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Commercial data for the Greenland halibut fishery in the Disko Bay.

by

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### **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 dog sledges through a hole in the sea ice. This document presents catch statistics combined 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 or dog sledges through a hole in the sea ice. 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.

Licences requirements were introduced in 1998 and in 2008 TAC and quota regulations were introduced for the inshore fishery. A separate TAC is set for each area. Logbooks have been mandatory for vessels larger than 30ft since 2008. In 2012, the TAC was split in two components with ITQ's for vessels and a shared quota for open boats. The ITQ system currently does not specify catch to a certain district which causes a discrepancy between the ITQ and total quota set for each district. In 2014, it was decided by the Government of Greenland that only traditional fishing grounds should be taken from the Quota, whereas in other areas there should be free fishery. In 2021 the quota free areas were finally abandoned and the TAC now applies to the whole area.

### **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 landings) are reported as individual fishing events containing dates, field code or position, effort sorting categories and many more items. Catch can practically be broken in any thinkable way.

### **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 do commercial length measurements in factories during the winter months (jan-April)

In the Disko Bay Greenland halibut are generally smaller than fish caught inside the Ilulissat Ice fjord, where large Greenland halibut can still be caught at greater depth. The fishery in the Ilulissat ice fjord mainly takes place during the winter, when the glacier is less active and the fjord is covered with sea ice. Fish landed in the winter months are therefore often much larger and winter size in general shows higher inter annual variation, but this depends solely on the location of the fishery. Fish caught on the regular summer fishing grounds during the winter are normally the same size as fish landed during the summer. The winter fishery is highly dependent on Sea ice coverage or open water allowing access to the inner parts of the Ice fjord. During the summer Gillnet fishery is not allowed and samples are obtained mainly from the summer fishery near Ilulissat and the Torsukattak area. The size of the landed fish are vary different due to the narrow selection curves in gillnets and the known size difference between the Disko Bay and the deep ice covered Ilulissat Ice fjord (world heritage area). In Uummannaq and Upernivik there is not the same difference between summer and winter fishing grounds and only small differences in the summer and winter length distributions are observed.

## 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 during summer gillnet surveys. In the Disko Bay otoliths are furthermore collected from the Disko Bay part of the Greenland shrimp and fish survey See (SCR 22-008).

## 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 2008. 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 errors on the analysis. CPUE observations are log-transformed prior to the GLM analysis. Least-mean square estimates were used as standardized CPUE series. Due to massive use of fine meshed (80mm) gillnets used to target Greenland halibut mixed with 110mm gillnets and a reduced legal mesh size to 95mm in 2017, the Gillnet CPUE has not been used in assessments. For more information about the standardized logbook CPUE see SCR 18/023. A new CPUE based on factory landings data from longline fishery calculated in the same manor as the logbook CPUE but from a different source of statistics (SCR 22-024). The new CPUE covers almost all longline 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 2021 reached 9 028 t.

### 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. A breakdown of catch by gear and area is provided in table 2.

#### Breakdown of catch

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 (table 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).

#### Mean size in the landings.

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 (fig 3). In the Disko Bay mean length in the landings have been stable between 49 and 50 cm corresponding to a ~1 kg Greenland halibut in 2020 and slightly increasing in 2021.

#### *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. In order to complete the CAA tables ALK was constructed using age readings from whole frozen otoliths from all 3 inshore areas collected from 2008, 2009 and 2010 until 2019. The 2020 and 2021 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 in the CAA bubble plot (figure 4)

#### Factory landings CPUE (longline)

The new CPUE based on Factory landings data consists of more than 10 000 observations in all years and covers all longline fishery and therefore >90% of all the yearly catch (table 5). The CPUE shows a decrease until 2017, but a slow recovery since then (figure 5).

#### Logbook CPUE (longline)

Longline CPUE based on logbooks show a gradual decrease from the beginning of the timeseries. Although the CPUE is based on only the larger vessels and a different source of statistics, the CPUE shows an almost identical trend as the Factory landings longline CPUE (table 6 and figure 6). The standardised longline log-CPUE series show a decreasing trend from 2009 to 2020 (disregarding the outlier year 17) and a break upwards in 2021 (fig 6).

#### Logbook CPUE (Gillnet)

The Gillnet CPUE based on logbooks should be taken with some caution due to the occasionally observed illegally use of finer meshed gillnets and the legal mesh size reductions from 110mm half mesh to 95mm halfmesh in 2017 (table 7 and figure 7). In spite of these issues making the gillnets more effective the CPUE 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 (See figure 8). This implies a poor overlap with the selection curve and a gradual decrease in the number of older fish in the stock. The apparently large 2015 YC is currently too small to be fully selected by the commercial 95mm gillnets (figure 8).

## References

- Riget, F. and J. Boje (1989). Fishery and some biological aspects of Greenland halibut (*Reinhardtius hippoglossoides*) in West Greenland waters. NAFO Sci.Council Studies(13): 41-52.
- Riget and Nygaard (2017). An analyses of logbooks of Greenland Halibut Stock Component in NAFO Division 1A Inshore. NAFO SCR 18/023. Serial No N
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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 excl IIF		Ilulissat Icefjord excl		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
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
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			
2010				6954	1505	332	86	8458	Total incorrect
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	

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 30t.

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 2** Commercial catch per month by area (Disko Bay og Ilulissat Icefjord) and year.

	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
Ilulissat icefjord - longline	2021	128	9	17	91	383	1010	1121	1335	658	836	329	250	6169
	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
Disko Bay - gillnet	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
	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
Total	2011	508	505	247	489	923	1644	1594	488	572	373	320	235	7898
	2012	354	549	697	770	888	1367	1695	496	483	831	491	447	9068
	2013	575	585	641	953	942	1168	1132	676	761	842	631	267	9173
	2014	413	349	377	962	660	1681	1178	1013	780	548	430	281	8674
	2015	489	978	840	753	1395	1556	1054	1219	789	701	515	470	10759
	2016	330	553	545	563	535	756	425	583	701	463	494	460	6409
	2017	365	554	646	798	351	1008	1109	1177	621	687	493	589	8399
	2018	330	906	790	611	514	810	1067	1216	785	638	645	447	8759
	2019	350	679	567	488	436	528	1035	1078	749	889	390	414	7602
	2020	319	932	736	510	566	1022	1142	1344	661	885	625	286	9028

**Table 3.** Number of length measured Greenland halibut on factories by year, month gear and Disko bay or Ilulissat Icefjord since 2010.

