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Denmark/Greenland Research Report for 2016

Compiled by

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

This report presents information on catch statistics from the commercial Greenland fishery in 2016 at West Greenland. Furthermore, the report gives a brief overview over the research carried out in 2016 by the Greenland Institute of Natural Resources. For further information on GINR survey activities in 2017 visit www.natur.gl. For future research activities, education, collaboration opportunities, infrastructure, logistics and much more, visit Isaaffik – the arctic gateway www.isaaffik.org.

WEST GREENLAND (NAFO SUBAREA 1)**A. Status of the fisheries**

Provisional statistics for the fisheries from 2013 to 2016 are presented in Table 1. Additional information on the status of the fisheries is as follows:

1. Shrimp

The shrimp stock off West Greenland is distributed in NAFO SA 1 (Div. 1A-1F), but a small part of the habitat, and of the stock, intrudes into the eastern edge of Div. 0A (east of 60°30' W). Northern shrimp is found mainly in depths between 150 and 600 m. The stock is assessed as a single population. The Greenland fishery exploits the stock in SA 1, Canada in Div. 0A.

Three fleets, one from Canada and two from Greenland (vessels above and below 75 GRT) have participated in the fishery since the late 1970s. The Canadian fleet and the Greenland offshore fleet (> 75 GRT) have been restricted by areas and quotas since 1977. The fishery by the Greenland coastal fleet (< 75 GRT) was unrestricted until 1997, when quota regulation was imposed. Mesh size is at least 44 mm in Greenland, 40 mm in Canada. To reduce the bycatch, sorting grids have been mandatory for Greenlandic vessels since 2002, but dispensation was given for all vessels under 75 GRT until 2011. Discarding of shrimps is prohibited.



Greenland requires that logbooks should record catch live weight, but for shrimps sold to on-shore processing plants an allowance was made for crushed and broken shrimps in reckoning quota draw-downs, which were based on weight sold, not on weight caught. From 1st of January 2011 the quotas is required to be drawn down by the amount caught without allowances for shrimps landed in poor condition.

Catches of shrimp gradually increased throughout the 1980's and 1990's and reached a level around 157000 tons by 2005-2006. In 2016 the total catches in Subarea 1 were 80127 t of *P. borealis*, of which 78541 were taken by Greenlandic trawlers and 3180 t of *P. montagui*.

The early fishery was concentrated in NAFO Division 1B, but from the late 1980s the fishery spread southwards, - and by 1996–98 Divisions 1C–1F were producing nearly 70% of the catches. Since then the range of the fishery has contracted northwards and since 2007 Divisions 1C-1F have yielded only about 10-20% of the catch. In recent years up to 40% of the catch has been taken in Division 1A alone. This is especially due to increased fishing in the Disko Bay. This is consistent with results from the survey, in which the proportion of survey biomass in Disko Bay has been high since 2005 and the proportion of survey biomass in the northern Areas has been high since 2003.

2. Greenland halibut

The stocks of Greenland halibut in the North West Atlantic are assessed in several management units. Greenland halibut in East Greenland (ICES XIV) is considered to be a part of a stock also distributed in Icelandic and Faroese waters. Greenland halibut in Baffin Bay and Davis Strait, NAFO SA 0 and 1 including inshore Div. 1B-1F is assessed as one stock while the inshore stock in NAFO Div. 1A is considered isolated from the offshore stock and assessed by fjord area (Disko bay, Uummanaq and Upernavik districts).

The total catches of Greenland halibut (*Reinhardtius hippoglossoides*) in NAFO Subarea 1 amounted to 46276 tons in 2016. 15606 t were taken offshore including 615 t taken by longline vessels conducting experimental fishery mainly in the Melville Bay (1A). Greenlandic vessels caught 10019 t (7641 tons in division 1AB + 2378 tons in division 1CD) and other nations caught 5587 t (987 tons in division 1AB + 4600 tons in division 1CD). Inshore landings increased substantially to 30670 tons were taken inshore (28471 in division 1A inshore, 2030 in division 1BCDEF and 134 t in the Qaanaaq district (1A)). The offshore catches were mainly taken by trawlers at the traditional fishinggrounds (Fig. 1), while the inshore catches were taken by small vessels using gillnets and longlines (Fig. 2). Trawl fishery is banned inshore, with the exception of shrimp trawl fishery in the Disko bay and a small area inshore in division 1B. Sorting grids in the shrimp fishery have been mandatory offshore since 2002 with a sorting grid dispensation given to the smaller shrimp vessels operating inshore until 2011.

