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Assessment of Northern Shrimp stocks in the Estuary and Gulf of St. Lawrence in 2013: commercial fishery data

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ABSTRACT

The Estuary and Gulf of St. Lawrence northern shrimp (*Pandalus borealis*) stock status is determined every year by examining a main indicator from the commercial fishery and the research survey. This document presents the data and methods that are used to produce the commercial fishery statistics (catches, effort, catch rates, number at length, bycatches) for 1982 to 2013 for each of the four fishing areas.

RÉSUMÉ

L'état des stocks de crevette nordique (*Pandalus borealis*) de l'estuaire et du golfe du Saint-Laurent est déterminé chaque année par l'examen d'un indicateur principal provenant de la pêche commerciale et du relevé de recherche. Ce document présente les données et méthodes utilisées pour produire les statistiques de la pêche commerciale (captures, effort, taux de capture, nombres à la longueur, prises accessoires) de 1982 à 2013 pour chacune des quatre zones de pêche.

INTRODUCTION

The Northern Shrimp (*Pandalus borealis*) fishery began in the Gulf of St. Lawrence in 1965 (Table 1). The exploitation is conducted by trawlers in four shrimp fishing areas (SFA): Estuary (SFA 12), Sept-Iles (SFA 10), Anticosti (SFA 9) and Esquiman (SFA 8) (Figure 1). Fishing is regulated by several management measures, including the setting of total allowable catches (TAC) for each of the four areas. The TAC is set each year from the main stock status indicator. The main indicator of stock status is calculated from the male (recruitment to the female component) and female indices (spawning stock) obtained from the summer fishery (number per unit effort) and research survey (abundance) (DFO 2012, Savard 2012a).

This document presents the data and methods that are used to produce the commercial fishery statistics from 1982 to 2013 for each of the four fishing areas. This is an update of the research document produced by Savard (2012b) on catch per unit effort and numbers to the length of the commercial fishery with added information on the fishing effort distribution (Savard 2012c) and on bycatches (Savard et al. 2012).

FISHERY STATISTICS

The shrimp fishing licence holders have to describe their fishing operations in a logbook. Information on the estimated catch, the number of hours of trawling, and the location of the fishing tows are noted for each day at sea. The catch data are validated with the processing plant purchase slips or with the dock side monitoring program. The dock side monitoring program has been running since 1991; all fishermen have to have their landings weighted by observers who are based in designated ports.

The resolution of the information noted in the logbook and recorded in a zonal file (ZIFF, Zonal Interchange File Format) corresponds to one fishing day at a given location. Every day, the fisherman has to note the total of the estimated catches and the total of hours of trawling for each location. The official landing (coming from the dock side weighting), that happens often after many days at sea, is then attributed proportionally to the daily catches.

The fishing location that is noted by the fisherman in his logbook is used to identify the shrimp fishing area in which the fishing operations took place. The location is expressed in latitude and longitude or with the identification of the fishing square (10 minutes by 10 minutes, Figure 2) according to the form that is available to the fleet to which the fisherman belongs. It could happen that the fishing location is missing; in such cases, it is possible to identify the shrimp fishing area with the NAFO sub-division (Figure 3) which the fisherman should also note in his logbook.

The landing and the total allowable catch (TAC) by shrimp fishing area are presented in table 1 and figures 4, 5 and 6. These official DFO statistics come from the Canadian Atlantic Quota Report (CAQR).

COMMERCIAL CATCH SAMPLING

Samples from commercial catches have been collected at landing since 1982 (Table 2). The samples are brought back to the laboratory where the individuals are sexed and measured (cephalothorax length, CL) to the closest 0.1 mm. The individuals are sexed according to the characteristic of the endopod of the first pleopod (Rasmussen 1953) and the maturity stage is determined by the presence or absence of sternal spines (McCrary 1971) and by the presence or absence of eggs.

CATCH AND FISHING EFFORT COMPILATION

An observation corresponds to a catch and an effort realised by a vessel for a fishing day in a given location. A first validation of the observations is done in eliminating missing or improbable data for essential variables (fishing vessel, catch, effort, date of the catch, shrimp fishing area).

Table 3 presents the catches and effort corresponding to the validated observations, by fishing area and by year. An annual catch per unit of effort is estimated from these data for each fishing area (Table 3, Figure 7).

The sum of catches does not represent the total of the landings given that some observations had to be removed from the analyses because they were missing or incomplete. The sum of the effort corresponding to the same observations neither represents the total effort put by the fleets to catch the total landing. However, it is possible to estimate the total fishing effort corresponding to the total landing by using the catch per unit of effort estimated from the validated observation subset (Table 3, Figure 7). Similarly, it is possible to estimate the monthly catch and effort by fishing area and by year (Tables 4 and 5). The total effort of fishing by year for shrimpers is presented at figure 8.

The spatial distributions of catches, efforts and CPUE by statistical squares are presented at figures 9, 10 and 11. They are presented by decade, the average by statistical square, or for the years 2010 to 2013.

CATCH PER UNIT OF EFFORT STANDARDIZATION

The annual catches per unit of effort (CPUE) are standardized to take into account the changes in the fishing capacity and in the seasonal fishing patterns (Gavaris 1980). Multiple linear regressions were performed between the logarithm of CPUE and the variables vessel length and propulsion power (to reflect changes in fishing power), month (to take account changes in the fishing season) and year (to isolate the annual effect without any effect from the other variables). The analyses were performed with the GLM procedure of the SAS software (SAS 1996). The analyses were done separately for each fishing area.

The important factors were first examined to determine if the number of observations in each category was sufficient to be representative of the fleet behaviour. The length and the propulsion power of the vessels were grouped into classes. The lengths were grouped into 6 classes of 10 feet, from 30 to 89 feet, identified by the middle of the class. The powers were grouped into 9 classes of 100 hp, from 100 to 999 hp, identified also by the middle of the class. Given that one observation corresponds to one (or less) fishing day, it is considered that the fishing effort in a given category is representative when many observations (and thus many fishing days) are associated with it.

The conditions for which the fishing effort is considered representative have already been presented in Savard (2011) (Table 6). They are the following:

- a vessel had to be active during at least 3 years and had to have at least 7 observations per year;
- a length or power class had to be present during at least 3 years and had to have at least 7 observations per year;
- the months that were kept were those during which there were activities for at least 3 years and for which there are at least 7 observations (5 observations for the Estuary area) per year and per fishing area;

- an observation would be considered as significant if it corresponds to an effort greater than one hour and a catch greater than 50 kg;
- the sub-categories representing less than 1% of the total observations were not used in the analyses because it was considered that they were little representative of the behaviour of the fleets.

The validation of these models is done by analyzing the residuals against the predicted values and categories of factors studied. The analyses of variance are all significant ($p<0.0001$) as well as the contribution of the categories to the regression ($p<0.0001$) except for the length category ($p=0.0704$) in the Estuary area (Tables 7 to 10). The model explains 61% of the variance for Esquiman area, 60% for Anticosti, 52% for Sept-Iles and 56% for Estuary.

The standardized catch rates are shown in table 11 and figure 12. The CPUEs correspond to a standard vessel with a length class of 60-69 ft and a propulsion power class of 500-599 hp. The standard month is June.

NUMBER AT LENGTH COMPILATION

Commercial catch samples are combined by area and by month. The monthly length frequency distributions are weighted by the month landing (Table 12) and the numbers at length are calculated by applying the weight-length relationships estimated from the survey (Bourdages and Marquis 2014). The annual commercial catches are estimated by summing the monthly numbers at length (Table 13). The numbers per unit of effort are calculated by dividing the numbers at length by the fishing effort (Figure 13).

The main indicator of the stock status is estimated using data from the commercial fishery and research survey. Indices used from commercial fishing are numbers per unit of effort (NPUE) during the summer for the male and female components. These indices have been restricted to the summer (June, July and August) due to seasonal variations in catchability. The male and female NPUE are estimated from length frequency of summer months by fishing area (Table 14 and Figures 14 and 15).

Mean lengths of female carapace shrimps harvested in the summer by fishing area and year are presented in figure 16.

EXPLOITATION RATE

An index of the exploitation rate is obtained by dividing the commercial catches in number by the abundance estimated from the research survey (Bourdages and Marquis 2014). This method cannot be used to estimate the absolute exploitation rate or to relate it to target exploitation rates. However, the method does make it possible to track relative changes in the exploitation rate over the years. The exploitation rate indices by fishing area and year are presented at figure 17.

REPRODUCTIVE CYCLE

Monitoring of the reproductive cycle in the area of Sept-Iles is made from samples collected during fishing (see section commercial catch sampling). The proportion of egg-bearing females (females carrying eggs under the abdomen), the number of egg-bearing females on the total number of females, is determined for each sample (Figure 18). As the proportion of females in maturation is determined by comparing the number of female with green head compared to the number of females excluding egg-bearing females (Figure 19). Spring day when 50% of females

released their eggs is determined, and the autumn day when 50% of females carrying eggs. In addition, the day of the year where 50% of females are in maturation is determined. These days of the year for these three events, extrusion, maturation and spawning are presented annually in figure 20.

BYCATCHES

Harvesters are obliged to have an at-sea observer on board at the Department's request. The At-Sea Observer Program aims at 5% coverage of all shrimper fishing trips. These observers record detailed information on tows (position, duration, and catch per species or taxon and, for some species, specimen length). Data from the At-Sea Observer Program that were used for this study were collected between 2000 and 2013 during the northern shrimp fishing in the Estuary and Gulf of St. Lawrence with the goal to estimate the bycatches.

The methodology for data processing of bycatches is presented in Savard et al. (2013). Since 2000, 16545 tows were sampled. The positions of the observed tows from 2011 to 2013 are presented in figure 21. Weighting factors (∑shrimper effort/∑observer effort) were calculated and used to scale the bycatch results to the total effort deployed by the fleet (Tables 15 and 16).

Bycatches for all species combined are estimated by fishing area and year (Table 17, Figure 22). The bycatch estimate is compared to the shrimp catch to obtain a ratio of bycatch on the total shrimp catch (Table 17, Figure 23). The results, in occurrence and in weight, are also presented for 98 taxa (Tables 18 and 19 and Figure 24).

Bycatches in the shrimp fishery were compared with biomass and population number estimates from the DFO trawl survey in the Estuary and northern Gulf of St. Lawrence between 2000 and 2013 (Archambault et al. 2014) (Table 20 and Figure 25).

The geographical distributions of bycatches during fishing activities directed on shrimp in presence of an at-sea observer are presented for Atlantic Cod, Redfishes, Atlantic Halibut, Greenland Halibut, American Plaice, Witch Flounder and Capelin. The average of catches (kg/tow) of all tows in a same square of 5 minutes is made annually (2012 and 2013) or for the period of 2000 to 2010 (Figures 26 to 32).

Length frequencies are available for Atlantic Cod, Redfishes, Atlantic Halibut, Greenland halibut, American plaice and Witch Flounder (Figures 33 to 38).

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TABLES

Table 1. Landing (L) and total of allowable catch (TAC) by shrimp fishing areas: Estuary (SFA 12); Sept-Iles (SFA 10), Anticosti (SFA 9) and Esquiman (SFA 8).

Year	Estuary		Sept-Iles		Anticosti		Esquiman		Total	
	L	TAC	L	TAC	L	TAC	L	TAC	L	TAC
1965			**11**						**11**	
1966			**95**						**95**	
1967			**278**						**278**	
1968			**271**						**271**	
1969			**273**						**273**	
1970			**413**				**159**		**572**	
1971			**393**				**691**		**1084**	
1972			**481**				**184**		**665**	
1973			**1273**				**520**		**1793**	
1974			**1743**		**980**		**594**		**3317**	
1975			**2135**		**1025**		**1368**		**4528**	
1976			**1841**		**1310**		**1494**		**4645**	
1977			**2746**		**1185**		**1249**		**5180**	
1978			**2526**		**1460**		**2166**		**6152**	
1979			**3207**		**1108**		**3226**		**7541**	
1980	**539**		**2978**		**1454**		**2441**		**7412**	
1981	**27**		**3680**		**1385**		**3014**		**8106**	
1982	**152**	*500*	**3774**	*3800*	**2464**	*4400*	**2111**	*4200*	**8501**	*12900*
1983	**158**	*500*	**3647**	*3800*	**2925**	*5000*	**2242**	*6000*	**8972**	*15300*
1984	**248**	*500*	**4383**	*4800*	**1336**	*5000*	**1578**	*6000*	**7545**	*16300*
1985	**164**	*500*	**4399**	*4600*	**2786**	*3400*	**1421**	*6000*	**8770**	*14500*
1986	**262**	*500*	**4216**	*4600*	**3340**	*3500*	**1592**	*3500*	**9410**	*12100*
1987	**523**	*500*	**5411**	*5600*	**3422**	*3500*	**2685**	*3500*	**12041**	*13100*
1988	**551**	*500*	**6047**	*5600*	**2844**	*3500*	**4335**	*3500*	**13777**	*13100*
1989	**629**	*500*	**6254**	*5700*	**4253**	*4200*	**4614**	*4500*	**15750**	*14900*
1990	**507**	*500*	**6839**	*6400*	**4723**	*4200*	**3303**	*4700*	**15372**	*15800*
1991	**505**	*500*	**6411**	*6400*	**4590**	*5000*	**4773**	*4700*	**16279**	*16600*
1992	**489**	*500*	**4957**	*6400*	**4162**	*5000*	**3149**	*4700*	**12757**	*16600*
1993	**496**	*500*	**5485**	*6400*	**4791**	*5000*	**4683**	*4700*	**15455**	*16600*
1994	**502**	*500*	**6165**	*6400*	**4854**	*5000*	**4689**	*4700*	**16210**	*16600*
1995	**486**	*500*	**6386**	*6400*	**4962**	*5000*	**4800**	*4700*	**16634**	*16600*
1996	**505**	*500*	**7014**	*7040*	**5469**	*5500*	**5123**	*5170*	**18111**	*18210*
1997	**549**	*550*	**7737**	*7744*	**6058**	*6050*	**5957**	*5687*	**20301**	*20031*
1998	**634**	*633*	**8981**	*8966*	**6932**	*7004*	**6554**	*6584*	**23101**	*23187*
1999	**646**	*633*	**9239**	*8966*	**7022**	*7004*	**6732**	*6584*	**23639**	*23187*
2000	**739**	*709*	**10160**	*10042*	**7941**	*7844*	**7396**	*7374*	**26236**	*25969*
2001	**832**	*786*	**10965**	*11136*	**5399**	*8700*	**7815**	*8178*	**25011**	*28800*
2002	**799**	*786*	**11493**	*11136*	**8638**	*8700*	**8250**	*8178*	**29180**	*28800*
2003	**796**	*802*	**11357**	*11360*	**8742**	*8874*	**6773**	*6674*	**27668**	*27710*
2004	**1033**	*995*	**15932**	*15611*	**10429**	*10226*	**8593**	*8502*	**35987**	*35334*
2005	**1001**	*995*	**12793**	*15611*	**8047**	*10226*	**8867**	*9351*	**30708**	*36183*
2006	**1029**	*995*	**15312**	*15611*	**8754**	*10226*	**8957**	*9351*	**34052**	*36183*
2007	**1022**	*995*	**15645**	*15611*	**10180**	*10226*	**9208**	*9352*	**36055**	*36184*
2008	**1017**	*1020*	**15972**	*15995*	**9635**	*10478*	**9110**	*9409*	**35734**	*36902*
2009	**993**	*1018*	**15873**	*15970*	**9644**	*10461*	**9473**	*9567*	**35983**	*37016*
2010	**906**	*917*	**15756**	*15969*	**10099**	*10461*	**9541**	*9567*	**36302**	*36914*
2011	**880**	*916*	**14376**	*15172*	**9831**	*9938*	**9177**	*9091*	**34264**	*35117*
2012	**956**	*1053*	**12516**	*12896*	**8267**	*8447*	**10244**	*10452*	**31983**	*32848*
2013	**1117**	*1211*	**14217**	*14830*	**7681**	*7676*	**9145**	*9395*	**32160**	*33112*

2013: as in January 10, 2014

Table 2. Number of samples of the commercial catches and number of samples per 1,000 tons of landing, by fishing area (SFA) and by year.

Year	Number of samples					N. samples / 1,000 tons			
	SFA					SFA			
	12	10	9	8	*Total*	12	10	9	8
1982	1	29	21	15	*66*	6.6	7.7	8.5	7.1
1983	7	27	49	27	*110*	44.3	7.4	16.8	12.0
1984		43	16	29	*88*		9.8	12.0	18.4
1985		56	52	40	*148*		12.7	18.7	28.1
1986	2	28	35	29	*94*	7.6	6.6	10.5	18.2
1987	1	21	28	39	*89*	1.9	3.9	8.2	14.5
1988	2	42	16	38	*98*	3.6	6.9	5.6	8.8
1989		39	25	39	*103*		6.2	5.9	8.5
1990	3	32	11	28	*74*	5.9	4.7	2.3	8.5
1991		26	16	26	*68*		4.1	3.5	5.4
1992	3	30	12	23	*68*	6.1	6.1	2.9	7.3
1993	4	34	21	29	*88*	8.1	6.2	4.4	6.2
1994	7	31	10	42	*90*	13.9	5.0	2.1	9.0
1995	11	50	36	46	*143*	22.6	7.8	7.3	9.6
1996	10	33	52	50	*145*	19.8	4.7	9.5	9.8
1997	9	38	49	44	*140*	16.4	4.9	8.1	7.4
1998	15	46	47	56	*164*	23.7	5.1	6.8	8.5
1999	16	39	36	49	*140*	24.8	4.2	5.1	7.3
2000	12	57	34	49	*152*	16.2	5.6	4.3	6.6
2001	11	60	37	37	*145*	13.2	5.5	6.9	4.7
2002	14	69	38	45	*166*	17.5	6.0	4.4	5.5
2003	14	74	36	48	*172*	17.6	6.5	4.1	7.1
2004	19	73	40	34	*166*	18.4	4.6	3.8	4.0
2005	16	66	34	48	*164*	16.0	5.2	4.2	5.4
2006	18	71	36	58	*183*	17.5	4.6	4.1	6.5
2007	23	64	36	56	*179*	22.5	4.1	3.5	6.1
2008	22	65	27	50	*164*	21.6	4.1	2.8	5.5
2009	22	56	33	26	*137*	22.2	3.5	3.4	2.7
2010	17	67	32	37	*153*	18.8	4.3	3.2	3.9
2011	21	61	33	40	*155*	23.9	4.2	3.4	4.4
2012	18	59	38	37	*152*	18.8	4.7	4.6	3.6
2013	26	64	29	49	*168*	23.3	4.5	3.8	5.4

Table 3. Number of observations, catch (kg), effort (h), catch per unit of effort (kg/h) and its standard error (SE), percentage (%) of the landing corresponding to the observations, landing (t) and nominal effort (h) by fishing area (SFA) and by year.

SFA	Year	n obs	∑catch	∑effort	CPUE	SE	%	Landing	Nominal effort
8	1982	1281	1617	13095	123.5	1.93	76.6	2111	17093
8	1983	2038	1929	20289	95.1	1.64	86.0	2242	23584
8	1984	742	846	7902	107.1	3.14	53.6	1578	14733
8	1985	164	231	2796	82.7	1.78	16.3	1421	17189
8	1986	952	1060	10412	101.8	2.04	66.6	1592	15643
8	1987	948	1139	11312	100.7	1.41	42.4	2685	26665
8	1988	1029	1656	13405	123.5	2.04	38.2	4335	35101
8	1989	1468	2659	16708	159.1	2.52	57.6	4614	28997
8	1990	1914	3465	22206	156.0	2.40	104.9	3303	21171
8	1991	2440	4630	29256	158.3	1.83	97.0	4773	30158
8	1992	1775	3063	24622	124.4	1.36	97.3	3149	25314
8	1993	2307	4256	31074	137.0	1.18	90.9	4683	34190
8	1994	1764	4264	26917	158.4	1.77	90.9	4689	29601
8	1995	2198	4548	30429	149.5	1.42	94.8	4800	32114
8	1996	1647	4964	22288	222.7	2.92	96.9	5123	23003
8	1997	1558	5273	20994	251.2	3.02	88.5	5957	23716
8	1998	2088	6345	25383	250.0	2.55	96.8	6554	26218
8	1999	2107	6249	24804	252.0	2.81	92.8	6732	26719
8	2000	2189	6980	23690	294.6	3.62	94.4	7396	25101
8	2001	1937	6888	23970	287.4	2.95	88.1	7815	27196
8	2002	2336	7621	27017	282.1	2.34	92.4	8250	29248
8	2003	1817	6018	18111	332.3	3.32	88.9	6773	20382
8	2004	1857	7806	17228	453.1	4.63	90.8	8593	18965
8	2005	1681	7830	17152	456.5	5.38	88.3	8867	19424
8	2006	1608	8155	17062	478.0	6.18	91.0	8957	18740
8	2007	2081	8097	22118	366.1	3.94	87.9	9208	25154
8	2008	1717	7904	19915	396.9	5.00	86.8	9110	22954
8	2009	3263	9022	20344	443.5	4.34	95.2	9473	21362
8	2010	2952	8715	17872	487.6	5.15	91.3	9541	19566
8	2011	2951	8822	16139	546.7	5.84	96.1	9177	16788
8	2012	3046	9579	16875	567.6	5.91	93.5	10244	18047
8	2013	2632	8436	17310	487.34	5.86	92.2	9145	18766

Table 3 continued. Number of observations, catch (kg), effort (h), catch per unit of effort (kg/h) and its standard error (SE), percentage (%) of the landing corresponding to the observations, landing (t) and nominal effort (h) by fishing area (SFA) and by year.

SFA	Year	n obs	∑catch	∑effort	CPUE	SE	%	Landing	Nominal effort
9	1982	1725	2259	24987	90.4	0.95	91.7	2464	27252
9	1983	1890	2252	25894	87.0	1.06	77.0	2925	33626
9	1984	1482	1243	20206	61.5	0.85	93.1	1336	21710
9	1985	2292	2570	30665	83.8	0.76	92.2	2786	33243
9	1986	2980	3181	40802	78.0	0.70	95.2	3340	42841
9	1987	2354	3051	36176	84.3	0.85	89.1	3422	40580
9	1988	1624	2367	24137	98.1	1.14	83.2	2844	28999
9	1989	1901	3662	27630	132.5	1.51	86.1	4253	32089
9	1990	1981	4244	30459	139.3	1.81	89.9	4723	33900
9	1991	2280	4611	37598	122.7	1.09	100.5	4590	37425
9	1992	2416	4113	40742	101.0	0.79	98.8	4162	41226
9	1993	2460	4554	44786	101.7	0.63	95.0	4791	47121
9	1994	2295	4897	41169	119.0	0.88	100.9	4854	40804
9	1995	1874	5024	34810	144.3	1.08	101.3	4962	34379
9	1996	2039	5480	38038	144.1	1.32	100.2	5469	37958
9	1997	1923	6052	37455	161.6	1.55	99.9	6058	37491
9	1998	2128	6991	40955	170.7	1.26	100.9	6932	40609
9	1999	2355	6880	44971	153.0	1.19	98.0	7022	45899
9	2000	2181	7680	41171	186.5	1.40	96.7	7941	42571
9	2001	1579	5155	30727	167.8	1.89	95.5	5399	32184
9	2002	2129	8476	40843	207.5	1.89	98.1	8638	41625
9	2003	1693	8442	32173	262.4	2.53	96.6	8742	33317
9	2004	2077	10058	39541	254.4	2.27	96.4	10429	40999
9	2005	1277	7551	23618	319.7	4.69	93.8	8047	25170
9	2006	1377	7830	24554	318.9	4.67	89.4	8754	27452
9	2007	1711	9427	31961	294.9	2.94	92.6	10180	34515
9	2008	1473	9018	27673	325.9	3.31	93.6	9635	29567
9	2009	1529	9591	28114	341.2	3.73	99.5	9644	28268
9	2010	1713	9720	32106	302.8	3.09	96.2	10099	33358
9	2011	1575	9603	29598	324.4	3.37	97.7	9831	30302
9	2012	1522	8173	28530	286.5	3.12	98.9	8267	28858
9	2013	1120	7463	20306	367.5	4.52	97.2	7681	20900

Table 3 continued. Number of observations, catch (kg), effort (h), catch per unit of effort (kg/h) and its standard error (SE), percentage (%) of the landing corresponding to the observations, landing (t) and nominal effort (h) by fishing area (SFA) and by year.

SFA	Year	n obs	∑catch	∑effort	CPUE	SE	%	Landing	Nominal effort
10	1982	2247	2554	31755	80.4	1.50	67.7	3774	46932
10	1983	1532	2058	21767	94.6	1.73	56.4	3647	38573
10	1984	3593	4011	51114	78.5	1.12	91.5	4383	55860
10	1985	3297	4305	50343	85.5	0.99	97.9	4399	51444
10	1986	2888	4179	43386	96.3	1.43	99.1	4216	43775
10	1987	3540	5151	56227	91.6	1.09	95.2	5411	59070
10	1988	4079	5401	65130	82.9	0.95	89.3	6047	72918
10	1989	3477	5326	55785	95.5	1.05	85.2	6254	65501
10	1990	2783	6043	45937	131.6	1.62	88.4	6839	51990
10	1991	3336	6206	53084	116.9	1.46	96.8	6411	54842
10	1992	3921	4923	65510	75.2	0.96	99.3	4957	65961
10	1993	4066	5295	72394	73.1	0.81	96.5	5485	74995
10	1994	3841	6212	73030	85.1	0.92	100.8	6165	72472
10	1995	2303	6457	44583	144.8	2.11	101.1	6386	44094
10	1996	2120	7105	40423	175.8	2.51	101.3	7014	39908
10	1997	2275	7819	41477	188.5	2.56	101.1	7737	41040
10	1998	2427	9102	43620	208.7	2.76	101.3	8981	43042
10	1999	2589	9228	46399	198.9	2.50	99.9	9239	46457
10	2000	2819	10075	51683	194.9	2.06	99.2	10160	52118
10	2001	3486	10829	66553	162.7	1.75	98.8	10965	67389
10	2002	3068	11433	57315	199.5	1.86	99.5	11493	57616
10	2003	2156	11226	37844	296.6	3.84	98.8	11357	38285
10	2004	2928	15803	51634	306.1	3.11	99.2	15932	52054
10	2005	2352	12605	40787	309.0	2.92	98.5	12793	41396
10	2006	2951	15576	50950	305.7	2.79	101.7	15312	50087
10	2007	2240	14242	39794	357.9	3.76	91.0	15645	43715
10	2008	2543	15685	44761	350.4	4.11	98.2	15972	45580
10	2009	2785	15540	48891	317.8	3.28	97.9	15873	49940
10	2010	2932	15662	54879	285.4	2.65	99.4	15756	55207
10	2011	2964	14920	54696	272.8	2.60	103.8	14376	52703
10	2012	2477	12536	44449	282.0	2.89	100.2	12516	44376
10	2013	3139	14336	55930	256.3	2.34	100.8	14217	55464

Table 3 continued. Number of observations, catch (kg), effort (h), catch per unit of effort (kg/h) and its standard error (SE), percentage (%) of the landing corresponding to the observations, landing (t) and nominal effort (h) by fishing area (SFA) and by year.

SFA	Year	n obs	∑catch	∑effort	CPUE	SE	%	Landing	Nominal effort
12	1982	108	120	1628	73.9	4.34	79.1	152	2058
12	1983	59	57	1093	52.0	4.18	36.0	158	3039
12	1984	217	207	3254	63.7	3.75	83.6	248	3895
12	1985	46	51	705	73.0	6.35	31.4	164	2246
12	1986	182	154	3058	50.5	2.43	58.9	262	5189
12	1987	268	319	5097	62.5	2.42	60.9	523	8369
12	1988	264	457	4327	105.5	6.49	82.9	551	5222
12	1989	314	506	5576	90.8	3.27	80.5	629	6929
12	1990	229	450	3592	125.3	5.88	88.7	507	4048
12	1991	161	495	2144	230.9	23.31	98.0	505	2187
12	1992	300	486	4463	108.9	7.41	99.4	489	4491
12	1993	183	486	3092	157.1	9.47	97.9	496	3158
12	1994	166	490	2247	217.9	21.10	97.6	502	2303
12	1995	144	478	1718	278.2	20.39	98.3	486	1748
12	1996	129	490	1528	320.7	26.38	97.0	505	1575
12	1997	163	535	1903	280.9	13.90	97.4	549	1954
12	1998	164	646	1760	366.8	22.24	101.8	634	1729
12	1999	143	647	1708	378.6	25.63	100.1	646	1707
12	2000	188	728	2022	360.2	18.90	98.5	739	2052
12	2001	245	822	3251	252.7	9.41	98.7	832	3292
12	2002	258	803	3655	219.8	8.23	100.6	799	3635
12	2003	197	797	1939	411.3	20.65	100.2	796	1935
12	2004	212	1033	2614	395.2	15.72	100.0	1033	2614
12	2005	225	1009	2498	404.0	13.15	100.8	1001	2478
12	2006	209	1036	2293	451.6	17.40	100.6	1029	2278
12	2007	232	1022	2745	372.2	13.43	100.0	1022	2746
12	2008	209	1016	2826	359.6	12.71	99.9	1017	2828
12	2009	257	994	3485	285.3	10.81	100.1	993	3481
12	2010	255	914	3563	256.5	9.34	100.9	906	3532
12	2011	277	879	4405	199.6	4.76	99.9	880	4408
12	2012	253	956	4240	225.4	6.40	100.0	956	4242
12	2013	333	1117	6269	178.2	3.72	100.0	1117	6268

Table 4. Catch (t) per month by fishing area (SFA) and by year.

SFA	Year	J	F	M	A	M	J	J	A	S	O	N	D
8	1982	0	0	0	242	832	138	193	277	129	299	0	0
8	1983	0	142	345	696	187	382	159	111	149	59	12	0
8	1984	0	8	9	572	273	244	84	122	101	140	24	0
8	1985	0	0	0	5	236	378	176	419	208	0	0	0
8	1986	0	0	0	527	203	97	296	215	147	98	9	0
8	1987	0	0	78	213	344	753	219	539	204	238	76	22
8	1988	0	0	0	379	1203	960	881	445	0	300	123	45
8	1989	0	0	0	121	1292	1178	377	624	424	253	331	15
8	1990	0	0	0	0	860	532	1048	339	308	215	0	0
8	1991	0	0	0	720	1498	1283	875	240	101	28	29	0
8	1992	0	0	0	0	634	1615	686	72	102	40	1	0
8	1993	0	0	0	2	1338	1172	1334	621	171	36	10	0
8	1994	0	0	0	0	455	1660	1896	411	200	68	0	0
8	1995	4	0	0	9	2651	1460	38	114	316	206	3	0
8	1996	0	0	0	0	1834	2073	815	263	91	48	0	0
8	1997	0	0	0	3	1448	2596	1133	322	170	204	64	17
8	1998	0	0	0	1023	2433	1080	567	204	548	360	201	137
8	1999	0	0	0	1761	2393	1578	412	99	213	82	130	64
8	2000	0	0	0	2427	1875	1136	815	890	199	53	1	0
8	2001	0	0	0	1810	1629	1828	839	218	592	900	0	0
8	2002	0	0	0	1595	1488	2637	1772	478	182	68	31	0
8	2003	0	0	0	6	2495	2807	441	534	218	84	182	7
8	2004	0	0	6	39	2398	4296	1050	348	285	171	0	0
8	2005	0	0	0	1	2289	2608	639	1534	1113	675	8	0
8	2006	0	0	0	505	2344	1938	944	1261	1248	653	65	0
8	2007	0	0	3	880	4288	1028	848	592	892	431	223	22
8	2008	0	0	0	1149	3593	1739	2147	400	22	7	53	0
8	2009	0	0	0	874	3727	1344	2610	418	402	88	10	0
8	2010	0	0	0	304	4426	3548	557	535	106	18	47	0
8	2011	0	0	0	125	6666	1996	172	113	7	58	40	0
8	2012	0	0	0	123	5685	2850	807	391	308	80	0	0
8	2013	0	0	0	73	3784	2991	1412	440	226	202	20	0

Table 4 continued. Catch (t) per month by fishing area (SFA) and by year.

SFA	Year	J	F	M	A	M	J	J	A	S	O	N	D
9	1982	0	0	0	14	185	680	524	505	469	84	5	0
9	1983	0	0	0	45	108	912	592	365	543	327	33	0
9	1984	0	0	0	15	283	249	307	99	179	185	19	0
9	1985	0	0	0	15	100	490	791	577	607	206	0	0
9	1986	0	0	0	8	101	800	770	1027	418	216	0	0
9	1987	0	0	0	13	584	602	1047	827	236	113	0	0
9	1988	0	0	0	27	84	484	393	1065	354	425	12	0
9	1989	0	0	0	1	187	1173	827	544	380	1083	59	0
9	1990	0	0	0	6	22	965	1372	1919	439	0	0	0
9	1991	0	0	0	24	373	1055	1537	762	495	306	39	1
9	1992	0	0	0	1	152	1336	1375	777	479	41	3	0
9	1993	0	0	0	0	269	1908	1676	689	189	45	14	0
9	1994	0	0	0	12	95	891	2305	1141	305	99	6	0
9	1995	0	0	0	4	310	1085	2515	841	165	41	1	0
9	1996	0	0	0	30	349	1934	1902	773	348	98	37	0
9	1997	0	0	0	309	560	2007	2659	419	104	0	0	0
9	1998	0	0	0	153	1141	2494	1867	1052	181	43	0	0
9	1999	0	0	0	42	540	1546	3117	1206	396	74	62	40
9	2000	0	0	0	11	647	2547	3217	1081	369	50	19	0
9	2001	0	0	0	2	215	737	1448	2021	870	75	29	2
9	2002	0	0	0	15	892	1590	3344	2155	541	88	0	15
9	2003	0	0	0	368	834	2351	3669	1165	235	73	44	3
9	2004	0	0	0	94	699	2121	4824	1866	683	128	15	0
9	2005	0	0	0	120	1428	3486	1704	420	647	236	7	0
9	2006	0	0	0	40	1119	2348	2483	1536	925	274	30	0
9	2007	0	0	0	0	1162	1893	3278	2309	1318	109	47	64
9	2008	0	0	0	0	1231	2730	3234	1863	497	80	0	0
9	2009	0	0	0	69	1378	4463	2552	824	133	84	143	0
9	2010	0	0	0	1	930	4748	3329	1019	47	24	0	0
9	2011	0	0	0	22	1240	5359	2474	549	162	22	5	0
9	2012	0	0	0	22	1818	3905	1679	487	207	72	77	0
9	2013	0	0	0	95	1689	4675	670	257	229	50	17	0

Table 4 continued. Catch (t) per month by fishing area (SFA) and by year.

