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Disko Bay - Commercial data for the Greenland halibut.

by

Rasmus Nygaard

Greenland Institute of Natural Resources, P.O. Box 570, 3900 Nuuk, Greenland

Abstract

The commercial fishery in the Disko Bay started around 1910 with the introduction of the longline in Greenland. The fishery is traditionally performed with longline from small open boats or through a hole in the sea ice and transported by dog sledge. This document presents catch statistics and data from the commercial catch from various resources. The document includes statistics of commercial sampling effort done by the GINR and calculations of mean size in the landings and a preliminary CAA. Also provided are 3 indices of CPUE from the Disko Bay based on logbooks (one for longline fishery and one for Gillnets) and factory landings data (longline).

Introduction

The commercial fishery in the Disko Bay started around 1910 with the introduction of the longline in Greenland. The fishery is traditionally performed with longline from small open boats, small vessels or through holes in the seaice and transported by dogsledge. In the 1980s, small vessels entered the fishery and the use of gillnets increased in the following years. In the late 1990s, the first regulations limiting areas open to gillnet fishery were introduced, limiting gillnet fishery to the winter season. The main fishing areas is the deep Ilulissat Icefjord and the shallower bank next to Ilulissat where the Icebergs strand and the Icefjord Torsukattaq in the Northeastern part of the Disko Bay.

Materials and methods

Recent catch statistics (factory landing and logbooks) are available from a centralized database managed by the Greenland Fisheries License Control Authority (GFLK). Both logbook (haul by haul) and factory landings (daily individual fishing events landings) are reported as individual fishing events containing dates, field code or position, effort, gear type, sorting categories, bait and many more items. Catch can practically be broken in any thinkable way. Data quality has been high since 2012 with very little missing data.

Commercial sampling

Commercial samples are collected by the GINR. During surveys or in sampling campaigns factories are visited and the size of the landed fish by species and gear is registered. However, due to the logistic challenges in Greenland (size of Greenland and mainly transport by air or sea), sampling catch is challenging. To ensure sufficient length information from the commercial catches, GINR yearly sample length measurements in factories during the winter months (jan-April) and the survey period normally in July-august.

ALK

Age information is occasionally obtained from commercial landings, but the majority of otoliths collected in the area is through biological surveys with the GINR research vessel R/V Sanna. In the Disko Bay otoliths are furthermore collected from the Disko Bay part of the Greenland shrimp and fish survey.

Logbook CPUE calculation

A general linear model (GLM) with year, month and boat as factors is applied to the longline and gillnet fishery logbook data since 2007. Only longline setting with more than 200 hooks and gillnets with catches between 50 and 200 kg/gillnet are included to omit obvious outlier values and limit the influence of data potential data errors on the analysis. CPUE observations are log-transformed prior to the GLM analysis. Least-mean square estimates were used as standardized CPUE series. For more information about the standardized logbook CPUE see SCR 18/023. A new CPUE based on factory landings was introduced in 2022 (SCR 22-024). The new CPUE covers almost all longline fishery both logbook providing vessels, small boat fishery and ice fishery.

Results

Catches

Although the fishery started around 1910 total landings remained at a low level until the beginning of the 1980s (table 1 and figure 1). In the Disko Bay, catches increased during the 1980s and peaked in 2004 to 2006 with catches of more than 12.000 tons per year (fig 1). Thereafter, catches decreased without the TAC being reached, to explain the decrease. Since 2009 catches have gradually increased and in 2016 catches were 10 760 tons. This was followed by a poor season in 2017 where only 6 409 tons was caught in the Disko Bay. After 2017 catches have gradually increased and in 2023 reached 11 435 tonnes.

Distribution of catch

The fishery in the Disko bay is concentrated near the mouth of the Ilulissat Icefjord (Kangia) near Ilulissat city and typically more than one third of the Disko Bay catches are from this small area (fig.2). Other important fishing grounds in the Disko Bay is the deep Ilulissat Ice fjord where the fishery since the fjord is normally filled with icebergs during the summer. In the Ilulissat Icefjord larger fish are present (>900m) and the northern part of the Disko Day concentrated around the settlements Saqqaq and Qeqertaq and the ice fjord Torssukattak east of the settlements. In the most recent years the fishery has increased in the western part of the Disko Bay between Aasiaat and Qeqertarsuaq, where deep trenches are located.

Breakdown of catch

A breakdown of catch by gear and area is provided in table 2. The catch by area (Disko Bay or Ilulissat Ice fjord) gear (longline or gillnet) and month is combined with the length frequencies from the commercial landings (Tab. 3) to calculate mean size in the landings for both and the CAA. Due to the logistical challenges in Greenland not all months have commercial length information (table 3). Nevertheless, in most years the sampling covers the 3 different categories (Disko bay longline, Ilulissat Ice Fjord longline and Gillnet fishery). However, in 2022 and 2023 data from automated sorting machines “Graders” was used to create the length distribution of the landings. Graders are sorting machines that sort every individual fish into size groups. To do the sorting the machine weighs every individual fish typically with an accuracy of 5 grams. The individual weights from millions of fish were available and the length frequencies are therefore more accurate in 2022 and 2023 than when based on eventual factory visits by biologists, mean length in the landings and the CAA was estimated by applying a monthly length distribution to the ALK.

Size of the landed fish.

In the Disko Bay, mean individual size in the landings gradually decreased for more than a decade in the area in both the winter longline fishery (a mixture of Greenland halibut from the Disko Bay and large fish from

Kangia) and the summer longline fishery (Fig. 3). The overall mean length when accounting for differences distribution of the catch and gear have also decreased significantly from 2010 to 2020 but has increased slightly since then.