Commercial fisheries data. CPUE data, based on logbooks reported to the Greenland authorities, were available from four Greenland trawlers. The CPUE for all vessels combined increased in Div. 1AB from 0.82 ton/hr in 2009 to 0.93 ton/hr in 2010 and further to 1.30 ton/hr in 2011 and remained at that level in 2012 and 2013 to increase to 1.55 ton/hr in 2014. In 2015 CPUE was back

at the 2011-2013 level, 1.30 ton/hr. In 2016, CPUE increased to 1.88 ton/hr. The highest level in the time series apart from small trial fisheries in 2000 and 2001.

In Div. 1CD the CPUE for Greenland vessels fishing there has been fluctuating between 0.55 tons/hr and 0.87 ton/hr since 2000.. In 2011 CPUE was 0.87 ton/hr but and it remained at that level in 2012 (0.88 ton/hr) but increased gradually in 2013- 2015 to record high 1.91 to ton/hr in 2015 to decrease to 1.54 tons/hr in 2016

Length frequency samples were available from trawlers fishing in Div. 1AB and Div. 1CD and landbased factories.

3. Cod

Cod (*Gadus morhua*) found in Greenland is a mixture of four separate “stocks” that are defined by their spawning areas: I) offshore West Greenland waters; II) West Greenland fjords cod III) offshore East Greenland and offshore Icelandic waters and IV) inshore Icelandic waters (Therkildsen et al. 2013). Therkildsen et al. (2013) showed a relatively stable spatial and temporal distribution of these spawning stocks during actual spawning events, but the proportional contribution of the different components to commercial and survey catches in different areas, seasons and years and the associated variation is unclear. However, Icelandic inputs are believed to have been responsible for the previous large year classes in Greenland (i.e. 1984 and 2003). A proportion of these cod return to Iceland when reaching maturity.

Previously the stocks have been assessed together. From 2012 the inshore component (West Greenland, NAFO Subarea 1) was assessed separately from all offshore components. From 2016 the offshore components have been assessed separately with the West Greenland offshore component being comprised in the offshore area corresponding to NAFO subdivisions 1A, 1B, 1C, 1D and 1E. The East Greenland offshore component is comprised in the offshore area corresponding to NAFO subdivision 1F in SouthWest Greenland and East Greenland (ICES subarea XIV). The stocks are assessed by the ICES North-Western Working Group (NWWG), see ICES (2016) and ACFM (2016) report.

The coastal fisheries caught in total 34,204 t in 2016 as opposed to 25,272 tons in 2015. The fishery has only been this high in three periods; 1960-1961, 1979-1981 and 1989. The majority of the catches (67%) were taken in Mid Greenland in NAFO Div. 1B and 1C, 17% were fished in Disco Bay (NAFO 1AX) and 15% in NAFO 1D (Nuuk-Fiskenæsset). The catches peak during summer and autumn where the dominant pound net fishery takes place. Several year-classes (ages 4-7) were caught in the inshore fishery and the catches were dominated by the 2011 YC followed by the 2010 YC.

The offshore cod fisheries in South and East Greenland in 2016 caught in total 14,800 tons compared to 15,800 t in 2015. 12,500 tons were fished in East Greenland mainly on “Kleine Bank” and on the edge of Dohrn bank (66oN). The trawlers fished primarily on Dohrn bank during January and switched to Kleine Bank from March – June. The longliners fished primarily on “Kleine Bank” during June and Juli. The remaining 2,300 tons were fished in NAFO area 1F in Southwest Greenland

exclusively by longliners which fished during Januar-June and November-December.

West Greenland was reopened for fishery in 2015 and 2016 with a TAC of 5000 tons. 4,860 t were fished in 2015 and 3,740 t were fished in 2016. The main part of the fishery occurred from June to November mainly around Dana Bank.

4. Salmon

The fishery for Atlantic salmon in Greenland waters started around 1960 and peaked in the early seventies at a catch of more than 2,000t a year. The fishery was quota regulated from 1972, but due to declining stocks, in June 1998 NASCO agreed that no commercial fishery for salmon should be allowed, but that the catch at West Greenland should be restricted to internal consumption. Since then export of salmon from Greenland has been banned by law, and the fishery has been reduced to an internal subsistence fishery within Greenland. After 1997, it has been mandatory to report private catches of salmon. From 2002 licensed fishermen were allowed to sell salmon to institutions, local markets and restaurants only, but in 2012 pressure by fishermen, led to the opening of factory landings for the Greenlandic home market, at a selected few factories. However factory landings were not allowed after 2015. In 2016, total reported catches of 27.1 t were reported (25.6 in West Greenland) but a phonesurvey further estimated non-reported catches of 4 t. Very little salmon was reported from division 1A and it seems clear that very little fishery took place north of Sisimiut.

