

# **Review of the 2022 snow crab (*Chionoecetes opilio*) fishery in the southern Gulf of St. Lawrence (Areas 12, 12E, 12F and 19)**

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## ABSTRACT

Surette T., Allain, R., Landry J.-F., and Moriyasu, M. 2023. Review of the 2022 snow crab (*Chionoecetes opilio*) fishery in the southern Gulf of St. Lawrence (Areas 12, 12E, 12F and 19). Can. Data Rep. Fish. Aquat. Sci. 1371 : vi + 16 p.

The review of the 2022 snow crab (*Chionoecetes opilio*) fishery in the southern Gulf of St. Lawrence (sGSL; Areas 12, 12E, 12 F and 19) is presented. Preliminary landings in the sGSL in 2022 were 31,661 t out of a revised quota of 32,129 t. The allowable quota in the notice to harvesters was 32,512 t. For Area 12 harvesters, landings were 27,620 t (revised quota of 28,075 t). The catch-per-unit-of-effort (CPUE) from logbooks decreased in 2022 (51.4 kg per trap hauled (kg/th)) compared to 2021 (57.4 kg/th). In Areas 12E and 12F, landings were 197 t (revised quota of 195 t) and 1,173 t (revised quota of 1,177 t), respectively. In Area 12E, CPUE increased in 2022 (78.5 kg/th) compared to 2021 (55.7 kg/th). In Area 12F, CPUE also increased in 2022 at 76.4 kg/th compared to 2021 (59.1 kg/th). In Area 19, landings reached 2,671 t (revised quota of 2,682 t). Although CPUE decreased from 2021 (121 kg/th) they remained high in 2022 at 112.6 kg/th.

## RÉSUMÉ

Surette T., Allain, R., Landry J.-F., and Moriyasu, M. 2023. Review of the 2022 snow crab (*Chionoecetes opilio*) fishery in the southern Gulf of St. Lawrence (Areas 12, 12E, 12F and 19). Can. Data Rep. Fish. Aquat. Sci. 1371 : vi + 16 p.

La revue de 2022 de la pêche au crabe des neiges, *Chionoecetes opilio*, dans le sud du golfe du Saint-Laurent (sgSL ; zones 12, 12E, 12F et 19) est présentée. Les débarquements préliminaires dans le sgSL en 2022 ont atteint 31 661 t sur un quota révisé de 32 129 t. Le quota alloué dans l'avis aux pêcheurs était de 32 512t. Pour les pêcheurs de la zone 12, les débarquements ont atteint 27 620 t (quota révisé de 28 075 t). La prise par unité d'effort (PUE) selon les carnets de bord a diminué en 2022 (51,4 kg par casier levé (kg/cl) comparativement à 2021 (57,4 kg/cl)). Dans les zones 12E et 12F, les débarquements ont atteint 197 t (quota révisé de 195 t) et 1 173 t (quota révisé de 1 177 t), respectivement. Dans la zone 12E, la PUE a augmenté en 2022 (78,5kg/cl) comparativement à 2021 (55,7 kg/cl). Dans la zone 12F, la PUE a également augmenté en 2022 à 76,4 kg/cl, une augmentation par rapport à 2021 (59,1 kg/cl). Dans la zone 19, les débarquements étaient de 2 671 t sur un quota révisé de 2 682 t. Malgré que la PUE soit diminuée par rapport à 2021 (121,0 kg/cl), celle-ci est demeurée élevée en 2022 à 112,6 kg/cl.



## **1. INTRODUCTION**

Snow crab, *Chionoecetes opilio*, has been commercially exploited in the southern Gulf of St. Lawrence (sGSL) since the mid-1960s. There are currently four management areas in the sGSL: 12, 12E, 12F and 19 (Figure 1), with Area 12 being the largest in terms of area, number of participants, and landings.

The fishing season in Areas 12, 12E and 12F generally starts as soon as the sGSL is clear of ice in late April to early May and until mid-July or when the area quota is caught. In Area 19, the fishing season starts in July and ends in mid-September or when the quota is caught. The number of traps per license varies by harvester group and management area. Conical traps are set mainly on mud or sand-mud bottoms at temperatures ranging from -0.5 to 4.5°C, with depths ranging from 50 to 280 m. Management of these fisheries is based on quotas and effort controls (trap allocations, trap dimensions and seasons). Only hard-shelled males  $\geq 95$  mm of carapace width are commercially exploited and landing of female crab is prohibited.

There are two buffer zones within the sGSL where fishing is prohibited: one is a two nautical mile strip located along the northern edge of Area 19 and the other is located along the south edge of Area 19. During the season, the fishery is subject to local area closures to limit the impacts on soft-shell crabs and as well as closures for the protection of north Atlantic right whales (NARW). Large-scale closures from either source can result in significant displacements in fleet fishing effort.

## **2. METHODS**

### **2.1. FISHERY LOGBOOK DATA**

Data on reported landings and fishing effort (number of trap hauls) were obtained from fishery logbooks and dockside monitoring data, compiled by the DFO Statistics Branches from the Quebec and Gulf Regions. Post-processing of these data by Science staff involves verification, correction or deletion of erroneous data. This includes corrections for fishing dates, fishing coordinates, landings and effort data. Three to six percent of landings could not be georeferenced due to erroneous or missing coordinate data.

Only data with reliable effort data were used for calculating catch-per-unit-of-effort (CPUE), an index of overall fishery performance. CPUE for 2022 were calculated as the ratio of landings over the fishing effort. Mid-term (2011-2021) and long-term (1998-2021) CPUE means were also calculated for comparison. To account for missing effort data, total effort was estimated from the landings divided by the CPUE estimate.

### **2.2. AT-SEA OBSERVER DATA**

Since 1990, DFO has implemented an observer sampling program onboard commercial vessels which provides data on the size composition of males caught, discard practices, as well as the hardness and condition of the crab carapace (Hébert et al., 2021).

### **2.3. FISHERY CLOSURES**

Newly moulted crab are called soft-shelled and have low commercial value due to their lower meat content. Discarding of these vulnerable crab by harvesters can result in mortality of

commercial-sized soft/white-shelled crabs. A soft shell protocol is thus applied and aims to limit the quantity of these newly moulted crab occurring in at-sea catches, as they represent future recruits to the fishery (Hébert et al., 1992). In Areas 12, 12E and 12F (spring fishery), crabs with a claw hardness of less than 68 units on the durometer were categorized as soft-shelled crabs (Hébert et al. 1992). In Area 19 (summer fishery), crabs with a claw hardness less than 72 units on the durometer reading were considered as soft and white crabs. This monitoring protocol allows for the seasonal closure of portions of fishing areas, usually in the form of 10 x 10 minute grids or sectors when the proportion of these males exceeds 20% in the catch within a 15-day period. Crab harvesters are given 2 days (Area 19) or 5 days (Area 12, 12E, 12F) to remove their fishing gear upon grid closure.