Year	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
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			

Year	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
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									

Year	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
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									

**Table 4.** CAA – Catch at age for the Disko bay.

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

Note 2020 and 2021 calculated with new ALK for the respective years and Disko Bay.

**Table 5.** Disko bay Factory landings (longline only) used to calculate longline CPUE for all longline fishery.

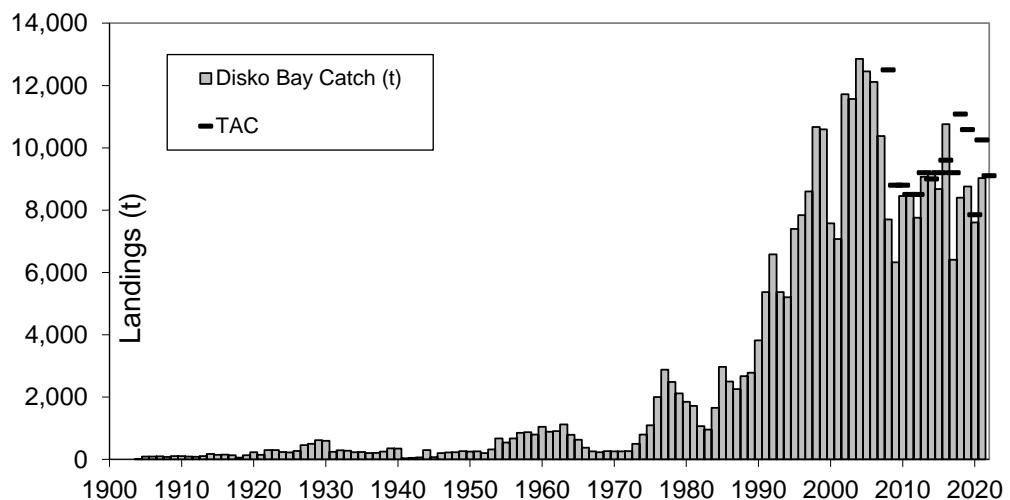
Year	No of OBS in the dataset	Total longline catch (t)	Available for CPUE calculation	% of total longline fishery covered	CPUE Kg/100 hooks
2013	13543	7545	7230	96	47.4
2014	12785	7193	7005	97	40.5
2015	14945	7129	6916	97	35.8
2016	14831	8105	8047	99	33.6
2017	11889	4465	4337	97	24
2018	12745	6397	6185	97	32.2
2019	15319	6954	6830	98	28.7
2020	14360	6662	6097	92	29.7
2021	15939	7042	6898	98	36.2

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

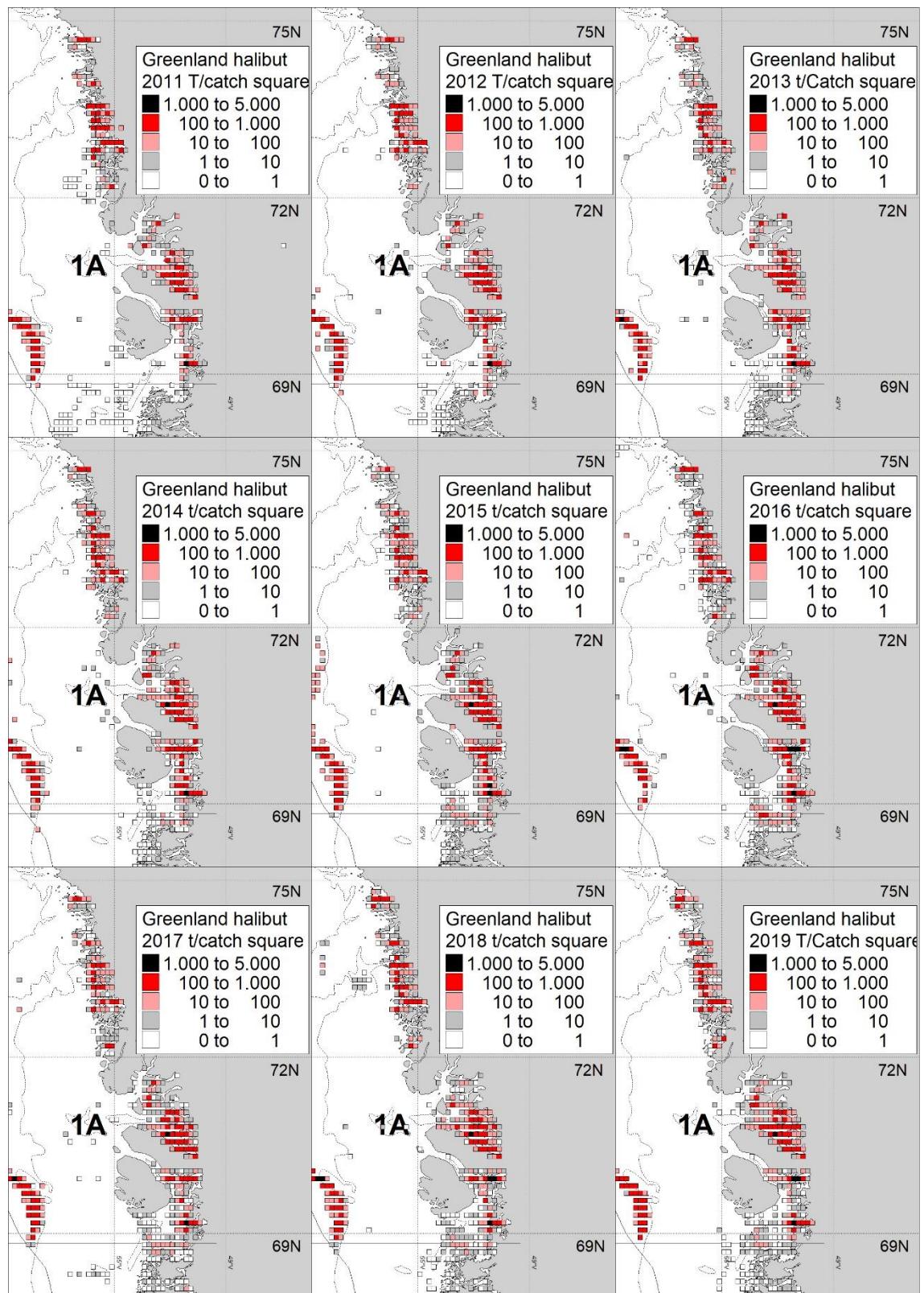
Year	No of longline observations	Total longline catch (t)	longline logbook catch (t)	% of longline fishery covered	CPUE Kg/100 hooks
2006	6		excluded	excluded	
2007	262		277	?	45.8
2008	338		346	?	42.1
2009	727		701	?	49.2
2010	2035	7286	1707	23	41.9
2011	2593	6043	1764	29	37.8
2012	2766	6901	2147	31	40.4
2013	3221	7545	2461	33	37.9
2014	2708	7193	2175	30	37.3
2015	2340	7129	1674	23	30.8
2016	2237	8105	2127	26	34.9
2017	1485	4465	1058	24	22.3
2018	1686	6397	1305	20	28.9
2019	1556	6954	1103	16	26.9
2020	1142	6662	887	13	25.9
2021	622	7042	539	8	29.2