ALK – Age Length Key
Age reading of Greenland halibut was suspended from 2011 to 2017 at GINR due to low quality of the age readings and lack of an internationally agreed method. However, the age readings have since then been reinitiated and an ALK is currently being constructed back in time.

CAA

The CAA tables was constructed using age readings from whole frozen otoliths from all 3 inshore areas collected from 2008, 2009 and 2010 until 2019 (Tab. 4). The 2020 to 2023 CAA was constructed with individual years ALK from the Disko Bay based on the new method. In spite of the ALK still being preliminary and unverified CAA reveal the dominance of the 2015 YC and younger in the CAA bubble (Fig. 4)

Factory landings CPUE (longline)

A general linear model (GLM) with year, month and vessel type and catch area as factors was applied to the longline landings in the factory provided landing slips from 2012 to 2022 (See SCR 22-024). The new CPUE based on Factory landings data consists of more than 10 000 observations in all years (table 5). The CPUE shows a decrease until 2017, but has recovered since then. Although decreasing slightly from 2022 to 2023 the CPUE is at a level not seen since 2014 (figure 5).

Logbook CPUE (longline)

A general linear model (GLM) with year, month and boat as factors was applied to the longline fishery logbook data since 2007. The CPUE index gradually decreased from 2007 to 2017 (Fig. 6). Since 2020, the CPUE has been increasing reaching a level close to the 2015 level.

Logbook CPUE (Gillnet)

The gillnet logbook CPUE covers about 50% of the gillnet fishery (Table 7). The Gillnet CPUE based on logbooks shows a gradual decreasing trend in spite of both legal meshsize reductions from 110mm half mesh to 95mm halfmesh and codgillnets of 80mm halfmesh, occasionally being used to target Greenland halibut (Fig. 8). In spite of these issues making the gillnets more effective the CPUE gradually decrease except for a short rebound in 2022, decrease over the period. Both the previous old 110mm gillnets and new the 95mm gillnets mainly selects Greenland larger than the mean length in the landings (figure 8).

Discussion

CPUE indices are often heavily criticized for being untrustworthy. However, the CPUE's presented here are based on a very large number of observations. The CPUE index from the factory landings are based on all individual landings and typically constitute more than 10.000 observations per year. Furthermore, the longlines have been optimized for decades and are difficult to improve further. And finally the Greenland halibut is not a schooling species with a patchy distribution, improving the ability of the CPUE to track changes in the stock.

The increase in the gillnet CPUE based on logbook data coincide with the apparently large 2015 YC reaching a size large enough to be selected by the gillnets.

References

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Table 1. Landings of Greenland halibut by area and gear. Disko bay is the central Disko Bay excluding Ilulissat icefjord. Ilulissat Icefjord is located in the eastern part of the Disko Bay.

	Disko Bay	Disko bay		Disko Bay excluding Kangia		Ilulissat Icefjord / Kangia		total	Source
Year	Longline	Gillnet	Unknown gear	Longline	Gillnet	Longline	Gillnet	Catch	
1904	10							10	Mattox
1905	89							89	Mattox
1906	93							93	Mattox
1907	99							99	Mattox
1908	76							76	Mattox
1909	106							106	Mattox
1910	105							105	Mattox
1911	94							94	Mattox
1912	87							87	Mattox
1913	106							106	Mattox
1914	176							176	Mattox
1915	147							147	Mattox
1916	156							156	Mattox
1917	136							136	Mattox
1918	57							57	Mattox
1919	135							135	Mattox
1920	233							233	Mattox
1921	146							146	Mattox
1922	297							297	Mattox
1923	301							301	Mattox
1924	239							239	Mattox
1925	223							223	Mattox
1926	268							268	Mattox
1927	455							455	Mattox
1928	500							500	Mattox
1929	616							616	Mattox
1930	596							596	Mattox
1931	242							242	Mattox
1932	294							294	Mattox
1933	280							280	Mattox
1934	231							231	Mattox
1935	237							237	Mattox
1936	205							205	Mattox
1937	210							210	Mattox
1938	251							251	Mattox
1939	357							357	Nellemann

Table 1. continued

	Disko Bay	Disko bay		Disko Bay excluding Kangia		Ilulissat Icefjord / Kangia		total	Source
Year	Longline	Gillnet	Unknown	Longline	Gillnet	Longline	Gillnet	Catch	
1940	350							350	Nellemann
1941	38							38	Nellemann
1942	49							49	Nellemann
1943	61							61	Nellemann
1944	298							298	Nellemann
1945	70							70	Nellemann
1946	202							202	Nellemann
1947	224							224	Nellemann
1948	229							229	Nellemann
1949	265							265	Nellemann
1950	250							250	Nellemann
1951	257							257	Nellemann
1952	201							201	Nellemann
1953	323							323	Nellemann
1954	673							673	Nellemann
1955	541							541	Nellemann
1956	670							670	Nellemann
1957	853							853	Nellemann
1958	870							870	Nellemann
1959	796							796	Nellemann
1960	800							800	Guess
1961	800							800	Guess
1962	800							800	Guess
1963	800							800	Guess
1964	789							789	Riget & Boje 1987
1965	630							630	Riget & Boje 1987
1966	377							377	Riget & Boje 1987
1967	257							257	Riget & Boje 1987
1968	227							227	Riget & Boje 1987
1969	264							264	Riget & Boje 1987
1970	257							257	Riget & Boje 1987
1971	261							261	Riget & Boje 1987
1972	267							267	Riget & Boje 1987
1973	500							500	Guess
1974	800							800	Guess
1975	1093							1093	Riget & Boje 1987

