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Yellowtail flounder, redfish (*Sebastes spp.*) and witch flounder indices from the Spanish Survey conducted in Divisions 3NO of the NAFO Regulatory Area

by

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Abstract

Since 1995, Spain carries out a spring stratified random bottom trawl survey in Div. 3NO of the NAFO Regulatory Area. Total mean catches, biomass and mean numbers for yellowtail flounder (*Limanda ferruginea*) are presented for the period 1995-2019, for redfish (*Sebastes spp.*) for the period 1997-2019 and for witch flounder (*Glyptocephalus cynoglossus*) for the period 2002-2019. Detailed indices are presented from 2015.

Yellowtail flounder indices do not show a clear trend between 1999 and 2016. The 2017-2019 values were lower than the 1998 one. There has not been good recruitment in recent years. Redfish indices oscillate greatly over time, probably because the gear does not sample adequately aggregating pelagic species. There was a sharp increase in 2009 and since then until 2015, biomass fluctuated maintaining higher values than before 2009. In 2016 biomass dropped and increase again in 2017-2019 to or below the 2012 level. The 3N division comprises around the 90% of the total biomass in the last years. Good year classes have not been registered recently. Abundance by Division shows since 2002 shows the same trend of the biomass; most of the abundance corresponds to Division 3N. Witch flounder is very scarce and its indices fluctuated throughout the series reaching a low level in 2014 and 2018, with an increasing trend in the middle time. The 2019 value is the lowest of the series, being less than 50% of 2014 value. Recruitment was quite good at the beginning of the series but poor in recent years.

Material and methods

The Spanish Spring (May/June) survey in Div. 3NO of NAFO Regulatory Area was initiated by Spain in 1995. Until 2001, the survey was carried out on board the Spanish vessel C/V *Playa de Menduiña* (338 GT and 800 HP) using a *Pedreira* type bottom trawl. The R/V *Vizconde de Eza* replaced the C/V *Playa de Menduíña* in 2001, and the *Campelen* 1800 was implemented as survey gear. For more details about the technical specifications of the surveys, see Walsh *et al.* (2001) and González Troncoso *et al.* (2004).

In each haul, all the individuals caught were sorted by species and weighted. Random samples of the catch of each species were length measured (total length) to the nearest lower cm. The obtained length distribution was aggregated into 2 cm intervals (beginning with the pair number) and raised to the catch of each species.

Table 1 presents the number of valid tows, the depth strata covered and the dates of the total survey series. Table 2 shows the swept area and number of hauls by stratum for the last five years (2015-2019). To know the results of the rest of the years, see González-Troncoso *et al.* (2015).

The redfish series for total biomass and total mean catches and mean number per tow start in 1997 because sampling depth in 1995 and 1996 was shallower than 1000 meters so the data are not representative for this species. As all strata where the yellowtail flounder is caught were well surveyed, the series for this species are presented since 1995. As calibration for witch flounder data has not been done yet, only data from 2002 are presented. Data for yellowtail flounder and redfish were calibrated for the period 1995-2000 and no-transformed from 2002 onwards, to create a combined 1995-2019 time-series. Regarding 2001, there are both calibrated (from the former vessel) and non-transformed data (from the new vessel). More information on the calibration method can be found in González-Troncoso *et al.* (2004).

Mean catch and variance per haul, biomass and length distribution by strata are presented for each species for the last five years (2015-2019). To see the results of the rest of the years, see González-Troncoso *et al.* (2015). Total biomass and mean catch per tow with SD and mean number per tow by year are presented for the total period series.

Figure 1 presents the maps with the distribution of the catches of the three species during the 2019 Spanish 3NO survey.

Results

Yellowtail flounder

After a moratorium between 1994 and 1997, the yellowtail flounder fishery has been under TAC. According to the Report of NAFO Scientific Council Meeting, stock size reached a minimum in the mid 1990´s, but since 1994 has steadily increased and is now well above B_{msy}. There is very low risk of the stock being below B_{msy} or F being above F_{msy} (NAFO, 2019).

Mean Catches and Biomass

Table 3 shows mean catch and SD per haul and stratum and Table 4 the biomass estimates by the swept area method and their SD by stratum for years 2015-2019 for yellowtail flounder. Total biomass (t) and stratified mean catch per tow (kg) and SD by year for the entire series are presented in Table 5 for 1995-2019. Table 6 presents the parameters *a* and *b* for the calculation of the length-weight relationship for years 2015-2019.

Yellowtail flounder biomass index showed no clear trend between 1999 and 2016. It increased substantially from 1997 to 1999, has maintained almost constant values until 2013 and then decreased in 2014-2019. The 2017-2019 values were lower than the 1998 one (Table 5; Figures 2 and 3).

Length Distribution

The mean number per haul by year is presented in Table 7 and Figure 2 for 1995-2019 and Table 8 presents the same index by length, sex and year besides the sampled size and catch for the period 2015-2019. Figures 4 and 5 present theses indices for the entire period. The mean numbers are in concordance with the mean catches (Figure 2). There has not been good recruitment in recent years. In Figure 4, we can follow a length modal value since the beginning of the series, but the presence of juveniles is very low. This mode can be seen until 2009 when it reached 34-35 cm, and since 2010 the mode of the length distribution was about 30-34 cm. In 2013-2019 the mode was at 34-35 cm for females, and at 30-33 cm for males.

Redfish

There are two species of redfish that have been commercially fished in Div. 3NO; the deep-sea redfish (*Sebastes mentella*) and the Acadian redfish (*Sebastes fasciatus*). Due to the difficulty to distinguish the two species, the catches are usually reported by genus as "redfish" (*Sebastes* spp.) in the commercial fishery statistics.

This stock in Div. 3O has been under TAC regulation since 1974. In September 2004, the Fisheries Commission adopted an annual TAC of 20 000 t in the entire area of Div. 3O. The stock appears to have increased since the early 2000s. Catches were stable from 2009 to 2014. Survey index values have declined from those observed in 2012 when values were near time-series highs.

In 3N (the stock is 3LN) a moratorium was implemented from 1998 to 2009. The fishery was reopened in 2010 with the resultant increase of catches but the perception of the stock given by the available surveys has not been altered. Fishing mortality declined from 1991 to 1996, being from 1996 to 2016 at a level close to zero, with a marginal increase in 2018 (NAFO, 2019).

Mean Catches and Biomass

Redfish mean catches and SD are presented in Table 9 and biomass in Table 10 by stratum for 2015-2019. Annual biomass and stratified mean catch and SD per haul for years 1997-2019 are presented in Table 11 by Division. The length-weight relationship parameters *a* and *b* are presented in Table 12 for years 2015-2019.

Redfish indices oscillate greatly over time, probably because the gear does not sample adequately aggregating pelagic species. They showed a quick increase from 1997 to 2000, followed by a sudden drop until 2002, after which they have increased to the levels of the early years of the time series. The index increased nearly fivefold in 2009 in comparison with 2005. This was not just due to very large catches in few hauls, as redfish catch was over 1 ton in 11 of the 43 hauls in which redfish was caught. Furthermore, redfish catch was over 15 tons in three hauls. In 2015, an increase allowed biomass to reach the second highest value of the series. In this case, redfish catch was over 10 tons in 3 hauls. Then biomass dropped fourfold in 2016 and increase again in 2017-2019 to or below the 2012 level (Table 10; Figures 6 and 7).

Biomass and mean catch per haul and Division, the number of strata covered in each case, and the percentage of biomass in 3N respect to the total are presented in Table 11. Biomass is always larger in 3N than in 3O (Figure 8), although the percentage is very spread over the time. However, the mean catch per tow was higher in Division 3O until 2004. Since 2005, more than 83% of redfish biomass has occurred in Division 3N. In 2010, mean catch per tow in 3O was almost three times higher than in 2009, whereas in 3N was lower than in 2009. In 2013 and 2015, the increase in the total biomass was due to the increase in Division 3N. Last four years indices fluctuated. In 2018 and 2019, the 3O biomass is the third and the fourth lowest of the series, respectively.

Length Distribution

Mean number per haul by year is presented in Table 13 and Figure 6 for 1997-2019. Table 14 presents this index per length with sample size and catch for the period 2015-2019. Figures 9 and 10 show the trend of the mean abundance per tow by length class. The y-axis upper limit of Figure 10 has been changed for years 1997-2008 to see the length distribution despite the large catches registered in the period 2009-2019. The last good year class was recorded in 2004 and this cohort can be tracked until 2019. In recent years there was only a discrete presence of juveniles. The clear 18 cm mode in 2009 (20 cm in 2011) seems to be a consequence of the 2004 recruitment. In 2012 and 2013 the mode is in 20-21 cm, in 22-23 cm for 2014-2018 and 24-26 cm in 2019.

Length distribution in thousands (abundance) by Division and year since 2002 is presented in Table 15, together with total abundance by Division and year, in order to see the structure of the population in each Division. Following the trend of the biomass, most of the abundance corresponds to Division 3N (Figure 11).

Witch flounder

This stock occurs mainly in Div. 3O, along the South-western slopes of the Grand Bank, but it seems to migrate seasonally onto the shallow banks. It has been fished mainly in winter and springtime, targeting the spawning concentrations. The stock size increased since 1994 to 2013 and then declined from 2013-2015 and has since increased slightly. In 2019 the stock is at 41% B_{msy} (60000t) There is 0.20 risk of the stock being below B_{lim} and a 0.02 risk of F being above F_{lim} (0.063). With the exception of the growth of the stock following improved recruitment in the late 1990s, it is unclear if the recruitment index is representative (NAFO, 2019).

Mean Catches and Biomass

Witch flounder mean catches and SD by stratum are presented in Table 16 and biomass per stratum in Table 17 for 2015-2019. In Table 18 and Figures 12 and 13 the annual stratified mean catch per tow and biomass with SD are presented for the period 2002-2019. The length-weight relationship parameters *a* and *b* are presented in Table 19 for 2015-2019.

Witch flounder indices fluctuated throughout the period 2002-2019, reaching a low level in 2014 and 2018, with an increasing trend in the middle time. The 2019 value is the lowest of the series, being less than 50% of 2014 value. Highest values were found in 2004, 2010 and 2017 (Table 18; Figures 12 and 13).

Length Distribution

Table 20 and Figures 14 and 15 present witch flounder mean number per tow and sex by year for 2002-2019, and Table 21 the same index by length with sample size and catch for the period 2015-2019. The best recruitment occurred in the period 2002-2005 and has been very poor since 2008. Some modes can be tracked in Figure 14, probably due to the recruitments at the beginning of the series. In 2012 and 2013 there was a quite good presence of individuals of lengths 34-42 cm, poorly found in 2014, but that can be followed in 2015-2017. In 2018 and 2019, the presence of all the length ranges is small.

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Table 1. Spanish spring bottom trawl surveys in NAFO Div. 3NO: 1995-2019.

Year	Vessel	Valid tows	Depth strata covered (m)	Dates
1995	C/V *Playa de Menduíña*	77	42-684	May 18-May 29
1996	C/V *Playa de Menduíña*	112	41-1135	May 07-May 24
1997	C/V *Playa de Menduíña*	128	42-1263	April 26-May 18
1998	C/V *Playa de Menduíña*	124	42-1390	May 06-May 26
1999	C/V *Playa de Menduíña*	114	41-1381	May 07-May 26
2000	C/V *Playa de Menduíña*	118	42-1401	May 07-May 28
2001(*)	R/V *Vizconde de Eza*	83	36-1156	May 03-May 24
	C/V *Playa de Menduíña*	121	40-1500	May 05-May 23
2002	R/V *Vizconde de Eza*	125	38-1540	April 29-May 19
2003	R/V *Vizconde de Eza*	118	38-1666	May 11-June 02
2004	R/V *Vizconde de Eza*	120	43-1539	June 06–June 24
2005	R/V *Vizconde de Eza*	119	47-1485	June 10–June 29
2005	R/V *Vizconde de Eza*	119	47-1485	June 10–June 29
2006	R/V *Vizconde de Eza*	120	45-1480	June 7–June 27
2007	R/V *Vizconde de Eza*	110	45-1374	May 29–June 19
2008	R/V *Vizconde de Eza*	122	45-1374	May 27–June 16
2009	R/V *Vizconde de Eza*	109	45-1374	May 31–June 18
2010	R/V *Vizconde de Eza*	95	45-1374	May 30–June 18
2011	R/V *Vizconde de Eza*	122	44-1450	June 5–June 24
2012	R/V *Vizconde de Eza*	122	44-1450	June 3–June 21
2013	R/V *Vizconde de Eza*	122	44-1450	June 1–June 21
2014	R/V *Vizconde de Eza*	122	44-1450	June 2–June 21
2015	R/V *Vizconde de Eza*	122	44-1450	May 31-June 19
2016	R/V *Vizconde de Eza*	115	44-1450	May 30-June 18
2017	R/V Vizconde de Eza	113	44-1450	May 23-June 11
2018	R/V *Vizconde de Eza*	114	44-1450	June 2-June 21
2019	R/V *Vizconde de Eza*	115	44-1450	June 8-June 24

(*)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 Menduíña* (123 hauls in total)

Table 2. Swept area and number of hauls by stratum. Spanish Spring Surveys in NAFO Div. 3NO: 2015-2019. Swept area in square miles. n.s. means stratum not surveyed.

	2015		2016		2017		2018		2019	
Stratum	Swept area	Tow number	Swept area	Tow number	Swept area	Tow number	Swept area	Tow number	Swept area	Tow number
353	0.0401	3	0.0356	3	0.0360	3	0.0338	3	0.0386	3
354	0.0390	3	0.0345	3	0.0356	3	0.0341	3	0.0383	3
355	0.0263	2	0.0233	2	0.0225	2	0.0233	2	0.0263	2
356	0.0255	2	0.0225	2	0.0233	2	0.0225	2	0.0248	2
357	0.0233	2	0.0233	2	0.0233	2	0.0236	2	0.0251	2
358	0.0349	3	0.0338	3	0.0364	3	0.0345	3	0.0383	3
359	0.0855	7	0.0593	5	0.0596	5	0.0589	5	0.0634	5
360	0.2363	20	0.1995	17	0.2044	17	0.1939	17	0.2213	17
374	0.0229	2	0.0233	2	0.0236	2	0.0225	2	0.0255	2
375	0.0341	3	0.0360	3	0.0364	3	0.0356	3	0.0383	3
376	0.1159	10	0.0945	8	0.0975	8	0.0908	8	0.1043	8
377	0.0233	2	0.0233	2	0.0251	2	0.0233	2	0.0263	2
378	0.0225	2	0.0225	2	0.0236	2	0.0229	2	0.0259	2
379	0.0225	2	0.0229	2	0.0244	2	0.0225	2	0.0263	2
380	0.0229	2	0.0236	2	0.0236	2	0.0225	2	0.0263	2
381	0.0236	2	0.0229	2	0.0229	2	0.0225	2	0.0255	2
382	0.0458	4	0.0465	4	0.0360	3	0.0450	4	0.0645	5
721	0.0240	2	0.0225	2	0.0229	2	0.0229	2	0.0263	2
722	0.0259	2	0.0229	2	0.0233	2	0.0236	2	0.0255	2
723	0.0233	2	0.0225	2	0.0229	2	0.0240	2	0.0248	2
724	0.0236	2	0.0233	2	0.0240	2	0.0233	2	0.0244	2
725	0.0229	2	0.0229	2	0.0244	2	0.0233	2	0.0255	2
726	0.0229	2	0.0225	2	0.0233	2	0.0225	2	0.0259	2
727	0.0225	2	0.0225	2	0.0229	2	0.0225	2	0.0248	2
728	0.0225	2	0.0229	2	0.0229	2	0.0225	2	0.0248	2
752	0.0225	2	0.0236	2	0.0236	2	0.0233	2	0.0266	2
753	0.0233	2	0.0229	2	0.0233	2	0.0236	2	0.0248	2
754	0.0225	2	0.0225	2	0.0218	2	0.0225	2	0.0240	2
755	0.0450	4	0.0458	4	0.0338	3	0.0338	3	0.0356	3
756	0.0229	2	0.0225	2	0.0229	2	0.0229	2	0.0251	2
757	0.0229	2	0.0225	2	0.0225	2	0.0225	2	0.0263	2
758	0.0221	2	0.0221	2	0.0229	2	0.0225	2	0.0259	2
759	0.0229	2	0.0229	2	0.0225	2	0.0225	2	0.0251	2
760	0.0225	2	0.0229	2	0.0236	2	0.0356	3	0.0255	2
761	0.0240	2	0.0225	2	0.0236	2	0.0124	1	0.0236	2
762	0.0229	2	0.0225	2	0.0229	2	0.0225	2	0.0255	2
763	0.0341	3	0.0338	3	0.0353	3	0.0345	3	0.0383	3
764	0.0251	2	0.0225	2	0.0229	2	0.0225	2	0.0248	2
765	0.0236	2	0.0229	2	0.0225	2	0.0233	2	0.0251	2
766	0.0236	2	0.0229	2	0.0225	2	0.0229	2	0.0248	2
767	0.0229	2	0.0229	2	0.0229	2	0.0236	2	0.0244	2

Table 3. Yellowtail flounder mean catch (kg) and SD by stratum. Spanish Spring Surveys in NAFO Div. 3NO: 2015-2019. n.s. means stratum not surveyed.