SFA	Year	J	F	M	A	M	J	J	A	S	O	N	D
10	1982	0	0	87	834	1015	422	451	433	209	250	73	0
10	1983	0	0	0	698	1484	536	60	595	237	37	0	0
10	1984	0	0	17	776	1040	760	232	886	432	129	93	19
10	1985	0	0	143	1174	671	865	829	643	45	24	3	2
10	1986	0	0	92	1588	1093	633	684	22	86	20	0	0
10	1987	0	0	93	1329	1342	1028	25	54	1085	456	0	1
10	1988	0	0	79	999	1404	968	1321	349	728	199	0	0
10	1989	0	0	221	1555	1541	935	899	0	1103	0	0	0
10	1990	0	0	0	1310	1881	1676	1023	0	949	0	0	0
10	1991	0	0	0	1651	1435	891	655	771	595	373	40	1
10	1992	0	0	0	903	771	460	400	625	891	718	175	16
10	1993	0	0	0	931	964	283	733	844	1063	452	179	38
10	1994	0	0	181	888	1346	891	520	757	1037	392	113	41
10	1995	0	0	0	2018	1806	1216	325	650	269	84	16	2
10	1996	0	0	0	3151	2161	814	310	428	112	26	9	4
10	1997	0	0	0	3097	1897	1310	765	588	71	6	0	4
10	1998	0	0	0	2797	2242	677	1229	985	756	244	51	2
10	1999	0	0	0	3641	2175	1671	666	603	359	74	31	19
10	2000	0	0	0	2970	2410	1281	1103	1483	437	348	127	2
10	2001	0	0	0	3513	1182	395	277	1141	1913	1214	1163	167
10	2002	0	0	0	2047	2759	2979	1170	1042	1012	268	178	39
10	2003	0	0	0	4076	2828	1154	830	1450	864	92	39	25
10	2004	0	0	0	5375	3595	1784	896	2254	1735	275	19	0
10	2005	0	0	0	4760	3508	1439	1305	504	449	721	107	0
10	2006	0	0	0	1967	3665	2700	1300	1138	2745	1301	362	134
10	2007	0	0	0	2196	4533	4045	2521	781	476	546	473	75
10	2008	0	0	25	4717	3958	2954	1462	1233	1035	303	204	82
10	2009	0	0	0	4021	3868	1211	1002	2569	2755	438	8	0
10	2010	0	0	0	4405	4052	762	1516	2081	1783	899	257	2
10	2011	0	0	0	4151	3167	618	1811	2194	1531	737	167	0
10	2012	0	0	0	4479	2247	673	2065	1679	1007	310	55	0
10	2013	0	0	0	4133	2276	861	2379	2642	1386	526	14	0

Table 4 continued. Catch (t) per month by fishing area (SFA) and by year.

SFA	Year	J	F	M	A	M	J	J	A	S	O	N	D
12	1982	0	0	0	50	19	3	24	3	51	2	0	0
12	1983	0	0	0	14	7	45	85	7	0	0	0	0
12	1984	0	0	0	18	36	47	51	5	20	58	10	3
12	1985	0	0	0	50	21	0	5	18	42	28	0	0
12	1986	0	0	18	17	18	5	28	62	70	45	0	0
12	1987	0	0	0	14	80	58	189	181	0	0	0	0
12	1988	0	0	0	347	80	86	39	0	0	0	0	0
12	1989	0	0	205	133	35	49	141	66	0	0	0	0
12	1990	0	0	212	125	171	0	0	0	0	0	0	0
12	1991	0	0	0	386	45	3	5	13	40	11	1	0
12	1992	0	0	0	314	99	17	7	15	14	10	14	0
12	1993	0	0	0	264	146	2	2	3	2	69	7	0
12	1994	0	0	50	390	34	2	2	3	6	8	7	0
12	1995	0	0	0	340	40	6	7	71	11	0	12	0
12	1996	0	0	0	404	20	6	6	15	40	11	3	0
12	1997	0	0	0	333	95	4	30	73	6	3	5	2
12	1998	0	0	0	265	151	23	72	40	38	43	2	0
12	1999	0	0	0	373	77	3	41	105	41	5	1	0
12	2000	0	0	0	448	79	6	1	77	71	54	3	0
12	2001	0	0	0	220	377	0	3	5	46	127	54	0
12	2002	0	0	0	188	278	0	2	86	208	27	11	0
12	2003	0	0	0	314	138	44	0	93	168	31	8	0
12	2004	0	0	0	213	299	52	0	90	237	129	13	0
12	2005	0	0	0	363	240	168	48	85	13	67	18	0
12	2006	0	0	0	418	128	209	12	49	150	18	46	0
12	2007	0	0	0	261	100	79	0	270	265	19	29	0
12	2008	0	0	0	106	475	57	100	100	114	30	37	0
12	2009	0	0	0	322	200	0	0	183	221	51	16	0
12	2010	0	0	0	497	118	0	0	78	117	80	16	0
12	2011	0	0	0	107	96	0	0	263	314	81	20	0
12	2012	0	0	0	15	304	61	215	79	160	103	18	0
12	2013	0	0	0	26	84	13	227	257	273	148	90	0

Table 5. Effort (h) per month by fishing area (SFA) and by year.

SFA	Year	J	F	M	A	M	J	J	A	S	O	N	D
8	1982	0	0	0	1509	5781	1487	1557	2608	1382	2767	0	0
8	1983	0	835	2237	6240	1665	4107	2065	2124	2762	1277	272	0
8	1984	0	60	52	3558	2651	2386	781	1334	1455	2098	359	0
8	1985	0	0	0	105	2976	4583	2007	5140	2380	0	0	0
8	1986	0	0	0	2981	2307	1060	3368	2702	1901	1184	141	0
8	1987	0	0	685	2324	2926	6898	2671	5273	2413	2557	668	253
8	1988	0	0	0	2323	9413	8124	7428	3639	0	2831	914	429
8	1989	0	0	0	350	7698	6783	2616	3968	3185	1910	2392	96
8	1990	0	0	0	0	5304	2843	5389	2817	2841	1977	0	0
8	1991	0	0	0	2659	9839	7467	7021	1802	907	240	223	0
8	1992	0	0	0	0	4648	11777	6316	884	1192	488	8	0
8	1993	0	0	0	13	10057	7553	8839	5487	1746	359	134	0
8	1994	0	0	0	0	3589	9781	11505	2392	1699	635	0	0
8	1995	29	0	0	34	16989	9255	241	822	2573	2132	40	0
8	1996	0	0	0	0	6933	9020	4504	1830	428	288	0	0
8	1997	0	0	0	10	6003	9920	4078	1408	707	1118	404	67
8	1998	0	0	0	3810	9685	3552	2227	697	2286	1941	1371	650
8	1999	0	0	0	5994	10597	5343	1277	431	1262	511	910	394
8	2000	0	0	0	7610	7399	2701	2580	3577	985	239	11	0
8	2001	0	0	0	5715	6214	4734	2629	1009	2579	4316	0	0
8	2002	0	0	0	5088	5392	8005	7236	2192	792	433	110	0
8	2003	0	0	0	7	6961	8458	1438	1869	718	297	615	19
8	2004	0	0	15	159	5437	9412	1996	896	693	357	0	0
8	2005	0	0	0	1	4327	4641	1767	3549	3007	2111	22	0
8	2006	0	0	0	865	4385	2890	1650	3168	3695	1903	183	0
8	2007	0	0	3	1802	11968	2415	1567	1519	3084	1579	1039	179
8	2008	0	0	0	3335	10130	2917	4891	1270	120	38	255	0
8	2009	0	0	0	1799	8209	2762	5888	1202	1173	295	34	0
8	2010	0	0	0	905	8720	6426	1334	1623	419	42	97	0
8	2011	0	0	0	407	12450	2761	508	365	44	144	110	0
8	2012	0	0	0	369	9567	4879	1594	900	569	169	0	0
8	2013	0	0	0	263	6126	6022	3646	1498	524	625	61	0

Table 5 continued. Effort (h) per month by fishing area (SFA) and by year.

SFA	Year	J	F	M	A	M	J	J	A	S	O	N	D
9	1982	0	0	0	96	1712	7053	5827	5324	5852	1333	56	0
9	1983	0	0	0	297	854	8374	7357	4696	6462	4874	712	0
9	1984	0	0	0	114	3096	3198	5188	1913	3276	4403	523	0
9	1985	0	0	0	178	1543	5685	8043	6771	7752	3272	0	0
9	1986	0	0	0	43	788	8150	8962	12658	7032	5209	0	0
9	1987	0	0	0	237	5778	6675	13167	10103	3135	1485	0	0
9	1988	0	0	0	248	969	4756	3665	11186	3662	4294	218	0
9	1989	0	0	0	43	1364	7771	5939	4734	3180	8490	570	0
9	1990	0	0	0	3	162	4114	10263	15492	3865	0	0	0
9	1991	0	0	0	97	2417	7393	12883	7208	4184	2857	379	7
9	1992	0	0	0	11	1645	12063	13909	8080	4909	565	44	0
9	1993	0	0	0	0	2605	17805	16191	7780	1919	643	179	0
9	1994	0	0	0	158	1081	7464	18731	9976	2393	921	79	0
9	1995	0	0	0	34	2753	7377	16147	6459	1141	444	22	0
9	1996	0	0	0	170	2794	10794	13540	6447	3043	811	358	0
9	1997	0	0	0	1612	4761	12891	14924	2516	786	0	0	0
9	1998	0	0	0	818	5801	13953	11332	6822	1386	497	0	0
9	1999	0	0	0	236	3749	9160	18387	8630	3998	737	705	298
9	2000	0	0	0	62	3795	13629	16300	5939	2342	371	132	0
9	2001	0	0	0	17	1445	3342	6295	12708	7472	674	216	16
9	2002	0	0	0	90	4110	6259	14975	11610	3862	597	0	121
9	2003	0	0	0	1467	2766	10081	13890	3868	734	319	168	25
9	2004	0	0	0	434	2370	7929	18566	7808	3170	630	91	0
9	2005	0	0	0	295	3826	9264	6440	1554	2771	999	21	0
9	2006	0	0	0	141	3701	5063	6956	5535	4631	1221	204	0
9	2007	0	0	0	0	3355	5210	11754	9163	4209	480	148	197
9	2008	0	0	0	0	3370	6482	9565	7488	2174	489	0	0
9	2009	0	0	0	282	3843	11510	9008	2964	295	218	150	0
9	2010	0	0	0	7	2083	14995	11976	3962	220	114	0	0
9	2011	0	0	0	97	3003	14947	9773	2025	281	108	68	0
9	2012	0	0	0	98	5529	12902	6374	2095	939	362	559	0
9	2013	0	0	0	482	4301	11422	2393	1062	974	197	69	0

Table 5 continued. Effort (h) per month by fishing area (SFA) and by year.

SFA	Year	J	F	M	A	M	J	J	A	S	O	N	D
10	1982	0	0	286	4463	11798	6931	6455	7815	3712	4036	1437	0
10	1983	0	0	0	4232	13263	6619	1331	7963	4290	875	0	0
10	1984	0	0	20	4796	10256	10622	4614	13360	7420	2845	1579	348
10	1985	0	0	675	8552	11779	11199	10197	7432	920	577	101	12
10	1986	0	0	496	9100	13371	8793	9394	481	1639	503	0	0
10	1987	0	0	1098	11281	13818	11303	760	940	12941	6919	0	11
10	1988	0	0	710	8988	16241	13148	15584	4830	10116	3302	0	0
10	1989	0	0	1480	13855	16688	12002	10585	0	10892	0	0	0
10	1990	0	0	0	7846	14371	14732	6620	0	8420	0	0	0
10	1991	0	0	0	8627	14533	9253	6294	6367	5495	3852	407	15
10	1992	0	0	0	5533	10946	6752	5598	9830	12584	10535	3907	277
10	1993	0	0	0	7117	14800	3907	8837	11330	14416	10305	3869	415
10	1994	0	0	338	9482	18330	11207	5914	9101	10538	5276	1820	466
10	1995	0	0	0	10587	16141	9248	2146	3618	1694	514	126	21
10	1996	0	0	0	16102	13612	4582	1795	2587	769	193	138	131
10	1997	0	0	0	13644	12577	7978	3568	2785	385	81	0	22
10	1998	0	0	0	10287	9397	3430	6796	6367	4644	1795	316	10
10	1999	0	0	0	13598	13069	9021	2907	3734	3072	640	246	170
10	2000	0	0	0	12742	13636	7109	4735	7518	2797	2621	950	9
10	2001	0	0	0	13816	7547	2587	1259	6058	14404	11011	9742	964
10	2002	0	0	0	10989	15878	14503	4502	5187	4455	1187	740	175
10	2003	0	0	0	10113	9973	5175	3183	5459	3669	438	178	99
10	2004	0	0	0	12923	14212	7215	3163	7167	6375	919	81	0
10	2005	0	0	0	13924	12540	4536	3944	1758	1373	2876	445	0
10	2006	0	0	0	4823	12427	9411	4070	3310	9136	5315	1324	273
10	2007	0	0	0	4135	13444	12285	6180	1961	1700	2342	1537	132
10	2008	0	0	73	7116	13030	9706	5012	4448	4237	1336	455	167
10	2009	0	0	0	7524	14878	5097	2991	8968	9026	1417	37	0
10	2010	0	0	0	11974	13988	2975	5276	7808	7714	4371	1087	17
10	2011	0	0	0	12017	12519	2464	7249	9010	6360	2641	443	0
10	2012	0	0	0	13682	9411	2392	7177	5690	4184	1666	173	0
10	2013	0	0	0	13321	10357	3594	9059	10110	6727	2249	47	0

Table 5 continued. Effort (h) per month by fishing area (SFA) and by year.

SFA	Year	J	F	M	A	M	J	J	A	S	O	N	D
12	1982	0	0	0	423	284	54	334	39	876	47	0	0
12	1983	0	0	0	200	78	473	2010	278	0	0	0	0
12	1984	0	0	0	57	266	598	1036	117	430	1064	279	48
12	1985	0	0	0	331	323	0	67	341	672	512	0	0
12	1986	0	0	239	149	188	48	507	1051	1339	1668	0	0
12	1987	0	0	0	188	920	663	3290	3309	0	0	0	0
12	1988	0	0	5	2631	957	943	687	0	0	0	0	0
12	1989	0	0	1982	1669	587	512	1420	761	0	0	0	0
12	1990	0	0	1640	715	1693	0	0	0	0	0	0	0
12	1991	0	0	0	1097	262	51	125	173	308	157	14	0
12	1992	0	0	0	1716	1015	333	202	224	349	329	322	0
12	1993	0	0	0	1086	1110	14	29	86	47	692	94	0
12	1994	0	0	492	1035	364	57	50	110	42	93	61	0
12	1995	0	0	0	875	286	69	53	351	71	0	42	0
12	1996	0	0	0	959	80	69	63	127	222	45	10	0
12	1997	0	0	0	1056	317	42	114	348	43	11	16	6
12	1998	0	0	0	485	370	105	265	175	140	170	20	0
12	1999	0	0	0	604	269	32	227	360	180	26	9	0
12	2000	0	0	0	875	336	43	7	295	282	183	30	0
12	2001	0	0	0	731	1523	0	31	22	181	529	274	0
12	2002	0	0	0	880	1587	22	8	319	709	75	36	0
12	2003	0	0	0	524	319	146	0	308	498	120	21	0
12	2004	0	0	0	327	749	306	8	233	628	330	33	0
12	2005	0	0	0	819	547	334	158	273	51	243	54	0
12	2006	0	0	0	632	310	548	48	130	446	49	115	0
12	2007	0	0	0	371	290	248	0	757	889	103	88	0
12	2008	0	0	0	218	1299	109	227	335	465	88	88	0
12	2009	0	0	0	591	684	8	0	817	1062	259	59	0
12	2010	0	0	0	1500	686	0	0	274	640	358	73	0
12	2011	0	0	0	483	497	0	0	1321	1505	458	143	0
12	2012	0	0	0	74	1174	168	672	387	933	680	155	0
12	2013	0	0	0	138	506	88	1266	1465	1647	689	468	0

Table 6. Frequency of observations used for the multiple regression between the logarithm of catch rates and the different categories (year, month, length and power of the vessels) by fishing area.

	ESQUIMAN		ANTICOSTI		SEPT-ILES		ESTUARY	
	n	%	n	%	n	%	n	%
Year								
1982	1073	1.87	1566	2.63	1801	2.01	84	1.39
1983	1401	2.44	1790	3.01	1378	1.54	54	0.89
1984	622	1.08	1408	2.37	3425	3.83	203	3.35
1985	162	0.28	2272	3.82	3229	3.61	43	0.71
1986	943	1.64	2965	4.98	2835	3.17	175	2.89
1987	843	1.47	2319	3.90	3433	3.84	243	4.01
1988	970	1.69	1579	2.65	3908	4.37	226	3.73
1989	1382	2.41	1842	3.10	3372	3.77	252	4.16
1990	1881	3.28	1982	3.33	2773	3.10	194	3.21
1991	2403	4.19	2224	3.74	3323	3.72	149	2.46
1992	1751	3.05	2408	4.05	3877	4.34	261	4.31
1993	2270	3.96	2445	4.11	3982	4.45	153	2.53
1994	1621	2.83	2252	3.78	3670	4.10	134	2.21
1995	2003	3.49	1864	3.13	2267	2.53	120	1.98
1996	1623	2.83	1993	3.35	2066	2.31	112	1.85
1997	1507	2.63	1794	3.02	2159	2.41	140	2.31
1998	2006	3.50	2070	3.48	2320	2.59	143	2.36
1999	2034	3.55	2286	3.84	2518	2.82	125	2.07
2000	2144	3.74	2093	3.52	2643	2.96	177	2.92
2001	1864	3.25	1559	2.62	3333	3.73	223	3.68
2002	2283	3.98	2115	3.55	2952	3.30	239	3.95
2003	1720	3.00	1592	2.68	2087	2.33	186	3.07
2004	1813	3.16	2038	3.43	2797	3.13	205	3.39
2005	1620	2.83	1249	2.10	2257	2.52	213	3.52
2006	1570	2.74	1350	2.27	2766	3.09	208	3.44
2007	2033	3.55	1672	2.81	2126	2.38	232	3.83
2008	1692	2.95	1458	2.45	2460	2.75	209	3.45
2009	3093	5.40	1495	2.51	2674	2.99	256	4.23
2010	2855	4.98	1709	2.87	2804	3.14	252	4.16
2011	2916	5.09	1555	2.61	2845	3.18	276	4.56
2012	2841	4.96	1477	2.48	2419	2.70	253	4.18
2013	2389	4.17	1078	1.81	2931	3.28	313	5.17
Month								
3							231	3.82
4	5707	9.95			18717	20.93	1710	28.25
5	21277	37.11	4742	7.97	22023	24.63	1113	18.39
6	13075	22.81	15005	25.22	12856	14.38	283	4.68
7	7120	12.42	18463	31.03	9355	10.46	493	8.14
8	3747	6.54	12025	20.21	9488	10.61	662	10.94
9	3210	5.6	6263	10.53	10426	11.66	752	12.42
10	2468	4.31	3001	5.04	5003	5.59	570	9.42
11	724	1.26			1562	1.75	239	3.95
Vessel length class								
45	2692	4.7	1493	2.51	2502	2.8	176	2.91
55	28382	49.51	16206	27.24	33698	37.68	1141	18.85
65	20520	35.79	22083	37.11	34848	38.97	3797	62.73
75	3779	6.59	12807	21.52	12265	13.71	939	15.51
85	1955	3.41	6910	11.61	6117	6.84		
Engin power class								
150	3329	5.81	1252	2.1	1519	1.7		
250	6261	10.92	1755	2.95	2384	2.67		
350	11091	19.35	9615	16.16	17885	20	939	15.51
450	11072	19.31	10607	17.83	20857	23.32	1373	22.68
550	14022	24.46	25863	43.47	36984	41.36	3262	53.89
650	7068	12.33	6636	11.15	7298	8.16	479	7.91
750	3712	6.48	2315	3.89	2503	2.8		
850	773	1.35	1456	2.45				

Table 7. Results of the multiple regression between the logarithm of catch rates and the different categories (year, month, length and power of the vessels) for Esquiman fishing area.

	DF	Sum of squares	Mean square	F	Pr > F
Model	49	21189.17	432.43	1835.92	<.0001
Error	57278	13491.26	0.24		
Corrected total	57327	34680.43			

R^2 = 0.61 CV = 8.77 Root MSE = 0.49 Ln CPUE mean = 5.53

Source	DF	Type III SS	Mean square	F	Pr > F
Month	7	885.32	126.47	536.95	<.0001
Length	4	129.97	32.49	137.95	<.0001
Power	7	474.91	67.84	288.04	<.0001
Year	31	13329.85	430.00	1825.57	<.0001

Parameter		Estimate	Standard error	t	Pr > |t|
Intercept		5.585	0.030	183.80	<.0001
Month	4	0.519	0.020	26.27	<.0001
Month	5	0.380	0.019	20.08	<.0001
Month	6	0.463	0.019	24.24	<.0001
Month	7	0.344	0.020	17.59	<.0001
Month	8	0.179	0.020	8.84	<.0001
Month	9	0.102	0.020	4.97	<.0001
Month	10	0.034	0.021	1.61	0.1076
Month	11	0.000	.	.	.
Length class	45	0.194	0.016	12.01	<.0001
Length class	55	0.194	0.013	15.16	<.0001
Length class	65	0.193	0.012	15.58	<.0001
Length class	75	0.018	0.014	1.28	0.2021
Length class	85	0.000	.	.	.
Power class	150	-0.450	0.021	-21.91	<.0001
Power class	250	-0.090	0.019	-4.64	<.0001
Power class	350	-0.132	0.019	-7.02	<.0001
Power class	450	-0.061	0.018	-3.28	0.001
Power class	550	0.011	0.018	0.61	0.5443
Power class	650	0.011	0.019	0.58	0.5617
Power class	750	-0.017	0.019	-0.88	0.3791
Power class	850	0.000	.	.	.

Table 7 continued. Results of the multiple regression between the logarithm of catch rates and the different categories (year, month, length and power of the vessels) for Esquiman fishing area.

Parameter		Estimate	Standard error	t	Pr > |t|
Year	1982	-1.187	0.018	-64.67	<.0001
Year	1983	-1.705	0.017	-100.90	<.0001
Year	1984	-1.536	0.022	-69.29	<.0001
Year	1985	-1.488	0.040	-37.13	<.0001
Year	1986	-1.444	0.019	-75.87	<.0001
Year	1987	-1.398	0.020	-70.56	<.0001
Year	1988	-1.206	0.019	-63.65	<.0001
Year	1989	-0.884	0.017	-51.91	<.0001
Year	1990	-1.023	0.015	-66.89	<.0001
Year	1991	-1.071	0.014	-75.19	<.0001
Year	1992	-1.289	0.016	-83.09	<.0001
Year	1993	-1.104	0.014	-76.34	<.0001
Year	1994	-0.940	0.016	-59.06	<.0001
Year	1995	-0.995	0.015	-66.85	<.0001
Year	1996	-0.663	0.016	-41.94	<.0001
Year	1997	-0.532	0.016	-32.94	<.0001
Year	1998	-0.526	0.015	-35.10	<.0001
Year	1999	-0.599	0.015	-40.19	<.0001
Year	2000	-0.465	0.015	-31.11	<.0001
Year	2001	-0.447	0.015	-29.07	<.0001
Year	2002	-0.468	0.014	-32.32	<.0001
Year	2003	-0.266	0.015	-17.19	<.0001
Year	2004	0.031	0.015	2.06	0.0393
Year	2005	0.144	0.016	9.11	<.0001
Year	2006	0.182	0.016	11.45	<.0001
Year	2007	-0.172	0.015	-11.58	<.0001
Year	2008	-0.228	0.016	-14.64	<.0001
Year	2009	-0.069	0.013	-5.18	<.0001
Year	2010	0.029	0.013	2.13	0.0328
Year	2011	0.106	0.013	7.87	<.0001
Year	2012	0.169	0.014	12.50	<.0001
Year	2013	0.000	.	.	.

Table 8. Results of the multiple regression between the logarithm of catch rates and the different categories (year, month, length and power of the vessels) for Anticosti fishing area.

	DF	Sum of squares	Mean square	F	Pr > F
Model	47	16835.68	358.21	1877.96	<.0001
Error	59451	11339.80	0.19		
Corrected total	59498	28175.47			

R^2 = 0.60 CV = 8.77 Root MSE = 0.44 Ln CPUE mean = 4.98

Source	DF	Type III SS	Mean square	F	Pr > F
Month	5	649.41	129.88	680.93	<.0001
Length	4	44.30	11.07	58.06	<.0001
Power	7	397.11	56.73	297.41	<.0001
Year	31	9203.53	296.89	1556.49	<.0001

Parameter		Estimate	Standard error	t	Pr > |t|
Intercept		5.831	0.020	287.01	<.0001
Month	5	0.347	0.011	32.50	<.0001
Month	6	0.420	0.009	45.54	<.0001
Month	7	0.337	0.009	37.17	<.0001
Month	8	0.232	0.009	24.91	<.0001
Month	9	0.130	0.010	13.12	<.0001
Month	10	0.000	.	.	.
Length class	45	-0.194	0.014	-13.77	<.0001
Length class	55	-0.043	0.008	-5.69	<.0001
Length class	65	-0.026	0.007	-3.66	0.0003
Length class	75	-0.050	0.007	-7.15	<.0001
Length class	85	0.000	.	.	.
Power class	150	-0.626	0.018	-35.55	<.0001
Power class	250	-0.547	0.017	-32.06	<.0001
Power class	350	-0.419	0.013	-32.75	<.0001
Power class	450	-0.403	0.013	-31.32	<.0001
Power class	550	-0.330	0.012	-26.54	<.0001
Power class	650	-0.243	0.013	-18.80	<.0001
Power class	750	-0.196	0.015	-13.05	<.0001
Power class	850	0.000	.	.	.

Table 8 continued. Results of the multiple regression between the logarithm of catch rates and the different categories (year, month, length and power of the vessels) for Anticosti fishing area.

Parameter		Estimate	Standard error	t	Pr > |t|
Year	1982	-1.250	0.018	-70.10	<.0001
Year	1983	-1.279	0.017	-73.38	<.0001
Year	1984	-1.628	0.018	-89.25	<.0001
Year	1985	-1.324	0.017	-79.46	<.0001
Year	1986	-1.396	0.016	-86.85	<.0001
Year	1987	-1.322	0.017	-79.89	<.0001
Year	1988	-1.079	0.018	-61.01	<.0001
Year	1989	-0.808	0.017	-47.12	<.0001
Year	1990	-0.872	0.017	-51.71	<.0001
Year	1991	-0.986	0.016	-59.94	<.0001
Year	1992	-1.204	0.016	-74.21	<.0001
Year	1993	-1.204	0.016	-74.67	<.0001
Year	1994	-1.021	0.016	-62.14	<.0001
Year	1995	-0.835	0.017	-49.35	<.0001
Year	1996	-0.867	0.017	-51.96	<.0001
Year	1997	-0.770	0.017	-45.43	<.0001
Year	1998	-0.698	0.017	-42.26	<.0001
Year	1999	-0.798	0.016	-48.93	<.0001
Year	2000	-0.588	0.016	-35.73	<.0001
Year	2001	-0.665	0.018	-37.94	<.0001
Year	2002	-0.472	0.017	-28.59	<.0001
Year	2003	-0.281	0.017	-16.21	<.0001
Year	2004	-0.294	0.017	-17.70	<.0001
Year	2005	-0.102	0.018	-5.59	<.0001
Year	2006	-0.059	0.018	-3.27	0.0011
Year	2007	-0.136	0.017	-7.89	<.0001
Year	2008	-0.058	0.018	-3.30	0.001
Year	2009	-0.052	0.017	-2.98	0.0029
Year	2010	-0.175	0.017	-10.25	<.0001
Year	2011	-0.110	0.017	-6.32	<.0001
Year	2012	-0.229	0.018	-13.09	<.0001
Year	2013	0.000	.	.	.

Table 9. Results of the multiple regression between the logarithm of catch rates and the different categories (year, month, length and power of the vessels) for Sept-Iles fishing area.

	DF	Sum of squares	Mean square	F	Pr > F
Model	48	33151.68	690.66	2020.44	<.0001
Error	89381	30553.62	0.34		
Corrected total	89429	63705.29			

R^2 = 0.52 CV = 11.89 Root MSE = 0.58 Ln CPUE mean = 4.92

Source	DF	Type III SS	Mean square	F	Pr > F
Month	7	1924.89	274.98	804.43	<.0001
Length	4	210.78	52.70	154.15	<.0001
Power	6	669.68	111.61	326.51	<.0001
Year	31	23596.09	761.16	2226.7	<.0001

Parameter		Estimate	Standard error	t	Pr > |t|
Intercept		5.182	0.023	220.91	<.0001
Month	4	0.637	0.016	40.19	<.0001
Month	5	0.327	0.016	20.69	<.0001
Month	6	0.316	0.016	19.54	<.0001
Month	7	0.399	0.016	24.22	<.0001
Month	8	0.350	0.016	21.42	<.0001
Month	9	0.284	0.016	17.55	<.0001
Month	10	0.105	0.017	6.12	<.0001
Month	11	0.000	.	.	.
Length class	45	-0.297	0.015	-19.24	<.0001
Length class	55	-0.098	0.009	-10.59	<.0001
Length class	65	-0.051	0.009	-5.87	<.0001
Length class	75	-0.139	0.009	-14.71	<.0001
Length class	85	0.000	.	.	.
Power class	150	-0.538	0.020	-26.82	<.0001
Power class	250	-0.197	0.018	-10.87	<.0001
Power class	350	-0.135	0.013	-10.45	<.0001
Power class	450	-0.118	0.013	-9.36	<.0001
Power class	550	0.007	0.012	0.61	0.5422
Power class	650	0.098	0.014	7.21	<.0001
Power class	750	0.000	.	.	.

Table 9 continued. Results of the multiple regression between the logarithm of catch rates and the different categories (year, month, length and power of the vessels) for Sept-Iles fishing area.

Parameter		Estimate	Standard error	t	Pr > |t|
Year	1982	-1.100	0.018	-61.44	<.0001
Year	1983	-0.904	0.020	-46.16	<.0001
Year	1984	-1.118	0.015	-73.85	<.0001
Year	1985	-1.119	0.015	-73.48	<.0001
Year	1986	-1.015	0.016	-64.60	<.0001
Year	1987	-1.002	0.015	-66.55	<.0001
Year	1988	-1.117	0.015	-76.80	<.0001
Year	1989	-1.023	0.015	-68.58	<.0001
Year	1990	-0.641	0.016	-40.95	<.0001
Year	1991	-0.804	0.015	-53.94	<.0001
Year	1992	-1.208	0.014	-83.47	<.0001
Year	1993	-1.242	0.014	-86.66	<.0001
Year	1994	-1.100	0.015	-75.65	<.0001
Year	1995	-0.653	0.016	-39.73	<.0001
Year	1996	-0.509	0.017	-30.17	<.0001
Year	1997	-0.403	0.017	-24.18	<.0001
Year	1998	-0.268	0.016	-16.46	<.0001
Year	1999	-0.317	0.016	-19.91	<.0001
Year	2000	-0.274	0.016	-17.44	<.0001
Year	2001	-0.393	0.015	-26.09	<.0001
Year	2002	-0.228	0.015	-14.87	<.0001
Year	2003	0.162	0.017	9.63	<.0001
Year	2004	0.192	0.015	12.42	<.0001
Year	2005	0.224	0.016	13.61	<.0001
Year	2006	0.298	0.016	19.08	<.0001
Year	2007	0.435	0.017	25.96	<.0001
Year	2008	0.372	0.016	23.20	<.0001
Year	2009	0.274	0.016	17.51	<.0001
Year	2010	0.153	0.015	9.87	<.0001
Year	2011	0.095	0.015	6.20	<.0001
Year	2012	0.072	0.016	4.47	<.0001
Year	2013	0.000	.	.	.

Table 10. Results of the multiple regression between the logarithm of catch rates and the different categories (year, month, length and power of the vessels) for Estuary fishing area.

	DF	Sum of squares	Mean square	F	Pr > F
Model	45	3250.08	72.22	171.94	<.0001
Error	6007	2523.21	0.42		
Corrected total	6052	5773.29			

R^2 = 0.56 CV = 12.61 Root MSE = 0.65 Ln CPUE mean = 5.14

Source	DF	Type III SS	Mean square	F	Pr > F
Month	8	320.87	40.11	95.49	<.0001
Length	3	2.96	0.99	2.35	0.0704
Power	3	27.99	9.33	22.21	<.0001
Year	31	2188.64	70.60	168.08	<.0001

Parameter		Estimate	Standard error	t	Pr > |t|
Intercept		5.309	0.068	78.34	<.0001
Month	3	0.134	0.071	1.89	0.0584
Month	4	0.639	0.046	13.78	<.0001
Month	5	0.201	0.048	4.23	<.0001
Month	6	0.185	0.059	3.13	0.0018
Month	7	0.098	0.054	1.79	0.0732
Month	8	0.122	0.051	2.39	0.0168
Month	9	0.050	0.050	1.01	0.314
Month	10	-0.078	0.051	-1.54	0.1238
Month	11	0.000	.	.	.
Length class	45	-0.116	0.058	-2.01	0.0442
Length class	55	-0.078	0.035	-2.25	0.0242
Length class	65	-0.047	0.026	-1.80	0.0727
Length class	75	0.000	.	.	.
Power class	350	-0.297	0.039	-7.66	<.0001
Power class	450	-0.283	0.039	-7.17	<.0001
Power class	550	-0.198	0.034	-5.77	<.0001
Power class	650	0.000	.	.	.

Table 10 continued. Results of the multiple regression between the logarithm of catch rates and the different categories (year, month, length and power of the vessels) for Estuary fishing area.