Table 1. continued

	Disko Bay	Disko bay	Disko Bay	Disko bay		Ilulissat Icefjord / Kangia		total	Source
Year	Longline	Gillnet	Unknown	Longline	Gillnet	Longline	Gillnet	Catch	
1976									Guess
1977	2876							2876	Riget & Boje 1987
1978	2486							2486	Riget & Boje 1987
1979	2116							2116	Riget & Boje 1987
1980			1849					1849	Riget & Boje 1987
1981			1720					1720	Riget & Boje 1987
1982			1064					1064	Riget & Boje 1987
1983			953					953	Riget & Boje 1987
1984			1656					1656	Riget & Boje 1987
1985			2970					2970	Riget & Boje 1987
1986			1736					1736	Nellemann
1987			2258					2258	
1988			2670					2670	
1989			2781					2781	
1990			3821					3821	
1991			5372					5372	
1992			6577					6577	
1993			5367					5367	
1994			5201					5201	
1995			7400					7400	
1996			7837					7837	
1997			8601					8601	
1998			10671					10671	
1999			10593					10593	
2000			7574					7574	
2001			7072					7072	
2002			11718					11718	
2003			11571					11571	
2004			12857					12857	
2005			12451					12451	
2006			12114					12114	
2007			10381					10381	
2008			7700					7700	
2009			6321					6321	

Table 1. continued

	Disko Bay	Disko bay		Disko Bay excluding Kangia		Ilulissat Icefjord / Kangia		total	Source
Year	Longline	Gillnet	Unknown gear	Longline	Gillnet	Longline	Gillnet	Catch	
2010				6954	1505	332	86	8458	
2011	6043	1368		5592	1367	451	1	8005	Total incorrect?
2012	6901	998		6145	969	756	28	7898	
2013	7545	1523		6867	1520	678	4	9068	
2014	7193	1980		6675	1980	518	0	9173	
2015	7129	1544		6382	1540	747	4	8674	
2016	8105	2655		7776	2650	329	5	10760	
2017	4465	1944		3850	1933	615	11	6409	
2018	6397	2002		5504	1964	893	37	8399	
2019	6954	1805		5637	1784	1317	21	8759	
2020	6662	941		5409	1252	878	62	7602	
2021	7042	1986		6169	1979	874	7	9028	
2022	7971	2353		6326	2351	1645	2	10325	
2023	10181	1249		8141	1244	2040	5	11430	

Notes.
1998 License requirements introduced.
2002 Offshore shrimp trawlers equipped with grid separators.
2008 First Quota regulations introduced
2009 Logbooks mandatory for vessels larger than 30^{ft}.
2011 Inshore shrimp trawlers equipped with grid separators.
2012 Separate TAC set for vessels and small boats.
2014 Quota free areas outside TAC placed by the fisheries minister.
2017 Minimum mesh size in gillnets reduced from 110 halfmesh (220mm) to 95mm halfmesh (190mm).

Table 2a. **Disko Bay outside Kangia longline fishery -** catch of Greenland halibut by year and month

	YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OKT	NOV	DEC	Total
Disko Bay - longline	2011	147	131	57	108	477	1048	1311	1223	577	408	0	106	5592
	2012	63	128	43	96	836	1641	1589	487	538	345	177	203	6145
	2013	107	129	100	361	719	1292	1692	495	478	828	316	349	6867
	2014	158	123	51	191	809	1153	1130	675	758	827	560	240	6675
	2015	18	32	43	60	541	1670	1167	1012	761	530	310	239	6382
	2016	67	31	33	204	1387	1555	1052	1214	789	667	391	387	7776
	2017	6	31	19	18	135	738	420	579	693	431	401	378	3850
	2018	53	25	12	16	293	991	1097	1167	603	535	374	338	5504
	2019	36	56	10	63	483	792	1057	1208	781	634	367	150	5637
	2020	34	18	12	84	338	520	1001	1064	743	869	328	398	5409
	2021	128	9	17	91	383	1010	1121	1335	658	836	329	250	6169
	2022	80	15	16	207	492	1119	1256	1271	844	535	300	191	6326
	2023	35	20	40	229	547	1602	1714	1741	913	307	537	455	8141

Table 2b. **Kangia longline fishery -** catch of Greenland halibut by year and month

	YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OKT	NOV	DEC	Total
Ilulissat icefjord - longline	2011	126	123	33	97	2	0	2	0	2	3	1	61	451
	2012	328	97	60	75	4	2	1	1	34	25	102	26	756
	2013	41	49	156	19	116	74	2	0	0	3	141	77	678
	2014	78	77	90	184	2	1	2	0	3	15	52	13	518
	2015	199	39	174	114	26	11	4	0	15	13	111	40	747
	2016	57	19	6	4	0	0	2	5	0	34	123	79	329
	2017	130	136	87	47	4	5	3	1	5	29	91	77	615
	2018	122	75	80	59	15	14	5	4	17	152	116	234	893
	2019	152	233	82	242	19	17	9	2	1	1	270	289	1317
	2020	191	176	145	126	89	7	33	14	6	19	61	12	878
	2021	21	139	202	85	3	10	20	8	3	49	296	36	874
	2022	201	241	255	25	59	3	11	5	6	19	113	708	1645
	2023	165	183	682	231	49	22	11	4	4	362	302	25	2040

Table 2c. **Disko Bay including Kangia Gillnet fishery -** catch of Greenland halibut by year and month

	YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OKT	NOV	DEC	Total
Disko Bay + Kangia - gillnet	2011	85	463	364	324	130	0	0	0	0	0	0	0	1368
	2012	117	279	144	319	83	1	4	0	0	3	40	6	998
	2013	206	371	440	390	54	1	1	0	4	0	35	20	1523
	2014	339	385	499	578	131	14	0	0	0	1	19	14	1980
	2015	196	278	161	788	93	0	7	1	4	5	9	3	1544
	2016	365	928	801	546	8	1	0	0	0	0	0	4	2655
	2017	194	386	439	498	395	12	2	3	3	3	2	5	1944
	2018	190	454	554	723	43	4	6	6	1	1	3	18	2002
	2019	143	617	697	306	12	0	1	7	3	3	8	9	1805
	2020	125	485	410	278	8	1	2	0	0	1	1	4	1314
	2021	169	783	517	334	180	1	1	0	0	0	0	0	1986
	2022	119	436	912	655	221	5	1	1	0	3	0	0	2353
	2023	142	250	519	241	95	1	1	0	0	0	0	0	1249

Table 2d. **Disko Bay including Kangia All gears total -** catch of Greenland halibut by year and month

	YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OKT	NOV	DEC	Total
Total	2011													
	2012	508	505	247	489	923	1644	1594	488	572	373	320	235	7898
	2013	354	549	697	770	888	1367	1695	496	483	831	491	447	9068
	2014	575	585	641	953	942	1168	1132	676	761	842	631	267	9173
	2015	413	349	377	962	660	1681	1178	1013	780	548	430	281	8674
	2016	489	978	840	753	1395	1556	1054	1219	789	701	515	470	10759
	2017	330	553	545	563	535	756	425	583	701	463	494	460	6409
	2018	365	554	646	798	351	1008	1109	1177	621	687	493	589	8399
	2019	330	906	790	611	514	810	1067	1216	785	638	645	447	8759
	2020	350	679	567	488	436	528	1035	1078	749	889	390	414	7602
	2021	319	932	736	510	566	1022	1142	1344	661	885	625	286	9028
	2022	400	692	1183	888	772	1126	1269	1277	850	556	413	899	10325
	2023	341	453	1241	701	691	1625	1726	1745	916	669	839	480	11430

Table 3a Number of Greenland halibut length measured by GINR staff on factories by year, month gear and Disko Bay.

	Year	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Disko bay - longline	2010		1100	53		996		819		867	632		
	2011			3160		985		2029					
	2012		494					3721					
	2013		196	1045				2736					
	2014			346			1224		1011				
	2015				89	3142	2580	2322					
	2016		212	307		959	1211		1213	723	424		
	2017			171				585	4048	234			
	2018		135					2942				81	
	2019					962	6353						
	2020						3196						
	2021		867	189			1294	250	523	933			
	2022		245						2029				
	2023						650	609					

Table 3b Number of Greenland halibut length measured by GINR staff on factories from Ilulissat Icefjord.

	Year	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Longline Ilulissat Icefjord	2010		1630	246									
	2011			218									
	2012			492									
	2013			700									
	2014			485									
	2015	579			504								
	2016		80								185		
	2017			962	22								
	2018		873									667	
	2019		1917										
	2020		1877										
	2021		901	1659									
	2022		482	150									
	2023												

Table 3c Number of Greenland halibut length measured by GINR staff on factories by year, month gear and Disko Bay

	Year	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Gillnet	2010		673	279									
	2011			1439									
	2012		328	791									
	2013		54	1489									
	2014			5154									
	2015	1298			787								
	2016	543	3100	1278									
	2017		3173	146									
	2018		1776	397									
	2019	3786											
	2020		4582										
	2021		707	3648									
	2022		534	1379									
	2023												

Table 3d Number of Greenland halibut Individual weighed individuals on automated sorting machines (Grader data) recalculated to individual lengths) by GINR.

Greenland halibut individually gutted weights (5 gram accuracy) from automated sorting machines (Graders) recalculated to individual lengths. Tabel indicates number of individual observations.													
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2022	149209	256724	444107	422232	411649	547106	600040	753919	515427	271931	173001	254961
2023	75157	105405	309454	201390	208279	288203	357557	460721	334164	172129	290259	195015

Table 4. CAA – Catch at age for the Disko bay. (2020-2023) recalculated with new ALK)

Year/Age	3	4	5	6	7	8	9	10	11	12	13	14	15+	16+	Total
1988	0	0	0	1	9	59	182	173	132	73	63	65	38	33	828
1989	0	0	0	0	0	14	106	121	94	49	33	39	31	41	528
1990	0	0	0	0	1	24	141	185	188	126	80	59	42	44	890
1991	0	5	5	11	279	806	535	333	238	76	45	67	57	44	2501
1992	0	34	92	122	332	476	390	451	532	309	140	92	18	0	2988
1993	0	7	15	62	280	479	339	280	240	122	91	112	75	86	2188
1994	0	0	3	15	112	281	539	396	190	91	50	45	41	36	1799
1995	0	0	0	0	45	459	639	798	463	185	127	27	36	27	2806
1996	0	0	8	1	47	323	941	651	454	273	145	75	44	69	3031
1997	0	0	0	21	132	646	1113	1168	607	185	69	19	10	6	3976
1998	0	0	0	74	397	775	944	1248	754	346	132	68	27	6	4770
1999	0	1	4	41	360	619	836	1028	786	426	136	72	29	2	4340
2000	0	0	9	98	535	729	780	636	478	223	52	28	12	1	3583
2001	0	1	15	33	224	390	521	450	485	280	78	33	31	16	2557
2002	0	0	2	54	283	561	771	421	575	393	398	175	112	0	3745
2003	0	0	2	64	425	722	1187	610	847	422	158	146	135	89	4808
2004	0	0	2	56	409	691	1083	634	730	311	144	130	152	89	4431
2005	0	1	48	287	516	703	868	423	481	213	100	97	122	83	3943
2006	0	0	10	211	882	1001	1008	522	582	231	105	89	125	85	4852
2007	0	0	2	56	459	1073	754	749	151	94	4	166	126	60	3694
2008	0	0	2	46	363	825	552	548	105	66	2	114	86	40	2751
2009	0	1	26	199	904	962	515	337	147	79	55	40	26	13	3303
2010	21	17	148	467	1218	1187	460	402	194	119	114	78	70		4495
2011	1	14	172	558	1196	1153	430	356	136	67	57	34	40		4213
2012	5	54	457	829	1333	1047	400	359	154	77	59	28	48		4851
2013	3	35	368	765	1611	1333	438	374	175	101	68	35	60		5368
2014	3	36	379	844	1731	1493	514	420	159	70	49	23	32		5753
2015	8	120	718	1098	1685	1303	436	356	130	58	43	21	28		6002
2016	7	113	706	1126	1858	1588	647	546	206	84	51	23	30		6986
2017	5	58	408	625	1102	969	348	277	102	49	42	23	31		4040
2018	12	177	1061	1464	1885	1088	293	236	96	54	44	25	31		6464
2019	19	377	1109	1167	1665	1164	357	279	114	64	60	36	43		6454
2020	31	1026	2172	1398	921	333	149	55	29	12	7	7	6	16	6161
2021	9	345	2058	2407	1228	425	276	138	91	43	17	29	3	28	7098
2022	5	505	2402	1939	1472	947	435	99	68	29	21	15	10	30	7976
2023	0	623	2749	1276	1867	1894	461	140	50	14	42	22	22	34	9195