5. Capelin

The capelin (*Mallotus villosus*) fishery in West Greenland is carried out inshore and in the spawning season only (May-July). Only part of the catches are reported, as capelin are used directly by fishermen for bait and dog food during the capelin season. Reported catches of capelin amounted to 377 tons in 2016 and comprise a mixture of factory landed capelin (345 tons) for bait, human and animal consumption landed from small open boats mostly and logbook reported bycatch in shrimp fisheries (32 tons). The majority of the catches are taken in the northern part of West Greenland (NAFO 1A and 1B).

6. Redfish

Two species of redfish of commercial interest occur off West Greenland inshore and offshore, golden redfish (*Sebastes norvegicus*) and deep-sea redfish (*Sebastes mentella* Travin). Relationships to other North Atlantic redfish stocks are unclear, but the nearest stocks are the demersal and pelagic stocks in East Greenland and the Irminger Sea. Redfish catches in West Greenland are reported as redfish (unspecified, mainly by-catch), golden redfish and beaked redfish (deep-sea redfish).

Demersal redfish

In 2016 logbook reported (by-) catch of redfish were in the offshore fleet by Greenlandic shrimp vessels (1) of un-specified redfish amounted to 1 tons.

Catches reported as golden redfish is a mixture of *Sebastes norvegicus* and *sebastes mentella* taken mainly inshore partly as a bycatch in other fisheries. Reported bycatches of redfish in the offshore fishery decreased substantially to 8 t in 2016. Of these just 1 t was reported by shrimp vessels, 6 tons

were reported by longliners mostly from 1F and 1 t from offshore trawlers. Inshore reported factory landings of redfish amounted to 132 tons (2 t reported as *Norvegicus* and 130 t as *Mentella*).

Pelagic redfish

The aggregations of pelagic redfish *S. mentella* found in the NAFO Convention Area likely belong to the same stock of pelagic redfish from the Irminger Sea. The stock is assessed by ICES (NWWG report 2016) and the assessment covers the pelagic redfish in ICES Divisions Va, Vb, and XIV and in the NAFO Div. 1F, 2H and 2J. The pelagic fishery on *S. mentella* in NAFO Div. 1F started in 1999 and from 2000 - 2009, significant catches with up to 20% of total catches as in 2003 were taken in NAFO Divisions 1F outside Greenlands EEZ and 2J. In 2013, 3113 t were taken in the NAFO 1F, but since then No catches were reported by the Greenlandic fleet in 1F.

7. Grenadiers

There are two species of grenadiers of commercial interest in Greenland, roundnose grenadier (*Coryphaenoides rupestris*) and roughead grenadier (*Macrourus berglax*). Grenadiers are taken as a bycatch in the Greenland halibut fishery. In 2016, 1 t of grenadier (reported as roundnose) landed to factories and 77 t were taken by longline vessels conducting experimental fishery in the Melleville Bay (reported as roundnose).

8. Snow Crab

Snow crab (*Chionoecetes opilio*) is distributed along the west coast of Greenland from division 1A to 1F. The fishery is conducted mainly by Greenland vessels. Since 2004, the crab resource has been managed in 6 areas (from North to South: Upernavik, Uummannaq-Disko Bay, Sisimiut, Maniitsoq-Kangaamiut, Nuuk-Paamiut and Narsaq-Qaqortoq). The fishing fleet is dominated by small vessels (less than 75 GRT), which have exclusive rights for fishing inshore within the basis-line as well as offshore. Large vessels (greater than 75 GRT) may only fish in all offshore areas (outside the basis-line). Total allowable catch (TAC) restrictions have been imposed since 1995, but have only limited the catch in some years and management areas since 2004.

The number of vessels with licenses to participate in the snow crab fishery increased from 1999 to 2002 from approximately 120 vessels to 392 vessels. Since then the number of both large and small vessels have decreased substantially as the abundance of the resource has also declined.

The total catch in NAFO Subarea 1 peaked in 2001 with approximately 15.100 tons. From 2001 to 2006 total landings decreased markedly to 2,200 tons, and since annual landings have remained stable at approx 2.100 tons. (table 1). Most of the landings are based on fishery in the management areas Nuuk-Paamiut, Disko Bay-Uummannaq and Sisimiut and total fishing effort (trap hauls) has declined by more than 90% since 2001 (from 3,416 to about 319 thousand trap hauls during 2001-2014).

