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Commercial data for the Greenland Halibut Stock Component in NAFO Division 1A Inshore.

by

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Abstract

The fishery in Division 1A inshore mainly takes place in the Disko Bay, the Uummannaq fjord and the Fjords surrounding Upernavik, besides a small developing fishery in the Qaanaaq fjord. The commercial fishery started around 1910, but remained at a low level until the late 1970s. During the 1980's catches gradually increased and since the late 1990s total catches have fluctuated between 20.000 and 30.000 tonnes annually. The stocks are considered isolated from offshore stocks in the Baffin Bay and between areas so a separate advice is given for each area. In recent years, catches have been increasing substantially in all areas. During this period, several indices have started to decrease. In the Disko Bay, recent catches have gradually and reached +10.000 in 2016, followed a drastic decrease to 6409 t in 2017. In 2018, catches reached 8399t. During the recent decade, both the Trawl survey and the Gillnet survey, commercial size in the landings and commercial CPUE (Catch per Unit Effort) has decreased. In Uummannaq, Recent catches have increased reaching record high levels in 2016 but catches have decreased slightly since then. The high record high catches observed in the recent 5 years are combined with decreasing individual size of the landed fish and decreasing commercial CPUE.

In Upernavik, recent catches have increased to record high levels 7.549 t combined with decreasing CPUE and decreasing sizes of the landed fish. Although indices in all areas are decreasing, both the size of the landed fish, gillnet survey CPUE and commercial CPUE are higher in Upernavik and Uummannaq, than in the Disko Bay.

Introduction

The inshore stock in division 1A is considered to be recruited from the stock in the Davis Strait, but the adults appear resident in the fjords and isolated by the banks from the offshore spawning stock (Riget and Boje, 1989). As a result, the inshore component probably does not contribute significantly to the spawning stock in the Davis Strait (Boje, 1994). In samples from Disko Bay <10% of females in the reproductive age, were mature during the assumed peak spawning period in spring (Simonsen and Gundersen 2005) and only sporadic spawning has been observed in the inshore area (Jørgensen and Boje, 1994). The inshore component is assumed not to be self-sustainable, but dependent on recruits and immigration from the offshore area (Bech, 1995). In 1994, NAFO decided to separate the assessment and advice on the inshore stock components in division 1A from the offshore component in the Davis Strait and Baffin Bay. Greenland halibut in division 1A inshore is further divided three isolated stocks and a separate advice is given for the Disko Bay, the Uummannaq fjord and the fjords around Upernavik. Settling occurs both inshore and offshore, but large concentrations of recruits are yearly found inshore in the Disko bay and on the Banks in NAFO division 1B and 1A. Less is known about recruitment to the other inshore in other areas

The Disko Bay is of major importance to the shrimp fishing industry and earlier studies of the by-catch of Greenland halibut in the commercial shrimp fishery (Jørgensen and Carlsson, 1998) suggest that the by-catch is considerable and could have a negative effect on recruitment to the inshore stock component. To minimize by-catch of fish in the shrimp fishery, offshore shrimp trawlers have been equipped with grid separators since 2002 and inshore shrimp trawlers (Disko Bay) since 2011. The implementation of sorting grids in the shrimp fishery has led to a protection of juvenile fish species dependent on size and shape. Greenland halibut is in this sense less protected by the sorting grids due to the flat shape than other species with a more round body shape (SCR 07/88). A study of the by-catch in the offshore fishery suggested that grid separators currently used in the shrimp trawl offers high protection for Greenland halibut larger than 25 cm (SCR 07/88). The implementation of grid separators in the inshore component after 2011 may have led to a reduction in fishing mortality in the Disko Bay since 2011. Besides the Disko Bay and a small area inshore in Division 1B, there is no trawl fishery in other inshore areas.

The longline fishery

The inshore fishery targeting Greenland halibut started in the beginning of the 1900 century with the introduction of the longline but remained at a low level until the beginning of the 1980s. The fishery started in the Disko Bay and gradually spread to the Uummannaq and Upernavik districts and inshore areas in South West Greenland. The fishery is traditionally performed with longline from small open boats or dog sledges through a hole in the sea ice.

The gillnet fishery

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. Competence to regulate seasons and areas open to gillnet fishery, was transferred to municipalities in 2004, and areas open to gillnet fishery has expanded since then. Until 2017 the minimum mesh-size was 110 mm (half meshes or knot to knot) although increased illegal use of cod gillnets (80mm) used to target Greenland halibut has been observed since 2008. In general, gillnets have narrow selection curves and targeting fish at certain size intervals. Theoretical selection curves and factory landings show that 110 mm gillnets catches Greenland halibut from 55 cm and has maximal selectivity in the size interval 65-85 cm whereas 80 mm gillnets catch Greenland halibut as small as 42 cm and have a maximum selection in the interval 47-62 cm. In 2017, the minimum mesh-size in the Greenland halibut fishery was reduced to 95 mm, which catches Greenland halibut as small as 50 cm and have a maximal selection in the interval 55-70 cm.

1 Description of the fishery, catches and regulations.

Regulations and TAC

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 30^{ft} 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 og Greenland that only traditional fishing grounds should be taken from the Quota, whereas in other areas there should be free fishery.

Catches in division 1A inshore

Although the fishery started around 1910 total landings remained at a low level until the beginning of the 1980s (fig 1, table 1). A breakdown of catch by gear and area is provided in table 2.

The Disko Bay

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.5). Other important fishing grounds in the Disko Bay is the deep Kangia ice fjord mainly during the winter, where 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. 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 2). 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 6409 tons was caught in the Disko Bay. In 2018, catches reached 8399t. Although the total landings in tons is still less than during the end of the 1990s, the estimated total number of fish caught are much higher (fig 2).

Uummannaq fjord

The fishery in Uummannaq is scattered all over the fjord near settlements (fig.6). Particular in the deep South-eastern part of the fjord from Uummannaq and towards East where depths of more than 1500 meters are common and large iceberg producing glaciers are located are among the more important fishing areas. In **Uummannaq**, catches increased during the 1980s and peaked in 1999 at more than 8.000 tons (tab 1 and fig 3). Catch then stabilized at a level around 6000 t but after 2009 catches have increased substantially. In 2016, an all time record high 10 305 t was taken in the area but catches decreased slightly thereafter 2017, most likely related to the tragic Karrat fjord tsunami and the closure of the settlements Nuugaatsiaq and Illorsuit.in 2018, catches reached 8839 t. Although the total landings have decreased slightly in since 2016, an overall decrease in individual size in the landings, has had the effect that the estimated total number of fish caught remains record high (fig 3).

Upernavik fjords

The Upernavik area consists of several large ice fjords, but the main fishing grounds are the deep Ikeq fjord (Upernavik Icefjord) and Gulteqarffik (Giesecke Icefjord) (Gulteqarffik is the Inuit word for “where the gold is collected”). Since the large icefjords are often not accessible due to glacier ice, the fishery is sometimes restricted to the shallower fjords near Upernavik and the settlements in the area or less active icefjords like Tasiusaq Bay located between Gulteqarffik and Ikeq (fig 7). In **Upernavik**, catches increased from the mid 1980’s and peaked in 1998 at a level of 7 000 tons (tab.1, fig.4). Catches then decreased sharply, for unknown reasons, but during the past 15 years landings have gradually returned to higher levels. Since 2014, factory vessels receiving catch from small boats have been used in order to increase the factory capacity and increase competition and prices in the area. Total catch reached a record high 7549 t in 2018 (fig table 1 and fig 4.). Although catches have increased at a slower rate in the Upernavik area, an overall decrease in individual size in the landings, has had the effect that the estimated total number of fish caught remains record high (fig 4.).

3. Commercial Fishery Data

3.1 Length Distribution

Length frequencies by season and gear

In the **Disko Bay** Greenland halibut are generally smaller than fish caught inside the Ilulissat Icefjord (Kangia) where large Greenland halibut can still be caught at greater depth. The fishery in the Ilulissat icefjord 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 Icefjord. In **Uummannaq** and **Upernavik** 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.

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 8). The overall mean length when accounting for differences distribution of the catch and gear have also decreased significantly from 2010 (fig 8).

In Uummannaq the mean individual length in the commercial landings have gradually decreased since 1993 (fig 9.). In Uummannaq there is little difference between summer and winter fishing grounds and only small differences in the summer and winter length distributions are observed.

In Upernavik the mean individual length in the commercial landings decreased from 1993 to 1998 (fig 10). From 1999 to 2009 the mean length in the longline fishery remained constant but has since then decreased further.

3.2 Catch rate-Standardization

A general linear model (GLM) with year, month and boat as factors was 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 were included to omit obvious outlier values and limit the influence of data potential errors on the analysis. CPUE observations were 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.

Disko Bay

The longline logbook catch's in 2007 and 2008 were very low and were not included in the analyses. In most years the logbook catch constituted around 30% of the total longline catch. The GLM model explained 24% of the total variation and was based on more than 20.000 observations. The standardised log-CPUE series show a decreasing trend since 2009, and a substantial decrease in 2017 (fig 11). This fits well with countless reports of an unusually bad fishery in 2017 and decreasing landings in the Disko Bay. Although the CPUE has increased in 2018, the decreasing trend observed since 2009 remains. The months with low CPUE are typically in the periods with sea-ice coverage and the highest CPUE is found in the autumn and early winter likely related to the months with less glacier activity but before the sea-ice covers the fjords.

Uumannaq

In most years, the logbook longline catch constituted around 15% of the total longline catch due to fewer vessels larger than 30^{tf} in Uummannaq. The GLM model explained 22% of the total variation and was based on more than 9000 longline settings. Initial years (2008-2010) were based on fewer observations and from 2010 the CPUE is based on about 1000 observations per year. From 2011, the CPUE index decreased slightly but a sharp drop in CPUE is observed in 2017 to the lowest value observed (Fig. 13). Although the CPUE increases in 2018, the CPUE remains within the decreasing trend. Monthly variation in CPUE is somewhat different from the Disko bay and Upernavik which is may be related to wider fjords in the area and local Iceberg producing glaciers and Sea-ice conditions.

Upernavik

The catch in logbooks constituted a significant part of the total landings already from 2007. The GLM model explained 25% of the total variation and was based on more than 18.000 logbook observations. The GLM model CPUE reveal a gradual decreasing CPUE with the most recent 4 years being among the lowest observed and an overall decreasing trend since 2007 (fig 15).

Age distribution

ALK – Age Length Key

Age reading of Greenland halibut has been suspended since 2011 at GINR due to low quality of the age readings and lack of an internationally agreed method. The most recent age readings was however performed on frozen otoliths which is a better method for ageing Greenland halibut. Otoliths are still collected during the annual gillnet and trawl surveys and ageing has been reinitiated in 2019. In order to complete the CAA tables and calculate the total number of fish caught in the areas, an ALK was constructed using age readings from whole frozen otoliths from all 3 inshore areas collected from 2008, 2009 and 2010.

CAA – Catch At Age

Since it is known that Greenland halibut caught in the deep Kangia Icefjord are considerably larger than in the rest of the Disko Bay, recent catches were split on both gear (longline and gillnet) and location (Disko Bay and the Ilulissat icefjord (Kangia)). In Uummannaq and Upernavik no split on area was made. In all areas the calculation accounted for gear and the available samples from the area. An overview of the available samples are given in table 3. The numbers in each cm category was calculated and the general ALK applied. Although the ages are likely underestimated, particularly for the larger individuals, the calculated total number of fish caught should be valid. No attempts was made to use the catch at age table for modelling. Calculated CAA matrices are available in table 4 to 6.

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Table 1. Landings of Greenland halibut by area and gear.

	Disko Bay		Disko Kangia		total	Uummannaq			Upernavik		
Year	Longline	Gillnet	Longline	Gillnet	Catch	Longline	Gillnet	Catch	Longline	Gillnet	Catch
1987					2258			2897			1634
1988					2670			2920			777
1989					2781			2859			1253
1990					3821			2779			1245
1991					5372			3045			1495
1992					6577			3067			2156
1993					5367			3916			3805
1994					5201			4004			4844
1995					7400			7234			3269
1996					7837	3176	1437	4579			4846
1997					8601			6293			4879
1998					10671			6912			7012
1999					10593			8425			5258
2000					7574	7103	465	7568	3764	0	3764
2001					7072	6185	375	6558	3239	0	3239
2002					11718			5339			3019
2003					11571	3924	1115	5039	2509	1378	3884
2004					12857	4140	1101	5248	2476	2097	4573
2005					12451	1947	2908	4856	3096	1743	4839
2006					12114			5984	3535	1598	5132
2007					10381	4460	858	5318	4218	659	4877
2008					7700			5426			5478
2009					6321			5451			6497
2010	6954	1505	332	86	8458	5617	610	6226	5443	411	5941
2011	5592	1367	451	1	8005	5046	1179	6397	6176	362	6471
2012	6145	968	756	28	7755	5847	357	6151	6204	514	6830
2013	6867	1520	678	4	9073	6639	369	7007	5606	433	6039
2014	6675	1979	518	0	9177	7800	407	8199	6964	409	7381
2015	6383	1541	746	5	8674	7279	962	8244	5491	782	6274
2016	7776	2650	328	5	10760	9512	792	10304	6954	408	7362
2017	3850	1933	615	11	6409	8261	788	9049	6365	418	6783
2018	5504	1964	893	37	8399	7505	1334	8839	7230	319	7549

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 2. Landings of Greenland halibut (tonnes) by area, gear and month in 2018.

