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Denmark/Greenland Research Report for 2014

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This report presents information on catch statistics from the commercial Greenland fishery in 2014. Furthermore, the report gives a brief overview over the research carried out in 2014 by the Greenland Institute of Natural Resources.

WEST GREENLAND (NAFO SUBAREA 1)

A. Status of the fisheries

Provisional statistics for the fisheries from 2011 to 2014 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 late1970s. 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. Sorting grids to reduce by-catch of fish are required in both of the Greenland fleets (but dispensation from this has been granted for all vessels under 75 GRT from 2001 until 2011 for safety reasons) and in the Canadian fleet. Discarding of shrimps is prohibited.

The annual TAC advised for the entire stock for 2004-2007 was 130 000 tons live-caught weight, which was reduced to 110 000 tons for 2008-2010. The advised TAC for 2011 was 120 000 tons. The advised TAC for 2012 was 90 000 tons and the advised TAC for both 2013 and 2014 is 80 000 tons.

The TAC set by the Greenland authorities for SA 1 was 114 570 tons in 2009 and 2010 and 124 000 tons in 2011. The TAC for SA 1 for 2012 was 101 675 tons, which was reduced to 90 000 tons for 2013. The TAC for 2014 for SA1 is 85 000 tons. A TAC of 18 417 tons was set by the Canadian authorities for Div. 0A east of 60°30'W for 2007-2011, which was reduced to 12 750 tons in 2012 and 11 333 tons in 2013.

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.

The logbook recorded catches in 2005 and 2006, around 157 000 tons, were the highest recorded. Since then catches have gradually decreased and reached a catch level of 96225 tons in 2014.

The overall combined index of standardized catch rates (CPUE) for the 3 fleets fluctuated without trend by a factor of 1½ between 1976 and 1987. It then dropped precipitously to the lowest levels in the series in 1989–91, and stayed fairly flat until 1997. In the subsequent years the unified CPUE index increased markedly and remained at a high level for 11 years, reaching the highest level in 2008, but turned downward in 2009. Since the unified CPUE index has been decreasing.

According to logbook records, 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% 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) area. 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 area are assessed as several isolated populations. Greenland halibut in East Greenland (ICES XIV) are considered to be a shared population with Icelandic and Faroese stocks. Greenland halibut in NAFO 1 offshore is a population shared with Canada in NAFO (0AB) and assessed with the inshore stocks in division 1B-F. The inshore stocks in NAFO subarea 1A are considered isolated from the offshore stocks and further divided into local populations and assessed by fjord area (Disko bay, Uummannaq and Upernavik districts).
The total catches of Greenland halibut (*Reinhardtius hippoglossoides*) in NAFO Subarea 1 amounted in to 41,486 tons in 2014, of which 36,319 t were taken by Greenlandic vessels. 14749 tons were taken offshore and of these Greenlandic vessels caught 9580 tons (7315 tons in division 1AB + 2265 tons in division 1CD) and 26739 tons were taken inshore (24789 in division 1A inshore and 1950 in division 1BCDEF and the Qaanaq district north of 1A inshore). Landings in East-Greenlandic fjords amounted to 25 tons in 2014.The offshore catches were exclusively taken by trawlers (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 and on the smaller vessels operating inshore since 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 1.52 t/hr in 2014. The highest level in the time series apart from small trial fisheries in 2000 and 2001.

In Div. 1CD the CPUE for three Greenland vessels fishing there has been fluctuating between 0.55 tons/hr and 0.87 ton/hr since 2000. The CPUE has been rather stable since 2005. In 2011 CPUE was 0.87 ton/hr but and it remained at that level in 2012 (0.88 ton/hr) but increased to 1.00 ton/hr in 2013 and further to1.20 ton/hr in 2014.

Length frequency samples from trawlers fishing in Div. 1AB and Div. 1CD.

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 fiords 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 (2015) and ACFM (2015) report.

In 2013 a management plan was implemented for the offshore cod fishery in Greenland (2014-2016). The management plan is build on the distinction between the inshore and the two offshore stocks (as also recognized by ICES). According to the management plan, management area West (NAFO subdivisions 1A-1E) TAC should be 0 t for the period 2014-2016. The TAC in management area East is 10,000 t/year between 2014 and 2016, though with possible changes if stock developments changes significantly. The TAC for 2015 has however not followed the management plan, as the TAC for management area West (NAFO subdivisions 1B-1E) has been set at 7,000 tons and TAC for management area east (NAFO subdivision 1F and ICES Subarea XIV) has been set at 18,000 tons.

