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PORTUGUESE RESEARCH REPORT FOR 2020

by

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A. Status of the fisheries

In 2020, the Portuguese provisional nominal catches proceeding from NAFO Regulatory Sub Area 3 reached 22 315 tonnes (Table 1-A). Nominal catches increased continuously from 2000 to 2003, when they peaked at 22 700 tonnes, but declined sharply afterwards (Table I-B); during 2004-2008 catches stabilized between 11 700 and 13 500 tonnes. Since then catches increased been between 15 500 and 16 500 tonnes from 2009 to 2012, and from 16 900 to 19 500 tonnes from 2013 to 2018. In 2019 and 2020 catches increased again to 22 300 level.

The 2020 fishing effort (Table II) and the catches are provisional (data extracted from NAFO Database STATLANT 21 on 27 April 2021 and provided by the NAFO Secretariat in June 2021). In 2020, 8 trawlers composed the Portuguese fleet that operated in the NAFO area.

Greenland halibut together with redfish continues to be the bulk of the catch on Div. 3L, catches in this Division represents 18% of the total Portuguese catches.

In Div. 3M (Flemish Cap), cod and redfish are the most important fisheries and represents, each species respectively, 41% and 54% of the total catch in this division. Together, cod and redfish catches in Div.3M corresponds to 44% of the total Portuguese catches in all Sub Area 3. Div. 3M is, at present, the most important NAFO Division for the Portuguese fleet.

In 2020, redfish is the most representative species (around 81%) in the total catches of Div. 3N and 3O. Catches in Div. 3N and 3O represents 35% of the total Portuguese catches.

The redfish fishery in Div. 3LMNO has been, by far, the most important for the Portuguese fleet, representing the catches of redfish, in 2020, 61% of the total Portuguese catches in NAFO. The second fishery, in 2020, was cod is Div. 3M, representing the catches of cod in this Div., in 2020, 19% of the total Portuguese catches in NAFO. Been the Greenland halibut the third fishery, with most of the effort applied in Div. 3L, representing the catches of Greenland halibut in Div. 3LMNO, in 2020, 11% of the total Portuguese catches in NAFO.

Catches of redfish tripled its value from 2013 (571 tonnes) to 2015-2017 (around 1600 tonnes) in Div. 3L, after a small decrease in 2018 to 1200 tonnes catches increased again to 1800 tonnes in 2020. In Div. 3N catches oscillated between 250 and 400 tonnes in 2015-2016, but more than doubled in 2017 (from 412 to 1023 tonnes). In 2020 redfish catches in Div. 3N were 2 040 tonnes. In Div. 3M, from 2015 to 2016, the redfish catches increased around 1 400 tonnes and remains stable at the same level in 2017 (around 3600 tonnes), since then catches increase again oscillating between 4800 and 6100 tonnes. In Div. 3O, catches of redfish remained relatively stable until 2017, and increased from 2018 (2950 tonnes) to 2020 (4260 tonnes).

The Greenland halibut catches after a continuous reduction since 2013, increased from 2017 to 2020 (2419 tonnes). Since 2015, this fishery has been developed in the North (mainly in division 3L). Greenland halibut catches in divisions 3N and 3O became residual.

Roughhead grenadier catches, in recent years, are mainly by-catch of the Greenland halibut fishery and have been decreasing year by year and are residual now. The witch flounder catches, that in 2015 decreased to residual values (55 tonnes in all Subarea 3), reached in 2016-2017 an average of 250 tonnes (due the increase of 120 tonnes in both Div. 3M and 3O), but in 2018 and 2019 decreased to residual levels, in 2020 catches increased again to 209 tonnes mainly in Div. 3M (122 tonnes). The yellowtail catches in Div. 3N and 3O reached 280 tonnes in 2017 (13 tonnes in 2016) and decrease again to 31 tonnes in 2018 and 15 tonnes in 2019, in 2020 catches increased again to 200 tonnes. Skates catches in Subarea 3 remains stable at the level of 370 tonnes until 2016, decreasing in 2017 (246 tonnes) and in 2018 (70 tonnes), since then catches increased, been at 117 tonnes in 2019 and at 300 tonnes in 2020. The 3O division catches of silver hake, after almost doubled in 2016 (returning to the values of 2014 - at the level of 400 tonnes), were in 2017-2018 around 140 tonnes, decreased to 77 tonnes in 2019 and increased in 2020 to 181 tonnes. The by-catch of haddock in Div. 3M, that reached 108 tonnes in 2016, are now residual, both in this division and in all Sub Area 3. The catch of white hake in Div. 3O decreased from 109 tonnes in 2016 to 31 tonnes in 2020. The shrimp fishery in Div. 3L, that in 2009 its catches reached 20% of the total catch in this division, declined significantly in 2010. Portugal stopped fishing shrimp in 2013. The catches of other species remained more or less stable in all divisions.

B. Portuguese Annual Sampling Program

1. Catch and effort sampling.

Effort and CPUE data for 2020 Portuguese trawl fishery on the NAFO Regulatory Area were obtained through the revision of skipper logbooks from two trawlers, kindly supplied by its owners. All the information (round weight of the catch by species, fishing effort, positions and depths) has been recorded on a tow-by-tow basis. The vessel conversion factors were used to convert its processed landings in catches. Effort data in days and hours were supplied by the Portuguese administration, but since 2015 the fishing effort values are available only in days. The update for the past years was extracted from Database STATLANT 21B, on May 21, 2017 (Table II).

The daily catch and effort data from the logbooks were used to estimate the directed effort and CPUE for each of the target species/stock, as well as the main by-catch species and depth range of the different fisheries, on a monthly basis. From the data available, the majority of the fishing effort was directed towards cod, redfish and Greenland halibut. Data regarding directed effort and catch rates of the Greenland halibut fishery are presented in Table III to IV-B and Fig. 1.

The Greenland halibut CPUE series was updated with the 2020 observed CPUEs. The additive model (Ávila de Melo and Alpoim, 1995), was upgraded in 1998 (Alpoim *et al*., 1998) and used, like in previous years, to standardize the observed CPUEs, but excluding the vessel factor because the sampling program in recent years was carried out on vessels that were not sampled before. If the vessel factor is applied, these new vessels increase a lot the noised. Because they are the only vessels sampled in the recent years, we assumed that all vessels belong to the same category what is realistic. From January 1988 till April 1995, each monthly observed CPUE of this series was previously corrected for 130mm mesh size (Ávila de Melo and Alpoim, 1996). In this analysis, any observation corresponding to a month and a trawler with less than 10 hours of directed effort

was rejected. The CPUEs are presented in Tables IV and Fig. 1, with the associated standard errors (+/- 2 standard errors in the Figures) and coefficients of variation.

1.1. Comments on catch and effort data (based on the vessels sampled)

1.1.1. Greenland halibut in Div. 3L, 3M, 3N and 3O

In Div. 3L catch rates declined prior to the boom of the deep-water fishery (Table IV-A, Fig. 1). However, it is from 1990 to 1991, i.e. from the first to the second year of this new fishery in the Regulatory Area, that CPUEs fell by half. Between 1991 and 1994 catch rates remained stable at a low level. Since then, catch rates gradually increased, reaching an upper level in 1998-2000. Catch rates declined in 2001 and remained stable at that lower level in 2002 and 2003. In 2004 the catch rates decline again, reaching the lowest value since 1994. However, after 2004, the Greenland halibut catch rates recovered continuously and, despite the high variability from 2006 to 2020, the catch rates reached, in this period, the highest values observed of the time series (0.688 tonnes/h in 2020).

