



# UPDATE TO 2021 OF THE FISHERY INDICATORS FOR ROCK CRAB (*CANCER IRRORATUS*) IN THE SOUTHERN GULF OF ST. LAWRENCE

## Context

An update of the fishery indicators for the rock crab (*Cancer irroratus*) fishery of the southern Gulf of St. Lawrence (sGSL) was last completed in 2018 with information up to 2017 (DFO 2019a). The most recent stock assessment was completed in 2013, with information up to 2011 (DFO 2013; Rondeau et al. 2014). The update of the fishery status indicators was requested by DFO Gulf Region Fisheries and Harbour Management.

This Science Response Report results from the Regional Peer Review on the Update of the Fishery Indicators for Rock Crab in Southern Gulf of St. Lawrence (LFAs 23, 24, 25, 26A, 26B) which took place December 7, 2022.

## Background

The rock crab (*Cancer irroratus*) fishery in the sGSL (Figure 1) is comprised of two distinct components: the directed fishery and the bycatch fishery. The directed fishery is conducted by rock crab licence holders, during the rock crab fishery. The bycatch fishery is conducted during the lobster fishery, by lobster licence holders, and the landed catch is either sold (i.e. bycatch sales) or used as bait in the fisher's lobster traps.

The management of the directed rock crab fishery is largely based on effort controls, including the number of licences, individual trap allocations, restrictions on gear characteristics, defined fishing seasons, a minimum legal size (MLS), and a prohibition on the landing of females (Table 1). Individual allocations are also used, but these are not based on stock status or biomass estimates. The minimum legal sizes, the trap allocations and the individual allocations have not changed since 2000 with the exception that an individual allocation was only implemented in LFA 24 starting in 2015. All rock crab landings from the directed fishery must be recorded through a dockside monitoring program (DMP). Logbooks are mandatory for the directed rock crab fishery and record daily catch, effort, and fishing locations. The bycatch fishery has fewer management restrictions but includes a defined fishing season (i.e. the lobster fishing season) and a prohibition on the landing of females. Since 2021, as a condition of licence in the lobster fishery, the use of rock crab as bait is restricted to rock crabs with a minimum carapace width of 102 mm. There are no reporting requirements for the bycatch fishery but rock crab that is sold through buyers is recorded in landing slips.

Table 1. Key management measures in the directed rock crab fishery in the southern Gulf of St. Lawrence in 2021.

LFA	Minimum legal size (mm)	Trap allocation	Individual allocation (kg)	Licences issued
23	102	100	35,000	53
24	102	150	20,000	10
25	102	100	25,000 <sup>1</sup>	69
26A	108	90	23,913	92
26B <sup>2</sup>	NA	NA	NA	NA