Parameter		Estimate	Standard error	t	Pr > |t|
Year	1982	-1.150	0.082	-14.01	<.0001
Year	1983	-1.434	0.099	-14.50	<.0001
Year	1984	-1.208	0.061	-19.89	<.0001
Year	1985	-1.156	0.107	-10.83	<.0001
Year	1986	-1.365	0.062	-21.95	<.0001
Year	1987	-1.211	0.058	-20.81	<.0001
Year	1988	-0.967	0.059	-16.30	<.0001
Year	1989	-0.976	0.060	-16.30	<.0001
Year	1990	-0.528	0.068	-7.76	<.0001
Year	1991	-0.515	0.066	-7.80	<.0001
Year	1992	-1.138	0.056	-20.39	<.0001
Year	1993	-0.455	0.066	-6.92	<.0001
Year	1994	-0.590	0.069	-8.52	<.0001
Year	1995	-0.153	0.071	-2.15	0.0313
Year	1996	-0.062	0.073	-0.85	0.3976
Year	1997	0.016	0.068	0.23	0.8153
Year	1998	0.507	0.067	7.61	<.0001
Year	1999	0.481	0.070	6.88	<.0001
Year	2000	0.373	0.063	5.96	<.0001
Year	2001	0.157	0.059	2.67	0.0076
Year	2002	-0.079	0.057	-1.39	0.1658
Year	2003	0.570	0.061	9.28	<.0001
Year	2004	0.658	0.060	10.91	<.0001
Year	2005	0.574	0.060	9.64	<.0001
Year	2006	0.729	0.060	12.14	<.0001
Year	2007	0.671	0.057	11.74	<.0001
Year	2008	0.603	0.059	10.21	<.0001
Year	2009	0.325	0.056	5.82	<.0001
Year	2010	0.079	0.056	1.40	0.1618
Year	2011	0.007	0.054	0.12	0.9038
Year	2012	0.211	0.055	3.81	0.0001
Year	2013	0.000	.	.	.

Table 11. Standardised catch per unit of effort and its standard error, landing and standardised effort, by fishing area and by year.

SFA	Year	CPUE std	SE	Landing (t)	Effort std
8	1982	178.39	2.95	2111	11834
8	1983	106.24	1.57	2242	21103
8	1984	125.78	2.60	1578	12546
8	1985	131.88	5.16	1421	10775
8	1986	137.95	2.38	1592	11541
8	1987	144.45	2.61	2685	18587
8	1988	174.89	2.99	4335	24787
8	1989	241.44	3.60	4614	19110
8	1990	210.03	2.74	3303	15726
8	1991	200.38	2.33	4773	23820
8	1992	161.10	2.08	3149	19547
8	1993	193.81	2.32	4683	24163
8	1994	228.30	3.09	4689	20539
8	1995	216.17	2.69	4800	22204
8	1996	301.30	4.02	5123	17003
8	1997	343.44	4.72	5957	17345
8	1998	345.39	4.34	6554	18975
8	1999	320.96	4.00	6732	20974
8	2000	367.28	4.61	7396	20137
8	2001	373.85	4.84	7815	20904
8	2002	365.97	4.34	8250	22543
8	2003	448.19	5.78	6773	15112
8	2004	603.10	7.55	8593	14248
8	2005	674.95	9.08	8867	13137
8	2006	701.46	9.66	8957	12769
8	2007	492.32	6.18	9208	18703
8	2008	465.35	6.21	9110	19577
8	2009	545.41	5.87	9473	17369
8	2010	601.56	6.34	9541	15860
8	2011	649.97	7.08	9177	14119
8	2012	692.15	7.56	10244	14800
8	2013	584.50	6.62	9145	15646

Table 11 continued. Standardised catch per unit of effort and its standard error, landing and standardised effort, by fishing area and by year.

SFA	Year	CPUE std	SE	Landing (t)	Effort std
9	1982	114.50	1.45	2464	21521
9	1983	111.24	1.34	2925	26295
9	1984	78.49	1.04	1336	17021
9	1985	106.35	1.16	2786	26197
9	1986	99.00	0.99	3340	33739
9	1987	106.55	1.15	3422	32117
9	1988	135.87	1.68	2844	20931
9	1989	178.22	2.04	4253	23863
9	1990	167.14	1.88	4723	28258
9	1991	149.04	1.58	4590	30798
9	1992	119.86	1.21	4162	34723
9	1993	119.90	1.19	4791	39957
9	1994	144.01	1.52	4854	33707
9	1995	173.39	1.96	4962	28617
9	1996	167.93	1.84	5469	32566
9	1997	185.01	2.09	6058	32745
9	1998	198.95	2.12	6932	34842
9	1999	179.95	1.87	7022	39021
9	2000	221.89	2.37	7941	35788
9	2001	205.50	2.56	5399	26273
9	2002	249.33	2.70	8638	34646
9	2003	301.77	3.61	8742	28969
9	2004	297.91	3.27	10429	35008
9	2005	360.97	4.81	8047	22293
9	2006	376.87	4.91	8754	23228
9	2007	348.90	4.18	10180	29178
9	2008	377.06	4.77	9635	25553
9	2009	379.35	4.67	9644	25422
9	2010	335.57	3.89	10099	30095
9	2011	358.14	4.32	9831	27450
9	2012	317.82	3.92	8267	26011
9	2013	399.64	5.65	7681	19220

Table 11 continued. Standardised catch per unit of effort and its standard error, landing and standardised effort, by fishing area and by year.

SFA	Year	CPUE std	SE	Landing (t)	Effort std
10	1982	92.36	1.43	3774	40862
10	1983	112.43	1.94	3647	32437
10	1984	90.75	1.09	4383	48297
10	1985	90.67	1.10	4399	48519
10	1986	100.58	1.27	4216	41916
10	1987	101.96	1.20	5411	53072
10	1988	90.89	1.02	6047	66530
10	1989	99.77	1.17	6254	62684
10	1990	146.29	1.81	6839	46750
10	1991	124.29	1.46	6411	51582
10	1992	82.98	0.94	4957	59737
10	1993	80.20	0.90	5485	68394
10	1994	92.41	1.05	6165	66716
10	1995	144.50	1.95	6386	44193
10	1996	166.82	2.37	7014	42044
10	1997	185.60	2.57	7737	41686
10	1998	212.40	2.90	8981	42283
10	1999	202.10	2.62	9239	45716
10	2000	211.04	2.71	10160	48144
10	2001	187.30	2.29	10965	58542
10	2002	221.04	2.67	11493	51995
10	2003	326.25	4.63	11357	34810
10	2004	336.52	4.27	15932	47344
10	2005	347.20	4.81	12793	36846
10	2006	373.85	4.74	15312	40958
10	2007	428.93	5.95	15645	36475
10	2008	402.87	5.32	15972	39646
10	2009	365.26	4.74	15873	43456
10	2010	323.38	4.15	15756	48723
10	2011	305.39	3.90	14376	47075
10	2012	298.27	4.04	12516	41962
10	2013	277.59	3.49	14217	51215

Table 11 continued. Standardised catch per unit of effort and its standard error, landing and standardised effort, by fishing area and by year.

SFA	Year	CPUE std	SE	Landing (t)	Effort std
12	1982	74.11	6.24	152	2051
12	1983	55.71	5.44	158	2836
12	1984	70.04	4.28	248	3541
12	1985	73.50	8.03	164	2231
12	1986	59.85	3.92	262	4378
12	1987	69.85	4.14	523	7487
12	1988	89.17	5.00	551	6180
12	1989	88.35	5.32	629	7119
12	1990	138.22	9.58	507	3668
12	1991	139.98	9.40	505	3608
12	1992	75.13	4.26	489	6509
12	1993	148.71	10.07	496	3335
12	1994	129.92	9.03	502	3864
12	1995	200.98	14.29	486	2418
12	1996	220.21	16.17	505	2293
12	1997	238.08	16.40	549	2306
12	1998	389.25	26.10	634	1629
12	1999	379.10	27.13	646	1704
12	2000	340.49	21.85	739	2170
12	2001	274.39	16.78	832	3032
12	2002	216.58	12.94	799	3689
12	2003	414.69	25.93	796	1920
12	2004	452.59	27.34	1033	2282
12	2005	416.43	24.84	1001	2404
12	2006	486.15	28.12	1029	2117
12	2007	458.82	26.90	1022	2227
12	2008	428.50	26.15	1017	2373
12	2009	324.56	19.09	993	3060
12	2010	253.74	15.01	906	3571
12	2011	236.03	13.82	880	3728
12	2012	289.47	16.91	956	3303
12	2013	234.51	13.35	1117	4763

Table 12. Weighting cells used to estimate the numbers at length by fishing area (SFA), by year and by month. The catch corresponds to the landing that is adjusted for the proportion (ratio) of P. borealis in the samples. The origin (month, year) of the samples used for the estimated is also indicated.

SFA	Year	Month	Landing (t)	Samples		Catch estimate (t)	From:		SFA	Year	Month	Landing (t)	Samples		Catch estimate (t)	From:	
				N individuals	Ratio *P. borealis*		Month	Year					N individuals	Ratio *P. borealis*		Month	Year
8	2011	1	0.0						9	2011	1	0.0					
8	2011	2	0.0						9	2011	2	0.0					
8	2011	3	0.0						9	2011	3	0.0					
8	2011	4	125.0	268	0.994	124.3	4	2011	9	2011	4	21.9			21.8	5	2011
8	2011	5	6665.9	4665	0.995	6633.8	5	2011	9	2011	5	1239.6	1290	0.996	1234.7	5	2011
8	2011	6	1996.2	4187	0.993	1982.8	6	2011	9	2011	6	5358.8	2856	0.971	5204.2	6	2011
8	2011	7	172.0	260	0.995	171.2	7	2011	9	2011	7	2473.6	2626	0.986	2439.5	7	2011
8	2011	8	112.8			112.3	7	2011	9	2011	8	548.6	1320	0.983	539.2	8	2011
8	2011	9	6.7			6.7	10	2011	9	2011	9	161.5	513	0.991	160.1	9	2011
8	2011	10	58.0	536	0.995	57.7	10	2011	9	2011	10	22.3			22.1	9	2011
8	2011	11	40.3	571	0.999	40.3	11	2011	9	2011	11	4.6			4.6	9	2011
8	2011	12	0.0						9	2011	12	0.0					
8	2012	1	0.0						9	2012	1	0.0					
8	2012	2	0.0						9	2012	2	0.0					
8	2012	3	0.0						9	2012	3	0.0					
8	2012	4	123.3	555	0.939	115.8	4	2012	9	2012	4	22.3			21.7	5	2012
8	2012	5	5685.0	5165	0.984	5593.4	5	2012	9	2012	5	1818.1	2733	0.971	1765.2	5	2012
8	2012	6	2849.7	2970	0.986	2809.9	6	2012	9	2012	6	3905.1	2179	0.988	3856.9	6	2012
8	2012	7	807.2	1101	0.997	804.9	7	2012	9	2012	7	1679.1	2240	0.994	1669.6	7	2012
8	2012	8	390.8	263	1.000	390.8	8	2012	9	2012	8	487.0	1622	0.999	486.3	8	2012
8	2012	9	307.7			307.7	8	2012	9	2012	9	207.3	801	0.996	206.5	9	2012
8	2012	10	80.2			80.2	8	2012	9	2012	10	71.5	807	0.997	71.3	10	2012
8	2012	11	0.0						9	2012	11	76.6			76.4	10	2012
8	2012	12	0.0						9	2012	12	0.0					
8	2013	1	0.0						9	2013	1	0.0					
8	2013	2	0.0						9	2013	2	0.0					
8	2013	3	0.0						9	2013	3	0.0					
8	2013	4	72.6			71.2	5	2013	9	2013	4	94.8	495	0.963	91.3	4	2013
8	2013	5	3783.5	4505	0.981	3710.9	5	2013	9	2013	5	1689.2	1658	0.959	1620.5	5	2013
8	2013	6	2990.7	2365	0.989	2958.2	6	2013	9	2013	6	4674.5	2133	0.988	4616.8	6	2013
8	2013	7	1411.6	1317	0.996	1406.1	7	2013	9	2013	7	669.9	1946	0.996	667.2	7	2013
8	2013	8	439.9	782	0.993	436.8	8	2013	9	2013	8	257.0	870	0.999	256.7	8	2013
8	2013	9	225.8	2046	0.993	224.2	9	2013	9	2013	9	228.7	544	0.998	228.3	9	2013
8	2013	10	201.5	1805	0.999	201.3	10	2013	9	2013	10	49.6	273	0.978	48.5	10	2013
8	2013	11	19.5			19.5	10	2013	9	2013	11	17.2			16.8	10	2013
8	2013	12	0.0						9	2013	12	0.0					

Table 12 continued. Weighting cells used to estimate the numbers at length by fishing area (SFA), by year and by month. The catch corresponds to the landing that is adjusted for the proportion (ratio) of P. borealis in the samples. The origin (month, year) of the samples used for the estimated is also indicated.

SFA	Year	Month	Landing (t)	Samples		Catch estimate (t)	From:		SFA	Year	Month	Landing (t)	Samples		Catch estimate (t)	From:	
				N individuals	Ratio *P. borealis*		Month	Year					N individuals	Ratio *P. borealis*		Month	Year
10	2011	1	0.0						12	2011	1	0.0					
10	2011	2	0.0						12	2011	2	0.0					
10	2011	3	0.0						12	2011	3	0.0					
10	2011	4	4150.5	3713	0.990	4109.7	4	2011	12	2011	4	106.7	1267	0.975	104.0	4	2011
10	2011	5	3166.8	2625	0.988	3129.6	5	2011	12	2011	5	96.1	512	0.992	95.3	5	2011
10	2011	6	618.0	2410	0.993	613.5	6	2011	12	2011	6	0.0					
10	2011	7	1810.5	2112	0.982	1777.2	7	2011	12	2011	7	0.0					
10	2011	8	2193.9	2619	0.987	2166.4	8	2011	12	2011	8	263.3	1831	0.975	256.6	8	2011
10	2011	9	1531.4	1319	0.966	1478.9	9	2011	12	2011	9	313.6	1044	0.980	307.4	9	2011
10	2011	10	737.4	1278	0.970	715.1	10	2011	12	2011	10	80.7	773	0.975	78.7	10	2011
10	2011	11	167.4			162.3	10	2011	12	2011	11	19.6			19.1	10	2011
10	2011	12	0.0						12	2011	12	0.0					
10	2012	1	0.0						12	2012	1	0.0					
10	2012	2	0.0						12	2012	2	0.0					
10	2012	3	0.0						12	2012	3	0.0					
10	2012	4	4479.4	3746	0.987	4422.2	4	2012	12	2012	4	14.7	273	0.994	14.6	4	2012
10	2012	5	2247.4	2984	0.995	2237.1	5	2012	12	2012	5	304.4	1614	0.982	298.9	5	2012
10	2012	6	673.2	1647	0.996	670.5	6	2012	12	2012	6	61.3	263	0.983	60.3	6	2012
10	2012	7	2064.9	2432	0.990	2044.1	7	2012	12	2012	7	214.6	862	0.942	202.1	7	2012
10	2012	8	1679.4	2253	0.994	1669.4	8	2012	12	2012	8	79.3	260	1.000	79.3	8	2012
10	2012	9	1006.8	1659	0.991	998.1	9	2012	12	2012	9	160.0	543	0.989	158.2	9	2012
10	2012	10	309.8	1271	0.992	307.4	10	2012	12	2012	10	103.3	1082	0.974	100.6	10	2012
10	2012	11	55.1			54.7	10	2012	12	2012	11	18.3			17.8	10	2012
10	2012	12	0.0						12	2012	12	0.0					
10	2013	1	0.0						12	2013	1	0.0					
10	2013	2	0.0						12	2013	2	0.0					
10	2013	3	0.0						12	2013	3	0.0					
10	2013	4	4133.3	4160	0.990	4093.0	4	2013	12	2013	4	26.0	572	0.993	25.8	4	2013
10	2013	5	2275.9	4007	0.990	2252.8	5	2013	12	2013	5	84.2	869	0.992	83.5	5	2013
10	2013	6	860.8	1780	0.992	854.0	6	2013	12	2013	6	13.0	292	0.976	12.7	6	2013
10	2013	7	2379.0	2135	0.986	2344.8	7	2013	12	2013	7	226.9	1438	0.955	216.7	7	2013
10	2013	8	2642.1	2267	0.992	2621.0	8	2013	12	2013	8	256.5	1155	0.967	248.0	8	2013
10	2013	9	1386.3	2055	0.989	1371.3	9	2013	12	2013	9	272.6	1133	0.953	259.8	9	2013
10	2013	10	526.1	1086	0.990	520.6	10	2013	12	2013	10	147.7	772	0.991	146.3	10	2013
10	2013	11	13.5			13.4	10	2013	12	2013	11	90.1	548	0.945	85.2	11	2013
10	2013	12	0.0						12	2013	12	0.0					

Table 13. Commercial catches (in million) by fishing area and by year. M: males, Fp: primiparous females, Fm: multiparous females.

ESQUIMAN	M	Fp	Fm	Total	ANTICOSTI	M	Fp	Fm	Total
1982	215.494	49.492	91.256	356.242	1982	354.331	55.094	61.002	470.427
1983	211.819	37.740	91.560	341.119	1983	375.077	54.539	78.453	508.069
1984	145.040	15.549	85.196	245.785	1984	151.252	36.732	38.081	226.065
1985	151.231	37.706	46.987	235.924	1985	320.703	78.089	76.269	475.061
1986	120.045	31.901	89.999	241.945	1986	442.183	114.163	89.859	646.205
1987	493.459	42.252	68.386	604.097	1987	518.113	125.330	59.129	702.572
1988	656.047	119.061	102.194	877.302	1988	381.706	98.655	75.004	555.365
1989	577.444	124.477	156.915	858.836	1989	637.523	105.404	118.282	861.209
1990	387.893	86.160	98.431	572.484	1990	497.342	196.956	73.961	768.259
1991	566.111	76.143	201.893	844.147	1991	556.637	112.013	107.116	775.766
1992	420.714	102.085	73.063	595.862	1992	406.097	197.015	17.839	620.951
1993	698.498	165.563	86.800	950.861	1993	597.755	222.650	16.018	836.423
1994	619.205	252.483	37.162	908.850	1994	634.086	203.387	22.730	860.203
1995	667.039	241.633	130.037	1038.709	1995	660.898	193.718	21.759	876.375
1996	721.922	250.670	75.166	1047.758	1996	534.054	252.672	48.925	835.651
1997	707.747	323.717	80.080	1111.544	1997	578.694	239.342	73.004	891.040
1998	724.994	192.660	287.530	1205.184	1998	576.832	324.173	92.946	993.951
1999	708.681	284.961	292.935	1286.577	1999	794.582	306.487	52.019	1153.088
2000	886.107	301.021	277.073	1464.201	2000	808.052	367.987	102.416	1278.455
2001	1060.451	350.249	272.424	1683.124	2001	693.367	256.858	31.371	981.596
2002	1123.099	374.999	267.882	1765.980	2002	983.521	494.299	53.328	1531.148
2003	828.602	407.706	150.114	1386.422	2003	830.157	444.364	131.779	1406.300
2004	1032.410	373.656	329.239	1735.305	2004	820.917	529.865	252.313	1603.095
2005	1296.424	406.123	305.434	2007.981	2005	787.549	364.186	194.474	1346.209
2006	1412.634	290.951	441.742	2145.327	2006	887.003	309.751	232.736	1429.490
2007	1427.443	389.382	513.918	2330.743	2007	1010.923	571.354	269.727	1852.004
2008	1436.889	594.169	264.614	2295.672	2008	1194.198	507.016	188.134	1889.348
2009	1552.270	575.361	223.377	2351.008	2009	1141.609	574.811	180.627	1897.047
2010	1363.004	438.653	217.868	2019.525	2010	1396.917	492.835	182.825	2072.577
2011	1089.972	440.064	352.035	1882.071	2011	1169.269	521.825	133.595	1824.689
2012	1453.819	463.478	311.899	2229.196	2012	1144.702	370.907	134.581	1650.190
2013	1007.108	518.097	265.971	1791.176	2013	806.590	442.152	111.488	1360.230

Table 13 continued. Commercial catches (in million) by fishing area and by year. M: males, Fp: primiparous females, Fm: multiparous females.

SEPT-ILES	M	Fp	Fm	Total	ESTUARY	M	Fp	Fm	Total
1982	375.282	53.857	170.848	599.987	1982	13.810	2.877	3.781	20.468
1983	485.454	58.186	138.521	682.161	1983	26.289	3.431	2.544	32.264
1984	390.134	48.936	192.620	631.690	1984	0.000	0.000	0.000	0.000
1985	315.398	84.758	207.568	607.724	1985	0.000	0.000	0.000	0.000
1986	293.776	70.364	267.590	631.730	1986	21.947	8.923	5.832	36.702
1987	538.326	88.080	290.142	916.548	1987	44.606	18.122	10.868	73.596
1988	611.767	108.888	266.561	987.216	1988	32.501	5.390	38.175	76.066
1989	410.861	154.875	311.362	877.098	1989	0.000	0.000	0.000	0.000
1990	489.744	111.135	360.979	961.858	1990	42.153	3.426	27.542	73.121
1991	476.345	73.968	323.239	873.552	1991	0.000	0.000	0.000	0.000
1992	505.295	117.119	160.793	783.207	1992	9.026	3.216	43.162	55.404
1993	514.300	175.244	156.151	845.695	1993	10.958	1.634	39.891	52.483
1994	632.719	195.742	156.810	985.271	1994	7.262	1.315	42.146	50.723
1995	535.856	237.542	196.221	969.619	1995	8.841	4.545	40.014	53.400
1996	608.578	287.066	173.234	1068.878	1996	3.998	5.703	42.644	52.345
1997	510.236	198.577	337.013	1045.826	1997	14.492	8.706	39.940	63.138
1998	515.923	211.279	395.123	1122.325	1998	12.334	9.810	45.413	67.557
1999	541.918	269.191	405.233	1216.342	1999	16.843	12.260	43.412	72.515
2000	738.989	348.368	387.798	1475.155	2000	15.806	11.172	55.032	82.010
2001	661.354	299.342	578.698	1539.394	2001	39.214	20.743	52.503	112.460
2002	787.058	653.214	318.475	1758.747	2002	47.265	24.545	43.310	115.120
2003	530.773	282.130	720.734	1533.637	2003	26.301	15.553	55.642	97.496
2004	764.002	465.282	953.292	2182.576	2004	40.626	15.917	74.884	131.427
2005	696.846	335.327	790.340	1822.513	2005	28.446	20.274	77.983	126.703
2006	859.492	471.118	835.223	2165.833	2006	37.700	15.053	80.898	133.651
2007	806.439	364.161	855.166	2025.766	2007	35.852	18.826	69.653	124.331
2008	895.468	395.937	935.592	2226.997	2008	38.022	18.765	65.636	122.423
2009	958.749	468.496	854.031	2281.276	2009	60.346	20.336	57.901	138.583
2010	1326.559	338.655	943.957	2609.171	2010	43.176	11.771	68.848	123.795
2011	1143.480	488.737	802.924	2435.141	2011	121.495	22.225	32.463	176.183
2012	917.835	390.521	647.957	1956.313	2012	131.421	26.400	27.511	185.332
2013	802.538	547.942	628.512	1978.992	2013	99.101	45.315	28.464	172.880

Table 14. Number per unit of effort by fishing area and by year for the summer season (months of June, July and August). M: males, Fp: primiparous females, Fm: multiparous females.

ESQUIMAN	M	Fp	Fm	Total	ANTICOSTI	M	Fp	Fm	Total
1982	12845	3109	2785	18739	1982	12448	2336	2423	17207
1983	7388	1212	3290	11890	1983	11304	2082	2187	15573
1984	10046	1241	4306	15594	1984	7215	1936	1847	10999
1985	8216	2521	2599	13337	1985	9881	2858	2372	15112
1986	6013	2566	4022	12601	1986	11746	2935	2292	16973
1987	18988	1741	1938	22667	1987	13311	2975	1153	17440
1988	18766	2993	2238	23996	1988	11465	4238	1991	17694
1989	18650	6186	3793	28628	1989	15232	5124	3246	23601
1990	20201	4240	5913	30353	1990	14924	5914	2262	23099
1991	19909	2325	4616	26850	1991	13039	3674	2512	19225
1992	19400	5080	970	25450	1992	9235	5243	157	14635
1993	24667	5944	587	31198	1993	12824	4845	254	17923
1994	21693	9218	1190	32101	1994	15577	5283	346	21206
1995	23299	9163	1844	34305	1995	19813	5720	610	26143
1996	30285	10395	1656	42336	1996	15377	6929	1018	23324
1997	31723	15112	1996	48831	1997	17070	7210	915	25194
1998	39532	13661	1393	54586	1998	14271	8853	915	24038
1999	31478	19599	2607	53684	1999	19195	7293	630	27118
2000	43491	16741	3256	63488	2000	19433	8993	2212	30638
2001	50206	20202	3349	73757	2001	25007	8770	940	34717
2002	40244	18016	1033	59292	2002	24207	12776	665	37648
2003	41526	20380	3342	65247	2003	25963	13545	2663	42170
2004	54115	23899	12619	90633	2004	19862	13586	5731	39179
2005	59383	32072	8299	99754	2005	34693	17068	3695	55456
2006	78243	26079	16361	120683	2006	37762	14506	7190	59457
2007	70104	26985	11473	108561	2007	28682	15777	7119	51578
2008	71563	32384	10509	114456	2008	38808	18251	6572	63631
2009	70258	26883	6299	103440	2009	41083	20515	4628	66225
2010	74142	20590	11163	105896	2010	40380	14448	5500	60328
2011	88551	33294	12418	134263	2011	36740	16992	3839	57571
2012	82334	28262	9198	119794	2012	40394	12904	3653	56951
2013	43260	28773	8382	80414	2013	40008	20944	5328	66280

Table 14 continued. Number per unit of effort by fishing area and by year for the summer season (months of June, July and August). M: males, Fp: primiparous females, Fm: multiparous females.

SEPT-ILES	M	Fp	Fm	Total	ESTUARY	M	Fp	Fm	Total
1982	6275	1417	1743	9435	1982	6465	1347	1770	9583
1983	9649	1796	2264	13708	1983	8435	991	857	10284
1984	7100	979	2193	10272	1984				
1985	7744	2306	2246	12297	1985				
1986	10652	2301	2016	14969	1986	5470	2313	793	8576
1987	13195	1592	2713	17500	1987	5484	2320	795	8599
1988	9917	1612	2725	14255	1988	7115	3009	1032	11156
1989	7485	2007	2860	12352	1989				
1990	13117	3048	3482	19647	1990				
1991	10696	1952	3787	16435	1991				
1992	6995	3359	399	10753	1992	3098	670	3083	6851
1993	6247	4017	468	10732	1993	3735	808	3717	8260
1994	8657	3990	458	13104	1994	2721	1038	1283	5042
1995	12601	7250	1368	21220	1995	12903	7825	4440	25168
1996	14788	8670	1673	25131	1996	3796	4645	3863	12304
1997	16246	7931	2136	26313	1997	5604	11664	6747	24015
1998	14161	8296	1197	23654	1998	12660	12423	5316	30398
1999	17787	9366	873	28026	1999	9080	15353	2912	27346
2000	19615	9240	2883	31738	2000	20801	11217	5935	37953
2001	14256	9250	3027	26533	2001	20153	3901	3771	27824
2002	18087	16085	502	34673	2002	17055	16888	1254	35197
2003	20197	12708	3442	36348	2003	11332	17082	7439	35852
2004	19842	15694	5170	40707	2004	14925	14730	5850	35505
2005	25579	17658	3608	46844	2005	20553	18474	14103	53130
2006	21576	13349	9776	44700	2006	27826	10207	16060	54093
2007	25084	12255	10899	48239	2007	20957	9713	15123	45793
2008	29843	13630	4567	48040	2008	28113	17973	6243	52330
2009	23531	14322	5137	42990	2009	15330	12757	3832	31919
2010	35723	11764	3693	51180	2010	10830	17148	7349	35328
2011	23800	15000	3157	41957	2011	38310	6002	1791	46103
2012	33134	13308	3376	49818	2012	47641	9304	3037	59982
2013	20546	14898	2022	37466	2013	12601	13200	648	26449

Table 15. Sum of the duration (hours) of fishing tows realised with an observer on board and total fishing effort (hours) of shrimpers by fishing area and by NAFO unit area for 2012 and 2013.

	2012		2013	
	Hour (h)		Hour (h)	
	Observer	Fishery	Observer	Fishery
Estuary				
4TP				515
4TQ	278	4242	627	5753
Total	**278**	**4242**	**627**	**6268**
Sept-Iles				
4SI	201	7874	1045	16021
4SS	537	12737	507	12033
4SZ	614	13071	617	13713
4TK	302	1804	355	3903
4TN	338	2530	264	3052
4TO	313	6206	208	6586
4TQ	75	154		156
Total	**2380**	**44376**	**2997**	**55464**
Anticosti				
4SS	31	433	6	72
4SV	130	2154		81
4SX	1219	24959	852	20421
4SY	39	1293		316
4TF	11	18		
4TK	34		6	9
Total	**1464**	**28858**	**864**	**20899**
Esquiman				
4R	352		202	
4RA		1352		543
4RB	645	16314	738	18227
4RC	39	109	2	8
4SV	36	262		10
Total	**1072**	**18038**	**941**	**18788**

Table 16. Weighting factor (fleet fishing effort / fishing effort with an observer) by cell (combination of shrimp fishing area (SFA) and NAFO subdivisions) used to scale the at-sea observer results to the total fishing effort of the shrimper fleet.

	Estuary	Sept-Iles				Anticosti			Esquiman
SFA	12	10	10	10	10	9	9	9	8
NAFO	4Tp 4Tq	4To 4Tn 4Tk	4Tq 4Sz	4Si 4Sy	4Ss	4Tf 4Tk	4Ss	4Sx 4Sy 4Sv	4Sv 4Ra 4Rb 4Rc 4R
Year									
2000	21.17	15.45	26.98	17.97	11.56	12.21	14.11	39.28	29.55
2001	16.95	23.73	28.01	18.46	22.22	82.75	15.36	25.75	29.33
2002	12.34	14.05	10.72	50.50	43.30	5.88	16.73	23.06	26.54
2003	54.00	14.36	12.20	19.96	14.77	79.10	22.24	25.83	19.37
2004	19.60	24.38	23.86	8.14	14.02	29.34	24.20	23.82	36.27
2005	9.18	14.29	12.83	21.18	21.72	1.72	22.73	20.15	44.65
2006	18.94	12.21	16.06	14.25	27.41	28.96	16.22	30.55	26.08
2007	8.95	11.03	23.84	20.28	44.99	10.03	13.69	20.12	28.01
2008	9.12	15.41	20.16	16.87	28.35	3.50	19.91	17.36	34.80
2009	12.00	11.72	29.47	21.77	28.91	1.28	23.40	11.94	68.48
2010	12.59	18.02	16.45	15.10	27.97		11.77	16.23	24.23
2011	6.85	37.42	26.91	19.08	28.51		9.56	13.46	24.51
2012	15.24	11.06	19.20	39.14	23.71	0.41	14.20	20.46	16.82
2013	10.00	16.37	22.48	15.33	23.73	1.65	11.81	24.43	19.93

Table 17. Bycatch (t) and ratio (%) of the bycatch on the northern shrimp catch by year and by fishing area for all species combined.

	Bycatch (t)					Ratio (%)				
SFA	12	10	9	8	Total	12	10	9	8	Total
Year										
2000	20	227	168	80	495	2.71	2.24	2.12	1.08	1.89
2001	6	152	70	125	353	0.69	1.39	1.29	1.60	1.41
2002	9	225	107	316	657	1.18	1.96	1.24	3.83	2.25
2003	11	276	85	85	457	1.42	2.43	0.97	1.25	1.65
2004	8	324	105	165	601	0.73	2.03	1.01	1.92	1.67
2005	17	158	60	175	410	1.66	1.23	0.75	1.98	1.34
2006	8	187	108	42	345	0.82	1.22	1.24	0.47	1.01
2007	10	145	124	94	373	1.02	0.93	1.22	1.02	1.04
2008	42	206	112	86	446	4.18	1.29	1.17	0.94	1.25
2009	25	169	124	283	599	2.49	1.06	1.28	2.98	1.67
2010	41	176	176	111	505	4.53	1.12	1.75	1.16	1.39
2011	23	329	137	66	555	2.60	2.29	1.40	0.72	1.62
2012	12	260	147	70	488	1.25	2.08	1.77	0.68	1.53
2013	74	537	88	143	842	6.60	3.78	1.15	1.56	2.62
Mean 2000-2011	22	241	115	131	508	2.28	1.79	1.31	1.51	1.59

Table 18. Occurrence and total catch of sampled tows by observers (16,545 tows) for 98 taxa for the 2000-2013 period.

	Occurrence		Catch (kg)
Taxa	n tows	%	
Northern shrimp	16526	99.885	21860175
Greenland halibut	14789	89.387	64863
Capelin	13872	83.844	103687
Redfishes	11745	70.988	36326
Atlantic herring	11444	69.169	34201
American plaice	9582	57.915	17413
Witch flounder	7471	45.156	10858
White barracudina	6748	40.786	6866
Thorny skate	5818	35.165	6256
Atlantic hagfish	4796	28.988	2312
Eelpouts (Lycodes)	4009	24.231	3759
Marlin-spike	3957	23.917	1085
Atlantic cod	3806	23.004	9082
Fourbeard rockling	2076	12.548	814
Sand lances	1782	10.771	2802
Squids	1566	9.465	1852
Poachers	1416	8.558	1463
Pink glass shrimp	1297	7.839	12920
Silver hake	1223	7.392	339
White hake	1155	6.981	599
Atlantic soft pout	792	4.787	83
Smooth skate	774	4.678	357
Octopoda	678	4.098	41
Arctic cod	655	3.959	741
Anthozoan	596	3.602	146
Sea stars	459	2.774	32
Seasnails	446	2.696	446
Snow crab	446	2.696	81
Atlantic halibut	408	2.466	2596
Sculpins (Chaboisseaux)	380	2.297	381
Spinytail skate	349	2.109	275
Scyphozoans	335	2.025	596
Eelpouts (Lompénies)	315	1.904	410
Lumpfishes (Poules de mer)	288	1.741	295
Wrymouth	276	1.668	103
Lumpfish (Grosse poule de mer)	244	1.475	42
Rocklings	243	1.469	333
Hookear sculpins	239	1.445	249
Winter flounder	207	1.251	277
Lantern-fishes	197	1.191	200
Sculpins (Faux-trigles)	162	0.979	163
Hatchetfishes	146	0.882	146
Fourline snakeblenny	141	0.852	169
Atlantic wolffish	135	0.816	93
Bobtails	124	0.749	125
Winter skate	120	0.725	129
Longfin hake	110	0.665	112
Sea urchins	94	0.568	114
Pennatula borealis / Sea pen	91	0.550	91

Table 18 continued. Occurrence and total catch of sampled tows by observers (16,545 tows) for 98 taxa for the 2000-2013 period.

