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Results of the Greenland Bottom Trawl Survey for Northern shrimp (*Pandalus borealis*) Off East Greenland (ICES Subarea XIV b), 2008-2010

by

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Abstract

In 2008, 2009 and 2010 the Greenland Institute of Natural Resources has carried out annual stratified-random trawl surveys in East Greenland area in August and September to assess the *Pandalus borealis* stock biomass and obtain information on the size and sex composition of the stock as well as on the environmental conditions. A total number of 53, 97 and 81 valid hauls were made in 2008, 2009 and 2010. The highest offshore densities in 2008-2010 were found in the Northern region Q1, Q2 and Q3. Shrimp densities in the remaining southerly offshore areas (Q4-Q6) showed very low densities in all three years.

The surveys conducted since 2008 shows that the shrimp stock is concentrated in the area north of 65°N. The biomass estimates (in tons) for the entire survey area in 2008, 2009 and 2010 are: 1953, 8446 and 5758 tons.

Introduction

Since 2008 stratified-random trawl surveys has been conducted to assess the stock status of northern shrimp in East Greenland. The main objectives were to obtain indices for stock biomass, abundance, recruitment and demographic composition. The area was also surveyed in 1985-1988 (Norwegian survey) and in 1989-1996 (Greenlandic survey). The historic survey is not directly comparably with the recent survey due to different area coverage, survey technique and trawling gear. However, both showed similar levels of biomass and abundance and the presence of large shrimps. Absence of the smaller male and juvenile shrimp in the survey area stresses that the total area of distribution and recruitment patterns of the stock are still unknown. This document presents results on biomass, abundance and sex-composition of 2008, 2009 and 2010 surveys, and attempt to compare these results with survey conducted in 1989-1996.

Materiel and Methods

The survey is carried out with the same gear and survey protocols as used in West Greenland (Ziemer *et al.*, 2010). Stratification was based on the "Q-areas" used for the East Greenland survey for Greenland halibut (Fig. 1.) The areas are further depth stratified into 0-200 m, 200-400m and 400-600 m zones (area sizes are given in table 1). Total survey area has been estimated to 118.107 km². Standard tow duration was set to 15 minutes at all stations. Towing speed have been about 2.5 knots in all cases.

Stations were randomly selected from historical known trawlable sites, however, a number of the selected positions were not deemed trawl able. A total number of 53, 97 and 81 valid hauls were made in 2008, 2009 and 2010 (table 1). Trawling has been carried out days and nights (24 hours). The influence of light induced nocturnal vertical migrations of shrimp has not been taking into account in the estimation of biomass.

Biomass estimation
For each tow, the catch was divided by the estimated swept area calculated from wingspread and track length to estimate haul by haul biomass density. Mean stratum densities were multiplied by the stratum area to compute stratum biomass, and corresponding coefficients of variation (CV, in %) for each stratum were calculated from the swept area estimate of the biomass (B) and the standard deviation of the density times the stratum area (STD) – see Ziemer et al., 2010 for details.

Demography
From each catch a sample of about 0.5 to 3 kg of shrimp was taken and sorted to species. All specimens of Northern Shrimp were grouped into males, primiparous and multiparous females based on their sexual characteristics according to Allen (1959) and McCrary (1971). The oblique carapace length (CL) of each shrimp in the sub sample was furthermore measured to the nearest 0.1 mm using callipers.

The West Greenland length-weight relationship (0.000578537*ShrimpLength**2.9941)/1000) was used on the East Greenland shrimp sample to estimate the female and males' abundance and proportion of females.

Results and Discussion
Biomass and Stock composition
For all strata biomass estimates have been calculated (Tab.2) on the basis of the nominal swept area. The biomass estimates (in tons) for the entire survey area in 2008, 2009 and 2010 are:

YEAR	BIOMASSE	+/-	PROCENT
2008	1953	1764	90.32
2009	8446	3852	45.61
2010	5758	3928	68.22

The highest off shore densities in 2008-2010 were found in the Northern region Q1, Q2 and Q3 (Tab. 2). Shrimp densities in the remaining southerly offshore areas (Q4-Q6) showed very low densities in all three years.

Tab. 4 shows the biomass of female and males weighted up to total biomass and the abundance of female and males weighted up to total biomass.

The total number of *Pandalus borealis* (males and females) for 2008, 2009 and 2010 was estimated to 206, 909 and 519 million respectively. The abundance of males in 2010 is 286 million or 56% of total abundance compared to a male proportion on 64% and 75% in 2008 and 2009 respectively.

The demographic structure in East Greenland shows large males with 20 mm CL as the smallest (fig. 2). A calculation of the fishable biomass - as in West Greenland - of individuals equal to and above 17 mm CL has therefore not been calculated.

The female biomass estimates was 942, 2.920 and 3.158 tons in 2008, 2009 and 2010 (tab. 4). The female proportion in 2010 was hence the highest despite a total biomass that decease from 8.446 in 2009 to 5.758 tons in 2010 (or a 30% reduction)

Comparison with earlier surveys
Stratified-random trawl surveys have been carried out in Denmark Strait in 1989-1992 and in 1994-1996 the surveys was conducted by a sampling technique based on the Spline Designer Software System. The surveys in the 1980ties and 1990ties were conducted in the shrimp fishing area North of 65N up to 67N. The recent surveys in 2008 to 2010 covered the shelf area from Cap Farwell to Dorhn area up to 67N. To compare the two survey time series only the areas Q1 and Q2 in the 2008-2010 surveys are used. Table 5 list the biomass estimates, numbers of stations, area covered, cod–end mesh size and survey technique from all surveys in 1980ties and 1990ties and the recent surveys from 2008, 2009 and 2010. It is difficult to compare the different surveys due to different survey technique and trawling gear. However the low biomass estimate and the demographic structure in all surveys is very must in correspondence.

Conclusions

The biomass of shrimp in East Greenland in 2010 is estimated to be lower than the 2009 estimate but higher than the 2008 level. The last three years biomass estimate is probably not a reflection of the status of the stock biomass. Absence of the smaller male and juvenile shrimp in the survey area stresses that the total area of distribution and recruitment patterns of the stock are still unknown.