**Table 7.** Disko bay logbook data (gillnet only) for vessels >30ft.

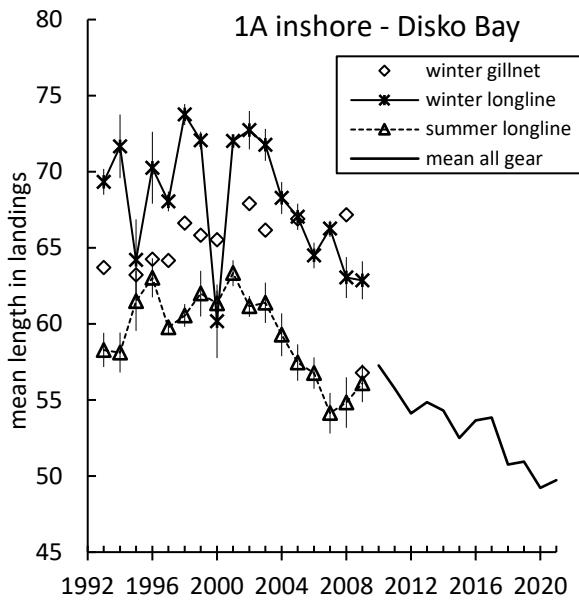
Year	No of gillnet observations	Total gillnet catch (t)	Gillnet logbook catch (t)	% of gillnet fishery covered.	CPUE Kg/gillnet
2009	246		178	?	40.8
2010	778	1591	797	50	50.4
2011	1253	1368	836	61	46.1
2012	530	998	460	46	51.4
2013	1480	1523	1081	71	42.4
2014	1390	1980	1331	67	55
2015	1448	1544	1057	68	41.5
2016	1574	2655	1215	46	46.5
2017	1649	1944	1012	52	41
2018	1317	2002	1020	51	45.4
2019	1557	1805	1008	56	37.4
2020	1117	941	694	74	29.1
2021	1484	1986	1045	53	33.9



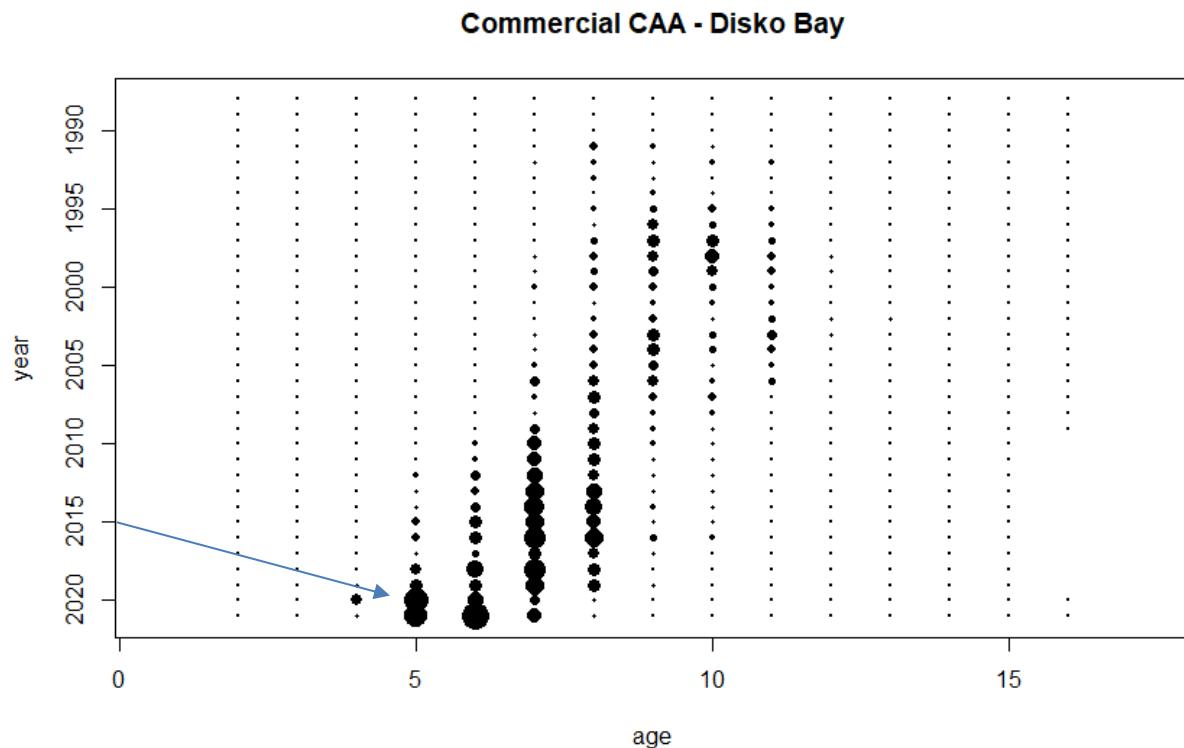
**Figure 1.** Catches of Greenland halibut in NAFO Subarea 1 Division 1A inshore since 1904.



