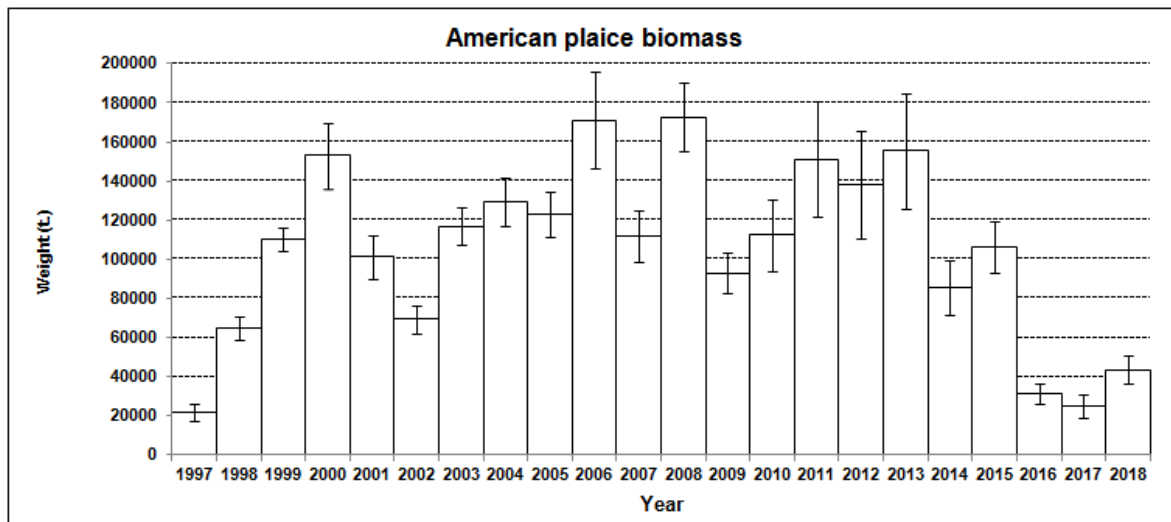


Figure 10. American plaice biomass calculated by the swept method in tons and \pm SD by year. Spanish Spring surveys in NAFO Div. 3NO: 1997-2018.

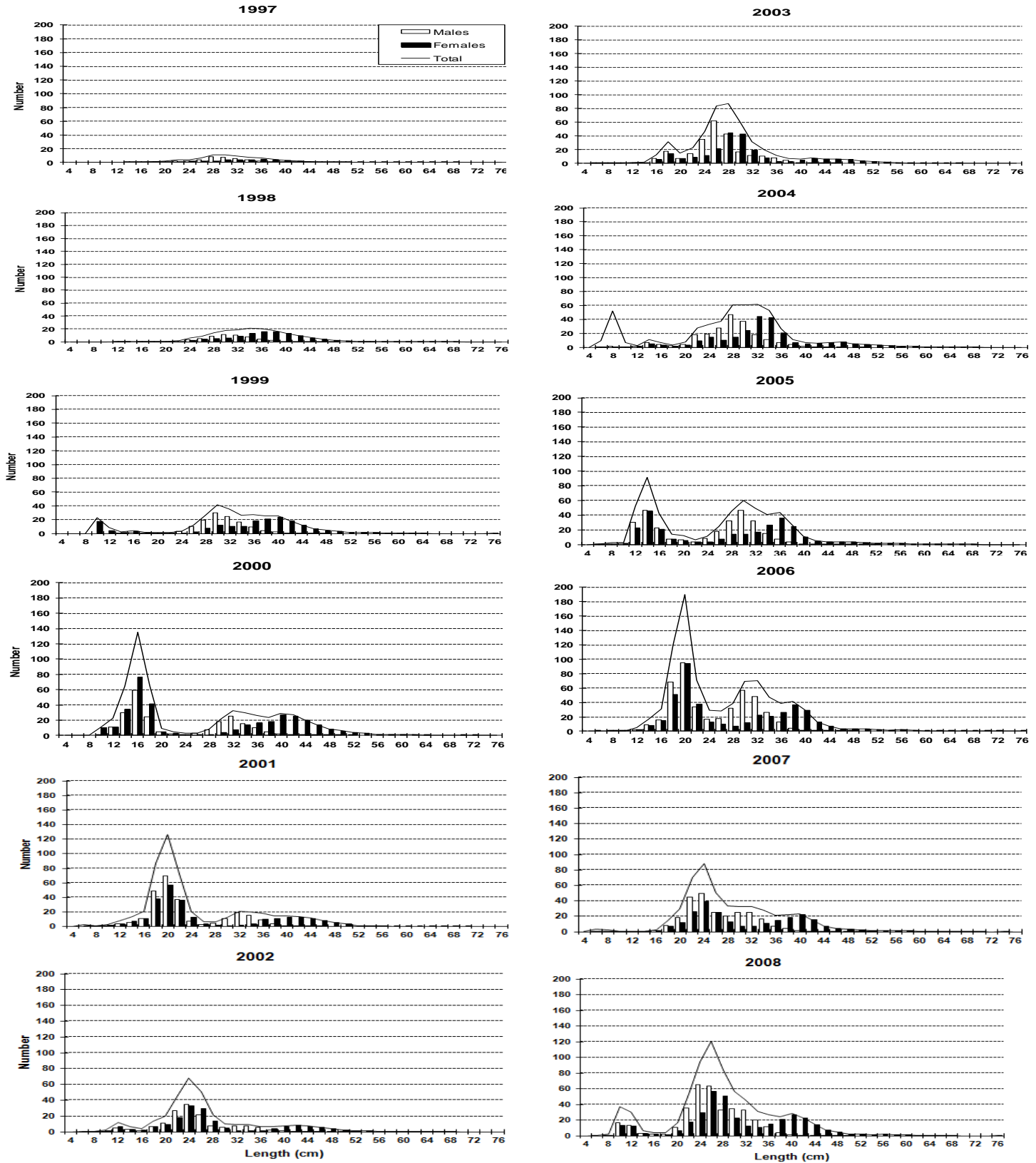


Figure 11. American plaice length distribution (cm) on NAFO 3NO: 1997-2018. Mean catches per tow number. Data from 2014 to 2018 are in Table 17; data for 1997-2013 can be seen in SCR Doc 14/005.