References

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Table 1. Stratum, area and numbers of station in 2008, 2009 and 2010.

Stratum		Areal	2008	2009	2010
Q1	0001-0200	217	0	0	0
	0201-0400	35445	6	21	16
	0401-0600	6975	2	1	5
Q2	0001-0200	93	0	1	2
	0201-0400	7657	4	7	8
	0401-0600	1246	2	3	2
Q3	0001-0200	3363	2	3	4
	0201-0400	22547	5	17	12
	0401-0600	9830	5	5	8
Q4	0001-0200	1337	0	3	1
	0201-0400	7770	5	14	6
	0401-0600	2054	2	3	1
Q5	0001-0200	469	3	2	2
	0201-0400	2785	3	3	2
	0401-0600	1819	1	1	2
Q6	0001-0200	6307	7	5	5
	0201-0400	6130	3	6	4
	0401-0600	2063	3	2	1
Total areas / stations		118107	53	97	81

Table 2. Biomass(tons) and density (t/ km²) in strata (Q1-Q6).

Biomasse (tons)

Year	Q1	Q2	Q3	Q4	Q5	Q6	Total survey	Number of hauls
2008	1,591	7	312	4	24	15	1,953	53
2009	6,945	325	1,157	1	1	17	8,446	97
2010	3,814	55	1,882	1	3	2	5,758	81

Density (t/km²)

Stratum-Areal/Year	Q1	Q2	Q3	Q4	Q5	Q6	Total survey	Number of hauls
	42,637	8,996	35,740	11,161	5,073	14,500	118,107	
2008	37	1	9	0	5	1	17	53
2009	163	36	32	0	0	1	72	97
2010	89	6	53	0	1	0	49	81

Table 3. Biomass in depth strata in tons and percent.

Stratum		Areal	2008	2009	2010
Q1	0001-0200	217	·	·	·
	0201-0400	35445	965	5688	3451
	0401-0600	6975	626	1257	363
Q2	0001-0200	93	·	0	0
	0201-0400	7657	7	325	55
	0401-0600	1246	0	0	0
Q3	0001-0200	3363	0	2	0
	0201-0400	22547	102	874	1770
	0401-0600	9830	209	281	111
Q4	0001-0200	1337	·	0	0
	0201-0400	7770	0	0	0
	0401-0600	2054	4	1	1
Q5	0001-0200	469	0	0	0
	0201-0400	2785	22	0	3
	0401-0600	1819	2	1	0
Q6	0001-0200	6307	0	11	1
	0201-0400	6130	0	4	1
	0401-0600	2063	15	2	1
Total areas / stations		118107	1952	8446	5757

Stratum		Areal	2008	2009	2010
Q1	0001-0200	217	·	·	·
	0201-0400	35445	49.4%	67.3%	59.9%
	0401-0600	6975	32.1%	14.9%	6.3%
Q2	0001-0200	93	·	0%	0%
	0201-0400	7657	0.4%	3.8%	1.0%
	0401-0600	1246	0%	0%	0%
Q3	0001-0200	3363	0%	0%	0%
	0201-0400	22547	5.2%	10.3%	30.7%
	0401-0600	9830	10.7%	3.3%	1.9%
Q4	0001-0200	1337	·	0%	0%
	0201-0400	7770	0%	0%	0%
	0401-0600	2054	0.2%	0%	0%
Q5	0001-0200	469	0%	0%	0%
	0201-0400	2785	1.1%	0%	0.1%
	0401-0600	1819	0.1%	0%	0%
Q6	0001-0200	6307	0%	0.1%	0%
	0201-0400	6130	0%	0%	0%
	0401-0600	2063	0.8%	0%	0%
Total areas / stations		118107	1	1	1

Table 4. Female and male: biomass (tons) and abundance (‘000000). Weighted up to total biomass.

Biomass in tons	Female	Males	Total
2008	942	1011	1,953
2009	2920	5526	8,446
2010	3158	2600	5,758

Biomass in tons	Female	Males
2008	48%	52%
2009	35%	65%
2010	55%	45%

Abundance weighted up ('000000)	Female	Males	Total
2008	74	132	206
2009	226	683	909
2010	230	289	519

Abundance weighted up ('000000)	Female	Males
2008	36%	64%
2009	25%	75%
2010	44%	56%

Table 5. Two Greenlandic surveys from 1989-1996 and 2008-2010 for comparision.

Q1-Q2 (North for 65)	Biomass	No. Station	Area	Cod-end	Surveymethode
1989	4,879	87	33,971	44	Stratified random technique
1990	1,860	99	33,971	44	Stratified random technique
1991					
1992	1,044	37	43,439	44	Stratified random technique
1993					
1994	3,800	69		20	Spline Designer Designer
1995	4,558	72		20	Spline Designer Designer
1996	No estimate	40		20	Spline Designer Designer
1997					
1998					
1999					
2000					
2001					
2002					
2003					
2004					
2005					
2006					
2007					
2008	1,598	20	51,633	20	Stratified random technique
2009	7,270	47	51,633	20	Stratified random technique
2010	3,869	45	51,633	20	Stratified random technique