Div. 3M catch rates, despite noisier, follows the same trend as the ones in Div. 3L.

For all Div. 3LMNO combined (Table IV-A, Fig. 1) the observed catch rates series follows the Div. 3L pattern, since this is the division of Sub Area 3 with the highest concentration of Greenland halibut fishing effort.

2. Biological Sampling

In 2020, biological sampling was obtained from two stern trawlers fishing in Div. 3L, 3M, 3N and 3O during the first semester. Apart from species under moratoria, a priority to be sampled whenever they appear in the hauls, biological sampling was conducted for the two most abundant species in each haul, following the NAFO sampling recommendations.

Redfish (*S. mentella*) was sampled in Div. 3M, 3N and 3O (Tab. V). American plaice was sampled in Div. 3M and 3O. Greenland halibut and roughhead grenadier were sampled in Div. 3L and 3M. Cod was sampled only in Div. 3M.

Since 1996, all commercial information is representative of the catch as a whole, although sampling continues to be carried out by sex, with the exception of cod, white hake, Atlantic halibut and haddock. Mean weight and mean weight in the catch are derived from the length-weight relationships calculated from the commercial sampling in 2020 and are presented in Table VI. However, for species/stock with a low sampling level in 2020, the length-weight relationships calculated in previous years were used.

2.1. Catch and by-catch composition of the 2019 trawl fishery (130mm codend mesh size).

The regular mesh size in the codend used by the trawlers fishing groundfish was the 130mm and, when the mesh size is not mentioned it, means that the sample refers to the 130mm mesh size. However, in 2020, no sets were made with the 200 mm mesh size in the codend by the monitored vessels.

2.1.1. Cod Div. 3M

Information on length composition of the cod trawl catch in Div. 3M is available from January to May (Table VII, Fig. 2), from 225 m to 498 m depth.

Lengths between 54 cm and 69 cm dominated the catch, with a modal class at 63 cm (mean length and weight of 63 cm and 2425 g).

2.1.2. Redfish (*S. mentella*) **Div. 3M**

Information on length composition of the redfish (*S. mentella)* trawl catches in Div. 3M is available from January to April (Table VIII, Fig. 3), from 305 m to 658 m depth.

Lengths between 30 cm and 35 cm dominated the catch, with a modal class at 33 cm (mean length and weight of 33.1 cm and 572 g).

2.1.3. Redfish (*S. mentella*) **Div. 3N**

Information on length composition of the redfish (*S. mentella)* trawl catches in Div. 3N is available only for April is available for April (Table IX, Fig. 4), from 311 m to 532 m depth.

Lengths between 24 cm and 26 cm dominated the catch, with a modal class at 25 cm (mean length and weight of 26.2 cm and 229 g).

2.1.4. Redfish (*S. mentella*) **Div. 3O**

Information on length composition of the redfish (*S. mentella)* trawl catches in Div. 3O is available only for April (Table X, Fig. 5), from 345 m to 683 m depth.

Lengths between 25 cm and 28 cm dominated the catch, with a modal class at 28 cm (mean length and weight of 27.3 cm and 246 g).

2.1.5. American plaice Div. 3M

Information on length composition of the American plaice by-catch in Div. 3M is available from February to April (Table XI, Fig. 6), from 394 m to 553 m depth.

Lengths between 40 cm and 52 cm dominated the catch, with a modal class at 44 cm (mean length and weight of 47.9 cm and 1231 g).

2.1.6. American plaice Div. 3O

Information on length composition of the American plaice by-catch in Div. 3O is available only for April (Table XII, Fig. 7), from 521 m to 635 m depth.

Lengths between 40 cm and 50 cm dominated the catch, with a modal class at 44 cm (mean length and weight of 48.2 cm and 927 g).

2.1.7. Greenland halibut Div. 3L

Information on length composition of the Greenland halibut catches in Div. 3L is available from February to May (Table XIII, Fig. 8), from 866 m to 1485 m depth.

Lengths between 40 cm and 52 cm dominated the catch, with a modal class at 48 cm (mean length and weight of 50.0 cm and 1122 g).

2.1.8. Greenland halibut Div. 3M

Information on length composition of the Greenland halibut catches in Div. 3M is available for February and May (Table XIV, Fig. 9), from 827 m to 1150 m depth.

Lengths between 42 cm and 58 cm dominated the catch, with a modal class at 52 cm (mean length and weight of 52.5 cm and 1257 g).

2.1.9. Roughhead grenadier Div. 3L

Information on length composition of the roughhead grenadier catches in Div. 3L is available from March to May (Table XV, Fig. 10), from 877 m to 1495 m depth.

The lengths were by mistake measured at total length. The total length was converted into anal fin length using the relationship: *TS = 5.2320 + 2.3455 * AFL* (Atkinson, 1991).

Anal fin lengths between 15 cm and 19 cm dominated the catch, with a modal class at 16 cm (mean length and weight of 20.4 cm and 1061 g).

2.1.10. Roughhead grenadier Div. 3M

Information on length composition of the roughhead grenadier catches in Div. 3M is available for February and May (Table XVI, Fig. 11), from 923 m to 1150 m depth.

The lengths were by mistake measured at total length. The total length was converted into anal fin length using the relationship: *TS = 5.2320 + 2.3455 * AFL* (Atkinson, 1991).

Anal fin lengths between 20 cm and 25 cm dominated the catch, with a modal class at 25 cm (mean length and weight of 22.0 cm and 1227 g).

3. Acknowledgements

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4. References

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TABLE I-A: PORTUGUESE NOMINAL TRAWL CATCHES (mt) IN NAFO AREA, 2020
(STATLANT 21 NAFO Secretariat June 2021)

	DIVISION				TOTAL
SPECIES	3L	3M	3N	3O	2020
Cod		4234			4234
Redfish	1794	5563	2043	4259	13659
American plaice	54	161	90	153	458
Yellowtail flounder			45	154	199
Witch flounder	10	122	3	74	209
Greenland halibut	2156	245	16	2	2419
Atlantic halibut	46	57	41	105	249
Roughhead grenadier	7				7
Roundnose grenadier	18	1			19
Anarhichas spp.		2			2
Hadocck					
Pollock					
White hake				31	31
Red hake					
Silver Hake			13	181	194
Capelin					
Skates	10	7	176	107	300
Monkfish					
Squid			26	308	334
Shrimp					
Others/Unidentified	1				1
TOTAL	4096	10392	2453	5374	22315

TABLE I - B: PORTUGUESE NOMINAL TRAWL CATCHES (mt) IN NAFO DIV. 3LMNO (data extracted from NAFO Database STATLANT 21 on 27 April 2021).