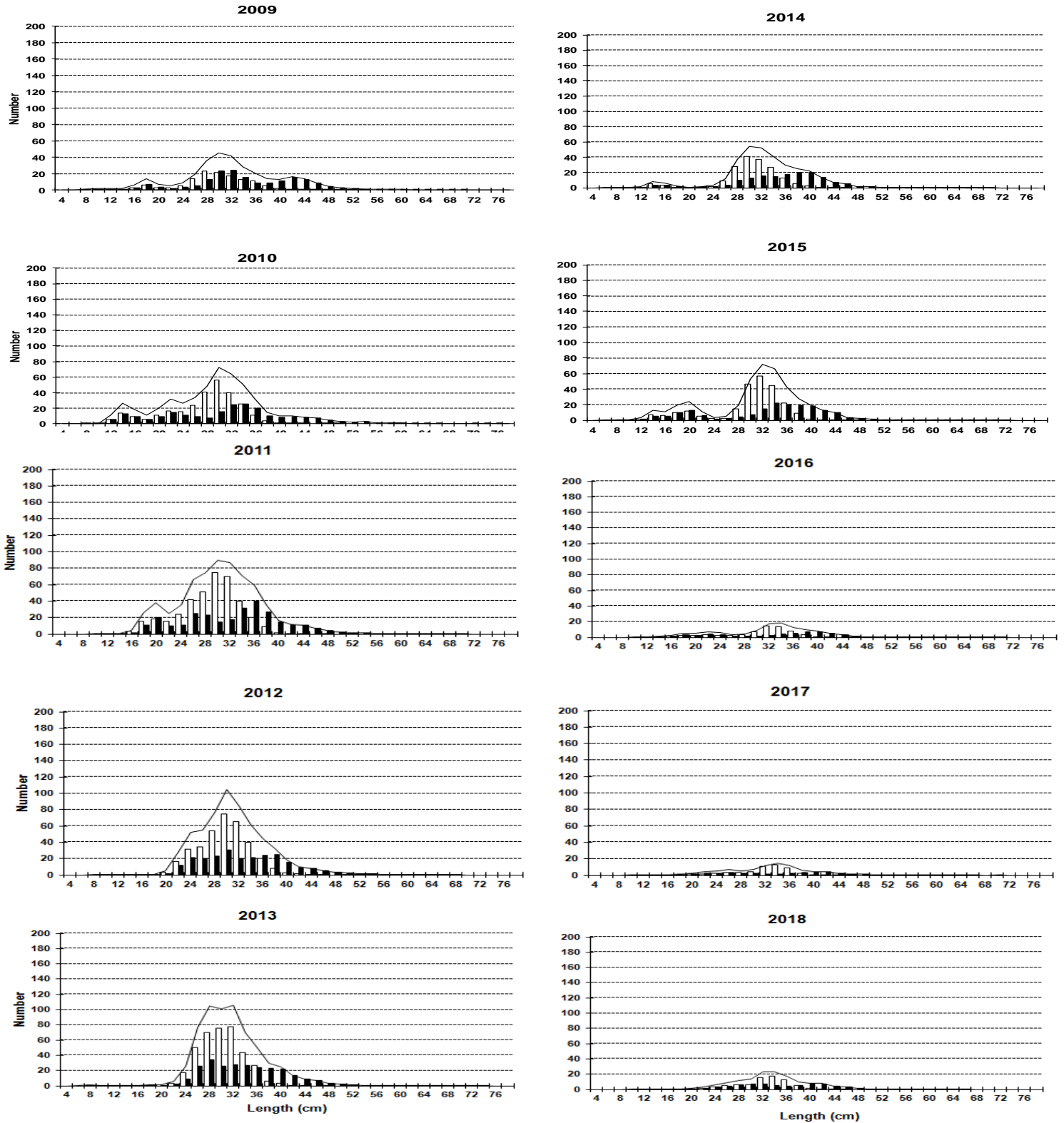


Figure 11 (cont.). American plaice length distribution (cm) on NAFO 3NO: 1997-2018. Mean catches per tow number. Data from 2014 to 2018 are in Table 17; data for 1997-2013 can be seen in SCR Doc 14/005.

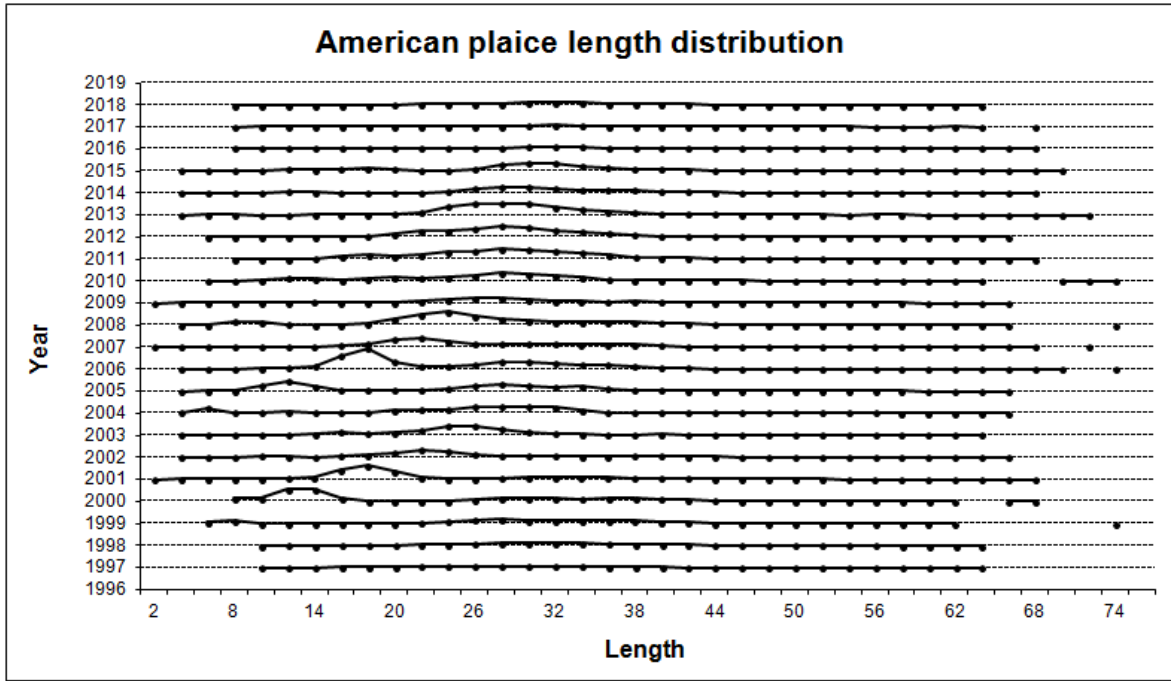


Figure 12. American plaice mean catches per tow by length (cm) on NAFO 3NO: 1997-2018. Data from 2014 to 2018 are in Table 17; data for 1997-2013 can be seen in SCR Doc 14/005.