	2015		2016		2017		2018		2019	
Stratum	Y. flounder Mean catch	Y. flounder SD	Y. flounder Mean catch	Y. flounder SD	Y. flounder Mean catch	Y. flounder SD	Y. flounder Mean catch	Y. flounder SD	Y. flounder Mean catch	Y. flounder SD
353	34.18	48.09	7.82	13.54	27.50	23.33	3.40	5.56	0.00	0.00
354	2.28	3.94	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
355	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
356	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
357	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
358	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
359	2.27	2.92	0.24	0.36	0.05	0.11	0.44	0.46	0.00	0.00
360	286.35	205.84	277.57	501.85	260.47	349.29	179.78	128.90	97.45	142.67
374	220.08	96.88	227.62	23.37	3.49	4.50	168.18	114.08	81.72	7.95
375	195.40	124.81	84.61	24.64	45.17	54.99	44.41	23.76	37.26	6.16
376	553.63	422.74	722.38	520.54	309.79	234.89	506.07	308.21	191.10	117.71
377	7.53	10.64	0.76	1.07	0.36	0.51	0.00	0.00	0.52	0.74
378	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
379	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
380	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
381	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
382	0.00	0.00	0.33	0.48	0.25	0.43	0.00	0.00	0.00	0.00
721	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	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	0.00	0.00	0.00	0.00	0.00	0.00	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	0.00	0.00	0.00	0.00	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 4. Yellowtail flounder survey biomass (t) by stratum in NAFO Div. 3NO: 2015-2019. n.s. means stratum not surveyed.

Strata	2015	2016	2017	2018	2019	Strata	2015	2016	2017	2018	2019
353	688	177	616	81	0	**725**	0	0	0	0	0
354	43	0	0	0	0	**726**	0	0	0	0	0
355	0	0	0	0	0	**727**	0	0	0	0	0
356	0	0	0	0	0	**728**	0	0	0	0	0
357	0	0	0	0	0	**752**	0	0	0	0	0
358	0	0	0	0	0	**753**	0	0	0	0	0
359	78	9	2	16	0	**754**	0	0	0	0	0
360	67463	65826	60296	43872	20839	**755**	0	0	0	0	0
374	4118	4190	63	3199	1372	**756**	0	0	0	0	0
375	4655	1911	1010	1014	792	**757**	0	0	0	0	0
376	63736	81580	33908	59513	19562	**758**	0	0	0	0	0
377	65	6	3	0	4	**759**	0	0	0	0	0
378	0	0	0	0	0	**760**	0	0	0	0	0
379	0	0	0	0	0	**761**	0	0	0	0	0
380	0	0	0	0	0	**762**	0	0	0	0	0
381	0	0	0	0	0	**763**	0	0	0	0	0
382	0	10	7	0	0	**764**	0	0	0	0	0
721	0	0	0	0	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 5. Yellowtail flounder survey biomass (t) with SD and stratified mean catch per tow (kg) and SD by year in NAFO Div. 3NO: 1995-2019.

Year	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Biomass	9264	43349	38697	122601	197012	144685	182704	148487	136775	169978	156472	160145	160731
SD	2484	6032	8527	31359	22938	19097	25847	23368	19287	18869	15271	16458	18852
MCPT	16.22	59.54	47.74	137.32	232.41	167.76	210.84	164.28	148.92	190.05	176.42	189.32	202.64
SD	4.37	8.41	10.69	34.70	27.41	22.21	30.58	24.92	20.84	21.27	17.06	19.83	23.61

Year	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Biomass	160146	183412	189687	203833	195606	187969	136484	140845	153708	95905	107695	42569
SD	17297	25736	22611	30743	23679	22493	29519	18915	34788	22868	15055	8578
MCPT	178.27	209.43	224.54	231.22	221.33	214.17	173.79	159.25	175.03	112.03	118.41	53.55
SD	19.00	29.75	26.30	35.18	26.27	25.35	38.52	21.37	40.46	25.20	16.47	10.75

Table 6. Yellowtail flounder length weight relationships in Spanish Spring Surveys in NAFO Div. 3NO: 2015-2019. E(x) means Error of the parameter x.

	Males						Females						Total					
Year	**a**	**b**	**E (a)**	**E (b)**	**R2**	**N**	**a**	**b**	**E (a)**	**E (b)**	**R2**	**N**	**a**	**b**	**E (a)**	**E (b)**	**R2**	**N**
2015	**0.00491**	**3.16089**	0.2087	0.0646	0.988	506	**0.0069**	**3.0678**	0.0797	0.0233	0.998	611	**0.0066**	**3.0784**	0.0242	0.0383	0.997	1144
2016	**0.01051**	**2.94093**	0.0867	0.0270	0.998	311	**0.0086**	**3.0047**	0.0584	0.0175	0.999	441	**0.0110**	**2.9338**	0.0740	0.0225	0.998	756
2017	**0.00720**	**3.03484**	0.1616	0.0513	0.993	284	**0.0056**	**3.1206**	0.0840	0.0249	0.998	402	**0.0063**	**3.0871**	0.0838	0.0256	0.997	689
2018	**0.00406**	**3.21763**	0.1175	0.0359	0.999	358	**0.0044**	**3.2050**	0.0893	0.0262	0.999	436	**0.0038**	**3.2409**	0.0658	0.0194	0.999	794
2019	**0.00721**	**3.05949**	0.1319	0.0401	0.995	390	**0.0049**	**3.1766**	0.0964	0.0280	0.998	547	**0.0059**	**3.1268**	0.0646	0.0192	0.999	937

Table 7. Yellowtail flounder mean number per tow by year in Spanish Spring surveys in NAFO Div. 3NO: 1995-2019. Indet. means indeterminate.

	1995				1996				1997				1998				1999				2000				2001			
	Males	Females	Indet.	Total	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	31.12	47.36	6.14	84.62	73.11	188.83	13.23	275.17	134.85	147.98	0.00	282.83	279.83	343.35	1.61	624.79	508.72	539.70	4.48	1052.90	332.06	376.36	0.00	708.42	328.27	428.33	6.98	763.57

	2002				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	Males	Females	Indet.	Total
MNPT	256.56	333.09	0.81	590.46	215.96	271.49	0.72	488.17	322.91	336.03	1.19	660.14	275.52	308.25	0.30	584.07	281.15	354.69	0.60	636.44	317.34	365.53	0.10	682.97	295.11	335.10	0.15	630.35

	2009				2010				2011				2012				2013				2014				2015			
	Males	Females	Indet.	Total	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	298.01	398.88	0.48	697.37	368.83	414.09	0.00	782.92	305.92	426.42	0.00	732.34	315.50	438.48	0.75	754.73	294.58	394.06	0.79	689.43	226.69	293.78	0.03	520.50	219.81	248.70	0.11	468.62

	2016				2017				2018				2019			
	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total
MNPT	227.23	274.70	0.02	501.95	154.84	179.89	0.02	334.75	139.66	193.84	0.00	333.49	65.25	77.16	0.00	142.41

Table 8. Yellowtail flounder mean number per tow by length class and year. Spanish Spring Survey on NAFO 3NO: 2015-2019. Indet. means indeterminate.

	2015				2016				2017				2018				2019			
Lenght (cm.)	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total
4	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
6	0.000	0.000	0.090	0.090	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
8	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.066	0.012	0.078	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
10	0.065	0.000	0.023	0.088	0.000	0.048	0.024	0.071	0.009	0.000	0.012	0.021	0.000	0.274	0.000	0.274	0.000	0.000	0.000	0.000
12	0.393	0.168	0.000	0.561	0.290	0.111	0.000	0.401	0.256	0.282	0.000	0.538	0.274	0.468	0.000	0.742	0.016	0.009	0.000	0.024
14	0.429	0.083	0.000	0.512	0.242	0.174	0.000	0.417	0.674	0.638	0.000	1.312	0.824	0.112	0.000	0.936	0.101	0.117	0.000	0.218
16	0.171	0.746	0.000	0.918	0.087	0.024	0.000	0.110	1.004	1.284	0.000	2.288	0.042	0.387	0.000	0.429	0.047	0.086	0.000	0.134
18	0.566	0.407	0.000	0.973	0.322	0.329	0.000	0.651	1.132	1.845	0.000	2.977	1.512	1.004	0.000	2.517	0.501	0.258	0.000	0.759
20	2.428	1.127	0.000	3.555	1.779	0.121	0.000	1.900	4.426	4.100	0.000	8.526	4.222	4.365	0.000	8.587	0.515	0.586	0.000	1.101
22	2.189	1.347	0.000	3.536	1.926	1.404	0.000	3.330	2.020	2.289	0.000	4.309	4.981	4.255	0.000	9.236	0.796	1.208	0.000	2.004
24	2.731	2.106	0.000	4.837	4.847	2.475	0.000	7.321	2.101	1.182	0.000	3.283	6.089	6.847	0.000	12.937	1.755	2.982	0.000	4.738
26	7.828	4.621	0.000	12.449	6.958	4.266	0.000	11.224	4.675	2.929	0.000	7.604	3.499	3.694	0.000	7.193	4.205	4.045	0.000	8.251
28	26.388	9.768	0.000	36.156	20.890	7.345	0.000	28.235	11.436	5.626	0.000	17.062	8.696	5.002	0.000	13.697	4.049	3.702	0.000	7.751
30	65.705	25.661	0.000	91.366	58.091	25.110	0.000	83.201	35.663	7.758	0.000	43.421	25.823	8.614	0.000	34.437	8.801	3.305	0.000	12.106
32	68.516	53.570	0.000	122.086	81.325	46.999	0.000	128.323	54.496	27.290	0.000	81.785	45.404	24.524	0.000	69.928	20.368	5.990	0.000	26.358
34	32.700	54.184	0.000	86.884	37.685	66.522	0.000	104.207	29.456	42.583	0.000	72.039	27.260	45.645	0.000	72.905	18.071	13.492	0.000	31.563
36	8.310	43.816	0.000	52.126	9.676	58.832	0.000	68.507	6.127	40.587	0.000	46.715	9.287	47.535	0.000	56.823	5.043	18.210	0.000	23.253
38	1.097	27.918	0.000	29.014	2.072	39.605	0.000	41.677	1.238	23.231	0.000	24.469	1.484	24.834	0.000	26.318	0.801	13.923	0.000	14.724
40	0.218	14.529	0.000	14.747	1.008	13.539	0.000	14.547	0.124	10.879	0.000	11.002	0.024	9.924	0.000	9.948	0.162	5.979	0.000	6.142
42	0.027	6.371	0.000	6.399	0.037	5.483	0.000	5.520	0.000	5.154	0.000	5.154	0.217	3.461	0.000	3.679	0.000	2.497	0.000	2.497
44	0.048	1.564	0.000	1.612	0.000	1.819	0.000	1.819	0.000	1.644	0.000	1.644	0.000	2.211	0.000	2.211	0.010	0.627	0.000	0.637
46	0.000	0.532	0.000	0.532	0.000	0.454	0.000	0.454	0.000	0.432	0.000	0.432	0.000	0.579	0.000	0.579	0.000	0.100	0.000	0.100
48	0.000	0.154	0.000	0.154	0.000	0.037	0.000	0.037	0.000	0.028	0.000	0.028	0.017	0.093	0.000	0.110	0.010	0.044	0.000	0.055
50	0.000	0.027	0.000	0.027	0.000	0.000	0.000	0.000	0.000	0.066	0.000	0.066	0.000	0.008	0.000	0.008	0.000	0.000	0.000	0.000
52	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
54	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
56	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
58	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	219.809	248.701	0.113	468.623	227.233	274.697	0.024	501.954	154.837	179.893	0.024	334.754	139.656	193.837	0.000	333.493	65.253	77.161	0.000	142.414
Nº samples:				44				34				35				35				28
Nº Ind.:	3831	4834	4	8669	1595	2466	1	4062	1675	2234	2	3911	1918	3032	0	4950	1567	2315	0	3882
Sampled catch:				3023				1489				1387				1844				1512
Range:				6-50				10-48				9-51				10-50				12-49
Total catch:				12				11234				7133				7587				3462
Total hauls:				122				115				113				114				115

Table 9. Redfish mean catch (kg) and SD by stratum. Spanish Spring Surveys in NAFO Div. 3NO: 2015-2019. n.s. means stratum not surveyed.