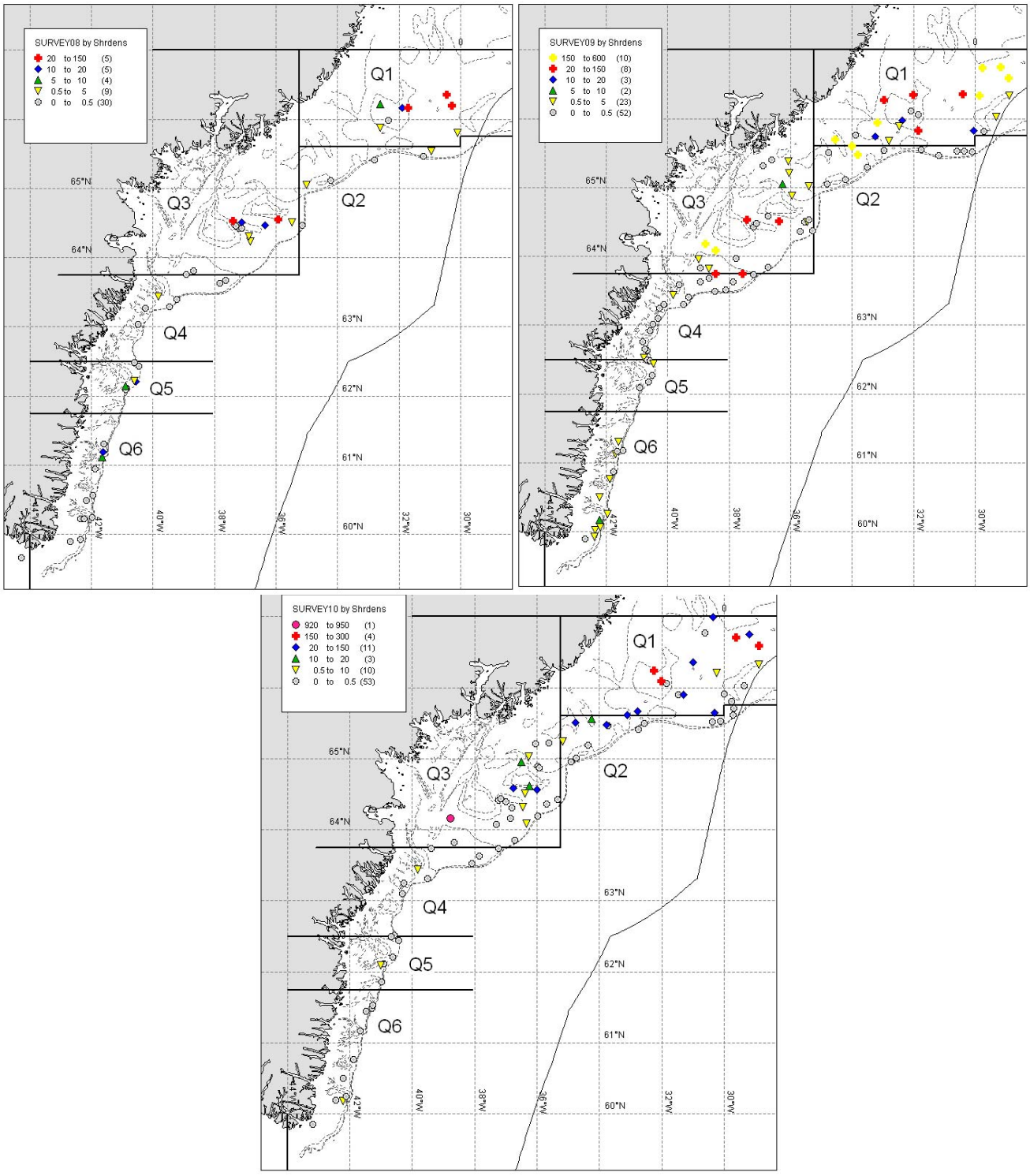

Fig.1. Shrimp densitet in surveyarea in 2008, 2009 and 2010.

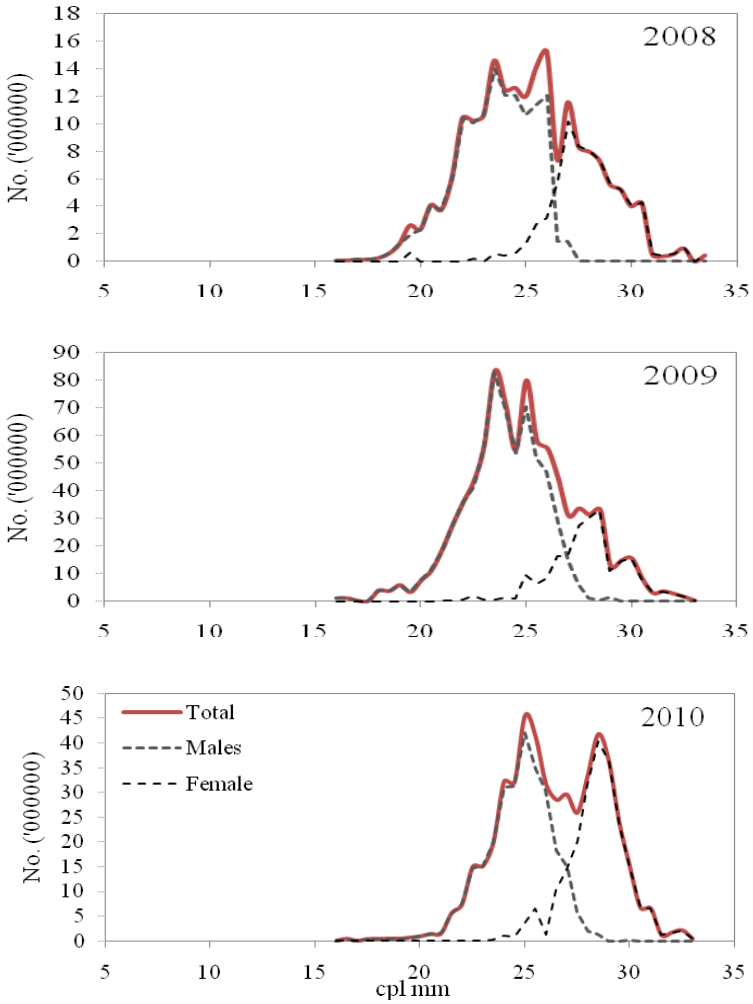

Fig.2. Numbers of shrimp by length group (CL)in the total survey area in 2008, 2009 and 2010, based on pooling of samples weighted by catch and stratum area.