SPECIES / YEAR	2019	2018	2017	2016	2015	2014	2013	2012	2011	2010	2009	2008	2007	2006	2005	2004
Cod	6442	4836	5473	5699	4889	5504	4814	2946	2832	1528	1003	434	255	177	105	281
Redfish	12619	10412	10300	9093	8800	9509	9504	8953	9983	10541	9361	7768	7204	7805	7338	5971
American plaice	351	206	359	322	291	275	407	468	198	160	298	355	443	376	371	517
Yellowtail flounder	15	31	280	13	35	31	94	267	71	27	71	145		134	188	68
Witch flounder	67	118	287	206	55	186	128	108	128	71	131	221	124	141	150	591
Greenland halibut	2288	2072	1920	1583	1722	1938	2124	2051	2493	2257	2075	1976	1873	2326	2256	1888
Atlantic halibut	229	154	296	207	200	133	96	70	46	56	469	23	32	43	20	59
Roughhead grenadier	35	31	27	41	90	293	88	488	251	83	266	50	34	77	262	381
Roundnose grenadier	25	9	1	19	13	42	10	39	48	27	198	29	37	54		
Anarhichas spp.	13	3	2	5	5	4	4	6	18	13	41	25	16	28	32	45
Hadocck		2	15	153	30	181	78	64	13	1	3	1	2		6	23
Pollock							1									4
White hake	21	28	69	109	133	109	81	19	25	17	24	55	62	102	157	1266
Red hake					2		1	1	69	1		3	2	4	18	13
Silver hake	77	135	149	392	266	468	30	35								6
Capelin																
Skates	117	70	246	359	360	452	496	427	435	304	1045	1252	1058	1003	576	1550
Monkfish		3	12	20	10	24	7	4	1	11	3	13	35	34	6	73
Squid	11	10	12						1	2	29	5	2	17		11
Shrimp								5		15	332					50
Others/Unidentified	322	201					48	160	29	11	77	2	1	216	6	15
TOTAL	22632	18321	19448	18221	16901	19149	18011	16111	16641	15125	15426	12357	11180	12537	11491	12812

TABLE I - B: cont.

SPECIES / YEAR	2003	2002	2001	2000	1999	1998	1997	1996	1995	1994	1993	1992	1991	1990	1989	1988
Cod	602	488	361	192	325	550	1545	1316	1670	2640	3657	5986	13362	15142	24130	12963
Redfish	7804	6346	5331	5678	6082	2370	1126	2152	3297	8614	9831	6584	12165	17803	19032	19137
American plaice	748	634	636	400	718	361	389	289	170	346	323	453	1183	715	1821	1813
Yellowtail flounder	287	123	350	151	428	87					21			11	5	
Witch flounder	485	436	576	230	509	381	350	238	385	579	291	851	1980	2257	15	10
Greenland halibut	4369	4318	5027	4688	3997	3245	3347	3313	1942	5970	8811	10547	13961	11171	3616	4194
Atlantic halibut	89	47	45	28	51	29	15	9	18	45	50	79	229	96		152
Roughhead grenadier	302	508	613	397	1302	1088	765	787	1377	2224	1996	2004	4053	3211	290	911
Roundnose grenadier																
Anarhichas spp.	112	88	142	61	552	139	184	121	1358	3219	2303	1697	2842	1941		
Hadocck	141	78	22	12	11	5	42		2	10	10	165	82	17		
Pollock	114									13	41	29	424	11		
White hake	4090	1678														8
Red hake	2	1968	273	43	76	19	54	124	230	270	365	467	1010	469	104	
Silver hake																
Capelin														14		
Skates	1942	1362	883	672	2168	1105	908	796	2062	6239	7604	7019	23304	13557	652	1075
Monkfish	165	71										37	7		15	
Squid						1		4							47	
Shrimp		16	420	289	227	203	170		17							
Others/Unidentified	13	322	40	1	115	38	115	23	15	12	245	325	725	779	158	6
TOTAL	21265	18483	14719	12842	16561	9621	9010	9172	12543	30181	35548	36243	75327	67194	49885	40269

TABLE II : PORTUGUESE TRAWL EFFORT IN FISHING DAYS
IN NAFO Div. 3LMNO (data extracted from NAFO.
(Database Statlant 21B on 21 May 2017)

YEAR	3L	3M	3N	3O	Total geral
2000	519	248	297	329	1393
2001	770	477	361	262	1870
2002	607	263	532	490	1892
2003	503	257	783	753	2296
2004	435	400	406	464	1705
2005	492	407	218	359	1476
2006	408	454	106	517	1485
2007	295	359	162	421	1237
2008	307	464	179	213	1163
2009	512	727	237	188	1664
2010	495	643	214	242	1594
2011	432	770	320	233	1755
2012	235	400	337	299	1271
2013	395	681	350	258	1684
2014	454	791	194	361	1800
2015	374	570	162	336	1442
2016 (a)	346	698	132	347	1523
2017 (a)	282	564	213	278	1337
2018 (a)	302	649	222	194	1367
2019 (a)	375	775	159	206	1515
2020 (a)	367	523	273	239	1402

a) not extracted from Database Statlant 21B, provisional

TABLE III: Portuguese trawl fishery cpue's and bycatch by month and division for 2020.

DIVISION	TARGET SPECIES	MONTH	DEPTH RANGE (m)		CPUE	MAIN BYCATCH		WITCH FLOUNDER	TOTAL
			MIN.	MAX.	(ton/hour)	SPECIES	%	BYCATCH (%)	BYCATCH (%)
3M	COD	JAN	256	678	1.929	RED	12.9	0.3	13.7
3M	COD	FEB	282	514	1.760	RED	4.2	0.0	5.1
3M	COD	MAR	292	500	1.792	PLA	3.7	0.0	4.2
3M	COD	APR	380	485	2.228	PLA	5.2	0.0	10.3
3M	COD	MAY	300	448	0.954	RED	2.9	0.0	2.9
3M	RED	JAN	325	703	4.176	COD	0.7	0.3	1.4
3M	RED	FEB	305	648	3.590	COD	3.4	0.2	4.3
3M	RED	APR	413	425	0.728	COD	49.0	0.0	57.6
3N	RED	APR	280	780	0.779	HAL	3.1	0.0	5.2
3O	RED	APR	128	683	1.643	HAL	3.8	0.7	9.4
3L	GHL	FEB	866	1148	0.828	RHG	7.0	0.0	7.1
3L	GHL	MAR	190	1237	0.729	RHG	4.5	0.0	5.6
3L	GHL	APR	917	1472	0.651	RNG	4.3	0.0	7.8
3L	GHL	MAY	1184	1488	0.701	RNG	10.3	0.0	16.6
3M	GHL	FEB	827	1067	0.396	RHG	7.6	0.0	7.9
3M	GHL	APR	950	971	0.305	PLA	4.1	0.0	7.4
3M	GHL	MAY	920	1150	0.510	RNG	19.2	0.0	25.8

TABLE IV - A: GREENLAND HALIBUT TRAWL CATCH RATES, 1988-2020: mean annual cpue's corrected for the month, division and vessel of each observation.