<sup>1</sup>Individual allocation for communal licences is 35,000 kg

<sup>2</sup>Commercial fishery closed since 2017

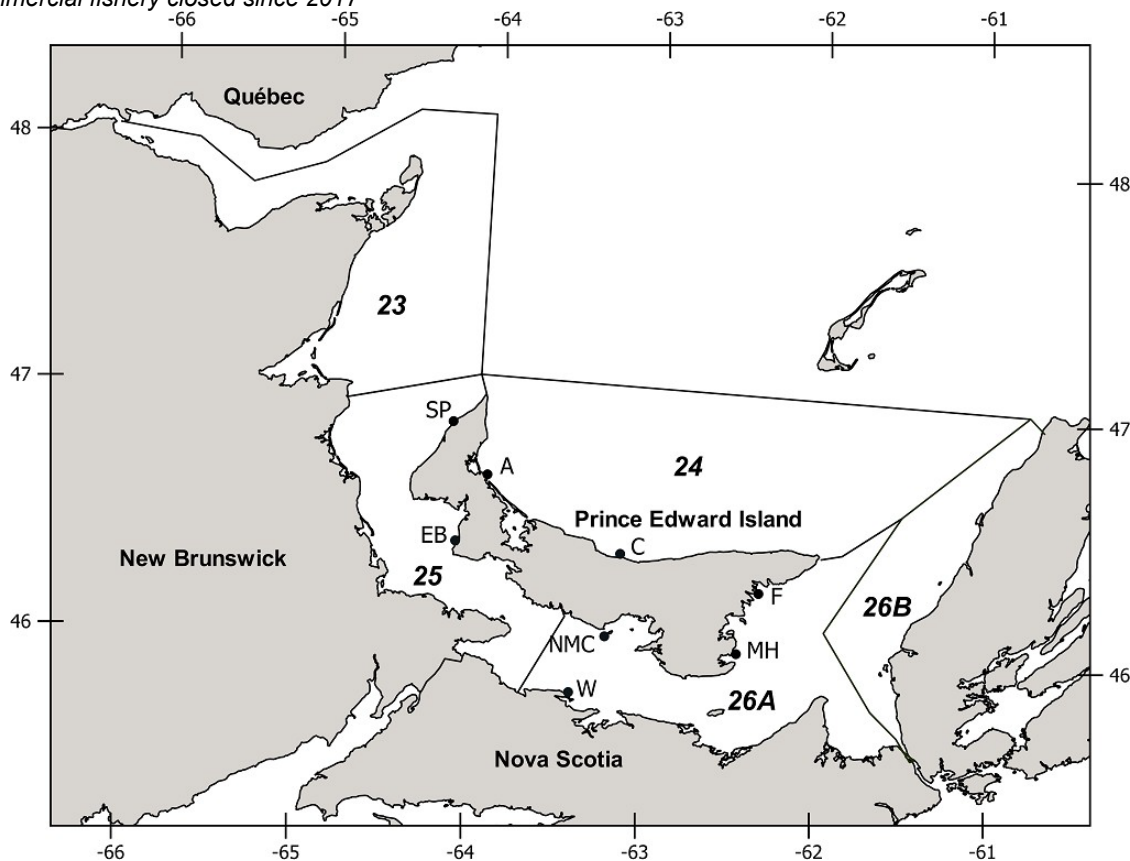


Figure 1. Lobster Fishing Areas (LFA) used in the management of the rock crab fishery and locations of bio-collector sites in the southern Gulf of St. Lawrence; in LFA 24 (A=Alberton, C=Covehead), in LFA 25 (EB=Egmont Bay, SP=Skinner's Pond) and LFA 26A [F=Fortune, MH=Murray Harbour, NMC=Nine Mile Creek, W=Wallace (NS)].

## Analysis and Response

This update is mainly based on fishery-dependent indicators: landings (directed and bycatch fisheries), fishing effort, catch rates, and the percentage of licence holders reaching their individual allocation. The data used are derived from logbook reports, DMP records and DFO records of sale transactions (directed and bycatch fisheries) and issued licenses. The records of bycatch sales are incomplete. While some data on the use of rock crab as bait are recorded within the lobster logbooks, the accuracy of these data is not sufficient at this time to allow for analysis.

The only fishery-independent data available are from the industry-led bio-collectors study in the coastal waters of Prince Edward Island (seven locations) and Nova Scotia (one location) (Figure 1). A rock crab juvenile index from this program is available for the period 2008 to 2022.

## Fishery-Dependent Indicators

### Total Fishery Landings

Prior to 2000, rock crab landings were not partitioned by fishery type (i.e. directed or bycatch). Overall, landings increased over the period 1985 to 2000, with relatively large inter-annual variability (Figure 2). Since 2000, total landings have decreased, as a result of decreases in both the directed fishery landings and the bycatch fishery landings. The declared bycatch fishery landings represented only 0.1% of the total rock crab landings in 2021. The amount of rock crab caught as bycatch during the lobster fishery and used as bait is unknown as data are not collected in a consistent manner.