	AREA	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OKT	NOV	DEC	Total
Longline catch in tonnes	1A Qaanaaq	34	49	47	56	14	22	0	0	0	0	5	24	252
	1A Upernavik	460	532	472	534	327	763	918	1068	1021	514	290	331	7230
	1A Uummannaq	157	370	508	564	427	1173	1455	1017	876	708	134	118	7505
	1A Disko Bay	53	25	12	16	293	991	1097	1167	603	535	374	338	5504
	1A Disko Kangia	122	75	80	59	15	14	5	4	17	152	116	234	893
	1B inshore total	0	0	0	0	3	16	23	10	4	1	0	0	58
	1C inshore total	21	10	33	16	3	9	7	10	9	17	24	37	196
	1D inshore total	92	22	118	53	27	169	120	96	102	89	107	116	1112
	1E inshore total	41	8	25	12	5	26	23	34	29	40	33	26	302
	1F inshore total	39	19	53	32	33	36	47	25	14	13	10	13	334
	XIV East inshore	0	0	1	2	4	41	41	49	21	39	59	21	279
Gillnet catch in tonnes	1A Qaanaaq	0	0	0	0	0	0	0	0	0	0	0	0	0
	1A Upernavik	7	24	30	70	9	0	0	0	0	0	136	43	319
	1A Uummannaq	163	76	270	316	3	14	3	0	0	0	320	169	1334
	1A Disko Bay	189	449	536	710	43	4	6	6	1	1	2	17	1964
	1A Disko kangia	0	5	18	13	0	0	0	0	0	0	1	1	37
	1B inshore total	0	1	2	7	2	0	0	0	0	0	0	0	12
	1C inshore total	0	0	4	1	0	0	0	0	5	0	1	0	12
	1D inshore total	0	0	0	0	0	0	3	0	0	0	0	0	4
	1E inshore total	0	0	4	1	0	0	1	1	0	2	2	0	12
	1F inshore total	0	0	0	1	0	1	0	2	1	1	2	1	9
	XIV East inshore	0	0	0	0	0	0	0	0	0	0	0	0	0
Total inshore catch in NAFO 1	1A Qaanaaq	34	49	47	56	14	22	0	0	0	0	5	24	252
	1A Upernavik	467	556	502	603	336	763	919	1068	1021	514	426	374	7549
	1A Uummannaq	320	445	778	880	430	1187	1458	1017	876	708	454	287	8839
	1A Disko Bay	242	474	548	726	336	995	1104	1173	603	536	376	355	7469
	1A Disko kangia	122	80	98	72	15	14	5	4	17	152	116	235	930
	1B inshore total	0	1	3	7	5	17	23	10	4	1	0	0	70
	1C inshore total	21	10	38	17	3	9	7	10	14	17	24	38	208
	1D inshore total	92	22	118	53	30	169	123	96	102	89	108	116	1118
	1E inshore total	41	9	30	13	5	26	23	35	29	42	34	26	314
	1F inshore total	39	19	53	33	33	38	47	27	16	14	12	13	343
	XIV East inshore	0	0	1	2	4	41	41	49	21	39	59	21	279
	Total	1379	1665	2215	2462	1211	3281	3749	3489	2704	2110	1616	1489	27371

Table 2.b Number of length measured Greenland halibut by gear, division and month from the inshore areas in 2017. Blocks indicates the use of length distributions in the CAA calculation.

	NAFOICES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	Total
Longline	1A Upernavik		611						3385			1415		5411
	1A Uummannaq		732	4770				3239						8741
	1A Disko Bay		135					2942				81		3158
	1A Disko Kangia		873									667		1540
	1D inshore	423	259		575			316			358			1931
	1E inshore													-
	Total	423	2610	4770	575			6497	3385		358	2163		20781
Gillnet	1A Upernavik	76	1038									484		1598
	1A Uummannaq		331	91										422
	1A Disko Bay		1776	397										2173
	1A Disko Kangia													-
	Total	76	3145	488								484		4193
Grand total		499	5755	5255	983			6497	3385		358	2647		25382

Table 3. 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

Table 4. CAA – Catch at age for Greenland halibut in the Uummannaq district.

age/year	3	4	5	6	7	8	9	10	11	12	13	14	15+	16+	Total
1988	0	0	0	1	5	20	52	121	143	121	96	49	23	17	648
1989	0	0	0	0	2	9	35	98	120	99	76	38	19	20	516
1990	0	0	0	1	3	15	47	108	121	101	82	42	20	21	561
1991															
1992															
1993	0	0	0	9	45	200	202	142	138	104	158	93	28	20	1139
1994	0	0	0	24	105	226	271	346	139	105	34	12	0	3	1265
1995	0	0	0	6	217	564	601	413	414	219	138	49	28	22	2671
1996	0	1	0	6	76	308	279	286	232	142	69	28	11	15	1453
1997	0	0	0	0	69	377	793	702	460	206	75	32	10	6	2732
1998	0	0	0	0	0	235	566	657	586	355	138	39	15	5	2595
1999	0	8	70	218	554	596	690	789	526	295	131	42	12	4	3935
2000	0	0	19	86	357	441	543	669	487	311	170	68	24	8	3184
2001	0	0	65	113	674	507	315	492	303	178	121	60	28	12	2868
2002															
2003	0	0	3	21	127	360	321	235	220	158	78	145	150	94	1911
2004	0	0	1	10	105	197	249	198	163	118	82	103	78	59	1364
2005	0	1	17	101	108	192	142	115	109	74	58	80	67	50	1115
2006	0	1	32	12	47	243	70	284	127	324	49	108	9	9	1315
2007	0	3	40	181	221	340	273	192	149	94	64	82	71	56	1767
2008	0	4	46	203	249	381	304	213	166	104	71	91	79	63	1974
2009	0	3	9	25	238	525	470	415	243	157	90	42	20	11	2248
2010	0	1	8	77	484	822	459	458	235	128	79	32	21		2804
2011	0	0	11	94	465	743	432	441	242	141	91	43	26		2730
2012	0	0	6	61	347	627	393	422	260	168	114	57	37		2492
2013	0	1	9	72	397	730	494	531	302	173	108	49	31		2896
2014	0	1	20	120	622	1026	613	608	308	163	107	46	32		3667
2015	0	2	26	112	489	828	545	582	354	211	144	68	41		3403
2016	0	4	49	203	840	1290	736	727	386	211	132	58	40		4679
2017	2	28	204	424	924	1079	564	553	299	174	121	62	38		4473
2018	2	36	265	499	1036	1150	586	550	261	137	93	43	29		4687

Table 5. CAA – Catch at age for Greenland halibut in the Upernavik district.

age/year	3	4	5	6	7	8	9	10	11	12	13	14	15+	16+	Total
1988	0	0	0	0	0	6	33	55	80	74	68	62	31	22	431
1989	0	0	0	0	0	2	16	34	59	66	69	73	40	31	390
1990	0	0	0	0	0	2	17	41	62	57	52	48	25	17	321
1991															
1992															
1993	0	0	0	0	0	2	16	86	252	268	143	95	40	46	948
1994	0	0	0	2	51	188	316	217	239	154	155	51	23	0	1396
1995	0	0	0	0	13	55	84	128	133	147	117	103	45	42	867
1996	0	0	3	0	16	114	359	275	238	206	151	90	48	39	1539
1997	0	0	4	25	142	428	500	430	278	175	67	37	19	8	2111
1998	0	0	0	116	343	538	535	505	410	275	112	84	39	10	2968
1999	0	14	55	172	449	619	566	343	229	138	51	36	16	5	2693
2000	0	0	2	108	420	446	302	160	133	116	48	38	17	9	1800
2001	0	0	28	144	404	422	258	103	104	87	36	14	9	3	1611
2002															
2003															
2004															
2005															
2006															
2007															
2008	0	0	4	65	197	429	274	788	372	135	10	6	0	6	2284
2009	0	0	5	51	333	579	465	421	262	187	112	65	94	7	2579
2010	0	0	3	47	376	707	471	484	242	126	70	27	15		2568
2011	0	5	51	175	555	772	468	484	260	141	80	31	18		3040
2012	0	2	28	111	375	620	445	504	312	188	117	50	27		2778
2013	0	12	42	107	387	581	368	401	259	161	113	55	34		2520
2014	3	31	177	349	773	919	483	475	243	131	88	45	27		3743
2015	5	25	98	205	574	752	405	388	200	117	92	52	43		2957
2016	2	17	138	308	736	867	460	452	251	142	103	52	34		3566
2017	2	30	188	325	679	799	423	406	214	122	97	51	32		3368
2018	4	58	332	546	990	1015	477	441	217	107	76	30	19		4310

Table 6. Disko bay logbooks data

Year	Total catch of Longline	No of Longline settings	Total longline logbook catch (t)	Total catch of gillnet	No of gillnet settings	Total gillnet logbook catch
2007		262				
2008		338				
2009		727			55	32
2010	7286	2035	1707 (23.4%)	1591	19	13 (0.8%)
2011	6043	2593	1764 (29.2%	1368	1063	698 (51.0%)
2012	6901	2766	2147 (31.1%)	996	456	321(32.3%)
2013	7545	3221	2461 (32.6%)	1524	1225	828 (54.3%)
2014	7193	2708	2175 (30.2%)	1979	1167	934 (47.2%)
2015	7129	2340	1674 (23.4%)	1546	1249	809 (52.3%)
2016	8104	2212	2104 (26.0%)	2655	1342	898 (33.8%)
2017	4465	1479	1058 (23.7%)	1944	1122	686 (35.3)
2018	6397		1267 (19,8%)	2001		907 (45,3%)

Table 7. Uumannaq logbooks data

Year	Total catch of Longline	No of Longline settings	Total longline logbook catch (t)	Total catch of gillnet	No of gillnet settings	Total gillnet logbook catch
2006		57	46			
2007		409	302			
2008		390	353			
2009		356	290			
2010	5617	466	389 (6.9%)	610		
2011	5046	691	762 (15.1%)	1179	355	353 (29.9%)
2012	5847	871	969 (16.6%)	357	172	188 (52.7%)
2013	6639	1254	1140 (17.2%)	369	131	159 (35.5%)
2014	7800	1190	1312 (16.8%)	407	92	106 (26.0%)
2015	7279	1179	1055 (14.5%)	962	63	71 (7.4%)
2016	9512	1305	1351 (14.2%)	792	89	78 (9.8%)
2017	8261	1254	1051 (12.7%)	788	161	211 (26.8)
2018	7505		800 (10,7%)	1334		330 (24,7%)

Table 8. Upernavik logbooks data

Year	Total catch of Longline	No of Longline settings	Total longline logbook catch (t)	Total catch of gillnet	No of gillnet settings	Total gillnet logbook catch
2006		170	158			
2007		1932	1607			
2008		1849	1491			
2009		1819	1611		151	
2010	5443	2534	2114 (38.8%)	411	239	84 (29.7%)
2011	6176	2471	1992 (32.3%)	362	572	122 (33.7%)
2012	6204	2153	2136 (34.4%)	514	632	250 (69.1%)
2013	5606	1415	1235 (22.0%)	433	619	304 (57.5%)
2014	6964	1822	1820 (26.1%)	409	153	63 (15.4%)
2015	5491	996	827 (16.0%)	782	381	185 (23.6%)
2016	6954	896	730 (10.5%)	408	431	177 (43.4%)
2017	6365	1013	849 (13.4%)	418	463	184 (44.0%)
2018	7230		851 (11,8%)	319		181 (56,7%)

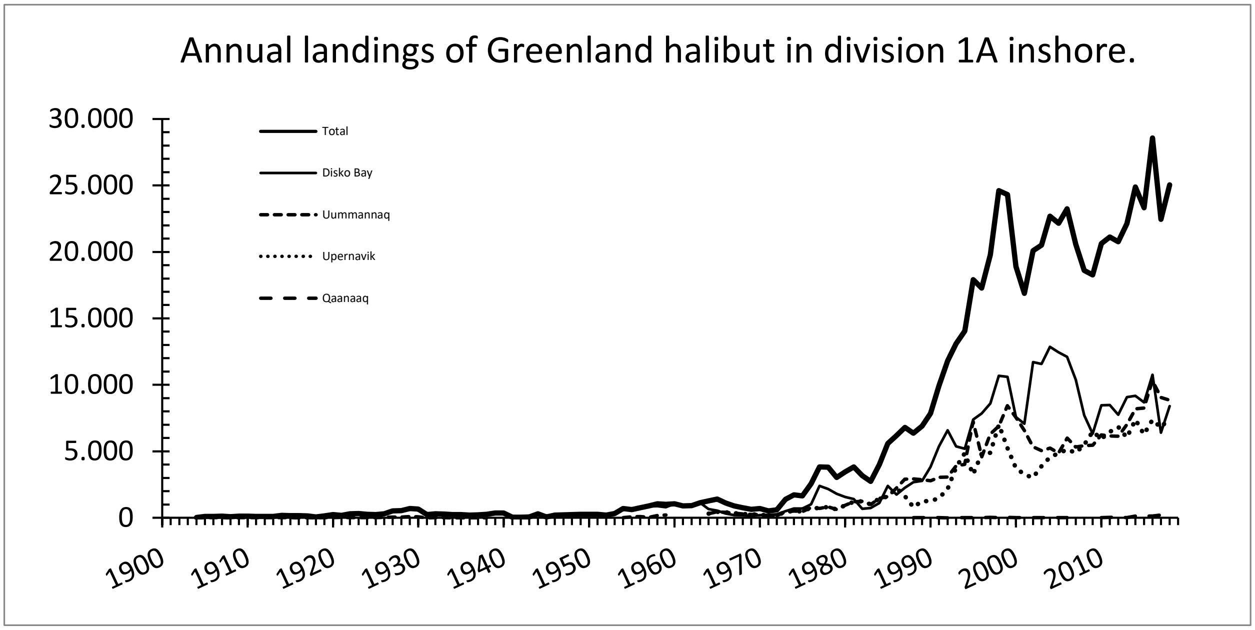


Figure 1. Catches of Greenland halibut in NAFO Subarea 1 Division 1Ainshore since 1904.