Local area-closures are also used to minimize risks of entanglement of NARW with fishing gear, which has been an ongoing concern since 2017. With less than 370 NARW remaining in the world, the Government of Canada continues to take action to protect this species. Since 2018, protective measures have focused on minimizing risks of NARW entanglements with fishing gear, as well as vessel collisions.

Protective measures for 2022 included both temporary and season-long fishing NARW area closures (DFO, 2022). Upon detection of a right whale, either visually or acoustically, a region consisting of nine 10 x 10 minute grids, centered on the whale's location was closed to non-tended fixed gear fisheries for 15 days. If a right whale was detected again within days 9-15 of the closed area, then the area remained closed until November 15, 2022. If a whale was not re-detected within the closed area, then the area was re-opened to fishing after day 15. A minimum of two flights with no right whale detections was required for a closed area to be re-opened to fishing.

### **3. RESULTS**

#### **3.1. FLEET AND SEASON**

The sGSL snow crab fishery in 2022 had a total of 446 quota allocation shares, which were fished by 471 active vessels during the 2022 fishery. Table 1 shows a breakdown of allocation shares, the number of vessels, and season lengths by management area. Fishing began on April 13<sup>th</sup> in Areas 12, 12E and 12F and on July 8<sup>th</sup> in Area 19. Areas 12, 12E and 12F closed on June 30<sup>th</sup>, while Area 19 closed on September 7<sup>th</sup>.

Observer sea-sampling coverage is presented in Table 2. In Area 12, observers were at sea for 220 trips, with a total of 1,262 traps sampled and 48,313 crabs measured. Catch size composition in 2022 are shown in Figure 2 where sub-legal crab represent 18.9% of catches prior to discarding. In 2022, trap soak time in Area 12 was 75 hours, which was comparable to 81 hours in 2021 and 75 hours in 2020.

Observer sea-sampling in Area 12E consisted of 2 trips sampled, with a total of 3 traps sampled and 92 crabs measured. Catch size composition for 2022 are shown in Figure 2 where sub-legal crab represented 6.1% of catches prior to discarding. Soak time in Area 12E decreased to 46 hours in 2022, from 73 hours in 2021 and 54 hours in 2020.

In Area 12F, 15 trips had at sea observers while 94 traps were sampled and 3,709 crabs were measured. Catch size composition for 2022 are shown in Figure 2 where sub-legal crab

represented 13.8% of catches prior to discarding. In 2022, soak time in Area 12F was similar (81 hours) to 2021 (82 hours) and 2020 (88 hours).

Observer sea-sampling in Area 19 consisted of 58 trips sampled, with a total of 185 traps samples and 7,320 crabs measured. Catch size composition for 2022 are shown in Figure 2 where sub-legal crab represented 17.7% of catches prior to discarding. In 2022, soak time in Area 19 was 33 hours and was comparable to 31 hours in 2021 and 33 hours in 2020.

### **3.2. QUOTAS AND LANDINGS**

Snow crab has been commercially exploited in the sGSL since the mid-1960s. Snow crab landings from the sGSL were low in the early 1970s but increased more than threefold from 1975 to 1982. There were four periods of landings exceeding 20,000 tonnes (t): 1981 to 1986, 1994 and 1995, 2002 to 2009, and the current period, from 2012 to 2022, the longest in the series (Figure 3).

The revised quota was set at 32,129 t for the 2022 fishery (Table 1). For reasons of annual quota adjustments, reconciliations, and re-distribution of the scientific quota among areas, the revised quota does not necessarily correspond to the Total Allowable Catch (TAC) set at the start of the fishing season. This quota includes 450 t set aside to finance stock assessment activities in 2022 (under the Section 10 agreement of the *Fisheries Act*). Preliminary landings of sGSL snow crab in 2022 were 31,661 t, with 27,620 t landed in Area 12, 197 t in Area 12E, 1,173 t in Area 12F, and 2,671 t in Area 19 (Table 3).

The geographical distribution of snow crab landings from 2018 to 2022 is shown in Figure 4. The spatial distribution of landings is relatively constant from year to year with the exception of 2018 and 2019 where static closures were implemented for the protection of NARW. In 2022, increases in landings were observed in the Bay des Chaleurs, the Magdalen Channel and the Cape Breton Corridor in comparison to previous years. Fishing in Area 12E is limited to a small area in the southeastern portion of the area while landings in Area 12F were concentrated along its central portion. In Area 19, landing were comparable to previous years with the bulk of landings occurring the southern portion of the area, around the tips of the two Cape Breton Troughs.

### **3.3. FISHING EFFORT AND CPUE**

Total fishing effort in the sGSL was 579,259 trap hauls (th) in 2022, near the record high of 606,504 th in 2020 (Table 3). Effort for 2022 was 35% higher than the average effort of 427,347 th from 1998 to 2022. Fishing effort from Area 12 varied from 187,409 in 2011 to a record 556,780 th in 2020. Effort was 537,820 th in 2022, an increase of 48% from 2021, at 363,136 th, which was above the long-term average of 382,335 th over the period from 1998 to 2022. Area 12E fishing effort varied from 1,825 in 2010 to 10,074 in 2006. Effort was 2,509 th in 2022 compared to 5,314 th in 2021, which is lower than the long-term average of 4,962 th. Area 12F fishing effort varied from a low of 5,112 in 2005 to 23,163 th in 2014. Effort decreased from 18,612 th in 2021 to 15,240 th in 2022 which is above the long-term average of 12,256 th. Area 19 fishing effort varied from 11 138 th in 2010 to 56 517 th in 2004. Effort was 23 690 in 2022 compared to 18 384 in 2021, which is lower than the long-term average of 27,964 th.

The geographical distribution of fishing effort since 2018 is presented in Figure 5. The spatial distribution of fishing effort is very similar to that of landings with the exception of Area 19

which has very low effort relative to the rest of the sGSL due to a much lower trap allocation. In 2022, increases in effort were observed in Baie des Chaleurs, the Bradelle Bank, the Magdalen Channel and along the Cape Breton Corridor.

Historical CPUE by Area are presented in Table 3 and Figure 6. In Area 12, the CPUE decreased by 10.5% to 51.4 kilograms per trap haul (kg/th) in 2022 compared to 2021. CPUE from Area 12 in 2022 were slightly below the mid-term (2011-2021) and long-term (1998-2021) means of 60.4 kg/th and 54.9 kg/th, respectively. CPUE by Area 12 crab harvesting group are presented in Table 4. Areas 12E and 12F both had strong increases in CPUE in 2022 compared to 2021, with a 40.9% increase to 78.5 kg/th in Area 12E and a 29.0% increase to 76.4 kg/th in Area 12F. CPUE from Area 12E in 2022 were well above the mid-term (49.4 kg/th) and long-term (44.9 kg/th) means. Similarly, CPUE from Area 12F in 2022 were considerably higher than the mid-term (50.4 kg/th) and long-term (54.1 kg/th) means. The characteristically high CPUE for Area 19 was 112.6 kg/th for 2022, a decreased by 6.9% compared to 2021. This value was well below the mid-term (138.9 kg/th) and slightly above the long-term (108.0 kg/th) means.

