

## Rock Crab of the Inshore Waters of Quebec in 1999

### Background

Rock crab is an emerging species in Quebec. Commercial fishing of this resource began in 1988, but the fishery did not really begin to take off until 1995. The main areas fished are the Magdalen Islands and Chaleur Bay. At present, little rock crab is harvested in the northern part of the Gaspé and the North Shore region.

As soon as the rock crab fishery began, DFO introduced a management plan to control its development and maintain the population's reproductive potential. The minimum legal carapace width has been set at 102 mm (4 inches), and landing of females is prohibited. The catches, number of licences, and number and types of traps are regulated.

Rock crab and lobster interact sufficiently to justify very cautious management of the rock crab fishery so as to prevent any overfishing.

### Summary

- Landings of rock crab in Quebec peaked at 1200 t in 1999, an increase of about 9% over 1998. In the Magdalen Islands, landings totalled 561 t in 1999, a slight increase over 1998. In areas 12E to 12Z (southern Gaspé), landings totalled 503 t in 1998, and the preliminary results for 1999 indicate landings of 498 t. Landings increased sharply in Area 12D (northern Gaspé), from 48 t in 1998 to more than 138 t in 1999, whereas landings in Area 17 (the St Lawrence Estuary) remained stable at about 16 t. The overall quotas were not reached in any of these areas.
- Commercial yields have not changed much in the Magdalen Islands since 1997 and they held steady in the Gaspé in 1998 and 1999. In all areas, the size structures have remained similar since the fishery's inception, and the average size of the crabs taken is well above the minimum legal size of 102 mm.
- The intensity of the fishing effort to date has not had any measurable impact on the rock crab populations.
- We recommend that in order to protect the lobster in these waters, a cautious approach be taken to the development of the rock crab fishery. We would like to keep harvesting rates low. It is recommended that the overall quota for each region not be increased above the

1999 level. It is also important not to increase the fishing effort but to keep it well distributed in each region.

### ***Biology***

The rock crab, *Cancer irroratus*, ranges all along the east coast of North America, from Labrador to South Carolina. This species is associated with various bottom types, from rock to loose material. Crabs of commercial size, and more generally those with a carapace width (CW) of over 50 mm, live on sandy or muddy bottoms, while a smaller portion of the adult population cohabits with other age groups (juveniles and adolescents) on rocky bottoms, along with lobsters. Berried females show a marked preference for soft substrates in which they can bury themselves and in which they form aggregations.

The males and females grow to different sizes. The males can reach a CW of 140 mm, while the females rarely exceed 100 mm. Breeding takes place in the fall, after the females have moulted and while their shells are still soft. Males moult in winter, so in the spawning season, their shells are fully hardened. Crab shells take from two to three months to harden completely. Females reach sexual maturity at a CW of about 60 mm, while males do so at a slightly larger size (CW 70 mm). The females lay their eggs, then keep them under their abdomens for nearly a year. A female with a CW of 60 mm may lay 125 000 eggs, and a 90 mm specimen may lay as many as 500 000. The eggs hatch the summer after they were produced, and the larvae remain in the water column from mid-June to mid-September. In the fall, the larvae metamorphose into tiny crabs (megalops) and begin their benthic life shortly thereafter. Juveniles (CW  $\leq$  15 mm) are found mainly at shallow depths on bottoms that offer shelter from predators and water turbulence. Growth data for rock crab in the

Gulf of St Lawrence are sparse. Data from more southerly regions suggest that the species may attain commercial size at about five years of age and live to about seven.

Rock crab are omnivorous and display a certain opportunism in their diet. Lobster has never been shown to constitute a significant portion of the rock crab's diet, but analyses of lobster stomach contents have shown that rock crab constitute a major item on the lobster's menu throughout its life, even from the earliest larval stage.