	2015		2016		2017		2018		2019	
Stratum	Redfish Mean catch	Redfish SD	Redfish Mean catch	Redfish SD	Redfish Mean catch	Redfish SD	Redfish Mean catch	Redfish SD	Redfish Mean catch	Redfish SD
353	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.07	0.00	0.00
354	972.97	883.47	482.34	791.85	540.03	923.90	1.26	1.15	0.75	1.14
355	1954.04	1984.34	513.80	79.20	708.98	623.84	35.22	32.22	16.55	3.68
356	707.30	62.72	210.70	127.84	1146.51	193.97	301.03	103.63	429.98	90.90
357	3886.69	2152.38	835.95	247.78	2502.83	2277.84	5876.23	3065.60	5134.54	5570.52
358	16765.95	10954.46	3706.23	3517.46	6005.13	4962.78	5435.00	7779.65	2006.12	749.42
359	356.78	723.22	1.55	1.46	1379.60	3054.66	119.55	248.28	2.91	4.55
360	0.00	0.00	0.37	1.37	0.00	0.00	0.07	0.29	0.00	0.00
374	0.00	0.00	0.00	0.00	2.63	3.71	0.00	0.00	0.00	0.00
375	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
376	0.00	0.00	0.49	1.20	0.00	0.00	0.00	0.00	0.00	0.00
377	0.00	0.00	0.00	0.00	1.30	1.84	3.09	3.27	180.00	254.56
378	6175.36	8441.67	164.55	220.41	3472.11	4099.57	811.36	920.67	1995.33	1230.71
379	3080.27	3492.78	611.70	12.55	318.93	10.01	5747.14	1716.66	4189.49	1349.32
380	1175.26	110.17	607.60	758.98	3.91	1.82	1062.54	1501.58	843.98	700.71
381	25.28	28.59	0.03	0.04	0.29	0.38	0.54	0.74	0.03	0.04
382	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.53	1.19
721	445.63	481.01	106.80	1.27	148.93	42.46	362.65	29.84	369.90	433.17
722	5.07	7.17	14.68	16.72	5.92	2.66	20.91	28.86	52.07	73.16
723	576.35	407.93	437.23	319.80	1544.42	1811.07	1633.62	1493.64	610.69	733.96
724	72.34	86.36	1.71	1.07	40.04	6.88	221.00	275.42	9.36	3.83
725	633.76	720.63	1138.33	1230.83	391.65	321.52	253.61	157.39	139.65	13.36
726	35.40	29.27	18.44	1.68	50.81	37.60	21.44	17.13	33.00	43.47
727	207.30	73.40	208.40	230.66	195.29	45.17	116.90	153.16	9.47	9.16
728	10.11	13.28	9.40	1.98	4.30	1.85	82.65	100.62	10.81	6.20
752	0.00	0.00	0.25	0.35	1.74	1.84	1.57	2.22	0.00	0.00
753	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.40	3.39
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	0.73	0.00	1.62	2.28	0.00	0.00	2.39	3.37	0.00	0.00
757	0.38	0.54	1.74	2.46	0.41	0.58	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	2.42	3.42	0.00	0.00	0.00	0.00	0.00	0.00
760	0.00	0.00	0.07	0.09	0.36	0.51	0.00	0.00	0.34	0.48
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	0.09	0.15	0.00	0.00	1.45	1.37
764	0.00	0.00	0.00	0.00	0.07	0.09	0.00	0.00	0.00	0.00
765	1.02	1.44	0.00	0.00	0.35	0.49	0.00	0.00	0.00	0.00
766	0.00	0.00	3.30	4.67	0.00	0.00	0.59	0.83	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 10. Redfish survey biomass (t) by stratum in NAFO Div. 3NO: 2015-2019. n.s. means stratum not surveyed.

Strata	2015	2016	2017	2018	2019
353	0	0	0	1	0
354	18412	10318	11187	27	15
355	11017	3271	4663	224	93
356	2607	880	4635	1258	1633
357	54832	11793	35309	81583	67030
358	324502	74125	111435	106337	35402
359	12297	55	48706	4274	97
360	0	87	0	17	0
374	0	0	48	0	0
375	0	0	0	0	0
376	0	56	0	0	0
377	0	0	10	27	1371
378	76300	2033	40857	9860	21438
379	29023	5669	2774	54151	33835
380	9864	4938	32	9067	6173
381	308	0	4	7	0
382	0	0	0	0	14
721	2414	617	846	2061	1832
722	33	108	43	149	343
723	7685	6024	20930	21101	7649
724	759	18	414	2357	95

Strata	2015	2016	2017	2018	2019
725	5818	10450	3374	2291	1150
726	223	118	315	137	184
727	1769	1778	1639	998	73
728	70	64	29	573	68
752	0	3	19	18	0
753	0	0	0	0	27
754	0	0	0	0	0
755	0	0	0	0	0
756	6	14	0	21	0
757	3	16	4	0	0
758	0	0	0	0	0
759	0	27	0	0	0
760	0	1	5	0	4
761	0	0	0	0	0
762	0	0	0	0	0
763	0	0	2	0	30
764	0	0	1	0	0
765	11	0	4	0	0
766	0	42	0	7	0
767	0	0	0	0	0

Table 11. Redfish survey biomass (t) with SD and stratified mean catch per tow (kg) and SD by year and Division in NAFO Div. 3NO: 1997-2019.

Div	Year	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
3NO	Biomass	5947	40909	76564	99226	63350	11172	15714	35275	157716	103029	98805	74172
	SD	988	20512	27740	33453	41460	2374	3224	7332	52646	23332	15893	26168
	MCPT	6.79	43.25	85.45	112.71	73.14	12.43	17.21	38.60	175.79	118.76	125.66	82.20
	SD	1.15	19.50	29.56	40.03	48.13	2.60	3.55	8.05	58.86	27.83	20.19	29.14
	Nº Strata	36	41	41	41	41	41	41	41	41	41	36	41
3N	Biomass	4753	22540	46459	68928	53855	7620	11031	27016	146918	87830	87602	68059
	SD	353	17632	25022	33109	41371	2106	3199	7174	52267	22675	15364	25890
	MCPT	6.14	26.32	58.78	90.12	71.16	9.62	13.83	33.95	187.61	115.44	124.79	86.51
	SD	0.46	18.33	30.08	45.16	55.00	2.61	4.05	9.06	67.31	30.96	22.09	33.12
	Nº Strata	27	31	31	31	31	31	31	31	31	31	28	31
3O	Biomass	1194	18369	30105	30298	9494	3552	4684	8259	10797	15199	11203	6113
	SD	922	10490	12129	6073	2702	1117	369	1326	2728	5279	3362	3258
	MCPT	11.41	159.86	269.16	268.32	86.80	31.74	40.55	70.63	94.35	141.64	132.90	52.55
	SD	8.68	87.87	107.03	54.27	24.47	9.78	3.10	11.68	24.19	52.04	39.93	28.27
	Nº Strata	9	10	10	10	10	10	10	10	10	10	8	10
3N/Total (%) Biomass		80	55	61	69	85	68	70	77	93	85	89	92

Div	Year	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
3NO	Biomass	763980	431296	487655	294033	458716	190832	557954	132505	287284	296546	178556
	SD	145765	69575	107982	62954	76825	54478	143611	44195	84550	97593	51184
	MCPT	670.46	506.43	543.17	320.52	502.58	240.24	628.14	145.51	330.49	331.74	220.53
	SD	172.93	81.06	124.68	72.27	79.94	69.17	164.37	46.90	98.46	106.48	65.66
	Nº Strata	39	37	41	41	41	41	41	41	41	41	41
3N	Biomass	735743	359536	418305	265238	429532	178055	523461	117270	265904	292819	174641
	SD	143334	58306	99454	60304	76128	54133	143235	43583	83567	85221	51604
	MCPT	721.67	473.94	533.85	330.89	539.18	256.34	669.86	147.23	350.85	375.19	247.00
	SD	194.48	76.53	132.71	80.20	91.06	79.00	187.34	52.24	111.75	121.94	75.16
	Nº Strata	30	29	31	31	31	31	31	31	31	31	31
3O	Biomass	28238	71760	69350	28795	29184	12778	34493	15235	21379	3727	3916
	SD	16762	37821	41858	16754	7503	3927	12527	10014	12196	12371	1583
	MCPT	280.98	772.76	607.40	249.04	250.43	129.36	340.74	133.66	190.25	32.41	38.17
	SD	163.87	402.81	362.85	140.90	64.52	39.61	125.38	85.91	103.27	3.37	15.71
	Nº Strata	9	8	10	10	10	10	10	10	10	10	10
3N/Total (%) Biomass		96	83	86	90	94	93	94	89	93	99	98

Table 12. Redfish length weight relationships in Spanish Spring Surveys in NAFO Div. 3NO: 2015-2019. E(x) means Error of the parameter x.

	Males						Females						Total					
Year	**a**	**b**	**E(a)**	**E(b)**	**R2**	**N**	**a**	**b**	**E(a)**	**E(b)**	**R2**	**N**	**a**	**b**	**E(a)**	**E(b)**	**R2**	**N**
2015	**0.00757**	**3.17016**	0.1274	0.0387	0.995	517	**0.0087**	**3.1206**	0.1057	0.0315	0.997	502	**0.0073**	**3.1798**	0.092	0.0283	0.997	1095
2016	**0.01212**	**3.01441**	0.0982	0.0308	0.997	339	**0.0100**	**3.0707**	0.0981	0.0307	0.997	382	**0.0128**	**2.9877**	0.2684	0.0892	0.967	751
2017	**0.01640**	**2.93220**	0.0997	0.0306	0.998	283	**0.0156**	**2.9555**	0.1401	0.0434	0.997	265	**0.0140**	**2.9828**	0.0516	0.0167	0.999	668
2018	**0.00917**	**3.10609**	0.1077	0.0346	0.9978	576	**0.0095**	**3.0930**	0.0868	0.0279	0.9985	489	**0.0100**	**3.0804**	0.0992	0.0318	0.9979	1105
2019	**0.00899**	**3.11169**	0.1428	0.0439	0.9939	549	**0.0181**	**2.9013**	0.1610	0.0483	0.9920	499	**0.0074**	**3.1665**	0.1374	0.0440	0.9927	1083

Table 13. Redfish mean number per tow by year in Spanish Spring surveys in NAFO Div. 3NO: 1997-2019. Indet. means indeterminate.

	1997				1998				1999				2000				2001				2002				2003			
	Males	Females	Indet.	Total	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	22.38	14.94	0.00	37.32	108.36	114.09	0.02	222.47	289.50	200.84	0.39	490.73	518.31	326.79	0.00	845.10	279.45	158.85	1.10	439.41	46.49	37.53	1.05	85.06	71.00	46.21	0.82	118.03

	2004				2005				2006				2007				2008				2009				2010			
	Males	Females	Indet.	Total	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	122.61	94.97	19.57	237.15	573.80	502.15	95.21	1171.16	398.90	293.94	247.70	940.54	368.68	313.47	3.01	685.15	329.78	259.80	2.00	591.59	3754.48	2846.50	3.64	6604.62	2009.91	1807.51	0.23	3817.65

	2011				2011				2012				2013				2014				2015				2016			
	Males	Females	Indet.	Total	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	2385.24	1906.21	9.10	4300.55	2385.24	1906.21	9.10	4300.55	1184.89	981.01	0.31	2166.20	2034.96	1542.08	0.38	3577.42	742.09	639.39	0.41	1381.88	2120.95	1721.56	11.42	3853.93	475.14	409.51	0.26	884.92

	2016				2017				2018				2019			
	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total
MNPT	475.14	409.51	0.26	884.92	964.13	853.43	15.02	1832.58	1024.93	710.51	1.35	1736.79	406.57	565.21	0.79	972.57

Table 14. Redfish mean number per tow by length class and year. Spanish Spring Survey on NAFO 3NO: 2015-2019. Indet. means indeterminate.

	2015				2016				2017				2018				2019			
Lenght (cm.)	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total
4	0.000	0.000	0.174	0.174	0.000	0.000	0.051	0.051	0.000	0.000	0.522	0.522	0.000	0.000	0.023	0.023	0.000	0.000	0.096	0.096
6	0.000	0.000	9.091	9.091	0.000	0.000	0.068	0.068	0.000	0.000	1.414	1.414	0.135	0.065	0.594	0.795	0.000	0.016	0.141	0.157
8	0.000	0.000	2.003	2.003	0.654	0.000	0.030	0.684	0.103	0.000	2.273	2.376	0.455	0.271	0.680	1.406	0.000	0.000	0.189	0.189
10	0.000	0.094	0.046	0.140	2.414	0.108	0.017	2.539	2.049	0.017	2.794	4.860	0.295	0.135	0.015	0.445	0.036	0.000	0.085	0.121
12	0.010	0.000	0.065	0.075	3.306	0.205	0.096	3.607	0.521	0.394	2.895	3.810	0.567	0.428	0.036	1.031	2.661	0.725	0.081	3.467
14	0.729	0.061	0.036	0.826	0.024	0.104	0.000	0.129	1.928	3.715	4.102	9.745	1.346	1.645	0.000	2.991	8.267	3.908	0.169	12.344
16	1.054	0.190	0.000	1.244	1.001	0.096	0.000	1.097	3.574	0.280	1.024	4.878	0.491	0.568	0.000	1.058	8.122	4.140	0.028	12.290
18	97.663	29.361	0.000	127.025	5.055	9.300	0.000	14.355	13.894	5.673	0.000	19.567	6.094	1.182	0.000	7.276	3.345	3.545	0.000	6.890
20	960.679	291.918	0.000	1252.597	178.277	46.371	0.000	224.648	224.661	62.895	0.000	287.556	115.665	7.446	0.000	123.111	18.751	5.932	0.000	24.683
22	803.867	668.544	0.000	1472.411	232.550	148.387	0.000	380.938	524.060	265.947	0.000	790.006	618.083	102.038	0.000	720.121	170.654	28.413	0.000	199.067
24	171.811	428.572	0.000	600.384	40.976	126.419	0.000	167.396	163.745	346.359	0.000	510.104	235.460	301.058	0.000	536.518	150.791	124.569	0.000	275.360
26	72.813	151.935	0.000	224.748	6.659	47.352	0.000	54.011	24.377	123.100	0.000	147.476	36.221	207.276	0.000	243.497	37.150	225.909	0.000	263.059
28	3.194	78.432	0.000	81.626	2.794	17.318	0.000	20.112	3.004	32.317	0.000	35.321	5.991	55.082	0.000	61.074	5.463	116.183	0.000	121.646
30	1.919	46.678	0.000	48.597	0.547	8.397	0.000	8.944	0.866	8.863	0.000	9.729	1.521	21.102	0.000	22.624	0.240	37.628	0.000	37.868
32	3.066	18.828	0.000	21.894	0.267	3.708	0.000	3.975	0.380	2.558	0.000	2.938	1.374	9.091	0.000	10.465	0.170	13.246	0.000	13.416
34	2.027	4.225	0.000	6.252	0.251	1.081	0.000	1.332	0.393	0.749	0.000	1.142	0.721	2.097	0.000	2.818	0.319	0.269	0.000	0.587
36	0.944	1.598	0.000	2.542	0.121	0.442	0.000	0.563	0.226	0.290	0.000	0.516	0.350	0.645	0.000	0.995	0.296	0.246	0.000	0.542
38	0.760	0.756	0.000	1.516	0.104	0.159	0.000	0.263	0.243	0.140	0.000	0.383	0.103	0.342	0.000	0.445	0.153	0.232	0.000	0.385
40	0.391	0.198	0.000	0.590	0.132	0.041	0.000	0.174	0.077	0.074	0.000	0.151	0.034	0.019	0.000	0.053	0.126	0.148	0.000	0.274
42	0.024	0.112	0.000	0.137	0.012	0.020	0.000	0.032	0.027	0.047	0.000	0.073	0.000	0.004	0.000	0.004	0.027	0.088	0.000	0.115
44	0.000	0.054	0.000	0.054	0.000	0.000	0.000	0.000	0.004	0.010	0.000	0.014	0.000	0.000	0.000	0.000	0.000	0.013	0.000	0.013
46	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
48	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
50	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
52	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
54	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
56	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
58	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
60	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.020	0.000	0.000	0.020	0.000	0.000	0.000	0.000
62	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.016	0.000	0.016	0.000	0.000	0.000	0.000
64	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.000	0.000	0.004
Total	2120.954	1721.558	11.415	3853.927	475.144	409.509	0.262	884.915	964.130	853.427	15.025	1832.582	1024.927	710.511	1.348	1736.786	406.575	565.210	0.789	972.573
Nº samples:				43				49				46				46				42
Nº Ind.:	3508	4328	1318	9154	1614	2108	22	3744	3013	3302	221	6536	3133	2410	183	5726	2640	2464	113	5217
Sampled catch:				1977				1162				1460				1298				1242
Range:				5-44				5-43				5-45				5-63				5-64
Total catch:				93699				22361				47617				50017				34097
Total hauls:				122				115				114				114				115

Table 15. Redfish total abundance (thousands) by length class and year by Division. Spanish Spring Survey on NAFO 3NO: 2002-2019. Indet. means indeterminate.