The spatial distribution of CPUE from 2018 to 2022 is shown in Figure 7. Overall CPUE were similar in Area 12 in 2022 in comparison to 2021 with slightly higher CPUE observed in the western portion of the Baie des Chaleurs and slightly lower CPUE around the Bradelle Bank. Higher CPUE were observed in 2022 in Areas 12E and 12F compared to previous years. As expected, CPUE in Area 19 are much higher than anywhere else in the sGSL, although decreased in 2022 compared to 2021.

### **3.4. FISHERY CLOSURES**

Local area closures of soft/white crab and for the protection of NARW in 2022 are shown in Figure 8 where numbers represent the total number of days grids were closed during the fishery.

Local area closures due to the presence of NARW began at the end of the fourth week of the fishery in Area 12 and 12E, on May 11<sup>th</sup>. By the end of May, significant portions of Area 12 were closed due to numerous NARW sightings, stretching from the Gaspé coast to the eastern tip of Prince Edward Island. A smaller area centered on the eastern portion of Area 12E was closed for 11 days in mid-May. Area 19 was also affected by NARW closures, albeit later in the season.

Local area closures due to the occurrence of soft-shelled crab were minimal in Area 12, with only two grid closures (Figure 8). In Area 19, white crab closures were more significant, with sectors C, E and F closing on July 30<sup>th</sup> and sector B closing on August 5<sup>th</sup> (Figure 8).

## **4. CONCLUSION**

Similar to 2021, the snow crab fishery in the sGSL opened in early April and quotas were reached in all fishing management areas. In 2022, landings and to some extent, fishing effort, increased in Baie des Chaleurs, the Magdalen Channel, in Area 12F and along the Cape Breton Corridor. In 2022, Area 12 CPUE decreased compared to 2021 and were slightly lower than the mid-term and long-term means. CPUE in Areas 12E and 12F strongly increased compared to 2021 and were well above their mid- and long-term means. Although CPUE in Area 19 remained high in 2022, they decreased compared to 2021 and this value was well below the mid-term and slightly above the long-term means. CPUE of a given fishing year may correlate to the biomass estimated from the preceding survey, however, many other factors unrelated to crab biomass, such as environmental conditions, local area closures, fishing gear and fishing practices likely

obscure the relationship between these two. Although soft-crab closures were minimal and occurred towards the end of the season, local area closures due to the detection of NARW were widespread throughout the sGSL and most likely resulted in significant displacement in fleet fishing effort in all management areas.

## 5. ACKNOWLEDGEMENTS

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## 7. TABLES

Table 1. Number of allocation shares, number of active vessels, season opening and closing dates, last landing dates, revised quotas, and total landings of the snow crab fishery by management area in the southern Gulf of Saint Lawrence in 2022.

Characteristics	Area 12	Area 12E	Area 12F	Area 19	Southern Gulf
Allocation shares	242	4	42	158	446
Active vessels	318	3	38	112	471
Season opening date	April 13	April 13	April 13	July 8	-
Season closing date	June 30	June 30	June 30	September 7	-
Last day of landings	June 30	June 4	June 30	August 22	-
Revised quota (t) <sup>1</sup>	28,075	195	1,177	2,682	32,129 <sup>2</sup>
Landings (t)	27,620 <sup>3</sup>	197	1,173	2,671	31,661

<sup>1</sup> For reasons of annual quota adjustments, reconciliations, and re-distribution of the scientific quota among areas, the revised quota does not necessarily correspond to the TAC in the notice to harvesters.

<sup>2</sup> Quota includes 450 t set aside to finance the stock assessment activities in 2022 (under Section 10 of the *Fisheries Act*).

<sup>3</sup> Total landings in Area 12 include landings allocated to Area 12E that were fished in Area 12.

Table 2. Fishery characteristics and at-sea observer coverage by management area in the southern Gulf of Saint Lawrence snow crab fisheries in 2022.

Characteristics	Area 12	Area 12E	Area 12F	Area 19
Fishing effort (traps hauled)	537,820	2,509	15,240	23,690
Fishing trips	4,284	14	215	1,576
Trips with observers	220	2	3	92
Traps sampled by observers	1,262	3	94	185
Crab sampled	48,313	92	3,709	7,320

Table 3. Landings, fishing effort and catch per unit effort from logbooks in the southern Gulf of Saint Lawrence snow crab, *Chionoecetes opilio*, fisheries (Areas 12, 12E, 12F and 19) since 1987 (note: landings for 2022 are preliminary).