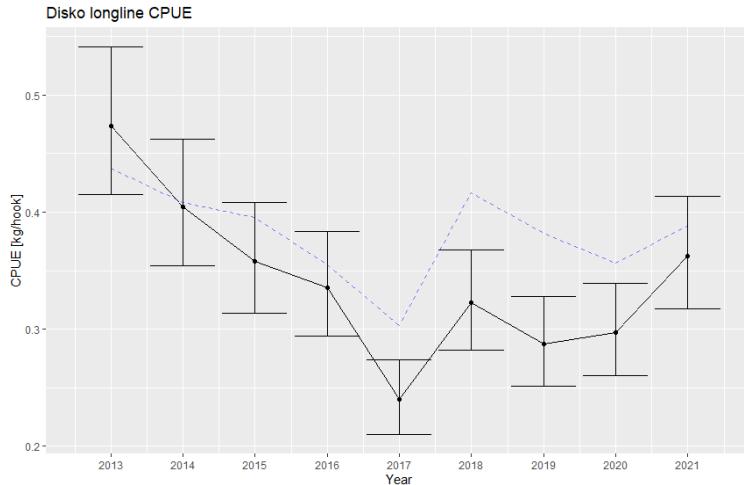
**Figure 2.** Greenland halibut catch by statistical square in the Disko Bay.



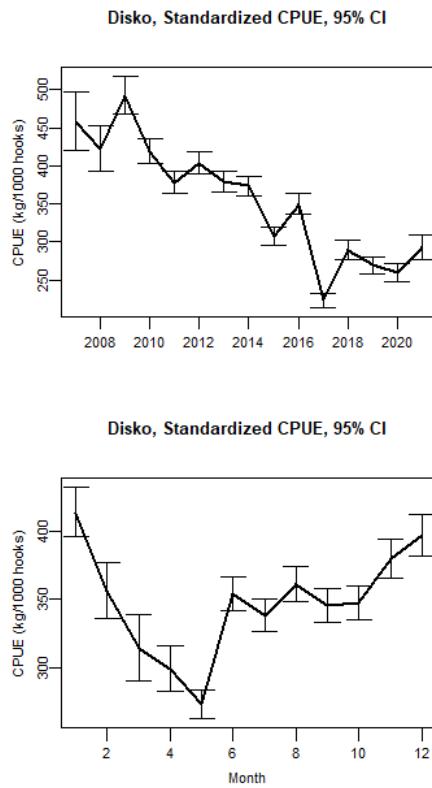
**Figure 3.** Disko Bay mean length in the landings: longline summer, longline winter, gillnet and overall mean weighted by area, season gear and amounts (after 2010).



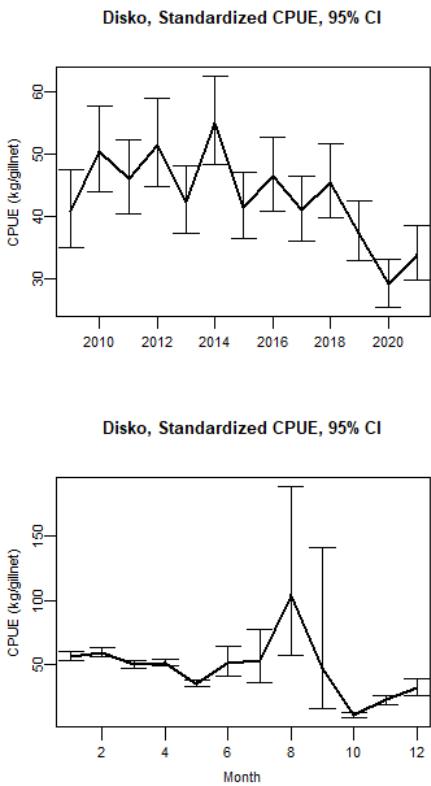
**Figure 4.** Catch At Age CAA bubble plot for the commercial landings in the Disko Bay. Years 2020 and 2021 have been recalculated by the new ALK from the Disko Bay in 2020 and 2021 respectively.



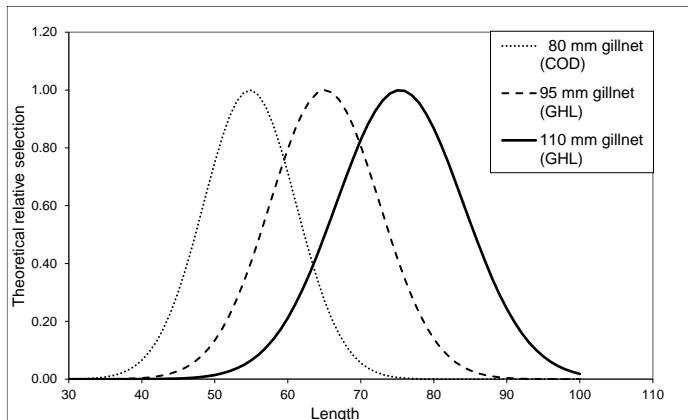
**Figure 5.** Commercial CPUE (Kg/hook) based on factory landing reports.