There are no explicit management objectives for the inshore cod in Greenland, and TAC for 2015 has been set at 25,000 tons. The total TAC for cod Greenland is therefore set at 50,000 tons in 2015.

The cod fishery in Greenland consists of two components, an offshore fishery and an inshore fishery. The offshore fishery completely collapsed in 1993. From 1994 to 2001 no directed offshore cod fishery has taken place. In the 2000s catches have gradually increased with maximum catches in 2008 in NAFO subdivision 1F. Between 2008-2010 offshore areal closures were implemented in order to protect the spawning stock in offshore areas. In 2011, 2012 and 2013 an experimental fishery was allowed in order to collect information on the distribution and composition of the cod stock. The catch for the experimental fishery amounted to 7,900 tons in 2014, where the majority has been taken outside the NAFO areas along the Greenland East coast in the ICES Subarea (1,800 tones in NAFO Subdivision 1F).

The Greenland inshore commercial cod fishery in West Greenland started in the 1920s. The fishery gradually developed culminating with catch levels above 30,000 tons annually in the 1960s. Catches then fluctuated between 5,000 and 35,000 tons in the 70s and 80s. The stock size then declined and the catches went below 500 tons in the 1990's. In the 2000s catches gradually increased until the maximum in 2007 and 2008 of 13,000 tons and then declined to around 8,000-11,000 the following years before reaching 13,500 tons again in 2013. The inshore fisheries did not require a license until 2009 and has historically not been constrained by catch ceilings (for 2009 a TAC of 10,000 tons was introduced). In 2014 a TAC of 15,000 tons was allocated to the inshore fisheries, but was raised during the season to 18,500 tons as the quata was being fished. The coastal fleet catches peaks during summer where the dominant pound net fishery takes place.

The offshore Greenland spawning component has not been fished during the last 15 years. Surveys and exploratory fishery now suggest dense concentrations of large spawning cod in East Greenland north of

63°N. The area is limited in distribution compared to the spawning grounds observed historically. Recruitments in the offshore area have improved since the end of the 1990s although it is still low compared to the recruitments before the stock was depleted.

Inshore spawning occurs in many fiords and recruitment has increased in recent years in the areas surveyed. Recruitment is now well above the lows observed in the late 1990's.

A strong 2009 YC is recognized in all areas in Greenland. The origin of this YC is not known, but the YC at age 5 in 2014 was still distributed in the inshore and offshore areas in West Greenland and has not shown the same eastward migration pattern as the previous strong 2003 YC that originated from Iceland.

4. Salmon

Atlantic salmon (*Salmo salar*) migrates to Greenland from most salmon producing countries around the North Atlantic and in Greenland only one spawning population Atlantic salmon is known. The modern fishery for Atlantic salmon fishery in Greenland waters started around 1960 and peaked in the early seventies at a catch level of more than 2000 tons a year. The fishery was quota regulated from 1972, but due to declining stocks NASCO in June 1998, agreed that no commercial fishery for salmon should be allowed, but that the catch at West Greenland should be restricted to *'that amount used for internal consumption in Greenland, which in the past has been estimated at 20 tonnes'*. Since then export of salmon from Greenland has been banned. The salmon caught along the shores of West Greenland are mostly (>90%) non-maturing 1SW salmon, most of which are destined to return to home waters in Europe or North America as MSW fish. In 2014 total reported catches increased to 58 tons including an insignificant amount from East Greenland. A phone survey among licensed fishermen revealed that unreported catches were at least 12 tonnes and likely higher from this segment alone.

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 346 tons in 2014 and comprise a mixture of factory landed capelin (298 tons) for bait, human and animal consumption and logbook bycatch in other fisheries (48 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 2014 logbook reported by-catch by Greenlandic shrimp vessels of un-specified redfish amounted to 10 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. In 2013 reported landings of Golden redfish amounted to 157 tons reported exclusively by open boats and small inshore operating vessels.

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 2014) 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. No catches were reported by the Greenlandic fleet.