Year	Landings (t)					Effort (number of trap hauls)				Catch per unit effort (kg / trap haul)			
	12	12E	12F	19	Total	12	12E	12F	19	12	12E	12F	19
1987	11,782	-	-	1,151	12,933	449,293	-	-	37,987	26.2	-	-	30.3
1988	12,355	-	-	1,337	13,692	528,844	-	-	22,794	23.4	-	-	58.7
1989	7,882	-	-	1,334	9,216	356,442	-	-	29,978	22.1	-	-	44.5
1990	6,950	-	-	1,333	8,283	254,578	-	-	28,422	27.3	-	-	46.9
1991	10,019	-	-	1,337	11,356	326,671	-	-	16,733	30.7	-	-	79.9
1992	11,235	-	-	1,678	12,913	362,967	-	-	17,140	31.0	-	-	97.9
1993	14,336	-	-	1,678	16,014	344,698	-	-	18,204	41.6	-	-	92.2
1994	19,995	-	-	1,672	21,667	390,833	-	-	24,495	51.2	-	-	68.3
1995	19,944	217	317	1,575	22,053	416,890	4,033	11,561	24,854	47.8	53.8	27.4	63.4
1996	15,978	164	238	1,342	17,722	318,796	2,714	5,604	24,583	50.1	60.3	42.4	54.6
1997	15,413	163	287	1,386	17,249	303,286	4,695	6,390	21,930	50.8	34.7	44.9	63.2
1998	11,136	161	290	1,988	13,575	243,339	5,624	6,035	31,232	45.8	28.6	48.1	63.1
1999	12,682	159	290	1,979	15,110	289,003	5,415	5,072	19,088	43.9	29.4	57.2	103.7
2000	15,046	150	291	3,225	18,712	436,782	6,528	5,136	55,977	34.5	22.9	56.7	64.1
2001	13,819	155	378	3,910	18,262	326,382	6,700	5,736	46,251	42.3	23.2	63.0	88.5
2002	21,869	165	378	3,279	25,691	544,454	2,916	4,437	43,662	40.2	56.6	85.2	72.3
2003	16,898	345	817	3,103	21,163	337,960	5,471	10,460	29,952	50.0	63.1	78.1	103.6
2004	26,626	349	806	3,894	31,675	484,991	6,277	10,775	56,517	54.9	55.6	74.8	68.9
2005	32,363	449	479	2,827	36,118	508,053	5,571	5,112	41,512	63.7	80.6	93.7	68.1
2006	25,934	411	787	1,989	29,121	402,702	10,074	14,079	23,566	64.4	40.8	55.9	84.4
2007	23,243	220	370	3,034	26,867	353,775	5,914	12,252	42,553	65.7	37.2	30.2	71.3
2008	20,911	187	431	2,929	24,458	370,762	9,232	15,504	38,388	56.4	20.3	27.8	76.3
2009	20,896	67	309	2,370	23,642	433,527	4,653	14,045	33,193	48.2	14.4	22.0	71.4
2010	7,719	50	420	1,360	9,549	161,148	1,825	14,335	11,138	47.9	27.4	29.3	122.1
2011	8,618	76	313	1,701	10,708	162,604	2,413	9,631	12,761	53.0	31.5	32.5	133.3
2012	18,159	185	706	2,906	21,956	267,044	5,623	16,890	16,317	68.0	32.9	41.8	178.1
2013	22,645	204	543	2,657	26,049	296,398	5,097	11,086	17,890	76.4	40.1	49.0	148.5
2014	19,674	178	882	3,745	24,479	317,689	3,765	23,163	25,407	61.8	47.3	38.1	147.4
2015	23,080	192	510	2,129	25,911	339,912	2,918	13,351	14,703	67.9	65.8	38.2	144.8
2016	19,499	144	381	1,701	21,725	304,624	2,796	8,667	11,937	64.0	51.5	43.9	142.5
2017	39,825	203	684	2,944	43,656	553,125	3,333	9,421	20,616	72.0	60.9	72.6	142.8
2018	20,769	260	1,183	2,048	24,260	469,887	5,579	17,120	13,120	44.2	46.6	69.1	156.1
2019	27,554	224	1,166	2,763	31,707	496,468	3,415	18,083	24,518	55.5	65.7	64.5	112.7
2020	24,554	234	1,084	2,284	28,156	556,780	5,098	22,168	22,458	44.1	45.9	45.2	101.7
2021	21,423 <sup>1</sup>	223	592	2,241	24,479	363,136	5,314	18,612	18,384	57.4	55.7	59.1	121.0
2022	27,620 <sup>1</sup>	197	1173	2,671	31,661	537,820	2,509	15,240	23,690	51.4	78.5	76.5	112.6

<sup>1</sup>Total landings in Area 12 include landings allocated to Areas 12E (2021, 2022) and 12F (2021) that were fished in Area 12.

Table 4. Catch per unit effort (kg per trap haul) by Area 12 crab harvester group.

Year	Traditional Area 12	Traditional Area 18	Traditional Area 25-26	First Nations	New entrants
2001	43.5	-	62.7	38.8	32.3
2002	42.3	-	45.2	33.8	31.0
2003	50.5	66.0	43.6	51.4	45.6
2004	55.5	64.4	63.9	55.8	48.4
2005	66.2	70.3	80.2	64.5	50.3
2006	68.7	66.2	79.8	59.7	53.8
2007	69.4	61.4	66.2	65.8	54.4
2008	57.3	77.3	54.6	56.0	49.3
2009	46.6	76.7	48.3	49.8	48.7
2010	48.7	36.3	54.0	45.2	51.0
2011	54.3	53.3	46.6	50.9	51.6
2012	67.7	133.1	66.0	67.8	60.5
2013	77.0	114.5	71.1	75.4	69.6
2014	62.1	88.6	53.4	61.4	57.8
2015	70.1	78.9	61.6	66.0	61.1
2016	64.6	69.6	71.0	61.8	61.5
2017	77.6	77.8	76.4	65.0	65.7
2018	43.4	84.5	45.5	42.5	43.5
2019	58.2	72.8	56.3	52.5	47.1
2020	42.9	61.9	54.2	46.5	41.5
2021	60.0	60.2	76.4	52.6	51.1
2022	50.1	79.0	52.7	45.9	55.8