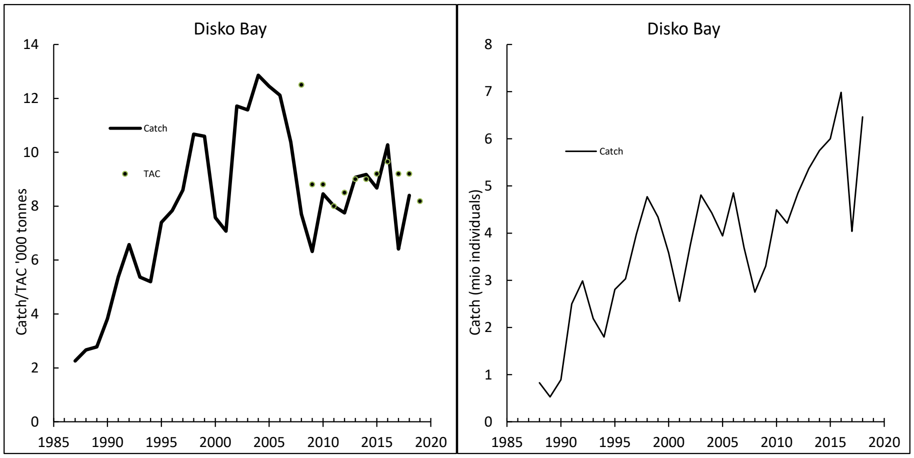


Figure 2. Disko Bay Greenland halibut catch and TAC in 000 t (right) and Catch in million individuals (left).

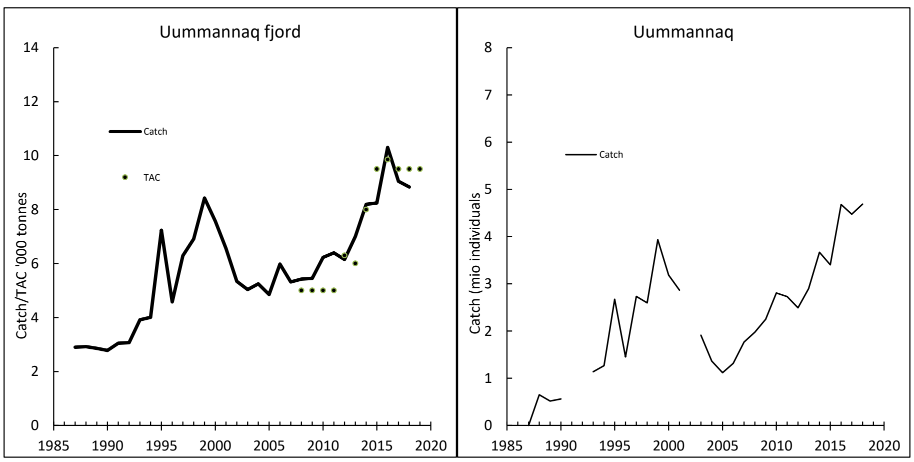


Figure 3. Uummannaq Greenland halibut catch and TAC in 000 t (right) and Catch in million individuals (left).

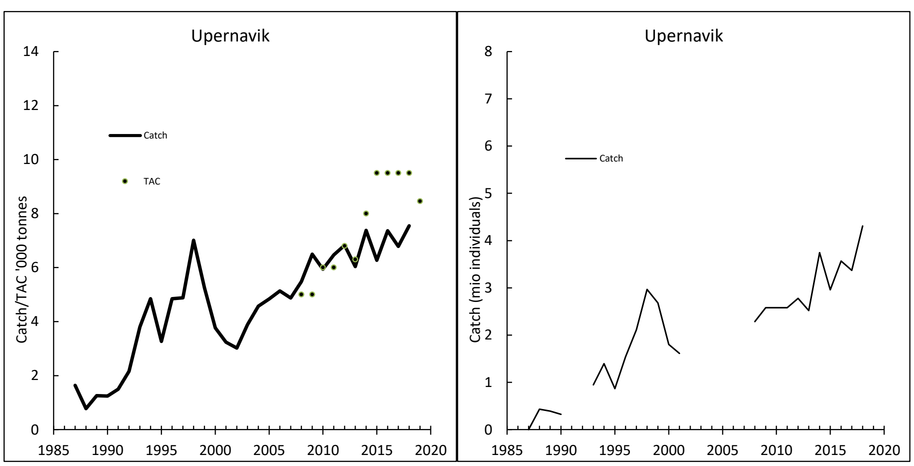


Figure 4. Upernavik Greenland halibut catch and TAC in 000 t (right) and Catch in million individuals (left).

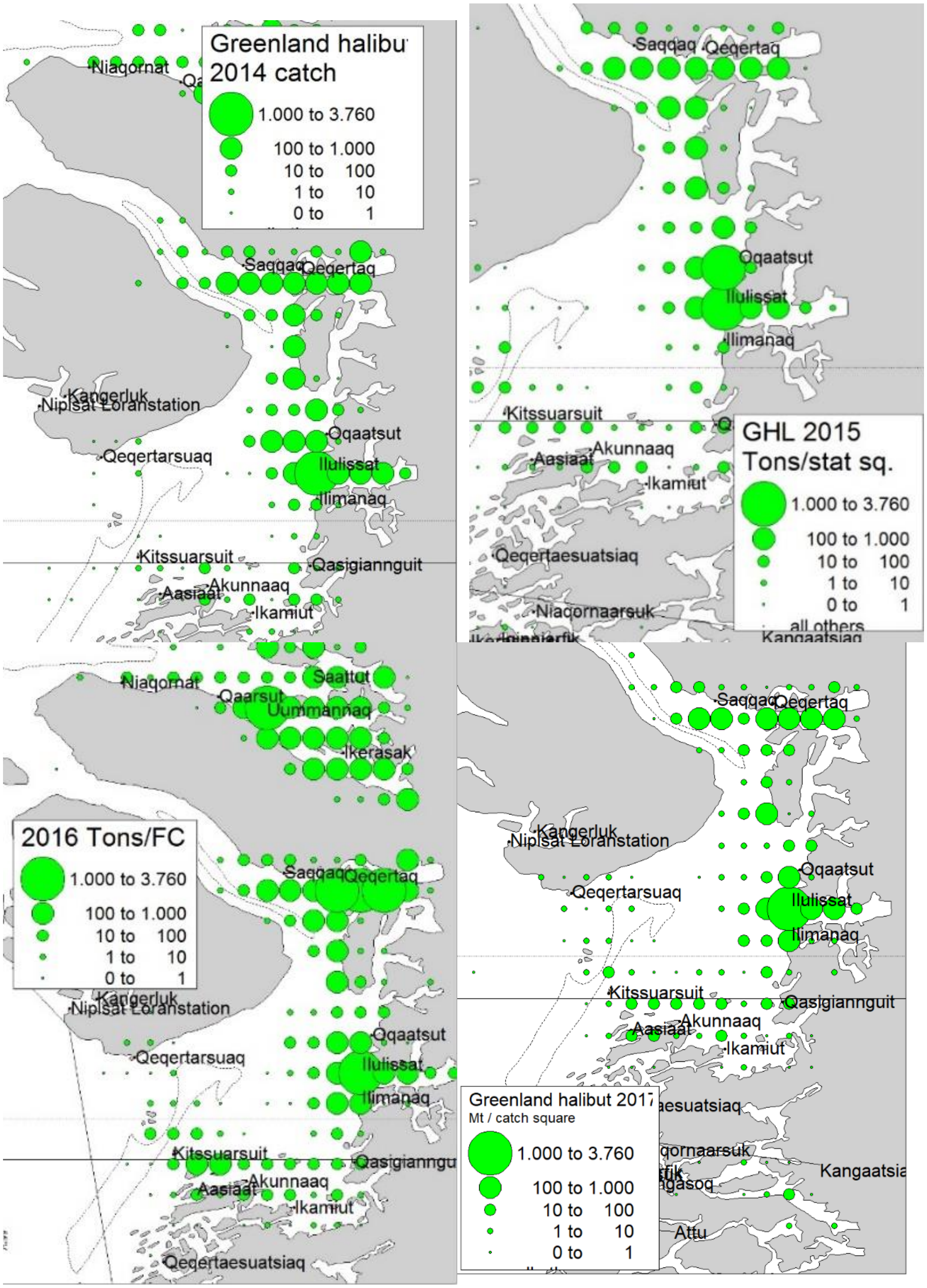


Figure 5. Greenland halibut catch by statistical square in the Disko Bay.

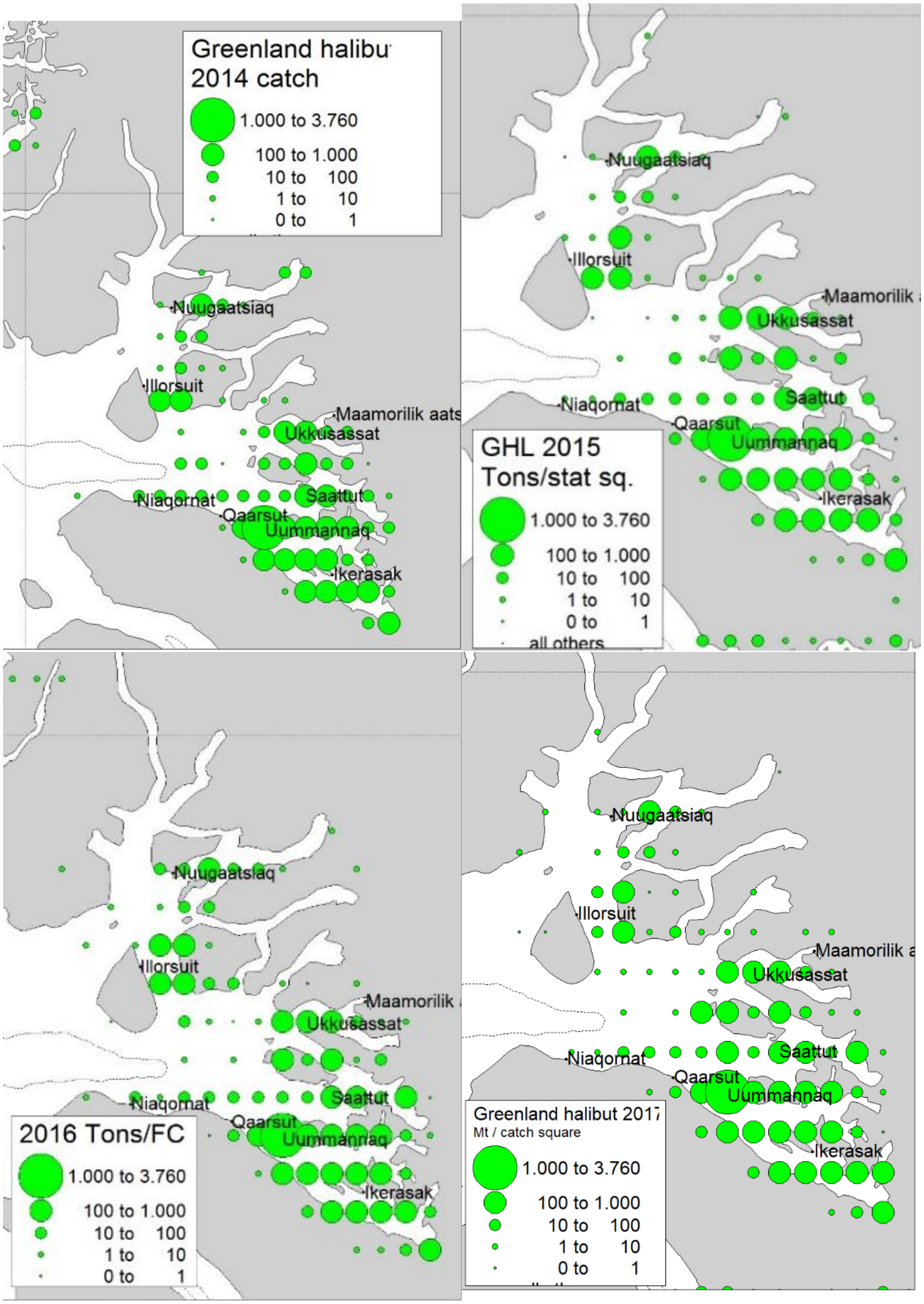


Figure 6. Greenland halibut catch by statistical square in the Uummannaq area.