7. Grenadiers

There are two species of grenadiers of commercial interest in Greenland, roundnose grenadier (*Coryphaenoides rupestris*) and roughead grenadier (*Macrourus berglax)*. Inshore catches in division 1A (mostly Uummannaq) are roughhead grenadier taken as by-catch in the fishery targeting Greenland halibut amounted to 9 tons, Offshore catches is a mixture of both species taken bycatch in the trawl fishery targeting Greenland halibut and were at 21 tons in 2014 of which 6 tons were reported by Greenlandic vessels. No forecast – the biological advice is "no direct fishery".

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. In 2014 number of permits were 63, where by 42 were active in the snow crab fishery.

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 90% since 2001 (from 3,416 to about 330 thousand trap hauls during 2001-2013).

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. In 2014, 887 tons of wolffish, mainly spotted wolffish, were landed to factories by small boats and smaller vessels mainly from the fjords and small amounts were taken as bycatch offshore in other fisheries (21 t). 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 633 tons in 2014 which is an increase compared to the most recent 5 years. The quota for scallops in 2015 is set at 2.520 tons. 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 2014 amounted to 1211 tons, which is converted to tons whole weight. The historically used conversion factor is however currently under evaluation. Since 2008, lumpfish carcasses have also increasingly been landed (11 t in 2014).

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 2014 amounted to 35 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 and in coastal areas. Production is mainly for the Greenlandic market, and increased slightly to 21 tons in 2014.

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 2014 less than 14 tons were landed to factories and only from small vessels operating inshore and near the coast.

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 Greenlan, for bait in other fisheries. In 2014, 158 tons were reported as by-catch in the shrimp fishery and of these 21 tons were landed to factories. In 2014, Arctic cod *Arctogadus glacialis* was also reported in logbooks (146) and 40 tons were landed to factories, 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 758 tons of non-specified fish were reported in 2014.

B. **Special Research Studies**

1. **Environmental Studies**

a. **Hydrography Studies**

Hydrographic conditions were monitored at 10 hydrographic standard sections in June/July 2014 across the continental shelf off West Greenland. Two offshore stations have been chosen to document changes in hydrographic conditions off Southwest Greenland. Both the coastal water and subpolar mode water showed properties above the long-term mean in the area south of the Sisimiut section.

2. Biological Studies

a) Shrimp

The series of annual stratified trawl surveys, initiated in 1988 and converted to a semi-systematic design in 1999, was continued in 2014. In June and July In 2014, 230 stations were fished in 42 fishing days; 189 provided data to the shrimp survey in all strata. No stations were fished in sub stratum C0 on the West Greenland shelf part of NAFO Subarea 0.

The survey index of total biomass remained fairly stable from 1988 to 1997 (c.v. 18%, downward trend 4%/yr). It then increased by, on average, 19%/yr until 2003, when it reached 316% of the 1997 value.
The 2003 peak in total survey and fishable biomasses has been followed by continuous decline, reaching in 2012 the lowest levels since 1997. Total survey biomass increased by 19% over 2012. While offshore survey biomass increased by 45% over 2012 and is about 60% of its previous maximum, in Disko Bay and Vaigat the surveybiomass declined by 12%, and is 58% of its (2005) maximum and equal to its 2004 value. Offshore regions comprise 65% of the total survey biomass, and 35% is inshore in Disko Bay and Vaigat.

Both inshore and offshore the index of age-2 shrimps is well below its 20-year mean when considered relative to survey biomass. However absolute numbers of age-2 shrimps increased by more than 50% offshore, mainly owing to a significant increase in numbers of 2-age in strata W4, but they declined by 16% over 2012 in Disko Bay.

b) Greenland halibut

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 200 nm line or the midline against Canada at depths between 400 and 1500 m. In 2014 there were made 58 successful hauls in Div. in Div. 1CD. (Jørgensen 2014)

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 was no deep sea survey in the area since then.

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 59º15'N and 72º30'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. Since 2008 the survey also covers the East Greenland area to Dohrn Bank at 67ºN.

A longline survey for Greenland halibut in the inshore areas of Disko Bay, Uummannaq, and Upernavik was initiated in 1993. Since 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). In 2014 a gillnet survey was conducted in Disko Bay and a longline survey was conducted in the Uummannaq and Upernavik areas.

c) Cod survey

Inshore
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. The indices

in all areas (NAFO 1B and 1D) are generally above the levels observed during the 1990's. The West Greenland inshore gillnet survey was in 2014 conducted in the areas NAFO 1B and NAFO 1D. The overall index is higher than the time series mean, but it has declined compared to high recruitment in 2011 and 2012, which was caused by a large 2009 YC that is no longer caught in the survey as 5 yr old. In NAFO 1D, the 2011 YC is the dominating YC at age 3 as was the case at age 2 in 2013. In NAFO 1B, catch rates have decreased substantially following three years of time series high recruitment, and current catch rates are below the time series mean.