Table 5. Disko bay Factory landings CPUE (longline only) (The CPUE extimated using a GLM model and changes slightly from year to year.

Year	GLM LogCPUE	SE	df	lower.CL	upper.CL	Kg/100 hooks
2012	-0.88343	0.024383	169893	-0.93122	-0.83564	41.34
2013	-0.9012	0.024093	169893	-0.94842	-0.85398	40.61
2014	-1.04964	0.02406	169893	-1.0968	-1.00249	35.01
2015	-1.16707	0.023881	169893	-1.21388	-1.12027	31.13
2016	-1.23701	0.024043	169893	-1.28414	-1.18989	29.02
2017	-1.56195	0.024155	169893	-1.60929	-1.5146	20.97
2018	-1.26435	0.024138	169893	-1.31166	-1.21704	28.24
2019	-1.38287	0.024041	169893	-1.42999	-1.33575	25.09
2020	-1.35173	0.024069	169893	-1.3989	-1.30455	25.88
2021	-1.15244	0.024076	169893	-1.19963	-1.10525	31.59
2022	-1.05131	0.024035	169893	-1.09841	-1.0042	34.95
2023	-1.08397	0.023985	169893	-1.13098	-1.03696	33.82

Table 6. Disko bay logbook data (longline) for vessels >30ft.

Year	emmean	SE	df	lower.CL	upper.CL	Kg/100 hooks
2007	6.136608	0.042342	26463	6.053615	6.219601	46.25
2008	6.0526	0.036065	26463	5.98191	6.12329	42.52
2009	6.210246	0.025823	26463	6.159631	6.260861	49.78
2010	6.049517	0.02017	26463	6.009983	6.089051	42.39
2011	5.947488	0.019258	26463	5.909742	5.985234	38.28
2012	6.013057	0.019026	26463	5.975765	6.050349	40.87
2013	5.948704	0.018631	26463	5.912186	5.985221	38.33
2014	5.933739	0.017785	26463	5.89888	5.968598	37.76
2015	5.740192	0.019478	26463	5.702015	5.77837	31.11
2016	5.865391	0.019632	26463	5.826911	5.903871	35.26
2017	5.422877	0.021173	26463	5.381377	5.464376	22.65
2018	5.681812	0.021011	26463	5.640629	5.722995	29.35
2019	5.609587	0.021379	26463	5.567683	5.65149	27.3
2020	5.577459	0.02314	26463	5.532103	5.622815	26.44
2021	5.691791	0.027559	26463	5.637775	5.745808	29.64
2022	5.763917	0.02844	26463	5.708174	5.81966	31.86
2023	5.826934	0.037793	26463	5.752858	5.901011	33.93

Table 7. Disko bay logbook data (gilllnet) for vessels >30ft.

Year	GLM LogCPUE	SE	df	lower.CL	upper.CL	Kg/gillnet
2009	3.679279	0.078176	18028	3.526047	3.832511	39.62
2010	3.864216	0.068879	18028	3.729207	3.999225	47.67
2011	3.776445	0.065438	18028	3.64818	3.904711	43.66
2012	3.896218	0.070154	18028	3.758709	4.033727	49.22
2013	3.697458	0.065257	18028	3.569548	3.825368	40.34
2014	3.962013	0.065258	18028	3.834102	4.089925	52.56
2015	3.686109	0.064753	18028	3.559187	3.81303	39.89
2016	3.780813	0.065092	18028	3.653227	3.9084	43.85
2017	3.656283	0.064173	18028	3.530498	3.782069	38.72
2018	3.730108	0.065376	18028	3.601965	3.858252	41.68
2019	3.577067	0.064988	18028	3.449684	3.70445	35.77
2020	3.342921	0.066478	18028	3.212617	3.473225	28.3
2021	3.509073	0.06564	18028	3.380413	3.637734	33.42
2022	3.80765	0.065033	18028	3.68018	3.93512	45.04
2023	3.271755	0.070992	18028	3.132605	3.410905	26.36