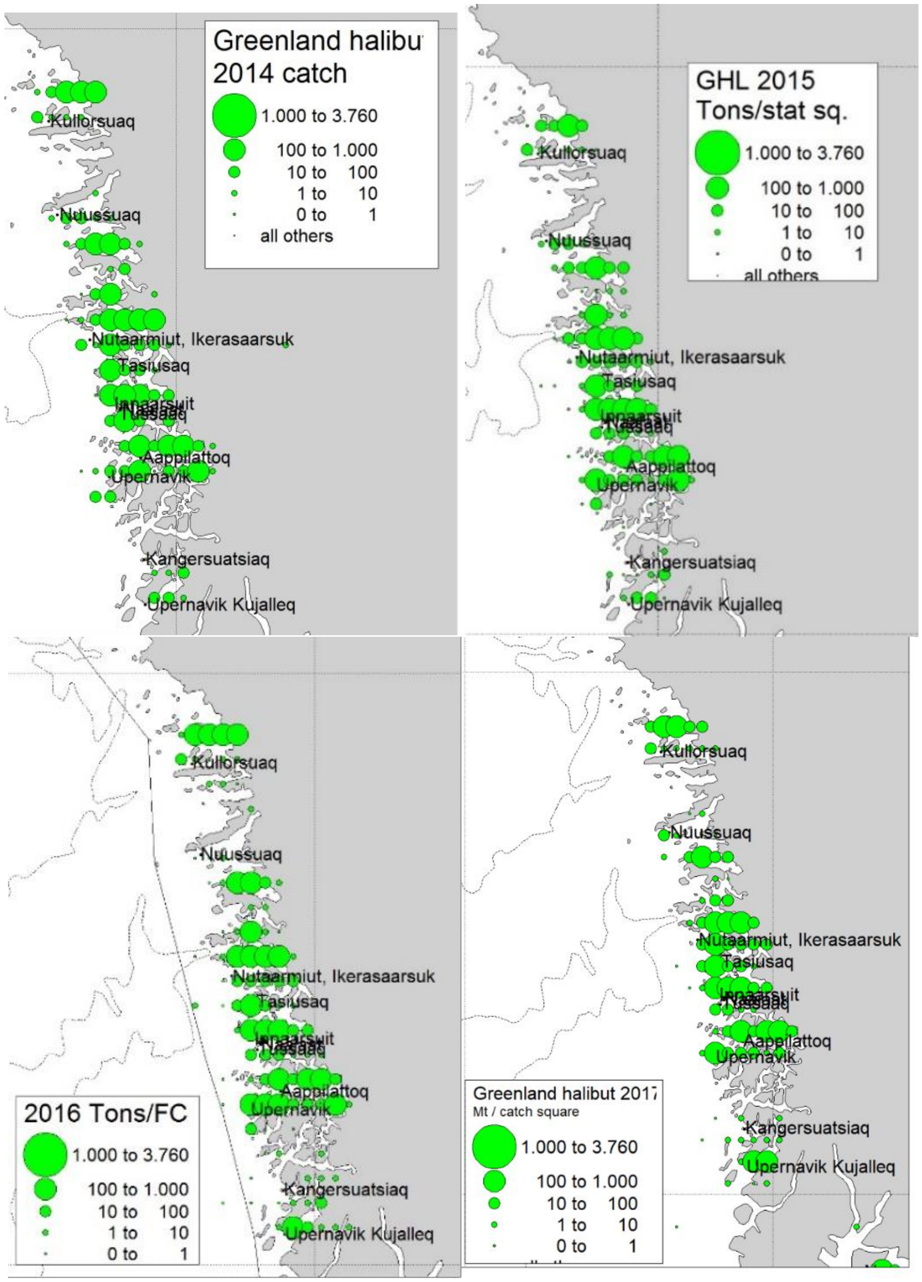


Figure 7. Greenland halibut catch by statistical square in the Upernavik area.

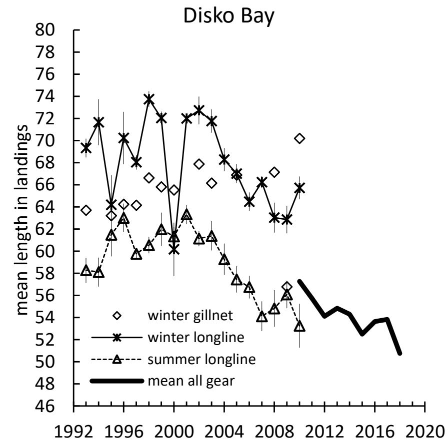


Figure 8. Disko Bay mean length in the landings: longline summer, longline winter, gillnet and overall mean weighted by area, season gear and amounts (after 2010).

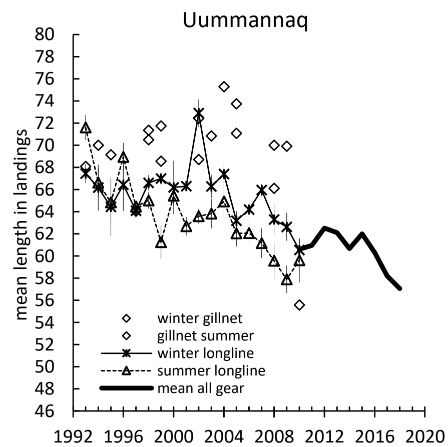


Figure 9. Uummannaq mean length in the landings: longline summer, longline winter, gillnet and overall mean weighted by area, season gear and amounts (after 2010).

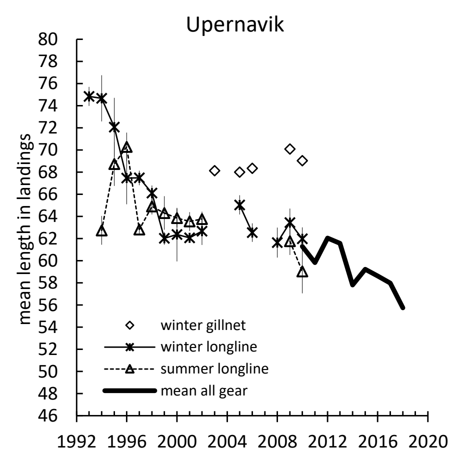
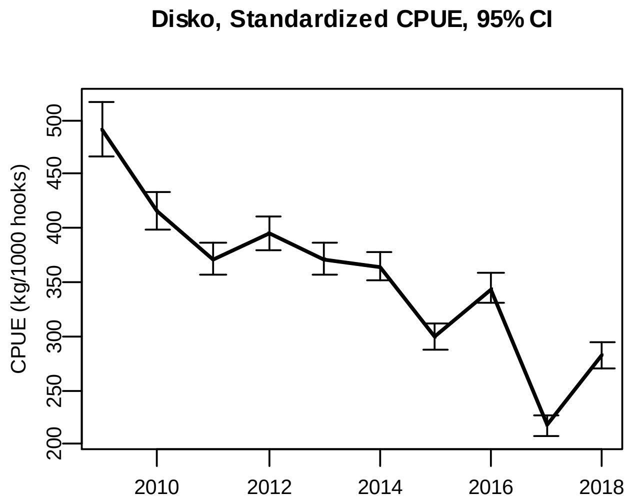


Figure 10. Upernavik mean length in the landings: longline summer and winter and overall mean weighted by season and gear (Mean all gear) (left) and in the gillnet fishery (right).



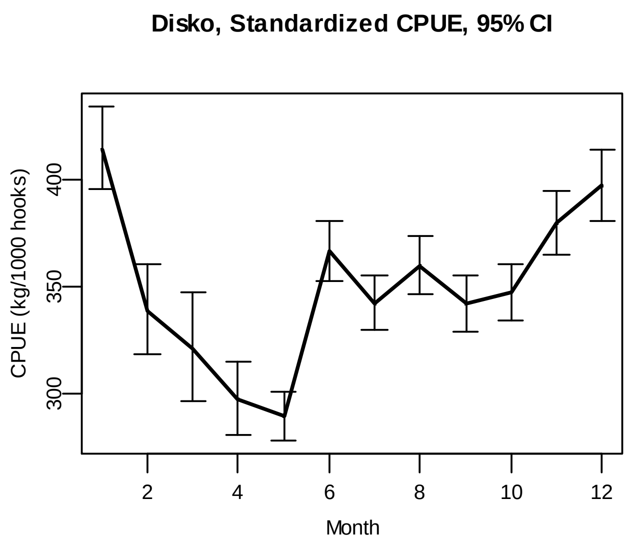
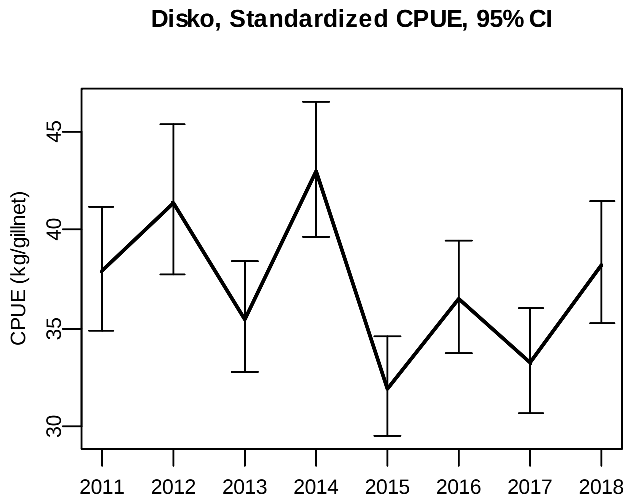


Figure 11. Longline Standardized mean and 95% CI CPUE based on logbooks from vessels larger than 30ft in Disko Bay.



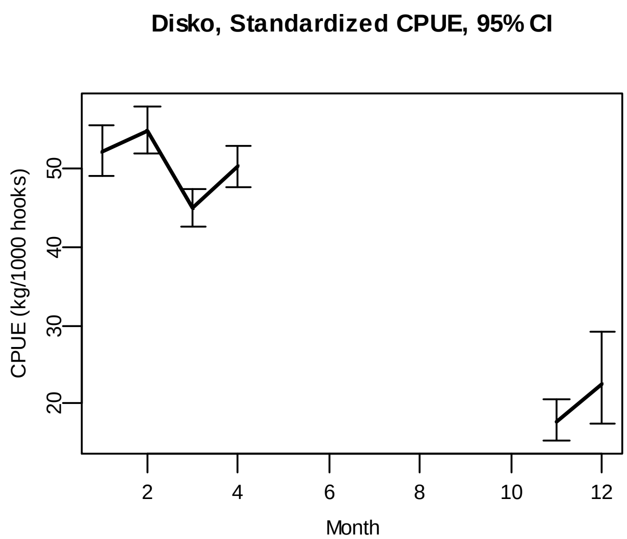
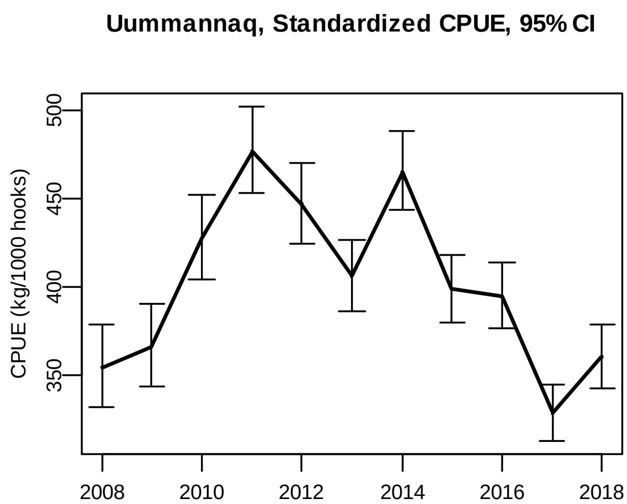


Figure 12. Gillnet Standardized mean and 95% CI CPUE based on logbooks from vessels larger than 30ft in Disko Bay.



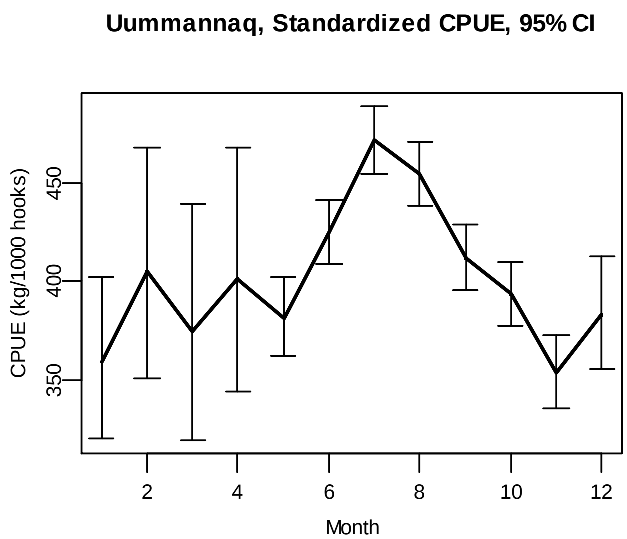


Figure 13. Longline Standardized mean and 95% CI CPUE based on logbooks from vessels larger than 30ft in Uummannaq.

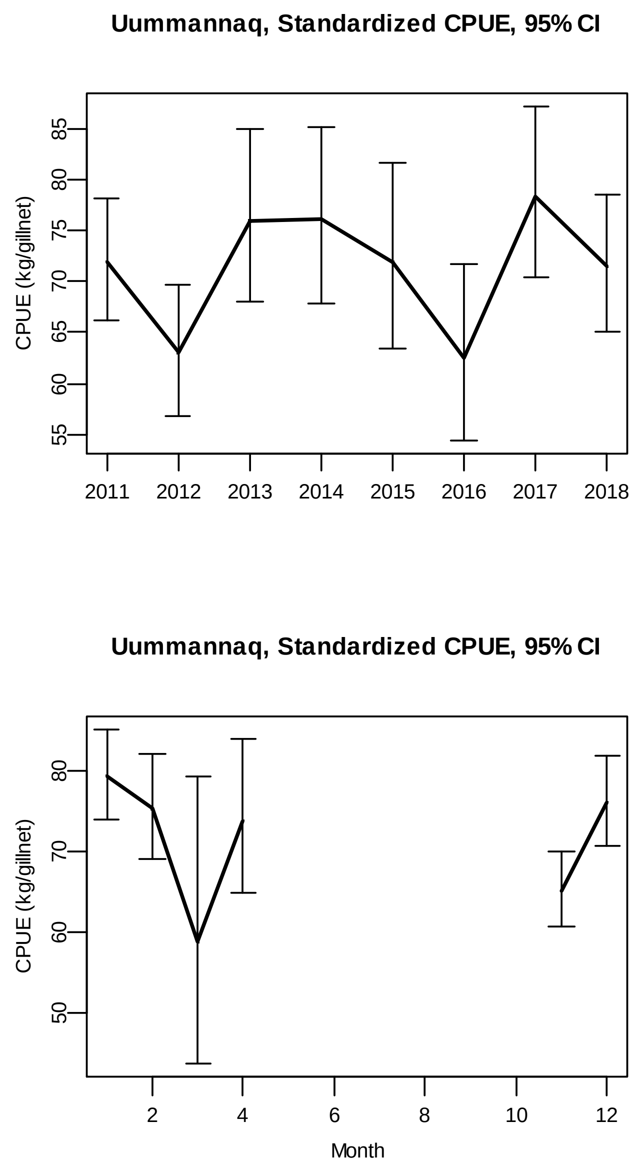


Figure 14. Gillnet Standardized mean and 95% CI CPUE based on logbooks from vessels larger than 30ft in Uummannaq.