**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.

\*\*\*\*\*  
**DISKO BAY LONGLINE LOGBOOK CPUE**  
\*\*\*\*\*

lm(formula = lcpue ~ Year + Month + Boat)

Residuals:

	Min	1Q	Median	3Q	Max
	-5.6812	-0.2563	0.0398	0.3135	2.9765

Coefficients:

	Estimate	Std. Error	t value	Pr(> t )
(Intercept)	6.176659	0.120547	51.238	< 2e-16 ***
Year2008	-0.082723	0.046680	-1.772	0.076384 .
Year2009	0.073256	0.044507	1.646	0.099790 .
Year2010	-0.087342	0.041735	-2.093	0.036380 *
Year2011	-0.189925	0.041224	-4.607	4.10e-06 ***
Year2012	-0.124910	0.041146	-3.036	0.002402 **
Year2013	-0.187962	0.040944	-4.591	4.44e-06 ***
Year2014	-0.203086	0.041442	-4.901	9.62e-07 ***
Year2015	-0.395819	0.041598	-9.515	< 2e-16 ***
Year2016	-0.269628	0.041921	-6.432	1.28e-10 ***
Year2017	-0.717227	0.042580	-16.844	< 2e-16 ***
Year2018	-0.457949	0.042449	-10.788	< 2e-16 ***
Year2019	-0.529834	0.043024	-12.315	< 2e-16 ***
Year2020	-0.568147	0.043922	-12.935	< 2e-16 ***
Year2021	-0.448434	0.046536	-9.636	< 2e-16 ***
Month2	-0.150128	0.028643	-5.241	1.61e-07 ***
Month3	-0.276143	0.038520	-7.169	7.77e-13 ***
Month4	-0.324839	0.027592	-11.773	< 2e-16 ***
Month5	-0.415995	0.019118	-21.759	< 2e-16 ***
Month6	-0.156135	0.017983	-8.682	< 2e-16 ***
Month7	-0.201695	0.018071	-11.161	< 2e-16 ***
Month8	-0.135576	0.018408	-7.365	1.82e-13 ***
Month9	-0.179953	0.018327	-9.819	< 2e-16 ***
Month10	-0.174568	0.018142	-9.622	< 2e-16 ***
Month11	-0.085896	0.018578	-4.624	3.79e-06 ***
Month12	-0.040993	0.019384	-2.115	0.034460 *
BoatA-MADS	-0.011533	0.132688	-0.087	0.930738
BoatAGGU S	0.533804	0.288081	1.853	0.063899 .
BoatAJO	0.068801	0.126202	0.545	0.585641
BoatAKAMALIK	0.578060	0.223233	2.589	0.009617 **
BoatAKKA AQQALU	0.248214	0.155623	1.595	0.110731
BoatAKKAANNGUAQ ZEEB	0.031013	0.147036	0.211	0.832953
BoatANE	-0.024825	0.129791	-0.191	0.848315
BoatANE-ANNA	0.206557	0.126427	1.634	0.102312
BoatANGAJE-NUKA	0.273172	0.129902	2.103	0.035484 *
BoatANGERLAQ	0.325616	0.187111	1.740	0.081831 .
BoatANGUTEERAQ	0.177222	0.135962	1.303	0.192429
BoatANGAANNGU	0.465526	0.186761	2.493	0.012686 *
BoatANITSI	0.142399	0.177419	0.803	0.422204
BoatANNI	-1.119390	0.533996	-2.096	0.036070 *
BoatANU MAASI	0.244656	0.127625	1.917	0.055251 .
BoatAPUTSIAQ	0.380463	0.131056	2.903	0.003699 **
BoatARNARISSOQ	0.180803	0.143007	1.264	0.206137



BoatARNAALUK MALIK 0.093799 0.165405 0.567 0.570659  
 BoatASSA MARIE 0.469718 0.147065 3.194 0.001405 \*\*  
 BoatAVALERAQ 0.199629 0.232499 0.859 0.390555  
 BoatBASSI 0.668590 0.135234 4.944 7.70e-07 \*\*\*  
 BoatBJ. NUKARLEQ 0.333913 0.134780 2.477 0.013238 \*  
 BoatCECILIA -0.263672 0.139609 -1.889 0.058951 .  
 BoatDORTINNGUAQ -0.280169 0.195037 -1.436 0.150875  
 BoatENOKSEN II 0.103045 0.213862 0.482 0.629929  
 BoatERIKA -0.335008 0.245945 -1.362 0.173170  
 BoatERNEERAQ -0.019395 0.232525 -0.083 0.933527  
 BoatERNUTA 0.883071 0.186965 4.723 2.33e-06 \*\*\*  
 BoatGERTO 0.035605 0.135319 0.263 0.792458  
 BoatGAABA -0.023335 0.127910 -0.182 0.855242  
 BoatHELENE 0.046783 0.164766 0.284 0.776460  
 BoatILULIAQ 0.272073 0.126832 2.145 0.031951 \*  
 BoatILUUNA -0.206808 0.324846 -0.637 0.524370  
 BoatINUNNGUA 0.178896 0.160721 1.113 0.265684  
 BoatIPIUTAQ 0.121634 0.200381 0.607 0.543848  
 BoatIVINNGUAQ ANE 0.156397 0.137651 1.136 0.255890  
 BoatJÄRGENSEN 0.627087 0.213944 2.931 0.003381 \*\*  
 BoatJENS HENRIK 0.156611 0.132980 1.178 0.238927  
 BoatJENS ROSBACH 0.148118 0.132519 1.118 0.263700  
 BoatJESS 0.291379 0.125306 2.325 0.020061 \*  
 BoatJETTE 0.050051 0.128809 0.389 0.697601  
 BoatJOHANSEN 0.417723 0.126756 3.295 0.000984 \*\*\*  
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 BoatJOLLE-000013681 -0.479566 0.324786 -1.477 0.139805  
 BoatJOLLE-000013687 -0.316536 0.387776 -0.816 0.414345  
 BoatJOLLE-000014054 -0.009456 0.221884 -0.043 0.966008  
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 BoatJOLLE-000014254 0.196352 0.168495 1.165 0.243898  
 BoatJOLLE-000014294 -0.067032 0.200212 -0.335 0.737773  
 BoatJOLLE-000014494 0.302781 0.199943 1.514 0.129953  
 BoatJOLLE-000014551 0.020736 0.232598 0.089 0.928964  
 BoatJOLLE-000014608 0.120581 0.288101 0.419 0.675558  
 BoatJOLLE-000015079 -0.291239 0.533980 -0.545 0.585476  
 BoatJOLLE-000015144 -1.645406 0.533828 -3.082 0.002056 \*\*  
 BoatJOLLE-000015165 0.204568 0.324743 0.630 0.528741  
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 BoatJOLLE-000015274 0.008340 0.194867 0.043 0.965864  
 BoatJOLLE-000015289 0.411116 0.206309 1.993 0.046303 \*  
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 BoatJOLLE-000015750 -0.124090 0.324493 -0.382 0.702160  
 BoatJOLLE-000015868 0.709671 0.263912 2.689 0.007170 \*\*  
 BoatJOLLE-000016231 0.088929 0.533954 0.167 0.867726  
 BoatJOLLE-000016247 1.291072 0.533956 2.418 0.015616 \*  
 BoatJOLLE-000016346 0.256296 0.174714 1.467 0.142405  
 BoatJOLLE-000016416 0.266756 0.200256 1.332 0.182848