	Occurrence		Catch (kg)
Taxa	n tows	%	
Greenland cod	89	0.538	130
Rainbow smelt	88	0.532	2240
Atlantic mackerel	85	0.514	70
Crevettes / Shrimp-Like	81	0.490	577
Ocean pout	67	0.405	19
Spiny dogfish	61	0.369	72
Toad crabs	59	0.357	59
Sticklebacks	58	0.351	58
Black dogfish	57	0.345	1925
Striped pink shrimp	55	0.332	4698
Spotted wolffish	54	0.326	60
Slender snipe eel	51	0.308	51
Sponges	49	0.296	49
Bivalves	35	0.212	35
Yellowtail flounder	31	0.187	32
Brittle stars	27	0.163	27
Haddock	25	0.151	25
Monkfish	23	0.139	28
Sea cucumbers	22	0.133	22
Sea lamprey	20	0.121	20
Pollock	19	0.115	23
Lightfishes	19	0.115	19
Stout sawpalate	16	0.097	16
Arctic staghorn sculpin	15	0.091	15
Norway king crab	12	0.073	12
Atlantic tomcod	10	0.060	23
Atlantic argentine	9	0.054	2614
American eel	9	0.054	9
Basket stars	8	0.048	8
American shad	7	0.042	9
Northern wolffish	6	0.036	7
Slatjaw cutthroat eel	6	0.036	6
Boa dragonfish	5	0.030	5
Manylight viperfish	5	0.030	5
Rock gunnel	5	0.030	5
Atlantic salmon	4	0.024	5
Blue whiting	4	0.024	4
Sea raven	4	0.024	4
Atlantic rock crab	4	0.024	5
Polar sculpin	3	0.018	3
Fish doctor	3	0.018	3
Scaleless dragonfishes	3	0.018	3
Atlantic saury	3	0.018	3
Anglers	2	0.012	2
Striped bass	1	0.006	1
Round skate	1	0.006	1
Sculpins (Icèles)	1	0.006	1
Butterfish	1	0.006	1
Mummichog	1	0.006	1

Table 19. Occurrence and bycatch means for the 2000-2011 period and for the years 2012 and 2013.

	Occurrence (%)			Bycatch (kg)		
Taxa	2000-2011	2012	2013	2000-2011	2012	2013
Greenland halibut	89.489	82.185	94.359	86987	50712	97390
Capelin	82.628	90.000	93.077	179777	149570	109564
Redfishes	68.920	68.739	97.778	27006	14878	391531
Atlantic herring	67.520	76.555	80.342	45814	64166	62219
American plaice	56.870	74.286	56.325	21628	51299	20700
Witch flounder	43.772	50.672	54.188	14821	15287	15854
White barracudina	36.982	63.193	62.906	7773	16875	16720
Thorny skate	34.599	43.445	32.393	7731	10048	4633
Atlantic hagfish	27.588	31.345	41.966	2997	3026	4497
Marlin-spike	25.089	11.092	21.453	1615	583	1127
Eelpouts (Lycodes)	23.857	28.571	24.103	4391	9451	5155
Atlantic cod	21.293	32.017	36.496	8166	22849	31638
Sand lances	12.180	2.689	1.795	4987	1000	406
Fourbeard rockling	11.207	21.849	20.000	875	1450	1712
Squids	10.331	6.639	1.709	2733	1279	397
Poachers	7.856	10.336	15.385	1741	2484	2809
White hake	7.083	3.782	8.974	707	257	1090
Silver hake	6.749	3.529	17.265	447	162	855
Pink glass shrimp	6.474	16.891	13.590	20159	2847	21316
Smooth skate	4.317	4.286	10.085	479	230	780
Atlantic soft pout	3.890	6.050	14.786	103	107	250
Arctic cod	3.881	5.546	2.308	940	1615	790
Octopoda	3.871	5.966	5.214	54	96	44
Anthozoan	2.977	5.042	9.915	167	178	424
Sea stars	2.589	2.101	6.410	39	14	38
Snow crab	2.552	3.361	3.846	108	100	84
Sculpins (Chaboisseaux)	2.303	2.689	1.538	468	670	219
Seasnails	2.279	3.445	7.265	387	732	1041
Atlantic halibut	2.271	4.790	1.709	2775	12529	3789
Spinytail skate	2.268	0.252	1.709	441	22	153
Eelpouts (Lompénies)	1.973	3.361	0.000	970	1009	0
Lumpfishes	1.859	1.765	0.342	407	436	95
Scyphozoans	1.742	3.277	3.932	1133	155	114
Wrymouth	1.647	3.109	0.513	133	71	11
Rocklings	1.605	0.756	0.171	478	268	31
Lumpfish (Grosse poule de mer)	1.513	1.092	1.795	64	24	33
Hookear sculpins	1.306	2.605	2.222	269	652	388
Sculpins (Faux-trigles)	1.073	1.008	0.342	184	249	60
Winter flounder	0.874	7.227	0.000	285	2110	0
Lantern-fishes	0.797	1.092	5.983	189	186	1246
Atlantic wolffish	0.780	1.429	0.171	126	282	27
Longfin hake	0.753	0.168	0.256	165	26	55
Fourline snakeblenny	0.651	3.782	0.342	182	1665	70
Hatchetfishes	0.631	2.017	2.821	148	396	567
Atlantic mackerel	0.609	0.000	0.085	128	0	24
Rainbow smelt	0.600	0.084	0.000	3024	11	0
Greenland cod	0.527	0.252	0.427	149	34	103
Winter skate	0.520	0.084	3.761	79	2	451
Spiny dogfish	0.434	0.000	0.000	149	0	0

Table 19 continued. Occurrence and bycatch means for the 2000-2011 period and for the years 2012 and 2013.

	Occurrence (%)			Bycatch (kg)		
Taxon	2000-2011	2012	2013	2000-2011	2012	2013
Sea urchins	0.426	0.420	2.650	107	121	534
Bobtails	0.425	2.689	2.650	100	681	601
Ocean pout	0.417	0.252	0.000	22	8	0
Spotted wolffish	0.402	0.168	0.000	83	50	0
Striped pink shrimp	0.364	0.168	0.171	5235	47	32
Sticklebacks	0.338	0.672	0.256	75	118	48
Slender snipe eel	0.326	0.504	0.085	71	135	22
Black dogfish	0.325	0.588	0.427	1587	25370	36
Toad crabs	0.309	0.168	1.111	54	22	148
Shrimp-Like	0.299	1.008	2.222	602	187	1655
Sea pen (Pennatula borealis)	0.262	1.008	3.675	66	199	798
Sponges	0.203	1.092	0.513	55	246	109
Yellowtail flounder	0.190	0.336	0.085	46	52	22
Haddock	0.161	0.000	0.000	33	0	0
Monkfish	0.154	0.168	0.000	41	117	0
Sea cucumbers	0.143	0.000	0.171	28	0	42
Bivalves	0.142	0.504	0.769	26	113	174
Brittle stars	0.136	0.168	0.513	28	41	97
Pollock	0.131	0.000	0.000	27	0	0
Sea lamprey	0.122	0.084	0.171	30	24	39
Arctic staghorn sculpin	0.106	0.000	0.085	22	0	24
Stout sawpalate	0.093	0.000	0.171	20	0	45
Atlantic tomcod	0.073	0.000	0.000	35	0	0
American eel	0.059	0.000	0.000	13	0	0
Atlantic argentine	0.056	0.000	0.085	5778	0	22
Northern wolffish	0.042	0.000	0.000	24	0	0
Slatjaw cutthroat eel	0.042	0.000	0.000	6	0	0
Lightfishes	0.041	0.084	1.026	9	11	212
Norway king crab	0.038	0.084	0.513	7	39	92
Rock gunnel	0.036	0.000	0.000	6	0	0
Atlantic salmon	0.029	0.000	0.000	10	0	0
Blue whiting	0.029	0.000	0.000	5	0	0
Boa dragonfish	0.029	0.000	0.085	6	0	22
Atlantic rock crab	0.028	0.000	0.000	9	0	0
American shad	0.027	0.084	0.171	9	24	31
Fish doctor	0.024	0.000	0.000	4	0	0
Polar sculpin	0.023	0.000	0.000	9	0	0
Atlantic saury	0.023	0.000	0.000	5	0	0
Basket stars	0.015	0.000	0.513	2	0	110
Manylight viperfish	0.014	0.000	0.256	4	0	63
Anglers	0.014	0.000	0.000	3	0	0
Sea raven	0.014	0.000	0.171	2	0	20
Scaleless dragonfishes	0.014	0.084	0.000	2	19	0
Mummichog	0.008	0.000	0.000	2	0	0
Striped bass	0.007	0.000	0.000	1	0	0
Round skate	0.007	0.000	0.000	2	0	0
Sculpins (Icèles)	0.007	0.000	0.000	1	0	0
Butterfish	0.007	0.000	0.000	1	0	0

Table 20. Survey abundance and biomass estimates, bycatches in number and weight and ratio of the bycatch on the survey estimate.

Year	Survey		Bycatch		Ratio (%)	
	N (x1000)	Weight (t)	N (x1000)	Weight (t)	N	Weight
Atlantic cod (< 30 cm)						
2000-2011	57338	7332	79.56	8.17	0.125	0.113
2012	75086	7794	378.07	22.85	0.504	0.293
2013	121686	15335	663.59	31.64	0.545	0.206
Redfishes(< 20 cm)						
2000-2011	955280	27136	603.47	27.01	0.140	0.197
2012	266725	9942	262.85	14.88	0.099	0.150
2013	7810891	97208	54315.47	391.53	0.695	0.403
Greenland halibut (< 31 cm)						
2000-2011	259575	27193	1350.24	86.99	0.536	0.355
2012	266506	34181	507.31	50.71	0.190	0.148
2013	199331	12316	2743.43	97.37	1.376	0.791
American plaice (< 30 cm)						
2000-2011	298107	16119	357.71	21.63	0.179	0.182
2012	325630	16373	853.83	51.30	0.262	0.313
2013	307489	15847	418.52	20.70	0.136	0.131
Witch flounder (< 30 cm)						
2000-2011	67731	3891	208.94	14.82	0.300	0.380
2012	76352	5941	227.39	15.29	0.298	0.257
2013	69381	5912	91.16	15.85	0.131	0.268
White hake (< 30 cm)						
2000-2011		466		0.71		0.232
2012		36		0.26		0.709
2013		540		1.09		0.202
Atlantic halibut						
2000-2011		6923		2.78		0.098
2012		9855		12.53		0.127
2013		9602		3.79		0.039
Fourbeard rockling						
2000-2011		1606		0.87		0.062
2012		1451		1.45		0.100
2013		2132		1.71		0.080
Thorny skate (< 30 cm)						
2000-2011		1884		7.73		0.450
2012		1519		10.05		0.662
2013		2113		4.63		0.219
Smooth skate (< 30 cm)						
2000-2011		463		0.48		0.153
2012		244		0.23		0.094
2013		471		0.78		0.166

Table 20 continued. Survey abundance and biomass estimates, bycatches in number and weight and ratio of the bycatch on the survey estimate.

Year	Survey		Bycatch		Ratio (%)	
	N (x1000)	Weight (t)	N (x1000)	Weight (t)	N	Weight
Atlantic hagfish						
2000-2011		5761		3.00		0.058
2012		4370		3.03		0.069
2013		9313		4.50		0.048
Marlin-spike						
2000-2011		2908		1.61		0.057
2012		2733		0.58		0.021
2013		1457		1.13		0.077
Lumpfish (Grosse poule de mer)						
2000-2011		325		0.06		0.028
2012		102		0.02		0.023
2013		180		0.03		0.018
Atlantic soft pout						
2000-2011		134		0.10		0.076
2012		115		0.11		0.093
2013		179		0.25		0.139
Silver hake						
2006-2011		390		0.78		0.394
2012		619		0.16		0.026
2013		2887		0.85		0.030
Atlantic wolffish						
2006-2011		2408		0.15		0.005
2012		1702		0.28		0.017
2013		2130		0.03		0.001
Spotted wolffish						
2006-2011		965		0.05		0.007
2012		511		0.05		0.010
2013		18		0.00		0.000
Arctic cod						
2006-2011		39		0.95		13.082
2012		4		1.61		42.908
2013		12		0.79		6.742
Longfin hake						
2006-2011		1929		0.26		0.014
2012		1433		0.03		0.002
2013		819		0.06		0.007
Rocklings						
2006-2011		1		0.50		259.232
2012		1		0.27		46.605
2013		1		0.03		2.264

Table 20 continued. Survey abundance and biomass estimates, bycatches in number and weight and ratio of the bycatch on the survey estimate.

Year	Survey		Bycatch		Ratio (%)	
	N (x1000)	Weight (t)	N (x1000)	Weight (t)	N	Weight
Sculpins (Faux-trigles)						
2006-2011		944		0.21		0.025
2012		557		0.25		0.045
2013		411		0.06		0.015
Sculpins (Chaboisseaux)						
2006-2011		2697		0.42		0.019
2012		2762		0.67		0.024
2013		1728		0.22		0.013
Hookear sculpins						
2006-2011		49		0.46		1.088
2012		60		0.65		1.092
2013		28		0.38		1.387
Poachers						
2006-2011		181		2.29		1.351
2012		442		2.48		0.563
2013		122		2.81		2.305
Seasnails						
2006-2011		447		0.52		1.061
2012		140		0.73		0.524
2013		58		1.04		1.786
Lumpfishes (Poules de mer)						
2006-2011		189		0.39		0.214
2012		58		0.44		0.757
2013		82		0.09		0.116
Eelpouts (Lompénies)						
2006-2011		3244		1.90		0.057
2012		2421		1.01		0.042
2013		3555		0.00		0.000
Wrymouth						
2006-2011		172		0.21		0.077
2012		231		0.07		0.031
2013		353		0.01		0.003
Eelpouts (Lycodes)						
2006-2011		2635		4.90		0.198
2012		2282		9.45		0.414
2013		2001		5.15		0.258

FIGURES

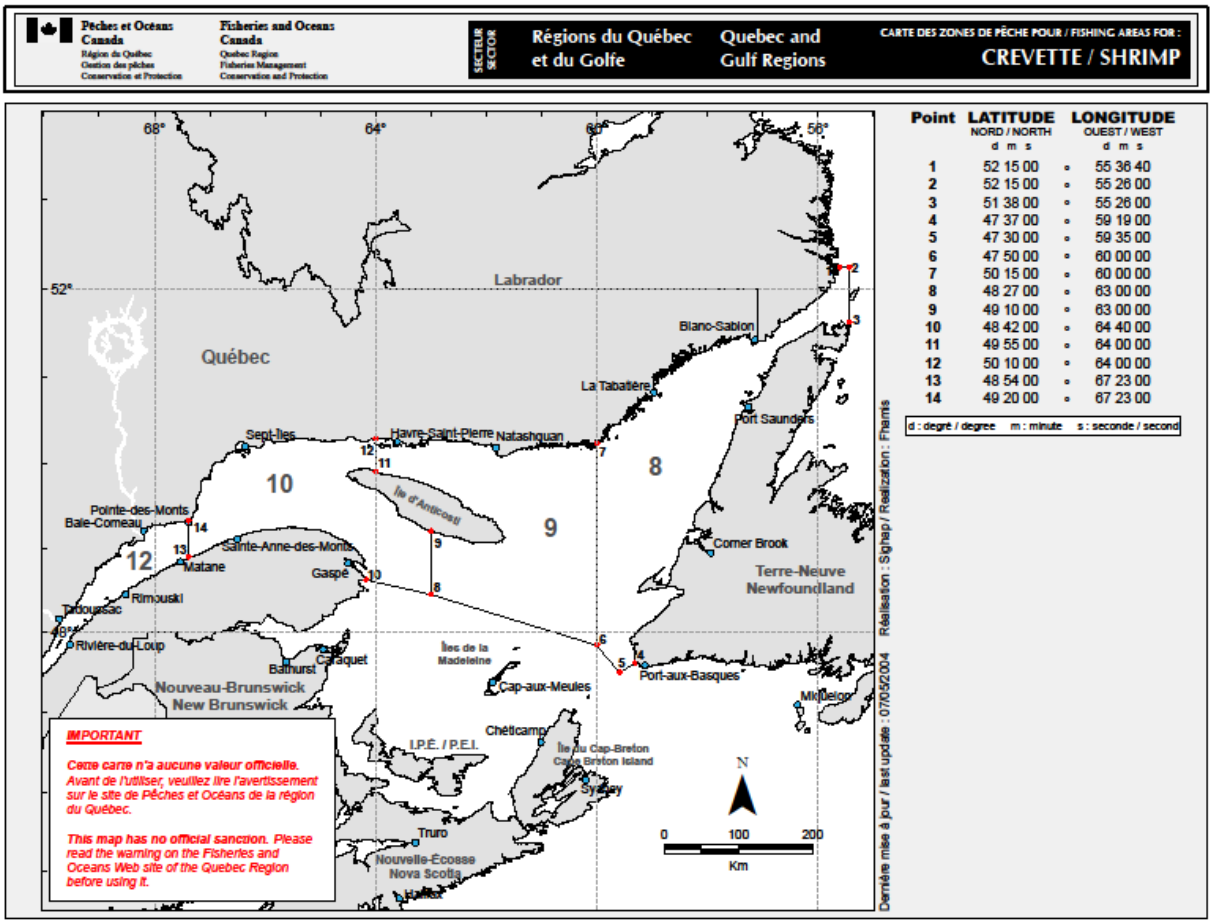

Figure 1. Shrimp fishing areas (SFA) in the northern Gulf of St. Lawrence: Estuary (SFA 12); Sept-Iles (SFA 10); Anticosti (SFA 9); Esquiman (SFA 8).

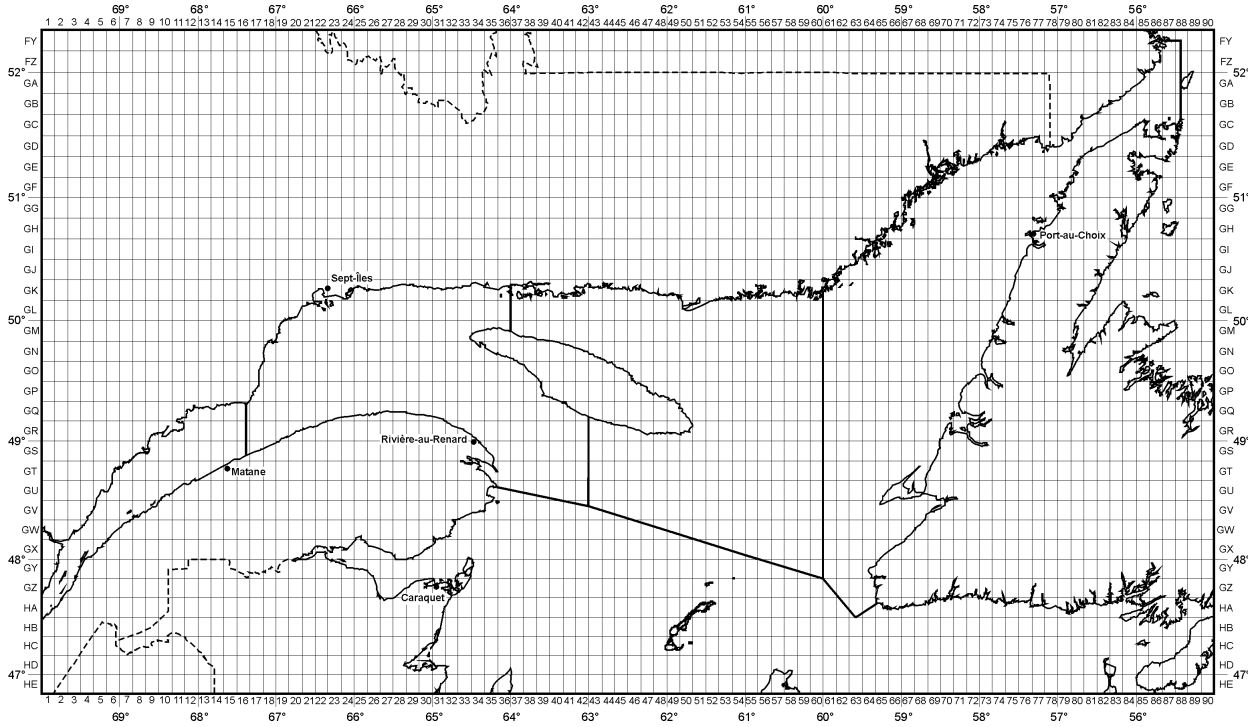

Figure 2. Statistical squares used to list the fishing effort and shrimp fishing areas (SFA) in the Estuary and Gulf of St. Lawrence. Estuary, ZFA 12; Sept-Iles, ZFA 10; Anticosti, ZFA 9; Esquiman, ZFA 8.

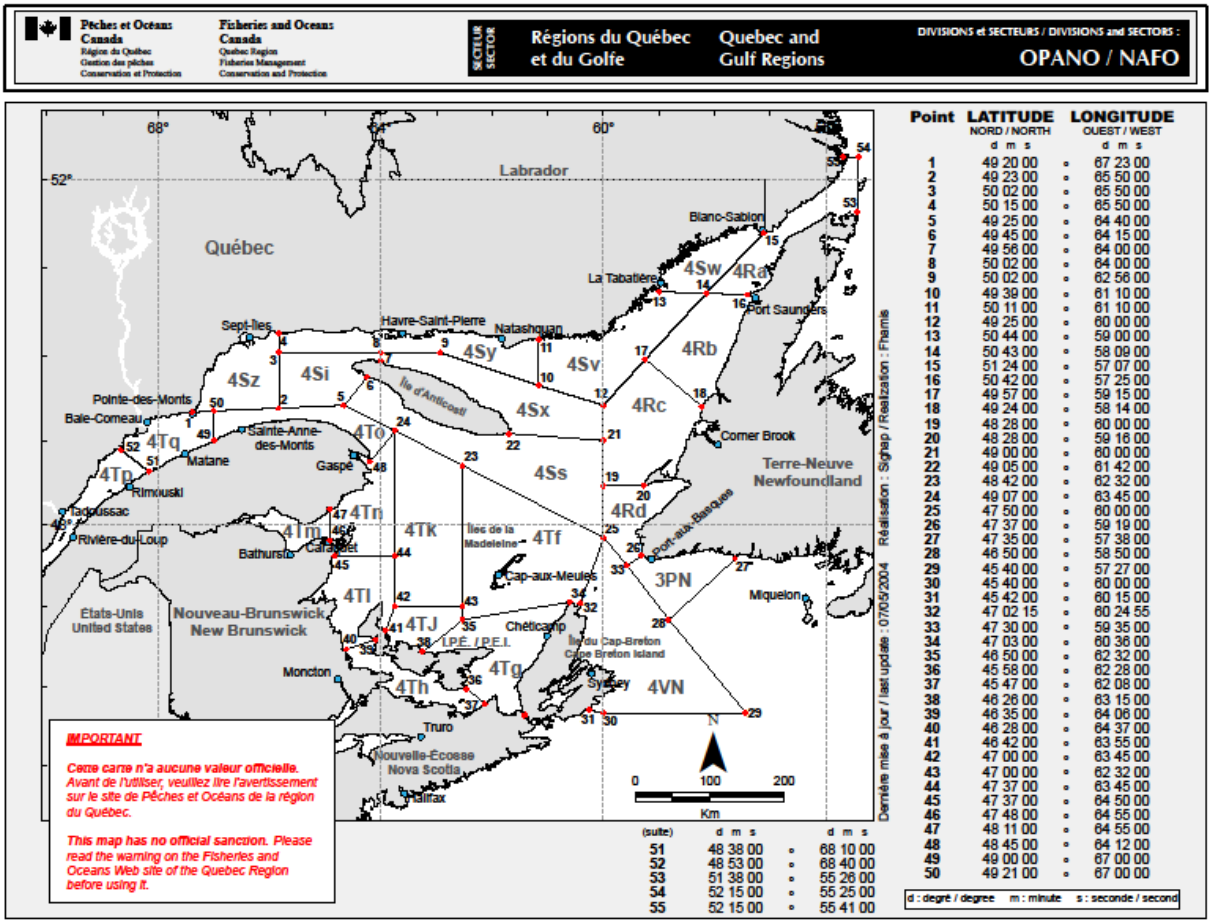

Figure 3. NAFO unit areas in the Gulf of St. Lawrence.

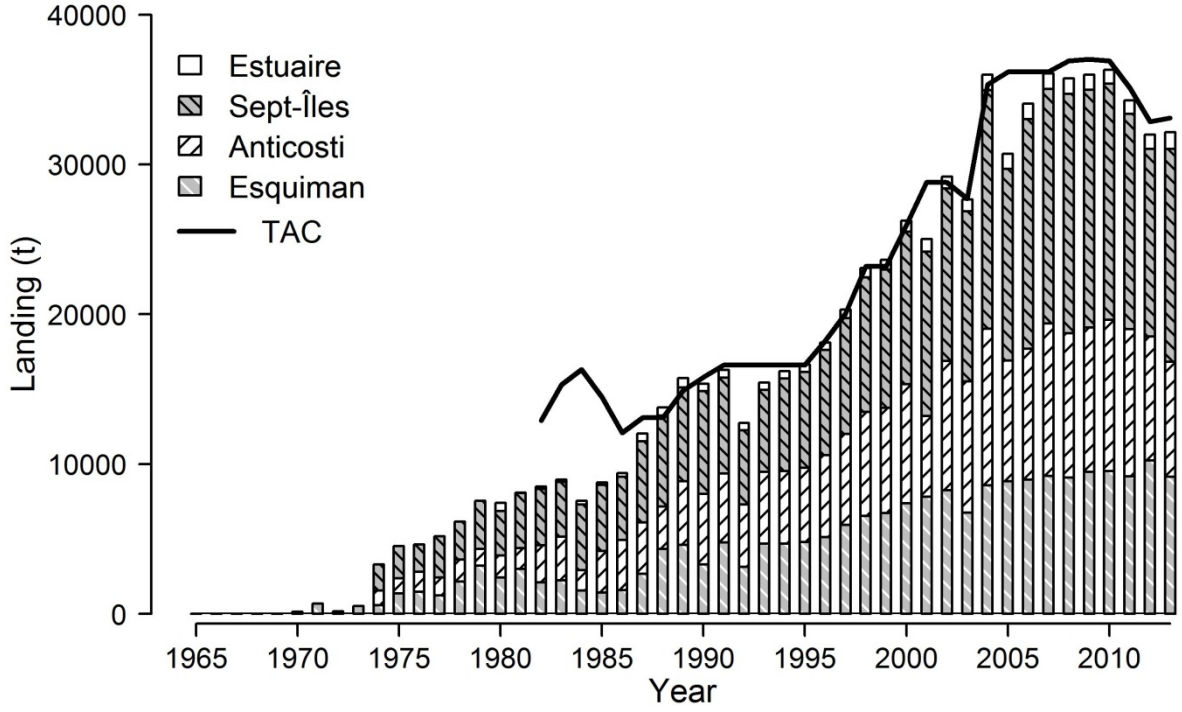

Figure 4. Landing and total allowable catches (TAC) in the Estuary and Gulf of St. Lawrence.

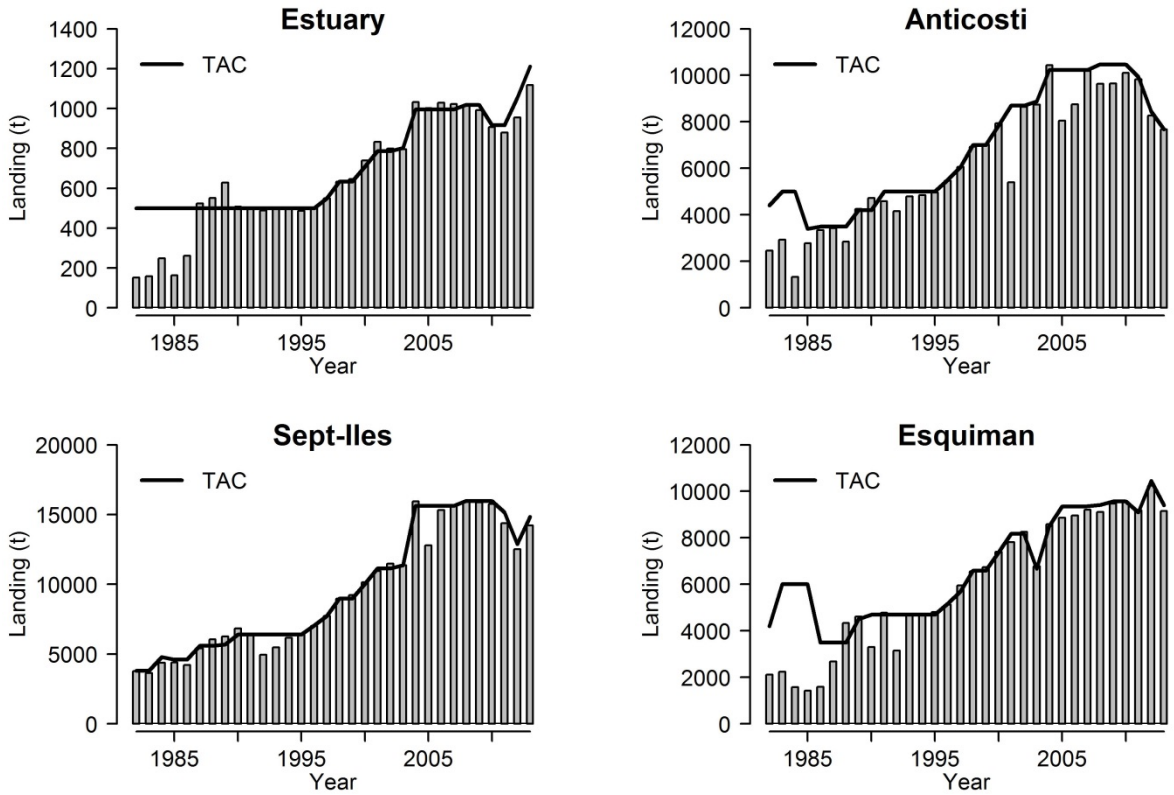

Figure 5. Landing and total allowable catches (TAC) by shrimp fishing area.

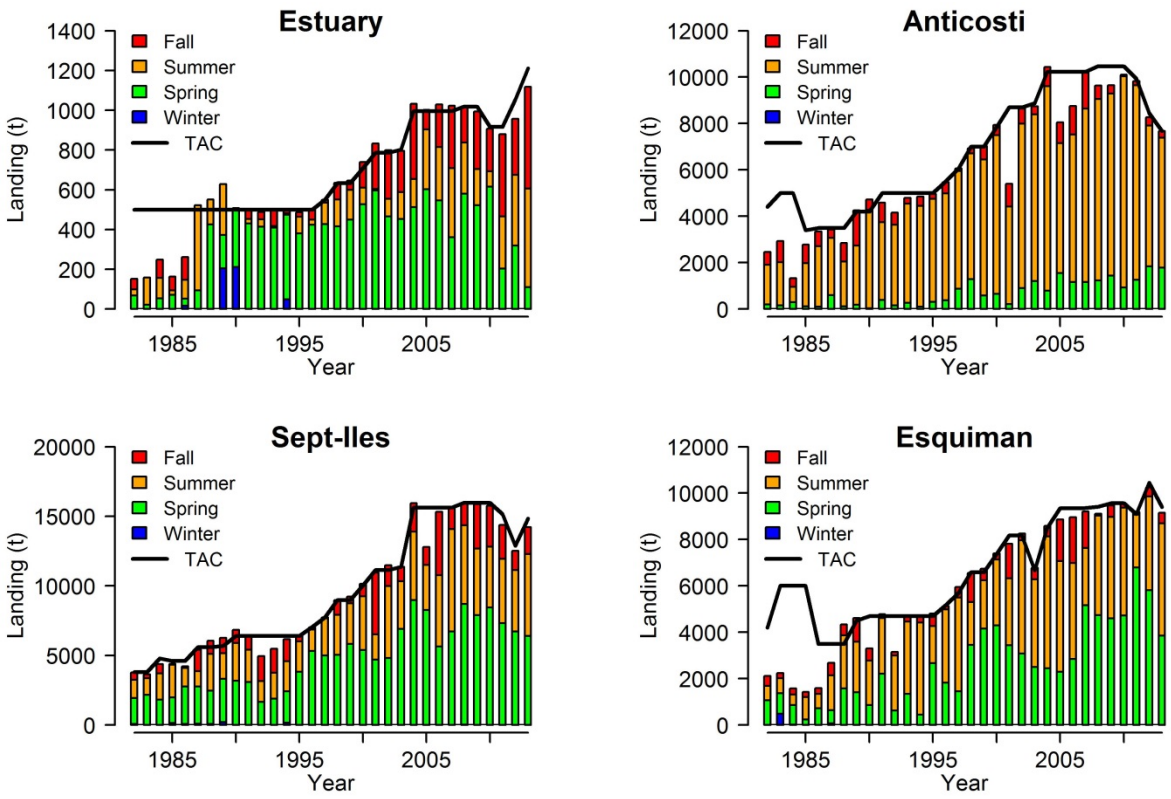

Figure 6. Seasonal landing and total allowable catches (TAC) by shrimp fishing area.