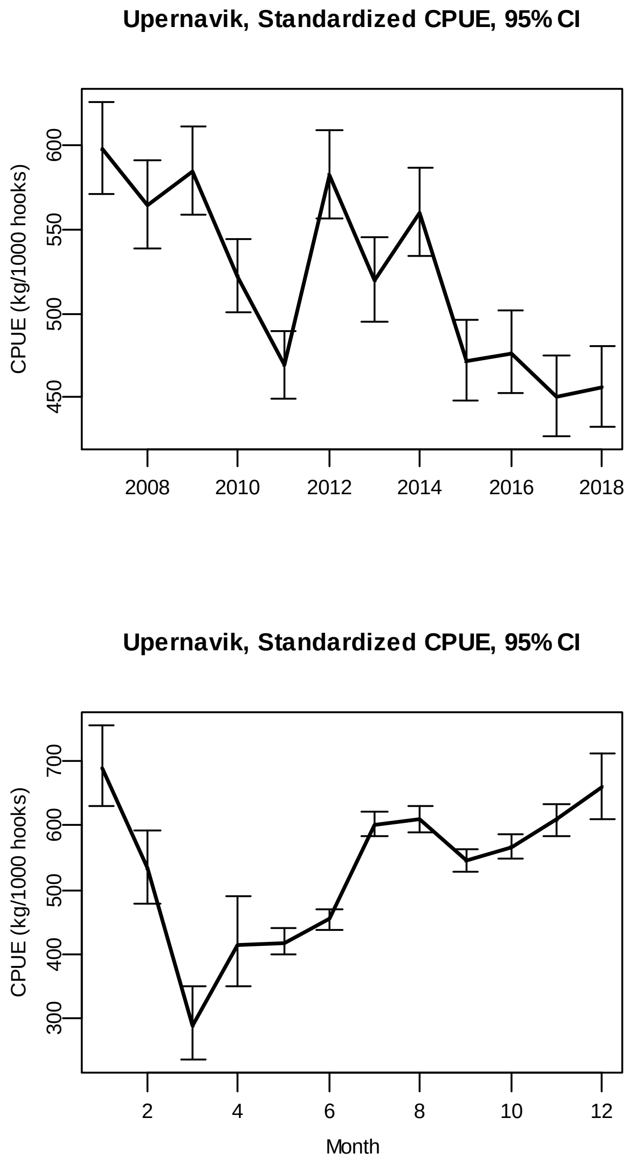
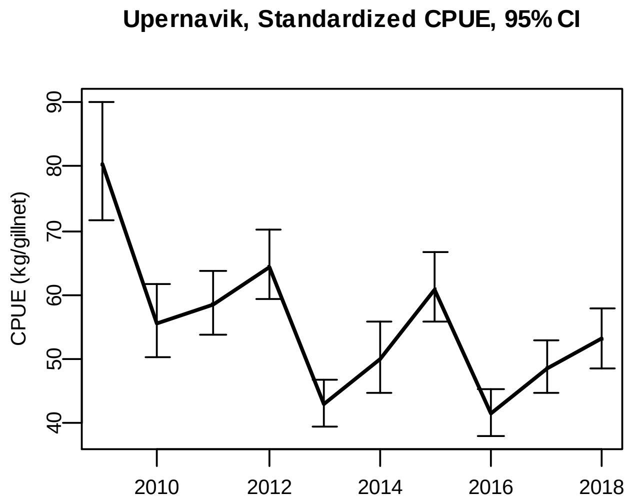


Figure 15. Longline Standardized mean and 95% CI CPUE based on logbooks from vessels larger than 30ft in Upernavik.



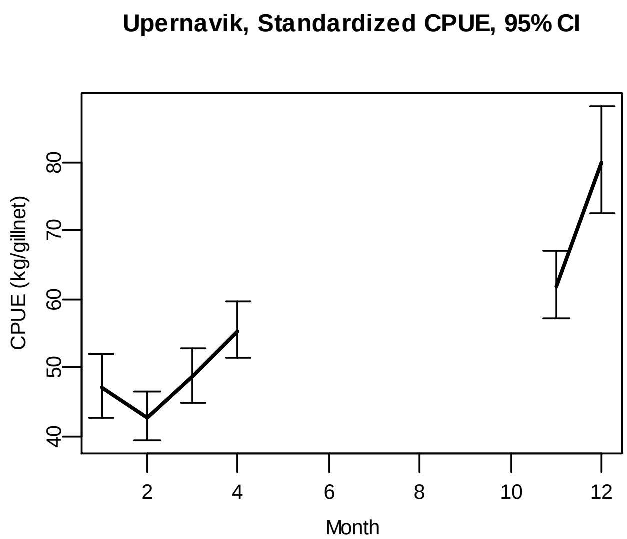


Figure 16. Gillnet standardized mean and 95% CI CPUE based on logbooks from vessels larger than 30ft in Upernavik.

Appendix 1

Disko logline GLM (log-CPUE ~ intercept + Year + Month + Boat)

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

Residuals:
    Min      1Q  Median      3Q     Max 
-5.6771 -0.2484  0.0412  0.3068  2.9714 

Coefficients:
                        Estimate Std. Error t value Pr(>|t|)    
(Intercept)            6.2435592  0.0529885 117.829  < 2e-16 ***
Year2010              -0.1645589  0.0229862  -7.159 8.39e-13 ***
Year2011              -0.2783479  0.0225487 -12.344  < 2e-16 ***
Year2012              -0.2158707  0.0223916  -9.641  < 2e-16 ***
Year2013              -0.2789408  0.0221064 -12.618  < 2e-16 ***
Year2014              -0.2980847  0.0227677 -13.092  < 2e-16 ***
Year2015              -0.4935331  0.0231143 -21.352  < 2e-16 ***
Year2016              -0.3556577  0.0234663 -15.156  < 2e-16 ***
Year2017              -0.8137592  0.0250011 -32.549  < 2e-16 ***
Year2018              -0.5521564  0.0255335 -21.625  < 2e-16 ***
Month2                -0.2011456  0.0310045  -6.488 8.91e-11 ***
Month3                -0.2547988  0.0401280  -6.350 2.20e-10 ***
Month4                -0.3311812  0.0295391 -11.212  < 2e-16 ***
Month5                -0.3586238  0.0201212 -17.823  < 2e-16 ***
Month6                -0.1224762  0.0189261  -6.471 9.93e-11 ***
Month7                -0.1915311  0.0191188 -10.018  < 2e-16 ***
Month8                -0.1404605  0.0195824  -7.173 7.59e-13 ***
Month9                -0.1923704  0.0195210  -9.855  < 2e-16 ***
Month10               -0.1762895  0.0193907  -9.091  < 2e-16 ***
Month11               -0.0875370  0.0199224  -4.394 1.12e-05 ***
Month12               -0.0421828  0.0209080  -2.018 0.043651 *  
BoatAG                 0.5394229  0.2579703   2.091 0.036537 *  
BoatAJ                 0.0840541  0.0502475   1.673 0.094381 .  
BoatAK                 0.2771806  0.1024956   2.704 0.006850 ** 
BoatAK                 0.0511336  0.0891918   0.573 0.566448    
BoatAN                -0.0062244  0.0586184  -0.106 0.915436    
BoatAN                 0.1992802  0.0538191   3.703 0.000214 ***
BoatAN                 0.2859538  0.0598662   4.777 1.80e-06 ***
BoatAN                 0.1752988  0.0701679   2.498 0.012487 *  
BoatAN                 0.3278381  0.1673060   1.960 0.050066 .  
BoatAN                 0.1544190  0.1316880   1.173 0.240964    
BoatAN                -1.0941219  0.5093904  -2.148 0.031732 *  
BoatAN                 0.2617127  0.0535594   4.886 1.03e-06 ***
BoatAP                 0.2824488  0.0902036   3.131 0.001743 ** 
BoatAR                 0.0893956  0.1159952   0.771 0.440903    
BoatAV                -0.2429993  0.2581974  -0.941 0.346645    
BoatBA                 0.6803912  0.0816002   8.338  < 2e-16 ***
BoatBJ                 0.3457019  0.0682760   5.063 4.15e-07 ***
BoatCE                -0.2668901  0.0771127  -3.461 0.000539 ***
BoatDO                -0.2696349  0.1536954  -1.754 0.079385 .  
BoatER                -0.3148408  0.2121248  -1.484 0.137764    
BoatER                 0.0134815  0.1974257   0.068 0.945558    
BoatGE                 0.0381384  0.0689276   0.553 0.580056    
BoatGA                -0.0096944  0.0542022  -0.179 0.858052    
BoatHE                 0.0721321  0.1148220   0.628 0.529874    
BoatIL                 0.2868898  0.0522598   5.490 4.07e-08 ***
BoatIN                 0.2079535  0.1094840   1.899 0.057526 .  
BoatIP                 0.1403972  0.1601260   0.877 0.380609    
BoatIV                 0.1623566  0.0734939   2.209 0.027177 *  
BoatJE                 0.1758206  0.0647059   2.717 0.006588 ** 
BoatJE                 0.1534106  0.0639952   2.397 0.016528 *  
BoatJE                 0.2572752  0.0486498   5.288 1.25e-07 ***
```

BoatJE	0.0644580	0.0557065	1.157	0.247245	
BoatJO	0.4364804	0.0514849	8.478	< 2e-16	***
BoatJO	-0.0815564	0.2579922	-0.316	0.751915	
BoatJO	-0.4616322	0.2966560	-1.556	0.119694	
BoatJO	-0.2835531	0.3617899	-0.784	0.433195	
BoatJO	0.0203135	0.1853828	0.110	0.912747	
BoatJO	0.0179947	0.1974769	0.091	0.927396	
BoatJO	0.3042336	0.5093686	0.597	0.550329	
BoatJO	0.2228620	0.1202923	1.853	0.063943	.
BoatJO	-0.0374691	0.1601221	-0.234	0.814985	
BoatJO	0.3313131	0.1598121	2.073	0.038171	*
BoatJO	0.0494189	0.1975119	0.250	0.802429	
BoatJO	0.1535632	0.2580885	0.595	0.551848	
BoatJO	-0.2733044	0.5093369	-0.537	0.591557	
BoatJO	-1.6089106	0.5092900	-3.159	0.001585	**
BoatJO	0.2375505	0.2967105	0.801	0.423364	
BoatJO	0.8316334	0.3617452	2.299	0.021517	*
BoatJO	0.3271334	0.5093369	0.642	0.520703	
BoatJO	0.2481614	0.2579624	0.962	0.336057	
BoatJO	-0.2085033	0.5093280	-0.409	0.682273	
BoatJO	0.0640182	0.2964791	0.216	0.829046	
BoatJO	0.0382464	0.1536960	0.249	0.803483	
BoatJO	0.4335652	0.1672621	2.592	0.009545	**
BoatJO	-0.0518590	0.1974157	-0.263	0.792792	
BoatJO	0.0669949	0.1974942	0.339	0.734444	
BoatJO	0.1169191	0.5093280	0.230	0.818439	
BoatJO	0.2630698	0.2317777	1.135	0.256384	
BoatJO	-0.0937815	0.2964615	-0.316	0.751750	
BoatJO	0.7409435	0.2320109	3.194	0.001407	**
BoatJO	0.1219120	0.5093686	0.239	0.810845	
BoatJO	1.3208919	0.5093280	2.593	0.009510	**
BoatJO	0.2848333	0.1284625	2.217	0.026616	*
BoatJO	0.2895801	0.1600632	1.809	0.070440	.
BoatJO	-0.1191538	0.5093369	-0.234	0.815035	
BoatJO	0.3682524	0.3617452	1.018	0.308695	
BoatJO	0.9837589	0.2966560	3.316	0.000914	***
BoatJO	-0.5638550	0.5093686	-1.107	0.268320	
BoatJO	1.3188276	0.1760701	7.490	7.13e-14	***
BoatJO	-0.3616637	0.2316274	-1.561	0.118443	
BoatJO	0.2538805	0.1539148	1.649	0.099062	.
BoatJO	-1.6179375	0.5093268	-3.177	0.001492	**
BoatJO	0.2052519	0.3617452	0.567	0.570453	
BoatJO	0.2569390	0.2123521	1.210	0.226305	
BoatJO	0.2637927	0.1317363	2.002	0.045251	*
BoatJO	0.3653805	0.5093280	0.717	0.473149	
BoatJO	0.0695998	0.2580885	0.270	0.787413	
BoatJO	0.3916719	0.5093369	0.769	0.441911	
BoatJO	0.1816615	0.2965755	0.613	0.540193	
BoatJO	0.0620815	0.1974442	0.314	0.753201	
BoatJO	-1.3986947	0.5093686	-2.746	0.006039	**
BoatJO	0.1081662	0.3616999	0.299	0.764905	
BoatJO	-0.3378430	0.5093369	-0.663	0.507146	
BoatJO	0.1250632	0.2579338	0.485	0.627777	
BoatJO	-0.4658746	0.5093686	-0.915	0.360406	
BoatJO	-1.1395455	0.3616999	-3.151	0.001632	**
BoatJO	-0.0750320	0.1600814	-0.469	0.639281	
BoatJO	0.8661299	0.5093369	1.701	0.089050	.
BoatJO	-0.1295337	0.5095001	-0.254	0.799315	
BoatJU	0.1476005	0.1003049	1.472	0.141166	
BoatJU	0.3277075	0.0800031	4.096	4.22e-05	***
BoatJU	0.5350539	0.1755843	3.047	0.002312	**
BoatJU	0.3601326	0.0529439	6.802	1.06e-11	***
BoatJU	0.1926354	0.0525825	3.663	0.000249	***

BoatJA	0.5082508	0.1392814	3.649	0.000264	***
BoatKA	0.0971161	0.0533522	1.820	0.068730	.
BoatKA	0.7671332	0.0756591	10.139	< 2e-16	***
BoatKA	-0.4077196	0.2968045	-1.374	0.169550	
BoatKA	-0.3306084	0.0984863	-3.357	0.000790	***
BoatKR	0.4635939	0.0765597	6.055	1.42e-09	***
BoatKU	0.1139018	0.0512330	2.223	0.026212	*
BoatKU	0.6786679	0.2968322	2.286	0.022242	*
BoatKA	0.5266411	0.0751034	7.012	2.42e-12	***
BoatKA	0.0433836	0.2315811	0.187	0.851398	
BoatL.	0.4587486	0.0740464	6.195	5.92e-10	***
BoatL.	0.4515923	0.0553291	8.162	3.48e-16	***
BoatLA	0.2844708	0.0618662	4.598	4.29e-06	***
BoatLE	0.1494929	0.0718236	2.081	0.037410	*
BoatLI	0.0004162	0.0642890	0.006	0.994835	
BoatLI	-0.2375847	0.1166412	-2.037	0.041674	*
BoatLA	0.2039066	0.0499435	4.083	4.47e-05	***
BoatM.	0.3247417	0.1854631	1.751	0.079964	.
BoatMA	0.0376245	0.0489203	0.769	0.441844	
BoatMA	0.4583529	0.1604666	2.856	0.004289	**
BoatMA	0.2653990	0.0750066	3.538	0.000403	***
BoatMA	0.2720851	0.0598894	4.543	5.57e-06	***
BoatMA	0.0330563	0.0532854	0.620	0.535026	
BoatMA	-0.1594489	0.1433837	-1.112	0.266132	
BoatMA	-0.0436708	0.1049229	-0.416	0.677254	
BoatMA	0.2083805	0.1256307	1.659	0.097196	.
BoatMI	0.3451865	0.0617819	5.587	2.34e-08	***
BoatMI	0.0030028	0.0523655	0.057	0.954272	
BoatMI	-0.0864185	0.0510579	-1.693	0.090554	.
BoatNA	0.4798576	0.0570349	8.413	< 2e-16	***
BoatNA	-0.8837355	0.0630289	-14.021	< 2e-16	***
BoatNÂ	-0.0323971	0.0508863	-0.637	0.524355	
BoatNA	0.5320980	0.1180296	4.508	6.57e-06	***
BoatNE	-0.3237371	0.1132165	-2.859	0.004248	**
BoatNI	0.0185764	0.0579400	0.321	0.748505	
BoatNI	-0.2099941	0.0987248	-2.127	0.033426	*
BoatNI	0.6992880	0.0500500	13.972	< 2e-16	***
BoatNI	0.0583466	0.1084254	0.538	0.590495	
BoatNI	-0.0078168	0.5093905	-0.015	0.987757	
BoatNO	0.0369153	0.0616500	0.599	0.549320	
BoatNO	0.0780807	0.0526378	1.483	0.137994	
BoatNO	-0.0762026	0.0972224	-0.784	0.433168	
BoatNU	0.0414123	0.0710519	0.583	0.560003	
BoatNU	0.0485707	0.3616135	0.134	0.893153	
BoatNU	-0.1717092	0.1389378	-1.236	0.216520	
BoatNU	0.3065216	0.0685121	4.474	7.72e-06	***
BoatNU	0.3507921	0.0716162	4.898	9.74e-07	***
BoatNU	-0.0048119	0.0644083	-0.075	0.940447	
BoatNU	-0.0492609	0.0880454	-0.559	0.575830	
BoatNU	0.4184171	0.0495477	8.445	< 2e-16	***
BoatNU	0.4100079	0.0757408	5.413	6.25e-08	***
BoatNU	0.2811569	0.0740108	3.799	0.000146	***
BoatOS	0.5039441	0.5094869	0.989	0.322615	
BoatOV	0.2153530	0.0772982	2.786	0.005341	**
BoatPA	0.1893615	0.0501089	3.779	0.000158	***
BoatPA	0.1731336	0.0511226	3.387	0.000709	***
BoatPI	0.2485193	0.1329129	1.870	0.061526	.
BoatPI	0.5086677	0.0528156	9.631	< 2e-16	***
BoatPI	-0.1026349	0.0556803	-1.843	0.065301	.
BoatPI	-0.4689289	0.1286394	-3.645	0.000268	***
BoatQA	0.2168704	0.0838970	2.585	0.009746	**
BoatQI	0.8015911	0.1319505	6.075	1.26e-09	***
BoatQV	0.0131527	0.2967634	0.044	0.964649	