## 8. FIGURES

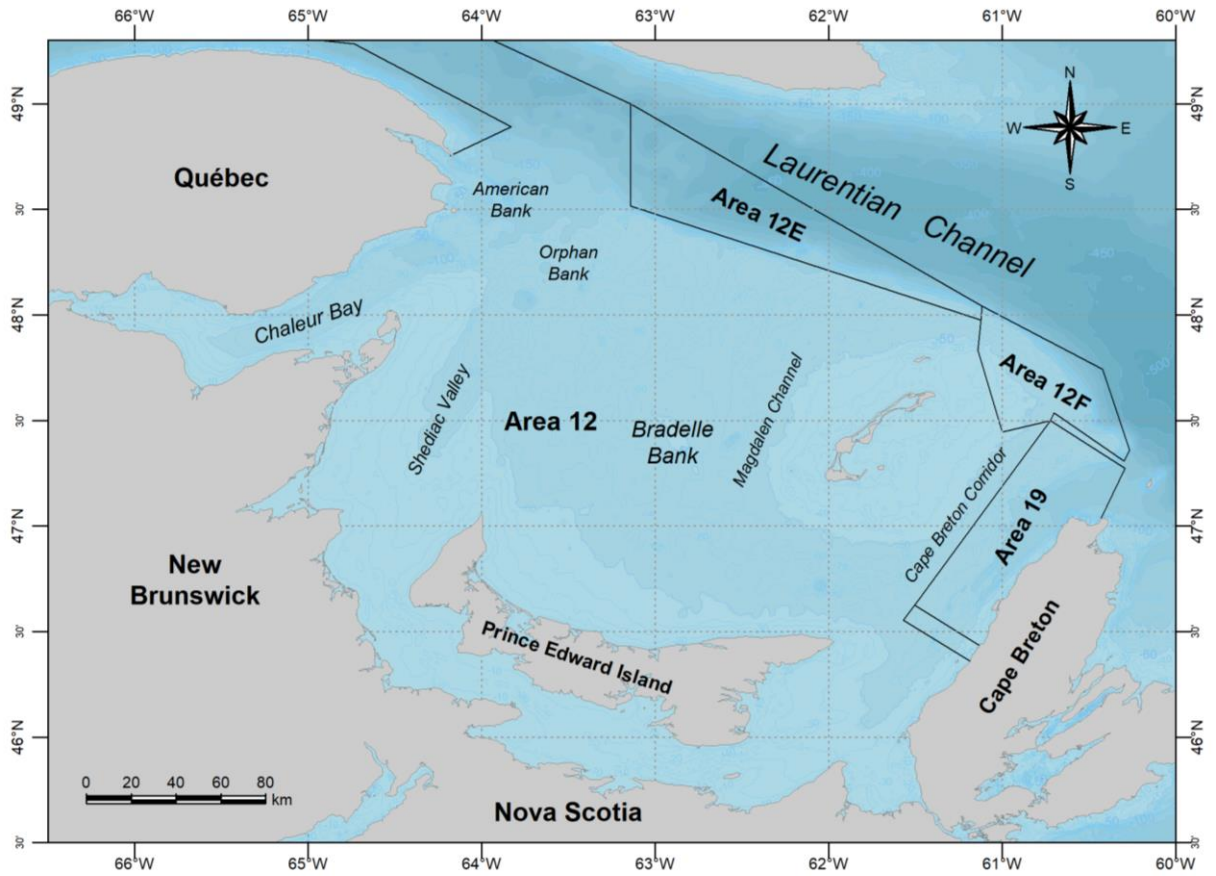


Figure 1. Location of snow crab (*Chionoecetes opilio*) fishing grounds and management areas in the southern Gulf of Saint Lawrence.

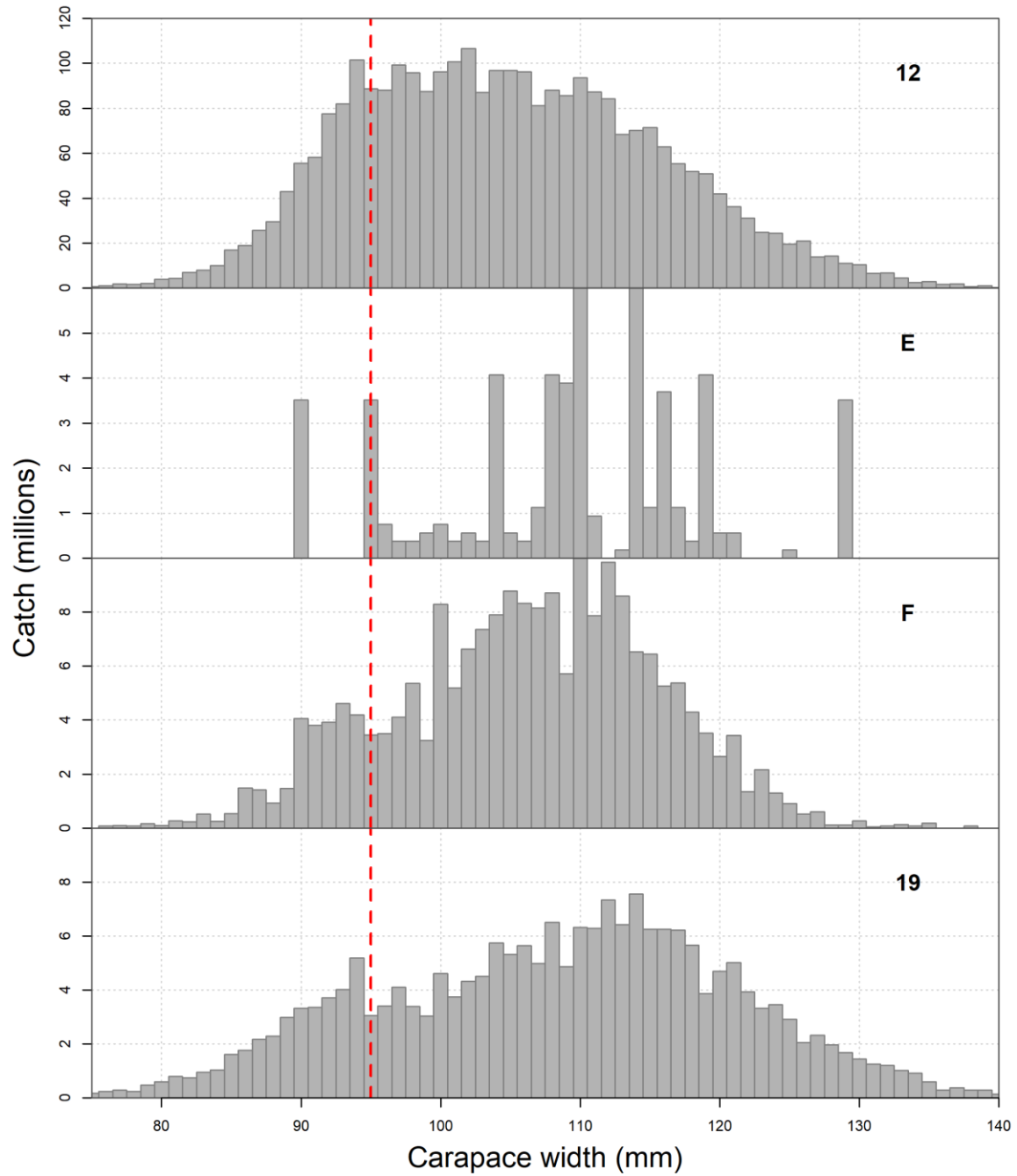


Figure 2. Size frequency distributions of all males crabs measured during the at-sea sampling (before discarding) in Areas 12, 12E, 12F and 19 in 2022. The red stippled line indicates the legal size of 95mm carapace width.