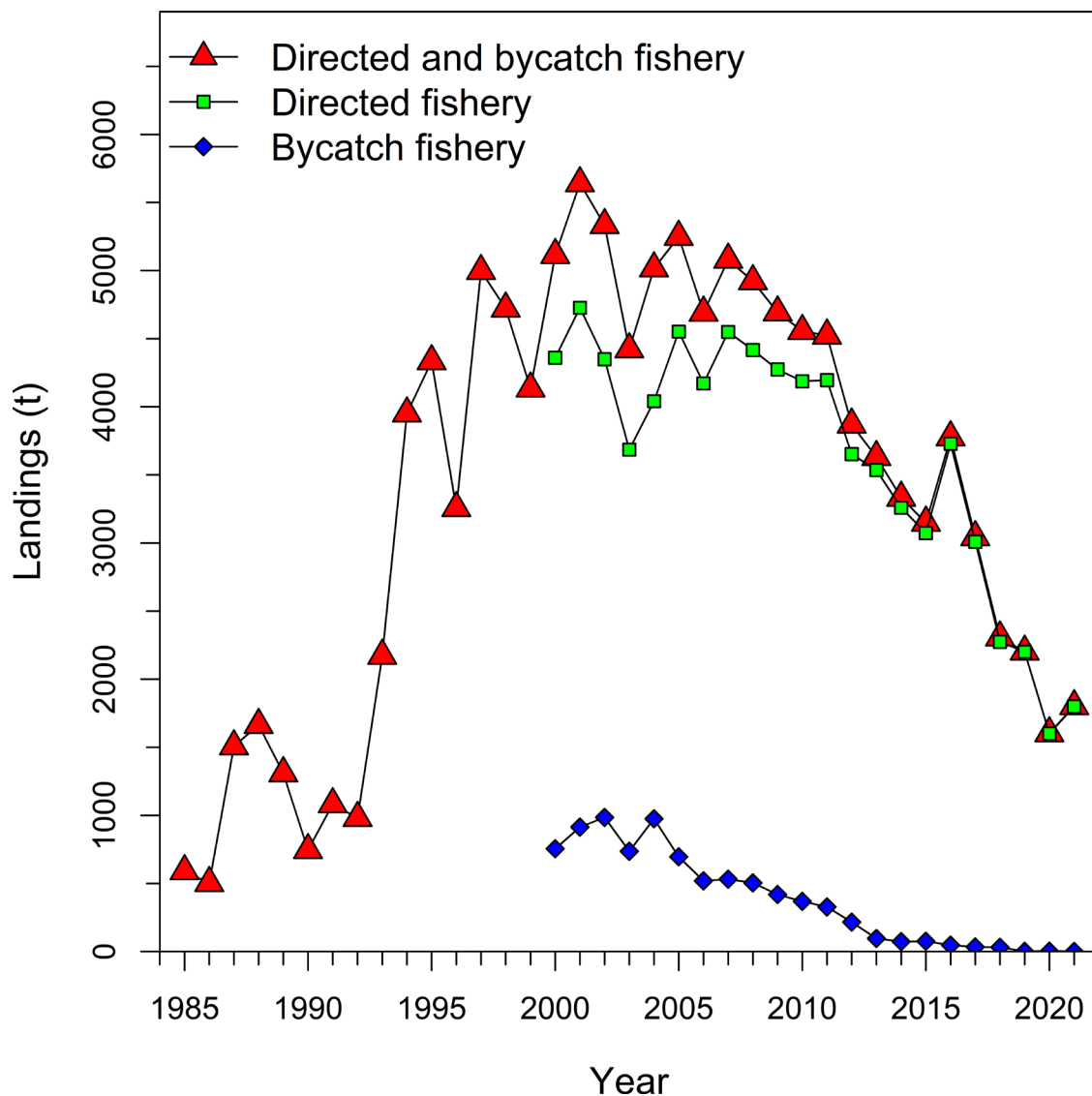


Figure 2. Recorded rock crab landings (tonnes, t) from the directed and bycatch fisheries in the southern Gulf of St. Lawrence from 1985 to 2021. Prior to 2000, only the total reported landings (directed and bycatch) are available. Data for 2021 are preliminary.

### Directed Fishery Landings

Annual landings from the directed fishery were relatively stable over the period 2004 to 2011 and have since generally decreased. Landings of 1,600 tonnes (t) in 2020 were the lowest reported for the directed fisheries over the 2000 to 2021 time period (Table 2). In all LFAs, reported landings in 2021 were lower than in 2017. The decreases range from 47% in LFA 26A to 10% in LFA 24. There have not been any recorded landings in LFA 26B since 2012.

In 2020 and 2021, 48% and 51%, respectively, of rock crab licence holders recorded sales (i.e. active licence holders). Landings of 1,796 t in 2021 (preliminary data) represent 27% of the sum of the individual allocations (“total allocation”) of 6,584 t (Table 2). Based on the available time series for 1985 to 2021, landings have consistently been below the current total allocation.