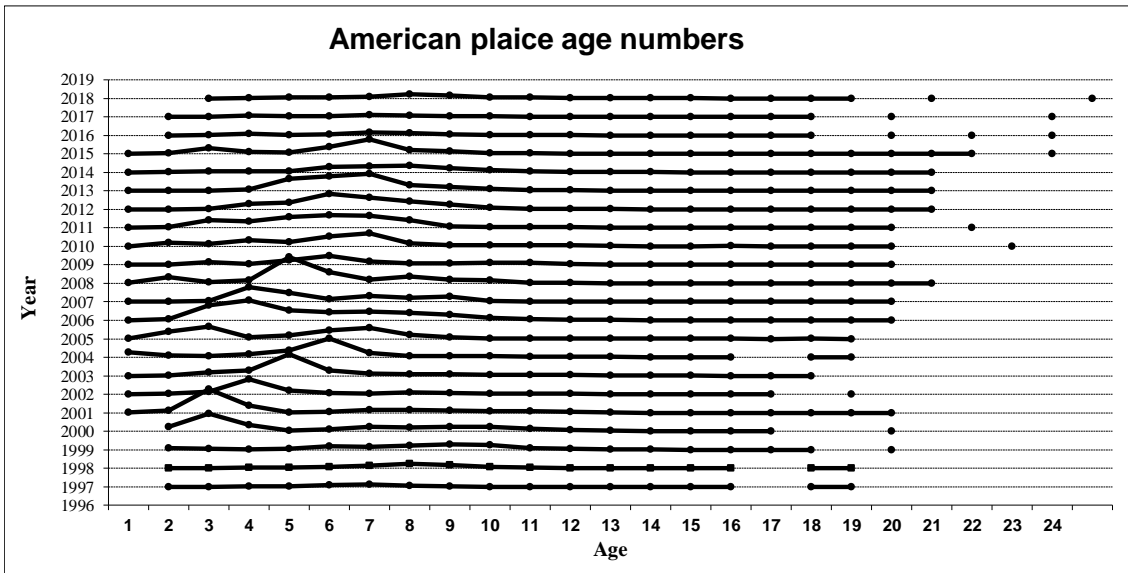


Figure 13. American plaice mean catches per tow by age on NAFO 3NO: 1997-2018. Data from 2014 to 2018 are in Table 18; data for 1997-2013 can be seen in SCR Doc 14/05. The 2016 ALK was not sexed. The 2017 and 2018 ALKs are not available yet, so the 2016 ALK was used.

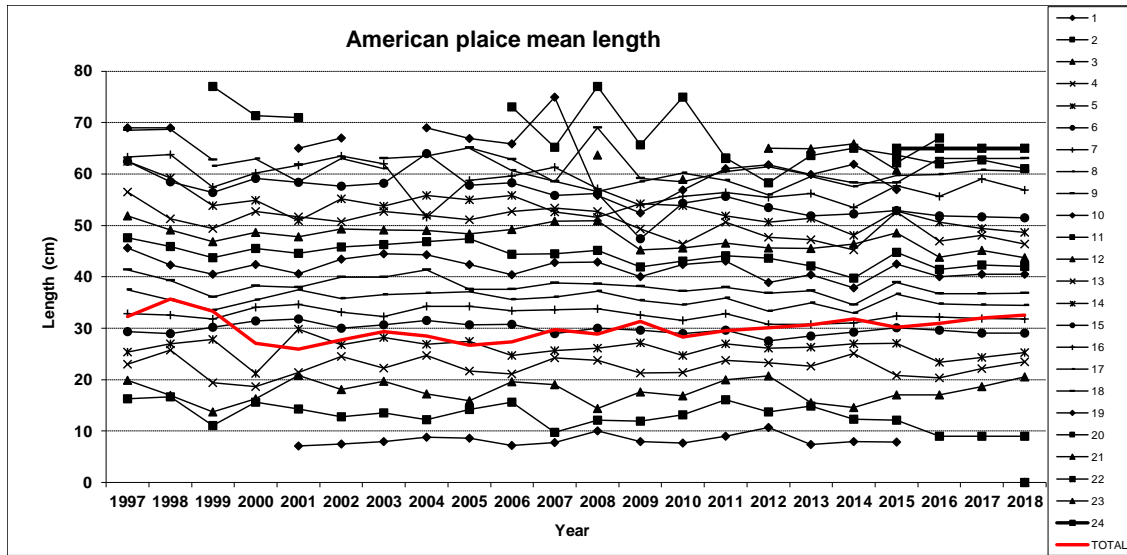


Figure 14. American plaice mean length (cm) at age on NAFO 3NO: 1997-2018. Data from 2014 to 2018 are in Table 19; data for 1997-2013 can be seen in SCR Doc 14/05. The 2016 ALK was not sexed. The 2017 and 2018 ALKs are not available yet, so the 2016 ALK was used.