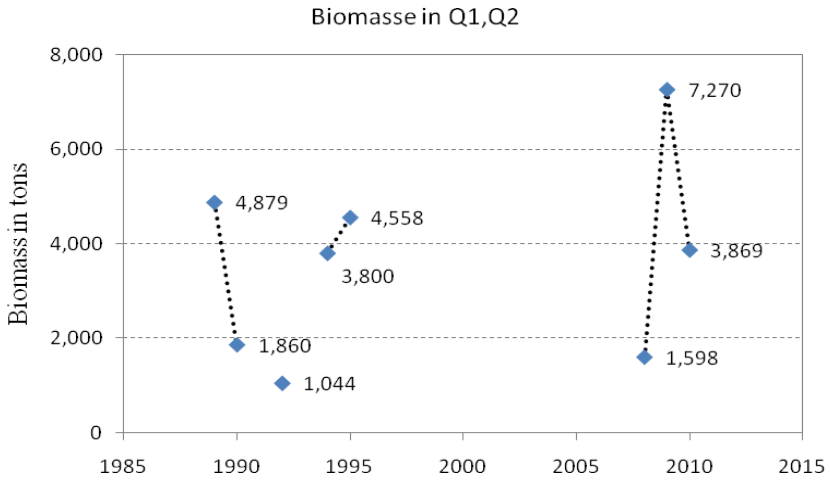

Fig.3. Biomass from two different surveys series from 1989-1995 and 2008-2010 for the areas North of 65°N and stratumarea Q1 and Q2 for comparison.

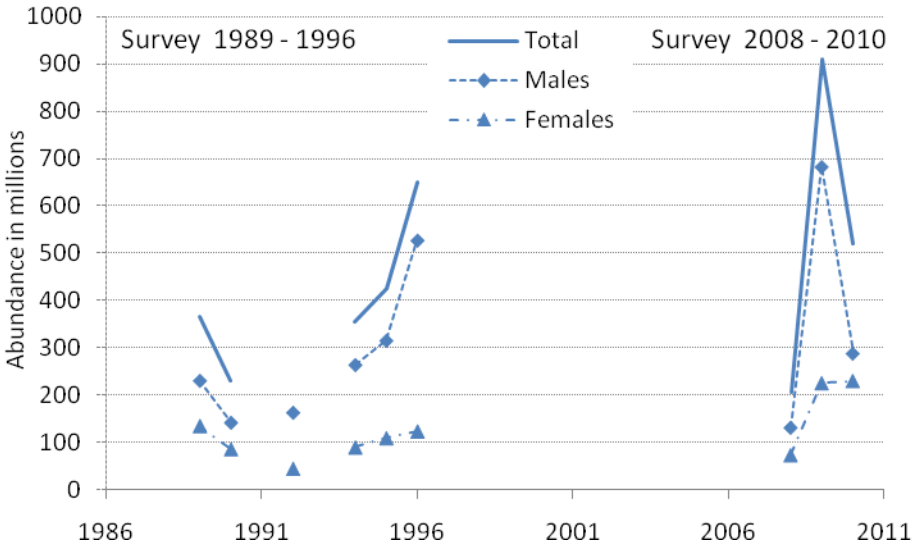

Fig. 4. Abundance of males and females in two different surveys series from 1989-1995 and 2008-2010 for the areas North of 65°N.