*Table 2. Recorded rock crab landings (t), by Lobster Fishing Area, from the directed fishery, 2000 to 2021. For 2006 to 2021, the percentage of the total allocation of rock crab landed is shown in parentheses. This percentage is not shown for 2000 to 2005 as complete data on licence types and allocations prior to 2006 were unavailable at the time of publication. LFA 24 did not have an allocation prior to 2015. The maximum recorded value of the time series for each LFA is shown in bold. Data for 2021 are preliminary. Years when no fishing activity was recorded are shown as “NA”.*

Year	23	24	25	26A	26B	Total
2000	995	<b>237</b>	1186	1917	24	4360
2001	<b>1128</b>	211	1300	<b>2063</b>	25	<b>4727</b>
2002	1007	177	1378	1769	18	4349
2003	665	136	1284	1592	8	3685
2004	956	183	1290	1591	21	4041
2005	1028	159	1469	1867	29	4552
2006	982 (51%)	212	1361 (69%)	1574 (69%)	<b>43 (13%)</b>	4172 (61%)
2007	957 (50%)	221	1551 (80%)	1796 (79%)	24 (7%)	4549 (67%)
2008	846 (44%)	181	<b>1687 (85%)</b>	1685 (74%)	18 (6%)	4417 (65%)
2009	1051 (55%)	162	1568 (79%)	1477 (65%)	17 (6%)	4274 (63%)
2010	817 (42%)	167	1578 (79%)	1624 (72%)	1 (1%)	4187 (65%)
2011	764 (40%)	187	1510 (76%)	1731 (76%)	4 (1%)	4195 (65%)
2012	534 (28%)	139	1474 (74%)	1504 (66%)	1 (1%)	3653 (57%)
2013	542 (29%)	155	1416 (73%)	1422 (61%)	NA	3536 (55%)
2014	448 (24%)	88	1171 (59%)	1552 (63%)	NA	3259 (49%)
2015	636 (35%)	49 (25%)	1281 (67%)	1107 (49%)	NA	3073 (48%)
2016	717 (39%)	84 (42%)	1469 (74%)	1458 (64%)	NA	3728 (57%)
2017	575 (31%)	81 (41%)	1025 (54%)	1327 (59%)	NA	3009 (47%)
2018	446 (24%)	112 (56%)	817 (41%)	899 (40%)	NA	2274 (35%)
2019	393 (21%)	77 (38%)	741 (37%)	990 (44%)	NA	2201 (33%)
2020	242 (13%)	65 (33%)	549 (28%)	743 (33%)	NA	1600 (24%)
2021	332 (18%)	69 (35%)	696 (35%)	698 (31%)	NA	1796 (27%)

### Bycatch Fishery Landings

Reported bycatch landings of rock crab sold during the lobster fishery have continued to decrease in all LFAs (Table 3). In total, only 1.4 t of rock crab from the bycatch fishery were reported as sale in 2021, compared to 34 t in 2017 and a high of 985 t in 2002. Rock crab landings from the bycatch fishery have never exceeded 20% of the total landings, and since

2004, have steadily decreased. From 2019 to 2021, landings from the bycatch fishery represented no more than 0.2% of total landings.

Table 3. Reported rock crab bycatch landings (t) by Lobster Fishing Area, 2000 to 2021. The maximum recorded value of the time series for each LFA is shown in bold. Data for 2021 are preliminary.

Year	23	24	25	26A	26B	Total	% of Total Landings
2000	284	18	230	223	0	755	15%
2001	244	22	<b>278</b>	370	0	914	16%
2002	<b>352</b>	17	272	344	0	<b>985</b>	18%
2003	227	16	191	302	0	736	17%
2004	261	20	203	<b>492</b>	0	976	<b>19%</b>
2005	194	37	172	293	<0.1	696	13%
2006	170	21	101	227	0.118	519	11%
2007	121	30	141	239	0	531	10%
2008	85	11	143	266	<0.1	505	10%
2009	68	<b>39</b>	84	227	<0.1	419	8.9%
2010	71	14	68	216	<0.1	369	8.1%
2011	26	12	43	246	<0.1	328	7.2%
2012	0.29	5.3	12	200	<0.1	217	5.6%
2013	1.8	2.3	20	72	0	96	2.6%
2014	0	0.57	16	56	0	73	2.2%
2015	0	0.151	12	64	0	76	2.4%
2016	<0.1	0.261	17	30	0	47	1.2%
2017	0	0.339	1.8	32	0	34	1.1%
2018	0	<0.1	1.4	30	0	32	1.4%
2019	0.245	0	0.567	0.81	0	1.6	0.1%
2020	<0.1	0	2.2	0.361	<b>0.235</b>	2.9	0.2%
2021	0.472	0	0.908	0	0	1.4	0.1%