```
BoatQA                   0.4483159  0.0625645   7.166 7.99e-13 ***
BoatRE                   0.3249541  0.1670427   1.945 0.051748 .
BoatRI                   0.1368121  0.0542095   2.524 0.011618 *
BoatRA                   0.1636753  0.0555876   2.944 0.003239 **
BoatSA                   0.1887054  0.0488301   3.865 0.000112 ***
BoatSA                   0.0688071  0.1132800   0.607 0.543587
BoatSA                   0.1218344  0.0582261   2.092 0.036411 *
BoatSE                  -0.1783129  0.0916349  -1.946 0.051679 .
BoatSE                   0.1532071  0.0564547   2.714 0.006657 **
BoatSO                  -0.0728106  0.1856716  -0.392 0.694953
BoatSU                  -0.2664862  0.0626991  -4.250 2.14e-05 ***
BoatTA                  -0.1270044  0.1757003  -0.723 0.469782
BoatTI                   0.0663917  0.0512227   1.296 0.194942
BoatUI                   0.5466852  0.0501467  10.902  < 2e-16 ***
BoatUL                   0.4389303  0.1669268   2.629 0.008558 **
BoatUM                   0.9001656  0.5094658   1.767 0.077262 .
BoatAA                   0.0404661  0.0973171   0.416 0.677548
BoatAA                   0.5457148  0.2581411   2.114 0.034525 *
BoatAA                   0.1341410  0.1005553   1.334 0.182217
BoatAA                   0.3718856  0.0495916   7.499 6.68e-14 ***
BoatAA                   0.2831901  0.2123599   1.334 0.182369
BoatAA                   0.1643326  0.0508836   3.230 0.001242 **
BoatAA                   0.2411093  0.0975736   2.471 0.013479 *
BoatAA                   0.7738242  0.1679683   4.607 4.11e-06 ***
BoatAA                  -0.0698048  0.1676793  -0.416 0.677195
BoatAA                   0.1185905  0.0529295   2.241 0.025066 *
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 0.5071 on 21527 degrees of freedom
Multiple R-squared:  0.2374,    Adjusted R-squared:  0.2302 
F-statistic: 33.01 on 203 and 21527 DF,  p-value: < 2.2e-16
```

Appendix 2

Disko gillnet GLM (log-CPUE ~ intercept + Year + Month + Boat)

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

Residuals:
    Min      1Q  Median      3Q     Max 
-5.3266 -0.3677  0.0943  0.4798  2.8111 

Coefficients:
                       Estimate Std. Error t value Pr(>|t|)    
(Intercept)             3.349892   0.282815  11.845  < 2e-16 ***
Year2012                0.087486   0.045296   1.931 0.053462 .  
Year2013               -0.065799   0.034936  -1.883 0.059679 .  
Year2014                0.125351   0.035895   3.492 0.000482 ***
Year2015               -0.169706   0.035935  -4.723 2.37e-06 ***
Year2016               -0.038189   0.035511  -1.075 0.282216    
Year2017               -0.131205   0.038767  -3.384 0.000716 ***
Year2018                0.008146   0.041102   0.198 0.842902    
Month2                  0.050027   0.027595   1.813 0.069880 .  
Month3                 -0.148673   0.027980  -5.314 1.10e-07 ***
Month4                 -0.036686   0.027190  -1.349 0.177291    
Month11                -1.077107   0.078011 -13.807  < 2e-16 ***
Month12                -0.840308   0.133086  -6.314 2.85e-10 ***
BoatAJ                  0.470512   0.290151   1.622 0.104923    
BoatAN                 -1.311575   0.515873  -2.542 0.011025 *  
BoatAN                  0.810355   0.286824   2.825 0.004735 ** 
BoatAN                  0.724944   0.304713   2.379 0.017376 *  
BoatAN                  0.129602   0.311646   0.416 0.677520    
```

BoatAN	0.882585	0.339857	2.597	0.009422	**
BoatAN	1.089675	0.304777	3.575	0.000352	***
BoatAQ	-0.032083	0.598860	-0.054	0.957276	
BoatAR	0.879210	0.297436	2.956	0.003125	**
BoatBA	1.440699	0.469069	3.071	0.002137	**
BoatBJ	0.113470	0.341232	0.333	0.739496	
BoatGA	0.215391	0.297488	0.724	0.469067	
BoatIL	1.164257	0.289528	4.021	5.84e-05	***
BoatIV	0.344178	0.467499	0.736	0.461623	
BoatJE	0.811465	0.298128	2.722	0.006504	**
BoatJE	-0.012817	0.300370	-0.043	0.965964	
BoatJE	0.785614	0.286335	2.744	0.006088	**
BoatJO	1.103261	0.339406	3.251	0.001156	**
BoatJO	0.251465	0.327342	0.768	0.442387	
BoatJU	0.799018	0.292009	2.736	0.006226	**
BoatJU	0.704113	0.316789	2.223	0.026264	*
BoatJU	0.919953	0.289357	3.179	0.001481	**
BoatJU	0.856395	0.293575	2.917	0.003542	**
BoatJA	1.036239	0.300758	3.445	0.000573	***
BoatKA	0.379501	0.288590	1.315	0.188538	
BoatKA	0.131245	0.467254	0.281	0.778805	
BoatKA	0.981165	0.306584	3.200	0.001378	**
BoatKA	-1.192175	0.293732	-4.059	4.98e-05	***
BoatKR	0.860515	0.339723	2.533	0.011327	*
BoatKU	0.337961	0.290357	1.164	0.244476	
BoatKA	1.403951	0.796801	1.762	0.078107	.
BoatL.	1.004521	0.309303	3.248	0.001168	**
BoatL.	0.914586	0.287504	3.181	0.001472	**
BoatLA	0.556978	0.292201	1.906	0.056664	.
BoatLE	0.411010	0.292143	1.407	0.159499	
BoatLI	0.146245	0.356824	0.410	0.681925	
BoatLA	0.458643	0.285132	1.609	0.107756	
BoatMA	0.876290	0.285558	3.069	0.002157	**
BoatMA	0.469850	0.339743	1.383	0.166713	
BoatMA	0.890209	0.295913	3.008	0.002634	**
BoatMA	1.024609	0.287849	3.560	0.000373	***
BoatMA	0.203664	0.292053	0.697	0.485600	
BoatMI	0.712915	0.287389	2.481	0.013133	*
BoatMI	0.581253	0.306379	1.897	0.057839	.
BoatMI	-0.127620	0.398546	-0.320	0.748814	
BoatNA	0.757409	0.308884	2.452	0.014223	*
BoatNÂ	-0.054260	0.285055	-0.190	0.849040	
BoatNA	0.602940	0.311869	1.933	0.053230	.
BoatNI	0.397414	0.295330	1.346	0.178446	
BoatNI	1.345746	0.443076	3.037	0.002394	**
BoatNI	0.577659	0.288675	2.001	0.045416	*
BoatNI	0.321913	0.293199	1.098	0.272264	
BoatNO	0.911640	0.362084	2.518	0.011828	*
BoatNO	0.174568	0.291383	0.599	0.549122	
BoatNU	1.358990	0.346879	3.918	9.01e-05	***
BoatNU	0.869628	0.340897	2.551	0.010758	*
BoatNU	0.469079	0.292532	1.604	0.108857	
BoatNU	0.771426	0.299124	2.579	0.009926	**
BoatNU	0.431956	0.333631	1.295	0.195454	
BoatNU	1.423139	0.398810	3.568	0.000361	***
BoatNU	0.778305	0.286769	2.714	0.006660	**
BoatNU	-0.175822	0.438386	-0.401	0.688381	
BoatNU	1.124116	0.340808	3.298	0.000976	***
BoatOV	1.071047	0.297650	3.598	0.000322	***
BoatPA	1.010378	0.289282	3.493	0.000480	***
BoatPA	0.658523	0.287060	2.294	0.021813	*
BoatPI	1.266091	0.288762	4.385	1.18e-05	***
BoatPI	1.207006	0.331789	3.638	0.000276	***

```
BoatPI               -0.045744   0.336647  -0.136 0.891919
BoatQA                1.363151   0.287379   4.743 2.13e-06 ***
BoatRI                0.463786   0.290082   1.599 0.109898
BoatRA                0.230463   0.798145   0.289 0.772781
BoatSA               -0.002840   0.286623  -0.010 0.992094
BoatSA                0.798928   0.301953   2.646 0.008163 **
BoatSE                0.205350   0.300500   0.683 0.494398
BoatSE                0.562728   0.291046   1.933 0.053211 .
BoatSO                1.339782   0.438288   3.057 0.002244 **
BoatSU               -0.184454   0.797841  -0.231 0.817172
BoatTA                0.131483   0.329916   0.399 0.690245
BoatTI                0.094224   0.308753   0.305 0.760240
BoatUI                0.926916   0.286254   3.238 0.001208 **
BoatAA                1.188364   0.337383   3.522 0.000430 ***
BoatAA                0.847033   0.285312   2.969 0.002998 **
BoatAA                1.272016   0.285177   4.460 8.28e-06 ***
BoatAA                1.241376   0.286072   4.339 1.44e-05 ***
BoatAA                1.653566   0.451420   3.663 0.000251 ***
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 0.7452 on 8740 degrees of freedom
Multiple R-squared:  0.2776,    Adjusted R-squared:  0.2695
F-statistic: 34.27 on 98 and 8740 DF,  p-value: < 2.2e-16
```