BoatJOLLE-000016692 -0.137088 0.533980 -0.257 0.797390  
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 BoatJULIANE 0.336136 0.141300 2.379 0.017372 \*  
 BoatJUUUKA 0.572834 0.200106 2.863 0.004204 \*\*  
 BoatJUULUNNGUAQ 0.371665 0.126266 2.944 0.003248 \*\*  
 BoatJUULUT 0.180459 0.127286 1.418 0.156279  
 BoatJAAKU-MALIK 0.427652 0.146234 2.924 0.003454 \*\*  
 BoatKAMMA 0.080143 0.127437 0.629 0.529430  
 BoatKARO 0.677082 0.130322 5.195 2.06e-07 \*\*\*  
 BoatKATRI -0.149353 0.178183 -0.838 0.401926  
 BoatKATTANNGUAQ -0.313515 0.153090 -2.048 0.040579 \*  
 BoatKRISTINA 0.456885 0.139080 3.285 0.001021 \*\*  
 BoatKUNUK 0.019762 0.534172 0.037 0.970489  
 BoatKUTUK 0.387911 0.180453 2.150 0.031592 \*  
 BoatKUUJUK 0.103875 0.126665 0.820 0.412179  
 BoatKUUKA 0.223793 0.200323 1.117 0.263936  
 BoatKAAKA-AQQALU 0.701415 0.131550 5.332 9.80e-08 \*\*\*  
 BoatKAALEERAQ 0.031377 0.263654 0.119 0.905269  
 BoatL. CHRISTINA 0.392316 0.133005 2.950 0.003184 \*\*  
 BoatL.CHRISTINA 0.438554 0.128359 3.417 0.000635 \*\*\*  
 BoatLAILA S. 0.271836 0.131452 2.068 0.038655 \*  
 BoatLANE 0.418139 0.145735 2.869 0.004119 \*\*  
 BoatLENE BOHM 0.172901 0.129498 1.335 0.181835  
 BoatLINDENHANN 0.039199 0.131909 0.297 0.766340  
 BoatLINE -0.009222 0.133204 -0.069 0.944806  
 BoatLAARSEERAQ LARSEN 0.215405 0.125643 1.714 0.086464 .  
 BoatM.A.FRENA 0.312703 0.222123 1.408 0.159205  
 BoatMALAMUK 0.047046 0.125491 0.375 0.707739  
 BoatMALIGIAQ 0.428053 0.200422 2.136 0.032709 \*  
 BoatMALIGIAQ S 0.417069 0.130094 3.206 0.001348 \*\*  
 BoatMALIK 0.285485 0.129367 2.207 0.027339 \*  
 BoatMANJA 0.018709 0.127424 0.147 0.883268

BoatMARIE SOFIE -0.187667 0.186524 -1.006 0.314362  
 BoatMARY WEST -0.063147 0.157680 -0.400 0.688807  
 BoatMASIK 0.197556 0.172741 1.144 0.252779  
 BoatMIILU 0.322958 0.131281 2.460 0.013899 \*  
 BoatMINA -0.009437 0.127028 -0.074 0.940783  
 BoatMINI -0.104259 0.126565 -0.824 0.410085  
 BoatNĀ,LO -0.044372 0.126377 -0.351 0.725508  
 BoatNAJANNGUAQ 0.379933 0.127627 2.977 0.002914 \*\*  
 BoatNAJATTAAQ -0.899593 0.131941 -6.818 9.43e-12 \*\*\*  
 BoatNANOQ 0.592604 0.152575 3.884 0.000103 \*\*\*  
 BoatNAPĀ\u0081RTOQ 0.450442 0.159500 2.824 0.004745 \*\*  
 BoatNEQITAQ -0.328745 0.161980 -2.030 0.042413 \*  
 BoatNIELS -0.118286 0.123296 -0.959 0.337384  
 BoatNIISE -0.227204 0.153224 -1.483 0.138135  
 BoatNILAK 0.693605 0.125884 5.510 3.63e-08 \*\*\*  
 BoatNINNI NUKA 0.053395 0.159939 0.334 0.738500  
 BoatNIVI K. 0.030425 0.534026 0.057 0.954568  
 BoatNONO 0.010650 0.131312 0.081 0.935360  
 BoatNORLOQ 0.032949 0.126340 0.261 0.794253  
 BoatNORSAQ -0.090580 0.152238 -0.595 0.551855  
 BoatNUKA AAJU 0.024837 0.136413 0.182 0.855529  
 BoatNUKANU S 0.090428 0.230417 0.392 0.694728  
 BoatNUKARIIT -0.186895 0.182987 -1.021 0.307094  
 BoatNUKARIIT III 0.315936 0.132941 2.377 0.017484 \*  
 BoatNUKARIIT IV 0.260776 0.134085 1.945 0.051803 .  
 BoatNUKARLEQ -0.021136 0.132759 -0.159 0.873510  
 BoatNUKAAJU 0.070918 0.140538 0.505 0.613834  
 BoatNUUNI 0.390325 0.125736 3.104 0.001909 \*\*  
 BoatNUUNU 0.363453 0.132884 2.735 0.006240 \*\*  
 BoatNUUNU MALIK 0.330093 0.131880 2.503 0.012321 \*  
 BoatOSKAR 0.265898 0.152848 1.740 0.081937 .  
 BoatOVE 0.132764 0.129701 1.024 0.306026  
 BoatPANITUAQ 0.109954 0.125990 0.873 0.382825  
 BoatPAPEROQ 0.178478 0.126442 1.412 0.158097  
 BoatPIITALUUSI 0.278612 0.178213 1.563 0.117978  
 BoatPINIARTOQ 0.494198 0.126396 3.910 9.26e-05 \*\*\*  
 BoatPIPALUK -0.108555 0.128463 -0.845 0.398103  
 BoatPITUAQ -0.270696 0.158755 -1.705 0.088184 .  
 BoatPAARNAQ -0.167896 0.388062 -0.433 0.665270  
 BoatQAJAJAQ 0.362500 0.195473 1.854 0.063682 .  
 BoatQASIGIAQ 0.196608 0.143809 1.367 0.171593  
 BoatQILANNGAQ 0.530828 0.164935 3.218 0.001291 \*\*  
 BoatQINGAAQ 0.631685 0.170878 3.697 0.000219 \*\*\*  
 BoatQVIST MĀ\RCH 0.025084 0.324863 0.077 0.938454  
 BoatQAASIINA 0.293455 0.130037 2.257 0.024035 \*  
 [ reached getOption("max.print") -- omitted 27 rows ]