	2002			2003			2004			2005			2006			2007			2008			2009			2010		
Length	3N	3O	3NO	3N	3O	3NO	3N	3O	3NO	3N	3O	3NO	3N	3O	3NO	3N	3O	3NO	3N	3O	3NO	3N	3O	3NO	3N	3O	3NO
4	29	0	29	42	0	42	0	0	0	0	0	0	0	0	0	0	0	0	48	0	48	31	0	31	106	0	106
6	726	43	769	428	0	428	653	929	1581	607	406	1013	497	1098	1595	229	3552	3781	546	0	546	115	73	188	89	0	89
8	131	12	143	131	32	163	4396	8998	13394	2013	8785	10798	786	5725	6511	369	2823	3193	211	0	211	566	681	1247	12	15	27
10	61	0	61	135	15	150	1593	1281	2873	35799	17710	53509	14502	1126	15628	291	264	555	438	0	438	12940	312	13252	12	0	12
12	125	0	125	123	0	123	2138	2006	4143	4287	6308	10595	118480	4441	122921	8675	1573	10248	1527	0	1527	26864	991	27855	18	0	18
14	734	23	757	774	64	838	2584	1189	3773	4609	8374	12983	67571	31801	99372	46902	5006	51909	18189	9	18198	78624	4510	83135	150	0	150
16	4160	732	4892	3196	540	3736	8402	1352	9754	37024	2328	39352	37857	12852	50708	59160	15372	74532	150631	2232	152863	771311	28800	800111	93890	16567	110457
18	10453	3442	13895	12690	4939	17629	16326	3649	19975	168240	6004	174244	44352	6510	50862	39188	10467	49655	86322	5448	91770	2344608	117755	2462363	898104	217029	1115134
20	13463	8295	21759	18058	11493	29551	26775	8016	34791	126477	15256	141733	121634	18361	139995	42951	10299	53250	36304	4946	41250	695022	63782	758804	817919	254757	1072677
22	9370	10144	19514	15054	10203	25256	29641	10372	40012	155507	14535	170042	110607	27252	137859	81649	13426	95074	57152	10878	68030	380843	21782	402626	293054	61525	354580
24	5805	2815	8621	9743	3844	13586	19847	8258	28105	139730	11076	150807	56333	14126	70460	84550	11182	95732	70582	9288	79870	335607	14713	350320	222493	27002	249495
26	2366	298	2664	4561	708	5269	12458	5658	18116	67260	3914	71174	38066	4318	42384	49687	4884	54570	41454	3137	44591	170424	3550	173973	112364	6967	119331
28	1987	118	2105	1939	213	2152	10449	2492	12940	42356	1691	44047	19299	1375	20674	24839	2397	27236	15101	908	16010	70008	846	70854	45699	2080	47779
30	1270	153	1423	935	132	1066	6997	706	7703	17495	514	18009	9822	464	10286	20358	1253	21611	5532	155	5687	26297	365	26661	23031	457	23488
32	1123	125	1248	979	96	1075	3488	282	3770	7835	210	8045	5391	201	5591	17150	798	17948	4357	102	4459	6432	28	6460	10924	132	11056
34	433	68	501	549	91	640	2407	97	2504	3442	62	3504	2540	113	2653	9784	681	10465	2955	60	3016	4239	21	4261	6129	141	6270
36	188	33	221	208	23	231	618	31	649	2466	8	2474	905	67	971	7544	476	8020	988	57	1045	4887	30	4917	2279	61	2341
38	32	4	36	96	18	114	128	4	132	597	8	605	330	30	360	2102	216	2318	386	56	442	371	0	371	1160	20	1180
40	0	3	3	62	14	75	118	0	118	324	0	324	264	14	277	267	59	326	160	21	181	99	0	99	786	0	786
42	6	0	6	36	0	36	0	0	0	224	0	224	56	6	62	90	0	90	64	3	66	121	0	121	193	0	193
44	0	0	0	16	0	16	9	0	9	21	0	21	0	0	0	11	0	11	16	0	16	37	0	37	164	0	164
46	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
48	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
52	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12	0	12	0	0	0	0	0	0
54	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
56	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
58	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
62	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
64	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	52465	26307	78772	69764	32425	102179	149025	55318	204344	816315	97189	913504	649292	129879	779171	495706	84727	580524	492974	37300	530274	4929448	268239	5197686	2528678	686755	3215433

	2011			2012			2013			2014			2015			2016			2017			2018			2019		
Length	3N	3O	3NO	3N	3O	3NO	3N	3O	3NO	3N	3O	3NO	3N	3O	3NO	3N	3O	3NO	3N	3O	3NO	3N	3O	3NO	3N	3O	3NO
4	0	0	0	0	0	0	0	0	0	17	0	17	146	0	146	44	0	44	444	0	444	21	0	21	77	0	77
6	154	0	154	0	36	36	288	0	288	11	105	116	7665	0	7665	59	0	59	1202	0	1202	676	50	727	110	16	126
8	114	23	137	16	153	169	49	375	424	4	95	98	625	1063	1689	26	569	595	343	1677	2020	788	497	1285	134	17	151
10	134	88	222	5	66	71	16	201	217	13	151	164	118	0	118	963	1247	2210	2680	1451	4131	100	306	407	80	17	97
12	1566	862	2427	38	7	45	0	182	182	13	20	33	64	0	64	1961	1180	3140	895	2343	3238	170	772	942	2712	68	2779
14	11796	12893	24688	1469	1456	2924	16	272	289	0	114	114	30	666	697	14	98	112	6978	1306	8284	1095	1639	2734	9725	172	9897
16	90336	21129	111466	11344	15480	26823	1730	3400	5130	3816	156	3971	126	923	1049	48	907	955	3547	600	4147	299	668	967	9562	291	9853
18	917914	84854	1002768	208465	37213	245678	155268	19352	174619	55258	2887	58144	99656	7443	107099	8809	3689	12498	15247	1385	16632	5975	675	6650	5170	354	5524
20	1700255	254651	1954907	899647	126534	1026181	1498464	99446	1597911	346889	25175	372064	994923	61187	1056110	171925	23657	195582	229245	15182	244427	110908	1615	112523	18464	1325	19789
22	347710	121253	468963	385092	51381	436473	988390	69696	1058086	353273	29779	383053	1134495	106948	1241443	285433	46217	331650	627094	44423	671516	652116	6073	658188	153034	6565	159598
24	104230	35938	140168	113740	7862	121602	176150	12582	188732	141409	12868	154277	475081	31124	506205	128563	17175	145737	398980	34615	433596	483483	6893	490376	213900	6866	220766
26	46197	4112	50309	56674	2725	59399	57377	2797	60174	43918	3617	47535	183619	5874	189494	44877	2146	47023	113822	11535	125357	219674	2882	222556	207885	3019	210903
28	28110	1204	29314	45882	754	46636	21984	1797	23781	24019	1831	25850	66752	2070	68822	16446	1063	17510	26878	3144	30023	54839	982	55821	96521	1007	97528
30	12351	3296	15646	22445	278	22724	19399	485	19884	14446	851	15297	40843	131	40974	7552	235	7787	7585	685	8270	20327	351	20678	30174	186	30360
32	3926	271	4198	6645	52	6697	5702	71	5773	6561	330	6890	18353	106	18460	3362	99	3460	2312	185	2497	9482	84	9565	10660	97	10756
34	1752	59	1811	3826	39	3865	3023	17	3040	1774	26	1801	5261	11	5272	1092	68	1160	958	13	971	2538	37	2575	439	32	471
36	986	4	990	2409	32	2441	4555	0	4555	1001	32	1033	2144	0	2144	433	57	490	424	14	438	906	4	910	427	7	434
38	360	22	382	787	11	798	509	4	513	258	5	264	1278	0	1278	186	42	229	318	7	325	407	0	407	309	0	309
40	119	8	127	158	4	162	172	0	172	106	5	111	497	0	497	140	11	151	125	4	128	49	0	49	219	0	219
42	32	0	32	12	0	12	115	0	115	25	0	25	115	0	115	24	4	28	55	7	62	3	0	3	92	0	92
44	6	0	6	0	0	0	3	4	7	0	0	0	45	0	45	0	0	0	8	4	12	0	0	0	11	0	11
46	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
48	0	0	0	796	0	796	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
50	0	0	0	0	0	0	0	0	0	9	0	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
52	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
54	0	0	0	0	0	0	0	0	0	9	0	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
56	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
58	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	18	0	18	0	0	0
62	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	0	15	0	0	0
64	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	3
Total	3268047	540668	3808715	1759450	244084	2003533	2933210	210680	3143891	992827	78047	1070873	3031839	217546	3249385	671956	98464	770420	1439141	118579	1557720	1563889	23528	1587417	759709	20036	779745

Table 16. Witch flounder mean catch (kg) and SD by stratum. Spanish Spring Surveys in NAFO Div. 3NO: 2015-2019. n.s. means stratum not surveyed.

	2015		2016		2017		2018		2019	
Stratum	W. flounder Mean catch	W. flounder SD	W. flounder Mean catch	W. flounder SD	W. flounder Mean catch	W. flounder SD	W. flounder Mean catch	W. flounder SD	W. flounder Mean catch	W. flounder SD
353	3.83	3.32	9.04	12.20	0.00	23.33	5.23	4.95	0.00	0.00
354	2.15	2.69	7.07	7.52	27.83	0.00	0.85	0.60	0.36	0.32
355	2.05	0.06	1.74	0.52	6.48	0.00	0.07	0.09	0.39	0.33
356	3.85	5.35	1.26	0.79	1.90	0.00	0.27	0.39	0.00	0.00
357	0.96	0.25	5.13	5.30	1.91	0.00	0.73	1.03	0.60	0.84
358	4.60	4.48	50.02	55.56	8.29	0.00	0.32	0.55	3.01	2.64
359	18.27	21.53	4.01	6.05	37.44	0.11	5.12	8.26	3.86	2.31
360	0.35	0.63	0.00	0.00	0.00	349.29	0.28	0.47	0.00	0.00
374	0.00	0.00	0.00	0.00	0.00	4.50	0.00	0.00	0.00	0.00
375	0.00	0.00	0.00	0.00	0.00	54.99	0.00	0.00	0.00	0.00
376	0.00	0.00	0.00	0.00	0.00	234.89	0.30	0.86	0.00	0.00
377	0.78	1.10	0.00	0.00	0.00	0.51	0.00	0.00	0.90	1.27
378	2.83	2.07	0.28	0.40	3.25	0.00	0.00	0.00	0.42	0.59
379	0.29	0.40	0.58	0.82	1.69	0.00	0.21	0.30	0.58	0.82
380	0.73	0.10	1.20	0.65	0.00	0.00	0.00	0.00	0.30	0.37
381	1.24	1.18	0.00	0.00	0.00	0.00	0.00	0.00	1.03	1.45
382	0.00	0.00	0.00	0.00	0.23	0.43	0.00	0.00	0.00	0.00
721	0.76	0.22	1.18	0.99	0.55	0.00	0.75	0.94	0.09	0.12
722	1.19	0.08	1.22	0.08	0.58	0.00	0.57	0.47	0.18	0.25
723	4.71	1.86	2.77	3.72	4.26	0.00	6.78	9.26	2.07	2.92
724	8.16	4.06	7.20	4.53	1.84	0.00	3.39	3.14	1.62	1.29
725	7.12	5.54	10.09	12.18	6.89	0.00	0.09	0.12	3.24	3.20
726	2.95	0.26	6.17	6.54	2.60	0.00	5.34	3.00	1.88	2.66
727	0.78	0.52	11.86	10.24	34.08	0.00	6.40	6.80	2.77	3.81
728	11.70	7.50	22.92	21.46	10.18	0.00	6.48	9.16	3.63	4.39
752	9.88	5.51	14.46	12.22	8.53	0.00	13.49	19.08	0.21	0.00
753	0.81	1.13	0.00	0.00	1.14	0.00	1.19	1.68	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	5.15	3.29	16.99	22.22	5.87	0.00	1.23	1.02	3.01	4.26
757	3.29	4.65	0.40	0.56	4.96	0.00	3.86	0.00	0.28	0.40
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	16.15	20.72	3.04	2.14	5.15	0.00	4.04	3.50	0.08	0.11
761	2.61	0.94	0.91	1.28	2.27	0.00	8.24	-	2.51	1.76
762	0.45	0.64	0.89	1.26	0.00	0.00	0.11	0.15	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	0.68	0.14	1.10	0.85	1.45	0.00	1.37	1.26	0.36	0.33
765	0.37	0.24	0.17	0.03	0.97	0.00	2.08	2.94	0.27	0.37
766	0.25	0.35	0.00	0.00	0.00	0.00	0.06	0.08	0.16	0.23
767	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.00

Table 17. Witch flounder survey biomass (t) by stratum in NAFO Div. 3NO: 2015-2019. n.s. means stratum not surveyed.

Strata	2015	2016	2017	2018	2019	Strata	2015	2016	2017	2018	2019
353	77	205	0	125	0	**725**	65	93	59	1	27
354	41	151	576	18	7	**726**	19	40	16	34	10
355	12	11	43	0	2	**727**	7	101	286	55	21
356	14	5	8	1	0	**728**	81	156	69	45	23
357	13	72	27	10	8	**752**	115	160	95	152	2
358	89	1000	154	6	53	**753**	10	0	13	14	0
359	630	142	1322	183	128	**754**	0	0	0	0	0
360	82	0	0	68	0	**755**	0	0	0	0	0
374	0	0	0	0	0	**756**	46	152	52	11	24
375	0	0	0	0	0	**757**	29	4	45	35	2
376	0	0	0	36	0	**758**	0	0	0	0	0
377	7	0	0	0	7	**759**	0	0	0	0	0
378	35	3	38	0	4	**760**	221	41	67	52	1
379	3	5	15	2	5	**761**	37	14	33	114	36
380	6	10	0	0	2	**762**	8	17	0	2	0
381	15	0	0	0	12	**763**	0	0	0	0	0
382	0	0	7	0	0	**764**	5	10	13	12	3
721	4	7	3	4	0	**765**	4	2	11	22	3
722	8	9	4	4	1	**766**	3	0	0	1	2
723	63	38	58	88	26	**767**	0	0	1	0	0
724	86	77	19	36	16						

Table 18. Witch flounder survey biomass (t) with SD and stratified mean catch per tow (kg) and SD by year and Division in NAFO Div. 3NO: 2002-2019.

Year	2002	2003	2004	2005	2006	2007	2008	2009	2010
Biomass	1784	3145	3348	2633	2570	1480	2118	1872	3239
SD	426	690	523	488	629	229	481	423	777
MCPT	2.00	3.42	3.66	2.95	3.01	1.84	2.32	2.13	3.82
SD	0.49	0.75	0.56	0.56	0.73	0.28	0.52	0.48	0.91

Year	2011	2012	2013	2014	2015	2016	2017	2018	2019
Biomass	1428	2763	2078	903	1834	2526	3033	1132	426
SD	248	648	367	134	376	737	1199	251	74
MCPT	1.58	3.06	2.32	1.09	2.11	2.79	3.47	1.27	0.52
SD	0.28	0.74	0.41	0.16	0.42	0.78	1.35	0.28	0.09

Table 19. Witch flounder length weight relationships in Spanish Spring Surveys in NAFO Div. 3NO: 2015-2019. E(x) means Error of the parameter x.