Greenland Shrimp and fish survey

An annual stratified random trawl survey has been conducted since 1988 in West Greenland between 59º15'N and 72º30'N and the inshore area of Disko Bay from the 3 mile limit down to the 600 m. 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. Since 2008 the survey also covers the East Greenland area to Dohrn Bank at 67°N.

Since 2008 the survey has been extended to cover East Greenland to 67°N. In the period before 2005 biomass was very low in West Greenland. With the emergence of the 2003 YC biomass increased from 2005, and the overall biomass value for all of Greenland in 2014 was the highest observed in the survey timeseries (since 2008). This increase is especially caused by a large 2009 yearclass, but also due to yearclasses between the 2003 YC and the 2009 YC at intermediate sizes.

The main distribution pattern is that juveniles (ages 1-3 yrs) are predominantly observed in West Greenland (NAFO subdivision 1A-1E), ages 4-6 yrs are predominantly distributed in South Greenland, and older spawning cod are predominantly distributed in East Greenland north of 62°N. West Greenland is therefore presently considered to act as a nursing area for the East Greenland stock component.

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.

The overall findings of the German survey with respect to distribution pattern and state of the stock correspond to the findings in the Greenland survey.

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 Ph.D. project, initiated in 2004, is studying the reproductive potential of snow crab in the coastal waters of West Greenland. The present study will use existing data and data collected in fieldwork surveys in Div. 1A, 1B and 1D. Exploited and non-exploited stocks will be examined as well as temperature effects. Life history traits will be related to aspects of snow crab reproductive potential at three study sites: Disko Bay (north), Sisimiut (middle) and Nuuk (south). The study will contribute to a better understanding of the reproductive potential in the snow crab fisheries resource and provide essential base line information for adaptive management and conservation strategies.

e) **Marine mammals**

Yearly summaries of studies of marine mammals in Greenland can be found at the annual reports of the North Atlantic Marine Mammal Commission (NAMMCO).

GREENLAND FISHERY IN OTHER NAFO SUBAREAS

A. **Status of the fisheries**

In 2014 no Greenlandic vessels has been involved in shrimp fishery at Grand Bank.

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Table 1. Estimated catches (tons) by Greenland vessels at West Greenland (NAFO Subarea 1) in 2009-2012.

		NAFO subarea 1 division 1ABCDEF					
NAFO SUBAREA		GREENLAND fleet					**Other nations**
Species		2010	2011	2012	2013	2014	2014
American Plaice	PLA	0	0	nd	nd	nd	0
Arctic char	ACH	nd	62	70	15	21	0
Atlantic halibut	HAL	6	5	9	12	14	0
Atlantic salmon	SAL	38	28	34	47	58	0
Atlantic cod	COD	12.000	16.100	11.869	15120*	19655	625
Capelin	CAP	90	124	59	262	346	0
Crabs	CRQ	2.363	2.015	1.983	2.162	2.086	0
Greenland cod	GRC	nd	155	130	60	35	0
Greenland halibut	GHL	29.222	29.088	29.365	31.513	36.319	5.167
Roughhead Grenadier	RHG	nd	8	2	33	9	0
Roundnose Grenadier	RNG	nd	8	4	2	6	15
Haddoc	HAD	nd	nd	nd	0	1	0
Lumpfish	LUM	8.482	11.443	11.776	14.229	8.127	0
Polar cod	POC	nd	172	73	46	158	0
Arctic cod	ATG	nd	nd	nd	nd	146	0
Redfish (unspecified - bycatch mainly)	RED	75	46	26	10	16	10
Pelagic redfish	REB	0	0	0	0	0	0
Redfish golden	REG	166	136	128	157	156	0
Saithe	POK	nd	nd	0	0	0	0
Scallops	ISC	398	412	406	587	633	0
Shark	GSK	nd	nd	nd	nd	nd	nd
Shrimp (P.boreallis)	PRA	133.990	123.985	111.450	92058	83224	3401
Shrimp (P.montagui)	AES	2.594	nd	3.124	4894	1380	0
Skate	SKA	0	1	1	0	1	8
Wolffishes	CAT	1.315	779	1.002	852	897	11
Fish not specified	MZZ	nd	678	842	759	758	23
Sum total		190.739	185.245	172.353	147.698	154.046	9.260

1 - Catches include insignificant amounts of cod landed by forgin vessels.
2 - Catch figures are provisional.