Appendix 1: data from 2010, 2009 and 2008

SURVEY 2010 STATION LIST, PAAMIUT

Stratum & Station number	FixPos-identifier	Mean depth	Haul duration	P.bor. catch kg.
Stratum: Q1-2				
2010-PA-04-118	Q102010400	287.5	15	0.000
2010-PA-04-104	JS114	363.0	15	0.000
2010-PA-04-117	JT101	319.5	15	0.011
2010-PA-04-103	JT114	320.0	15	0.000
2010-PA-04-084	JV113	322.0	15	0.000
2010-PA-04-111	JX107	356.5	15	7.288
2010-PA-04-090	KG110	297.5	15	2.414
2010-PA-04-114	JZ104	292.0	15	4.113
2010-PA-04-113	Q102010400	270.5	15	7.350
2010-PA-04-085	JZ115	279.0	15	0.000
2010-PA-04-115	Q102010400	297.5	15	4.637
2010-PA-04-086	KB117	282.5	14	0.078
2010-PA-04-087	KE117	319.5	15	8.852
2010-PA-04-089	KF114	313.0	15	8.394
2010-PA-04-088	KF123	353.0	15	4.725
2010-PA-04-091	KH113	368.5	15	4.737
Stratum: Q1-4				
2010-PA-04-105	JT101	416.5	15	0.000
2010-PA-04-110	JV107	421.5	15	2.387
2010-PA-04-099	Q104010600	406.0	15	3.057
2010-PA-04-095	Q104010600	500.5	15	0.141
2010-PA-04-093	Q104010600	455.5	15	3.670
Stratum: Q2-0				
2010-PA-05-022	JR097	172.5	15	0.000
2010-PA-05-021	JS098	183.0	15	0.000
Stratum: Q2-2				
2010-PA-04-068	Q202010400	325.5	15	0.000
2010-PA-05-025	Q202010400	281.5	15	0.060
2010-PA-04-069	JN095	337.0	15	0.000
2010-PA-04-077	JR103	312.5	15	0.000
2010-PA-05-024	Q202010400	344.0	15	1.670
2010-PA-05-023	Q202010400	285.5	15	0.342
2010-PA-04-083	JS111	384.5	15	0.000
2010-PA-04-106	JR112	368.5	15	0.000
Stratum: Q2-4				
2010-PA-04-067	Q204010600	454.0	15	0.000
2010-PA-04-076	JR102	492.0	15	0.000
Stratum: Q3-0				
2010-PA-04-061	JF084	151.5	15	0.000
2010-PA-05-043	JF084	156.5	15	0.000
2010-PA-05-029	JL089	184.0	15	0.009
2010-PA-05-030	JK089	185.0	15	0.000
Stratum: Q3-2				
2010-PA-04-047	JA078	241.5	15	0.000
2010-PA-04-053	Q302010400	312.0	14	0.000
2010-PA-04-054	JD088	369.0	15	0.000
2010-PA-05-044	JE077	339.0	15	28.179
2010-PA-04-064	Q302010400	378.0	15	0.015
2010-PA-04-066	JF090	351.0	15	0.141
2010-PA-04-063	JG085	249.5	16	0.022
2010-PA-05-036	JG091	377.5	15	0.000
2010-PA-05-040	Q302010400	328.0	15	0.226
2010-PA-05-028	JM087	234.0	15	0.052
2010-PA-05-027	JN088	236.5	15	0.000
2010-PA-05-026	Q202010400	226.5	15	0.000
Stratum: Q3-4				
2010-PA-04-056	JD083	459.0	15	0.000
2010-PA-04-055	JE085	416.0	15	0.016
2010-PA-04-065	JE089	447.5	15	0.000
2010-PA-05-042	Q304010600	424.5	15	0.000
2010-PA-05-041	JH086	452.0	15	0.799
2010-PA-05-038	JH088	582.5	15	0.641
2010-PA-05-037	JH089	530.5	15	1.113
2010-PA-05-031	JL086	427.5	15	0.663
Stratum: Q4-0				
2010-PA-04-043	HT071	190.0	15	0.000
Stratum: Q4-2				
2010-PA-04-037	Q402010400	219.0	15	0.000
2010-PA-04-042	HR071	251.5	15	0.000
2010-PA-04-044	HT075	369.0	15	0.000
2010-PA-04-049	HX080	223.0	15	0.000
2010-PA-04-046	HZ075	258.5	8	0.000
2010-PA-04-050	HZ081	219.5	15	0.000
2010-PA-04-051	HZ084	312.5	7	0.000
Stratum: Q4-4				
2010-PA-04-045	HV073	489.0	15	0.015
Stratum: Q5-0				
2010-PA-04-019	HH069	192.0	14	0.007
2010-PA-04-035	HK070	160.0	15	0.000
Stratum: Q5-2				
2010-PA-04-017	Q502010400	334.5	15	0.000
2010-PA-04-018	HG069	228.5	15	0.062
Stratum: Q5-4				
2010-PA-04-021	Q504010600	422.0	15	0.008
2010-PA-04-038	HK071	458.0	15	0.000
Stratum: Q6-0				
2010-PA-04-001	GH060	164.0	16	0.000
2010-PA-04-004	GL063	166.5	15	0.006
2010-PA-04-005	Q600010200	184.0	14	0.017
2010-PA-04-009	GP064	176.5	15	0.004
2010-PA-04-012	HA067	191.5	16	0.000
Stratum: Q6-2				
2010-PA-04-006	GL064	292.5	8	0.006
2010-PA-04-010	GS065	206.0	15	0.000
2010-PA-04-013	HB067	222.5	9	0.000
2010-PA-04-014	HB068	235.0	15	0.000
Stratum: Q6-4				
2010-PA-04-011	GX066	503.5	15	0.012

'

STRATUM	SQKM	BIOMASS IN STRATA				
SFE'2010,		TONS	HAULS,	Std	CV	
AREA Q1	35662					
201-400 M		3451.3,	16,	3579.2,	103.7,	
AREA Q1	6975					
401-600 M		363.1,	5,	323.1,	89.0,	
AREA Q2	93					
001-200 M		0.0,	2,	0.0,	.,	
AREA Q2	7657					
201-400 M		55.4,	8,	122.7,	221.5,	
AREA Q2	1246					
401-600 M		0.0,	2,	0.0,	.,	
AREA Q3	3363					
001-200 M		0.3,	4,	0.5,	200.0,	
AREA Q3	22547					
201-400 M		1769.8,	12,	6031.7,	340.8,	
AREA Q3	9830					
401-600 M		111.5,	8,	122.8,	110.2,	
AREA Q4	1337					
001-200 M		0.0,	1,	.,	.,	
AREA Q4	7770					
201-400 M		0.0,	7,	0.0,	.,	
AREA Q4	2054					
401-600 M		1.0,	1,	.,	.,	
AREA Q5	469					
001-200 M		0.1,	2,	0.1,	141.4,	
AREA Q5	2785					
201-400 M		3.0,	2,	4.2,	141.4,	
AREA Q5	1819					
401-600 M		0.2,	2,	0.3,	141.4,	
AREA Q6	6307					
001-200 M		1.2,	5,	1.6,	130.2,	
AREA Q6	6130					
201-400 M		0.6,	4,	1.2,	200.0,	
AREA Q6	2063					
401-600 M		0.7,	1,	.,	.,	

STRATUM	SQKM	DENSITY IN STRATA				
		KG	HAULS,	Std	CV	
AREA Q1	35662					
201-400 M		96.8,	16,	100.4,	103.7,	
AREA Q1	6975					
401-600 M		52.1,	5,	46.3,	89.0,	
AREA Q2	93					
001-200 M		0.0,	2,	0.0,	.,	
AREA Q2	7657					
201-400 M		7.2,	8,	16.0,	221.5,	
AREA Q2	1246					
401-600 M		0.0,	2,	0.0,	.,	
AREA Q3	3363					
001-200 M		0.1,	4,	0.1,	200.0,	
AREA Q3	22547					
201-400 M		78.5,	12,	267.5,	340.8,	
AREA Q3	9830					
401-600 M		11.3,	8,	12.5,	110.2,	
AREA Q4	1337					
001-200 M		0.0,	1,	.,	.,	
AREA Q4	7770					
201-400 M		0.0,	7,	0.0,	.,	
AREA Q4	2054					
401-600 M		0.5,	1,	.,	.,	
AREA Q5	469					
001-200 M		0.1,	2,	0.2,	141.4,	
AREA Q5	2785					
201-400 M		1.1,	2,	1.5,	141.4,	
AREA Q5	1819					
401-600 M		0.1,	2,	0.2,	141.4,	
AREA Q6	6307					
001-200 M		0.2,	5,	0.2,	130.2,	
AREA Q6	6130					
201-400 M		0.1,	4,	0.2,	200.0,	
AREA Q6	2063					
401-600 M		0.3,	1,	.,	.,	