	Males						Females						Total					
Year	**a**	**b**	**E(a)**	**E(b)**	**R2**	**N**	**a**	**b**	**E(a)**	**E(b)**	**R2**	**N**	**a**	**b**	**E(a)**	**E(b)**	**R2**	**N**
2015	**0.00103**	**3.51249**	0.1701	0.0489	0.995	306	**0.00154**	**3.39857**	0.0807	0.0230	0.998	440	**0.00206**	**3.31598**	0.1112	0.0329	0.996	762
2016	**0.00102**	**3.49955**	0.1145	0.0327	0.998	222	**0.00147**	**3.40745**	0.1089	0.0314	0.997	354	**0.00209**	**3.30679**	0.2052	0.0610	0.985	584
2017	**0.00104**	**3.49803**	0.1432	0.0405	0.997	247	**0.00120**	**3.45370**	0.0990	0.0286	0.998	299	**0.00173**	**3.35493**	0.0907	0.0263	0.998	595
2018	**0.00167**	**3.37049**	0.1496	0.0444	0.997	149	**0.00210**	**3.30161**	0.1524	0.0447	0.996	279	**0.00230**	**3.28003**	0.1309	0.0384	0.997	430
2019	**0.00101**	**3.50260**	0.3344	0.0953	0.984	77	**0.00116**	**3.46937**	0.2019	0.0555	0.994	116	**0.00194**	**3.32737**	0.1299	0.0373	0.996	196

Table 20. Witch flounder mean number per tow by year in Spanish Spring Surveys in NAFO Div. 3NO: 2002-2019. Indet. means indeterminate.

	2002				2003				2004				2005				2006				2007			
	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	2.602	3.488	0.459	6.548	4.499	5.864	0.057	10.420	4.182	6.088	0.211	10.480	4.160	5.570	0.605	10.336	3.384	4.937	0.040	8.360	1.952	3.050	0.061	5.063

	2008				2009				2010				2011				2012				2013			
	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	2.061	3.384	0.027	5.472	2.352	4.107	0.043	6.502	3.538	5.411	0.000	8.949	1.326	2.529	0.033	3.887	3.350	4.078	0.056	7.483	2.009	3.908	0.159	6.076

	2014				2015				2016				2017				2018				2019			
	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	0.756	1.626	0.012	2.395	1.941	2.810	0.125	4.875	2.466	3.419	0.046	5.931	3.611	3.773	0.034	7.418	1.435	2.125	0.007	3.567	0.552	0.722	0.012	1.286

Table 21. Witch flounder mean number per tow by length class and year. Spanish Spring Surveys in NAFO Div. 3NO: 2015-2019. Indet. means indeterminate.

	2015				2016				2017				2018				2019			
Lenght (cm.)	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total
4	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
6	0.000	0.000	0.064	0.064	0.000	0.000	0.028	0.028	0.000	0.000	0.000	0.000	0.000	0.005	0.000	0.005	0.000	0.000	0.004	0.004
8	0.000	0.000	0.042	0.042	0.000	0.006	0.000	0.006	0.000	0.000	0.008	0.008	0.000	0.000	0.000	0.000	0.000	0.000	0.008	0.008
10	0.000	0.000	0.000	0.000	0.000	0.026	0.008	0.033	0.000	0.000	0.019	0.019	0.000	0.007	0.000	0.007	0.000	0.000	0.000	0.000
12	0.000	0.008	0.000	0.008	0.007	0.008	0.010	0.025	0.000	0.000	0.000	0.000	0.022	0.021	0.000	0.042	0.000	0.000	0.000	0.000
14	0.009	0.000	0.000	0.009	0.002	0.000	0.000	0.002	0.000	0.000	0.007	0.007	0.022	0.053	0.007	0.082	0.003	0.000	0.000	0.003
16	0.000	0.007	0.000	0.007	0.000	0.007	0.000	0.007	0.003	0.008	0.000	0.011	0.013	0.033	0.000	0.046	0.000	0.000	0.000	0.000
18	0.022	0.018	0.000	0.040	0.000	0.014	0.000	0.014	0.010	0.012	0.000	0.022	0.000	0.005	0.000	0.005	0.000	0.004	0.000	0.004
20	0.006	0.000	0.000	0.006	0.012	0.012	0.000	0.024	0.006	0.030	0.000	0.036	0.008	0.039	0.000	0.047	0.007	0.000	0.000	0.007
22	0.016	0.014	0.000	0.030	0.000	0.040	0.000	0.040	0.000	0.028	0.000	0.028	0.024	0.014	0.000	0.039	0.005	0.005	0.000	0.010
24	0.010	0.025	0.000	0.036	0.016	0.004	0.000	0.020	0.008	0.028	0.000	0.036	0.035	0.031	0.000	0.066	0.007	0.000	0.000	0.007
26	0.037	0.004	0.000	0.042	0.025	0.037	0.000	0.061	0.024	0.044	0.000	0.069	0.048	0.030	0.000	0.078	0.009	0.014	0.000	0.023
28	0.057	0.058	0.000	0.115	0.070	0.062	0.000	0.132	0.108	0.050	0.000	0.158	0.154	0.100	0.000	0.254	0.037	0.040	0.000	0.077
30	0.118	0.114	0.000	0.232	0.105	0.153	0.000	0.257	0.129	0.112	0.000	0.241	0.203	0.188	0.000	0.391	0.059	0.056	0.000	0.115
32	0.179	0.099	0.000	0.278	0.086	0.132	0.000	0.218	0.105	0.128	0.000	0.233	0.264	0.157	0.000	0.421	0.074	0.061	0.000	0.135
34	0.245	0.196	0.004	0.445	0.127	0.163	0.000	0.290	0.210	0.104	0.000	0.314	0.156	0.188	0.000	0.344	0.065	0.044	0.000	0.109
36	0.352	0.259	0.000	0.611	0.280	0.181	0.000	0.461	0.341	0.125	0.000	0.466	0.081	0.137	0.000	0.218	0.037	0.053	0.000	0.089
38	0.339	0.268	0.000	0.607	0.428	0.244	0.000	0.672	0.790	0.344	0.000	1.134	0.117	0.195	0.000	0.312	0.074	0.035	0.000	0.109
40	0.358	0.423	0.000	0.781	0.518	0.440	0.000	0.958	1.029	0.629	0.000	1.658	0.096	0.151	0.000	0.247	0.067	0.084	0.000	0.151
42	0.110	0.384	0.004	0.497	0.423	0.571	0.000	0.994	0.617	0.643	0.000	1.260	0.121	0.119	0.000	0.240	0.062	0.105	0.000	0.167
44	0.040	0.377	0.007	0.425	0.276	0.673	0.000	0.949	0.111	0.628	0.000	0.739	0.025	0.172	0.000	0.197	0.038	0.093	0.000	0.131
46	0.026	0.262	0.000	0.287	0.072	0.322	0.000	0.394	0.100	0.379	0.000	0.479	0.025	0.225	0.000	0.250	0.008	0.045	0.000	0.053
48	0.016	0.176	0.004	0.196	0.019	0.144	0.000	0.164	0.020	0.256	0.000	0.276	0.017	0.156	0.000	0.173	0.000	0.044	0.000	0.044
50	0.000	0.063	0.000	0.063	0.000	0.090	0.000	0.090	0.000	0.143	0.000	0.143	0.004	0.035	0.000	0.039	0.000	0.031	0.000	0.031
52	0.000	0.042	0.000	0.042	0.000	0.048	0.000	0.048	0.000	0.048	0.000	0.048	0.000	0.025	0.000	0.025	0.000	0.009	0.000	0.009
54	0.000	0.012	0.000	0.012	0.000	0.035	0.000	0.035	0.000	0.033	0.000	0.033	0.000	0.014	0.000	0.014	0.000	0.000	0.000	0.000
56	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.024	0.000	0.024	0.000	0.000	0.000	0.000
58	0.000	0.000	0.000	0.000	0.000	0.006	0.000	0.006	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
60	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
62	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
64	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	1.941	2.810	0.125	4.875	2.466	3.419	0.046	5.931	3.611	3.773	0.034	7.418	1.435	2.125	0.007	3.567	0.552	0.722	0.012	1.286
Nº samples:				69				50				51				50				42
Nº Ind.:	304	443	21	768	330	513	8	851	360	455	6	821	171	303	2	476	78	115	3	196
Sampled catch:				336				401				387				180				81
Range:				7-54				6-59				8-55				7-57				7-53
Total catch:				346				442				509				181				82
Total hauls:				122				115				113				114				115

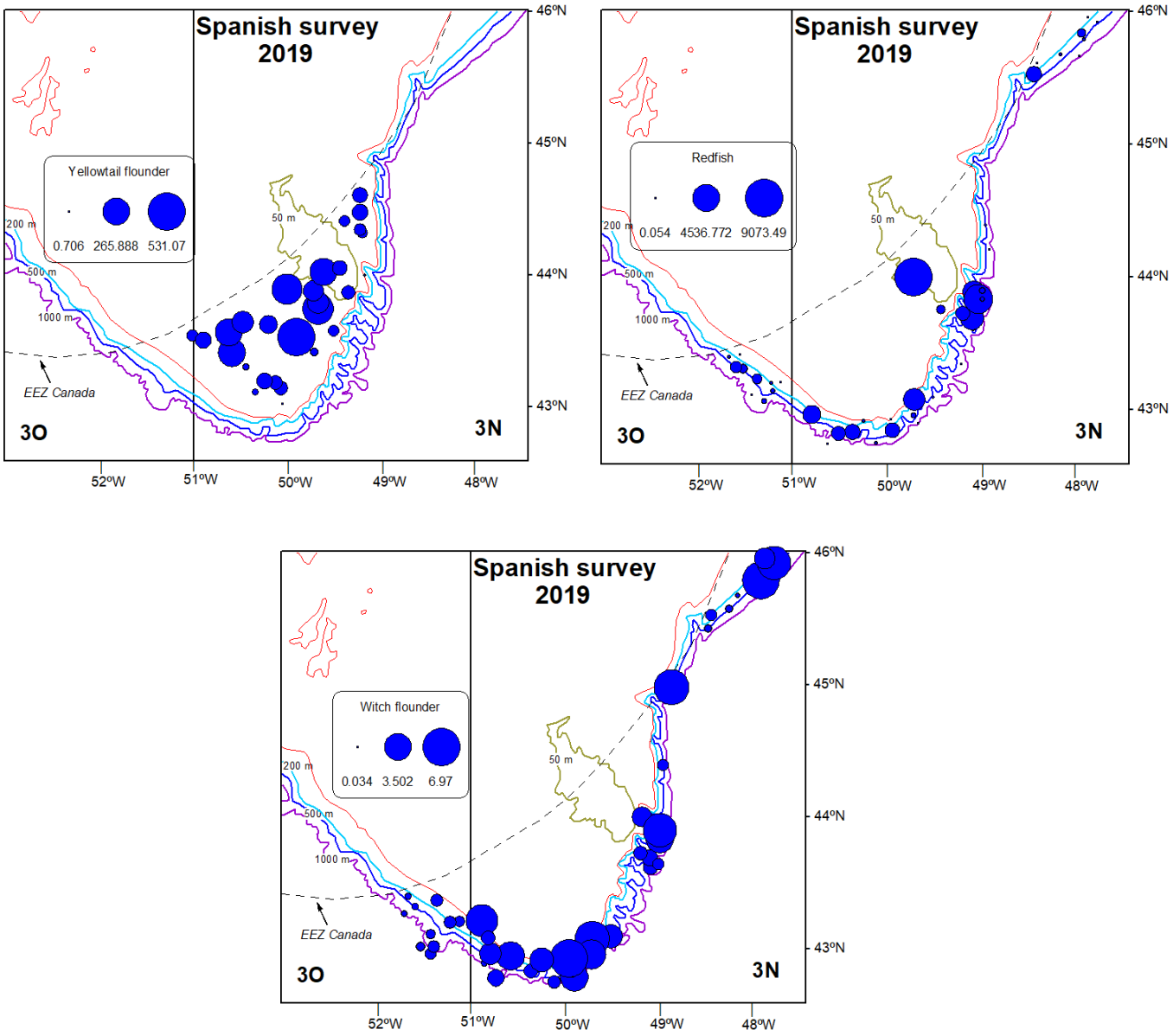

Figure 1. Position of the hauls and the catch of yellowtail flounder, redfish and witch flounder during the 2019 Spanish 3NO survey. Note that the scale is different in the three graphs.

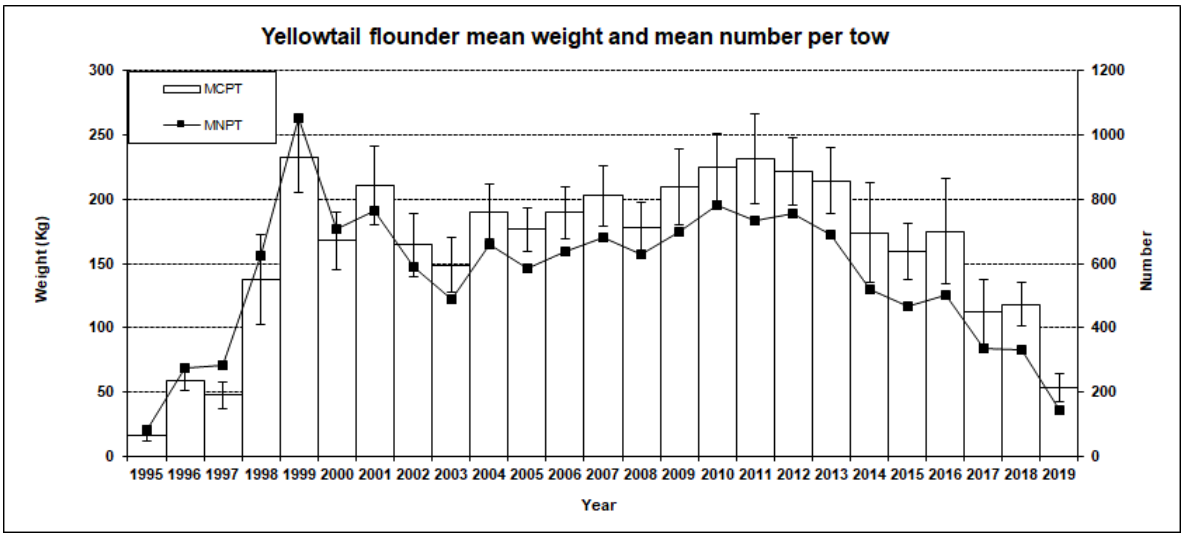

Figure 2. Yellowtail flounder stratified mean catches in Kg and ±SD by year and mean number by year. Spanish Spring surveys in NAFO Div. 3NO: 1995-2019.

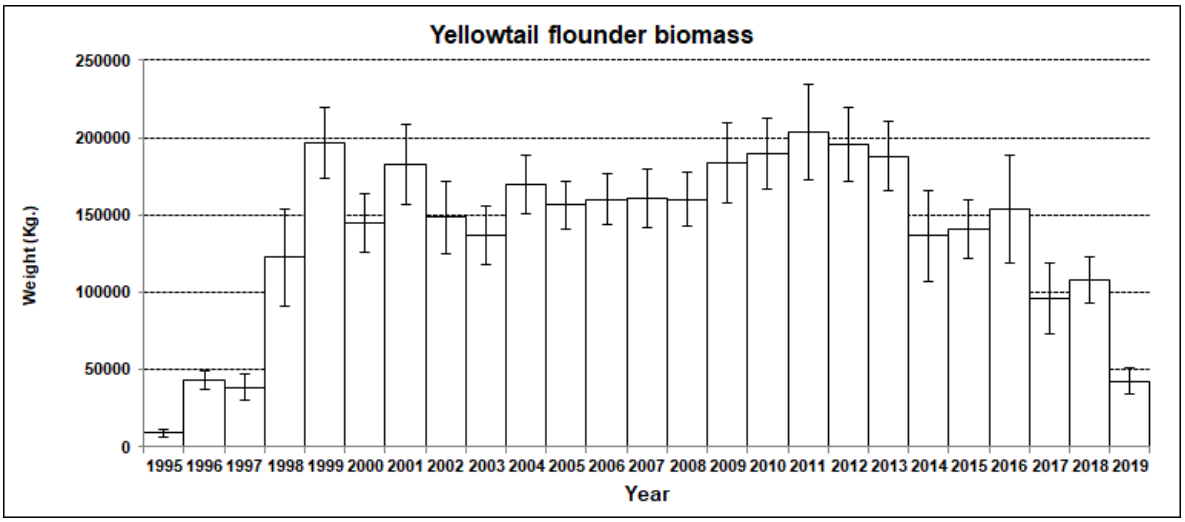

Figure 3. Yellowtail flounder biomass calculated by the swept area method in tons and ±SD by year. Spanish Spring surveys in NAFO Div. 3NO: 1995-2019.