9. Wolffish

There are three species of wolffish in subarea 1, Atlantic wolffish (*Anarhichas lupus*), spotted wolffish (*Anarhichas minor*) and Northern wolffish (*Anarhichas denticulatus*). Only the two first are of commercial interest. In the past, these stocks have mainly been taken as a by-catch in the offshore

fisheries targeting Cod, Greenland halibut and shrimp, but occasionally are directly targeted. A directed small-boat fishery still exists in the West Greenlandic fjords mostly targeting spotted wolffish and when quotas for other more valuable species have been fished. In 2016, 185 tons of wolffish were caught. 182 t (mainly spotted wolffish), were landed to factories by open boats and smaller vessels from the fjords (160t) and 25 t were taken as bycatch offshore and partly landed to factories (22t). There are no forecasts for any of the species. The biological advice is for Atlantic wolffish is “no direct fishery” and the advice Spotted wolffish is 1025 t.

10. Scallops

Total catches of Icelandic scallops (*Chlamys islandica*) in NAFO Subarea 1 amounted to 735 tons in 2016. All catches are taken in inshore areas in Div. 1A, 1B, 1C and 1D. New fishing grounds near Sisimiut (1B) was found in 2003 and quotas for two new areas was introduced in 2004.

11. Lumpfish

Total landings of lumpfish (*Cycloperus lumpus*) in NAFO Subarea 1 increased from 1.200 tons in 2000 to almost 9.000 tons in 2003. Catches have remained at this level until 2011 where catches increased to 11.443 tons and. Catches are taken in inshore areas in Div. 1A, 1B, 1C, 1D, 1E and 1F with the majority being caught in 1D. The fishery is conducted over a short time period of one to two months and over a vast coastline from 59° N to 72° N. Total landings of lumpfish roe in 2016 amounted to 743 tons, which is converted to 5030 tons whole weight. The historically used conversion factor is however currently under evaluation. Carcasses and males are increasingly being used instead of being discarded and in 2016, 43t were landed instead of being discarded. Carcasses are however included in the estimate of total landings via the roe to whole weight conversion factor.

12. Greenland cod

Greenland cod (*Gadus ogac*) is mostly by-catch in other fisheries. Greenland cod is mostly used for human consumption as dried or frozen fish for the local Greenlandic market. Total reported landings in 2016 amounted to 19 tons, which is a significant decrease compared to previous years.

13. Arctic char

Arctic char (*Salvinus alpinus*) is taken in gillnets when returning to natal rivers during their annual feeding migrations in coastal areas. Production is mainly for the Greenlandic market, and decreased slightly to 11 tons in 2016. There is no reporting required for private fisheries, but

14. Atlantic halibut

Catches of Atlantic halibut (*Hippoglossus hippoglossus*) peaked in the beginning of the 1960's and the mid 1980's at a level of 600 to 1000 tons per year. In 2016, 8 tons were landed to factories and 1 tons were reported in logbooks from vessels operating offshore.

15. Polar cod / Arctic cod

Reported catches of polar cod (*Boreagadus saida*) is mainly taken as bycatch in the shrimp fishery. In recent years part of the bycatch has been landed and used internally in Greenland, for bait in other fisheries. In 2016, 37 tons were reported as by-catch in the shrimp fishery and of these 34 tons were

landed to factories. In 2016, 2 tons of Arctic cod *Arctogadus glacialis* was also reported in logbooks, but these are likely polar cod.

16. Fish not specified

Fish not specified (FAO: MZZ) are logbook reported by-catch of mixed fish. The by-catch was mainly reported from shrimp trawlers indicating that is mainly small fish of noncommercial interest that are not sorted by the shrimp trawl sorting grids. In total 555 tons of non-specified fish were reported in 2016.

17. Large sharks

Large sharks (FAO: SHX/GSK) are without doubt exclusively Greenland sharks *somniosus microcephalus*. In 2016, 16 tons of large sharks were reported exclusively from trawl fishery indicating that they were taken in fisheries targeting Greenland halibut, cod and redfish. Shrimp-trawls are equipped with sorting grids and no sharks were reported via shrimp logbooks.

B. Special Research Studies

1. Environmental Studies

a. Hydrography Studies

Hydrographic conditions were monitored at all 10 hydrographic standard sections and stations in June/July 2016 across the continental shelf off West Greenland. Three offshore stations have been chosen to document changes in hydrographic conditions off Southwest Greenland. The coastal water showed temperatures above the long-term mean and in the higher end in the area south of the Sisimiut section. After some years with a relative fresh subpolar mode water mass, salinity have returned to the high level end observed over the past 15 years. 2.