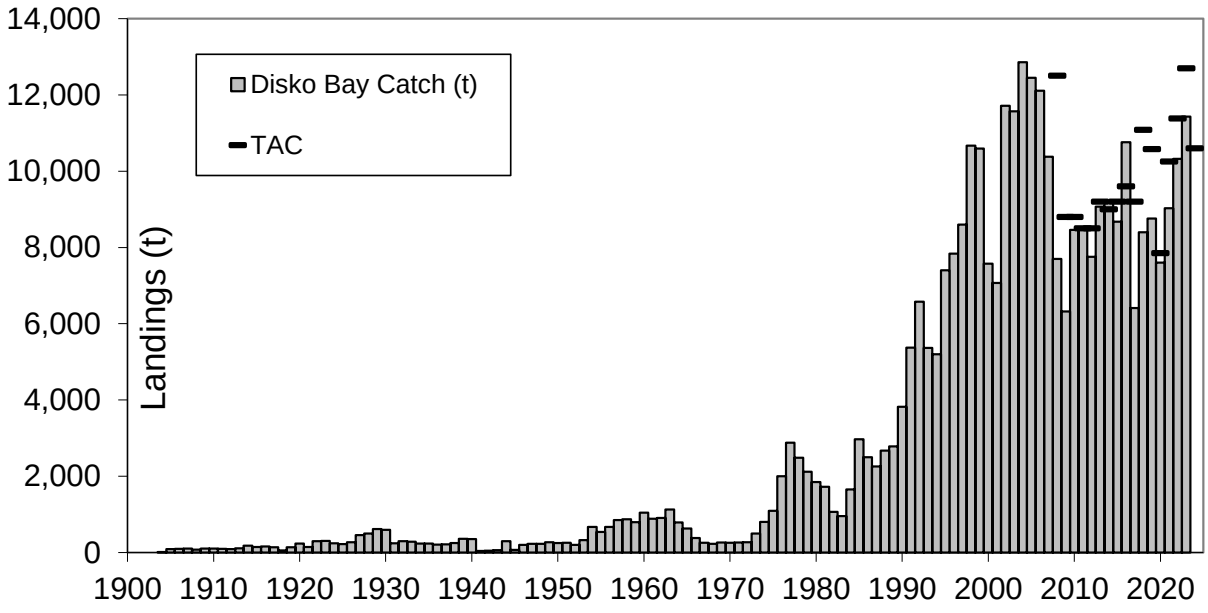

Figure 1. Catches of Greenland halibut in NAFO Subarea 1 Division 1Ainshore since 1904.

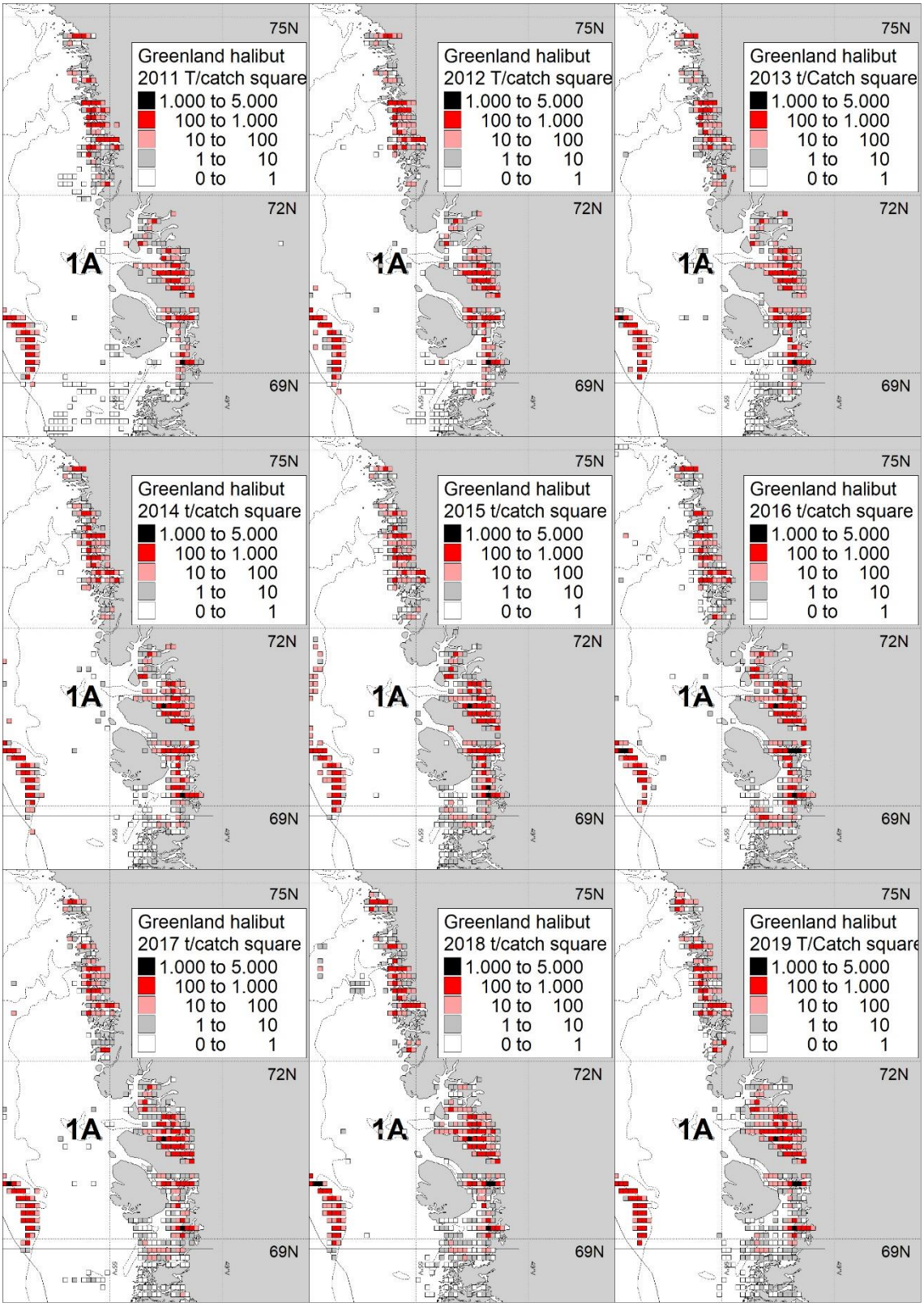

Figure 2. Greenland halibut catch by statistical square in the Disko Bay.