REGION	BIOMASSE	+/-	PROCENT
ØSTGRØNLAND	5758	3928	68.22

SURVEY 2009 STATION LIST, PAAMIUT

Stratum & Station number	FixPos-identifier	Mean depth	Haul duration	P.bor. catch kg.
Q1-2				Stratum:
2009-PA-05-011	Q22-4XIVB	248.5	15	0.165
2009-PA-05-010	Q12-4XIVB	308.0	15	14.374
2009-PA-05-013	Q12-4XIVB	306.0	15	2.341
2009-PA-04-062	Q12-4XIVB	314.5	15	0.034
2009-PA-05-012	Q12-4XIVB	306.0	15	0.600
2009-PA-05-003	Q12-4XIVB	285.0	15	8.207
2009-PA-04-080	Q12-4XIVB	354.0	15	0.443
2009-PA-04-079	Q12-4XIVB	321.5	15	0.000
2009-PA-05-007	Q12-4XIVB	326.0	15	9.116
2009-PA-04-063	Q12-4XIVB	265.0	15	0.338
2009-PA-05-004	Q12-4XIVB	223.5	15	0.098
2009-PA-04-064	Q12-4XIVB	284.5	15	4.796
2009-PA-04-065	Q12-4XIVB	271.5	10	4.962
2009-PA-04-078	Q12-4XIVB	287.5	18	0.022
2009-PA-05-006	Q12-4XIVB	324.5	14	0.782
2009-PA-05-005	Q12-4XIVB	317.0	15	2.973
2009-PA-04-069	Q12-4XIVB	338.0	15	11.427
2009-PA-04-070	Q12-4XIVB	280.5	15	0.088
2009-PA-04-071	Q12-4XIVB	314.0	15	15.807
2009-PA-04-073	Q12-4XIVB	306.0	15	20.601
2009-PA-04-072	Q12-4XIVB	356.0	15	11.976
Stratum: Q1-4				
2009-PA-04-068	Q14-6XIVB	465.0	15	6.032
Stratum: Q2-0				
2009-PA-04-060	Q20-2XIVB	181.5	15	0.007
Stratum: Q2-2				
2009-PA-04-058	Q22-4XIVB	353.5	15	0.000
2009-PA-05-021	Q22-4XIVB	328.0	15	0.000
2009-PA-05-009	Q22-4XIVB	345.0	15	9.336
2009-PA-05-014	Q22-4XIVB	293.0	15	0.015
2009-PA-04-095	Q22-4XIVB	390.5	15	0.000
2009-PA-04-096	Q22-4XIVB	388.0	15	0.000
2009-PA-05-001	Q22-4XIVB	372.5	15	0.000
Stratum: Q2-4				
2009-PA-04-061	Q24-6XIVB	415.5	15	0.000
2009-PA-04-094	Q24-6XIVB	436.0	15	0.000
2009-PA-04-093	Q24-6XIVB	443.5	15	0.007
Stratum: Q3-0				
2009-PA-04-049	Q30-2XIVB	153.0	15	0.000
2009-PA-05-035	Q30-2XIVB	180.5	15	0.042
2009-PA-05-040	Q30-2XIVB	168.5	15	0.000
Stratum: Q3-2				
2009-PA-05-050	Q32-4XIVB	238.0	15	0.000
2009-PA-05-051	Q32-4XIVB	240.0	15	0.031
2009-PA-05-062	Q32-4XIVB	259.5	9	0.000
2009-PA-05-060	Q32-4XIVB	312.5	15	0.000
2009-PA-05-049	Q32-4XIVB	266.0	15	0.043
2009-PA-05-053	Q32-4XIVB	381.0	15	0.703
2009-PA-05-048	Q32-4XIVB	322.5	15	8.804
2009-PA-05-047	Q32-4XIVB	344.0	15	9.209
2009-PA-05-028	Q32-4XIVB	352.0	14	0.000
2009-PA-05-027	Q32-4XIVB	375.5	15	0.000
2009-PA-04-051	Q32-4XIVB	271.0	15	0.000
2009-PA-04-053	Q32-4XIVB	329.0	15	1.257
2009-PA-05-036	Q32-4XIVB	230.5	14	0.274
2009-PA-05-034	Q32-4XIVB	282.0	15	0.141
2009-PA-05-037	Q32-4XIVB	235.5	15	0.016
2009-PA-05-039	Q32-4XIVB	204.0	15	0.006
2009-PA-05-038	Q32-4XIVB	225.5	9	0.018
Stratum: Q3-4				
2009-PA-05-029	Q34-6XIVB	411.0	15	0.000
2009-PA-04-050	Q34-6XIVB	428.5	15	2.881
2009-PA-04-052	Q34-6XIVB	441.0	15	2.188
2009-PA-05-030	Q34-6XIVB	431.0	15	0.022
2009-PA-05-031	Q34-6XIVB	413.5	15	0.000
Q4-0				Stratum:
2009-PA-04-034	Q40-2XIVB	176.5	15	0.000
2009-PA-04-037	Q40-2XIVB	191.0	15	0.014
2009-PA-04-040	Q40-2XIVB	189.0	15	0.000
Stratum: Q4-2				
2009-PA-04-035	Q42-4XIVB	255.5	15	0.010
2009-PA-04-036	Q42-4XIVB	232.0	15	0.000
2009-PA-04-038	Q42-4XIVB	217.5	15	0.000
2009-PA-04-039	Q42-4XIVB	260.5	15	0.005
2009-PA-04-041	Q42-4XIVB	213.5	15	0.000
2009-PA-05-072	Q42-4XIVB	366.5	15	0.000
2009-PA-05-071	Q42-4XIVB	317.0	15	0.000
2009-PA-05-065	Q42-4XIVB	280.5	15	0.000
2009-PA-05-064	Q42-4XIVB	231.0	15	0.000
2009-PA-05-067	Q42-4XIVB	212.5	15	0.000
2009-PA-05-068	Q42-4XIVB	258.5	15	0.000
2009-PA-05-052	Q32-4XIVB	233.5	10	0.000
2009-PA-05-063	Q42-4XIVB	217.5	15	0.000
2009-PA-05-061	Q42-4XIVB	311.5	15	0.000
Stratum: Q4-4				
2009-PA-05-075	Q44-6XIVB	589.0	15	0.000
2009-PA-05-070	Q44-6XIVB	488.0	15	0.032
2009-PA-05-069	Q44-6XIVB	498.0	15	0.006
Q5-0				Stratum:
2009-PA-04-014	Q50-2XIVB	169.5	15	0.000
2009-PA-04-032	Q50-2XIVB	161.5	15	0.000
Q5-2				Stratum:
2009-PA-04-015	Q52-4XIVB	377.5	15	0.000
2009-PA-04-016	Q52-4XIVB	386.0	15	0.000
2009-PA-04-033	Q52-4XIVB	201.0	15	0.000
Stratum: Q5-4				
2009-PA-05-077	Q54-6XIVB	417.5	11	0.013
Stratum: Q6-0				
2009-PA-04-001	GJ062	183.0	15	0.000
2009-PA-04-003	Q60-2XIVB	189.0	10	0.023
2009-PA-04-005	GL064	191.0	15	0.132
2009-PA-04-007	GP064	177.5	15	0.028
2009-PA-04-012	GZ066	176.0	15	0.040
Q6-2				Stratum:
2009-PA-04-002	GJ063	228.0	15	0.018
2009-PA-04-004	Q62-4XIVB	241.0	15	0.016
2009-PA-04-006	GM065	323.5	15	0.040
2009-PA-04-008	Q62-4XIVB	207.0	15	0.026
2009-PA-04-009	GT066	244.0	15	0.006
2009-PA-04-011	Q62-4XIVB	340.0	15	0.000
Stratum: Q6-4				
2009-PA-04-010	GX066	514.0	15	0.027
2009-PA-04-013	Q64-6XIVB	504.5	15	0.038