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Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 0.5191 on 25491 degrees of freedom  
 Multiple R-squared: 0.2299, Adjusted R-squared: 0.223  
 F-statistic: 33.66 on 226 and 25491 DF, p-value: < 2.2e-16

\*\*\*\*\*  
**DISKO BAY GILLNET LOGBOOK CPUE**  
\*\*\*\*\*

lm(formula = lcpue ~ Year + Month + Boat)

Residuals:

	Min	1Q	Median	3Q	Max
	-5.4384	-0.4164	0.0725	0.4969	3.1776

Coefficients:

	Estimate	Std. Error	t value	Pr(> t )
(Intercept)	4.915290	0.559773	8.781	< 2e-16 ***
Year2010	0.212486	0.075964	2.797	0.00516 **
Year2011	0.122085	0.073807	1.654	0.09812 .
Year2012	0.231424	0.078737	2.939	0.00330 **
Year2013	0.039299	0.074060	0.531	0.59568
Year2014	0.299796	0.074490	4.025	5.73e-05 ***
Year2015	0.018131	0.073835	0.246	0.80603
Year2016	0.131042	0.074141	1.767	0.07717 .
Year2017	0.005902	0.074092	0.080	0.93651
Year2018	0.107442	0.075930	1.415	0.15708
Year2019	-0.087229	0.075464	-1.156	0.24773
Year2020	-0.336790	0.076749	-4.388	1.15e-05 ***
Year2021	-0.185976	0.076458	-2.432	0.01501 *
Month2	0.053184	0.022206	2.395	0.01663 *
Month3	-0.111175	0.022423	-4.958	7.20e-07 ***
Month4	-0.087031	0.022290	-3.905	9.48e-05 ***
Month5	-0.458624	0.033334	-13.758	< 2e-16 ***
Month6	-0.086657	0.116431	-0.744	0.45672
Month7	-0.058219	0.193609	-0.301	0.76364
Month8	0.608486	0.301565	2.018	0.04363 *
Month9	-0.177851	0.559842	-0.318	0.75073
Month10	-1.628538	0.099650	-16.343	< 2e-16 ***
Month11	-0.901348	0.075174	-11.990	< 2e-16 ***
Month12	-0.560089	0.106625	-5.253	1.52e-07 ***
BoatA-MADS	-1.663314	0.620278	-2.682	0.00734 **
BoatAGGU S	-0.751013	0.967650	-0.776	0.43769
BoatAJO	-1.152858	0.558484	-2.064	0.03901 *
BoatANANAQ	-3.054575	0.716831	-4.261	2.05e-05 ***
BoatANE-ANNA	-0.726268	0.556761	-1.304	0.19210
BoatANGAJE-NUKA	-0.957657	0.561828	-1.705	0.08830 .
BoatANGUTEERAQ	-1.577179	0.572046	-2.757	0.00584 **
BoatANGAANNGU	-0.862448	0.561676	-1.535	0.12468
BoatANU MAASI	-0.765903	0.563744	-1.359	0.17429
BoatAPUTSIAQ	-0.727481	0.559930	-1.299	0.19388
BoatAQQU	-1.769870	0.785091	-2.254	0.02419 *
BoatARNAALUK MALIK	-0.776974	0.563074	-1.380	0.16764
BoatASSA MARIE	-1.120595	0.563654	-1.988	0.04682 *
BoatBASSI	-0.242743	0.680478	-0.357	0.72130
BoatBJ. NUKARLEQ	-1.595220	0.590619	-2.701	0.00692 **
BoatENOKSEN II	-0.476657	0.564515	-0.844	0.39848
BoatERNUTA	-0.188227	0.609076	-0.309	0.75730
BoatFALIK L	-1.375347	0.641656	-2.143	0.03209 *
BoatGAABA	-1.090483	0.561196	-1.943	0.05202 .
BoatILULIAQ	-0.401413	0.557843	-0.720	0.47179