	3L			3M			3N			3LMN			
	CPUE	ST.ERROR	C.V.	CPUE	ST.ERROR	C.V.	CPUE	ST.ERROR	C.V.	CPUE	ST.ERROR	C.V.	
1988	0.460	0.095	41.6							0.395	0.095	47.8	1988
1989	0.416	0.074	53.0							0.358	0.073	61.3	1989
1990	0.364	0.039	37.1	0.145			0.173			0.300	0.036	45.1	1990
1991	0.223	0.042	42.3				0.127	0.031	42.2	0.185	0.035	53.9	1991
1992	0.146	0.029	63.5				0.258	0.032	42.8	0.248	0.037	71.9	1992
1993	0.168	0.014	11.4				0.172	0.021	41.8	0.253	0.025	36.6	1993
1994	0.104	0.003	4.1				0.111	0.017	36.9	0.183	0.035	54.7	1994
1995	0.132	0.021	44.7	0.134	0.025	41.9	0.123	0.024	50.9	0.159	0.023	63.6	1995
1996	0.176	0.021	43.7	0.199	0.024	35.5	0.172	0.019	29.6	0.176	0.015	46.9	1996
1997	0.196	0.019	31.4	0.238	0.027	31.5	0.130	0.009	9.2	0.187	0.019	46.7	1997
1998	0.273	0.017	22.8	0.231	0.023	34.7	0.210	0.019	30.4	0.265	0.013	32.1	1998
1999	0.299	0.017	17.9	0.343	0.041	35.4	0.261	0.020	23.0	0.316	0.020	34.2	1999
2000	0.261	0.024	24.0	0.276	0.028	23.1	0.303	0.043	28.2	0.280	0.029	42.1	2000
2001	0.210	0.029	36.5	0.206	0.014	18.5	0.193	0.017	20.1	0.217	0.020	41.1	2001
2002	0.231	0.018	26.1	0.228	0.029	41.8	0.269	0.032	23.6	0.230	0.021	46.6	2002
2003	0.211	0.036	53.3	0.210	0.031	42.2	0.205	0.021	24.6	0.219	0.025	55.2	2003
2004	0.119	0.015	37.2	0.098	0.022	66.1	0.142	0.010	19.5	0.146	0.018	66.5	2004
2005	0.252	0.003	1.7	0.321	0.096	42.2				0.244	0.034	28.2	2005
2006	0.456	0.053	28.4	0.238	0.027	19.7				0.344	0.040	34.7	2006
2007	0.637	0.087	33.5	0.401	0.077	38.3				0.508	0.063	39.2	2007
2008	0.427	0.031	17.7	0.432	0.020	9.5				0.390	0.020	16.4	2008
2009	0.713	0.101	42.6	0.633	0.051	22.7				0.649	0.053	34.8	2009
2010	0.429	0.035	25.7	0.381	0.014	6.2	0.474			0.397	0.030	28.6	2010
2011	0.789	0.087	27.2	0.623	0.085	30.7				0.685	0.061	30.0	2011
2012	0.403	0.051	18.3	0.325						0.347	0.039	19.7	2012
2013	0.473	0.048	25.7	0.288	0.020	14.3	0.387	0.040	14.9	0.395	0.032	29.4	2013
2014	0.461	0.069	41.3	0.258	0.034	23.8	0.416	0.205	88.8	0.415	0.064	58.1	2014
2015	0.600	0.059	32.5	0.643	0.133	48.5				0.579	0.057	40.3	2015
2016	0.835	0.180	72.2	0.817						0.782	0.163	73.5	2016
2017	0.588	0.096	42.7	0.558	0.107	40.9				0.544	0.072	44.9	2017
2018	0.532	0.054	32.7	0.397	0.099	53.9				0.456	0.050	42.5	2018
2019	0.828	0.093	27.5	0.647						0.747	0.079	28.4	2019
2020	0.688	0.021	7.6	0.446	0.052	18.1				0.567	0.044	22.8	2020

TABLE IV - B: GREENLAND HALIBUT TRAWL CATCH RATES,
1988-2020 mean cpue's by division corrected for the year, month and vessel of each observation.

	CPUE	ST.ERROR	C.V.	
3L	0.388	0.011	43.0	3L
3M	0.318	0.009	34.1	3M
3N	0.209	0.008	38.4	3N
3LMNO	0.327	0.006	43.8	3LMNO

TABLE V: Intensity of the trawl sampling during 2020, by species, division and month.

SPECIES	DIV.	MONTH	Nº OF SAMPLES	Nº FISH MEASURED	SAMPLING WEIGHT(Kg)	OTOLITHS Nº	OTOLITHS LENGTH RANGE (cm)
COD	3M	JAN	6	672	1109	-	-
COD	3M	FEB	9	913	2084	147	49-98
COD	3M	MAR	12	1155	3128	243	50-97
COD	3M	APR	19	1849	4990	290	49-106
COD	3M	MAY	6	494	999	-	-
REDFISH (S. mentella)	3M	JAN	22	2377	1055	176	25-41
REDFISH (S. mentella)	3M	FEB	16	1577	896	298	23-55
REDFISH (S. mentella)	3M	MAR	3	244	146	-	-
REDFISH (S. mentella)	3M	APR	1	100	60	-	-
REDFISH (S. mentella)	3N	APR	2	179	46	38	23-33
REDFISH (S. mentella)	3O	APR	10	962	250	38	23-33
AMERICAN PLAICE	3M	FEB	2	159	177	-	-
AMERICAN PLAICE	3M	MAR	8	706	859	13	42-54
AMERICAN PLAICE	3M	APR	12	991	1196	20	42-58
AMERICAN PLAICE	3O	APR	2	142	172	-	-
GREENLAND HALIBUT	3L	FEB	3	300	275	-	-
GREENLAND HALIBUT	3L	MAR	16	1600	1716	171	36-90
GREENLAND HALIBUT	3L	APR	9	810	1206	229	40-80
GREENLAND HALIBUT	3L	MAY	6	532	719	92	42-69
GREENLAND HALIBUT	3M	FEB	1	100	124	2	57-66
GREENLAND HALIBUT	3M	MAY	1	103	137	-	-
ROUGHHEAD GRENADIER	3L	MAR	13	1385	1408	232	10-36
ROUGHHEAD GRENADIER	3L	APR	5	347	522	-	-
ROUGHHEAD GRENADIER	3L	MAY	5	395	582	-	-
ROUGHHEAD GRENADIER	3M	FEB	1	90	107	90	5-32
ROUGHHEAD GRENADIER	3M	MAY	1	82	122	-	-

TABLE VI: Length-weight relationship by species, stock and sex in 2020.

Species	Stock	Sex	a	b	n	*r2*	Length interval (cm)	Ref.
COD	3M	T	0.0129	2.9174	2817	0.977	39-120	
GHL	2J3KLMNO	F	0.0039	3.1778	249	0.988	44-72	
GHL	2J3KLMNO	M	0.0063	3.0493	185	0.994	37-60	
GHL	2J3KLMNO	T	0.0025	3.3191	2728	0.993	34-90	
PLA	3M	F	0.0029	3.3206	75	0.979	38-61	
PLA	3M	M	0.0124	2.9359	45	0.935	36-57	
PLA	3M	T	0.0018	3.4707	1219	0.996	33-61	
REB	3LN	F	0.0796	2.4401	43	0.968	22-33	
REB	3LN	M	0.0828	2.4146	28	0.957	21-28	
REB	3LN	T	0.0576	2.5341	71	0.989	21-33	
REB	3M	F	0.0073	3.2132	821	0.990	22-55	
REB	3M	M	0.0109	3.0947	571	0.982	21-45	
REB	3M	T	0.0081	3.1857	1392	0.993	21-55	
RHG	3LMNO	T	1.1089	2.2576	1468	0.863	5-36	
length-weight relationships calculated in previous years								
PLA	3LNO	F	0.0252	2.7014	20	0.845	35-47	SCS 19/09
PLA	3LNO	M	0.0182	2.7847	8	0.805	37-43	SCS 19/09
PLA	3LNO	T	0.0055	3.1219	216	0.980	33-62	SCS 19/09
REB	3O	F	0.0957	2.3760	246	0.995	20-33	SCS 20/09
REB	3O	M	0.0947	2.3660	116	0.984	21-32	SCS 20/09
REB	3O	T	0.0846	2.4105	362	0.995	20-33	SCS 20/09

TABLE VII: COD, DIV. 3M, 2020: length composition (0/000) of the 130mm trawl catches.