Biological Studies

a) Shrimp

A trawl survey is carried in NAFO Subarea 1 and NAFO Division 0A east of 60°30'W, as a contribution to the assessment of the stock of the Northern Shrimp (*Pandalus borealis*). In 2016, 252 stations were fished in 42 fishing days; 156 provided data to the shrimp survey in all strata.

The 2003 peak in total survey and fishable biomasses has been followed by continuous decline, reaching in 2014 the lowest levels since 1997. Total survey biomass increased by 58% over 2014, but were followed by a decrease of 25.2% over 2015. Offshore survey biomass were 28.3% less in 2016 than in 2015, about 62% of its previous maximum in 2010, above the past 5-year mean, but below the 20-year lower quantile. In Disko Bay and Vaigat the survey biomass was 17% less than in 2015, 74% of its past 5-year mean, and below the 20-year lower quantile. Offshore regions comprise 69% of the total survey biomass, and 31% is inshore in Disko Bay and Vaigat. Surveyed regions showed a decrease in survey biomass of about 20% in North (U1-U3) and 54% in the West (W1-W7) compared with 2015 results. Biomass in the southern part area, W8-W9, amounted only 1% of the

total estimated survey biomass in 2016.

The Fishable proportion of the survey biomass was a little above the mean of the foregoing 20 years. While female biomass was close to its 20-year median and proportion of the fishable biomass was high and above the 20-year upper quantiles, in both regions, the biomass of fishable males was low, and the stock appearing deficient in these length classes. Offshore the index of age-2 shrimps was well below its 20-year mean when considered relative to survey biomass, but above its 20-year lower quantiles, while index of age-2 shrimps inshore was slightly above 20-year mean.

b) **Greenland halibut**

Greenland halibut trawl survey in 1CD

A Greenland offshore trawl survey for Greenland halibut was initiated in 1997. The survey is a continuing of the joint Japanese/Greenland survey carried out in the period 1987-95. In 1997-2012 the survey covered NAFO Div. 1C and 1D between the 3 nm line and the midline against Canada at depths between 400 and 1500 m. In 2016 there were made 70 successful hauls in Div. in Div. 1CD. (Jørgensen 2017)

Greenland halibut trawl survey in 1AB offshore

In 2001 the survey area was expanded to include NAFO Div. 1B-1A (to 74°N) and in 2004 a survey was conducted in the northern part of the Baffin Bay (73°N-77°N) (Div. 1A) at depths down to 1500 m. In 2010 was conducted a survey in Div. 1A to 75°30' where 93 successful hauls were made. There has been no deep-sea survey in the area since then.

Shrimp and fish survey

Since 1988, an annual stratified random trawl survey SFW (Shrimp Fish West) has been conducted by the Greenland institute of natural resources on the West Greenlandic shelf between 59°15'N and 72°30'N from the 3 mile limit down to the 600 m and the inshore area of Disko Bay. The main purpose of the survey is to evaluate the biomass and abundance of the Northern shrimp (*Pandalus borealis*), but since 1992 data on fish species have been included and a recruitment index of one year old Greenland halibut is estimated. Since 2008, the survey has also covered the East Greenland area to Dohrn Bank at 67°N. (Nygaard and Jørgensen 2017)

Inshore surveys

A longline survey for Greenland halibut in the inshore areas of Disko Bay, Uummannaq, and Upernavik was initiated in 1993. In 2001 the Disko Bay survey was changed to a gillnet survey. The survey normally covers 4 transects and each gillnet setting is compiled of 4 different nets with differing mesh size (46, 55, 60 and 70 mm halfmesh). from 2013 to 2016 the surveys in Uummannaq and Upernavik gradually changed to gillnet surveys.

c) **Cod survey**

Inshore gillnet survey

A survey using gangs of gill nets with different mesh-sizes has been developed and used since 1985

with the objective of assessing the abundance of age 2 and age 3 cod in the inshore areas of NAFO subdivisions 1B and 1D (historically NAFO subdivision 1F has also been surveyed).

In 2016, the West Greenland inshore gillnet survey for juvenile Atlantic cod was conducted in NAFO area 1B (Sisimiut) and 1D (Nuuk). The combined abundance index for age 2 and 3 was higher than in 2014 and 2015, but lower than the record period of 2010-2013. The decline after the record period is most pronounced in 1B where previous strong cohorts (2009-2011 YCs) are no longer observed in 2014-2016. The index in 1D was among the highest recorded in the time series. The abundance index for all age groups combined for the two areas have increased from 2014. The discrepancy between the index of all age groups and the 2 and 3 year olds is caused by increased numbers of 4, 5 and 6 year old in especially 1B.