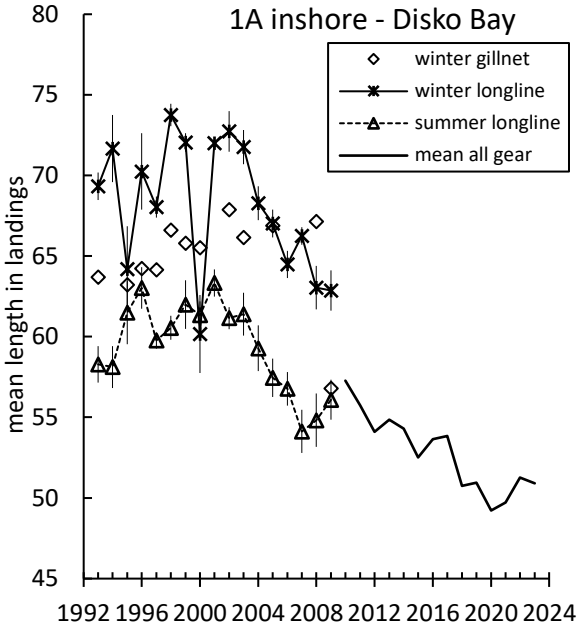

Figure 3. Disko Bay mean length in the landings: longline summer, longline winter, gillnet and overall mean weighted by area, season gear and amounts (after 2010).

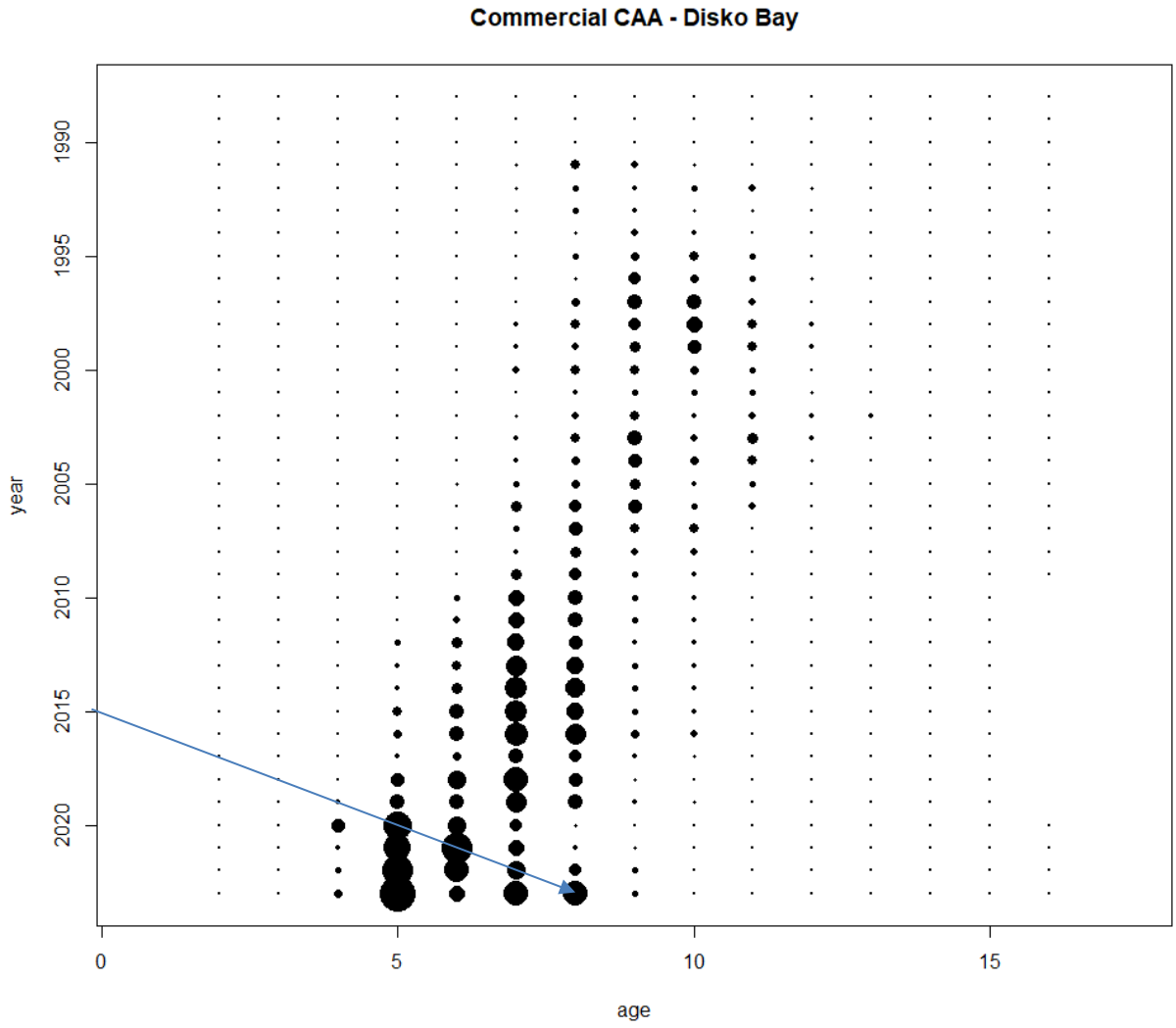

Figure 4. Catch At Age CAA bubble plot for the commercial landings in the Disko Bay.