STRATUM	SQKM	BIOMASS IN STRATA			
'SFE'2009					
		TONS	HAULS	Std	CV
AREA Q1	35662				
201-400 M		5688.0	21	6750.4	118.7
AREA Q1	6975				
401-600 M		1257.0	1	.	.
AREA Q2	93				
001-200 M		0.0	1	.	.
AREA Q2	7657				
201-400 M		324.9	7	858.0	264.1
AREA Q2	1246				
401-600 M		0.1	3	0.1	173.2
AREA Q3	3363				
001-200 M		1.5	3	2.6	173.2
AREA Q3	22547				
201-400 M		874.4	17	2146.6	245.5
AREA Q3	9830				
401-600 M		281.1	5	382.9	136.2
AREA Q4	1337				
001-200 M		0.2	3	0.4	173.2
AREA Q4	7770				
201-400 M		0.3	14	0.7	260.1
AREA Q4	2054				
401-600 M		0.8	3	1.0	134.8
AREA Q5	469				
001-200 M		0.0	2	0.0	.
AREA Q5	2785				
201-400 M		0.0	3	0.0	.
AREA Q5	1819				
401-600 M		1.2	1	.	.
AREA Q6	6307				
001-200 M		11.2	5	12.5	111.3
AREA Q6	6130				
201-400 M		3.6	6	3.2	87.6
AREA Q6	2063				
401-600 M		2.2	2	0.0	1.9

STRATUM	SQKM	DENSITY IN STRATA			
'SFE'2009					
		KG	HAULS	Std	CV
AREA Q1	35662				
201-400 M		159.5	21	189.3	118.7
AREA Q1	6975				
401-600 M		180.2	1	.	.
AREA Q2	93				
001-200 M		0.2	1	.	.
AREA Q2	7657				
201-400 M		42.4	7	112.1	264.1
AREA Q2	1246				
401-600 M		0.1	3	0.1	173.2
AREA Q3	3363				
001-200 M		0.4	3	0.8	173.2
AREA Q3	22547				
201-400 M		38.8	17	95.2	245.5
AREA Q3	9830				
401-600 M		28.6	5	38.9	136.2
AREA Q4	1337				
001-200 M		0.2	3	0.3	173.2
AREA Q4	7770				
201-400 M		0.0	14	0.1	260.1
AREA Q4	2054				
401-600 M		0.4	3	0.5	134.8
AREA Q5	469				
001-200 M		0.0	2	0.0	.
AREA Q5	2785				
201-400 M		0.0	3	0.0	.
AREA Q5	1819				
401-600 M		0.7	1	.	.
AREA Q6	6307				
001-200 M		1.8	5	2.0	111.3
AREA Q6	6130				
201-400 M		0.6	6	0.5	87.6
AREA Q6	2063				
401-600 M		1.1	2	0.0	1.9