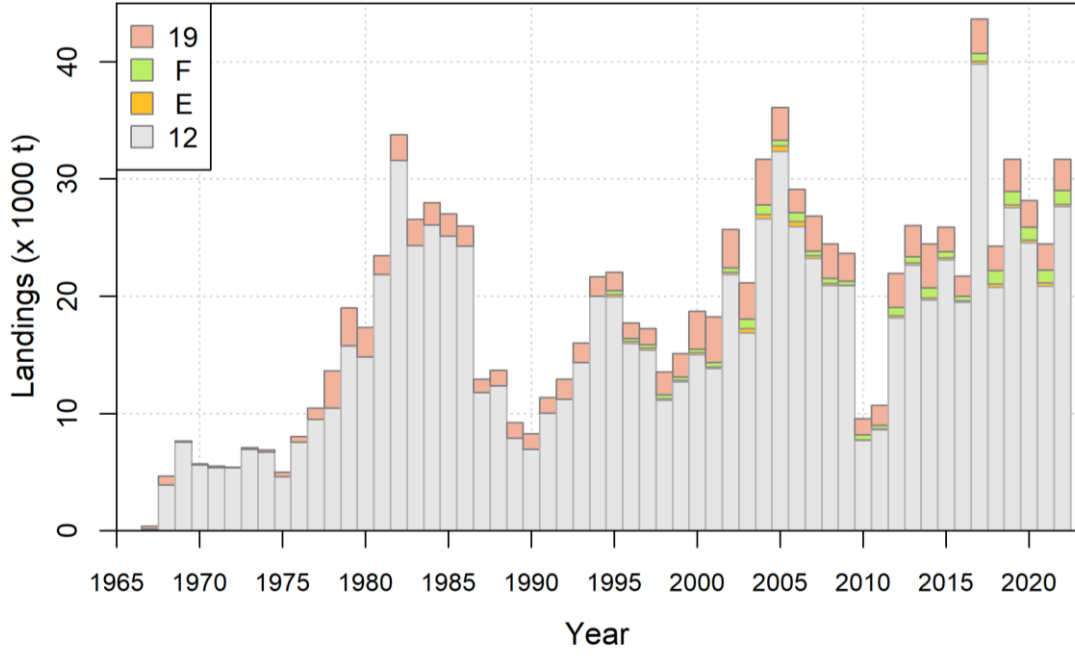


Figure 3. Annual landings (t) by fishing area in the southern Gulf of Saint Lawrence snow crab fishery by fishing area (19, F, E and 12).

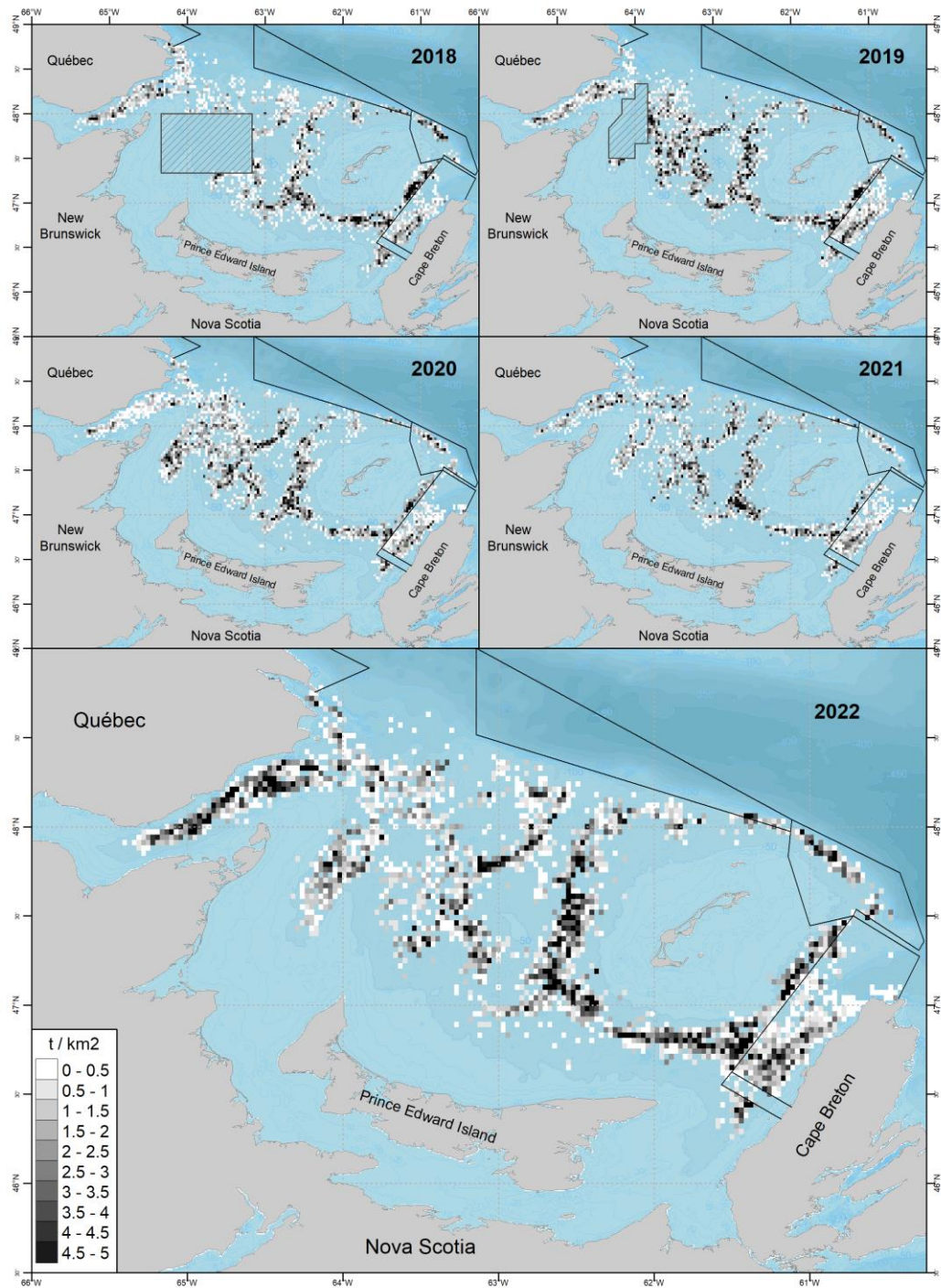


Figure 4. Geographic distribution of landings (t/km<sup>2</sup>) in snow crab fishing management areas from the 2018-2022 fishing seasons. Static closures for the protection of North Atlantic right whales are represented by shaded areas in 2018 and 2019.