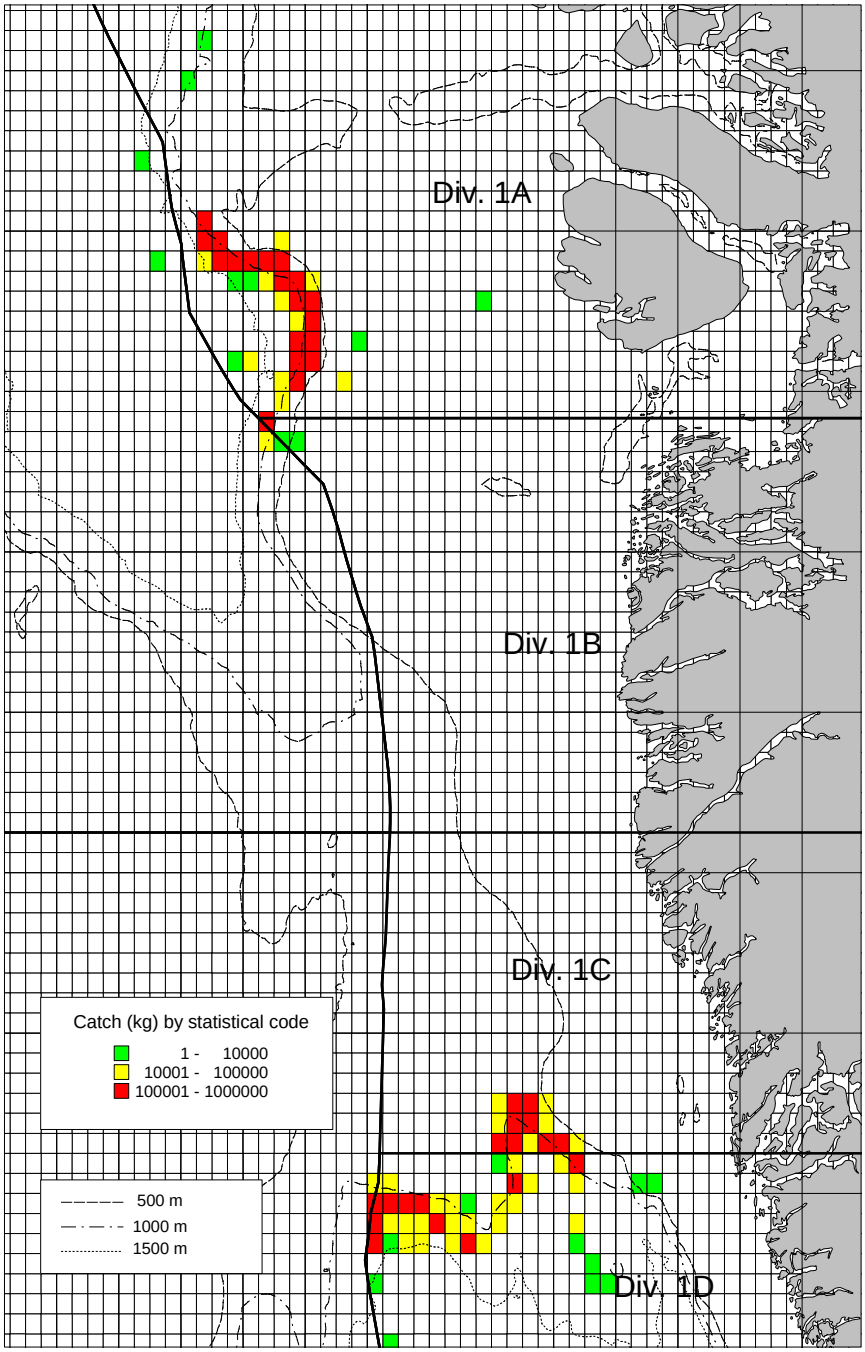

Fig. 1. Distribution of the offshore catches of Greenland halibut in SA 1 in 2014 by statistical square. All nations.