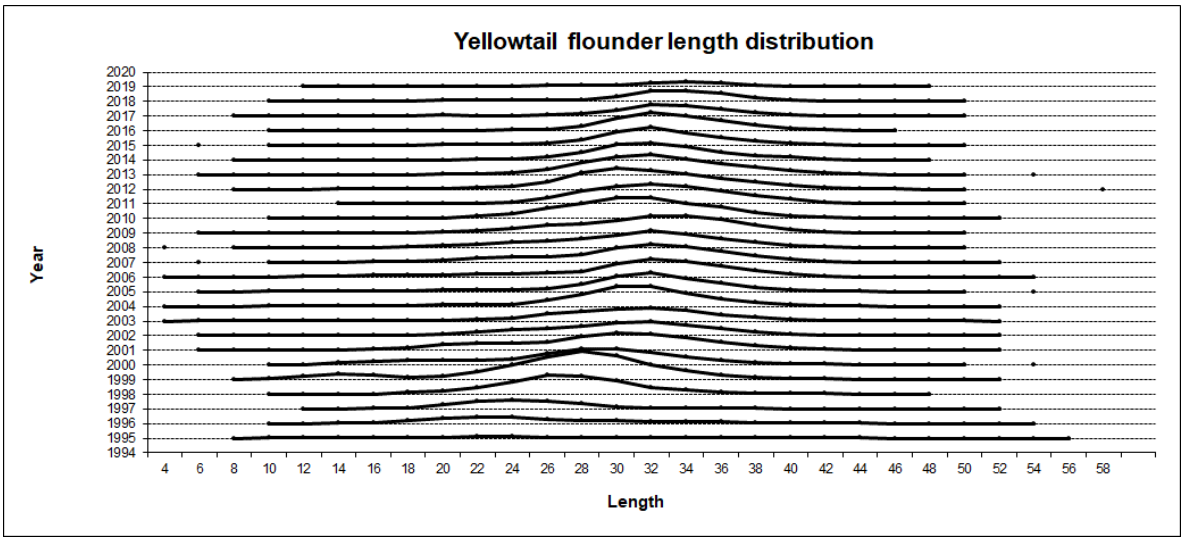

Figure 4. Yellowtail flounder mean number per tow by length (cm) on NAFO 3NO: 1995-2019. Data from 2015 to 2019 are in Table 8; data for 1995-2014 can be seen in SCR Doc 15/08.

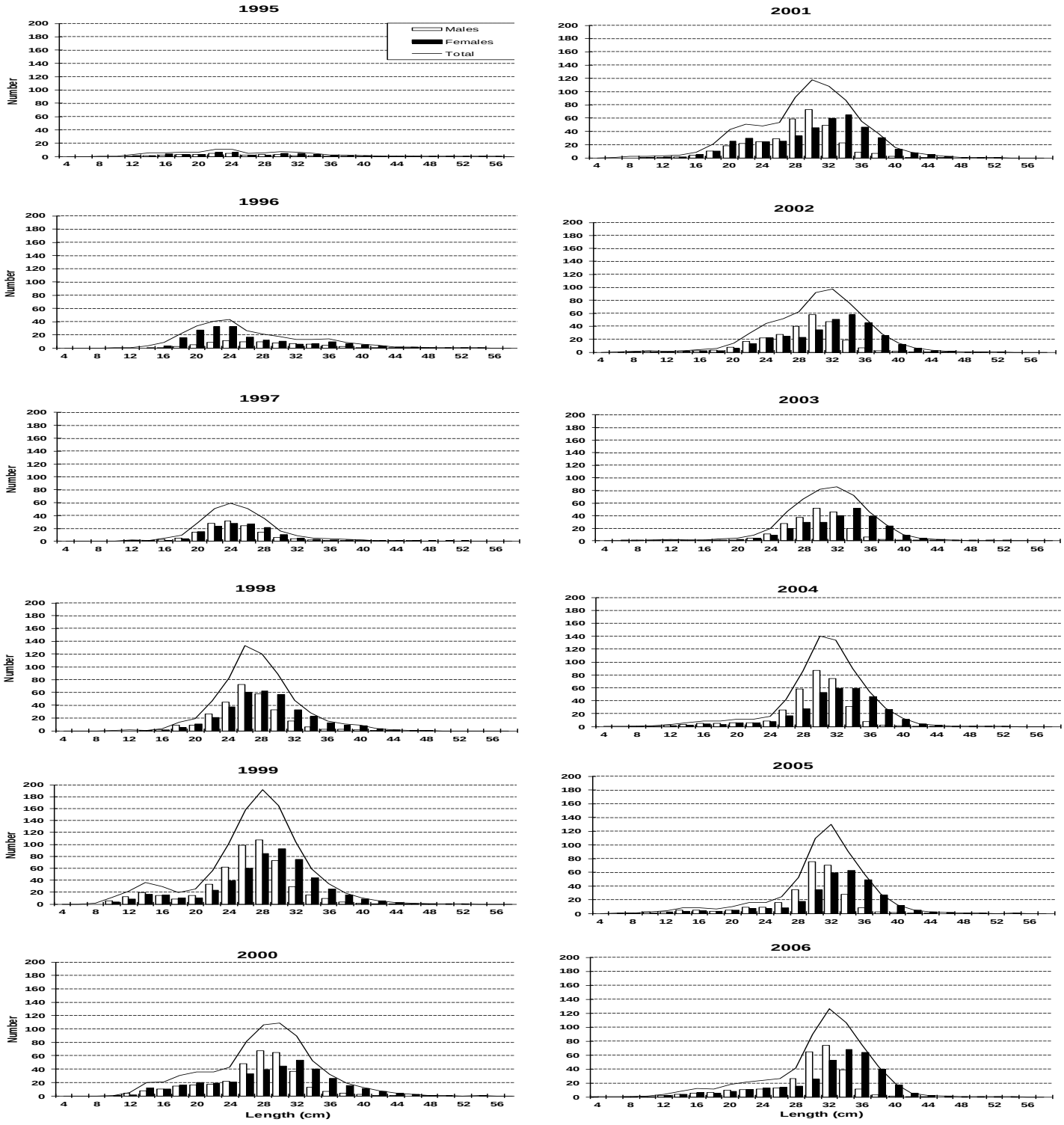

Figure 5. Yellowtail flounder length distribution (cm) on NAFO 3NO: 1995-2019. Mean numbers per tow. Data from 2015 to 2019 are in Table 8; data for 1995-2014 can be seen in SCR Doc 15/08.

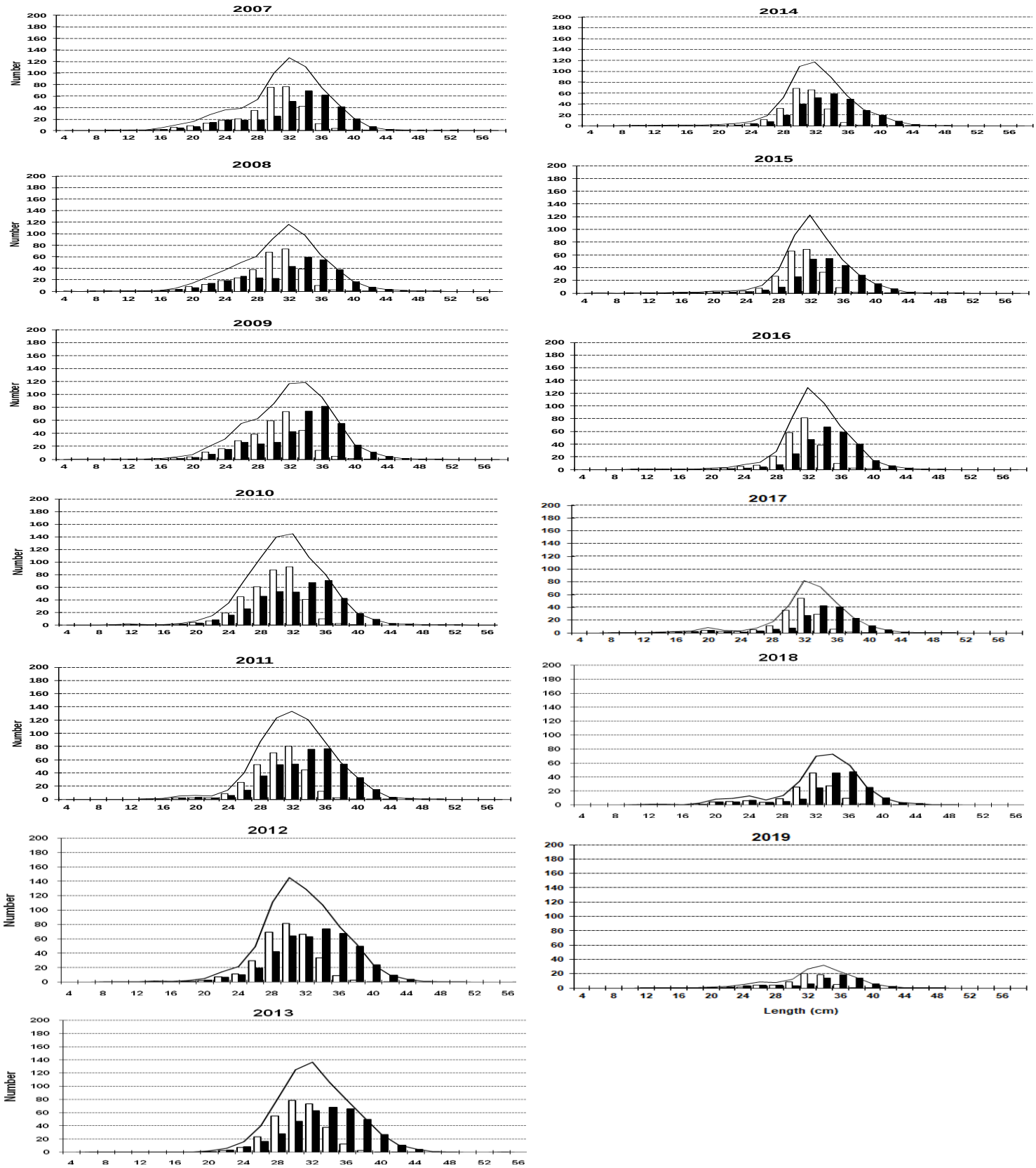

Figure 5 (cont.). Yellowtail flounder length distribution (cm) on NAFO 3NO: 1995-2019. Mean numbers per tow. Data from 2015 to 2019 are in Table 8; data for 1995-2014 can be seen in SCR Doc 15/08.

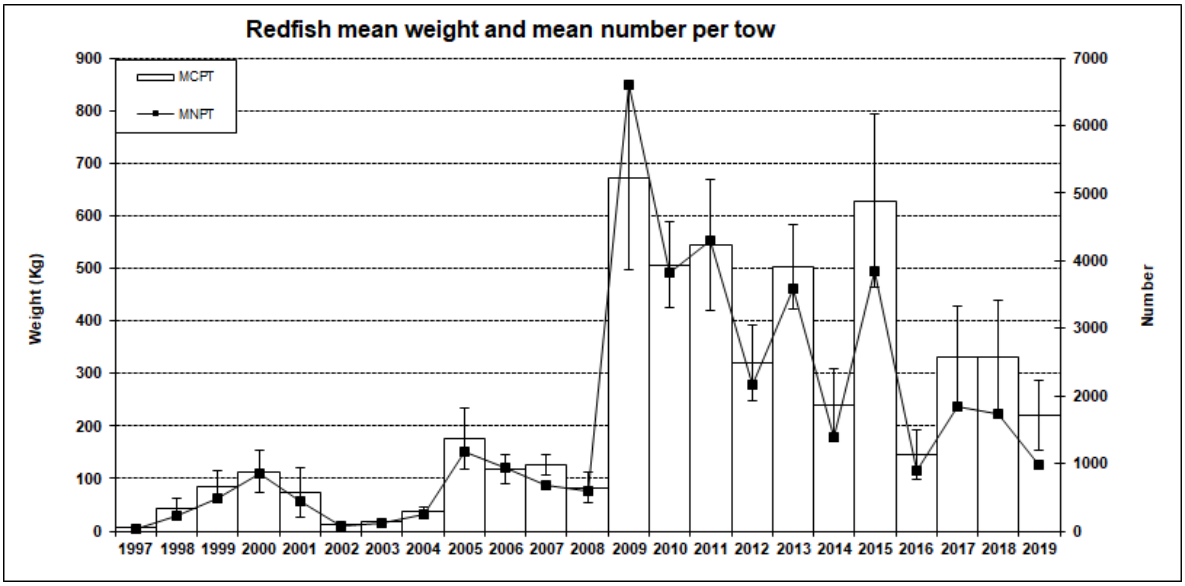

Figure 6. Redfish stratified mean catches in Kg and ±SD by year and mean number by year. Spanish Spring surveys in NAFO Div. 3NO: 1997-2019.

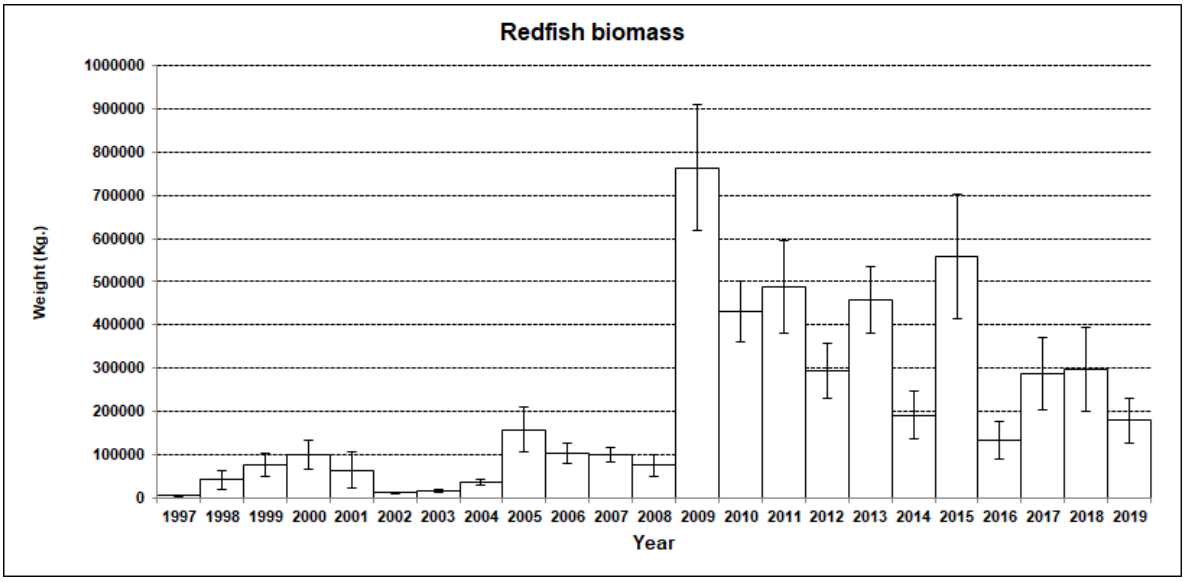

Figure 7. Redfish biomass calculated by the swept area method in tons and ±SD by year. Spanish Spring surveys in NAFO Div. 3NO: 1997-2019.