REGION	BIOMASSE	+/-	PROCENT
ØSTGRØNLAND	8446	3852	45.61

SURVEY 2008 STATION LIST, PAAMIUT

Stratum & Station number	FixPos-identifier	Mean depth	Haul duration	P.bor. catch kg.
Stratum: Q1-2				
2008-PA-04-058	Q12-4XIVB	382.0	15	0.039
2008-PA-04-051	Q12-4XIVB	320.5	15	0.028
2008-PA-04-052	Q12-4XIVB	268.0	15	0.009
2008-PA-04-053	Q12-4XIVB	291.0	15	0.878
2008-PA-04-054	Q12-4XIVB	377.0	15	0.478
2008-PA-04-055	Q12-4XIVB	287.0	15	4.286
Stratum: Q1-4				
2008-PA-05-007	Q14-6XIVB	416.0	15	1.270
2008-PA-05-006	Q1	461.5	15	5.451
Stratum: Q2-2				
2008-PA-05-037	Q2	385.5	15	0.000
2008-PA-04-050	Q22-4XIVB	328.5	15	0.092
2008-PA-05-030	Q2	333.5	15	0.000
2008-PA-05-015	Q22-4XIVB	391.0	15	0.027
Stratum: Q2-4				
2008-PA-05-025	JR10109	430.0	15	0.000
2008-PA-05-016	Q24-6XIVB	460.5	15	0.009
Stratum: Q3-0				
2008-PA-04-038	Q30-2XIVB	156.5	15	0.000
2008-PA-04-040	Q30-2XIVB	154.5	15	0.000
Stratum: Q3-2				
2008-PA-04-031	Q32-4XIVB	217.5	15	0.000
2008-PA-04-032	Q32-4XIVB	235.5	15	0.000
2008-PA-04-039	Q32-4XIVB	268.5	15	0.000
2008-PA-05-039	Q3	328.5	15	0.363
2008-PA-04-042	Q32-4XIVB	312.5	15	0.469
Stratum: Q3-4				
2008-PA-04-035	Q34-6XIVB	424.5	15	0.020
2008-PA-04-037	Q34-6XIVB	430.5	15	0.019
2008-PA-04-043	Q34-6XIVB	416.5	15	1.813
2008-PA-05-038	Q3	521.5	15	2.294
2008-PA-04-047	Q34-6XIVB	422.5	7	0.006
Stratum: Q4-2				
2008-PA-04-024	Q42-4XIVB	209.5	8	0.000
2008-PA-04-026	Q42-4XIVB	201.0	15	0.000
2008-PA-04-029	Q42-4XIVB	299.5	15	0.000
2008-PA-04-033	Q42-4XIVB	219.0	15	0.000
2008-PA-04-034	Q42-4XIVB	224.0	15	0.000
Stratum: Q4-4				
2008-PA-04-028	Q44-6XIVB	406.5	15	0.000
2008-PA-04-027	Q44-6XIVB	488.0	15	0.129
Stratum: Q5-0				
2008-PA-05-052	Q50-2XIVB	170.0	15	0.000
2008-PA-05-053	Q50-2XIVB	167.0	16	0.000
2008-PA-05-063	Q50-2XIVB	190.0	15	0.000
Stratum: Q5-2				
2008-PA-05-054	Q52-4XIVB	261.0	15	0.176
2008-PA-05-056	Q52-4XIVB	383.5	15	0.539
2008-PA-05-062	Q52-4XIVB	315.5	15	0.000
Stratum: Q5-4				
2008-PA-05-055	Q54-6XIVB	425.5	12	0.025
Stratum: Q6-0				
2008-PA-04-002	Q60-2XIVB	141.5	15	0.000
2008-PA-04-003	Q60-2XIVB	180.0	15	0.000
2008-PA-04-006	Q60-2XIVB	180.0	15	0.000
2008-PA-04-007	Q60-2XIVB	186.5	15	0.000
2008-PA-04-010	Q60-2XIVB	177.5	15	0.008
2008-PA-04-012	Q60-2XIVB	163.5	15	0.000
2008-PA-04-015	Q60-2XIVB	173.5	15	0.000
Stratum: Q6-2				
2008-PA-04-004	Q62-4XIVB	236.0	11	0.000
2008-PA-04-009	Q62-4XIVB	320.5	15	0.000
2008-PA-04-011	Q62-4XIVB	226.5	15	0.005
Stratum: Q6-4				
2008-PA-04-013	Q64-6XIVB	493.5	15	0.197
2008-PA-04-013	Q64-6XIVB	493.5	15	0.197
2008-PA-04-014	Q64-6XIVB	443.5	5	0.134

STRATUM	SQKM	BIOMASS IN STRATA TONS	HAULS	Std	CV
SFE'2008					
AREA Q1	35662				
201-400 M		965.2	6	1904.6	197.3
AREA Q1	6975				
401-600 M		626.2	2	554.0	88.5
AREA Q2	7657				
201-400 M		6.9	4	9.8	141.6
AREA Q2	1246				
401-600 M		0.2	2	0.2	141.4
AREA Q3	3363				
001-200 M		0.0	2	0.0	.
AREA Q3	22547				
201-400 M		102.1	5	140.4	137.5
AREA Q3	9830				
401-600 M		209.5	5	282.0	134.6
AREA Q4	7770				
201-400 M		0.0	5	0.0	.
AREA Q4	2054				
401-600 M		3.9	2	5.5	141.4
AREA Q5	469				
001-200 M		0.0	3	0.0	.
AREA Q5	2785				
201-400 M		22.1	3	26.2	118.8
AREA Q5	1819				
401-600 M		2.1	1	.	.
AREA Q6	6307				
001-200 M		0.3	7	0.7	264.6
AREA Q6	6130				
201-400 M		0.3	3	0.6	173.2
AREA Q6	2063				
401-600 M		14.8	3	6.0	40.9

STRATUM	SQKM	DENSITY IN STRATA KG	HAULS	Std	CV
'SFE'2008					
AREA Q1	35662				
201-400 M		27.1	6	53.4	197.3
AREA Q1	6975				
401-600 M		89.8	2	79.4	88.5
AREA Q2	7657				
201-400 M		0.9	4	1.3	141.6
AREA Q2	1246				
401-600 M		0.1	2	0.2	141.4
AREA Q3	3363				
001-200 M		0.0	2	0.0	.
AREA Q3	22547				
201-400 M		4.5	5	6.2	137.5
AREA Q3	9830				
401-600 M		21.3	5	28.7	134.6
AREA Q4	7770				
201-400 M		0.0	5	0.0	.
AREA Q4	2054				
401-600 M		1.9	2	2.7	141.4
AREA Q5	469				
001-200 M		0.0	3	0.0	.
AREA Q5	2785				
201-400 M		7.9	3	9.4	118.8
AREA Q5	1819				
401-600 M		1.2	1	.	.
AREA Q6	6307				
001-200 M		0.0	7	0.1	264.6
AREA Q6	6130				
201-400 M		0.1	3	0.1	173.2
AREA Q6	2063				
401-600 M		7.2	3	2.9	40.9

REGION	BIOMASSE	+/-	PROCENT
ØSTGRØNLAND	1953	1764	90.32