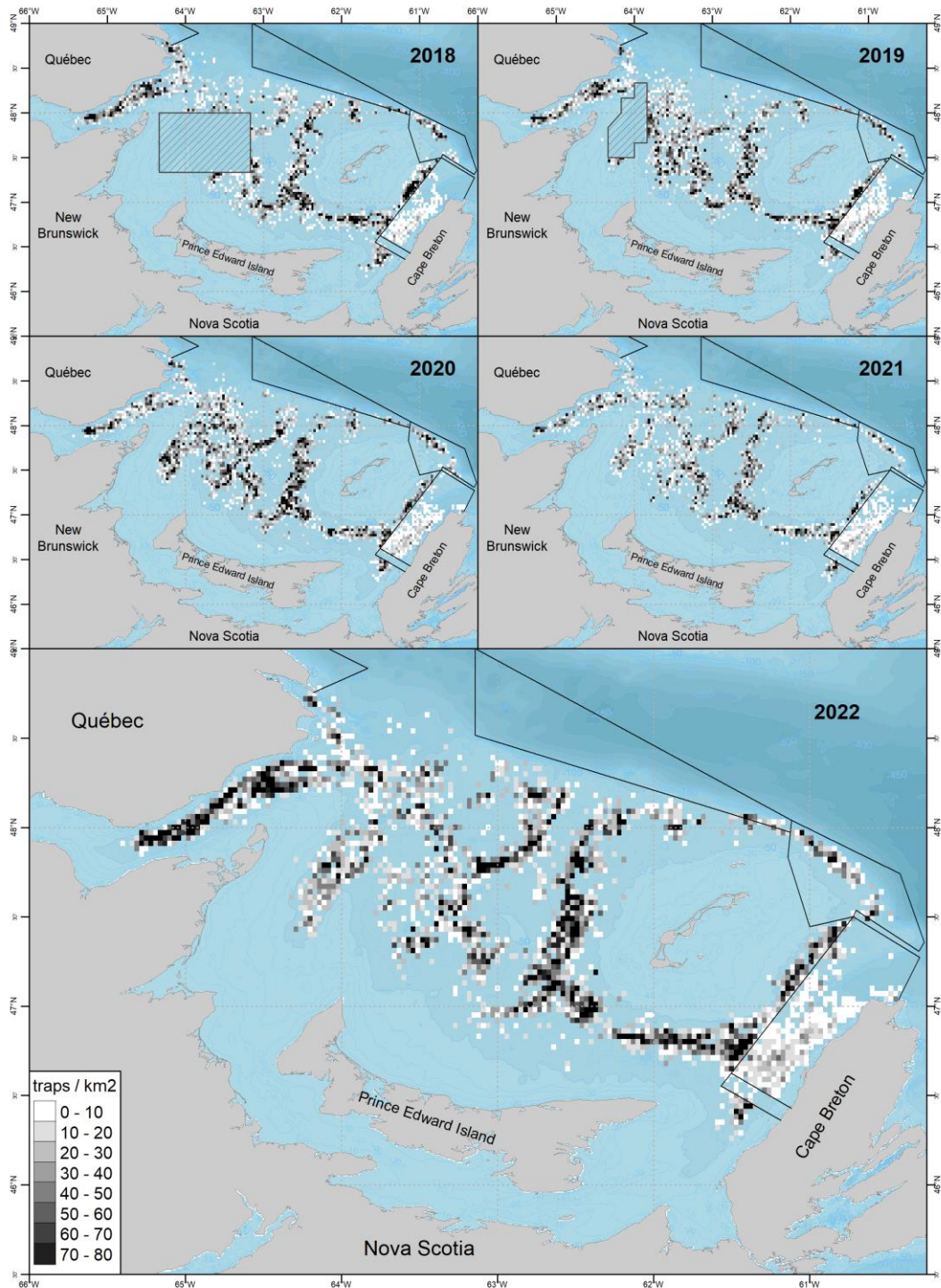


Figure 5. Geographic distribution of fishing effort (trap hauls per km<sup>2</sup>) by snow crab fishery management area from the 2018-2022 fishing seasons. Seasonal closures for the protection of North Atlantic right whales are represented by shaded areas in 2018 and 2019.

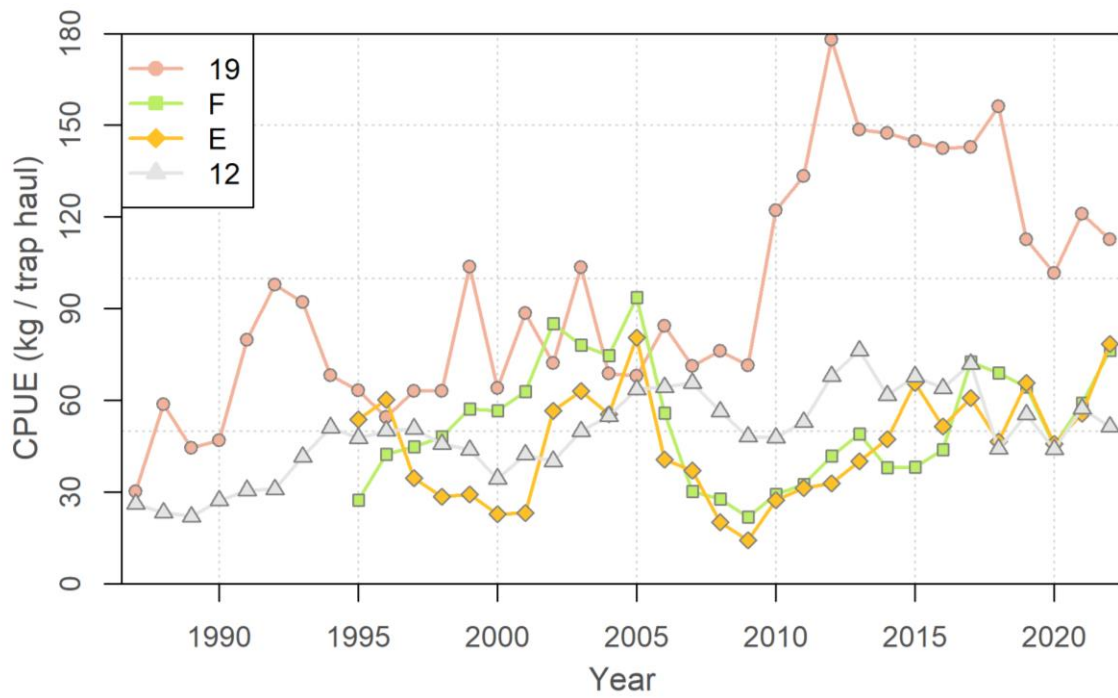


Figure 6. Catch per unit effort (kg/th) by management area in the southern Gulf of Saint Lawrence based on fishery logbook data.