### ***Resource management***

The rock crab management plan is designed to control the development of this new fishery and to protect the reproductive potential of the rock crab populations. Rock crab fishing is managed by fishing areas (Figures 1 and 2), so that the fishing effort can be distributed more evenly. Rock crab are taken by lobster fishers during the lobster season, when rock crab is authorized as an incidental catch. Outside the lobster season, the rock crab fishery is reserved for rock crab licence holders, who then practice a directed fishery. In 1999, in the Magdalen Islands, 14 fishers held directed fishing licences, with individual quotas of 45.5 t. They were allowed to fish in one, or in some cases two, of the six existing areas, three of which were exploratory (12D-E-F) (Table 1). Each fisher was allowed to set up to 100 traps. In the southern Gaspé, since 1997, 36 licences have been issued for a competitive directed fishery. Quotas of 375 tonnes have been authorized in areas 12E-P, 12Q-X, and 12Y-Z (Table 2), and the number of traps per licence holder ranges from 40 to 150. In areas 17 and 12D, there are 16 licences, and no quotas have been set, since fishing pressure is very low. All of the directed fishing licences are exploratory, and a minimum legal size of 102 mm (4 inches) has been in effect since the fishery in

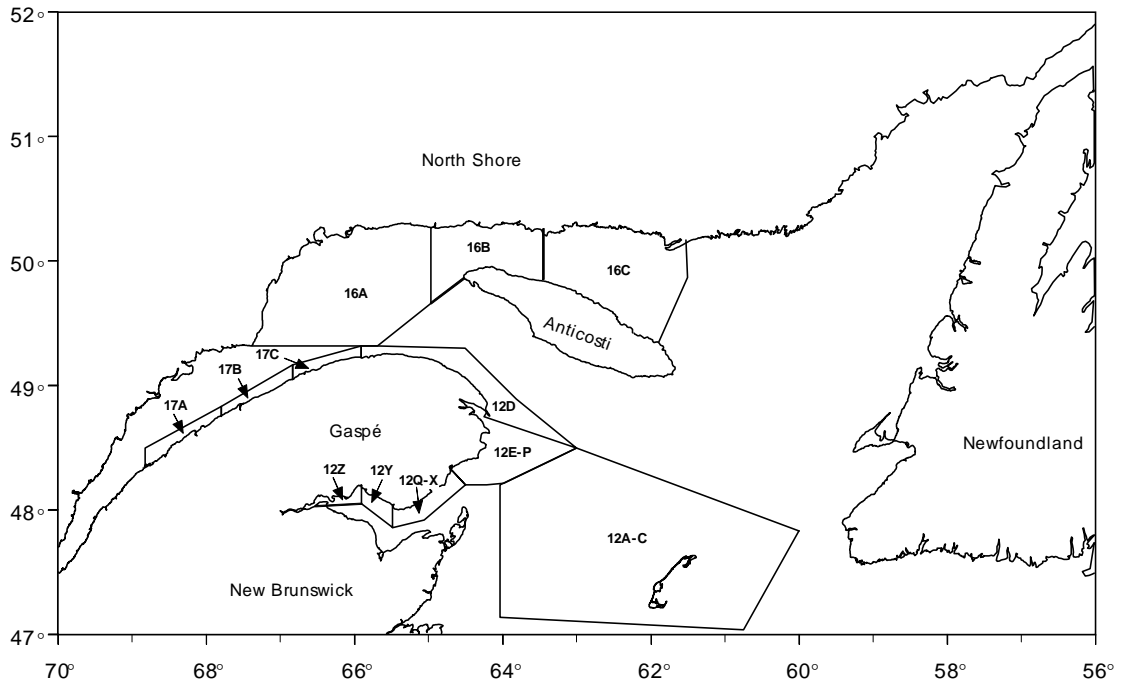
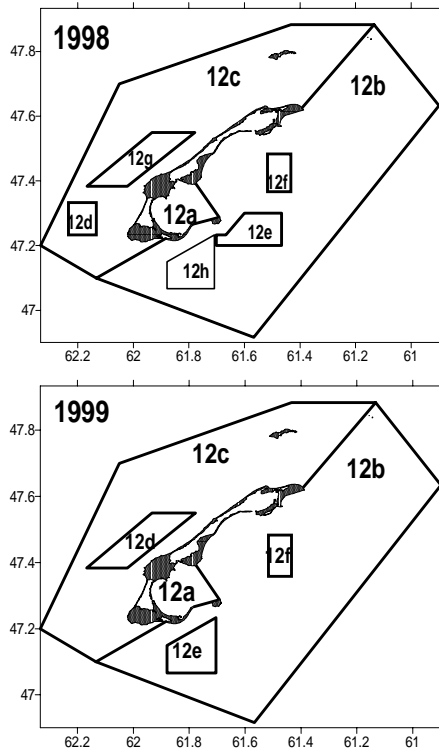