### Directed Fishery Effort

Since the previous update in 2017, the number of fishing trips in the directed fishery decreased to the lowest level in 2020 then increased in 2021 (Table 4). The 1,866 trips recorded in 2021 represent an 18% decrease relative to the number of trips recorded in 2017. In LFA 26B, there have not been any reported landings since 2012 and the rock crab fishery has been closed since 2017. Overall, the number of fishing trips has decreased over the 2000 to 2021 time series, with the most trips completed in each LFA in 2000 (LFA 24) or 2001 (LFAs 23, 25, 26A and 26B).

Table 4. Number of recorded fishing trips in the directed rock crab fishery by Lobster Fishing Area from 2000 to 2021. The maximum recorded value of the time series for each LFA is shown in bold. Data for 2021 are preliminary. Years when no fishing activity was recorded are shown as "NA".

Year	23	24	25	26A	26B	Total
2000	1497	<b>400</b>	1100	1795	68	4860
2001	<b>1556</b>	335	<b>1355</b>	<b>2159</b>	<b>82</b>	<b>5487</b>
2002	1397	257	1173	1633	47	4507
2003	637	178	1102	1341	19	3277
2004	1018	139	1176	1612	38	3983
2005	1063	166	1138	1276	49	3692
2006	1015	220	1305	1482	83	4105
2007	993	211	1277	1349	66	3896
2008	927	137	1266	1294	29	3653
2009	924	167	1256	1422	30	3799
2010	749	140	1158	1259	2	3308
2011	662	161	1093	1231	7	3154
2012	564	166	1057	1190	3	2980
2013	511	195	1042	1155	NA	2903
2014	454	129	954	1071	NA	2608
2015	519	77	881	1056	NA	2533
2016	607	105	1024	1197	NA	2933
2017	488	93	667	1025	NA	2273
2018	382	156	648	897	NA	2083
2019	294	126	545	841	NA	1806
2020	167	125	384	841	NA	1517
2021	263	144	539	920	NA	1866

### Directed Fishery Catch Rate

Catch rates were calculated on a per trip basis by dividing the landed weight from the DMP records with the number of traps from the logbook records. Catch rates (kg per trap) are variable. From 2017 to 2021 decreases were observed in LFA 24 and 26A while LFA 23 increased and LFA 25 remained stable (Table 5). LFAs 24 and 26A had their lowest catch rate of the time series in 2021.

Table 5. Catch rate (kg per trap; mean with coefficient of variation in parentheses) of rock crab in the directed fishery by year and by Lobster Fishing Area, 2000 to 2021. The maximum value of the time series in each LFA is shown in bold. Data for 2021 are preliminary. The median is calculated over the time period 2000 to 2021. Years when no fishing activity was recorded are shown as "NA".

Year	23	24	25	26A	26B
2000	7.5 (0.3)	6.1 (0.5)	11.2 (0.4)	13.2 (0.3)	4.4 (0.6)
2001	7.8 (0.3)	5.8 (0.5)	10.6 (0.7)	11.6 (0.3)	4.3 (0.8)
2002	8 (0.3)	6.7 (0.5)	12.2 (0.4)	13.7 (1.4)	5.5 (1)
2003	12.5 (0.5)	7.8 (0.6)	12.7 (0.4)	14.1 (0.4)	5.4 (1.2)
2004	10.8 (0.3)	10.2 (0.7)	12.1 (0.4)	11.6 (0.2)	9.5 (1.1)
2005	10.6 (0.3)	10.1 (0.8)	14.1 (0.6)	17.3 (0.6)	9.8 (1.2)
2006	9.9 (0.3)	<b>10.6 (0.7)</b>	11.3 (0.3)	12.2 (0.3)	6.1 (0.6)
2007	10.3 (0.4)	8.3 (0.6)	12.6 (0.3)	15 (0.4)	4.6 (0.6)