LENGTH GROUP	JAN	FEB	MAR	APR	MAY	1st Q.	2nd Q.	YEAR	LENGTH GROUP
36				1.1	5.6		2.0	0.9	36
39	0.9	11.8	10.4	13.0	29.7	9.4	16.2	12.3	39
42	11.2	22.7	7.4	14.8	27.3	14.0	17.2	15.4	42
45	22.0	41.1	5.4	27.7	26.1	22.0	27.4	24.3	45
48	70.8	68.2	25.4	43.3	52.5	49.6	45.1	47.7	48
51	93.8	84.3	31.7	63.0	114.2	62.5	73.0	67.0	51
54	77.4	88.4	53.9	71.0	169.8	71.2	90.2	79.4	54
57	154.5	126.4	76.2	86.8	131.6	108.8	95.5	103.1	57
60	217.0	147.3	112.2	128.3	139.1	143.4	130.4	137.8	60
63	168.6	127.5	164.6	136.8	103.8	150.8	130.4	142.1	63
66	115.6	98.9	183.3	138.4	87.5	139.2	128.5	134.6	66
69	46.0	71.2	109.3	103.4	47.0	83.9	92.4	87.6	69
72	19.3	43.3	87.2	65.1	29.6	58.8	58.2	58.5	72
75	1.0	38.5	51.5	46.6	15.4	38.0	40.5	39.1	75
78	1.9	18.5	35.4	25.5	7.0	23.2	21.9	22.6	78
81		7.1	22.5	13.8	12.4	12.8	13.6	13.1	81
84		4.2	11.1	6.8	1.4	6.6	5.8	6.2	84
87			5.4	7.2		2.4	5.8	3.9	87
90			4.0	2.6		1.8	2.1	1.9	90
93			0.6	2.7		0.3	2.2	1.1	93
96		0.6	1.4	1.1		0.9	0.9	0.9	96
99				0.5			0.4	0.2	99
102				0.2			0.1	0.1	102
105				0.3			0.3	0.1	105
108									108
111									111
114									114
117									117
120			0.8			0.4		0.2	120
TOTAL	1000	1000	1000	1000	1000	1000	1000	1000	
No. SAMPLES	6	9	12	19	6	27	25	52	
SAMPLING WEIGHT(kg)	1109	2084	3128	4990	999	6321	5988	12309	
No. F.MEASURED	672	913	1155	1849	494	2740	2343	5083	
MEAN LENGTH(cm)	60.2	61.1	66.1	63.8	59.1	63.2	62.8	63.0	
MEAN WEIGHT (g)	2068	2212	2759	2518	2004	2431	2418	2425	
DEPTH RANGE (m)	256/478	315/498	292/497	380/466	225/429	256/498	225/466	225/498	

TABLE VIII: REDFISH (*S. mentella*), DIV. 3M, 2020: length composition (0/000) of the 130mm trawl catches.

LENGTH GROUP	JAN	FEB	MAR	APR	1st Q.	2nd Q.	YEAR	LENGTH GROUP
21		0.2	3.2		0.1		0.1	21
22			5.9		0.003		0.003	22
23		0.3			0.1		0.1	23
24		0.5	9.1		0.2		0.1	24
25	3.2	2.8	30.2	10.0	3.1	10.0	3.2	25
26	14.8	9.3	37.8	80.0	13.2	80.0	13.7	26
27	18.2	24.7	67.8	100.0	20.1	100.0	20.6	27
28	40.4	47.1	85.6	220.0	42.3	220.0	43.6	28
29	49.6	72.6	46.8	90.0	56.1	90.0	56.3	29
30	96.3	110.6	56.9	80.0	100.3	80.0	100.2	30
31	133.6	112.0	58.8	50.0	127.4	50.0	126.9	31
32	138.8	124.8	103.0	30.0	134.8	30.0	134.0	32
33	148.9	113.4	85.1	30.0	138.9	30.0	138.1	33
34	127.2	119.3	88.7	40.0	125.0	40.0	124.3	34
35	98.4	95.1	63.0	30.0	97.5	30.0	97.0	35
36	54.5	61.7	40.0	20.0	56.5	20.0	56.3	36
37	38.5	36.7	43.3	20.0	38.0	20.0	37.8	37
38	19.3	24.3	26.7	60.0	20.7	60.0	21.0	38
39	12.9	16.9	36.7	20.0	14.0	20.0	14.1	39
40	0.6	8.9	26.0	40.0	3.0	40.0	3.2	40
41	3.0	4.6	22.8	20.0	3.5	20.0	3.6	41
42		0.9	20.4	20.0	0.3	20.0	0.4	42
43	0.7	0.9	2.8	10.0	0.7	10.0	0.8	43
44		2.5	5.6		0.7		0.7	44
45	1.1	1.7	16.9	10.0	1.3	10.0	1.3	45
46		1.4		10.0	0.4	10.0	0.5	46
47		2.0	8.4		0.6		0.6	47
48		0.9			0.3		0.3	48
49		1.3			0.4		0.4	49
50		1.4		10.0	0.4	10.0	0.5	50
51		0.8			0.2		0.2	51
52		0.2			0.1		0.1	52
53								53
54			5.6		0.002		0.002	54
55		0.2	2.8		0.1		0.1	55
TOTAL	1000	1000	1000	1000	1000	1000	1000	
No. SAMPLES	22	16	3	1	41	1	42	
SAMPLING WEIGHT(kg)	1055	896	146	60	2097	60	2157	
No. F.MEASURED	2377	1577	244	100	4198	100	4298	
MEAN LENGTH(cm)	33.0	33.2	33.4	32.2	33.1	32.2	33.1	
MEAN WEIGHT (g)	567	585	625	565	572	565	572	
DEPTH RANGE (m)	325/658	305/648	328/465	400/434	305/658	400/434	305/658	

TABLE IX: REDFISH (*S. mentella*), DIV. 3N, 2020:
length composition (0/000) of the 130mm trawl catches.

LENGTH GROUP	APR =YEAR	LENGTH GROUP
20	6.2	20
21	31.2	21
22	28.0	22
23	77.9	23
24	174.4	24
25	152.6	25
26	224.3	26
27	134.0	27
28	90.3	28
29	24.9	29
30	6.2	30
31	18.7	31
32	15.6	32
33	15.6	33
TOTAL	1000	
No. SAMPLES	2	
SAMPLING WEIGHT(kg)	46	
No. F.MEASURED	179	
MEAN LENGTH(cm)	26.2	
MEAN WEIGHT (g)	229	
DEPTH RANGE (m)	311/532	

TABLE X: REDFISH (*S. mentella*), DIV. 3O, 2020:
length composition (0/000) of the 130mm trawl catches.