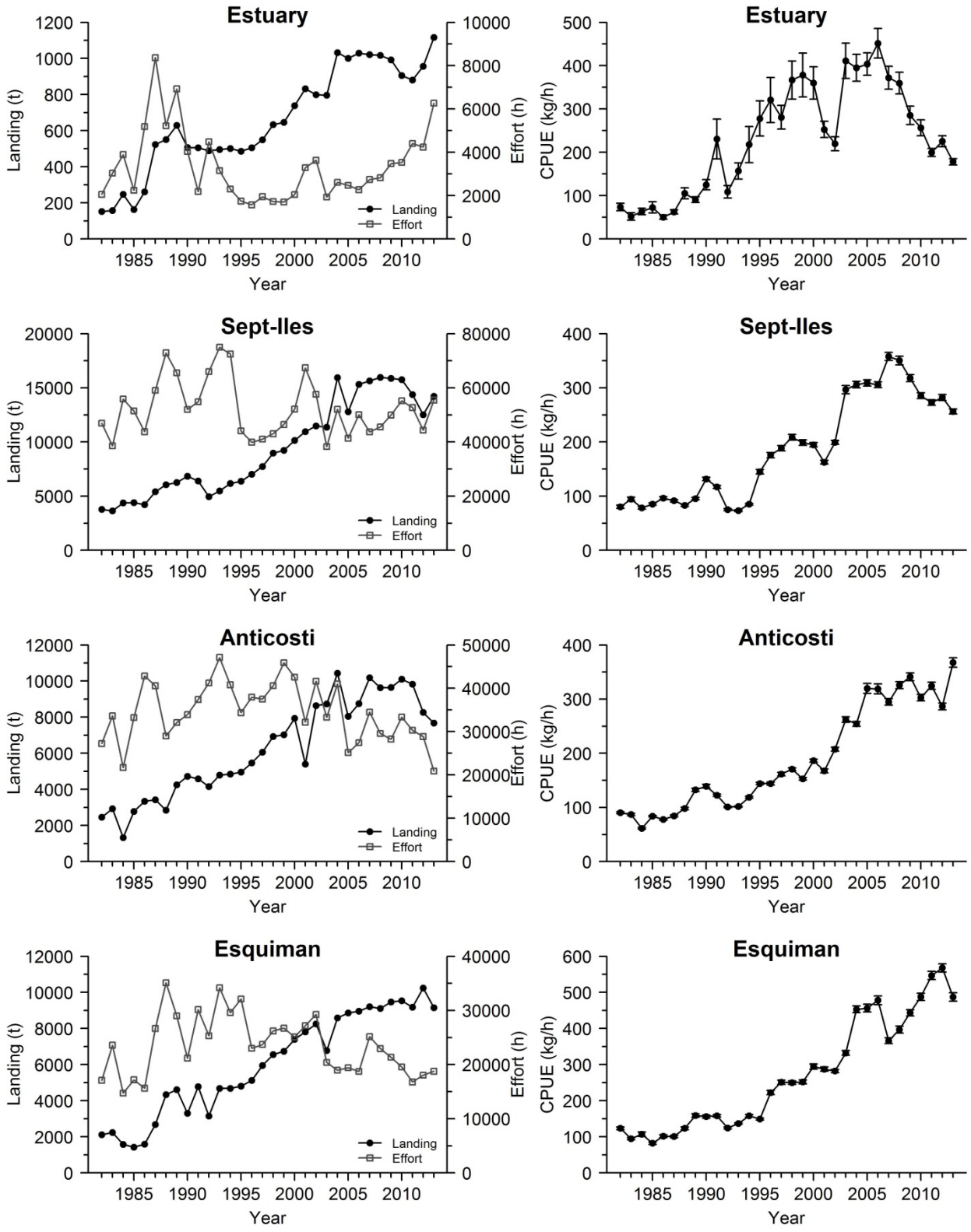

Figure 7. Landing, nominal effort and catch per unit of effort ± confidence interval (95%), by year and by fishing area.

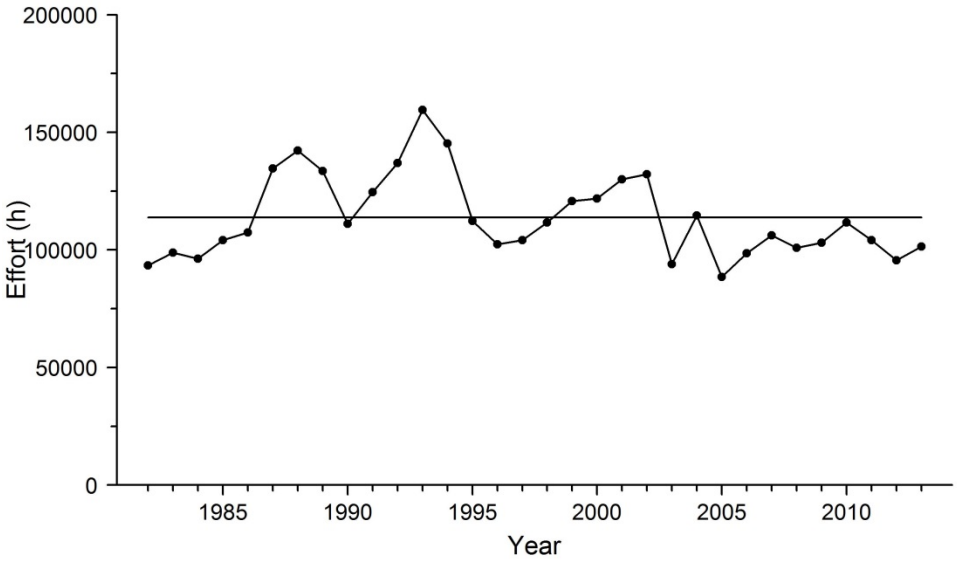

Figure 8. Total effort of fishing by year for the Estuary and Gulf of St. Lawrence. The full line indicates the mean of the series.

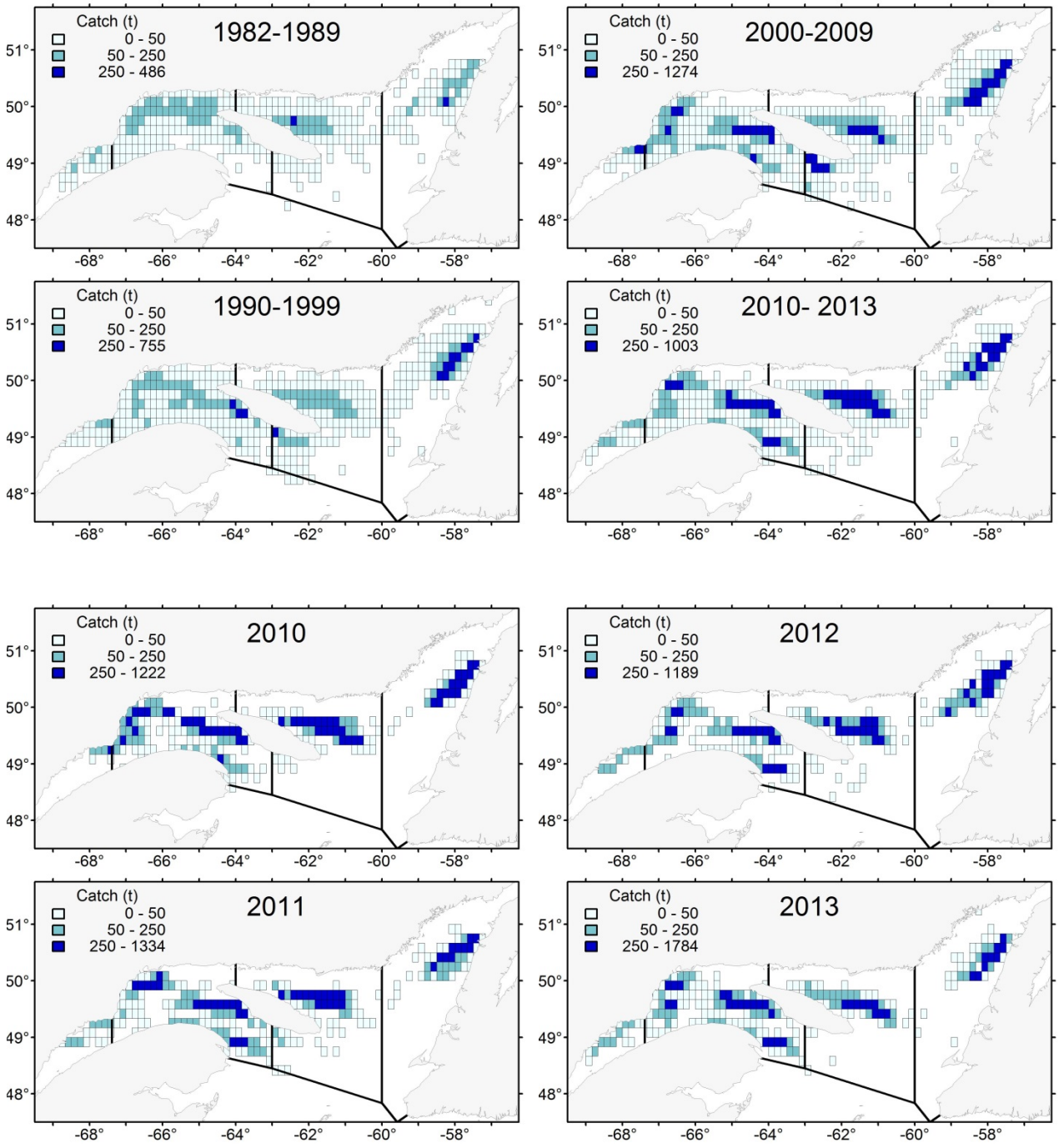

Figure 9. Catches (t) by statistical square by decade (annual mean) and from 2010 to 2013.

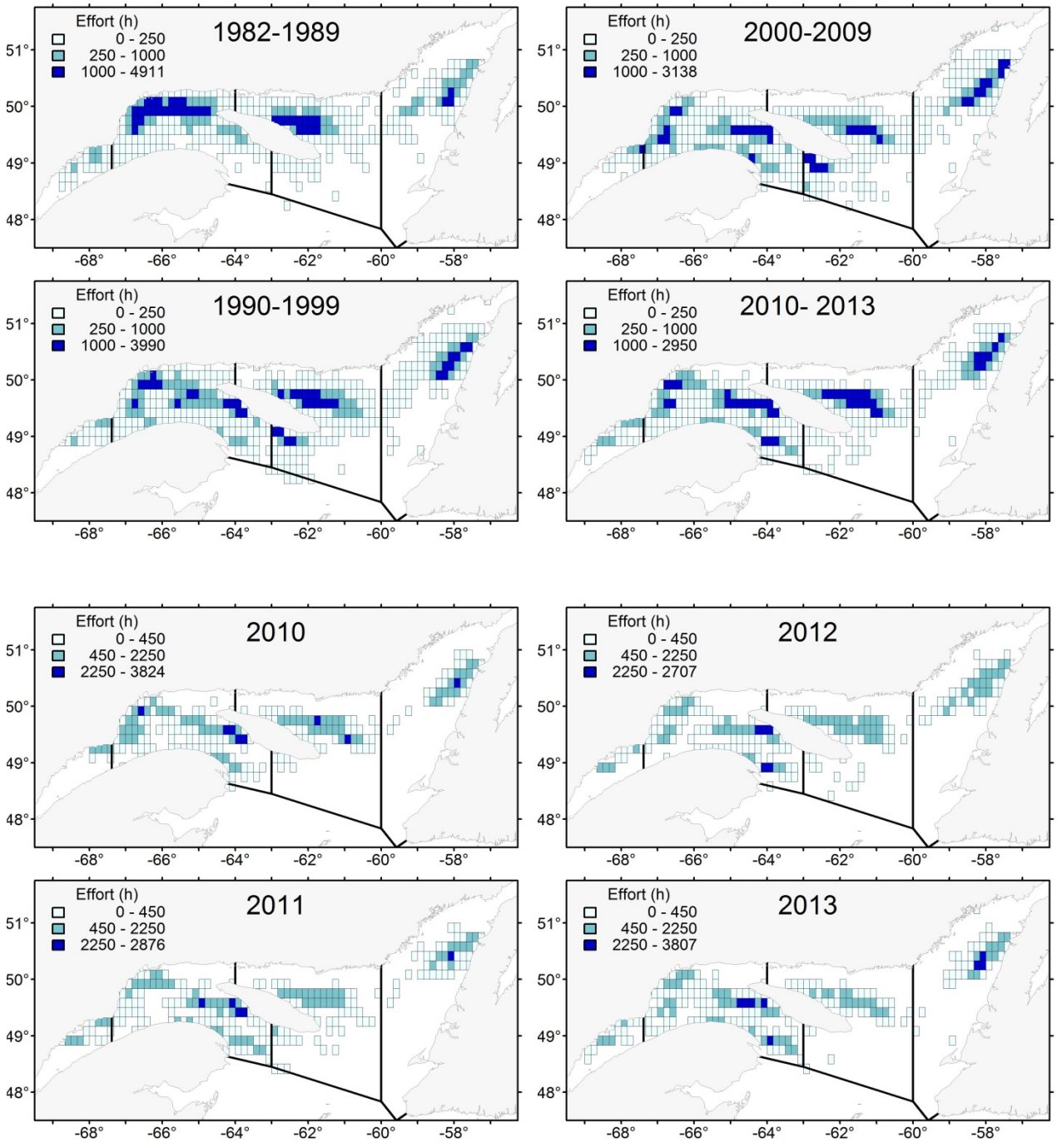

Figure 10. Fishing effort (t) by statistical square by decade (annual mean) and from 2010 to 2013.

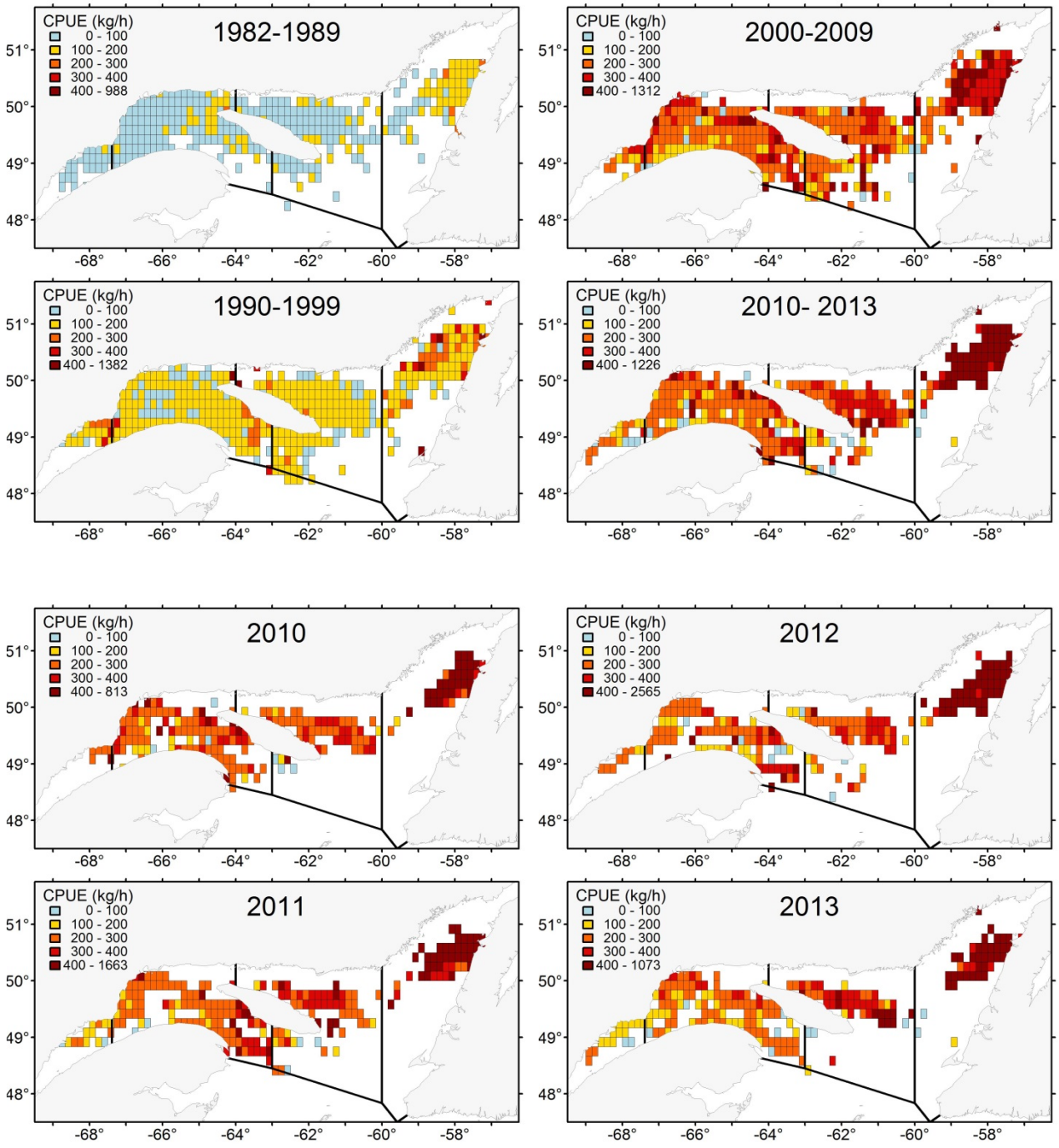

Figure 11. Catch per unit of effort by statistical square by decade (annual mean) and from 2010 to 2013.

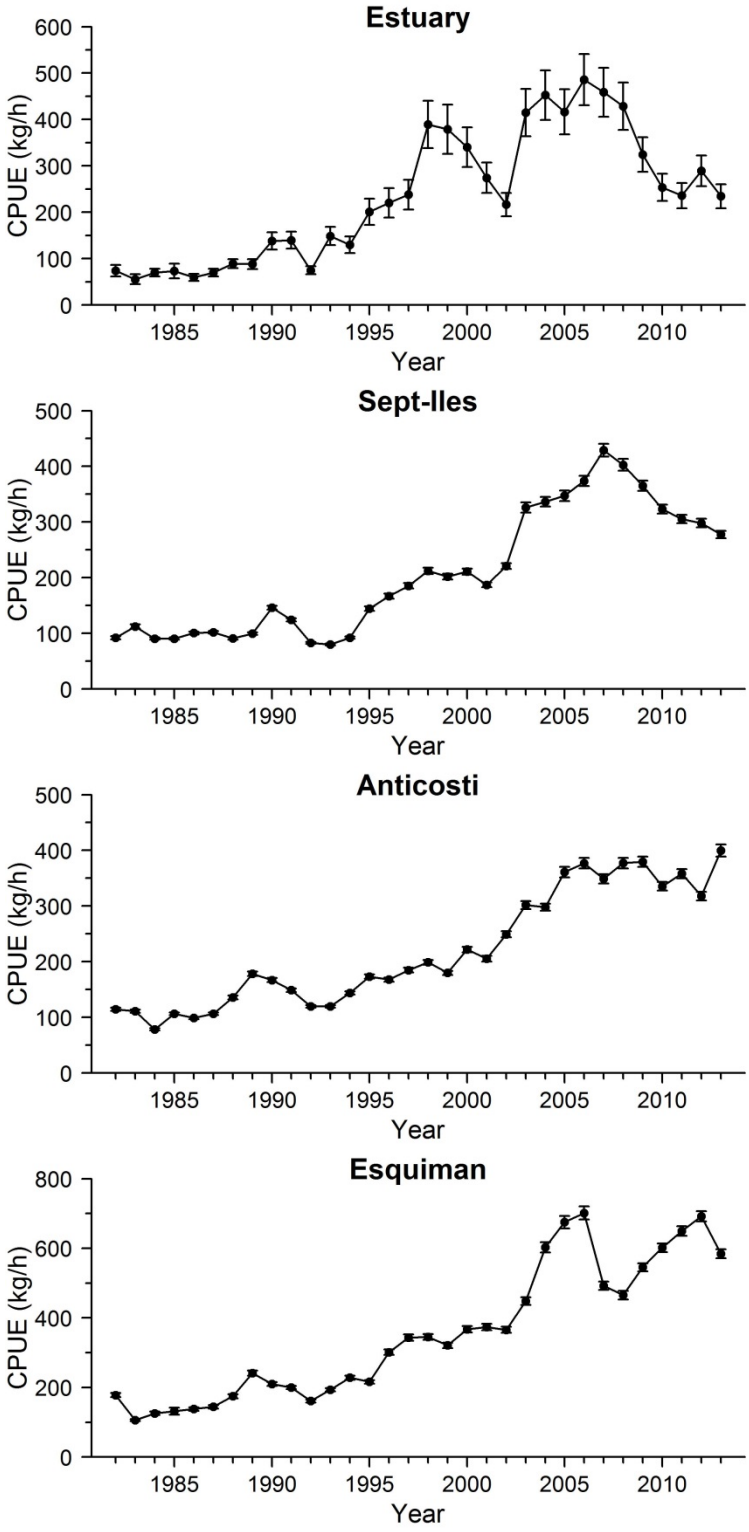

Figure 12. Standardized catch per unit of effort ± confidence interval (95%) by fishing area and by year.

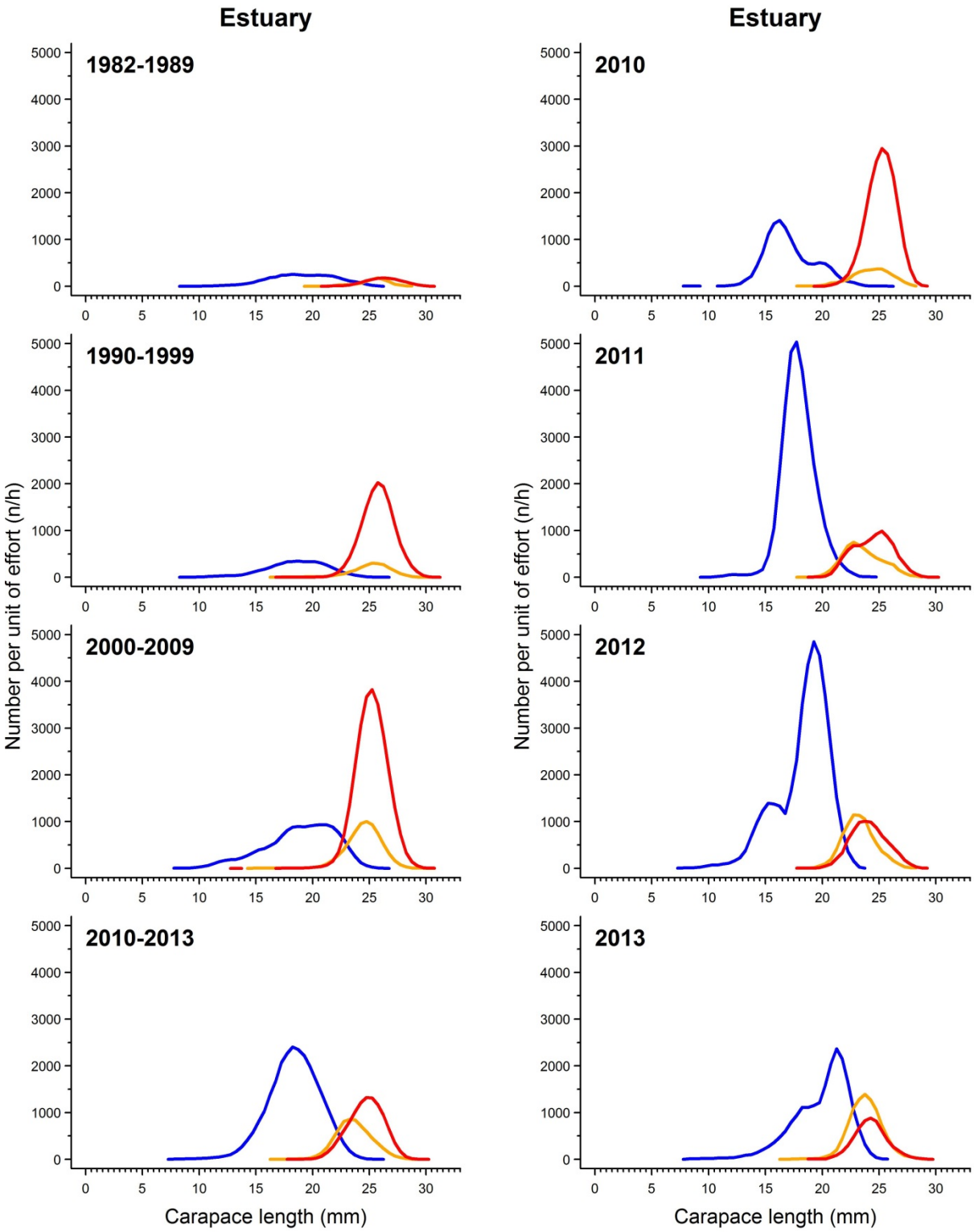

Figure 13. Number per unit of effort by carapace length class (0.5 mm) by fishing area for the fishing season. Males in blue, primiparous females in orange and multiparous females in red.

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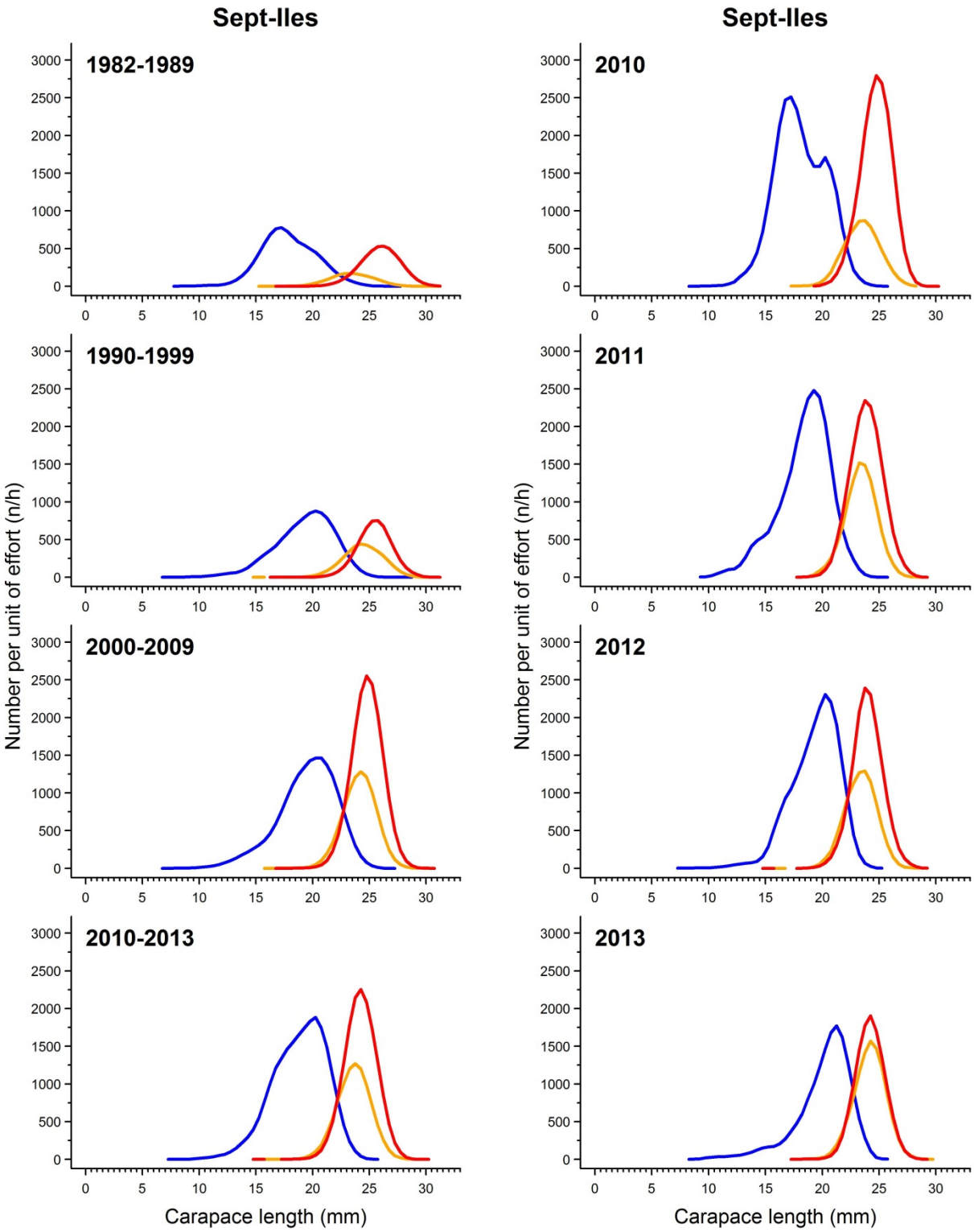

Figure 13 continued. Number per unit of effort by carapace length class (0.5 mm) by fishing area for the fishing season. Males in blue, primiparous females in orange and multiparous females in red.

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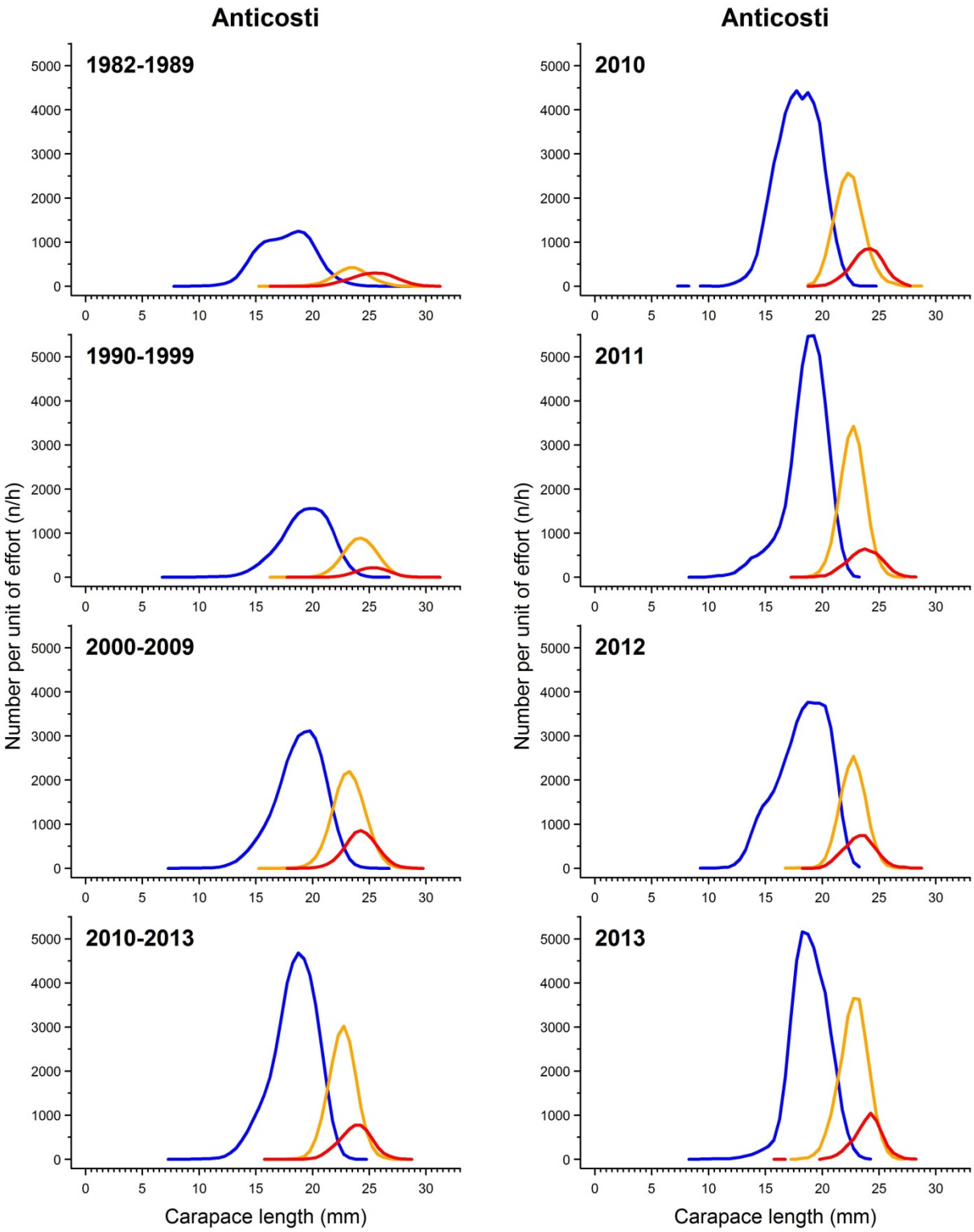

Figure 13 continued. Number per unit of effort by carapace length class (0.5 mm) by fishing area for the fishing season. Males in blue, primiparous females in orange and multiparous females in red.

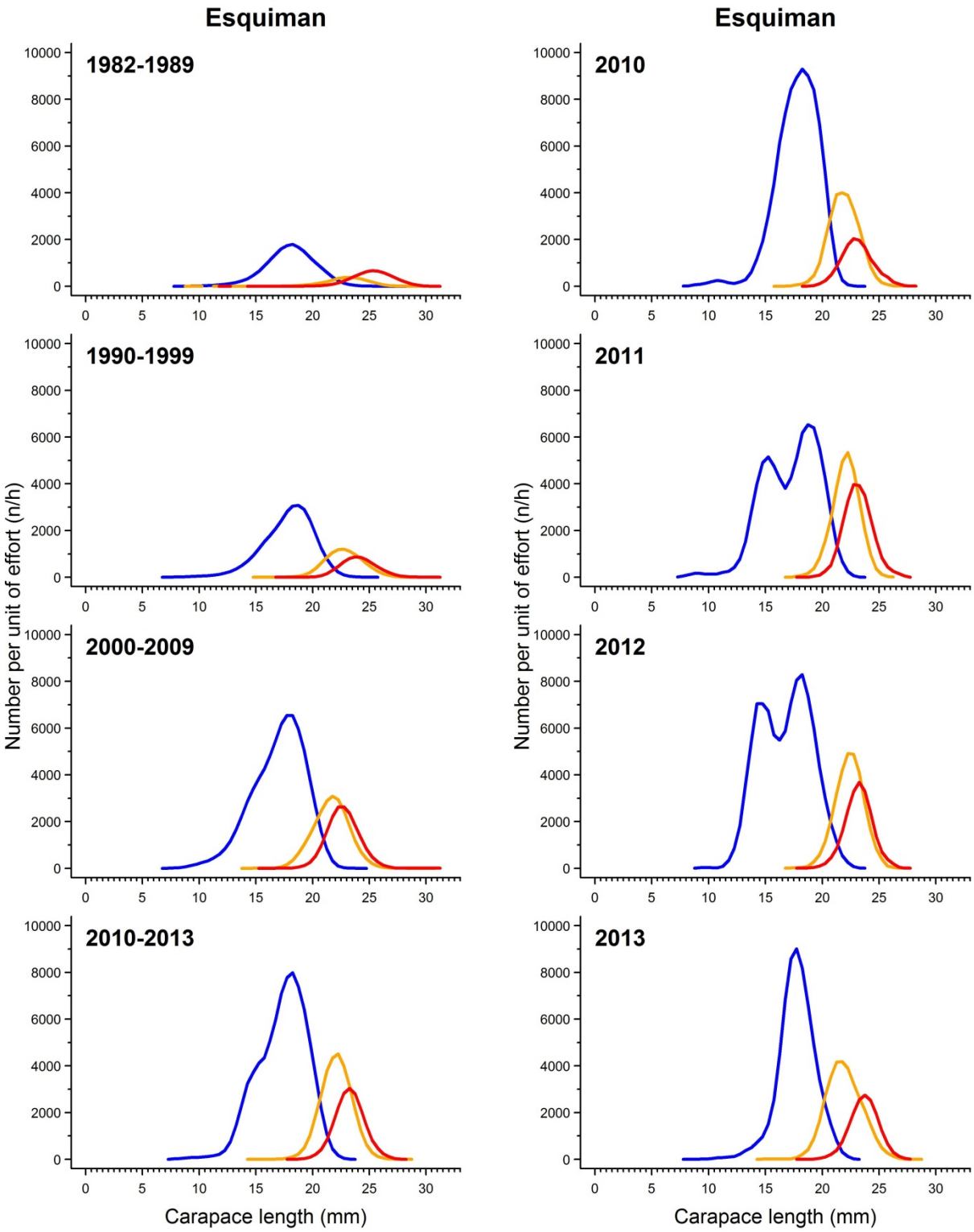

Figure 13 continued. Number per unit of effort by carapace length class (0.5 mm) by fishing area for the fishing season. Males in blue, primiparous females in orange and multiparous females in red.