Year	23	24	25	26A	26B
2008	10.8 (0.7)	9.5 (0.6)	13.9 (0.4)	15.4 (0.6)	7.3 (1.1)
2009	12.5 (0.4)	7.8 (0.5)	12.5 (0.3)	11.9 (0.2)	6.5 (0.7)
2010	11.9 (0.4)	9.8 (0.9)	14.3 (0.5)	15.1 (0.4)	8.4 (0.7)
2011	12.1 (0.5)	9.2 (0.5)	14.2 (0.4)	16.3 (0.4)	<b>10.6 (4)</b>
2012	9.8 (0.4)	7.2 (0.5)	13.9 (0.4)	14.4 (0.3)	5.9 (1.8)
2013	11.1 (0.5)	6.8 (0.4)	14 (0.4)	14 (0.4)	NA
2014	11.1 (0.5)	6.5 (0.6)	13.6 (0.4)	<b>17.5 (0.5)</b>	NA
2015	12.3 (0.5)	5.3 (0.4)	14.6 (0.4)	11.7 (0.4)	NA
2016	12.3 (0.7)	6.5 (0.4)	14.7 (0.4)	14 (0.5)	NA
2017	12.3 (0.5)	7.1 (0.7)	<b>15.2 (0.4)</b>	15.3 (0.4)	NA
2018	12.7 (0.5)	5.2 (0.7)	12.5 (0.4)	11.2 (0.4)	NA
2019	<b>15 (1)</b>	4.2 (0.5)	13.8 (0.4)	13.5 (0.4)	NA
2020	14.8 (0.4)	4.1 (0.5)	14.6 (0.4)	10.4 (0.5)	NA
2021	12.9 (0.4)	3.6 (0.7)	12.7 (0.4)	8.7 (0.5)	NA
Median	11.5	6.95	13.7	13.85	NA

#### Attainment of Individual Allocation in the Directed Fishery

In the LFAs with recorded landings in 2021, only 17 to 27% of total active licence holders landed 90% or more of their individual allocation. The percentage of active licence holders reaching 90% or more of their individual allocation was below the median for the time series in LFAs 24, 25 and 26A and equal to the median in LFA 23 (Table 6).

The decrease in the number of active licence holders landing 90% or more of their individual allocation is likely due to the combination of the decreases in the number of fishing trips (Table 4) and the decrease in the catch rates in most LFAs (Table 5).

Table 6. Percentages of active rock crab licence holders reaching 90% or more of their individual total allocated landings, by Lobster Fishing Area, for 2006 to 2021. The maximum value of the time series in each LFA is shown in bold. Individual allocations were implemented in 2015 in LFA 24, values in prior years are shown as “nd.” Data for 2021 are preliminary. Years when no fishing activity was recorded are shown as “NA”.

Year	23	24	25	26A	26B
2006	30%	nd	40%	59%	0%
2007	23%	nd	<b>64%</b>	<b>73%</b>	0%
2008	21%	nd	<b>64%</b>	69%	0%
2009	33%	nd	51%	40%	0%
2010	26%	nd	58%	60%	0%
2011	19%	nd	53%	70%	0%
2012	12%	nd	50%	48%	0%
2013	35%	nd	55%	50%	NA
2014	22%	nd	42%	68%	NA
2015	33%	17%	57%	31%	NA
2016	<b>41%</b>	<b>33%</b>	63%	47%	NA
2017	17%	29%	40%	42%	NA
2018	15%	<b>33%</b>	23%	17%	NA
2019	22%	29%	30%	43%	NA
2020	23%	14%	25%	22%	NA
2021	22%	17%	27%	18%	NA
Median	22%	29%	50%	48%	NA

## Fishery-Independent Indicator

### Rock Crab Juvenile Index

The abundance of rock crabs < 16 mm of carapace width was estimated using data from bio-collectors deployed at seven locations around Prince Edward Island and one location in Nova Scotia (Figure 1). Of the eight locations monitored, two have consistently had very low densities of < 1.1 rock crabs per m<sup>2</sup>: Nine Mile Creek and Wallace, both in LFA 26A. Rock crabs have never been detected in the collectors at Egmont Bay in LFA 25. Over the time series, the highest densities have been observed at Alberton and Covehead, both in LFA 24 (Figure 3). Since the last update in 2017, lower densities have been observed at these two sites.