LENGTH GROUP	APR =YEAR	LENGTH GROUP
22	22.4	22
23	80.9	23
24	98.8	24
25	135.0	25
26	140.2	26
27	123.8	27
28	167.5	28
29	96.7	29
30	52.7	30
31	37.0	31
32	24.7	32
33	14.1	33
34	3.2	34
35	3.1	35
TOTAL	1000	
No. SAMPLES	10	
SAMPLING WEIGHT(kg)	250	
No. F.MEASURED	962	
MEAN LENGTH(cm)	27.3	
MEAN WEIGHT (g)	246	
DEPTH RANGE (m)	345/683	

TABLE XI: AMERICAN PLAICE, DIV. 3M, 2020: length composition (0/000) of the 130mm trawl catches.

LENGTH GROUP	FEB	MAR	APR	1st Q.	2nd Q.	YEAR	LENGTH GROUP
32		2.6		2.1		0.8	32
34		6.7	8.5	5.3	8.5	7.3	34
36	10.8	37.1	32.0	31.7	32.0	31.9	36
38	30.7	74.1	51.1	65.2	51.1	56.6	38
40	76.0	91.0	80.9	87.9	80.9	83.6	40
42	122.1	92.1	128.9	98.2	128.9	117.0	42
44	91.4	133.7	137.6	125.0	137.6	132.7	44
46	144.4	127.9	107.6	131.3	107.6	116.8	46
48	89.8	74.7	88.7	77.8	88.7	84.4	48
50	149.8	92.0	88.1	103.9	88.1	94.2	50
52	89.1	102.9	88.1	100.0	88.1	92.7	52
54	67.6	58.9	79.1	60.7	79.1	72.0	54
56	41.5	49.7	44.1	48.0	44.1	45.6	56
58	26.1	33.9	37.3	32.3	37.3	35.4	58
60	58.4	15.1	16.0	23.9	16.0	19.1	60
62		7.8	8.6	6.2	8.6	7.7	62
64	2.3		3.4	0.5	3.4	2.3	64
TOTAL	1000	1000	1000	1000	1000	1000	
No. SAMPLES	2	8	12	10	12	22	
SAMPLING WEIGHT(kg)	177	859	1196	1035	1196	2231	
No. F.MEASURED	159	706	991	865	991	1856	
MEAN LENGTH(cm)	49.0	47.6	47.9	47.9	47.9	47.9	
MEAN WEIGHT (g)	1257	1223	1232	1230	1232	1231	
DEPTH RANGE (m)	445/553	412/497	394/466	412/553	394/466	394/553	

TABLE XII: AMERICAN PLAICE, DIV. 3O, 2020:
length composition (0/000) of the 130mm trawl catches.

LENGTH GROUP	APR =YEAR	LENGTH GROUP
34	14.1	34
36	27.8	36
38	69.9	38
40	77.5	40
42	105.9	42
44	133.7	44
46	127.2	46
48	98.0	48
50	77.1	50
52	63.8	52
54	42.5	54
56	35.7	56
58	55.9	58
60	42.5	60
62	14.1	62
64	14.4	64
TOTAL	1000	
No. SAMPLES	2	
SAMPLING WEIGHT(kg)	172	
No. F.MEASURED	142	
MEAN LENGTH(cm)	48.2	
MEAN WEIGHT (g)	927	
DEPTH RANGE (m)	521/635	

TABLE XIII: GREENLAND HALIBUT, DIV. 3L, 2020: length composition (0/000) of the 130mm trawl catches.

LENGTH GROUP	FEB	MAR	APR	MAY	1st Q.	2nd Q.	YEAR	LENGTH GROUP
34	11.9				2.3		1.6	34
36	18.3	4.7	5.2		7.3	3.3	6.0	36
38	46.3	22.1	4.3	2.6	26.8	3.7	19.4	38
40	139.8	88.8	18.6	23.9	98.6	20.5	73.7	40
42	173.5	134.5	39.7	34.8	142.0	37.9	108.7	42
44	171.1	161.6	53.6	51.9	163.4	53.0	128.1	44
46	139.4	126.3	91.6	53.4	128.8	77.7	112.5	46
48	108.9	120.7	77.9	55.9	118.4	69.9	102.9	48
50	68.3	108.9	109.4	101.2	101.1	106.4	102.8	50
52	46.3	77.1	121.0	97.6	71.2	112.5	84.4	52
54	22.3	48.9	100.6	121.1	43.8	108.0	64.3	54
56	12.3	48.3	115.5	117.6	41.4	116.3	65.3	56
58	10.3	18.5	88.4	110.7	16.9	96.5	42.4	58
60	5.6	14.7	60.6	73.4	13.0	65.3	29.7	60
62	6.0	8.8	35.1	46.6	8.3	39.3	18.2	62
64	14.0	5.2	28.4	53.8	6.9	37.6	16.7	64
66		3.4	25.3	19.4	2.7	23.2	9.3	66
68		3.4	13.4	25.1	2.7	17.6	7.5	68
70		1.7	8.1	5.2	1.4	7.0	3.2	70
72	2.0	0.6	3.1	5.8	0.9	4.1	1.9	72
74		0.4			0.3		0.2	74
76		0.5			0.4		0.3	76
78								78
80			0.3			0.2	0.1	80
82	3.7	0.4			1.1		0.7	82
84								84
86								86
88								88
90		0.4			0.3		0.2	90
TOTAL	1000	1000	1000	1000	1000	1000	1000	
No. SAMPLES	3	16	9	6	19	15	34	
SAMPLING WEIGHT(kg)	275	1716	1206	719	1990	1925	3916	
No. F.MEASURED	300	1600	810	532	1900	1342	3242	
MEAN LENGTH(cm)	46.2	48.3	53.9	55.1	47.9	54.3	50.0	
MEAN WEIGHT (g)	897	1030	1358	1392	1005	1370	1122	
DEPTH RANGE (m)	866/1148	868/1210	917/1457	1252/1485	866/1210	917/1485	866/1485	

TABLE XIV: GREENLAND HALIBUT, DIV. 3M, 2020: length composition (0/000) of the 130mm trawl catches.

LENGTH GROUP	FEB =1st Q.	MAY =2nd Q.	YEAR	LENGTH GROUP
38		29.1	17.4	38
40	30.0	19.4	23.7	40
42	80.0	68.0	72.8	42
44	90.0	58.3	71.0	44
46	160.0	58.3	99.2	46
48	130.0	58.3	87.1	48
50	100.0	106.8	104.1	50
52	170.0	116.5	138.0	52
54	50.0	87.4	72.4	54
56	50.0	135.9	101.4	56
58	50.0	97.1	78.2	58
60		87.4	52.2	60
62	40.0	19.4	27.7	62
64	10.0	48.5	33.0	64
66	10.0	9.7	9.8	66
68				68
70	10.0		4.0	70
72	20.0		8.0	72
TOTAL	1000	1000	1000	
No. SAMPLES	1	1	2	
SAMPLING WEIGHT(kg)	124	137	262	
No. F.MEASURED	100	103	203	
MEAN LENGTH(cm)	51.3	53.3	52.5	
MEAN WEIGHT (g)	1265	1252	1257	
DEPTH RANGE (m)	827/883	1023/1150	827/1150	

TABLE XV: ROUGHHEAD GRENADIER, DIV. 3L, 2020: length composition (0/000) of the 130mm trawl catches.