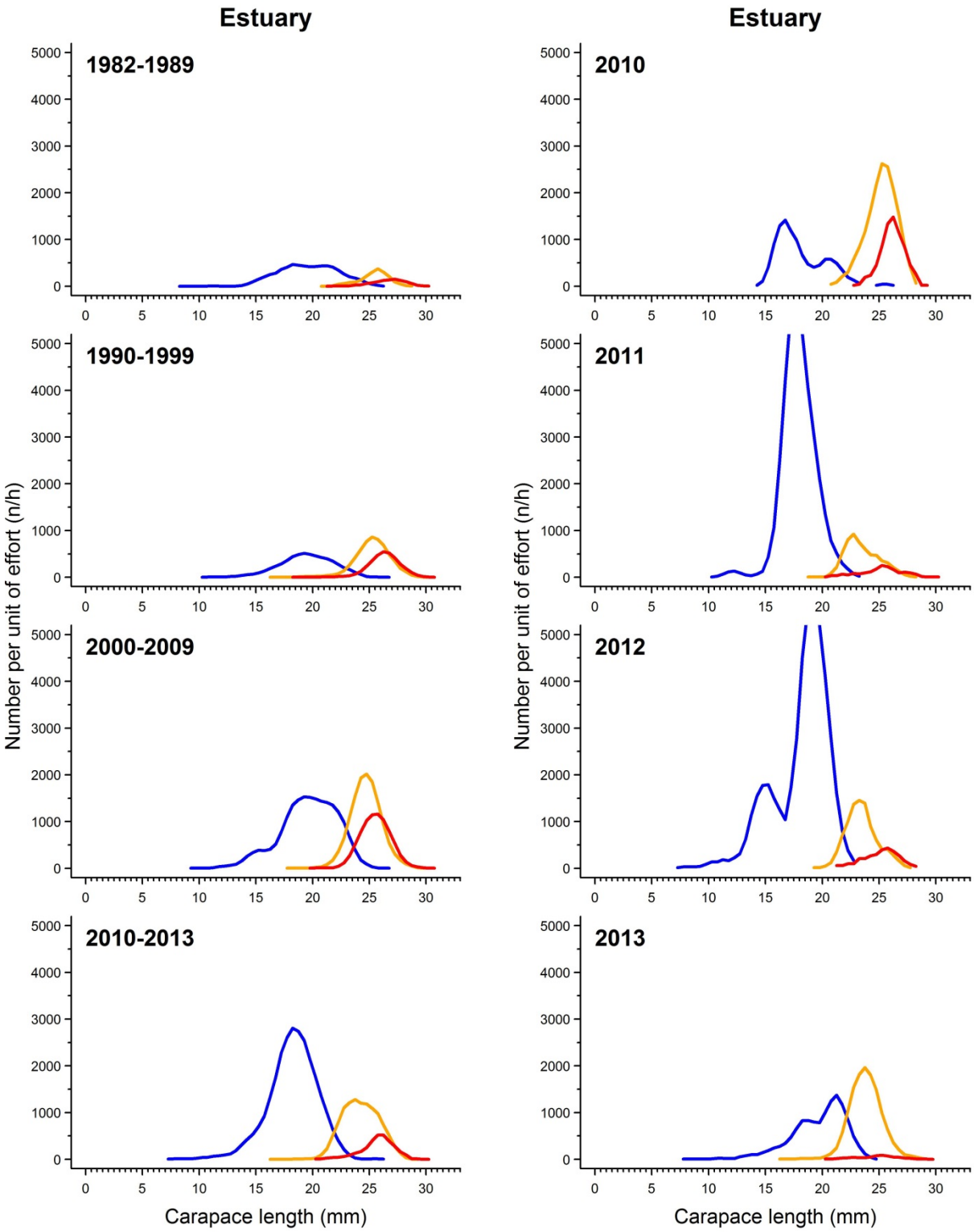

Figure 14. Number per unit of effort by carapace length class (0.5 mm) by fishing area for the summer season (June, July and August). Males in blue, primiparous females in orange and multiparous females in red.

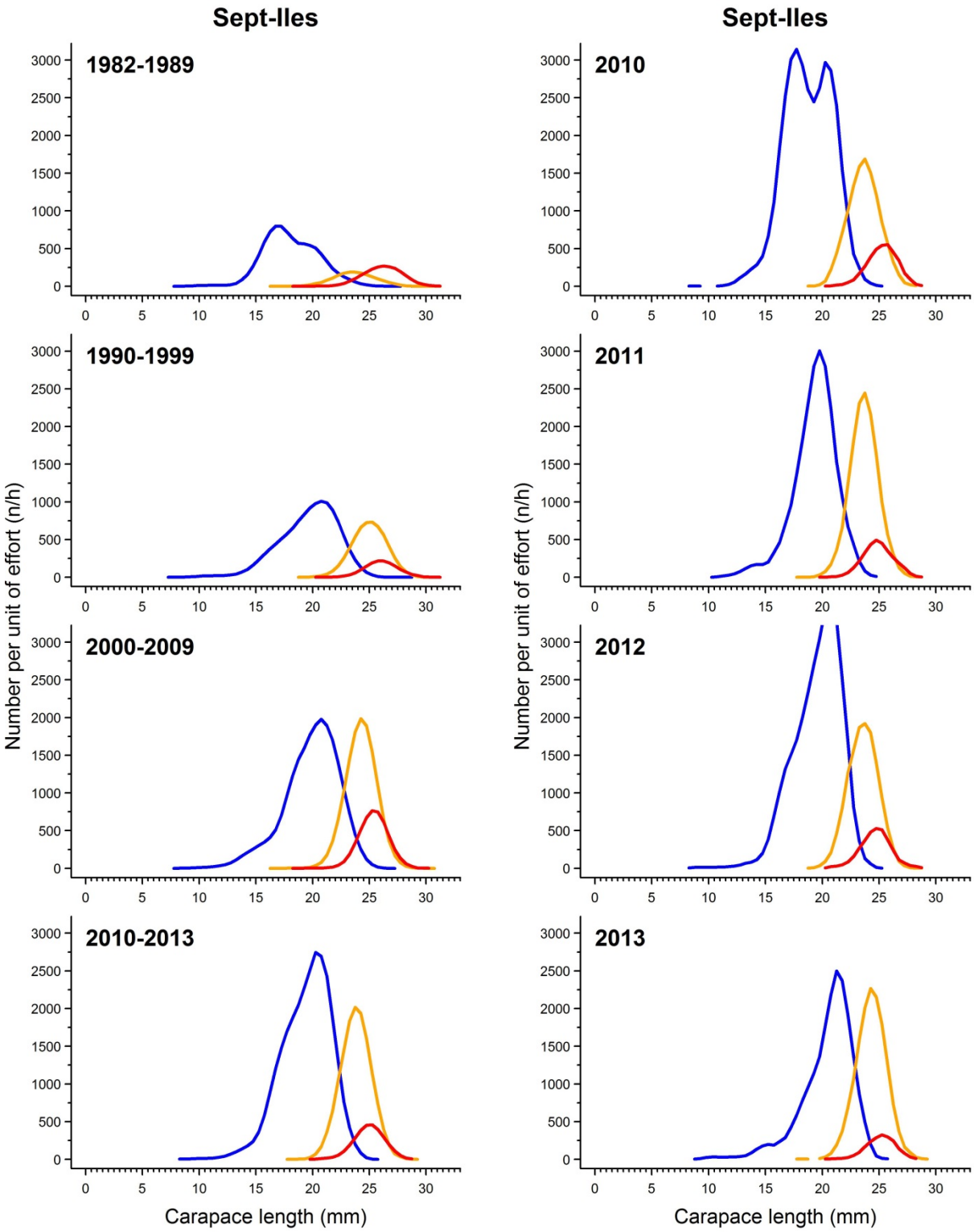

Figure 14 continued. Number per unit of effort by carapace length class (0.5 mm) by fishing area for the summer season (June, July and August). Males in blue, primiparous females in orange and multiparous females in red.

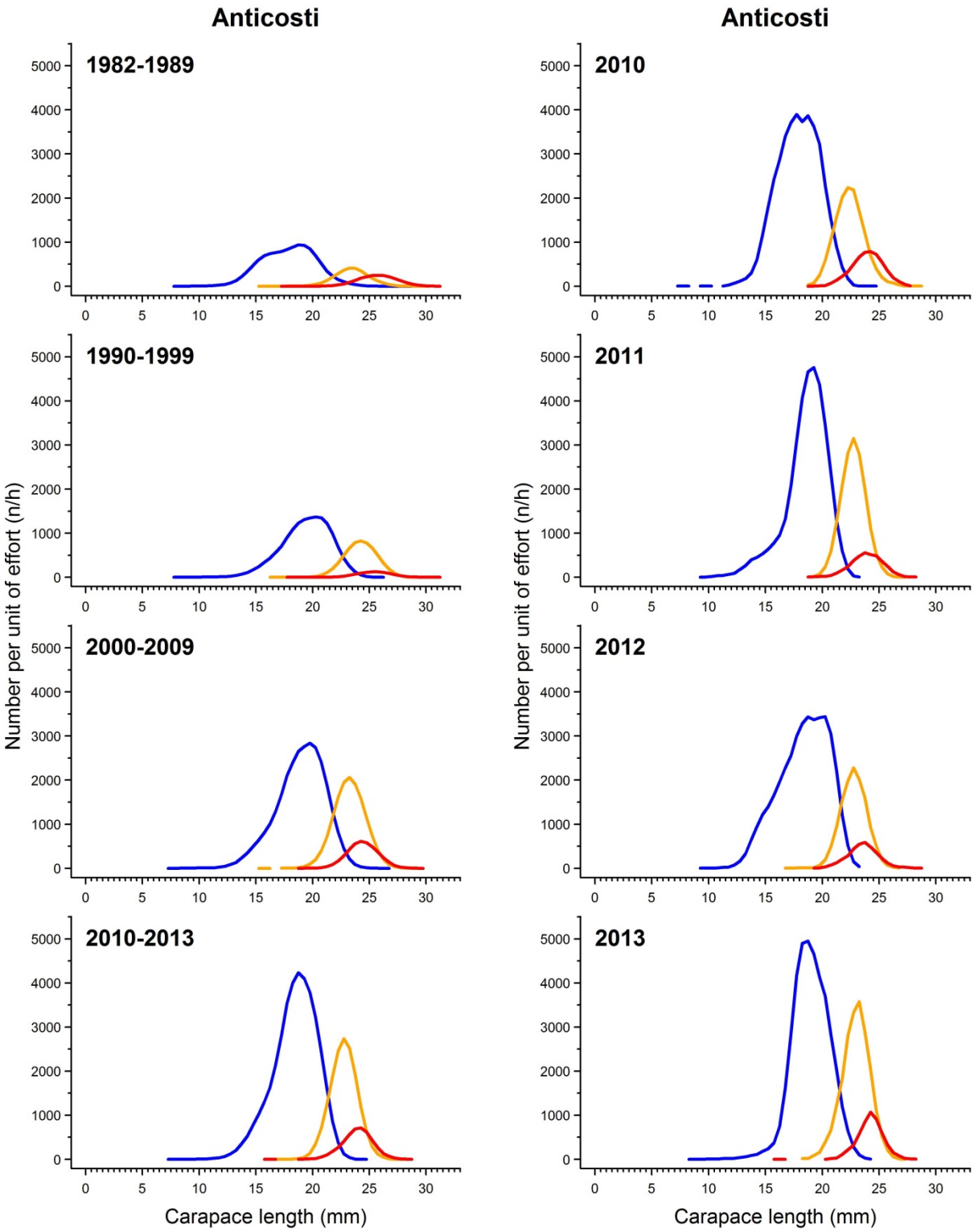

Figure 14 continued. Number per unit of effort by carapace length class (0.5 mm) by fishing area for the summer season (June, July and August). Males in blue, primiparous females in orange and multiparous females in red.

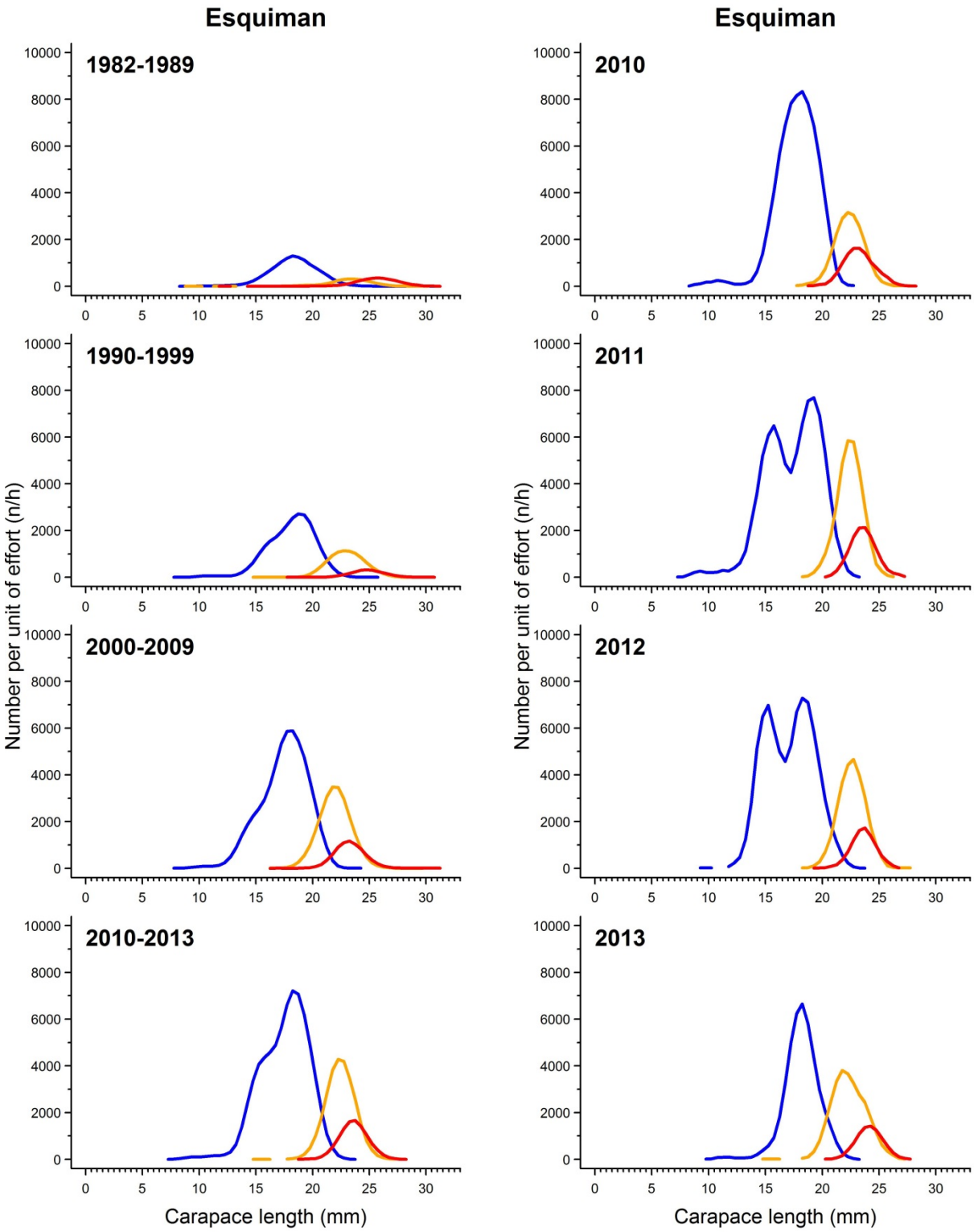

Figure 14 continued. Number per unit of effort by carapace length class (0.5 mm) by fishing area for the summer season (June, July and August). Males in blue, primiparous females in orange and multiparous females in red.

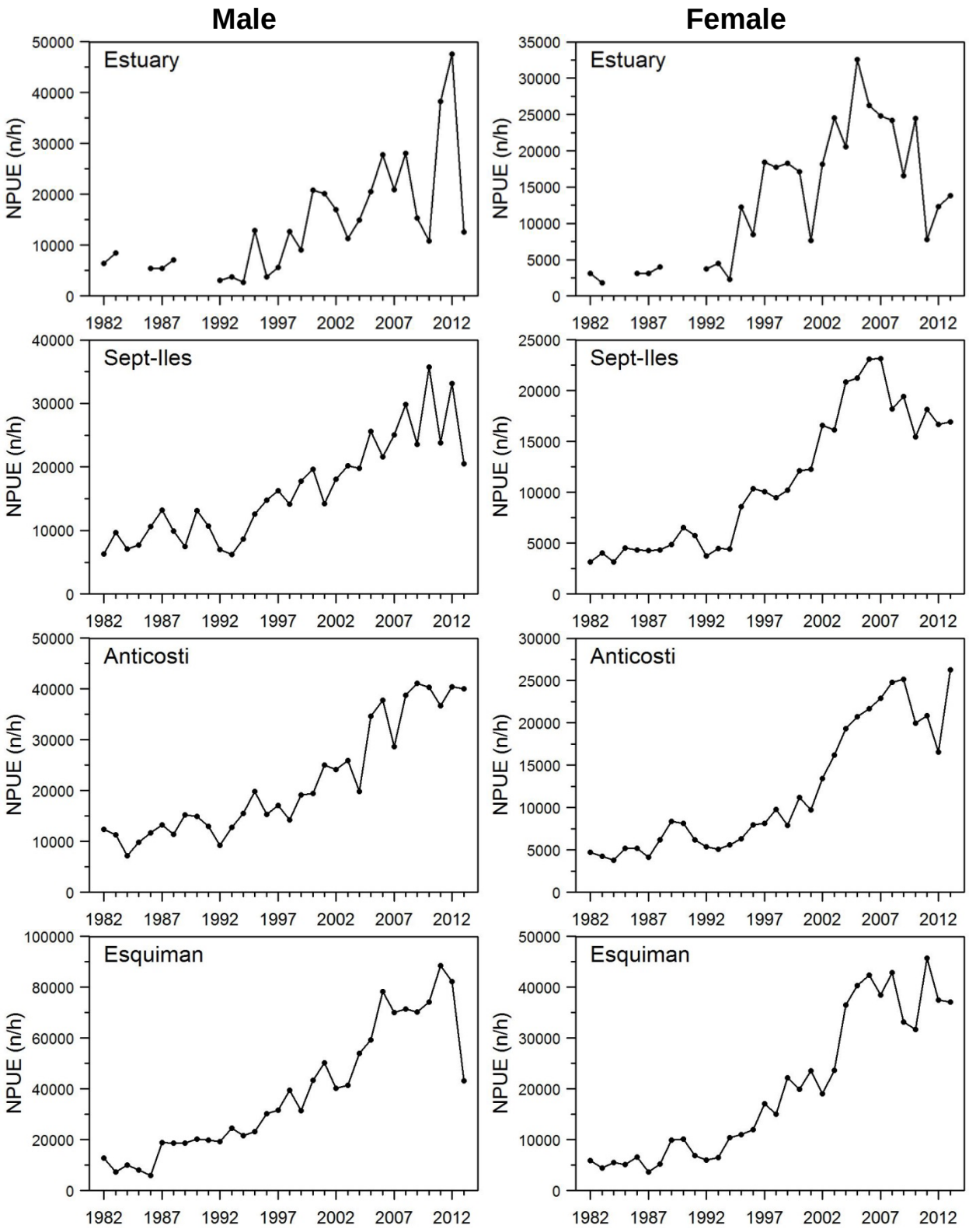

Figure 15. Number per unit of effort for the summer months (June, July and August) for the male and female shrimps, by fishing area and by year.

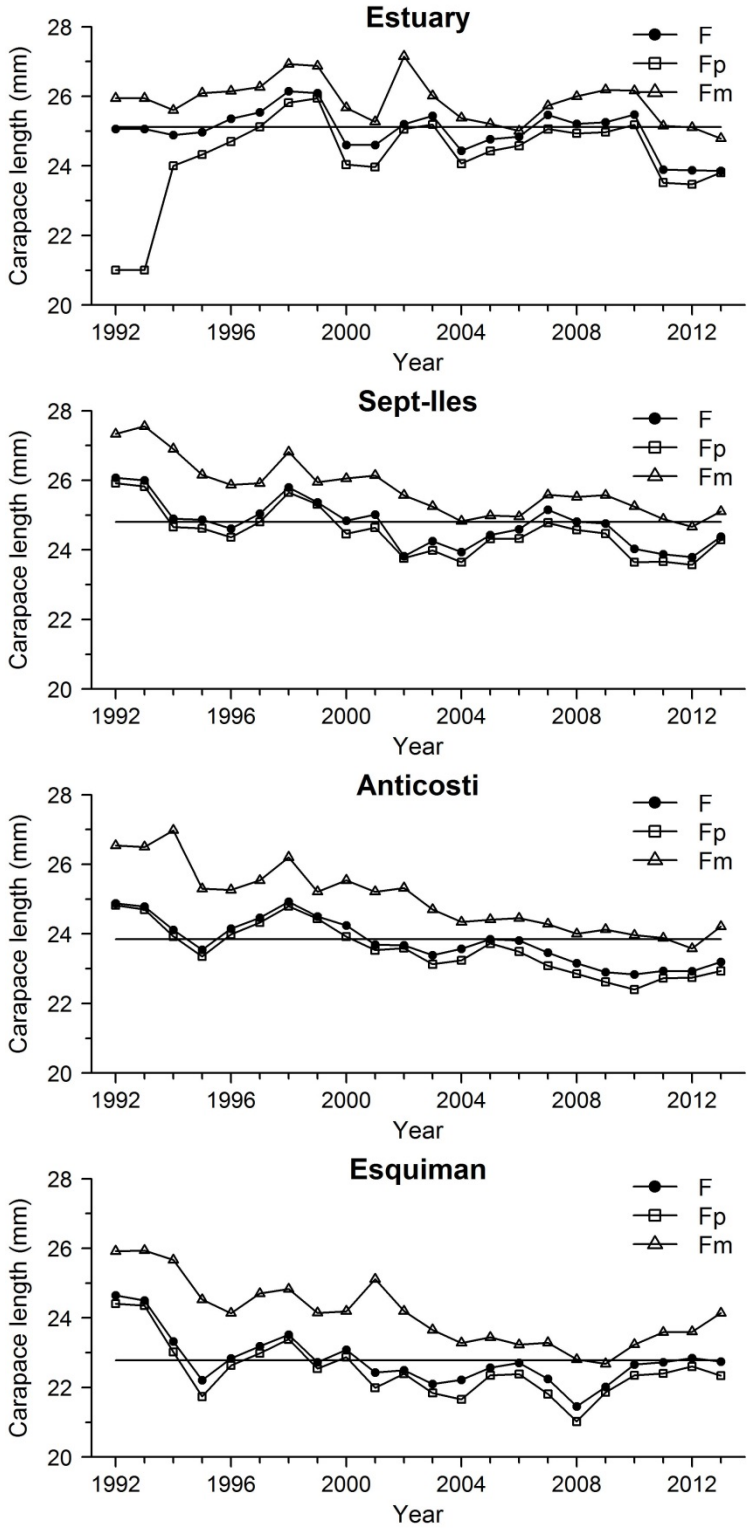

Figure 16. Average carapace length of female shrimps harvested in the summer by fishing area and year (F: female, Fp: primiparous female and Fm: female multiparous). The solid horizontal line represents the 1992-2011 mean.

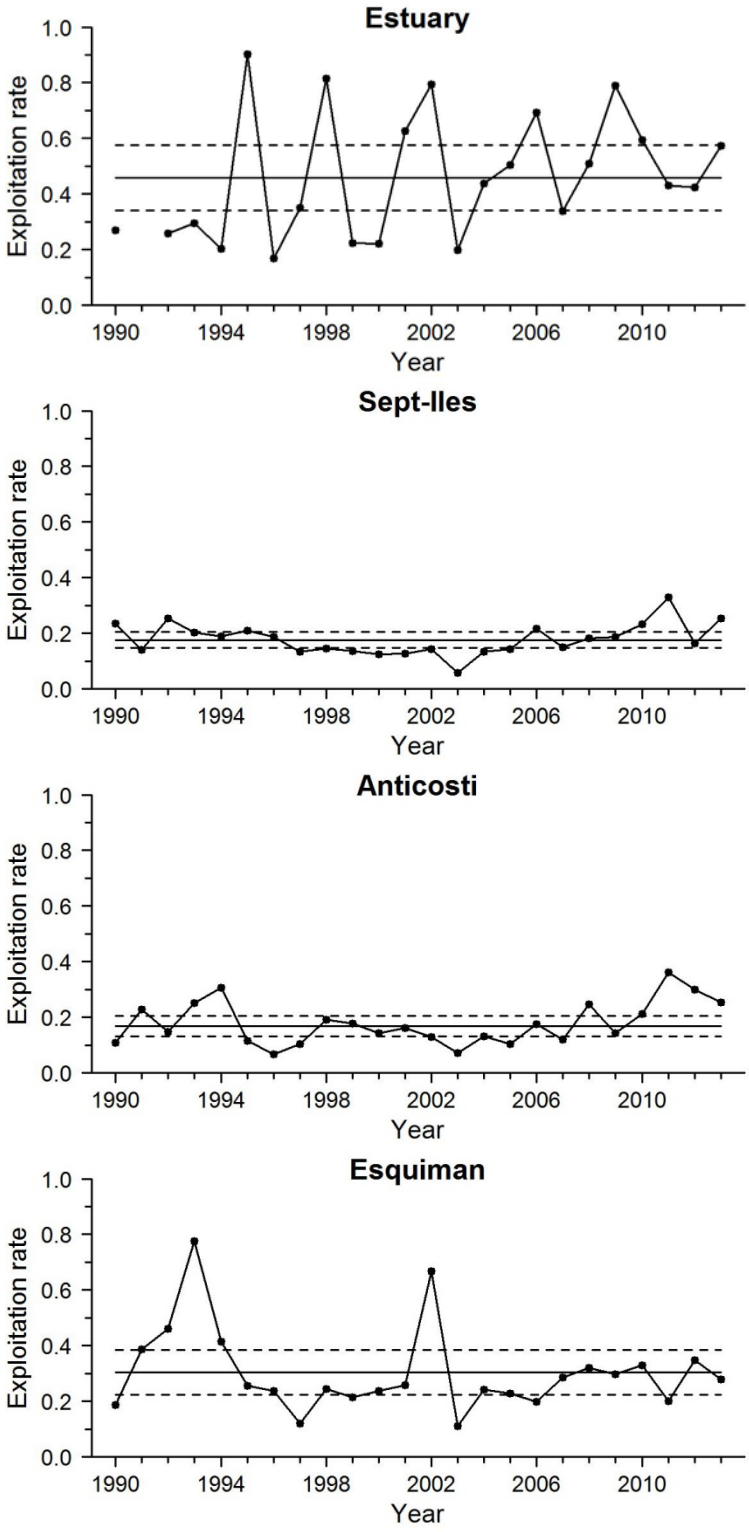

Figure 17. Index of the exploitation rate by fishing area and by year. The solid horizontal line represents the 1990-2011 mean ± 0.5 standard deviation.

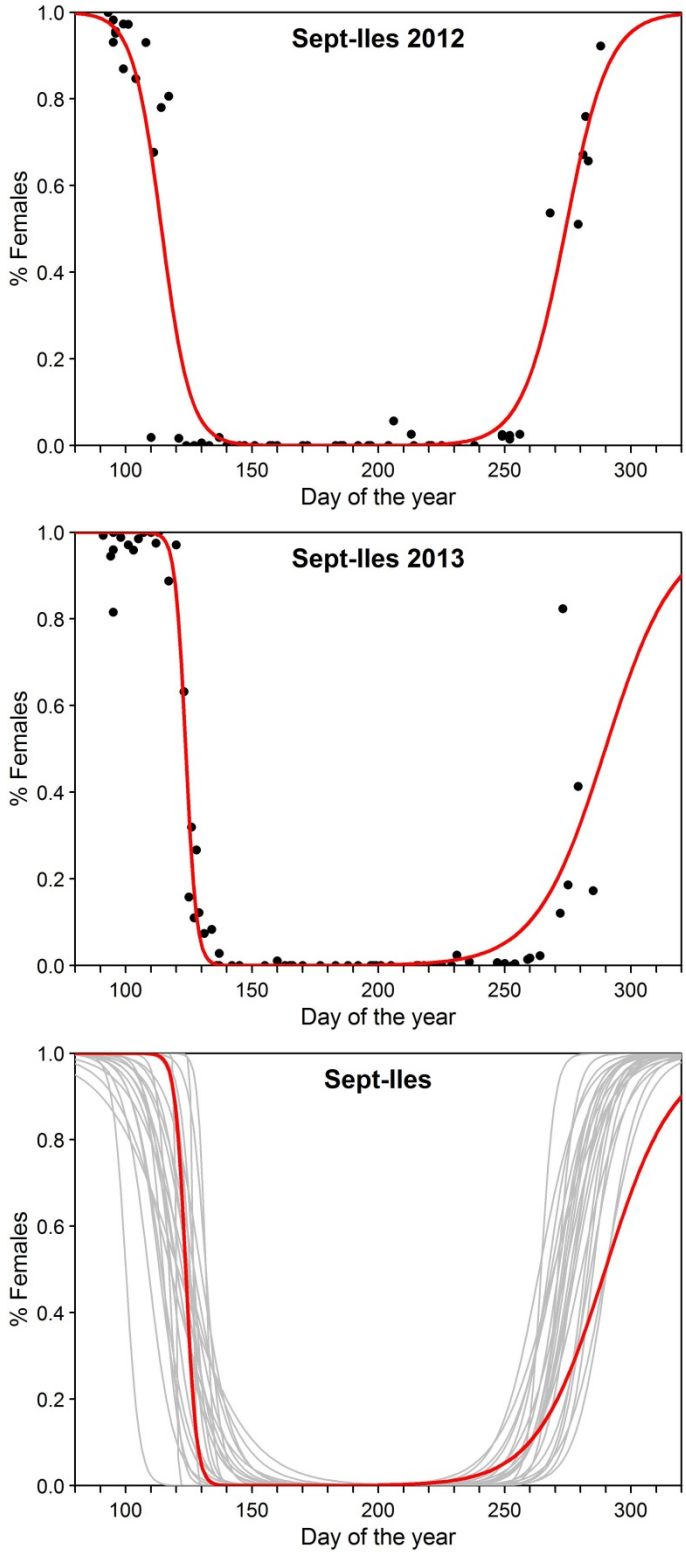

Figure 18. Proportion of egg-bearing females in the catch of females depending on the day of the year for the samples collected in 2012 and 2013 in the area of Sept-Iles. The bottom panel shows the years 1990-2012 in gray and 2013 in red.

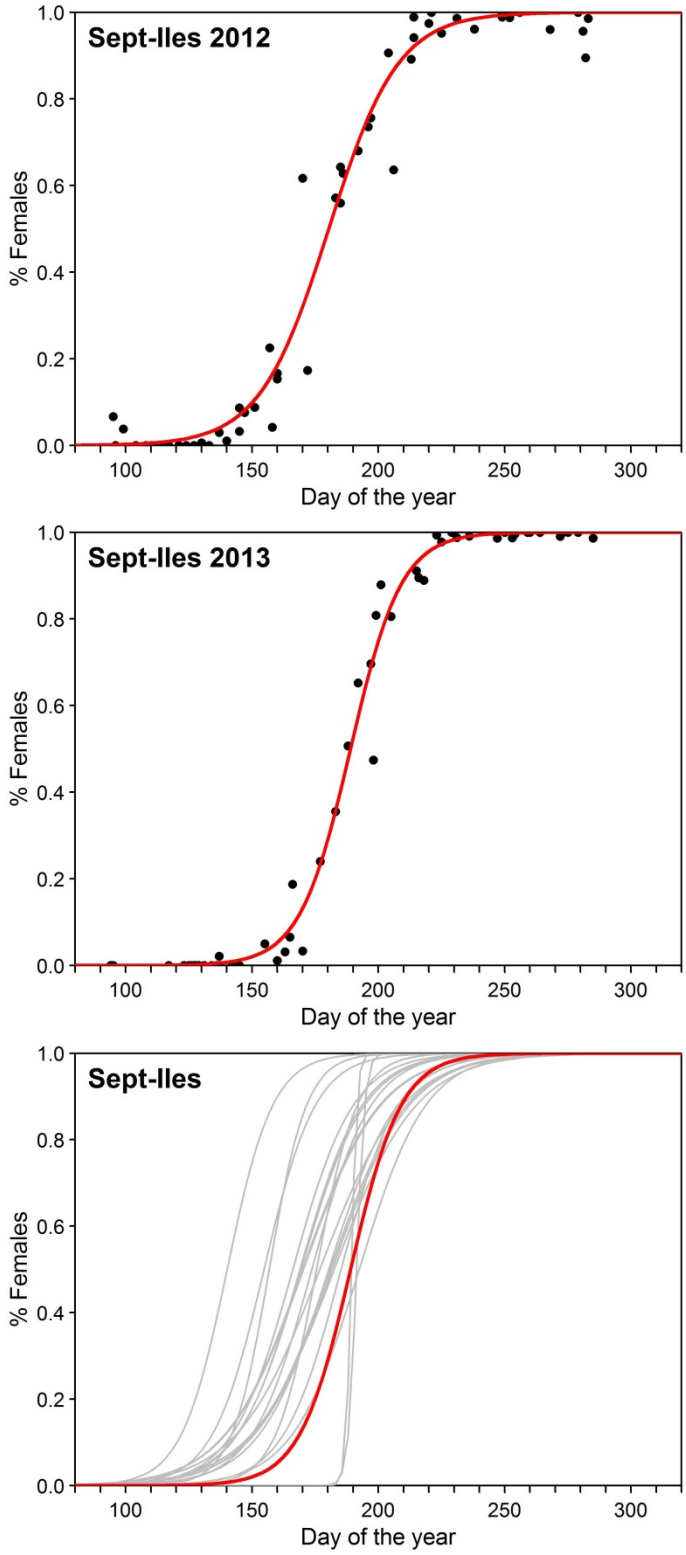

Figure 19. Proportion of females in maturation depending on the day of the year for the samples collected in 2012 and 2013 in the area of Sept-Iles. The bottom panel shows the years 1990-2012 in gray and 2013 in red.