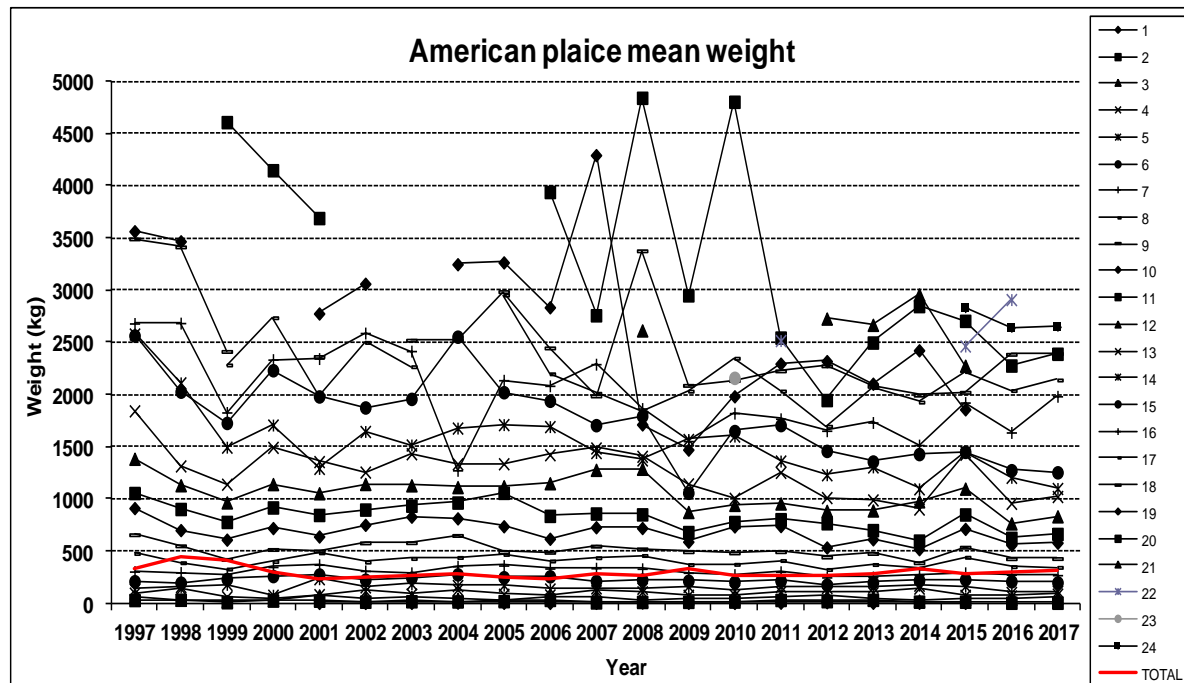


Figure 15. American plaice mean weight (gr) at age on NAFO 3NO: 1997-2018. Data from 2014 to 2018 are in Table 20; data for 1997-2013 can be seen in SCR Doc 14/05. The 2016 ALK was not sexed. The 2017 and 2018 ALKs are not available yet, so the 2016 ALK was used.

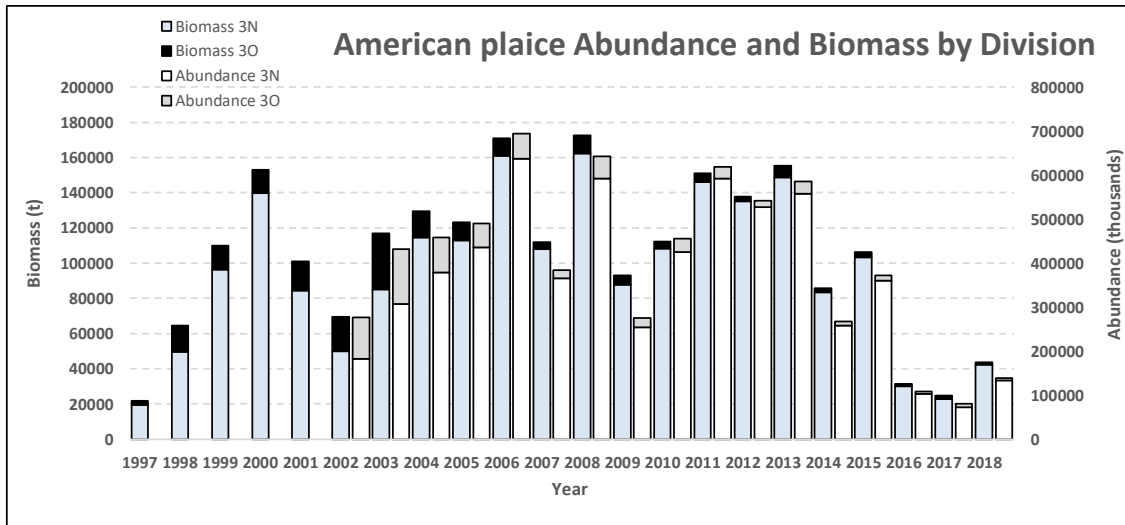


Figure 16. American plaice total biomass (tons) and abundance (thousands) by Division and year.

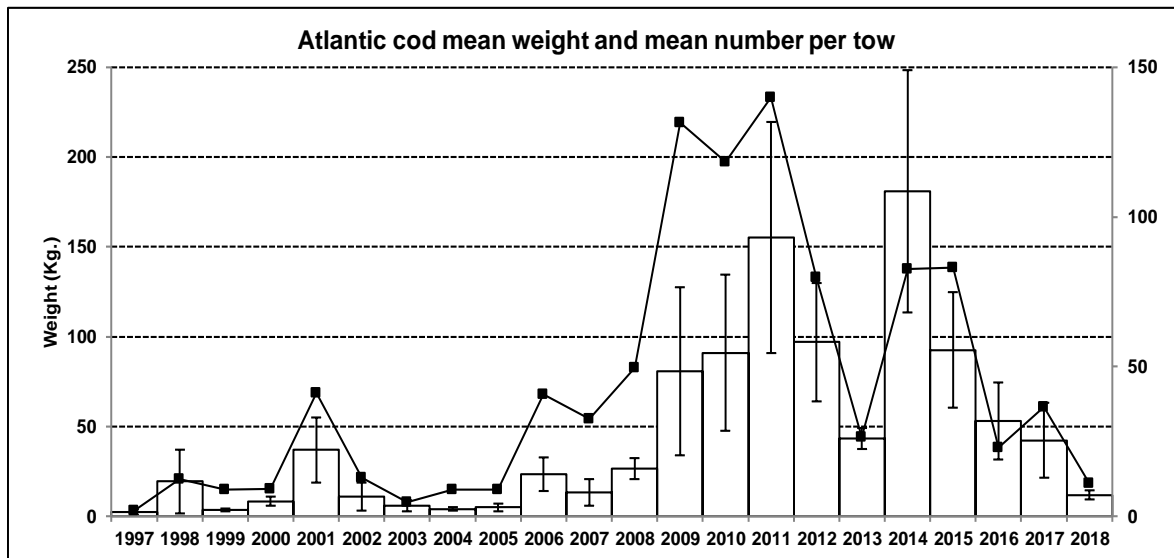


Figure 17. Atlantic cod stratified mean catches in Kg and \pm SD by year and mean number by year. Spanish Spring surveys in NAFO Div. 3NO: 1997-2018.