Appendix 3

Uumannaq logline GLM (log-CPUE ~ intercept + Year + Month + Boat)

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

Residuals:
    Min      1Q  Median      3Q     Max
-4.6713 -0.2450  0.0217  0.2682  2.8650

Coefficients:
                      Estimate Std. Error t value Pr(>|t|)
(Intercept)            6.29293    0.06646  94.683  < 2e-16 ***
Year2009               0.03216    0.03702   0.869 0.385029
Year2010               0.18617    0.03589   5.188 2.17e-07 ***
Year2011               0.29526    0.03288   8.980  < 2e-16 ***
Year2012               0.23059    0.03152   7.316 2.76e-13 ***
Year2013               0.13469    0.03050   4.416 1.02e-05 ***
Year2014               0.27025    0.03089   8.748  < 2e-16 ***
Year2015               0.11710    0.03102   3.775 0.000161 ***
Year2016               0.10588    0.03093   3.423 0.000622 ***
Year2017              -0.07519    0.03156  -2.383 0.017198 *
Year2018               0.01605    0.03306   0.485 0.627413
Month2                 0.12030    0.09016   1.334 0.182116
Month3                 0.04152    0.09704   0.428 0.668771
Month4                 0.11070    0.09399   1.178 0.238925
Month5                 0.06073    0.05992   1.013 0.310849
Month6                 0.16823    0.05724   2.939 0.003299 **
Month7                 0.27141    0.05689   4.771 1.86e-06 ***
Month8                 0.23529    0.05707   4.123 3.78e-05 ***
Month9                 0.13609    0.05768   2.359 0.018320 *
Month10                0.09079    0.05755   1.578 0.114669
Month11               -0.01471    0.06008  -0.245 0.806575
Month12                0.06450    0.06553   0.984 0.325001
BoatAJ                -0.35938    0.26661  -1.348 0.177701
BoatAK                -1.74481    0.45929  -3.799 0.000146 ***
BoatAK                -0.64048    0.05610 -11.417  < 2e-16 ***
BoatAK                -0.47313    0.03566 -13.266  < 2e-16 ***
```

BoatAN	-0.38595	0.03915	-9.858	< 2e-16	***
BoatAN	-0.42507	0.06073	-6.999	2.74e-12	***
BoatAN	-0.73041	0.10877	-6.715	1.98e-11	***
BoatAN	-0.50809	0.04864	-10.447	< 2e-16	***
BoatAN	-0.29123	0.03412	-8.534	< 2e-16	***
BoatAN	-0.10283	0.03300	-3.116	0.001839	**
BoatAP	-0.94528	0.26567	-3.558	0.000375	***
BoatAR	-0.58514	0.16426	-3.562	0.000369	***
BoatAV	-0.38910	0.05967	-6.521	7.34e-11	***
BoatBJ	-0.35100	0.03403	-10.314	< 2e-16	***
BoatDO	-0.19424	0.03201	-6.068	1.34e-09	***
BoatER	-0.14151	0.06413	-2.207	0.027372	*
BoatGA	-1.14820	0.23264	-4.936	8.12e-07	***
BoatIL	-0.54848	0.23202	-2.364	0.018104	*
BoatIN	-0.30154	0.03131	-9.631	< 2e-16	***
BoatIP	-1.76671	0.14198	-12.444	< 2e-16	***
BoatIV	-0.60297	0.23054	-2.615	0.008925	**
BoatJE	-0.16390	0.05222	-3.139	0.001702	**
BoatJE	-0.79068	0.11793	-6.705	2.13e-11	***
BoatJO	-1.05248	0.20690	-5.087	3.71e-07	***
BoatJO	0.06250	0.26567	0.235	0.814003	
BoatJU	-0.40476	0.05351	-7.563	4.28e-14	***
BoatJU	-0.32948	0.04796	-6.870	6.81e-12	***
BoatJU	-0.14615	0.03268	-4.471	7.86e-06	***
BoatJU	-0.17357	0.26558	-0.654	0.513425	
BoatKA	-0.50593	0.04275	-11.836	< 2e-16	***
BoatKA	-0.83126	0.45848	-1.813	0.069850	.
BoatKR	-0.47206	0.13460	-3.507	0.000455	***
BoatKU	-0.79105	0.08308	-9.521	< 2e-16	***
BoatKA	-0.62860	0.11450	-5.490	4.12e-08	***
BoatKA	-0.34244	0.05579	-6.138	8.68e-10	***
BoatL.	-0.52820	0.12137	-4.352	1.36e-05	***
BoatL.	-0.34808	0.08108	-4.293	1.78e-05	***
BoatLA	-0.37720	0.03674	-10.268	< 2e-16	***
BoatLE	-1.29098	0.14028	-9.203	< 2e-16	***
BoatLI	-0.13196	0.23163	-0.570	0.568906	
BoatLA	-0.37202	0.12944	-2.874	0.004061	**
BoatM.	-0.62153	0.10215	-6.084	1.21e-09	***
BoatMA	-0.67213	0.08149	-8.248	< 2e-16	***
BoatMA	-0.99689	0.07839	-12.718	< 2e-16	***
BoatMA	-0.47661	0.03146	-15.151	< 2e-16	***
BoatMI	0.02637	0.13507	0.195	0.845187	
BoatMI	-0.53418	0.11773	-4.537	5.77e-06	***
BoatMI	-0.66928	0.09223	-7.256	4.28e-13	***
BoatNA	-0.93157	0.45825	-2.033	0.042091	*
BoatNA	-1.11594	0.12964	-8.608	< 2e-16	***
BoatNÂ	-1.48098	0.13003	-11.389	< 2e-16	***
BoatNA	-0.07246	0.07527	-0.963	0.335782	
BoatNA	-1.33731	0.23045	-5.803	6.72e-09	***
BoatNE	-0.44184	0.03406	-12.972	< 2e-16	***
BoatNI	-0.64698	0.04602	-14.057	< 2e-16	***
BoatNI	-0.77996	0.16416	-4.751	2.05e-06	***
BoatNI	-0.56446	0.16419	-3.438	0.000589	***
BoatNI	-0.05861	0.08383	-0.699	0.484470	
BoatNI	-0.54010	0.05774	-9.354	< 2e-16	***
BoatNO	-0.86428	0.11709	-7.382	1.69e-13	***
BoatNO	-0.44788	0.03984	-11.241	< 2e-16	***
BoatNU	-0.09052	0.06257	-1.447	0.148040	
BoatNU	-0.37219	0.09026	-4.124	3.76e-05	***
BoatNU	-0.35112	0.10314	-3.404	0.000666	***
BoatNU	-0.47062	0.06931	-6.790	1.19e-11	***
BoatNU	-0.31781	0.11444	-2.777	0.005496	**
BoatOV	-0.75229	0.14034	-5.360	8.49e-08	***

```
BoatPA               -1.04203    0.06585 -15.825  < 2e-16 ***
BoatPA               -0.41948    0.17522  -2.394 0.016684 *
BoatPI                0.02045    0.10281   0.199 0.842366
BoatPI               -0.79711    0.04900 -16.268  < 2e-16 ***
BoatQA               -0.41531    0.03090 -13.442  < 2e-16 ***
BoatQI               -0.23011    0.03070  -7.496 7.13e-14 ***
BoatQA               -0.35898    0.26565  -1.351 0.176622
BoatRE               -0.31405    0.06860  -4.578 4.75e-06 ***
BoatRI               -0.58712    0.08548  -6.868 6.90e-12 ***
BoatSA               -0.44073    0.03854 -11.435  < 2e-16 ***
BoatSA               -0.28435    0.05890  -4.828 1.40e-06 ***
BoatSO               -0.64327    0.04673 -13.766  < 2e-16 ***
BoatSU               -0.88401    0.32484  -2.721 0.006513 **
BoatTU               -0.33656    0.45835  -0.734 0.462792
BoatUI               -0.18691    0.08171  -2.288 0.022187 *
BoatUL               -0.19365    0.03405  -5.688 1.33e-08 ***
BoatAA               -0.13183    0.03150  -4.186 2.87e-05 ***
BoatAA               -0.30021    0.04067  -7.381 1.70e-13 ***
BoatAA               -0.42828    0.06320  -6.776 1.30e-11 ***
BoatAA               -0.54077    0.08359  -6.470 1.03e-10 ***
BoatAA               -0.43342    0.08648  -5.012 5.49e-07 ***
BoatAA               -1.06457    0.08920 -11.935  < 2e-16 ***
BoatAA               -0.53928    0.06630  -8.134 4.68e-16 ***
BoatAA               -0.22258    0.06048  -3.680 0.000235 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.4573 on 9764 degrees of freedom
Multiple R-squared:  0.2308,    Adjusted R-squared:  0.222
F-statistic: 26.16 on 112 and 9764 DF,  p-value: < 2.2e-16
```

Appendix 4

Uumannaq gillnet GLM (log-CPUE ~ intercept + Year + Month + Boat)

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

Residuals:
     Min       1Q   Median       3Q      Max
-2.23519 -0.22970  0.03734  0.26143  1.32065

Coefficients:
                   Estimate Std. Error t value Pr(>|t|)
(Intercept)       4.7652485  0.0571780  83.341  < 2e-16 ***
Year2012         -0.1328530  0.0519361  -2.558 0.010643 *
Year2013          0.0550643  0.0549254   1.003 0.316279
Year2014          0.0556383  0.0557862   0.997 0.318785
Year2015          0.0002494  0.0606693   0.004 0.996720
Year2016         -0.1400512  0.0812694  -1.723 0.085078 .
Year2017          0.0849849  0.0595347   1.427 0.153686
Year2018         -0.0067687  0.0521489  -0.130 0.896749
Month2           -0.0520732  0.0381799  -1.364 0.172844
Month3           -0.2989086  0.1509071  -1.981 0.047835 *
Month4           -0.0722432  0.0754018  -0.958 0.338190
Month11          -0.1966727  0.0418635  -4.698 2.91e-06 ***
Month12          -0.0421953  0.0428164  -0.985 0.324569
BoatAN           -1.0933733  0.1321789  -8.272 3.29e-16 ***
BoatAN           -0.6375523  0.1587923  -4.015 6.29e-05 ***
BoatAN           -0.1624486  0.2137792  -0.760 0.447461
BoatAN           -0.1781257  0.4251868  -0.419 0.675334
BoatAN           -0.2481126  0.0575834  -4.309 1.77e-05 ***
BoatAN           -0.4525945  0.1005627  -4.501 7.40e-06 ***
```

```
BoatAR            0.0294919  0.2971655   0.099 0.920960
BoatAV            0.1365634  0.1070382   1.276 0.202246
BoatBJ           -0.8262723  0.1640180  -5.038 5.39e-07 ***
BoatDO           -0.4796249  0.0793169  -6.047 1.94e-09 ***
BoatIN           -0.8308158  0.0892856  -9.305  < 2e-16 ***
BoatJU           -0.3398107  0.0920658  -3.691 0.000233 ***
BoatJU           -0.3005366  0.1382264  -2.174 0.029872 *
BoatJU           -0.4077660  0.0576604  -7.072 2.52e-12 ***
BoatKA           -0.4146629  0.1439676  -2.880 0.004040 **
BoatKR           -0.1359336  0.1671069  -0.813 0.416111
BoatKA           -0.7833888  0.2459820  -3.185 0.001484 **
BoatLA           -0.3159947  0.0839452  -3.764 0.000175 ***
BoatM.           -0.5609289  0.1225620  -4.577 5.19e-06 ***
BoatMA           -0.3929211  0.0815586  -4.818 1.63e-06 ***
BoatNA           -0.6629369  0.2131573  -3.110 0.001912 **
BoatNE           -0.4256211  0.0955198  -4.456 9.09e-06 ***
BoatNO           -0.2000093  0.0653410  -3.061 0.002252 **
BoatNU           -0.6668022  0.1779696  -3.747 0.000187 ***
BoatNU           -1.1109550  0.1779696  -6.242 5.86e-10 ***
BoatNU           -0.3605259  0.1355963  -2.659 0.007940 **
BoatOV           -0.2041446  0.1846367  -1.106 0.269085
BoatQA           -0.3539864  0.0899733  -3.934 8.79e-05 ***
BoatQI           -0.1294002  0.0575594  -2.248 0.024740 *
BoatRE           -0.2404756  0.1225225  -1.963 0.049898 *
BoatRI           -0.0446553  0.1483176  -0.301 0.763403
BoatSA           -0.5702769  0.1113513  -5.121 3.50e-07 ***
BoatSO           -0.2390695  0.2447519  -0.977 0.328862
BoatUL           -0.4610084  0.0744269  -6.194 7.90e-10 ***
BoatAA           -0.3319998  0.1789340  -1.855 0.063766 .
BoatAA           -0.1272523  0.0955924  -1.331 0.183363
BoatAA           -0.1450726  0.1860568  -0.780 0.435700
BoatAA           -0.4545815  0.1307133  -3.478 0.000523 ***
BoatAA           -0.0656105  0.0898490  -0.730 0.465384
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.4128 on 1271 degrees of freedom
Multiple R-squared:  0.2418,    Adjusted R-squared:  0.2113
F-statistic: 7.947 on 51 and 1271 DF,  p-value: < 2.2e-16
```