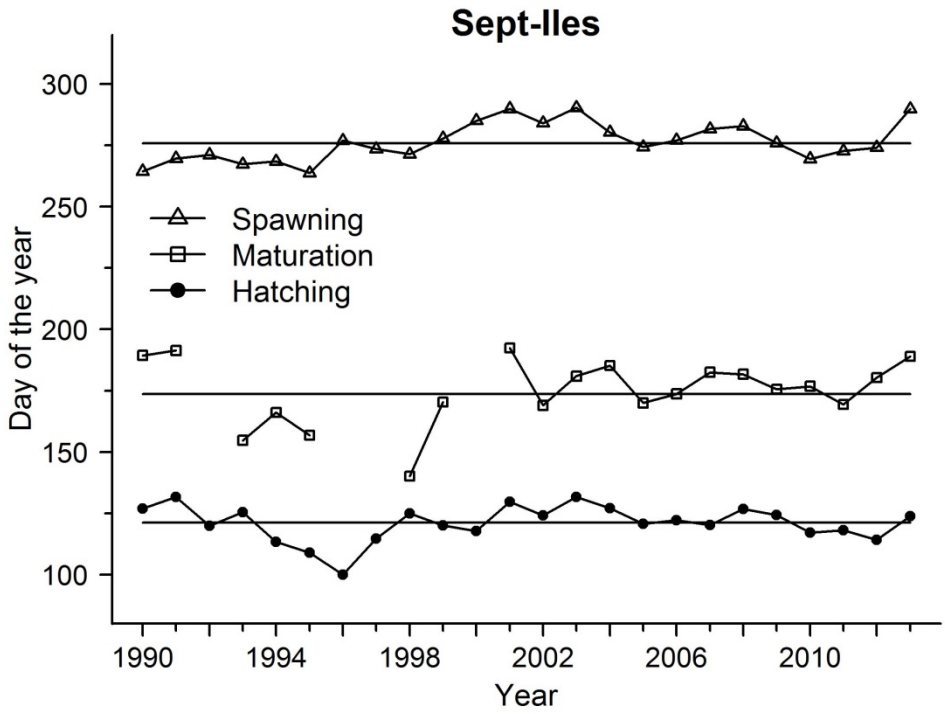

Figure 20. Days of the year where 50% of female shrimp were maturing (maturation), where 50% had spawn there eggs (spawning) and where 50% of females had released larvae (extrusion) depending on the day of the year for samples collected in the area of Sept-Iles from 1990 to 2013.

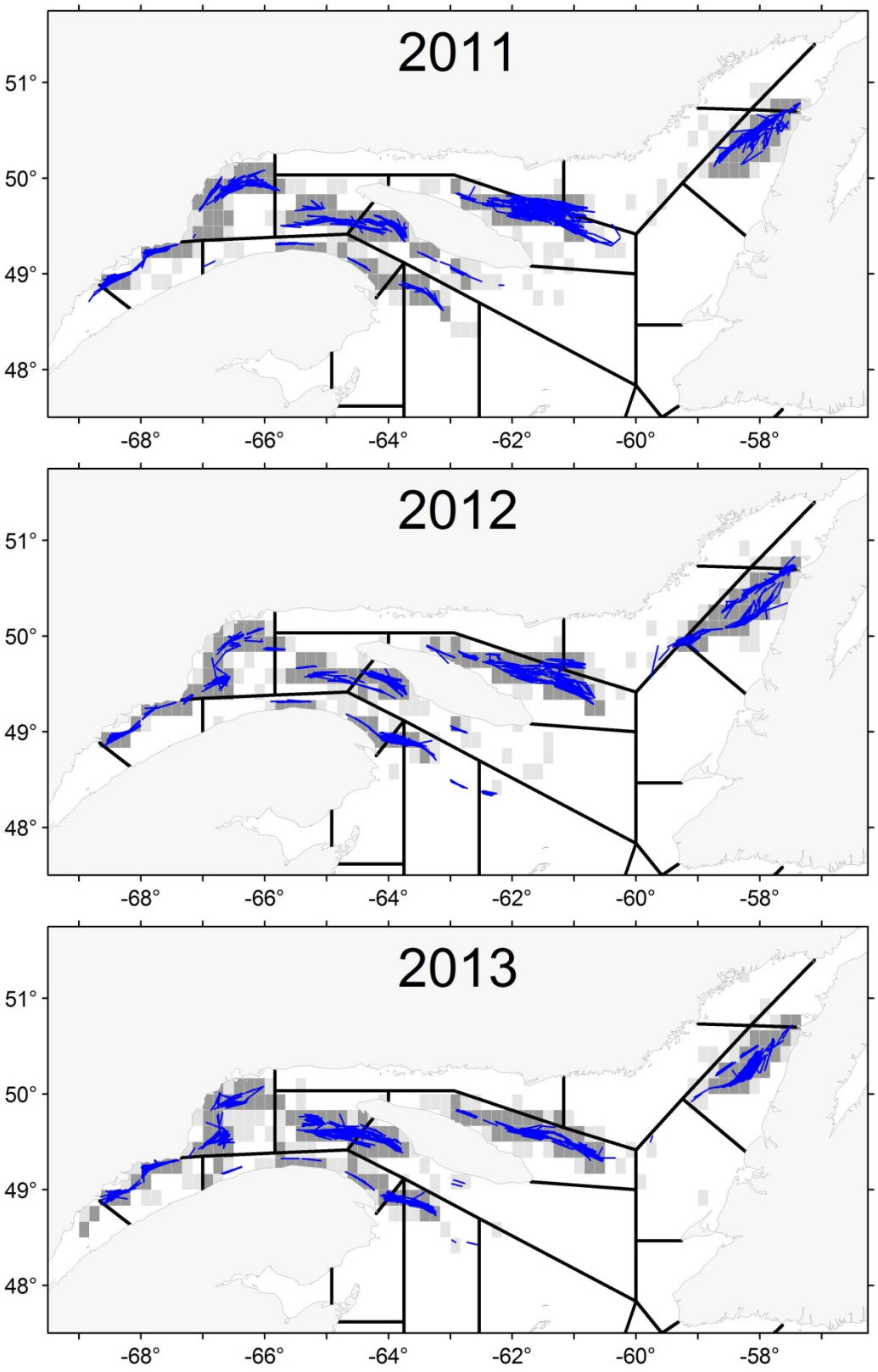

Figure 21. Geographic distribution of annual fishing effort by statistical square (gray squares: pale < 100h, dark > 100h) and fishing tows (blue lines) realised with an observer on board. The NAFO unit areas are also shown.

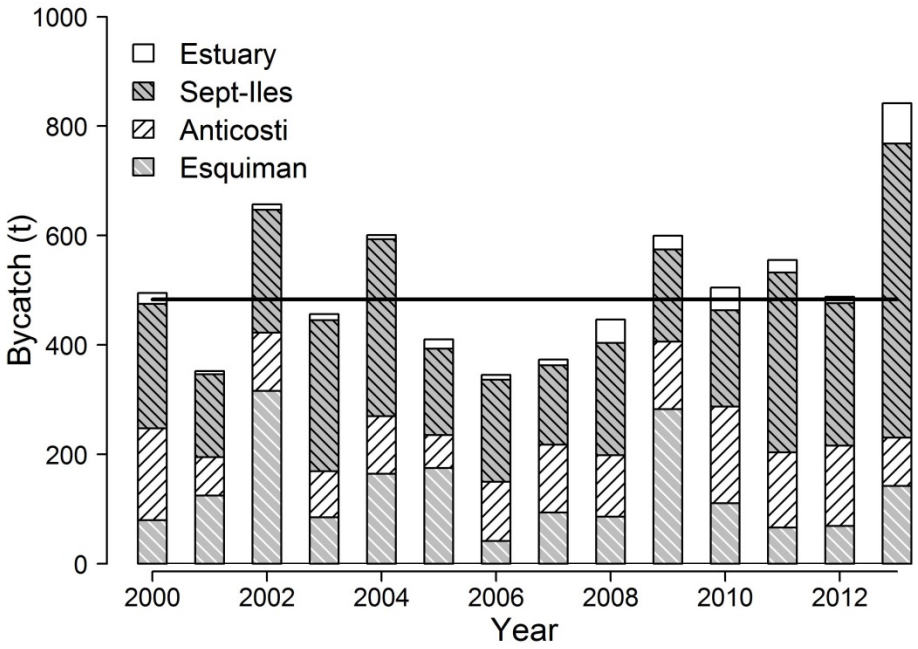

Figure 22. Bycatches for all species by year and by fishing area estimate by at-sea observers. Solid line indicates the average for the years 2000-2011.

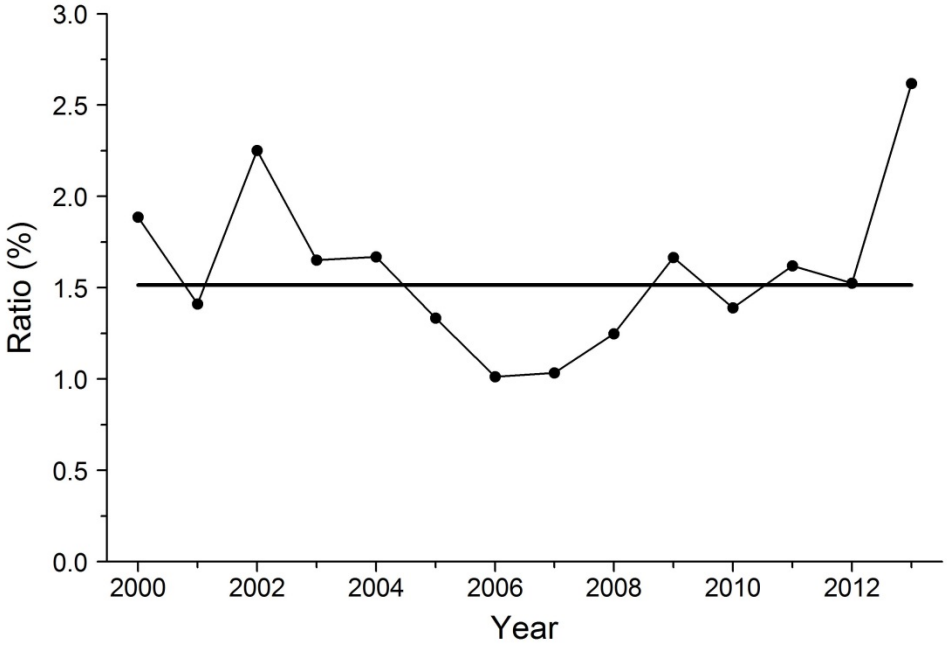

Figure 23. Ratio (%) of the bycatch of all species on the northern shrimp catch by year and by fishing area. Solid line indicates the average for the years 2000-2011.

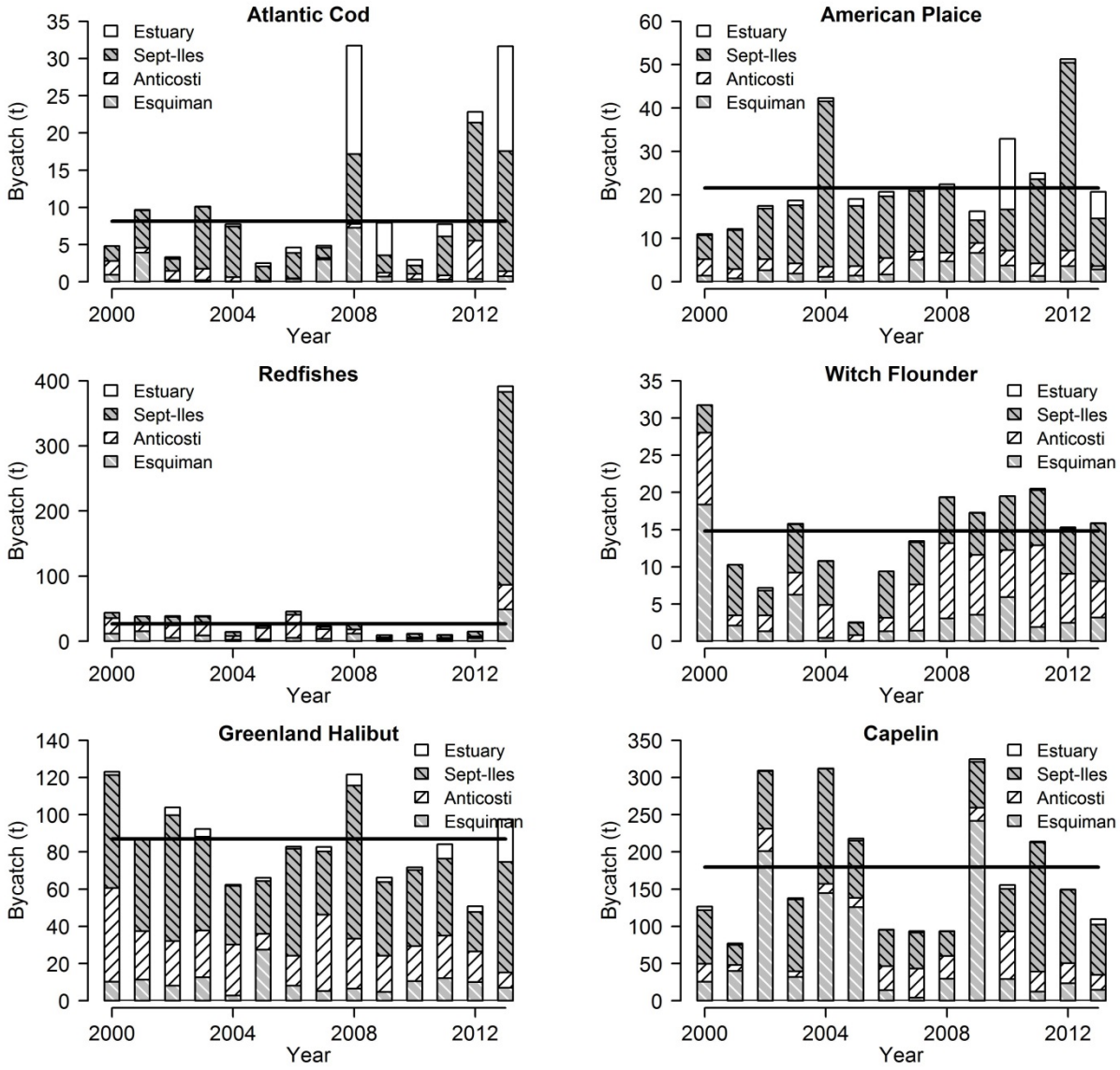

Figure 24. Bycatches by year and by fishing area estimate by at-sea observers for six species. Solid line indicates the average for the years 2000-2011.

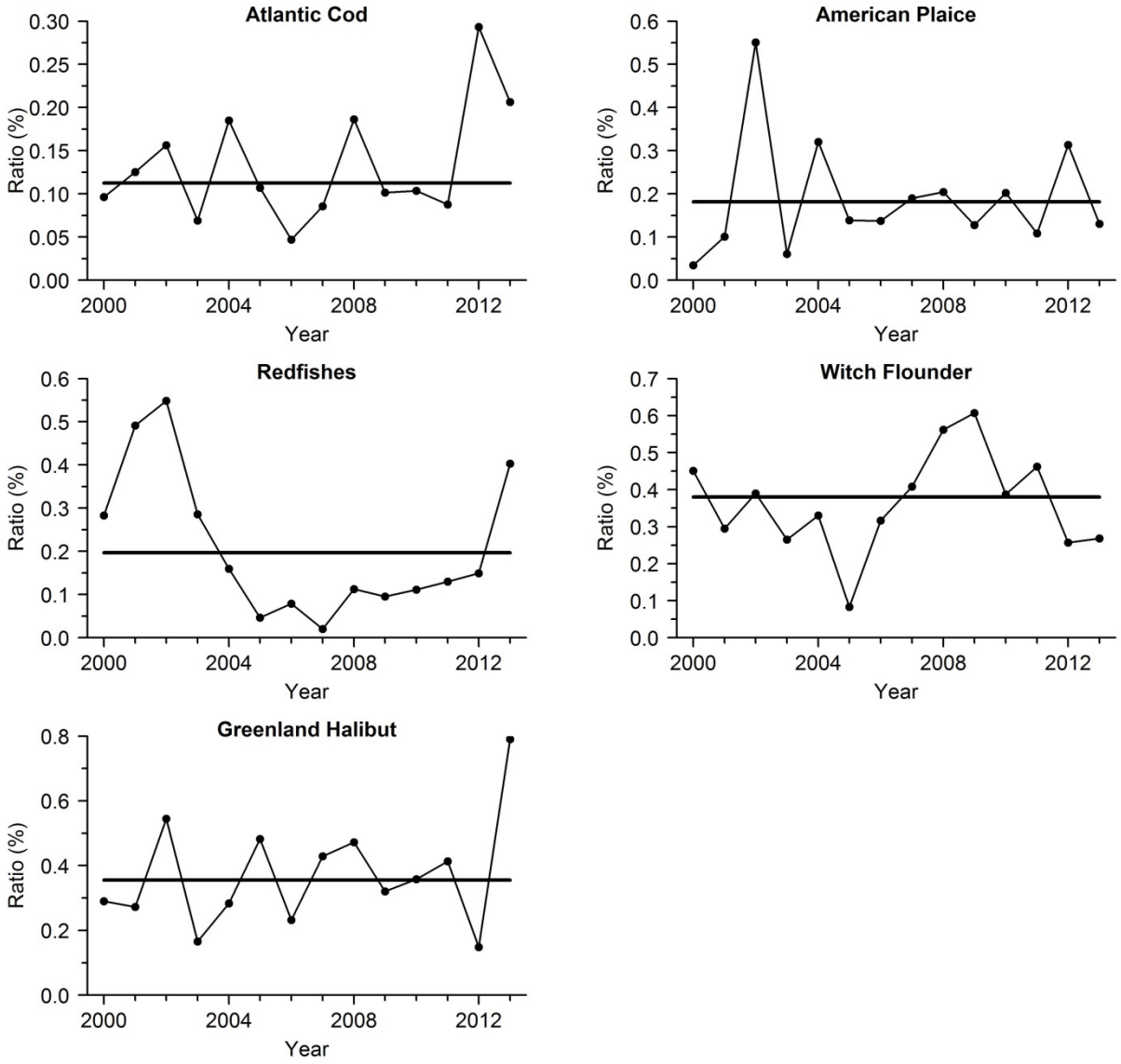

Figure 25. Ratio (%) of the bycatch on the biomass estimate from the groundfish survey in the northern Gulf of St. Lawrence for five species. Solid line indicates the average for the years 2000-2011.

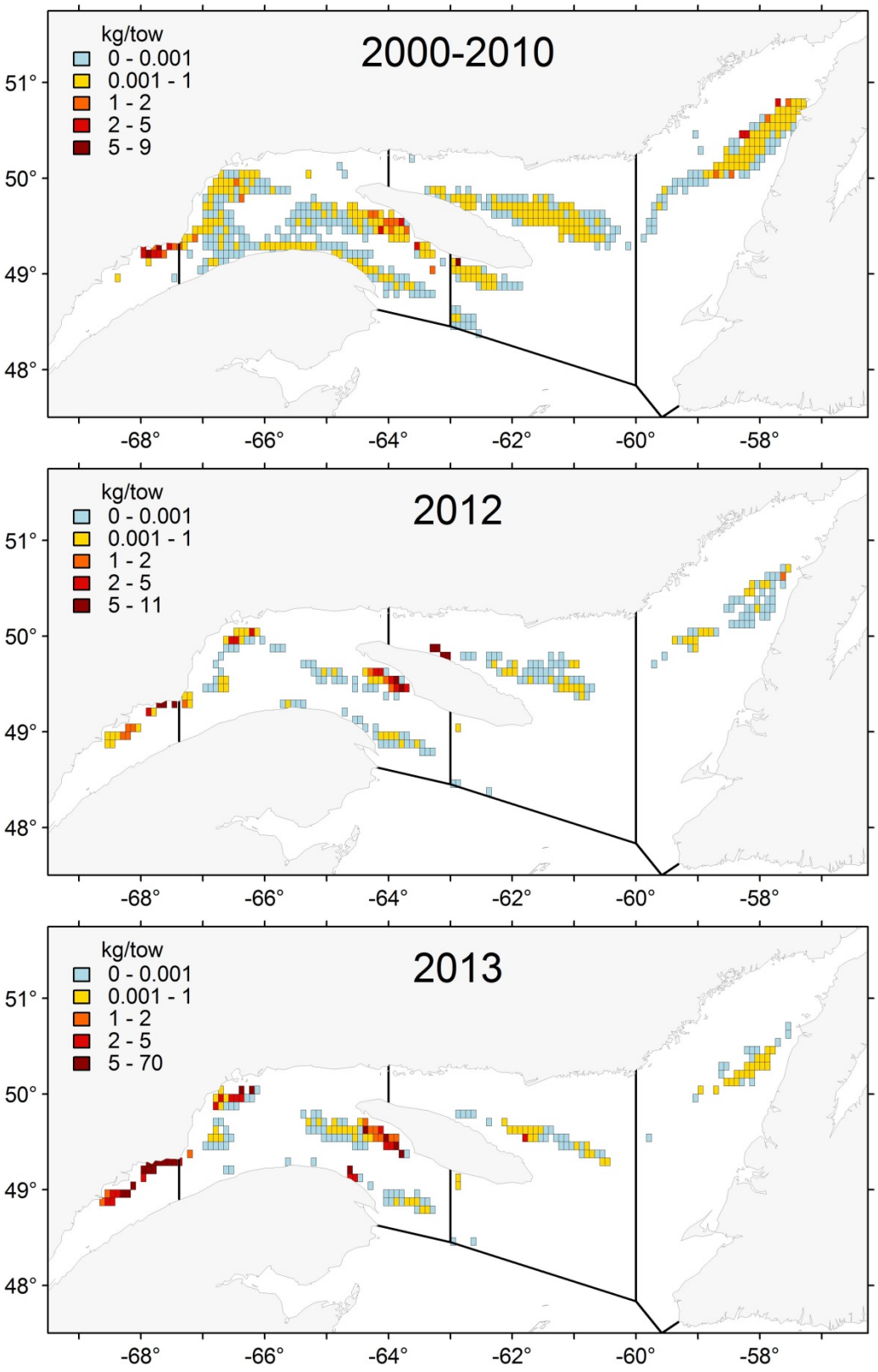

Figure 26. Geographical distribution of catches of Cod per averaged by statistical squares of 5 minutes during fishing activities directed on shrimp in the presence of an at-sea observer.

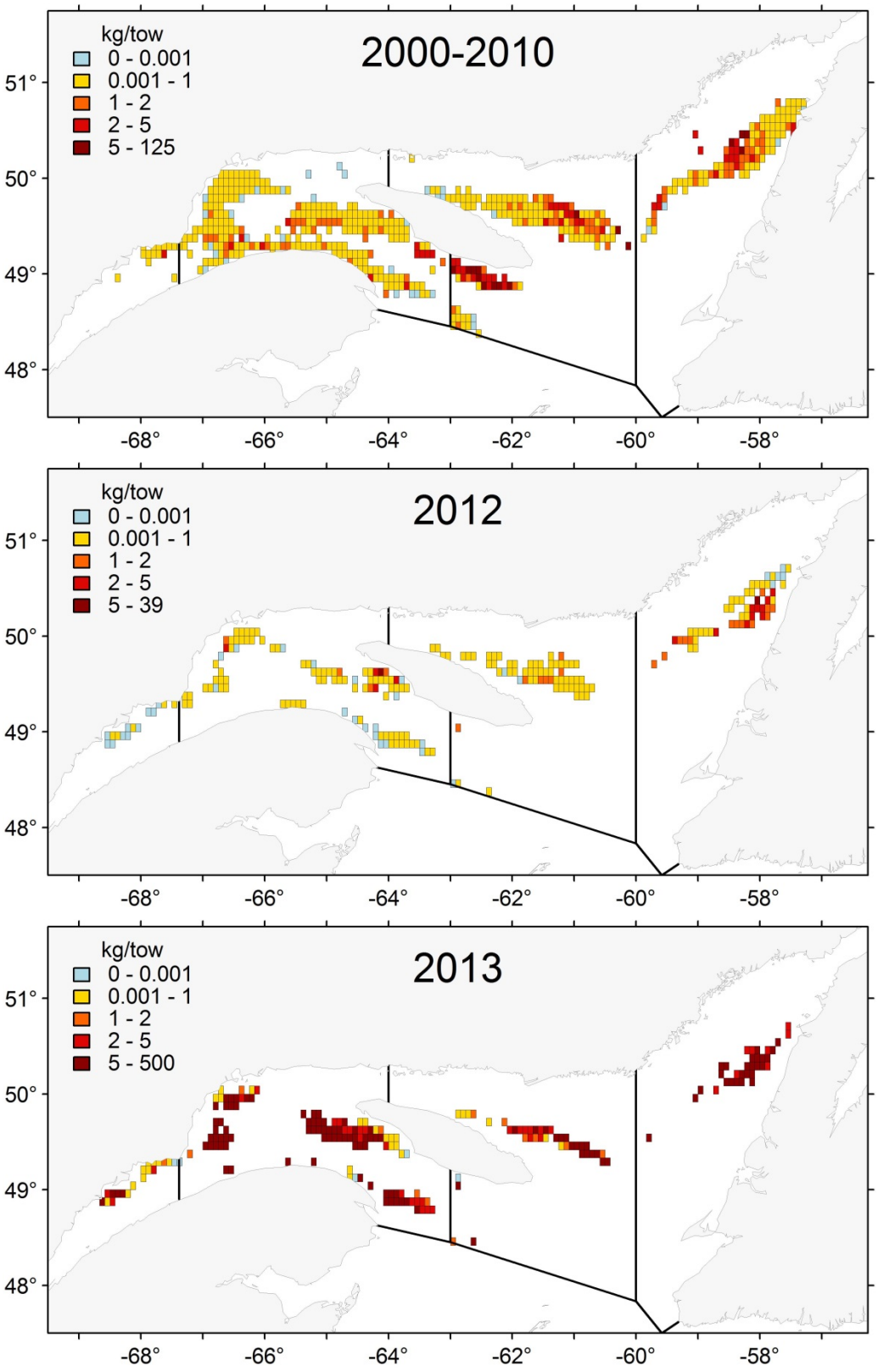

Figure 27. Geographical distribution of catches of Redfish per averaged by statistical squares of 5 minutes during fishing activities directed on shrimp in the presence of an at-sea observer.

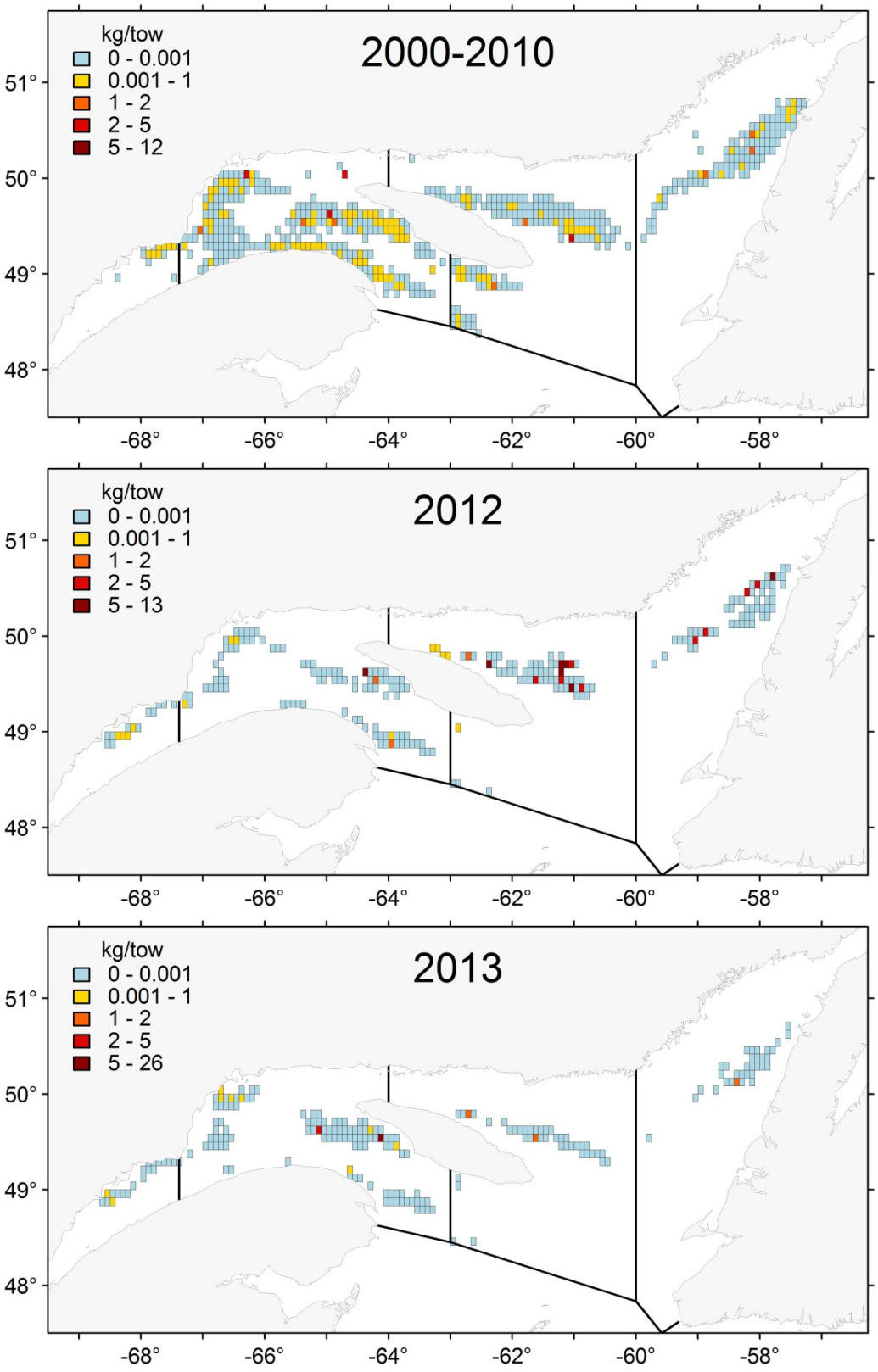

Figure 28. Geographical distribution of catches of Atlantic Halibut per averaged by statistical squares of 5 minutes during fishing activities directed on shrimp in the presence of an at-sea observer.

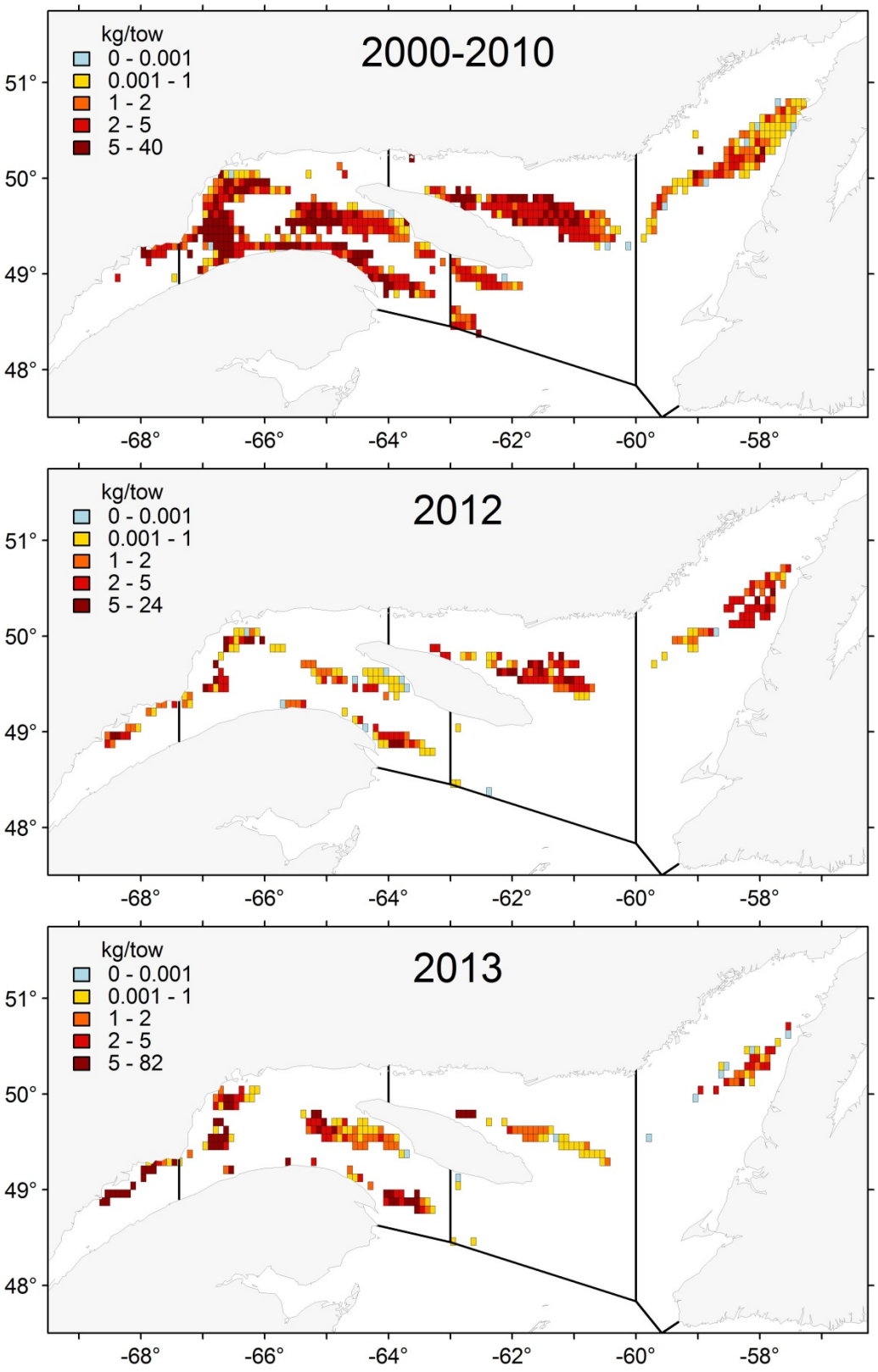

Figure 29. Geographical distribution of catches of Greenland Halibut per averaged by statistical squares of 5 minutes during fishing activities directed on shrimp in the presence of an at-sea observer.