BoatILUUNA 0.542854 0.633111 0.857 0.39122  
 BoatIVINNGUAQ ANE -0.462957 0.569826 -0.812 0.41654  
 BoatJENS HENRIK -1.033185 0.561132 -1.841 0.06560 .  
 BoatJENS ROSBACH -1.611067 0.563237 -2.860 0.00424 \*\*  
 BoatJESS -0.617540 0.556384 -1.110 0.26705  
 BoatJOHANSEN 0.848501 0.557627 1.522 0.12812  
 BoatJOLLE-000014494 0.639362 1.112513 0.575 0.56550  
 BoatJOSVASEN -1.256263 0.575929 -2.181 0.02918 \*  
 BoatJULIA NADUK -0.924776 0.557590 -1.659 0.09723 .  
 BoatJULIANE -0.826418 0.573097 -1.442 0.14932  
 BoatJUULUNNGUAQ -0.701164 0.557200 -1.258 0.20828  
 BoatJUULUT -0.780409 0.560654 -1.392 0.16395  
 BoatJAAKU-MALIK -0.524152 0.557966 -0.939 0.34754  
 BoatKABENA -1.679912 0.717306 -2.342 0.01919 \*  
 BoatKAMMA -1.146283 0.557521 -2.056 0.03980 \*  
 BoatKANGILINEQ -1.576566 0.679339 -2.321 0.02031 \*  
 BoatKARO -0.395691 0.558336 -0.709 0.47852  
 BoatKATRI -2.872367 0.559643 -5.132 2.89e-07 \*\*\*  
 BoatKRISTINA -0.724594 0.575182 -1.260 0.20777  
 BoatKUUJUK -1.377605 0.557988 -2.469 0.01356 \*  
 BoatKUUKA 0.782998 0.966357 0.810 0.41780  
 BoatKAAKA-AQQALU -1.173303 0.559114 -2.099 0.03588 \*  
 BoatKAALEERAQ -0.321030 0.960810 -0.334 0.73829  
 BoatL. CHRISTINA -0.763604 0.561255 -1.361 0.17368  
 BoatL.CHRISTINA -0.763725 0.557731 -1.369 0.17091  
 BoatLAILA S. -1.086816 0.559197 -1.944 0.05197 .  
 BoatLANE 0.091852 0.614398 0.149 0.88116  
 BoatLENE BOHM -1.035872 0.556880 -1.860 0.06289 .  
 BoatLINDENHANN -0.735232 0.566075 -1.299 0.19402  
 BoatLINE -1.394846 0.589481 -2.366 0.01798 \*  
 BoatLAARSEERAQ LARSEN -1.133222 0.556237 -2.037 0.04164 \*  
 BoatMALAMUK -0.800392 0.556294 -1.439 0.15023  
 BoatMALIGIAQ -1.082189 0.585596 -1.848 0.06462 .  
 BoatMALIGIAQ S -0.656449 0.557732 -1.177 0.23921  
 BoatMALIINA 0.082341 0.961584 0.086 0.93176  
 BoatMALIK -0.347394 0.556981 -0.624 0.53283  
 BoatMANJA -1.543039 0.559688 -2.757 0.00584 \*\*  
 BoatMIILU -0.904894 0.557526 -1.623 0.10460  
 BoatMINA -0.993795 0.567412 -1.751 0.07989 .  
 BoatMINI -1.852602 0.629137 -2.945 0.00324 \*\*  
 BoatNĀ,LO -1.720910 0.556385 -3.093 0.00198 \*\*  
 BoatNAJANNGUAQ -1.040678 0.560089 -1.858 0.06318 .  
 BoatNANOQ -0.936541 0.562170 -1.666 0.09575 .  
 BoatNANUVIK -0.177148 0.569321 -0.311 0.75569  
 BoatNIELS -1.089551 0.559008 -1.949 0.05130 .  
 BoatNIISE -0.590748 0.660193 -0.895 0.37090  
 BoatNILAK -1.136438 0.558018 -2.037 0.04171 \*  
 BoatNINNI NUKA -1.400710 0.560961 -2.497 0.01254 \*  
 BoatNONO -0.756682 0.604102 -1.253 0.21038  
 BoatNORLOQ -1.344857 0.557575 -2.412 0.01588 \*  
 BoatNORSAQ -0.999462 0.585027 -1.708 0.08758 .  
 BoatNUKA-OVE -0.381769 0.571297 -0.668 0.50398  
 BoatNUKA AAJU -0.818364 0.576388 -1.420 0.15568  
 BoatNUKARIIT III -1.147632 0.558000 -2.057 0.03973 \*  
 BoatNUKARIIT IV -0.825541 0.557597 -1.481 0.13875  
 BoatNUKARLEQ -1.256279 0.573791 -2.189 0.02858 \*

BoatNUKAAJU	-0.559393	0.585708	-0.955	0.33956
BoatNUUNI	-0.876270	0.556674	-1.574	0.11548
BoatNUUNU	-1.790170	0.657524	-2.723	0.00648 **
BoatNUUNU MALIK	-0.974894	0.566195	-1.722	0.08512 .
BoatOVE	-0.636940	0.558718	-1.140	0.25430
BoatPANITUAQ	-0.568466	0.556759	-1.021	0.30726
BoatPAPEROQ	-0.957900	0.556898	-1.720	0.08544 .
BoatPINIARTOQ	-0.139605	0.557540	-0.250	0.80229
BoatPIPALUK	-0.942019	0.573858	-1.642	0.10070
BoatPITUAQ	-1.643064	0.572253	-2.871	0.00409 **
BoatQILANNGAQ	-0.133949	0.717407	-0.187	0.85189
BoatQAASIINA	-0.389343	0.556701	-0.699	0.48433
BoatRITA	-1.261904	0.559223	-2.257	0.02405 *
BoatRAASI	-2.065435	0.679777	-3.038	0.00238 **
BoatSALIK	-1.707262	0.556963	-3.065	0.00218 **
BoatSAVIK	-0.899702	0.558849	-1.610	0.10744
BoatSERFAQ	-1.490291	0.564697	-2.639	0.00832 **
BoatSERFAAQ II	-1.056723	0.557747	-1.895	0.05816 .
BoatSOFIE	0.109303	0.600131	0.182	0.85548
BoatSUSSI LAILA	-1.937689	0.961489	-2.015	0.04389 *
BoatTALIFFAK	-1.495282	0.583061	-2.565	0.01034 *
BoatTIA	-1.525302	0.568744	-2.682	0.00733 **
BoatTUPPIA	-1.133540	0.580616	-1.952	0.05092 .
BoatUILOQ	-0.653129	0.556626	-1.173	0.24066
BoatAAJUNNGUAQ	-1.023511	0.569357	-1.798	0.07225 .
BoatAALIPAARAQ	-0.969825	0.556117	-1.744	0.08119 .
BoatAANAA RUTH	-0.549728	0.556063	-0.989	0.32287
BoatAAQA AQQALU	-1.208693	0.557450	-2.168	0.03015 *
BoatAARSU	-0.450074	0.556365	-0.809	0.41855
BoatAAVU	-0.830788	0.571126	-1.455	0.14579

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Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 0.7844 on 15693 degrees of freedom

Multiple R-squared: 0.3006, Adjusted R-squared: 0.2949

F-statistic: 52.3 on 129 and 15693 DF, p-value: &lt; 2.2e-16