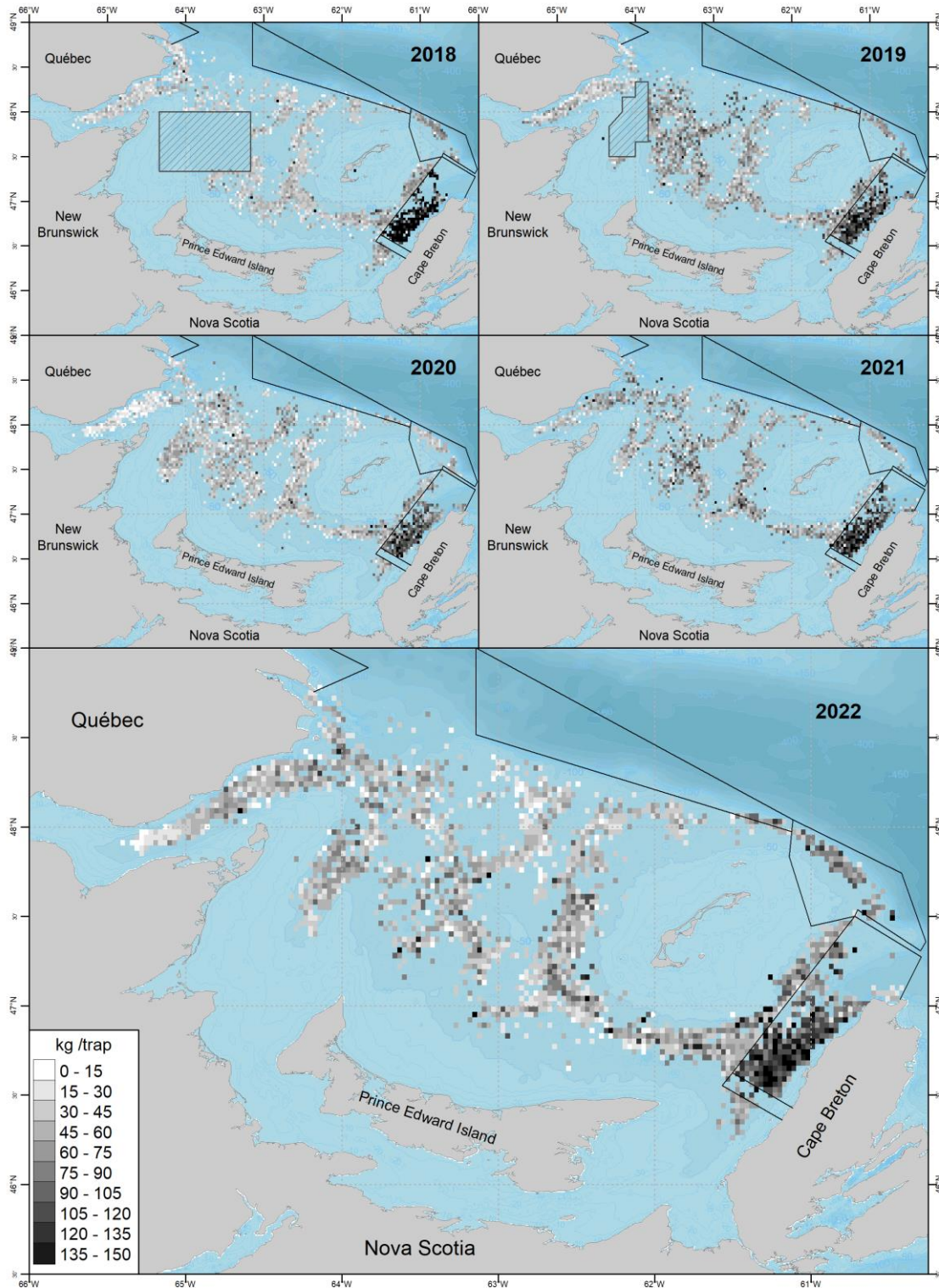


Figure 7. Geographic distribution of catch per unit effort (kg/th), in the snow crab fishery management areas from 2018-2022 fishing seasons. Seasonal closures for the protection of North Atlantic right whales are represented by shaded areas in 2018 and 2019.



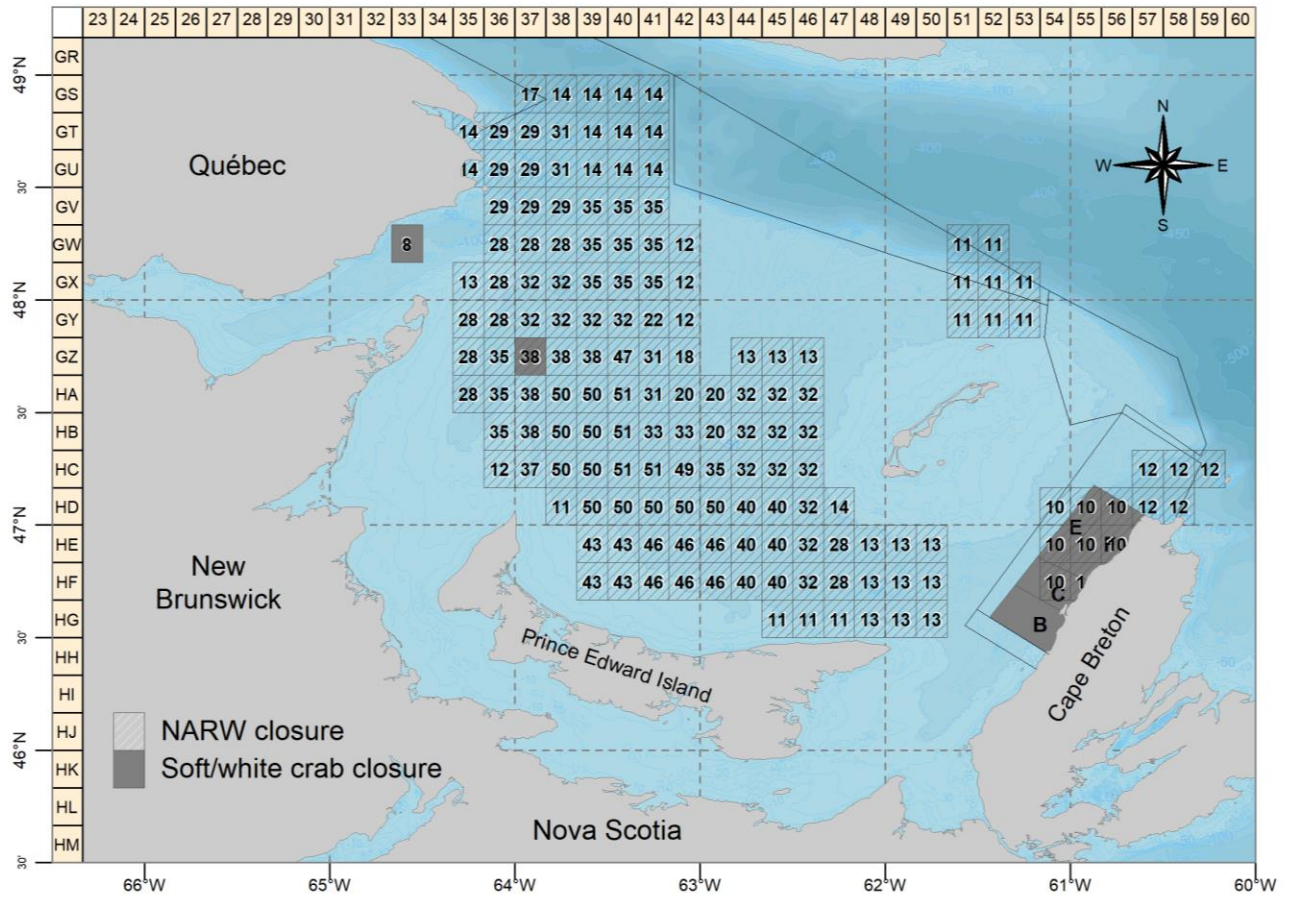


Figure 8. Local area closures of soft/white crab (solid grey area) and for the protection of North Atlantic right whales (hatched area) in 2022. Numbers represent the total number of days grids were closed during the fishery.