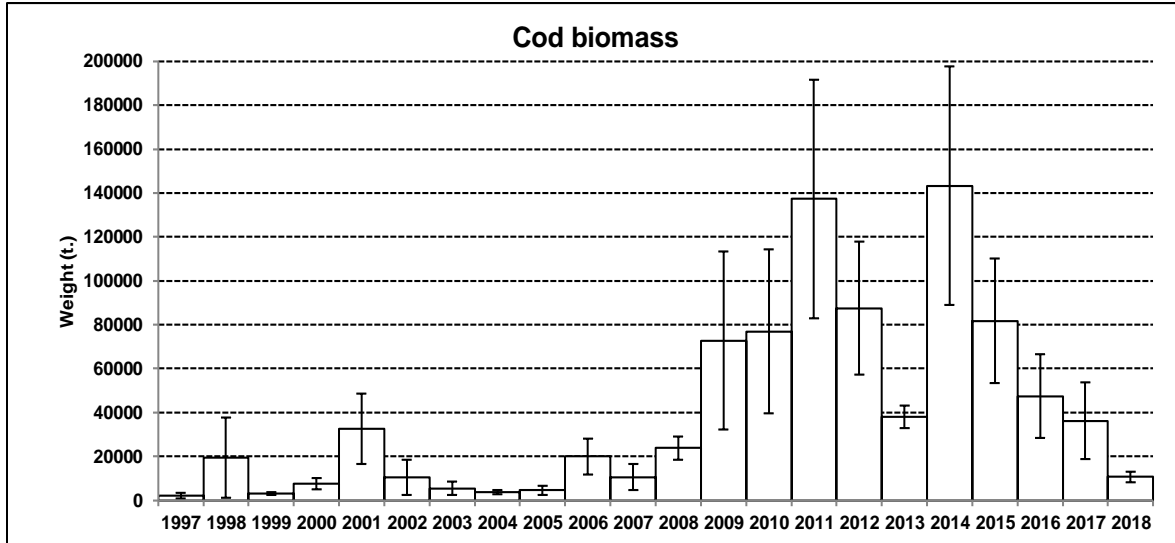


Figure 18. Atlantic cod biomass calculated by the swept method in tons and \pm SD by year. Spanish Spring surveys in NAFO Div. 3NO: 1997-2018.

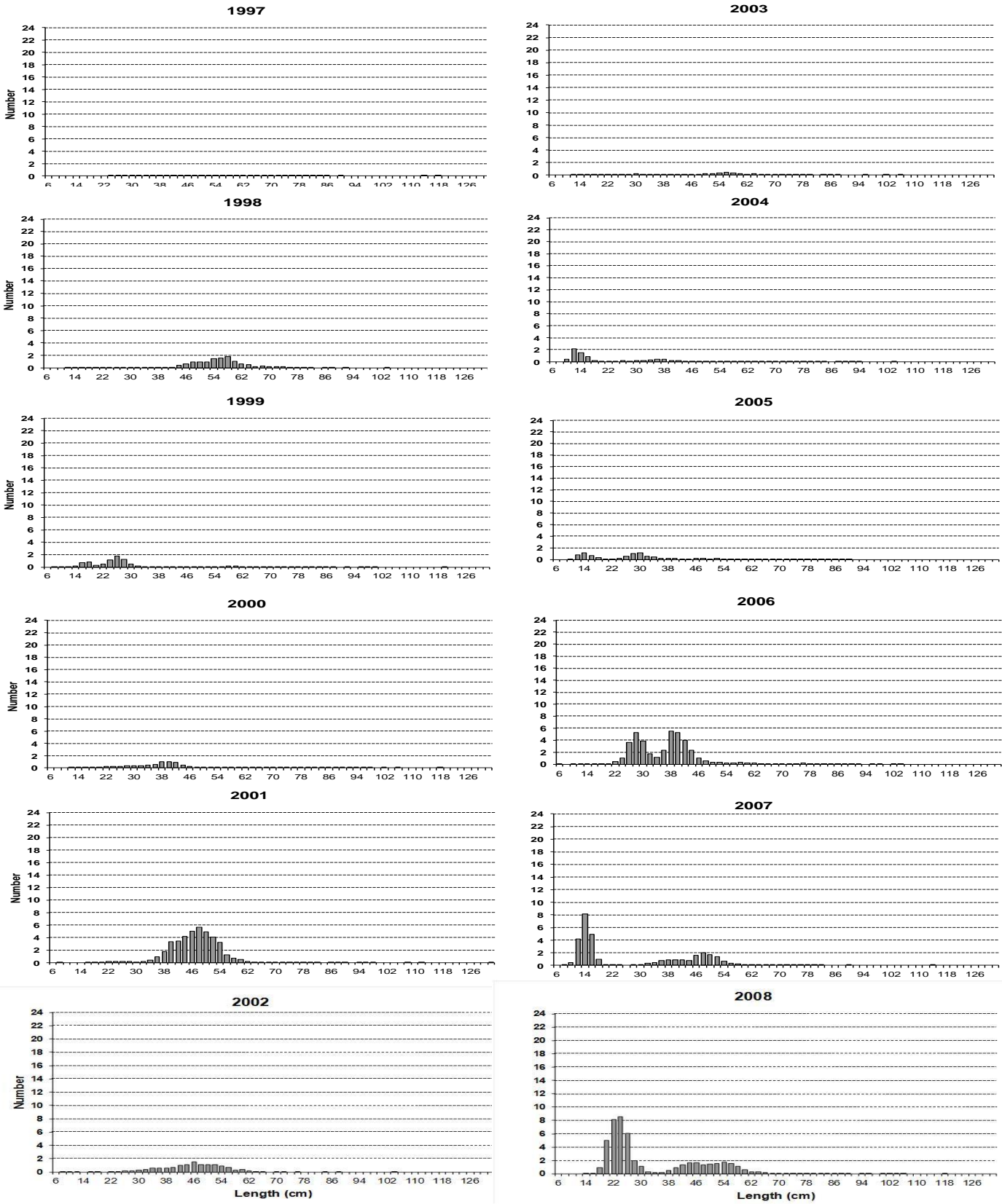


Figure 19. Atlantic cod length distribution (cm) on NAFO 3NO: 1997-2018. Mean catches per tow number. Data from 2014 to 2018 are in Table 28; data for 1997-2013 can be seen in SCR Doc 14/005