Appendix 5

Upernavik longline GLM (log-CPUE ~ intercept + Year + Month + Boat)

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

Residuals:
    Min      1Q  Median      3Q     Max
-7.5569 -0.2659  0.0389  0.3186  2.7395

Coefficients:
                       Estimate Std. Error t value Pr(>|t|)
(Intercept)            6.482188   0.066069  98.112  < 2e-16 ***
Year2008              -0.056664   0.017713  -3.199 0.001381 **
Year2009              -0.022499   0.019123  -1.177 0.239388
Year2010              -0.134905   0.017700  -7.622 2.61e-14 ***
Year2011              -0.242037   0.017926 -13.502  < 2e-16 ***
Year2012              -0.025787   0.018269  -1.411 0.158119
Year2013              -0.140108   0.019929  -7.030 2.13e-12 ***
Year2014              -0.065520   0.018995  -3.449 0.000563 ***
Year2015              -0.236670   0.022855 -10.355  < 2e-16 ***
Year2016              -0.226084   0.023794  -9.502  < 2e-16 ***
Year2017              -0.281806   0.023352 -12.068  < 2e-16 ***
```

Year2018	-0.270087	0.024000	-11.254	< 2e-16	***
Month2	-0.255715	0.066418	-3.850	0.000118	***
Month3	-0.872112	0.107578	-8.107	5.50e-16	***
Month4	-0.508937	0.096483	-5.275	1.34e-07	***
Month5	-0.497217	0.048061	-10.346	< 2e-16	***
Month6	-0.416218	0.045264	-9.195	< 2e-16	***
Month7	-0.134657	0.044815	-3.005	0.002661	**
Month8	-0.123589	0.044698	-2.765	0.005698	**
Month9	-0.233489	0.044724	-5.221	1.80e-07	***
Month10	-0.193545	0.045011	-4.300	1.72e-05	***
Month11	-0.123875	0.045572	-2.718	0.006569	**
Month12	-0.043083	0.056561	-0.762	0.446244	
BoatAG	0.232059	0.064473	3.599	0.000320	***
BoatAK	-0.297486	0.310613	-0.958	0.338205	
BoatAK	0.109118	0.076104	1.434	0.151649	
BoatAN	0.008980	0.060500	0.148	0.882007	
BoatAN	0.410018	0.064470	6.360	2.06e-10	***
BoatAN	0.239620	0.082493	2.905	0.003680	**
BoatAN	0.458886	0.075532	6.075	1.26e-09	***
BoatAN	0.012942	0.176429	0.073	0.941526	
BoatAN	0.400132	0.065110	6.145	8.12e-10	***
BoatAN	0.369205	0.084070	4.392	1.13e-05	***
BoatAN	0.375144	0.071298	5.262	1.44e-07	***
BoatAP	0.570361	0.096397	5.917	3.34e-09	***
BoatAQ	0.587133	0.058884	9.971	< 2e-16	***
BoatAQ	0.312457	0.063804	4.897	9.80e-07	***
BoatAR	0.558915	0.063331	8.825	< 2e-16	***
BoatAR	-0.184152	0.075110	-2.452	0.014224	*
BoatAR	0.509684	0.064854	7.859	4.07e-15	***
BoatAR	0.070680	0.169778	0.416	0.677188	
BoatBJ	-0.009975	0.114592	-0.087	0.930632	
BoatCE	-1.017161	0.091078	-11.168	< 2e-16	***
BoatDO	0.204650	0.077992	2.624	0.008698	**
BoatEL	0.441137	0.061597	7.162	8.25e-13	***
BoatER	0.340747	0.063927	5.330	9.92e-08	***
BoatER	0.606965	0.152357	3.984	6.81e-05	***
BoatHA	0.288755	0.076841	3.758	0.000172	***
BoatHA	0.632709	0.057356	11.031	< 2e-16	***
BoatHA	0.340244	0.059172	5.750	9.05e-09	***
BoatHI	0.552715	0.057429	9.624	< 2e-16	***
BoatIN	0.318789	0.070076	4.549	5.42e-06	***
BoatIP	-0.320718	0.086490	-3.708	0.000209	***
BoatJE	0.600765	0.087651	6.854	7.39e-12	***
BoatJE	0.028306	0.243708	0.116	0.907536	
BoatJU	0.338859	0.099073	3.420	0.000627	***
BoatJU	0.227387	0.062530	3.636	0.000277	***
BoatJU	0.240487	0.066373	3.623	0.000292	***
BoatJU	0.051130	0.152182	0.336	0.736892	
BoatJU	-0.200347	0.070116	-2.857	0.004276	**
BoatJA	-0.063490	0.106242	-0.598	0.550116	
BoatKA	0.312928	0.064109	4.881	1.06e-06	***
BoatKA	-0.427706	0.310352	-1.378	0.168179	
BoatKL	0.385940	0.057819	6.675	2.54e-11	***
BoatKU	0.315414	0.097199	3.245	0.001176	**
BoatKU	-0.224244	0.125965	-1.780	0.075058	.
BoatKA	0.162739	0.151815	1.072	0.283752	
BoatL.	0.551273	0.185782	2.967	0.003008	**
BoatL.	0.560980	0.096751	5.798	6.81e-09	***
BoatLA	0.492352	0.075079	6.558	5.60e-11	***
BoatLY	-1.058888	0.147593	-7.174	7.52e-13	***
BoatLA	0.476276	0.207701	2.293	0.021854	*
BoatM.	0.319558	0.119452	2.675	0.007475	**
BoatMA	0.107461	0.057835	1.858	0.063175	.

```
BoatMA               -0.103805   0.163529  -0.635 0.525577    
BoatMA               -0.522305   0.147666  -3.537 0.000406 ***
BoatMA                0.331714   0.126101   2.631 0.008531 ** 
BoatMA               -0.834197   0.532159  -1.568 0.116997    
BoatMI                0.396627   0.061107   6.491 8.74e-11 ***
BoatNA                0.730463   0.063531  11.498  < 2e-16 ***
BoatNA               -0.333356   0.112841  -2.954 0.003138 ** 
BoatNA                0.665495   0.113063   5.886 4.02e-09 ***
BoatNA                0.456851   0.057306   7.972 1.64e-15 ***
BoatNE                0.892651   0.243544   3.665 0.000248 ***
BoatNI               -0.221493   0.074806  -2.961 0.003071 ** 
BoatNI                0.382732   0.088868   4.307 1.66e-05 ***
BoatNI                0.539100   0.059145   9.115  < 2e-16 ***
BoatNI                0.074267   0.056489   1.315 0.188625    
BoatNI                0.266412   0.243170   1.096 0.273276    
BoatNI                0.757144   0.069166  10.947  < 2e-16 ***
BoatNI                0.140118   0.057806   2.424 0.015362 *  
BoatNO               -0.111358   0.131026  -0.850 0.395397    
BoatNO                0.375760   0.068647   5.474 4.46e-08 ***
BoatNU                0.719155   0.085506   8.411  < 2e-16 ***
BoatNU               -0.005521   0.057630  -0.096 0.923684    
BoatNU                0.216925   0.065809   3.296 0.000981 ***
BoatNU                0.069347   0.114491   0.606 0.544722    
BoatOL                0.253304   0.092616   2.735 0.006243 ** 
BoatOV                0.516112   0.089370   5.775 7.81e-09 ***
BoatPA                0.247617   0.310420   0.798 0.425063    
BoatPI                0.493597   0.076115   6.485 9.09e-11 ***
BoatPI                0.085762   0.122747   0.699 0.484753    
BoatPI                -0.197159   0.076774  -2.568 0.010235 *  
BoatQA                0.199492   0.128402   1.554 0.120285    
BoatQI                0.372846   0.063878   5.837 5.40e-09 ***
BoatQU                0.437561   0.147538   2.966 0.003023 ** 
BoatRE                0.365307   0.069338   5.269 1.39e-07 ***
BoatRA               -0.225485   0.270650  -0.833 0.404785    
BoatSA                0.260630   0.223192   1.168 0.242925    
BoatSU                0.599529   0.378258   1.585 0.112988    
BoatSV               -0.494304   0.139957  -3.532 0.000414 ***
BoatTH                0.249582   0.147674   1.690 0.091026 .  
BoatTI               -0.474347   0.378133  -1.254 0.209695    
BoatTU                0.078775   0.057180   1.378 0.168316    
BoatTU                0.735883   0.058252  12.633  < 2e-16 ***
BoatTU                0.851472   0.322186   2.643 0.008229 ** 
BoatUL               -0.081139   0.133197  -0.609 0.542425    
BoatUL                0.444813   0.102012   4.360 1.30e-05 ***
BoatUU                0.250403   0.075802   3.303 0.000957 ***
BoatAA                0.343225   0.117922   2.911 0.003611 ** 
BoatAA               -0.539358   0.532076  -1.014 0.310745    
BoatAA                0.339830   0.058337   5.825 5.79e-09 ***
BoatAA                0.143922   0.075164   1.915 0.055536 .  
BoatAA                0.297889   0.532076   0.560 0.575579    
BoatAA               -1.285920   0.119240 -10.784  < 2e-16 ***
BoatAA                0.292351   0.073806   3.961 7.49e-05 ***
BoatAA                0.622443   0.243728   2.554 0.010662 *  
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.5289 on 19756 degrees of freedom
Multiple R-squared:  0.2518,    Adjusted R-squared:  0.247 
F-statistic: 52.76 on 126 and 19756 DF,  p-value: < 2.2e-16
```

Appendix 6

pernavik gillnet GLM (log-CPUE ~ intercept + Year + Month + Boat)

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

Residuals:
    Min      1Q  Median      3Q     Max 
-4.1530 -0.2806  0.0097  0.3101  1.8067 

Coefficients:
                  Estimate Std. Error t value Pr(>|t|)    
(Intercept)        3.91851    0.11782  33.260  < 2e-16 ***
Year2010          -0.36598    0.06216  -5.888 4.24e-09 ***
Year2011          -0.31670    0.05382  -5.885 4.31e-09 ***
Year2012          -0.21958    0.05363  -4.094 4.32e-05 ***
Year2013          -0.62343    0.05669 -10.998  < 2e-16 ***
Year2014          -0.47370    0.06579  -7.200 7.15e-13 ***
Year2015          -0.27583    0.05695  -4.843 1.33e-06 ***
Year2016          -0.65673    0.05786 -11.350  < 2e-16 ***
Year2017          -0.50116    0.05689  -8.808  < 2e-16 ***
Year2018          -0.41334    0.05735  -7.208 6.77e-13 ***
Month2            -0.09823    0.03873  -2.536 0.011237 *  
Month3             0.03373    0.03960   0.852 0.394332    
Month4             0.15946    0.03872   4.118 3.90e-05 ***
Month11            0.27273    0.04300   6.343 2.51e-10 ***
Month12            0.52770    0.05201  10.146  < 2e-16 ***
BoatAN             1.21730    0.23143   5.260 1.52e-07 ***
BoatAN             1.21989    0.17439   6.995 3.09e-12 ***
BoatAQ             0.61236    0.12942   4.732 2.31e-06 ***
BoatAR             0.64489    0.20251   3.185 0.001461 ** 
BoatEL            -0.63245    0.20321  -3.112 0.001870 ** 
BoatER             0.38349    0.11944   3.211 0.001334 ** 
BoatHA             0.36914    0.10830   3.408 0.000660 ***
BoatHA             0.12488    0.21098   0.592 0.553935    
BoatHI             0.53489    0.10352   5.167 2.50e-07 ***
BoatJU             0.28761    0.11626   2.474 0.013408 *  
BoatJA             0.48430    0.51313   0.944 0.345321    
BoatKL            -0.19809    0.10978  -1.804 0.071230 .  
BoatLA             0.24278    0.36923   0.658 0.510881    
BoatMA             0.52944    0.11104   4.768 1.93e-06 ***
BoatNA            -0.42407    0.51362  -0.826 0.409052    
BoatNA             0.34852    0.30844   1.130 0.258576    
BoatNA             0.34571    0.11551   2.993 0.002779 ** 
BoatNI             0.39753    0.23022   1.727 0.084293 .  
BoatNI            -0.18792    0.20775  -0.905 0.365759    
BoatNI             0.37696    0.10337   3.647 0.000269 ***
BoatNI             0.53766    0.14345   3.748 0.000181 ***
BoatNI             0.09635    0.10345   0.931 0.351752    
BoatNU             0.12524    0.10599   1.182 0.237463    
BoatNU            -0.18279    0.10491  -1.742 0.081515 .  
BoatTU            -0.25136    0.11469  -2.192 0.028459 *  
BoatUL             1.15691    0.15556   7.437 1.25e-13 ***
BoatAA             0.75412    0.10890   6.925 5.05e-12 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.5022 on 4005 degrees of freedom
Multiple R-squared:  0.3524,    Adjusted R-squared:  0.3458 
F-statistic: 53.15 on 41 and 4005 DF,  p-value: < 2.2e-16
```