Figure 1. Rock crab fishing areas of Quebec.



Quebec began. Fishers are prohibited from landing females and are required to use selective gear to minimize incidental lobster catches.

Figure 2. Location of rock crab fishing areas in the Magdalen Islands in 1998 and 1999.

Table 1. Quotas and licences issued for the directed rock crab fishery in Magdalen Islands fishing areas, 1995 to 1999. Each licence authorizes the use of 100 traps.

Fishing Area	1995		1996		1997		1998		1999	
	Quotas	Licences	Quotas	Licences	Quotas	Licences	Quotas	Licences	Quotas	Licences
12	272 t	6X22.7t 136t <sup>(1)</sup>	318t	4X45.5t 2X22.7 91t <sup>(1)</sup>						
12A					136t	6X22.7t	136t	6X22.7t	136t	6X22.7t
12B					182t	6X22.7t 1X45.5t <sup>(2)</sup>	136t	6X22.7t	136t	6X22.7t
12C					182t	4X45.5t	182t	4X45.5t	182t	4X45.5t
12D									45.5t	1X45.5t
12D et 12G							45.5t	1X45.5t		
12E									91t	2X45.5
12E et 12H							91t	2X45.5		
12F							45.5t	1X45.5t	45.5t	1X45.5t
		6 fishermen		6 fishermen		10 fishermen		14 fishermen		14 fishermen

<sup>1</sup> By-catch

<sup>2</sup> Temporary quota

Table 2. Quotas and licences issued for a directed rock crab fishery in Gaspé fishing areas, 1995 to 1999. The number of traps authorized per licence is shown in parentheses. The fishing area numbers used prior to 1998 are shown in italics.

Fishing Area	1995		1996		1997		1998		1999	
	Quotas	Licences	Quotas	Licences	Quotas	Licences	Quotas	Licences	Quotas	Licences
17 et 12D <i>19</i>				7 (100)		16 (100)		16 (100)		16 (100)
12E-P <i>20a</i>	555t	11 (150)	375t	11 (150)	375t	11 (150)	375t	11 (150)	375t	11 (150)
12Q-X <i>20b</i>	433t	8 (150)	375t	10 (150)	375t	8 (150) 3 (100)	375t	8 (150) 3 (100)	375t	8 (150) 3 (100)
12Y <i>21a</i>				4 (100)		3 (75) 4 (40)		3 (75) 4 (40)		3 (75) 4 (40)
	87t	4 (150)	375t		375t	1 (75)	375t	1 (75)	375t	1 (75)
12Z <i>21b</i>				3 (100)		3 (75) 3 (40)		3 (75) 3 (40)		3 (75) 3 (40)

**Description of the fishery**

**Landings**

Fishing for rock crab along Canada’s Atlantic coast is relatively new. An experimental fishery began in the southern Gulf of St Lawrence in 1974. This fishery grew quite slowly between 1974 and 1982, with landings varying from 6 t to 227 t (Figure 3). Starting in 1983, interest in the rock crab grew as markets developed. Since 1994, recorded landings in Quebec and the Maritimes have exceeded 4 000 t, and they totalled 6436 t in 1998.