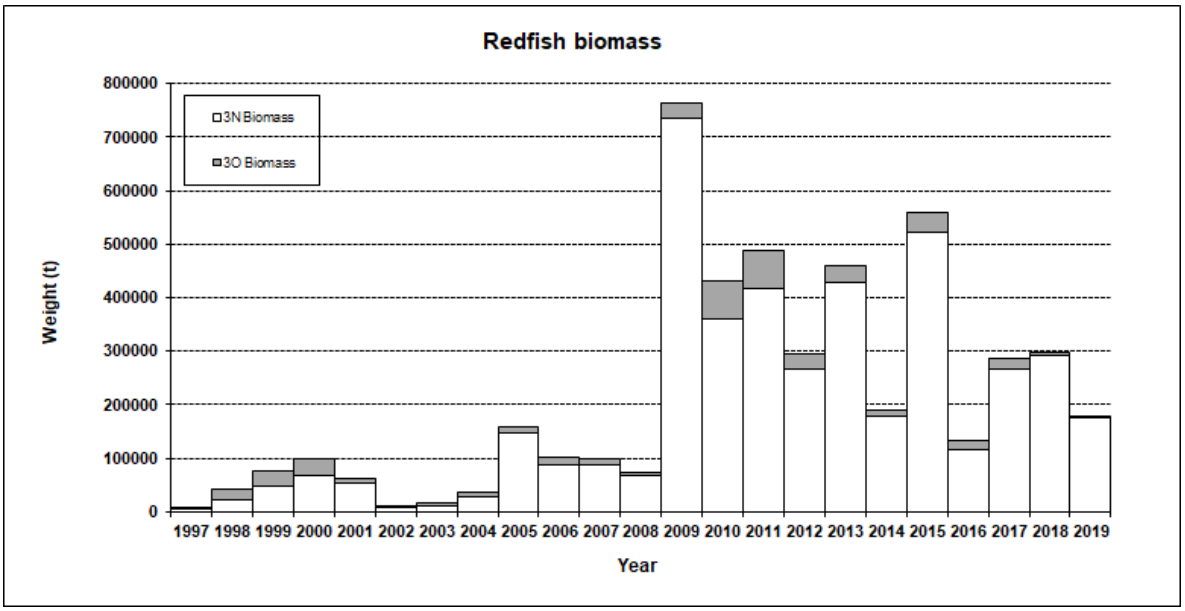

Figure 8. Redfish biomass calculated by the swept area method in tons by year and Division. Spanish Spring surveys in NAFO Div. 3NO: 1997-2019.

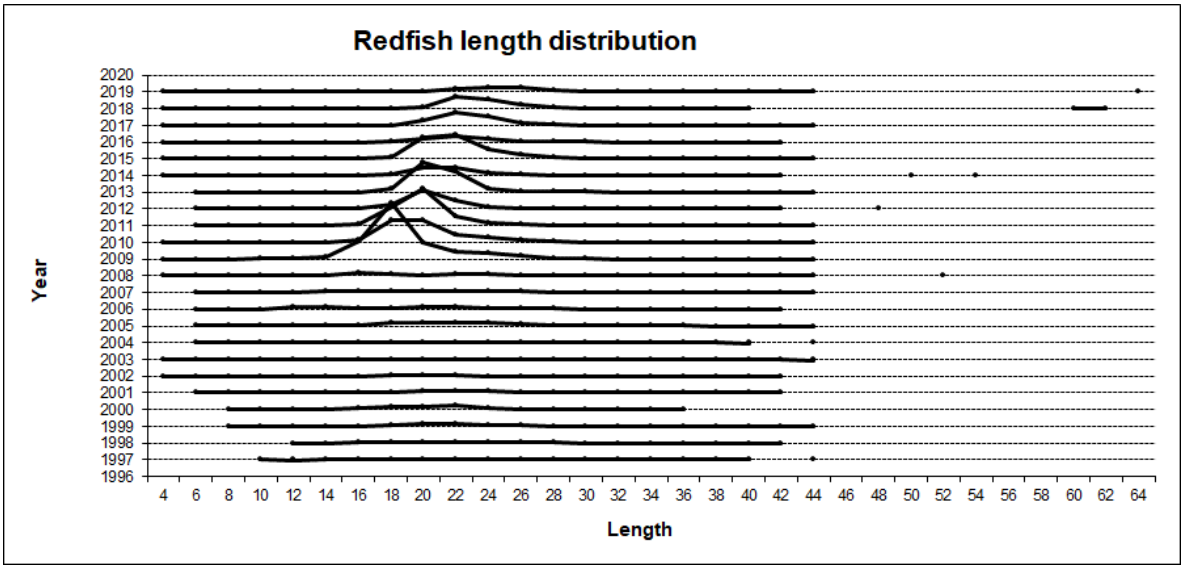

Figure 9. Redfish mean catches per tow by length (cm) on NAFO 3NO: 1997-2019. Data from 2015 to 2019 are in Table 14; the data for 1997-2014 can be seen in SCR Doc 15/08.

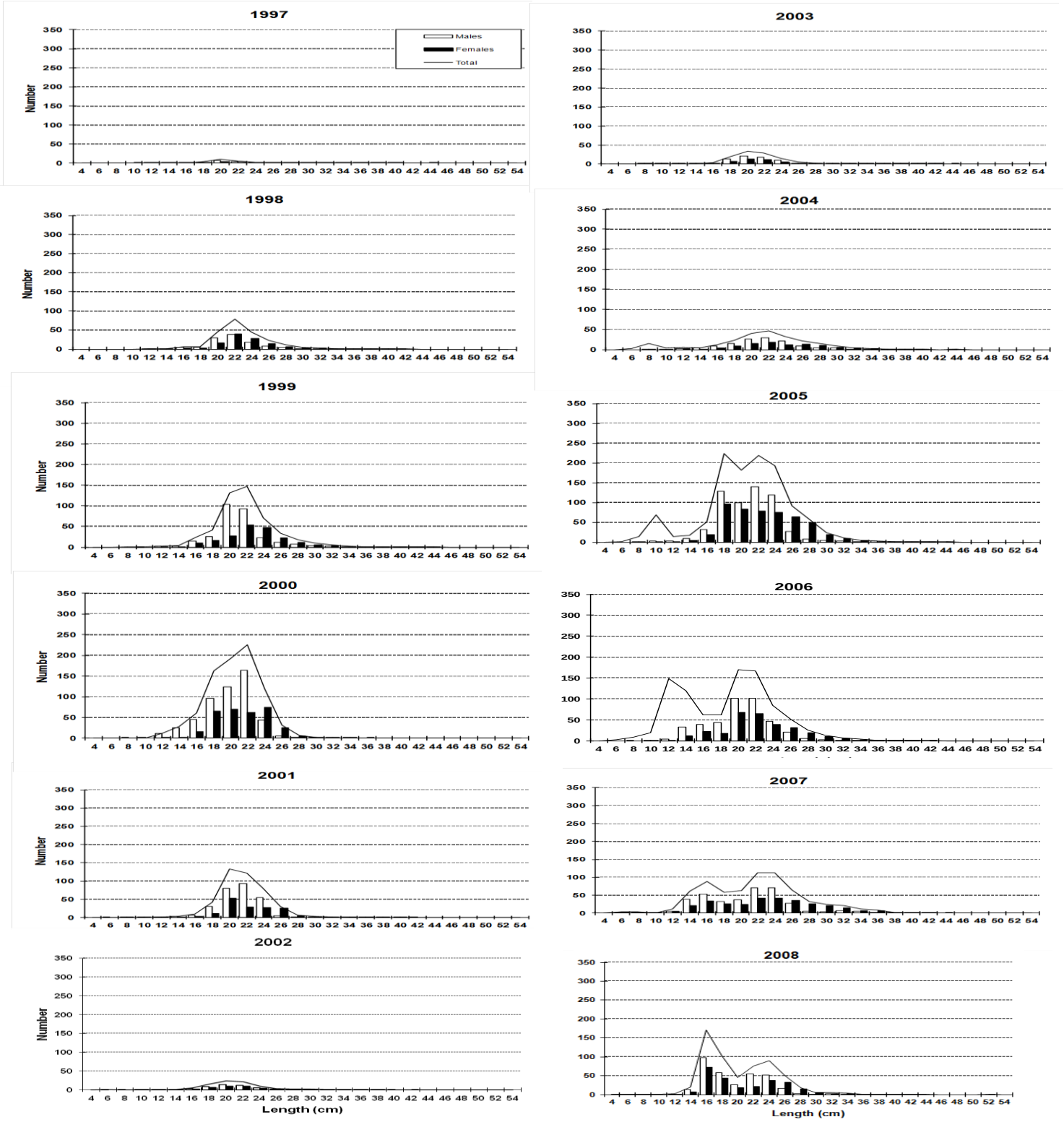

Figure 10. Redfish length distribution (cm) on NAFO 3NO: 1997-2019. Mean numbers per tow. Data from 2015 to 2019 are in Table 14; the data for 1997-2014 can be seen in SCR Doc 15/08. The 2010-2019 graphs have a different y-axis upper limit.

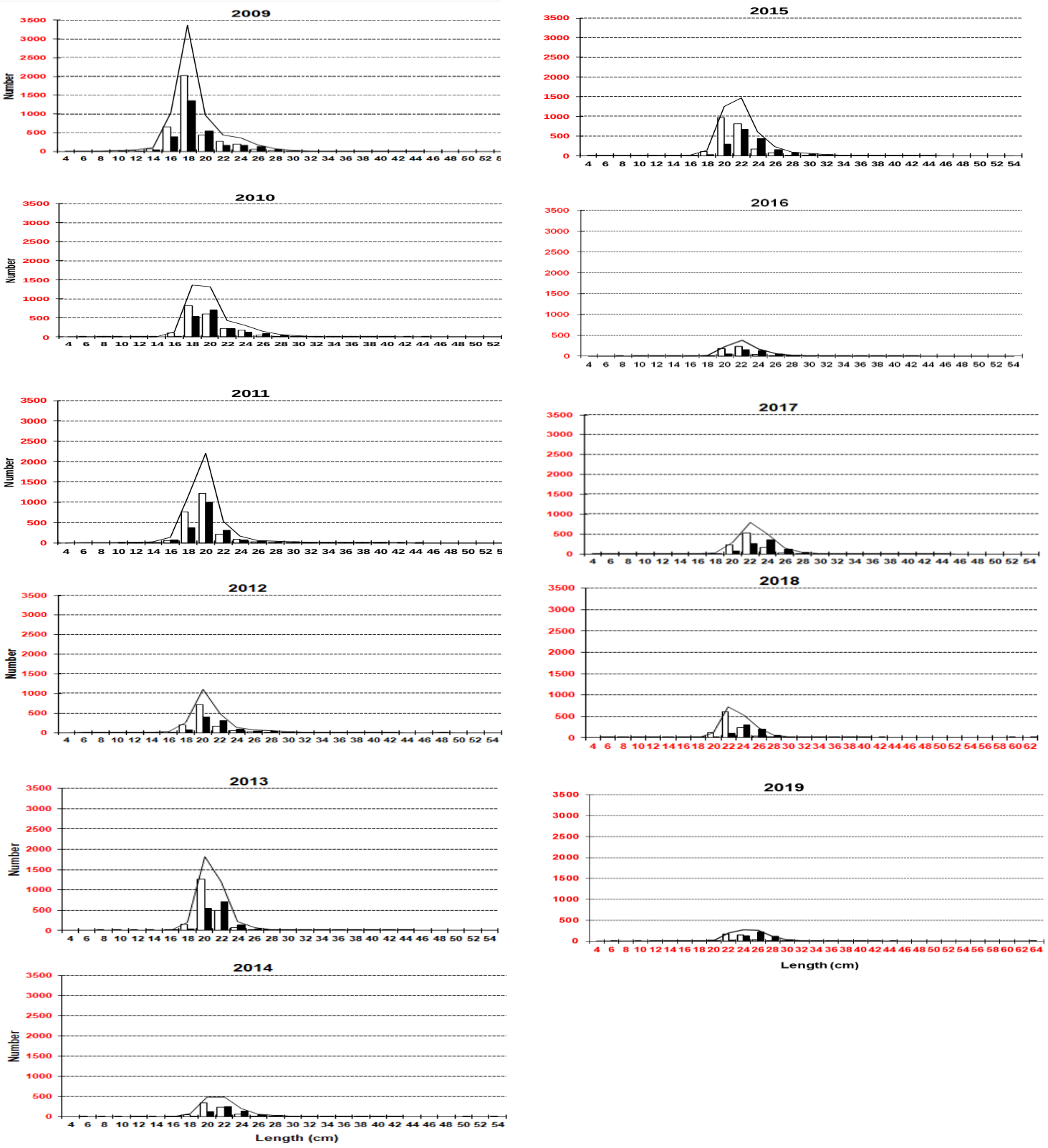

Figure 10 (cont.). Redfish length distribution (cm) on NAFO 3NO: 1997-2019. Mean numbers per tow. The data from 2015 to 2019 is in Table 8; the data for 1997-2014 can be seen in SCR Doc 15/08. The 2010-2019 graphs have a different y-axis upper limit.

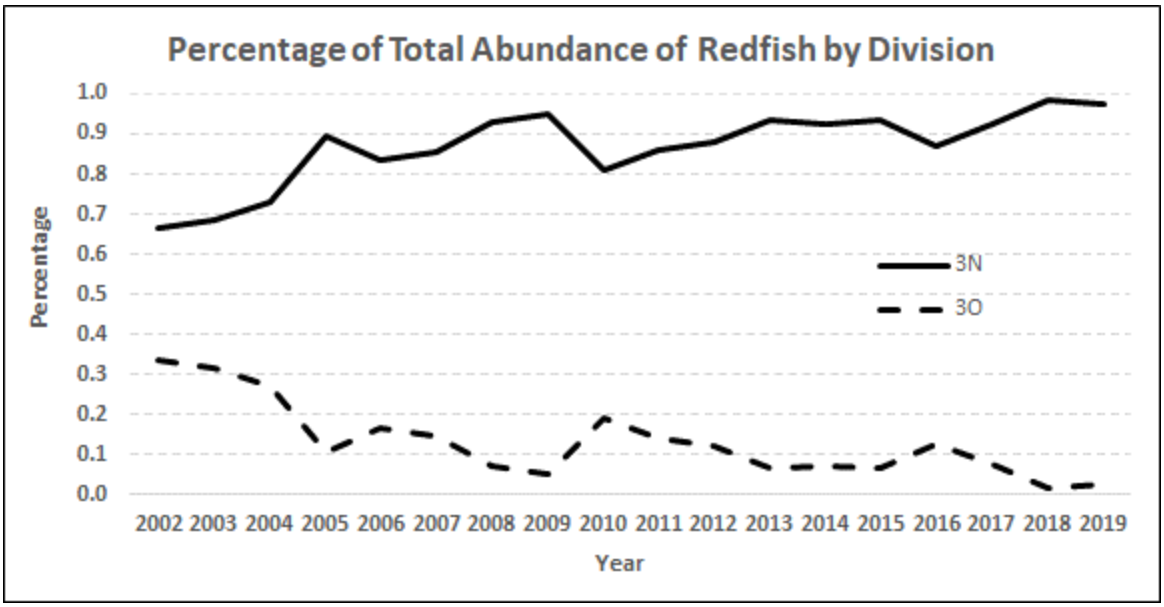

Figure 11. Redfish percentage of total abundance by Division and year. Spanish Spring surveys in NAFO Div. 3NO: 2002-2019.