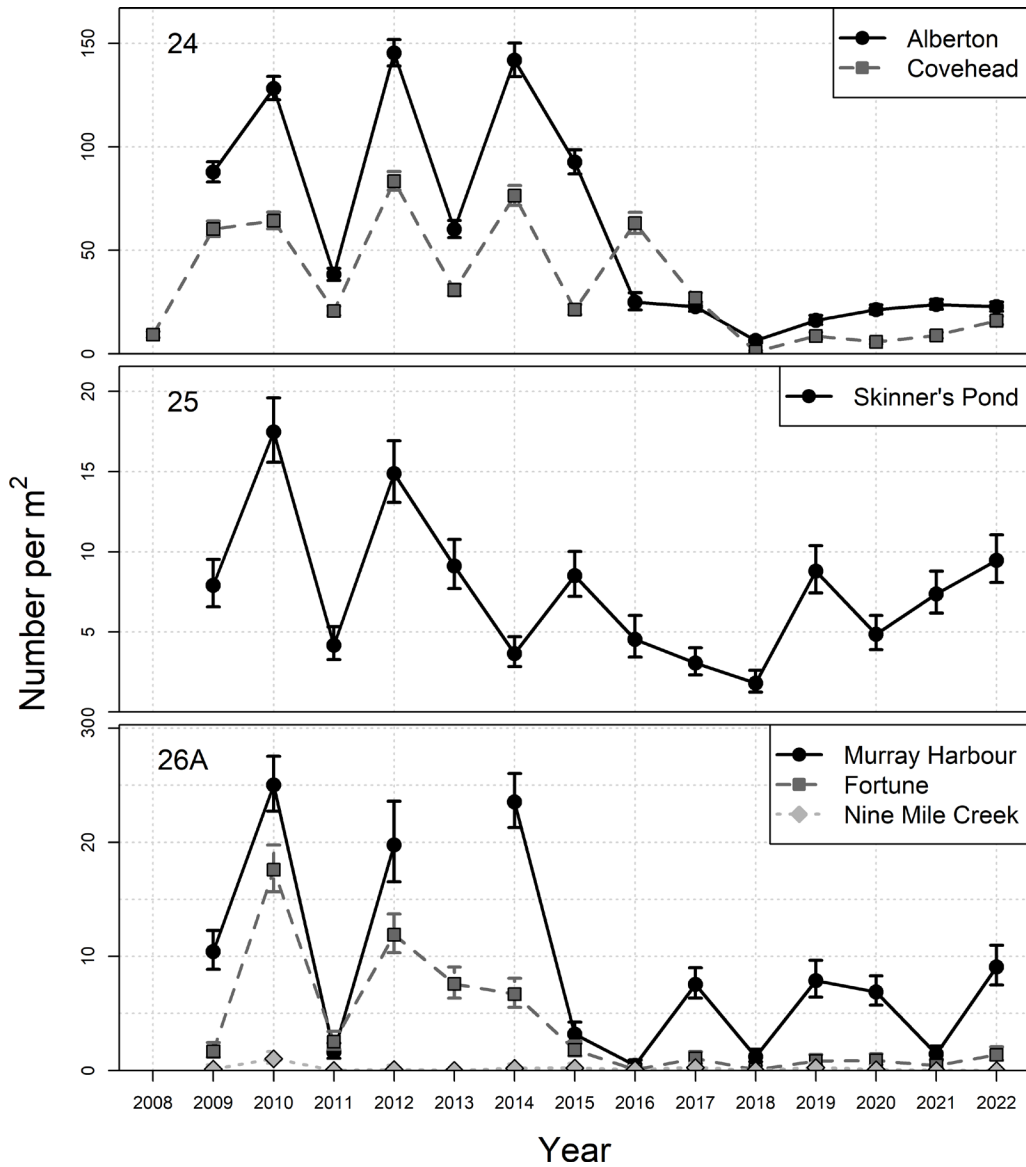


Figure 3. Density (number per m<sup>2</sup>; mean and one standard deviation as vertical lines) of small rock crab (< 16 mm carapace width) from bio-collectors at two sites in LFA 24 (top), one site in LFA 25 (middle) and three sites in LFA 26A (bottom), during 2008 or 2009 to 2022. Note: the scale of the y-axis varies between the three graphs.