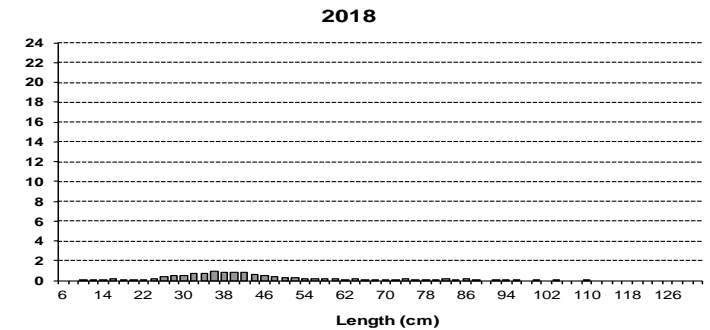
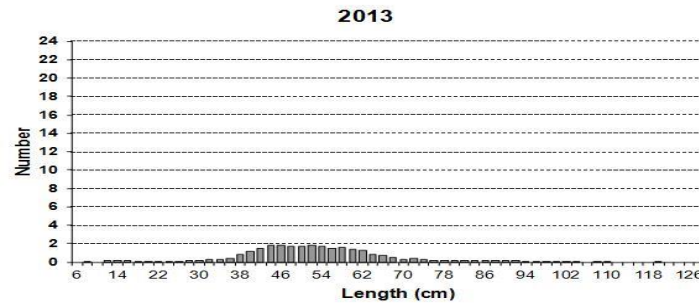
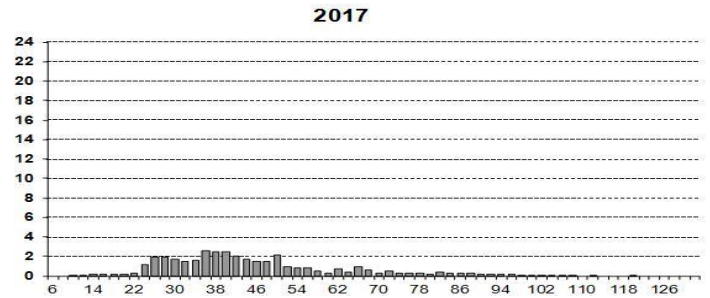
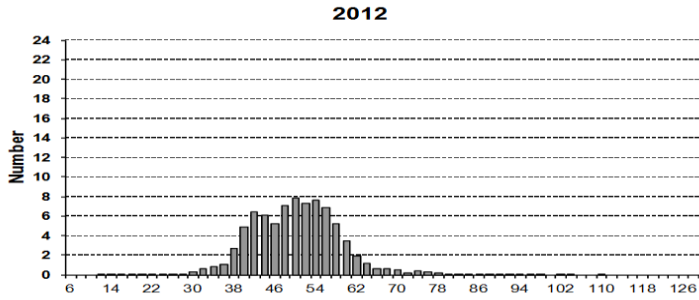
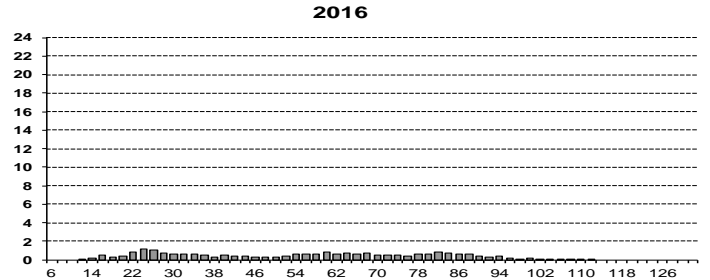
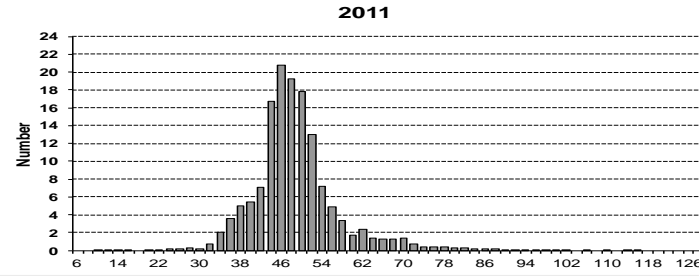
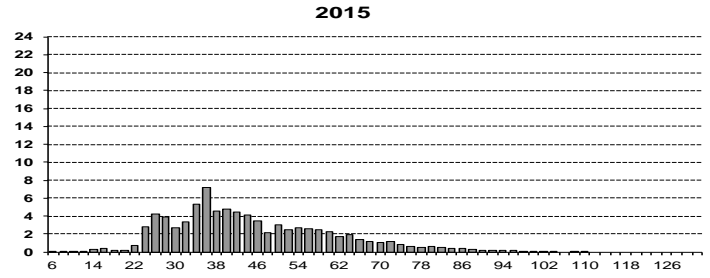
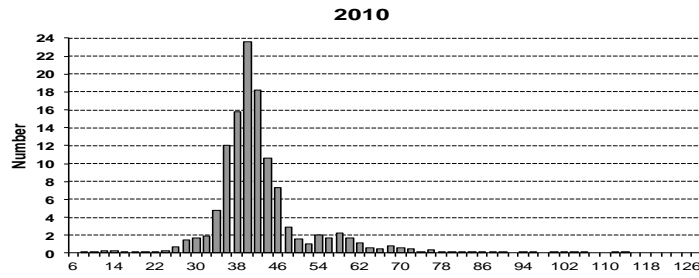
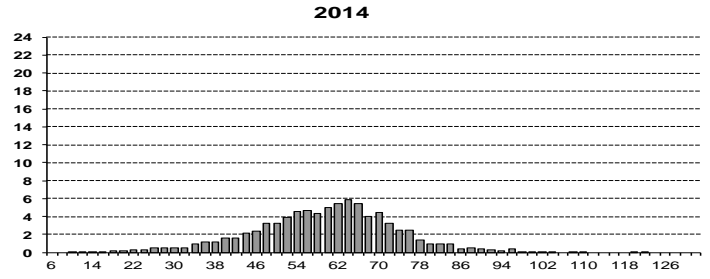
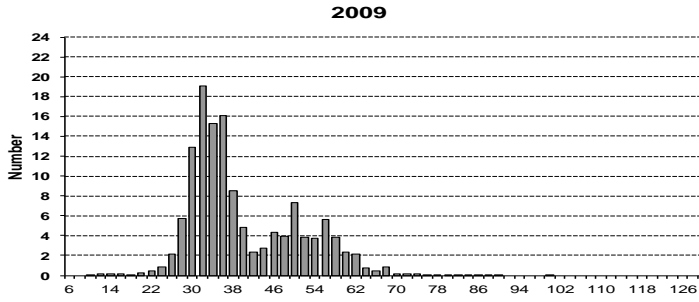