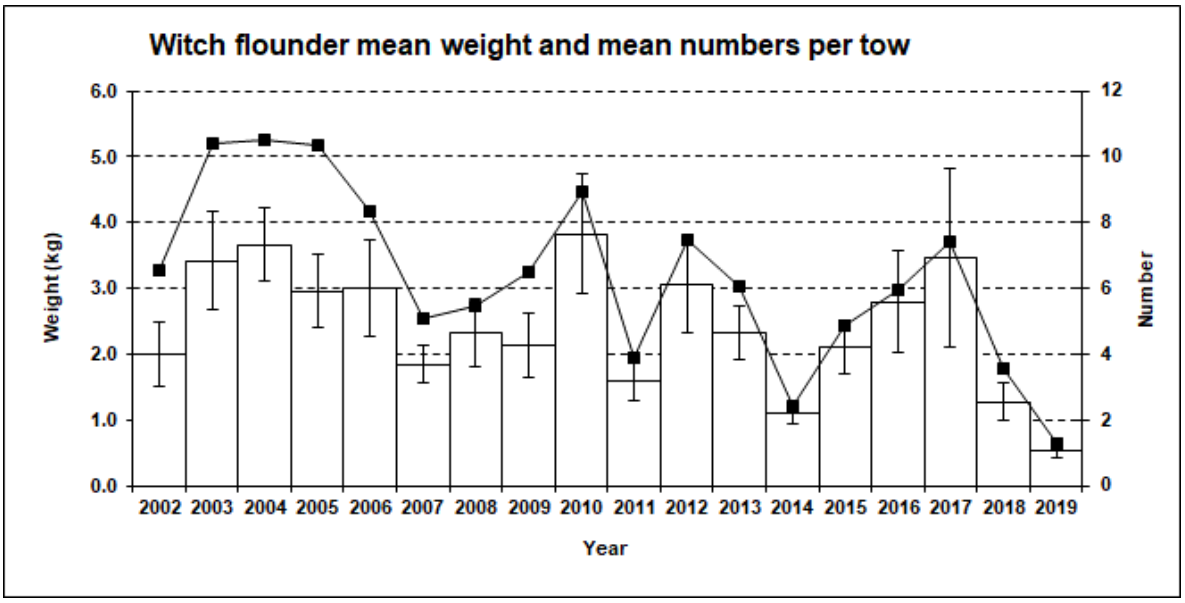

Figure 12. Witch flounder stratified mean catches in Kg and ±SD by year and mean number by year. Spanish Spring surveys in NAFO Div. 3NO: 2002-2019.

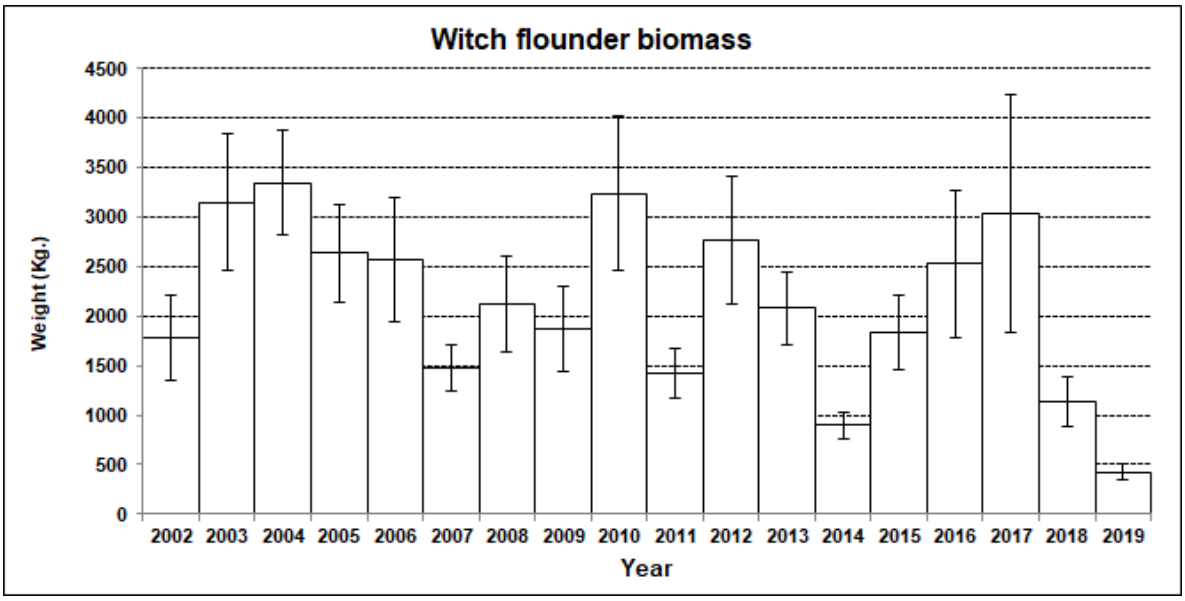

Figure 13. Witch flounder biomass calculated by the swept area method in tons and ±SD by year. Spanish Spring surveys in NAFO Div. 3NO: 2002-2019.

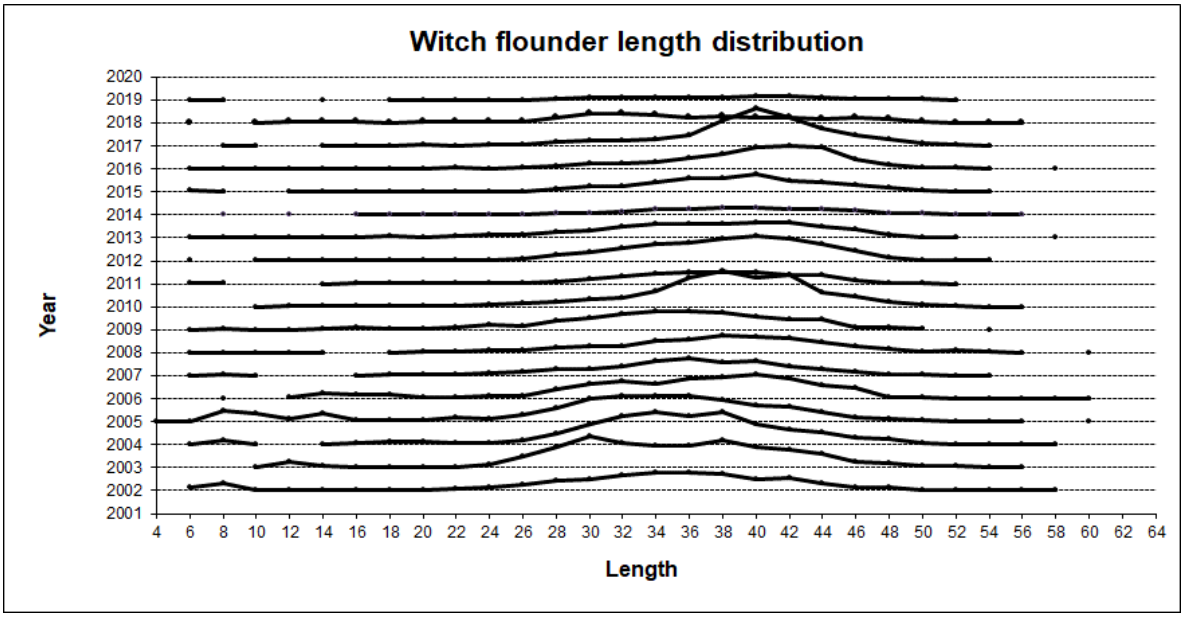

Figure 14. Witch flounder mean number per tow by length (cm) on NAFO 3NO: 2002-2019. Data from 2015 to 2019 are in Table 19; data for 2002-2014 can be seen in SCR Doc 15/08.

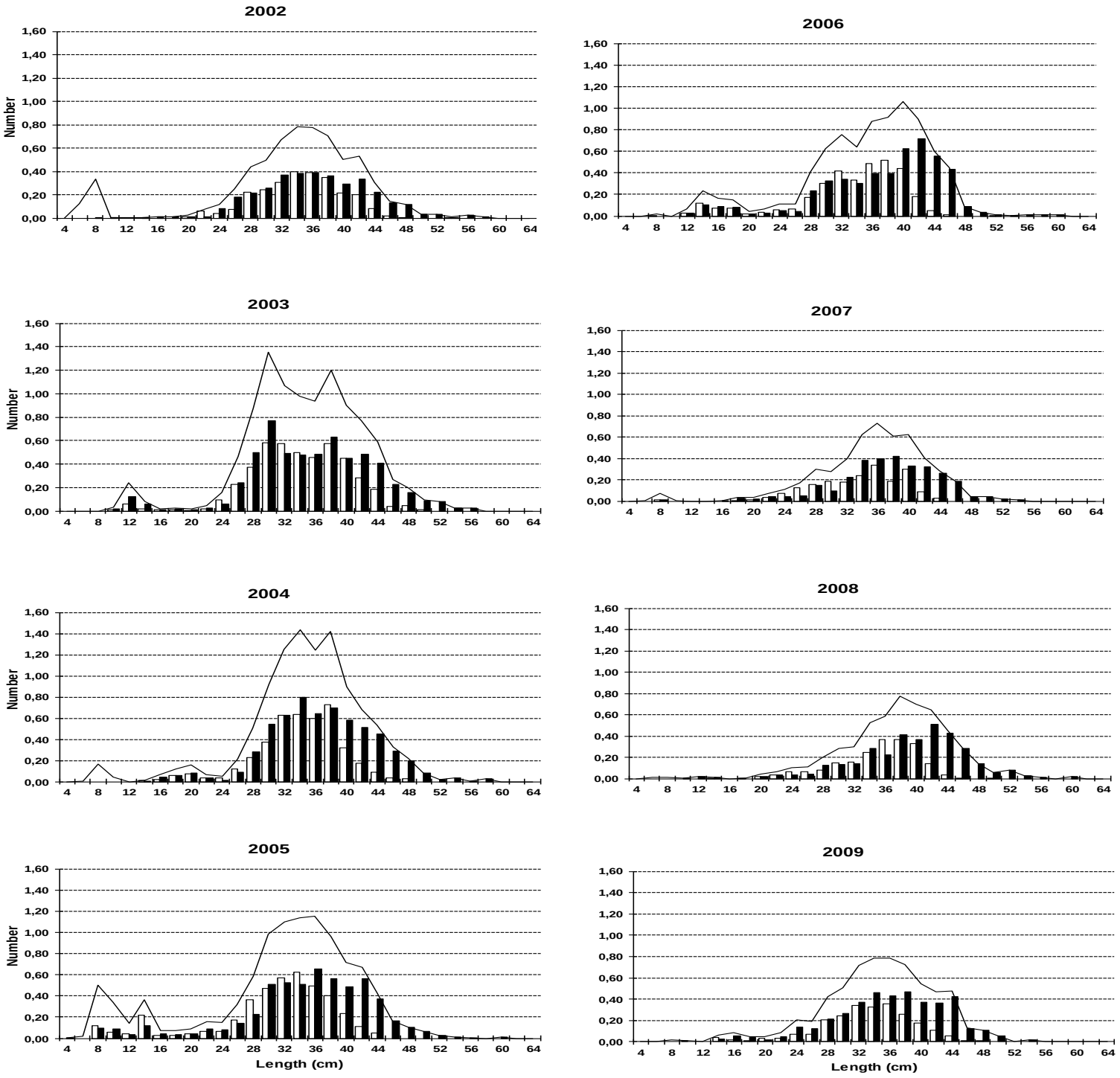

Figure 15. Witch flounder length distribution (cm) on NAFO 3NO: 2002-2019. Mean numbers per tow. Data from 2015 to 2019 are in Table 19; data for 2002-2014 can be seen in SCR Doc 15/08.

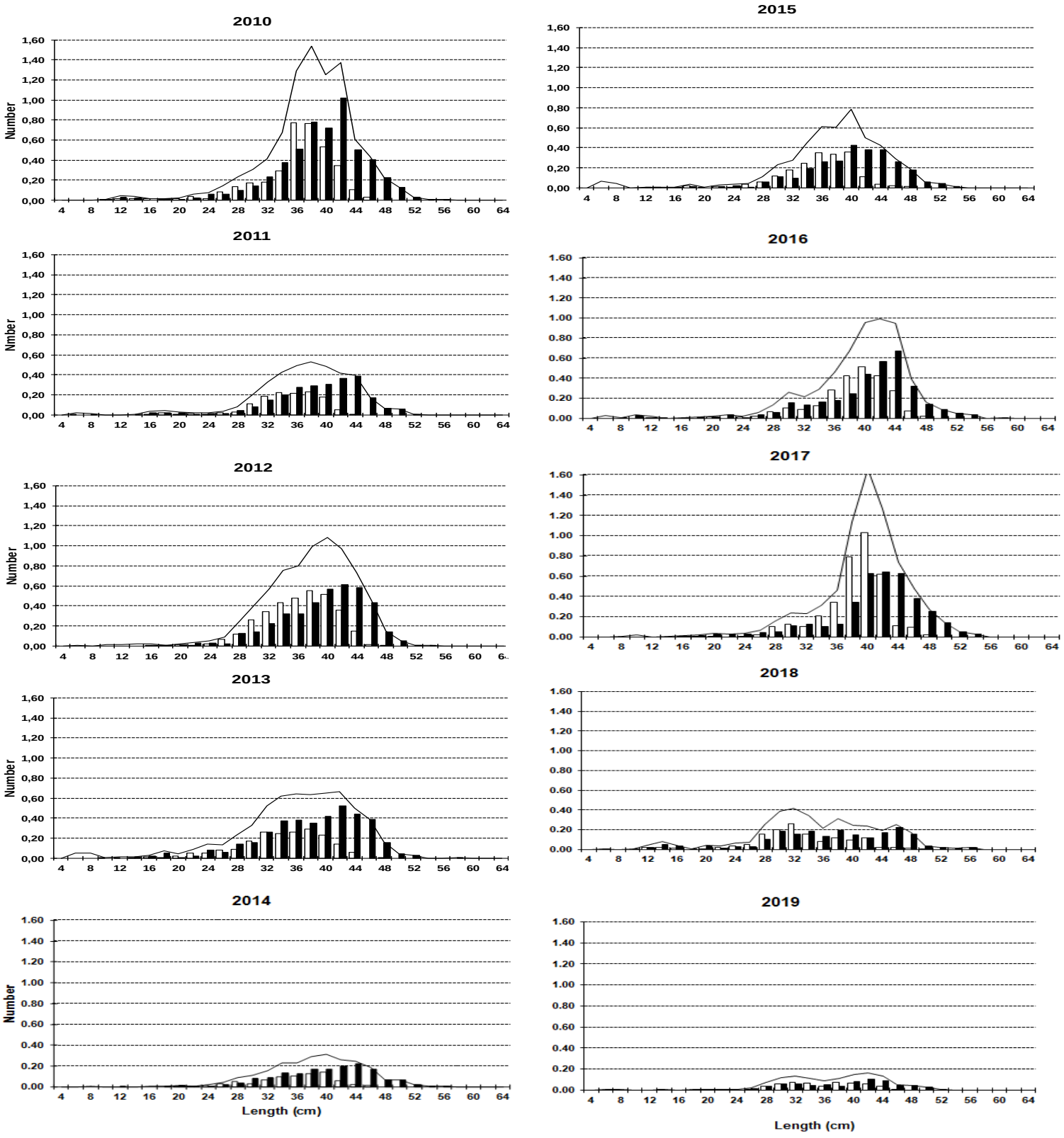

Figure 15 (cont.). Witch flounder length distribution (cm) on NAFO 3NO: 2002-2019. Mean numbers per tow. Data from 2015 to 2019 are in Table 19; data for 2002-2014 can be seen in SCR Doc 15/08.