### Conclusions

Landings from the directed fishery decreased from 2017 to 2021 in all LFAs. For the southern Gulf of St. Lawrence (sGSL) as a whole, the lowest recorded rock crab landings of the time series were in 2020, but this may be related to impacts of the COVID-19 pandemic on the fishery. The decrease in landings is consistent with the decrease in the number of fishing trips over the same time period, with 2020 having the lowest number of trips recorded. Catch rates, while variable, have decreased, and were well below the long-term median in 2021 in LFAs 24 and 26A.

The decrease in reported landings from the bycatch fishery may be due in part to increases in the size of the escape mechanisms on lobster traps, as larger escape vents may facilitate the

escape of rock crab. Another possibility is that rock crab caught as bycatch during the lobster fishery is increasingly used as bait and not sold.

In recent years, decreases in the density of juvenile rock crabs in the bio-collectors have been observed in LFAs 24 and 26A. The bio-collector project was initiated to monitor the abundance of young-of-year lobsters, as opposed to juvenile rock crabs. As such, the study locations for this project may not accurately monitor the density of rock crabs in these regions. In addition, as lobster abundance in the sGSL continues to increase (DFO 2019b), the predation of lobster on small rock crab is likely also increasing, which may explain the observed decreases in the rock crab juvenile index. Further research is needed to determine if the observed decreases in juvenile rock crab are a result of increases in lobster abundance.

The assessment of the rock crab fishery relies on a limited number of fishery-dependent indicators. Fishery data are obtained through several unrelated processes (e.g. logbooks, sales records and dockside monitoring program records) that increase the chance of data errors and result in delays in data availability. Complete, accurate, and timely mandatory logbook entries are required.

Most indicators used in this update were derived from mandatory logbook data and official catch statistics from sale transactions. Observed variations in these indicators may not reflect changes in the rock crab abundance as catch and effort trends are impacted by management decisions, market demands and other socio-economic factors. Landings are greatly impacted by changes in fishing effort and may not reflect changes in biomass. The observed decreases in catch rates in LFAs 24 and 26A since the previous update may be indicative of changes in the rock crab biomass in the region.

Additional data and further analyses are needed to fully assess the status of the southern Gulf of St. Lawrence rock crab stock and to develop reference points incorporating the precautionary approach. As such, a fishery-independent trap survey was initiated in 2021 in all LFAs. The main objective of this project is to gather LFA-specific data on rock crab abundance, size distribution and sex ratios. This survey could also provide information on the biology of rock crab such as molt increments, maturity and egg development. In addition, in collaboration with industry partners, a dockside sampling program was initiated in 2021 to determine the carapace width distribution of the commercial catch and allow for analyses of stock status based on size distributions.

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### Sources of Information

- DFO. 2013. [Assessment of the rock crab \(\*Cancer irroratus\*\) fishery in the southern Gulf of St. Lawrence for 2006 to 2011](#). DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2013/030.
- DFO. 2019a. [Update to 2017 of the fishery indicators for rock crab \(\*Cancer irroratus\*\) in the southern Gulf of St. Lawrence](#). DFO Can. Sci. Advis. Sec. Sci. Resp. 2019/007.
- DFO. 2019b. [Update of the stock status indicators for the American lobster \(\*Homarus americanus\*\) stocks in the southern Gulf of St. Lawrence](#). DFO Can. Sci. Advis. Sec. Sci. Resp. 2019/008.
- Rondeau, A., Hanson, J.M., and Comeau, M. 2014. [Rock crab, \*Cancer irroratus\*, fishery and stock status in the southern Gulf of St. Lawrence: LFA 23, 24, 25, 26A and 26B](#). DFO Can. Sci. Advis. Sec. Res. Doc. 2014/032. vi + 52 p.

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