Greenland Shrimp and fish survey

The 2016 survey indicated a major decline in the offshore cod stock in West Greenland with 80% in abundance and 86% in biomass compared to 2015. The decline was in all areas (NAFO 1A-1E) but predominant in the southern part of the survey (NAFO 1C-1E). The dominating YC in 2015 (2010 and 2009 YC) declined with 97% leaving younger YC such as the 2012 and 2014 YC to dominate the survey. The 2012 YC is more abundant in the southern part of the survey (NAFO 1C-1E), whereas the 2014 YC is more abundant in the northern part of the survey (NAFO 1A-1B). The numbers of these YC's are however low compared to the 2009 YC. The distribution pattern is similar with previous years with 1 and 2 yr old in the northern part of the survey area, and at age 3 moving further to the south. Cod older than 5 years was in 2014 and 2015 record high in the area, but in 2016 is once again almost absent in West Greenland.

The 2016 survey indicated that the offshore cod stock in East Greenland has decreased further since 2013 in terms of biomass (31% compared to 2015), and is at the level corresponding to the period 2008-2012. The abundance has also declined (56% compared to 2015) and is the lowest observed value in the timeseries indicating young cod are absent in abundant numbers and large cod are contributing to the biomass. As in previous years large and old cod (>7 yrs) are especially observed furthest to the north of the survey area on Dohrn Bank.

In the Greenland Fish and Shrimp trawl survey and gillnet survey in Disco Bay there have been caught higher numbers of cod since 2011 and 2013, respectively. The dominating cohorts are the 2009-2011 YCs as seen in the inshore juvenile cod gillnet survey in 1B.

German survey

An annual stratified random trawl survey has been conducted by Germany since 1982 in West and East Greenland from 67°N in West Greenland to 67°N in East Greenland covering the depthzone between 0-400 m. The main purpose of the survey is to evaluate the biomass and abundance of the Atlantic cod. The survey time series shows two abundance peaks in 1987-1989 caused by the 1984 and 1985 YC and from 2005 and onwards caused by the 2003 and younger Yearclasses.

d) Snow crab

Annual monitoring program (trap survey) was initiated in 1997 in Disko Bay (Div. 1A) and Sisimiut (Div. 1B). Since 2001 annual offshore trap survey has been conducted in more southern areas in West

Greenland (Div. 1C and 1D) but has been canceled since 2010. Large and small meshed conical traps are used. All snow crab were enumerated by sex, carapace width and carapace condition. The chelae height was measured in males and the abdomen width in females, respectively for maturity determination. Ovary contents, clutch weight, sperm load and egg development stage in females was also determined and females were sampled in relation fecundity studies.

The objective of both monitoring programs is to assess the abundance of snow crab in inshore and offshore waters of Greenland. Results from this survey are presented in the Technical Report Series of the Greenland Institute of Natural Research. In general, the stock and recruitment prospects are at a low level in all areas.

A map of GINR research vessel stations for 2016 is given in fig 2.

e) **Marine mammals**

For yearly summaries of studies of marine mammals in Greenland, see the annual reports of the North Atlantic Marine Mammal Commission (NAMMCO).

GREENLAND FISHERY IN OTHER NAFO SUBAREAS

A. Status of the fisheries

In 2016, Greenlandic vessels were not involved in fishery in other NAFO subareas than subarea 1.

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Table 1. Estimated catches (tons) at West Greenland (NAFO Subarea 1).