Figure 19 (cont.). Atlantic cod length distribution (cm) on NAFO 3NO: 1997-2018. Mean catches per tow number. Data from 2014 to 2018 are in Table 28; data for 1997-2013 can be seen in SCR Doc 14/005.



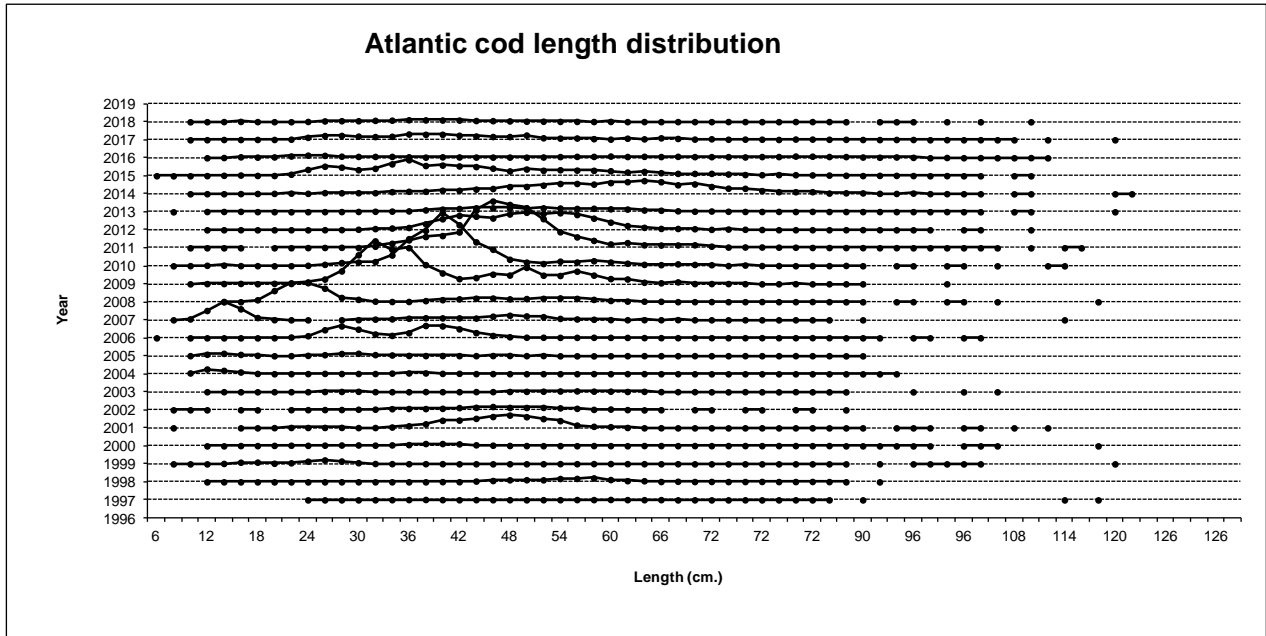


Figure 20. Atlantic cod stratified mean catches in Kg and \pm SD by year and mean number by year. Spanish Spring surveys in NAFO Div. 3NO: 1997-2018. Data from 2014 to 2018 are in Table 28; data for 1997-2013 can be seen in SCR Doc 14/005.