LENGTH GROUP	MAR	APR	MAY	1st Q.	2nd Q.	YEAR	LENGTH GROUP
10	2.6			2.6		2.3	10
11	3.9			3.9		3.4	11
12	17.6			17.6		15.4	12
13	50.7	14.4	1.4	50.7	7.1	45.3	13
14	43.5	13.9	23.0	43.5	19.0	40.4	14
15	103.4	25.1	17.0	103.4	20.6	93.1	15
16	137.1	15.2	37.3	137.1	27.6	123.5	16
17	81.8	40.0	45.0	81.8	42.9	77.0	17
18	65.9	67.8	77.7	65.9	73.4	66.8	18
19	92.0	75.0	63.5	92.0	68.5	89.0	19
20	43.9	83.1	61.7	43.9	71.1	47.3	20
21	30.6	69.7	61.7	30.6	65.2	34.9	21
22	42.7	78.0	73.8	42.7	75.6	46.8	22
23	42.9	53.7	76.7	42.9	66.6	45.8	23
24	33.7	67.6	64.7	33.7	66.0	37.7	24
25	62.4	43.4	64.0	62.4	55.0	61.5	25
26	37.7	72.9	47.8	37.7	58.8	40.4	26
27	34.9	42.8	49.5	34.9	46.6	36.3	27
28	39.8	35.4	27.5	39.8	31.0	38.7	28
29	15.2	56.3	52.2	15.2	54.0	20.0	29
30	5.9	38.0	49.4	5.9	44.4	10.6	30
31	5.6	31.2	43.1	5.6	37.9	9.6	31
32	2.9	34.6	27.3	2.9	30.5	6.3	32
33	1.9	28.4	27.7	1.9	28.0	5.1	33
34	0.4	13.5	5.1	0.4	8.8	1.5	34
35	0.4		2.8	0.4	1.6	0.6	35
36	0.4			0.4		0.4	36
TOTAL	1000	1000	1000	1000	1000	1000	
No. SAMPLES	13	5	5	13	10	23	
SAMPLING WEIGHT(kg)	1408	522	582	1408	1104	2511	
No. F.MEASURED	1385	347	395	1385	742	2127	
MEAN LENGTH(cm)	20.0	23.9	23.9	20.0	23.9	20.4	
MEAN WEIGHT (g)	1035	1246	1241	1035	1243	1061	
DEPTH RANGE (m)	877/1189	1170/1457	1252/1485	877/1189	1170/1485	877/1485	

TABLE XVI: ROUGHHEAD GRENADIER, DIV. 3M, 2020:
length composition (0/000) of the 130mm trawl catches.

LENGTH GROUP	FEB =1st Q.	MAY =2nd Q.	YEAR	LENGTH GROUP
5	22.2		18.6	5
6				6
7				7
8				8
9				9
10	11.1		9.3	10
11				11
12		12.2	2.0	12
13		24.4	4.0	13
14	44.4	12.2	39.2	14
15	11.1	36.6	15.3	15
16	44.4	24.4	41.2	16
17	77.8	48.8	73.1	17
18		61.0	9.9	18
19	77.8	73.2	77.0	19
20	88.9	122.0	94.3	20
21	111.1	73.2	104.9	21
22	111.1	61.0	103.0	22
23	66.7	48.8	63.8	23
24	55.6	24.4	50.5	24
25	122.2	61.0	112.3	25
26	55.6	61.0	56.4	26
27	55.6	61.0	56.4	27
28	11.1	36.6	15.3	28
29		36.6	6.0	29
30	11.1	36.6	15.3	30
31		36.6	6.0	31
32	22.2	24.4	22.6	32
33		12.2	2.0	33
34		12.2	2.0	34
TOTAL	1000	1000	1000	
No. SAMPLES	1	1	2	
SAMPLING WEIGHT(kg)	107	122	228	
No. F.MEASURED	90	82	172	
MEAN LENGTH(cm)	21.8	23.1	22.0	
MEAN WEIGHT (g)	1243	1146	1227	
DEPTH RANGE (m)	923/1067	1023/1150	923/1150	

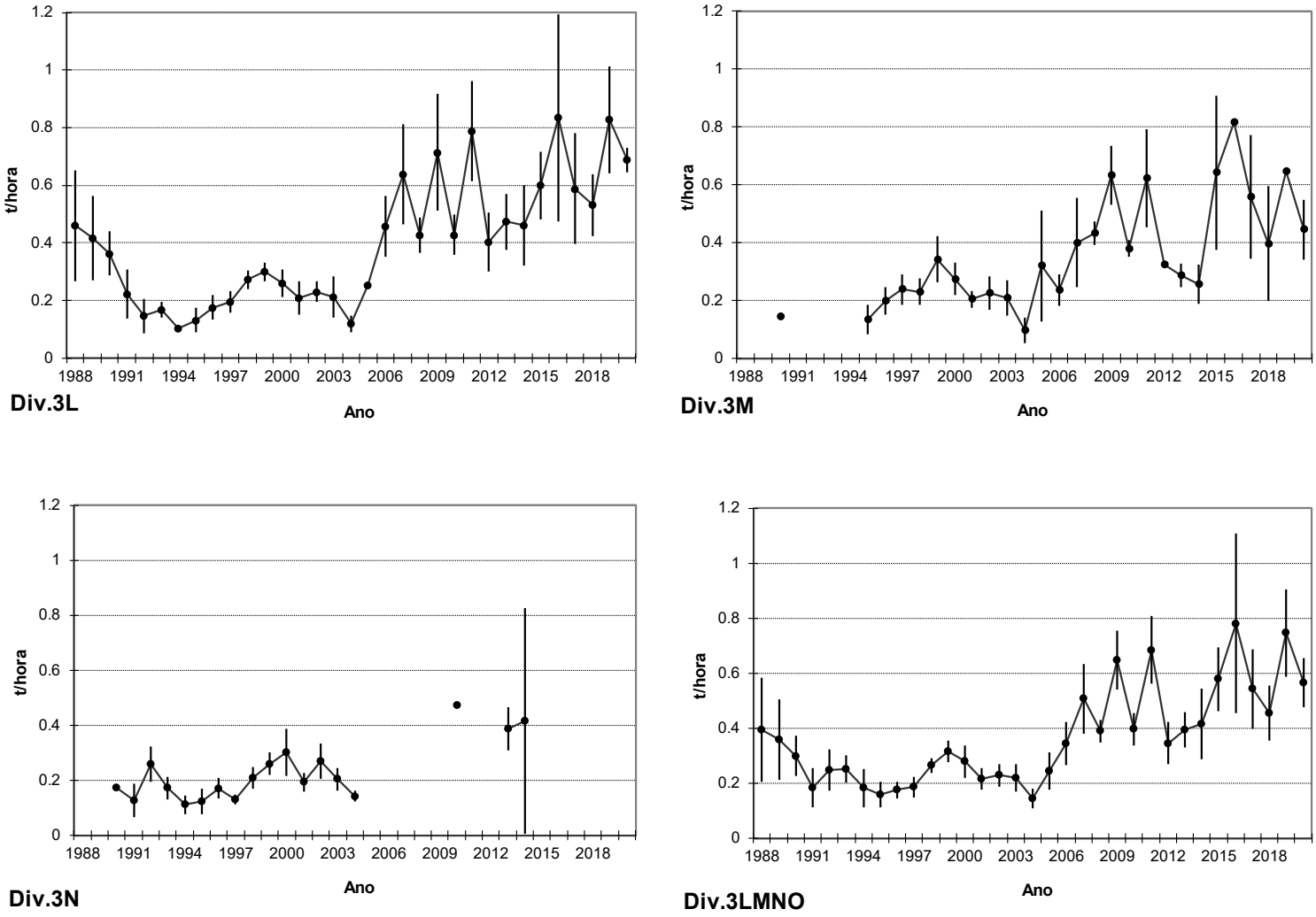


Fig. 1: Greenland halibut trawl catch rates by division, 1988 - 2020.