| NAFO SUBAREA 1 | | Div. 1ABCDEF | | | | Other nations | Greenland |
|--|-----|--------------|---------|---------|---------|---------------|-----------|
| Species | | 2013 | 2014 | 2015 | 2016 | 2016 | 2016 |
| American Plaice | PLA | nd | nd | 1 | <1 | 0 | <1 |
| Arctic char | ACH | 15 | 21 | 17 | 11 | 0 | 11 |
| Atlantic halibut | HAL | 12 | 14 | 13 | 9 | <1 | 8 |
| Atlantic salmon | SAL | 47 | 58 | 61 | 25 | 0 | 25 |
| Atlantic cod | COD | 14542 | 20280 | 33981 | 40279 | 0 | 40279 |
| Capelin | CAP | 262 | 346 | 338 | 377 | 0 | 377 |
| Snow crab | CRQ | 2.162 | 2.157 | 2088 | 2.126 | 0 | 2.126 |
| Greenland cod | GRC | 60 | 35 | 22 | 19 | 0 | 19 |
| Greenland halibut | GHL | 31.513 | 31.513 | 39.709 | 46.276 | 5.587 | 40.689 |
| Roughhead Grenadier | RHG | 33 | 9 | 7 | 0 | 0 | 0 |
| Roundnose Grenadier | RNG | 2 | 6 | 29 | 78 | 16 | 61 |
| Haddock | HAD | 0 | 1 | 11 | 0 | 0 | 0 |
| Lumpfish | LUM | 14.229 | 8.127 | 7.089 | 5.030 | 0 | 5.030 |
| Polar cod | POC | 46 | 158 | 114 | 37 | 0 | 37 |
| Arctic cod | ATG | nd | 146 | 3 | 2 | 0 | 2 |
| Redfish (unspecified - bycatch mainly) | RED | 10 | 16 | 26 | 18 | 3 | 15 |
| Pelagic redfish | REB | 0 | 0 | 2 | 15 | 1 | 14 |
| Redfish golden | REG | 157 | 156 | 244 | 132 | 0 | 132 |
| Saithe | POK | 0 | 0 | 0 | 0 | 0 | 0 |
| Scallops | ISC | 587 | 633 | 799 | 735 | 0 | 735 |
| Greenland Shark | GSK | nd | nd | 63 | 16 | <1 | 16 |
| Shrimp (<i>P.boreallis</i>) | PRA | 92058 | 83224 | 68875 | 80127 | 1582 | 78.541 |
| Shrimp (<i>P.montagui</i>) | AES | 4894 | 1380 | 2024 | 3180 | 0 | 3.180 |
| Skate | SKA | 0 | 1 | 6 | 22 | 15 | 7 |
| Wolffishes | CAT | 852 | 897 | 400 | 188 | 3 | 185 |
| Tusk | USK | - | - | 6 | 17 | 0 | 17 |
| Fish not specified | MZZ | 759 | 758 | 610 | 555 | 19 | 536 |
| Sum total | | 162.240 | 149.936 | 156.538 | 179.274 | 7.226 | 172.042 |

NOTE: Catch figures are provisional.

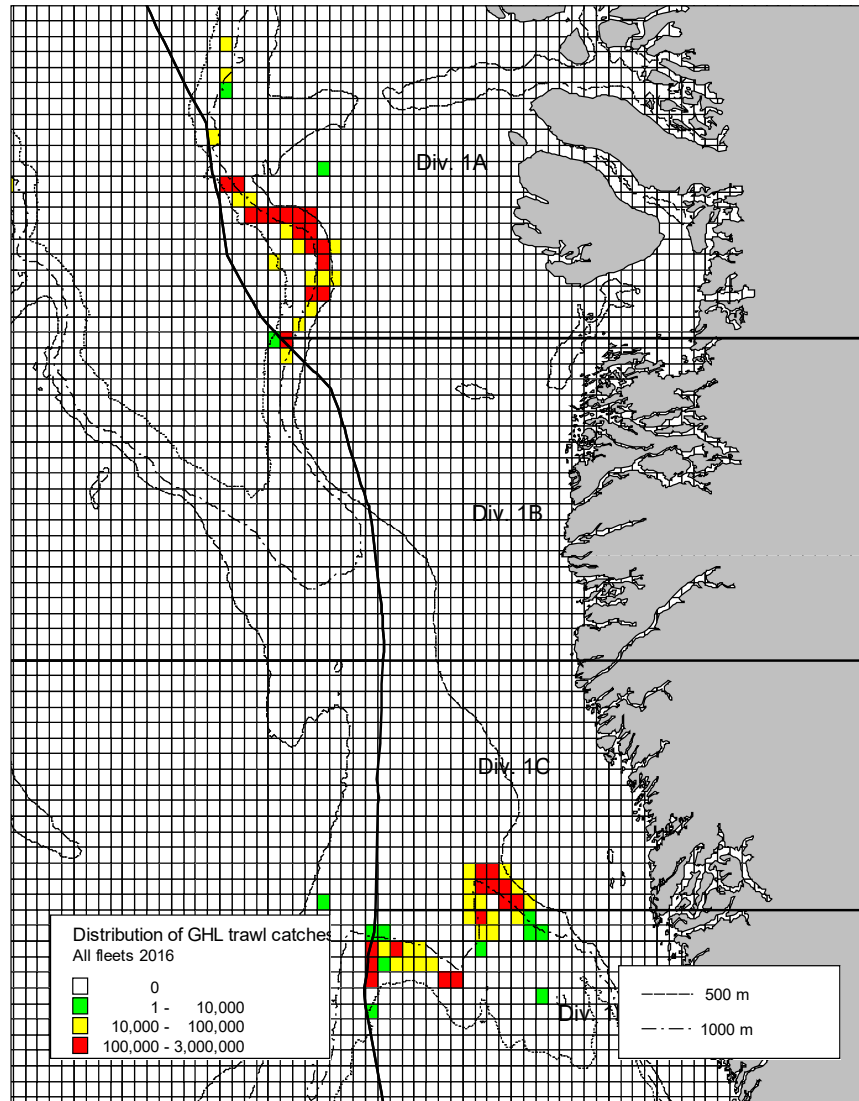


Fig. 1. Distribution of the offshore catches of Greenland halibut in SA 1 in 2015 by statistical square. All nations.