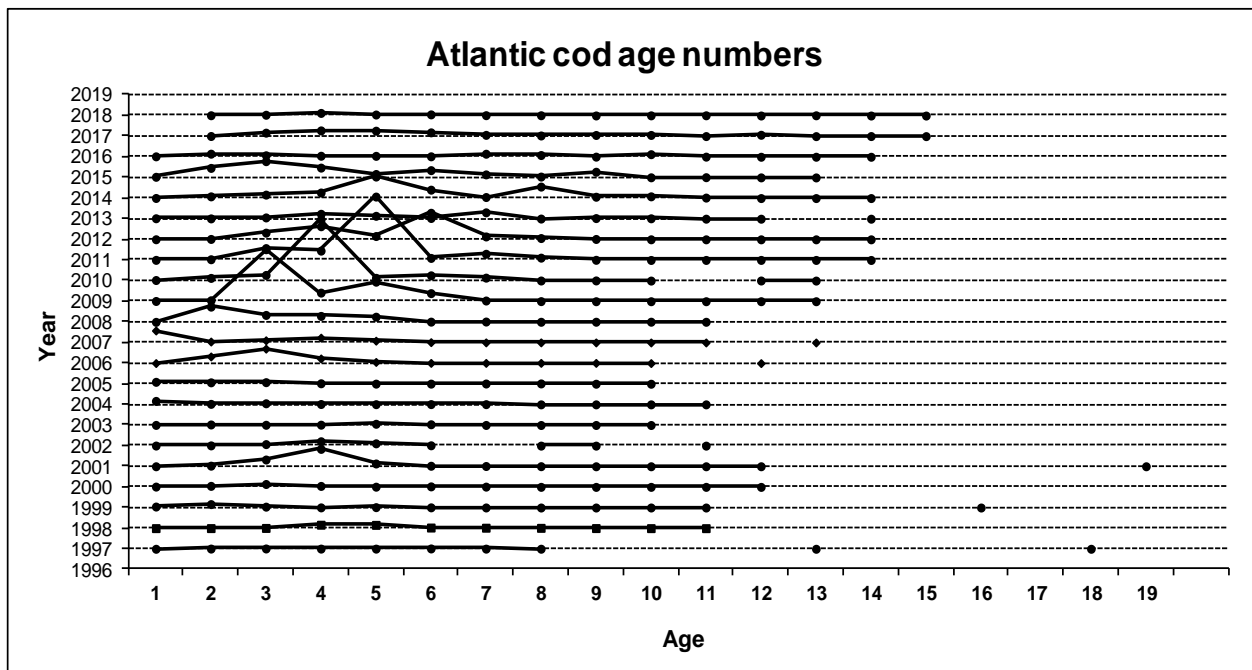


Figure 21. Atlantic cod biomass calculated by the swept method in tons and \pm SD by year. Spanish Spring surveys in NAFO Div. 3NO: 1997-2018. Data from 2014 to 2018 are in Table 29; data for 1997-2013 can be seen in SCR Doc 14/005.

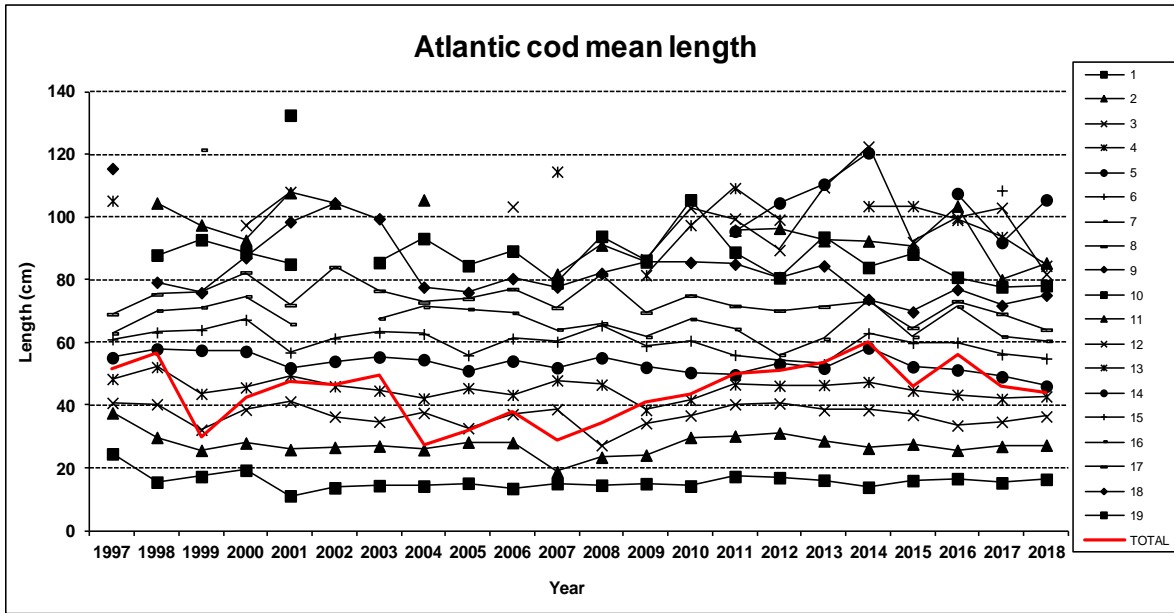


Figure 22. Atlantic cod mean length (cm) at age on NAFO 3NO: 1997-2018. Ages from 1 to 19. Data from 2014 to 2018 are in Table 30; data for 1997-2013 can be seen in SCR Doc 14/005.

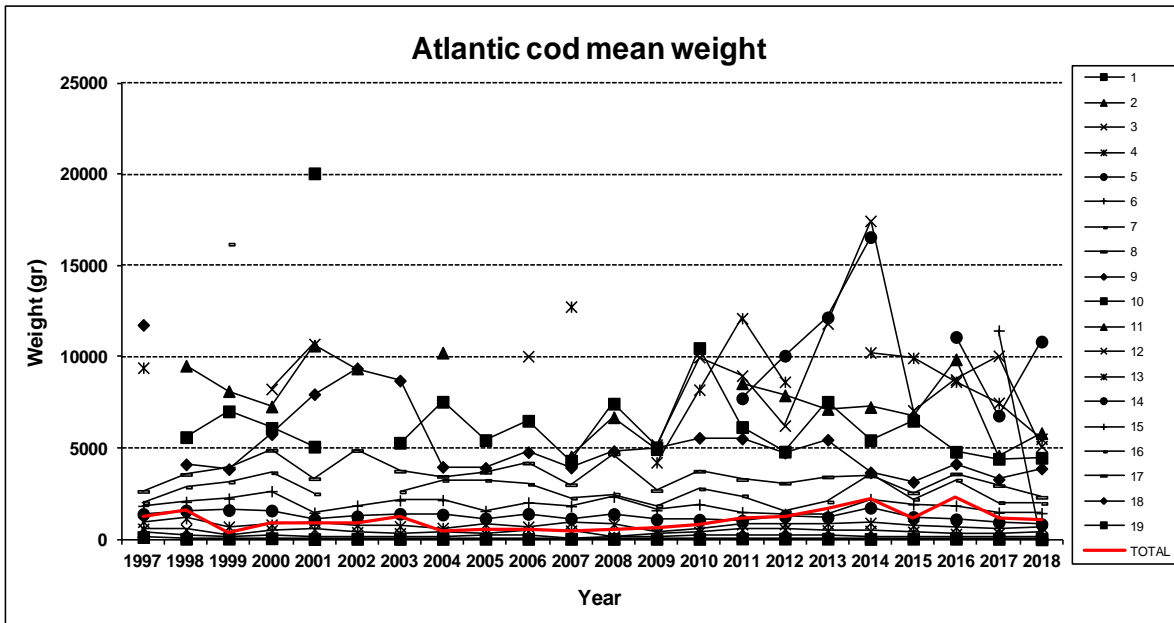


Figure 23. Atlantic cod mean weight (gr) at age on NAFO 3NO: 1997-2018. Ages from 1 to 19. Data from 2014 to 2018 are in Table 31; data for 1997-2013 can be seen in SCR Doc 14/005.