Fig. 2 - Annual length composition of Cod on Division 3M 130mm trawl fishery in 2020

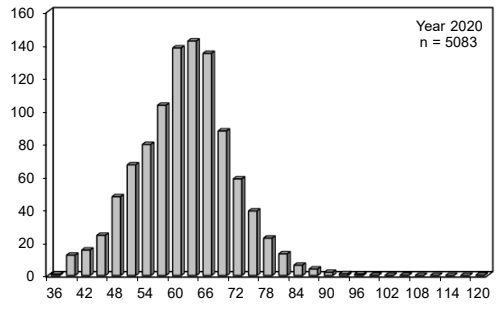


Fig. 3 - Annual length composition of redfish (*Sebastes mentella*) on Division 3M 130mm trawl fishery in 2020

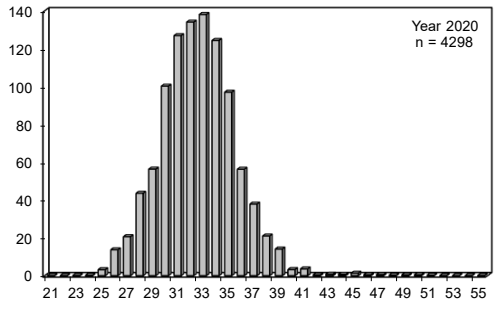


Fig. 4 - Annual length composition of redfish (*Sebastes mentella*) on Division 3N 130mm trawl fishery in 2020

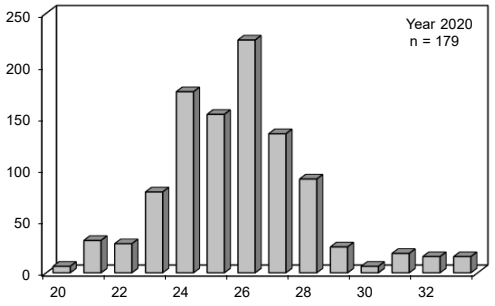


Fig. 5 - Annual length composition of redfish (*Sebastes mentella*) on Division 3O 130mm trawl fishery in 2020

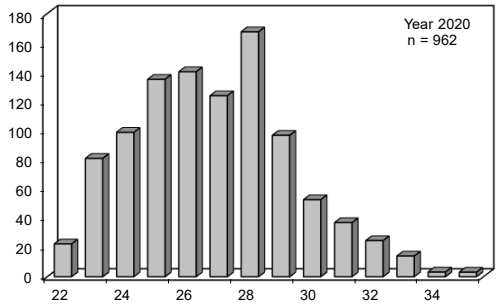


Fig. 6 - Annual length composition of American plaice on Division 3M 130mm trawl fishery in 2020

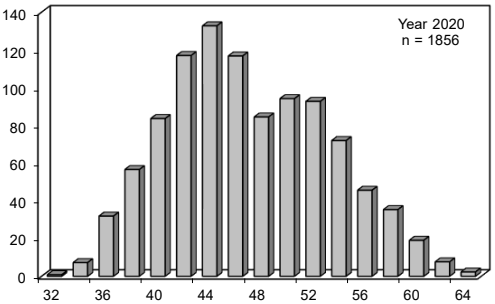


Fig. 7 - Annual length composition of American plaice on Division 3O 130mm trawl fishery in 2020

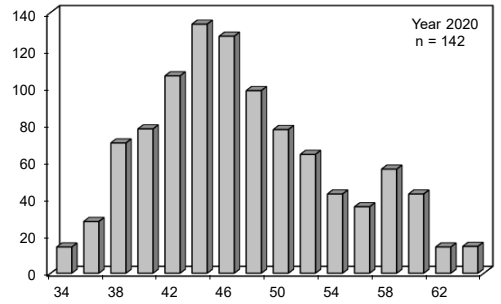


Fig. 8 - Annual length composition of Greenland halibut on Division 3L 130mm trawl fishery in 2020

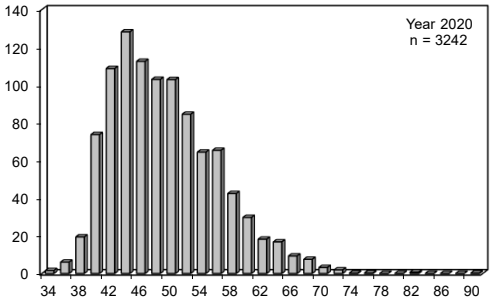
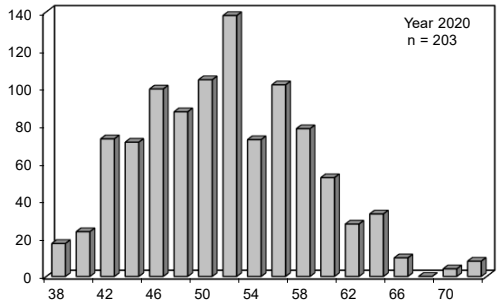


Fig. 9 - Annual length composition of Greenland halibut on Division 3M 130mm trawl fishery in 2020



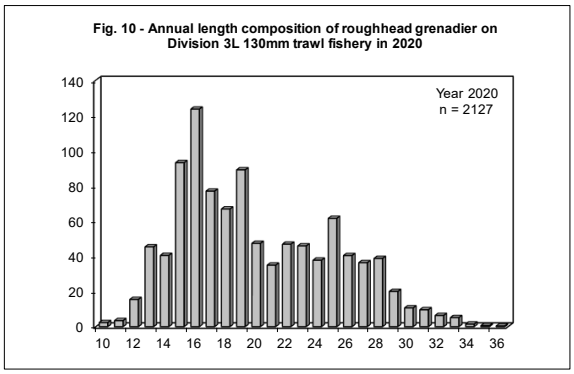


Fig. 10 - Annual length composition of roughhead grenadier on Division 3L 130mm trawl fishery in 2020

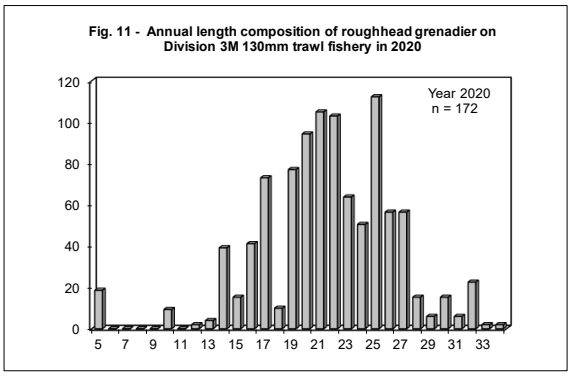


Fig. 11 - Annual length composition of roughhead grenadier on Division 3M 130mm trawl fishery in 2020