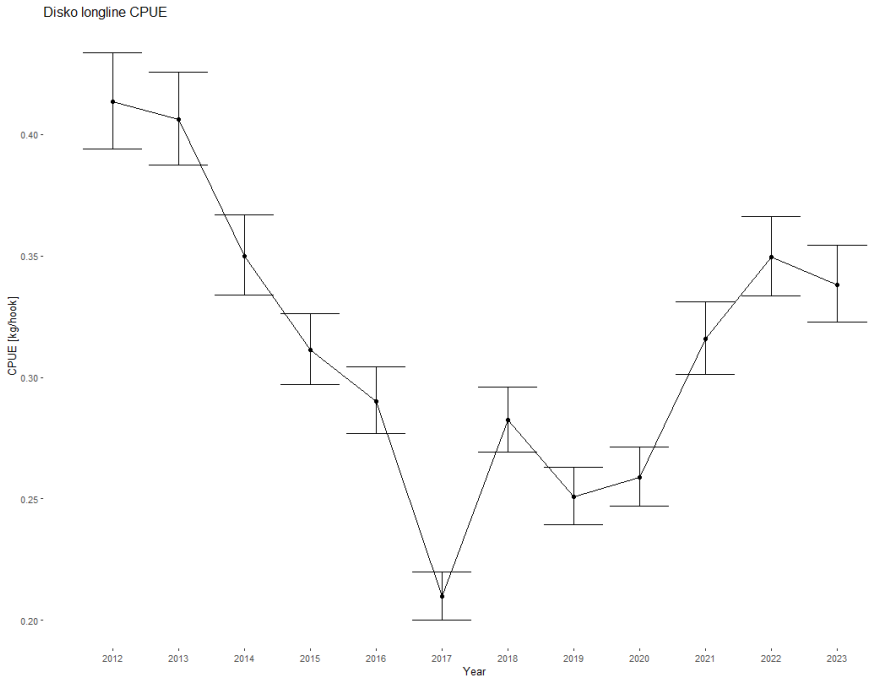

Figure 5. Commercial CPUE (Kg/hook) based on factory landing reports.

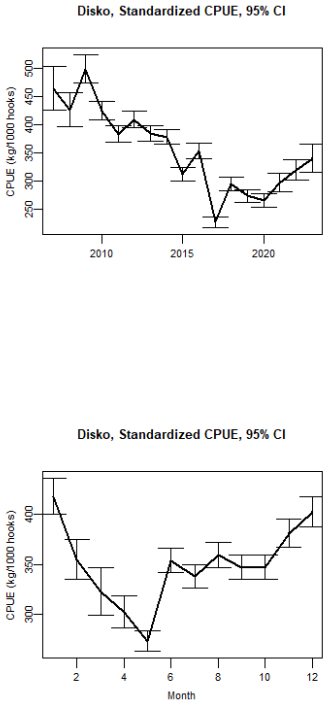

Figure 6. Longline Standardized mean and 95% CI CPUE based on logbooks from vessels larger than 30ft in Disko Bay.

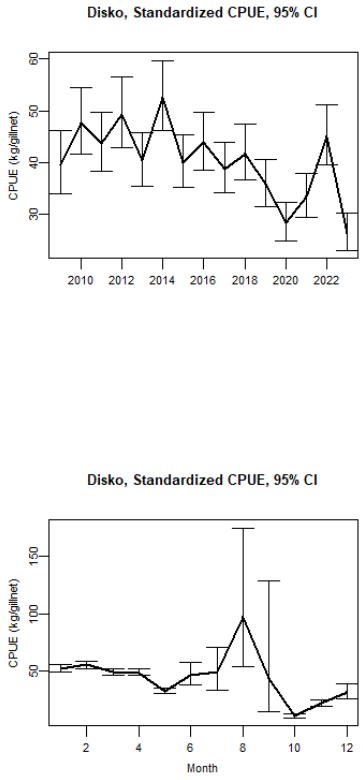

Figure 7. Gillnet Standardized mean and 95% CI CPUE based on logbooks from vessels larger than 30ft in Disko Bay.

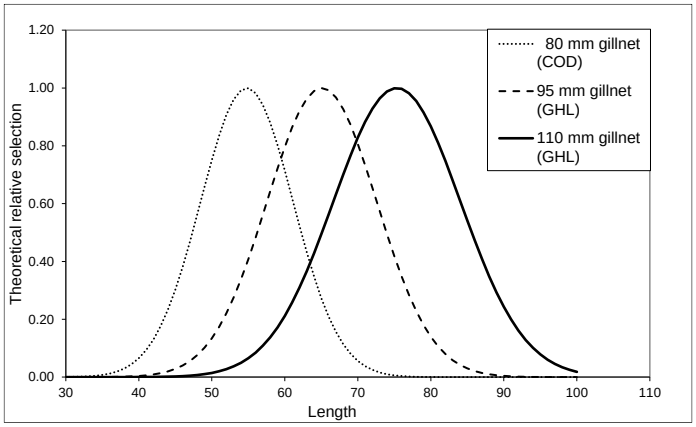

Figure 8. Relative selection curves for Greenland halibut with the most recently used gillnets. After a period with increasing use of illegal use of cod gillnets to target Greenland halibut the legal meshsize was changed from 110 mm halfmesh to 95mm halfmesh in 2017.