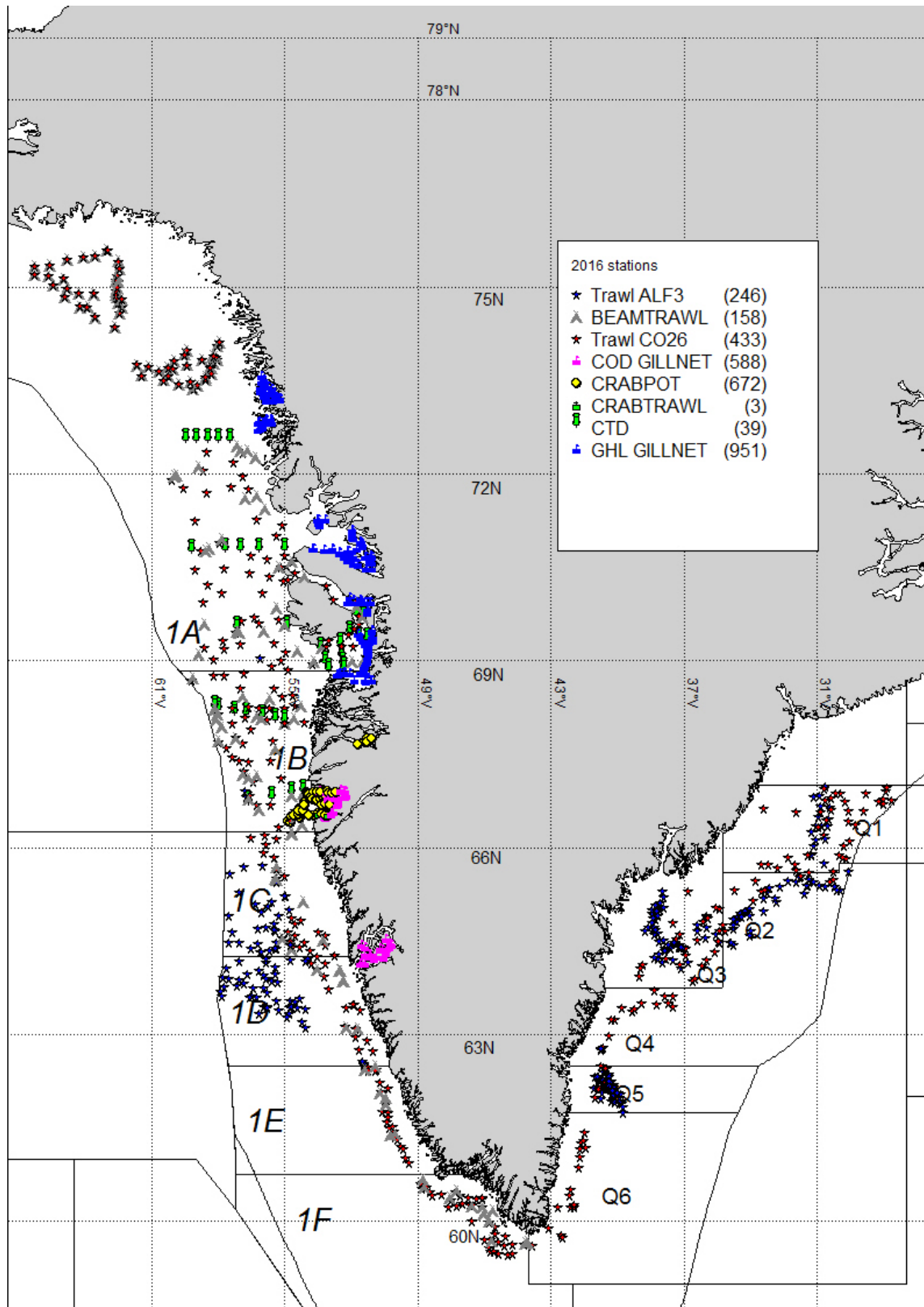


Fig. 2. Distribution of GINR stations from RV Pâmiut and RV Sanna and small boats operating out of Nuuk. Stations from chartered vessels related to pelagic activities and hydrography are not included.