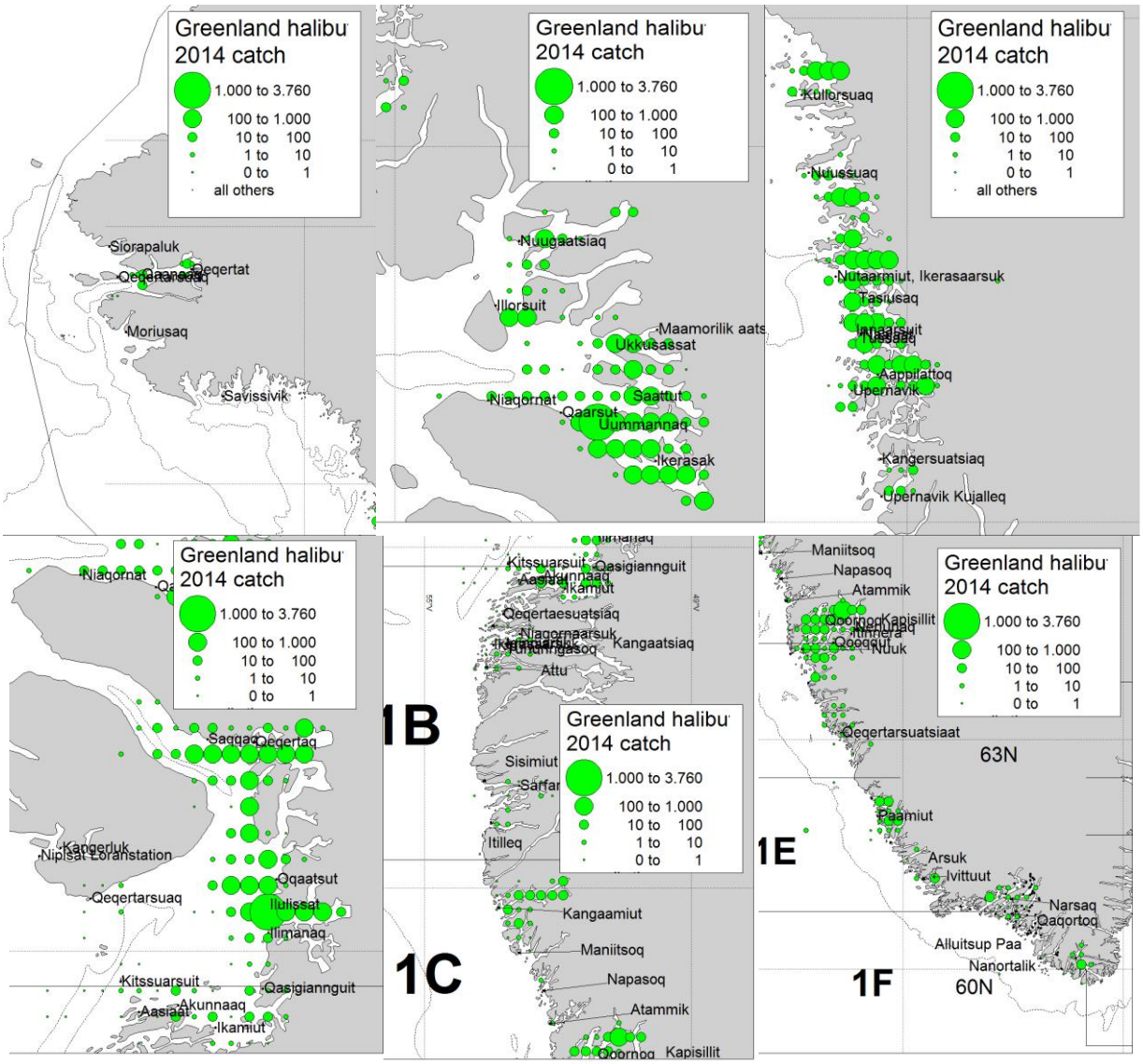

Fig. 2. Distribution of the Inshore catches of Greenland halibut in SA 1 in 2014 by statistical square. Top left – Qaanaq area, Top center - Upernavik area, Top right - Uummannaq fjord. Bottom left – Disko bay, Bottom center - NAFO 1BCD, Bottom right – NAFO 1DEF.