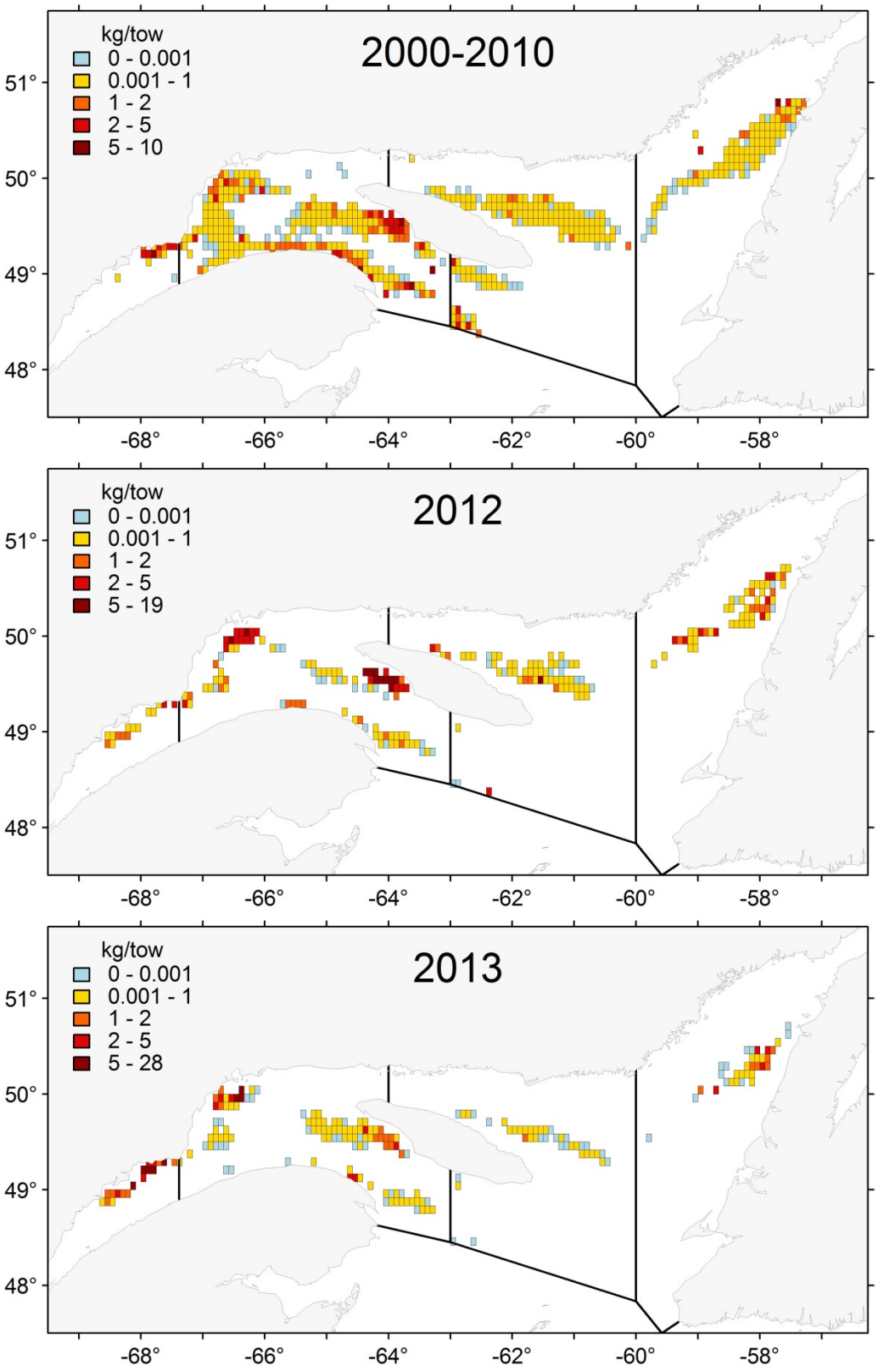

Figure 30. Geographical distribution of catches of American Plaice per averaged by statistical squares of 5 minutes during fishing activities directed on shrimp in the presence of an at-sea observer.

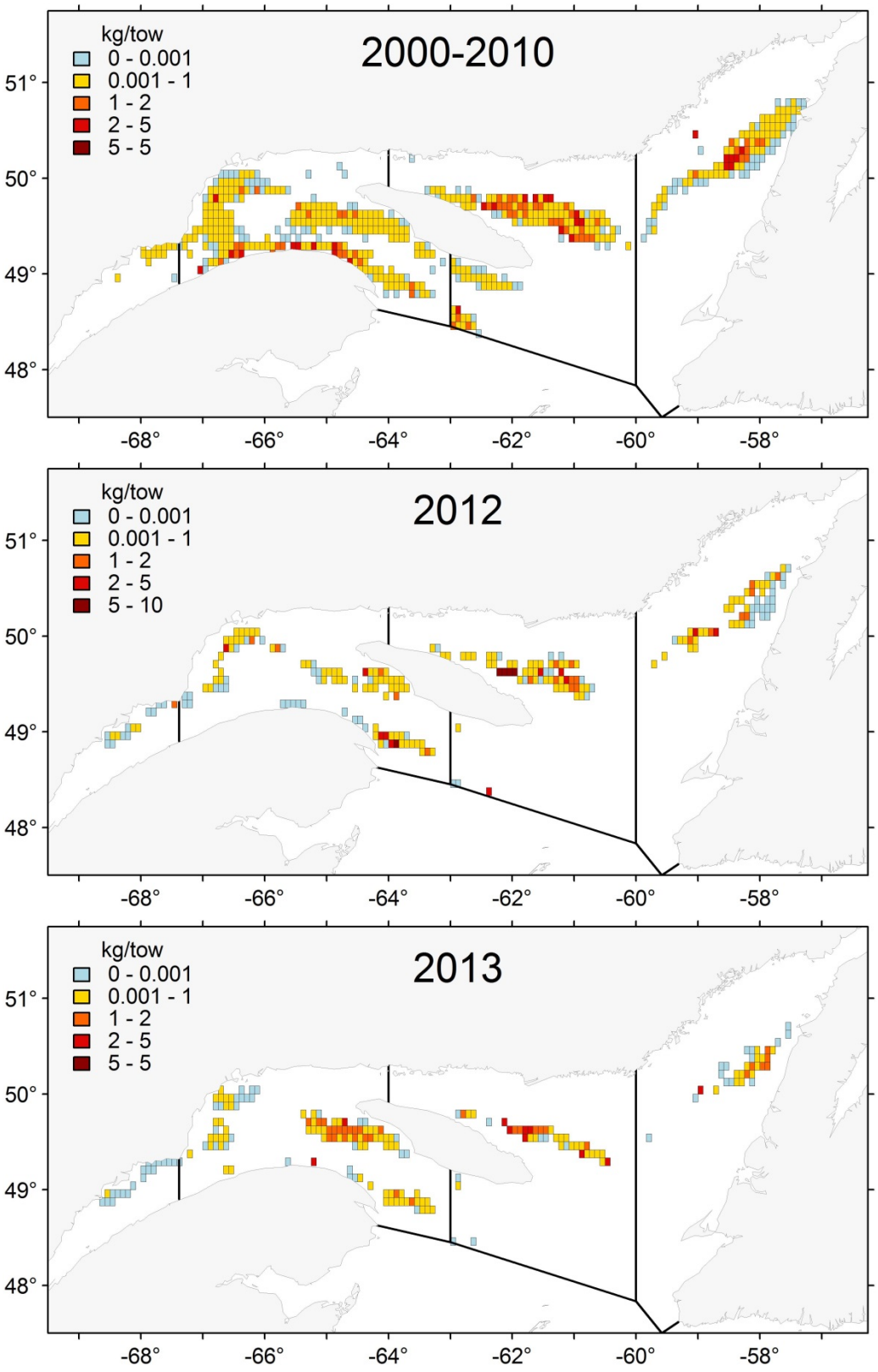

Figure 31. Geographical distribution of catches of Witch Flounder per averaged by statistical squares of 5 minutes during fishing activities directed on shrimp in the presence of an at-sea observer.

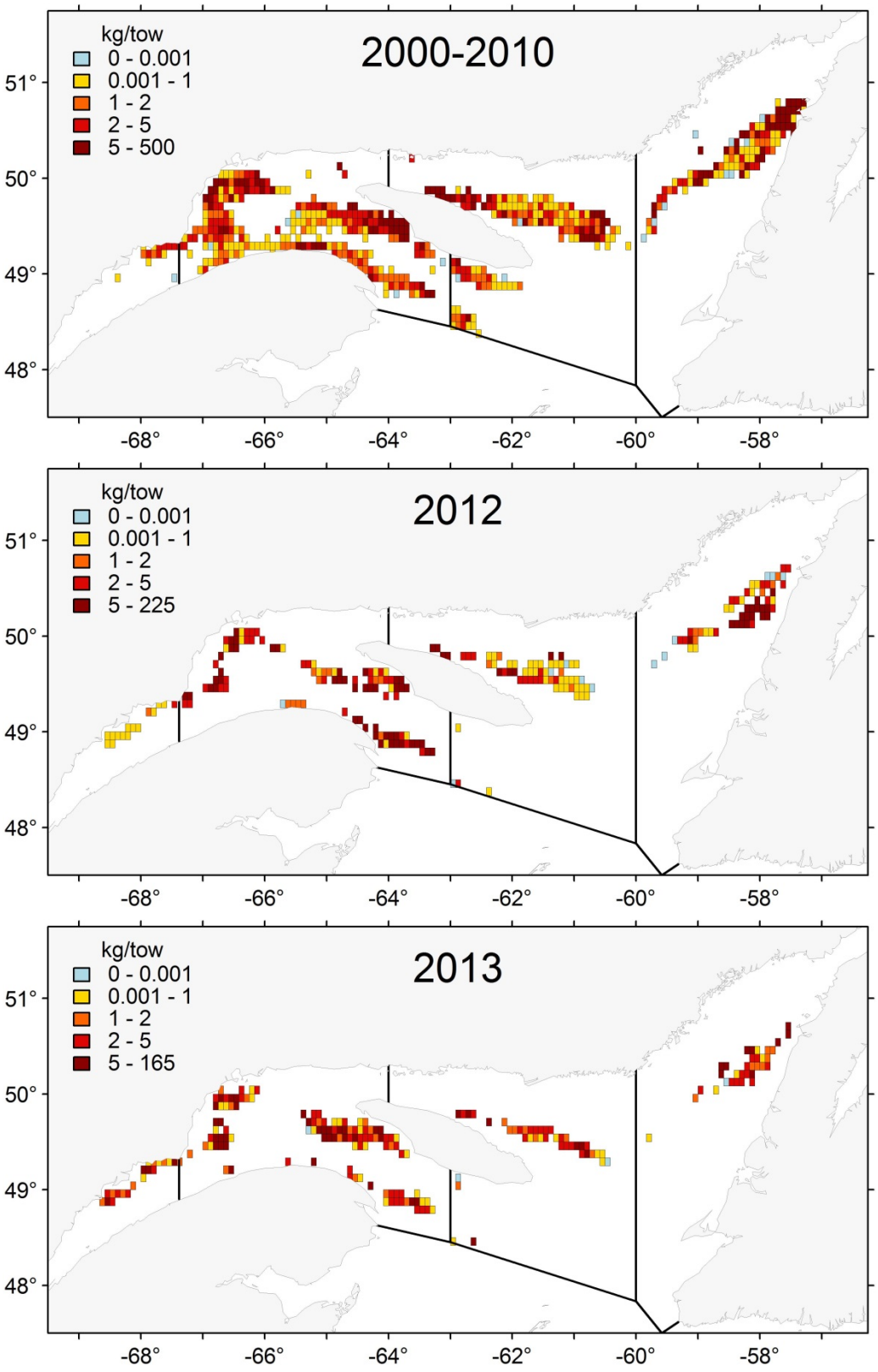

Figure 32. Geographical distribution of catches of Capelin per averaged by statistical squares of 5 minutes during fishing activities directed on shrimp in the presence of an at-sea observer.

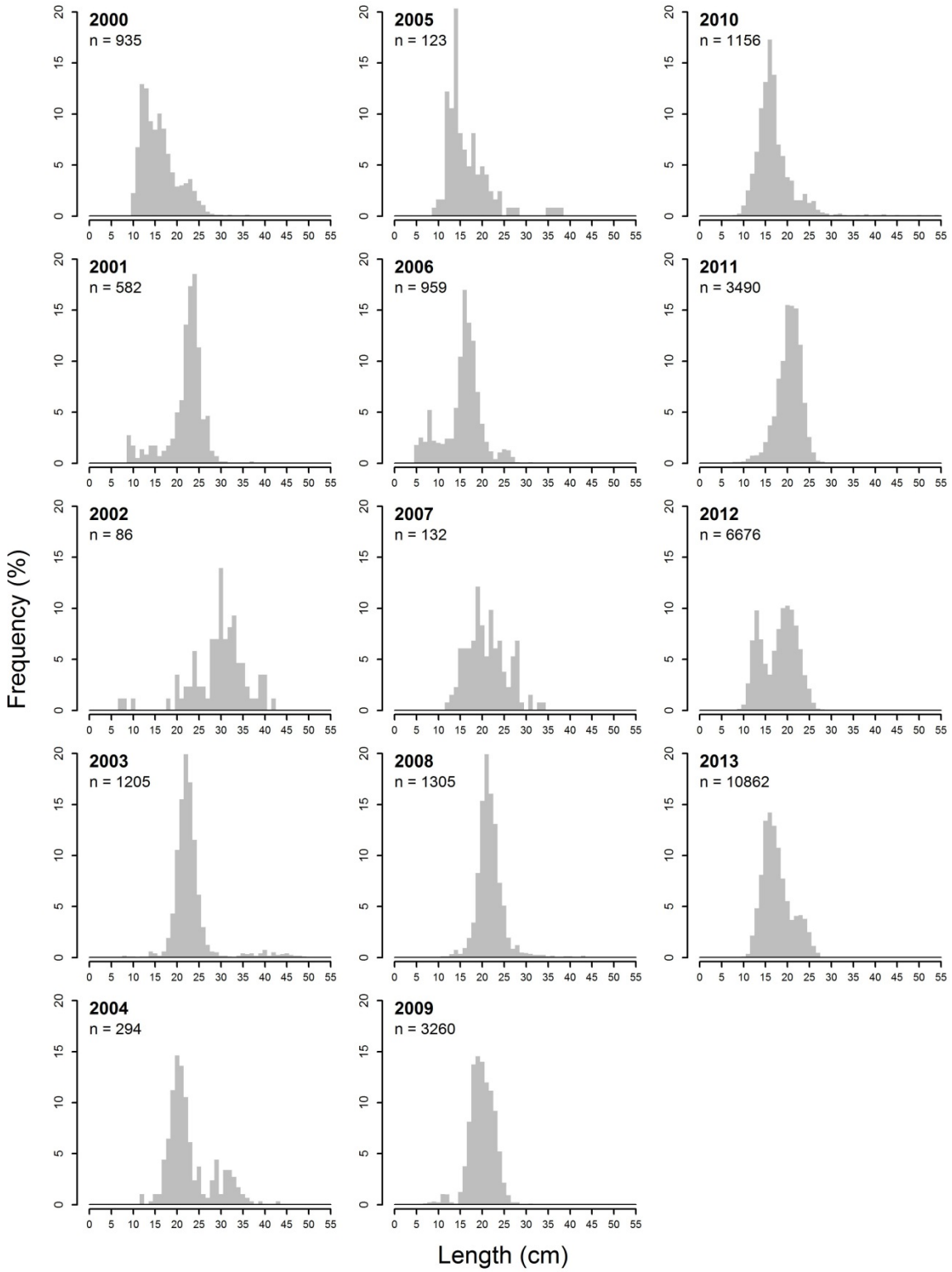

Figure 33. Atlantic Cod length frequency distributions sampled by at-sea observers from 2000 to 2013. The number (n) of specimens that were measured is shown.

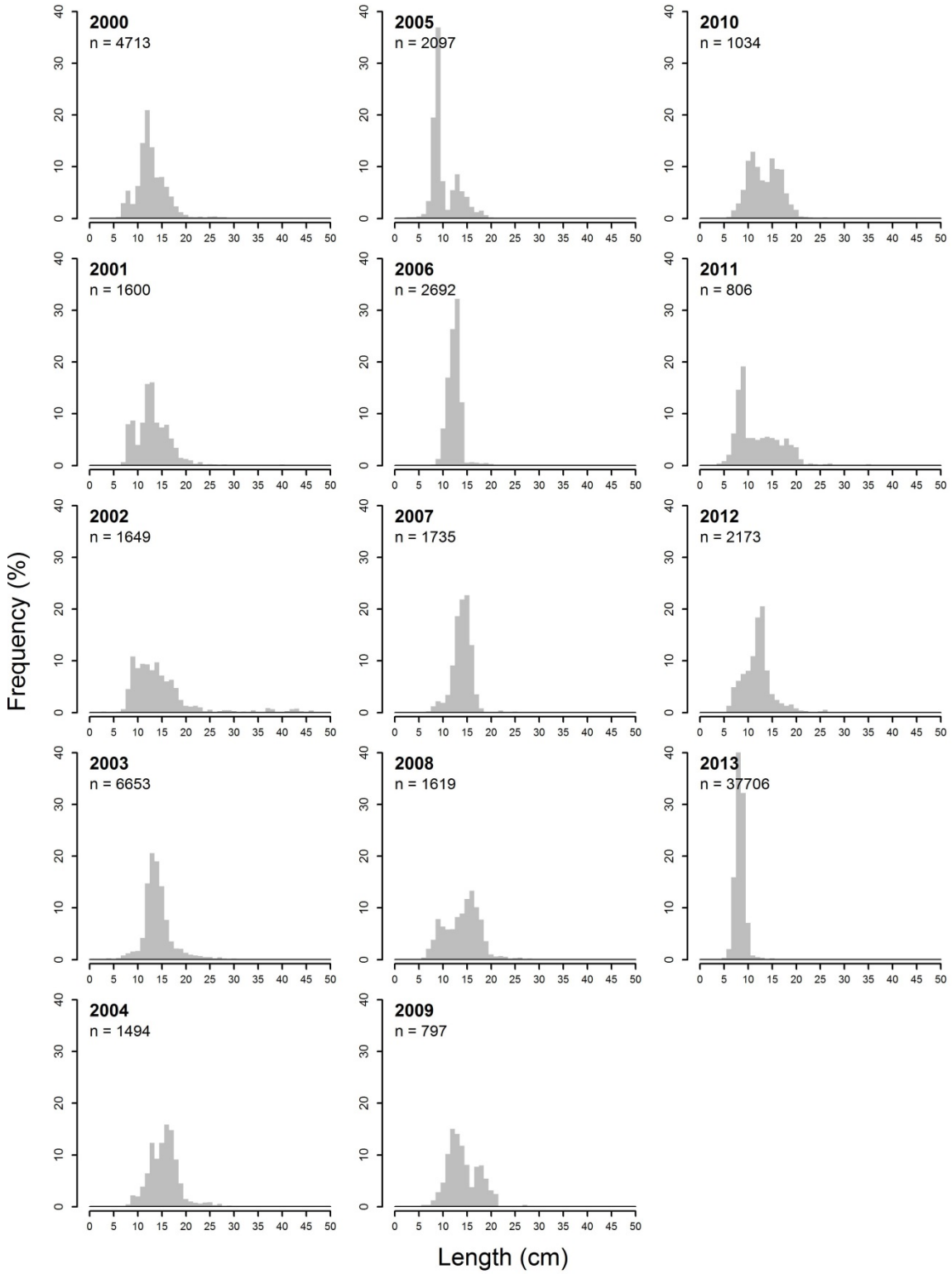

Figure 34. Redfish length frequency distributions sampled by at-sea observers from 2000 to 2013. The number (n) of specimens that were measured is shown.

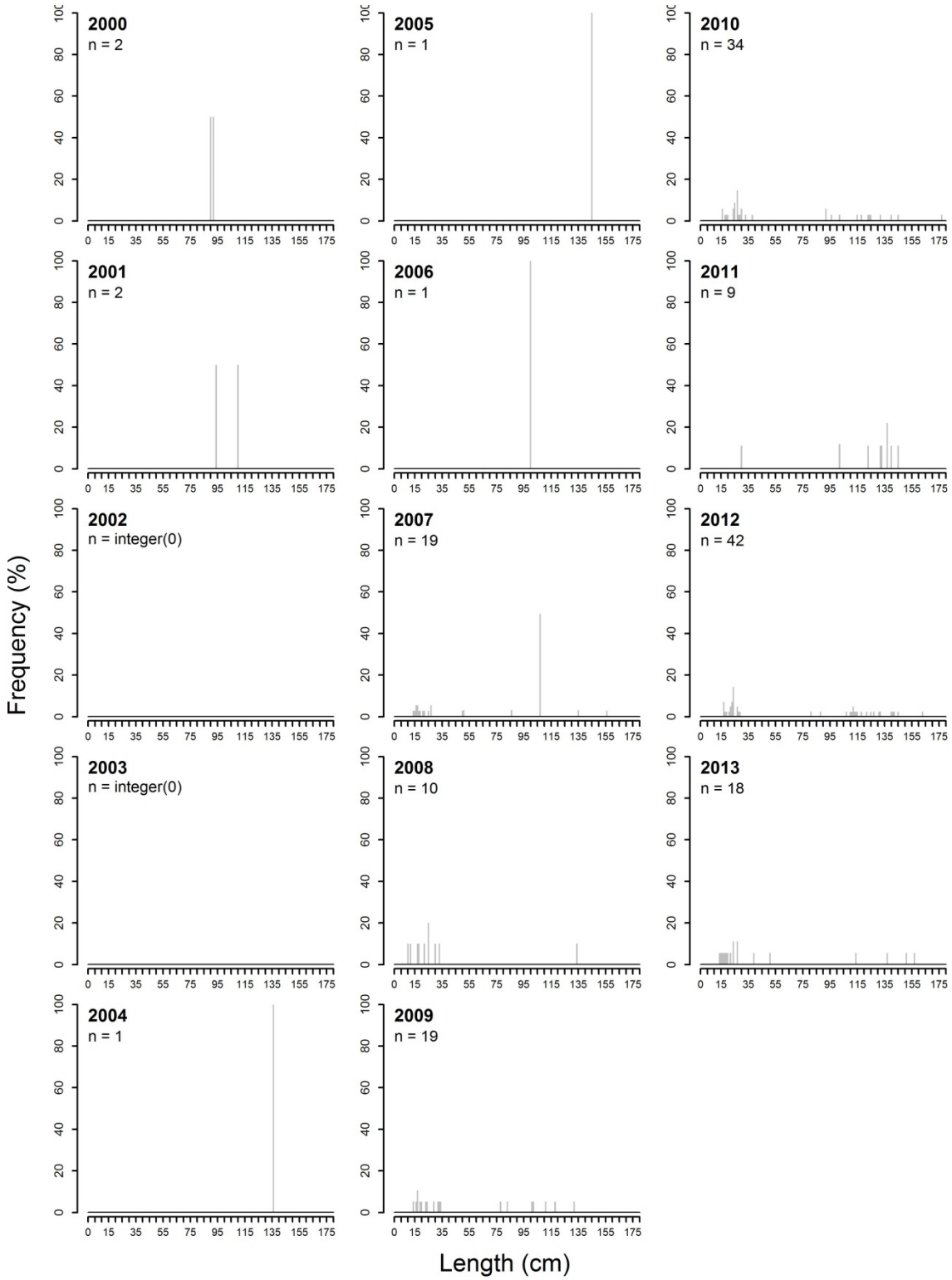

Figure 35. Atlantic Halibut length frequency distributions sampled by at-sea observers from 2000 to 2013. The number (n) of specimens that were measured is shown.

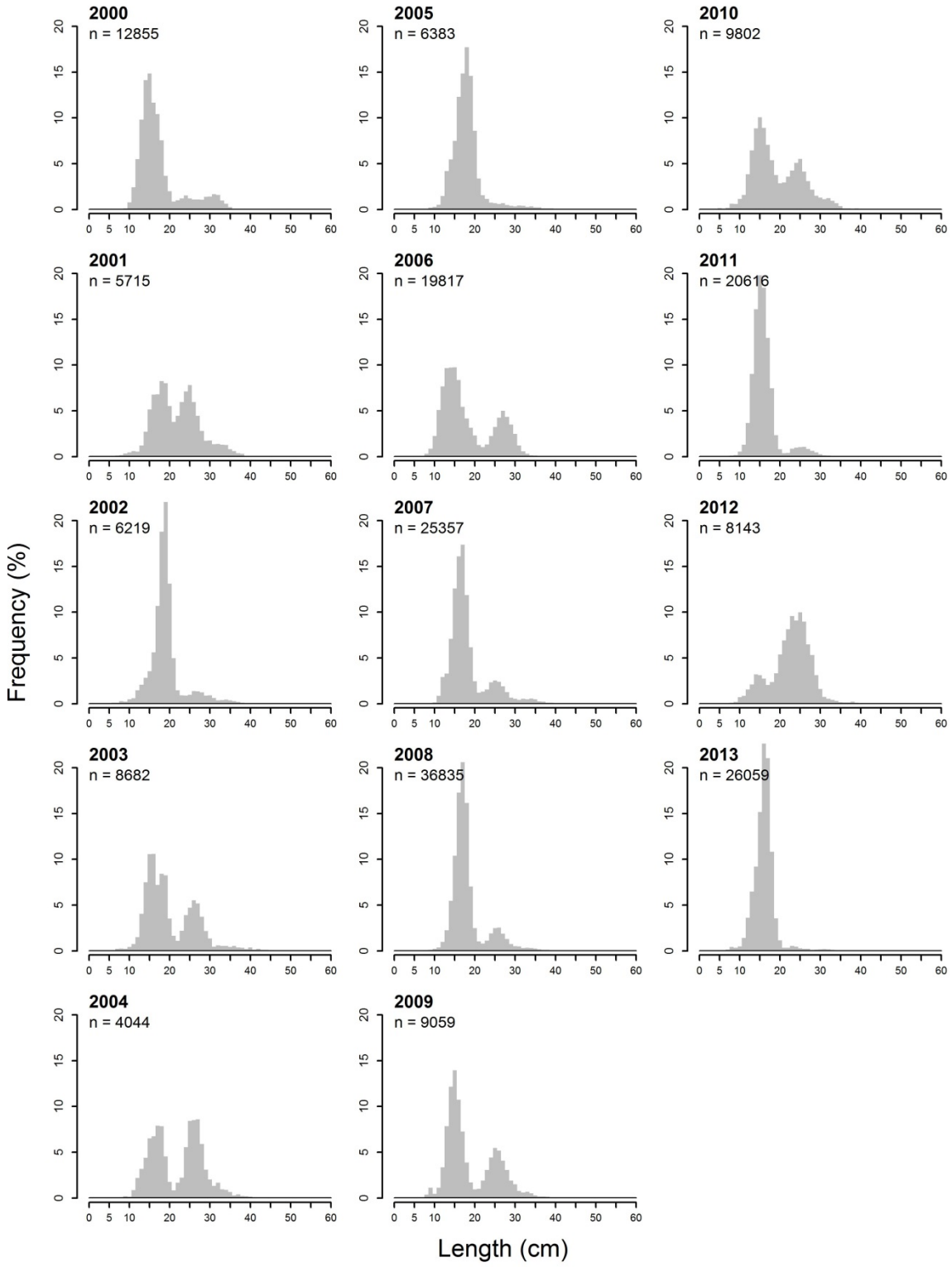

Figure 36. Greenland Halibut length frequency distributions sampled by at-sea observers from 2000 to 2013. The number (n) of specimens that were measured is shown.

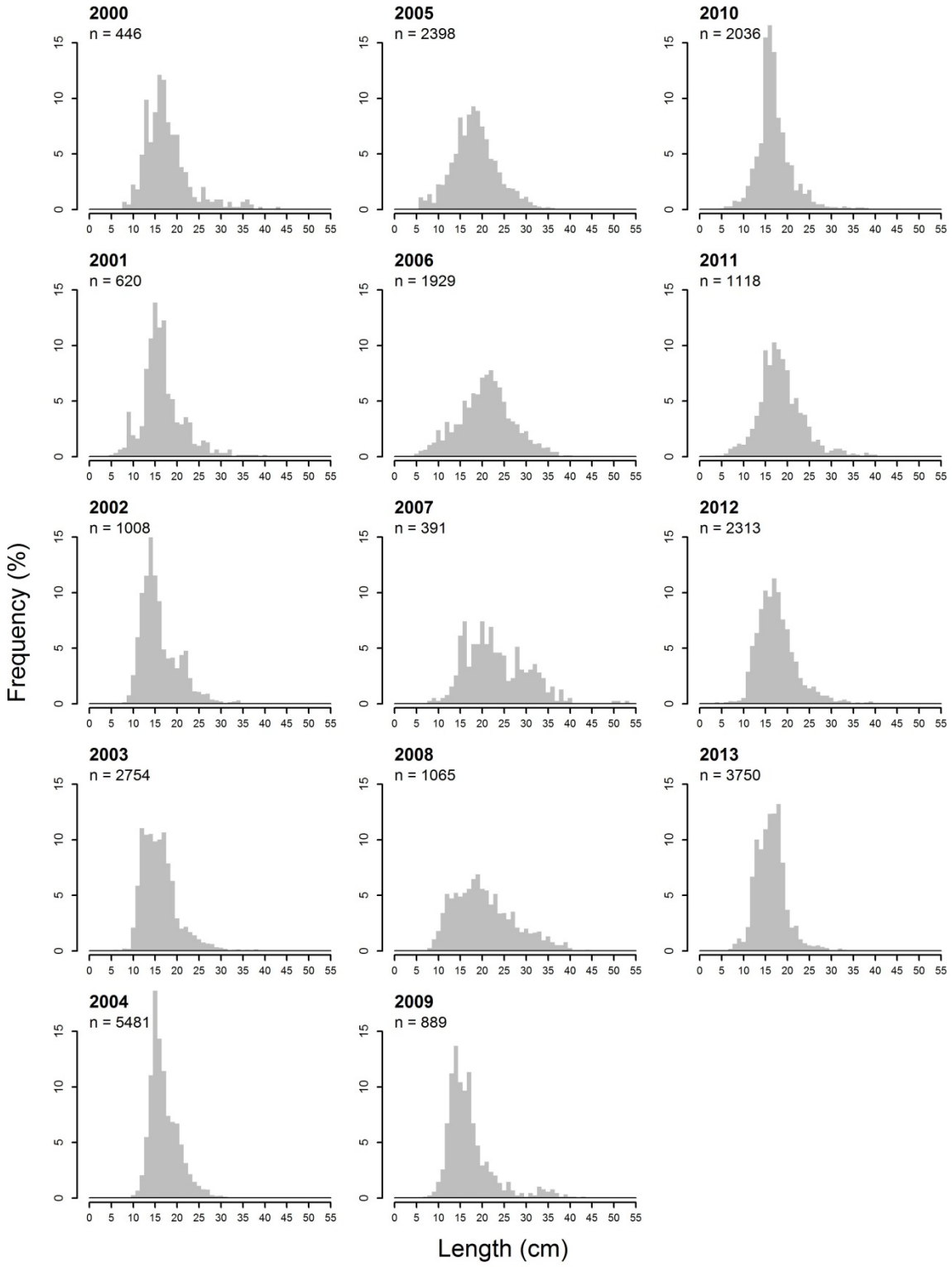

Figure 37. American Plaice length frequency distributions sampled by at-sea observers from 2000 to 2013. The number (n) of specimens that were measured is shown.

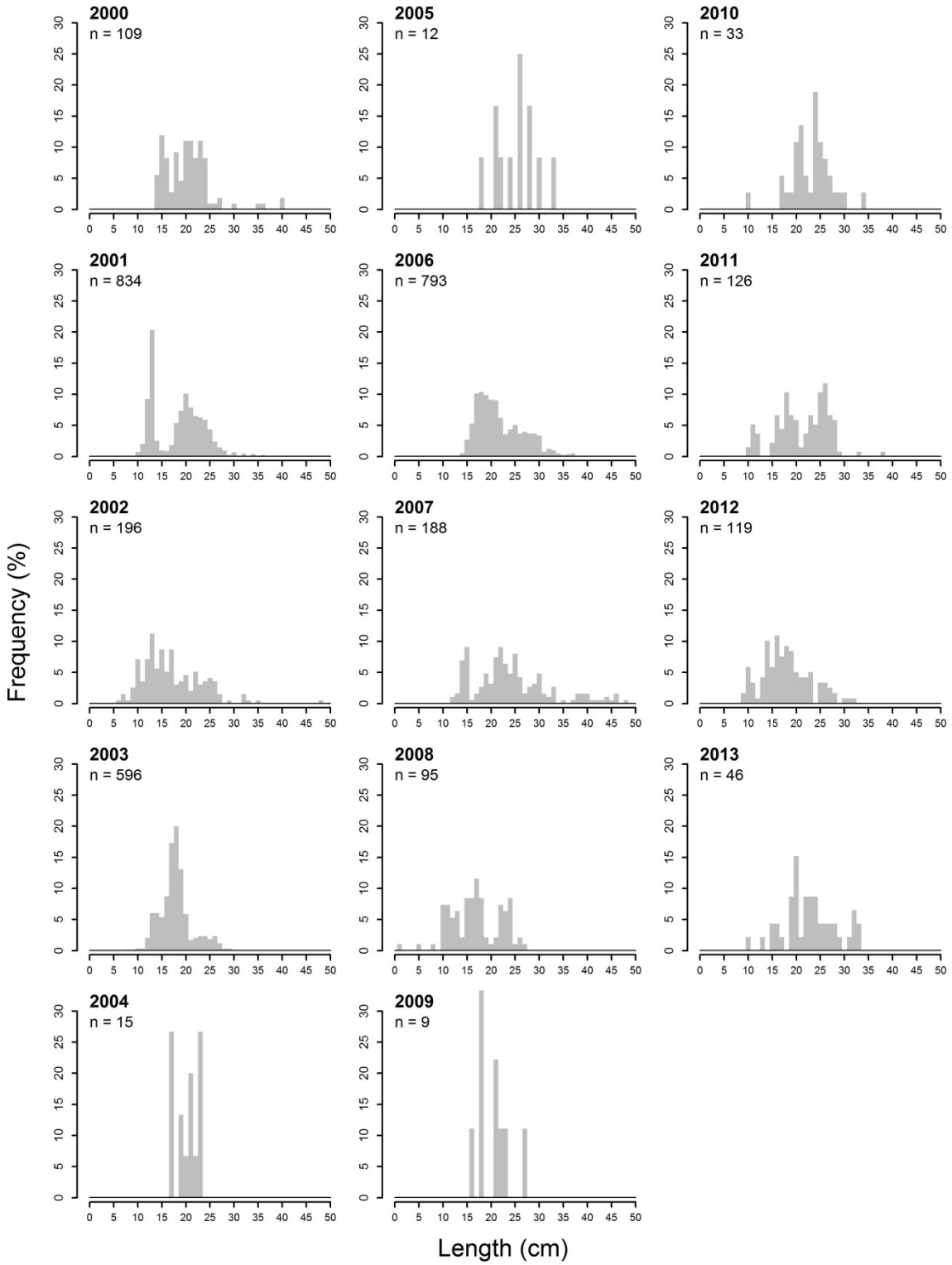

Figure 38. Witch Flounder length frequency distributions sampled by at-sea observers from 2000 to 2013. The number (n) of specimens that were measured is shown.