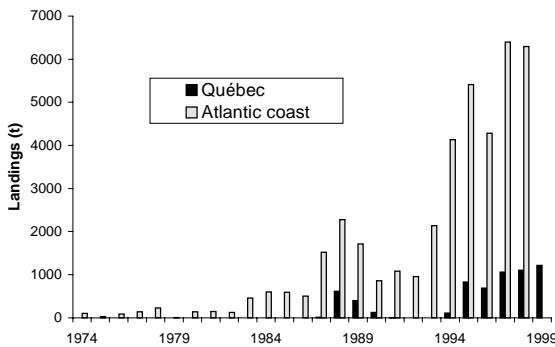


Figure 3. Rock crab landings (t) in Quebec and on the Atlantic Coast, 1974 to 1999.

In Quebec, markets developed later, and the fishery did not really get under way until 1988. However, after only two years, for lack of buyers, fishing operations practically ceased. The fishery revived, however, in 1995, when 829 t of crab were landed. In 1999, landings of rock crab in Quebec totalled 1214 t, or about 100 t more than in 1998 and 150 t more than in 1997. Since 1995, Quebec’s rock crab fishery has been concentrated mainly in the Gaspé and the Magdalen Islands.

In the Magdalen Islands, landings totalled 561 t in 1999—27 t more than in 1998 (Table 3)—accounting for 46% of the Quebec total. The overall quota (636 t) was reached neither in 1998 nor in 1999. All

holders of directed fishing licences were active in both of these years. Since the three main areas (12A-B-C) were established in 1997, fishing effort has been better distributed throughout the Magdalen Islands. Catches are made mainly in Plaisance Bay (area 12A), the western part of area 12B, and the eastern part of area 12C (Figure 4), generally at depths of less than 20 metres. The catches in exploratory areas 12D-E-F were relatively small in 1999. In 1998 and 1999, rock crab fishing took place mainly from mid-August to early November. Since 1997, the proportion of rock crab by-catch in lobster fishers’ catches has increased, to 6% in 1998 and 10% in 1999.

Table 3. Rock crab landings (t) in Quebec, 1995 to 1999.

Fishing Area	1995	1996	1997	1998	1999
17		2	8	16	16
12D		4	49	48	138
12E-P	39	21	56	84	121
12Q-X	221	148	184	152	153
12Y	162	163	165	145	112
12Z	148	151	144	121	112
Total Gaspé	570	489	606	566	652
Magdalen Islands	260	199	450	534	561
North Shore			1	8	2
Total Québec	829	688	1057	1107	1214

In the Gaspé, landings totalled 606 t in 1997, fell to 566 t in 1998, then reached a new record of 652 t in 1999 (Table 3), when they accounted for 54% of total rock crab landings in Quebec. Along the northern shore of the Gaspé peninsula (Area 12D), the catch has increased sharply, from 48 t in 1998 to 138 t in 1999. The explanation for this increase is that more fishers were active in this area in 1999. In areas 12E to 12Z (southern Gaspé), landings totalled 503 t in 1998 and 498 t in 1999. In general, landings increased in areas 12E-P, remained

unchanged in areas 12Q-X, and decreased in areas 12Y-Z. Landings in the St Lawrence Estuary (areas 17A-C) also held steady from 1998 to 1999, at about 16 t. In the North Shore region, the catch totalled 8 t in 1998 and less than 2 t in 1999.

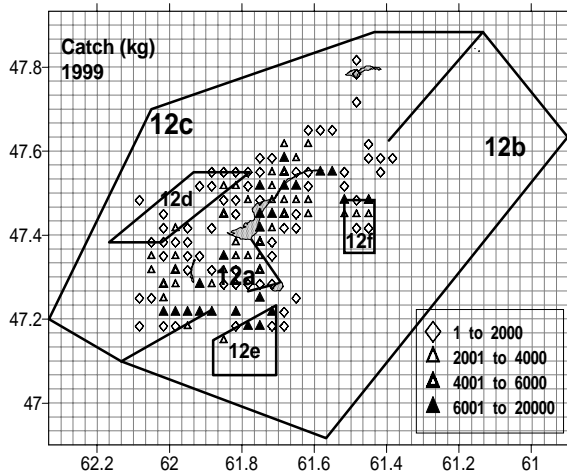


Figure 4. Distribution of catches (kg) in the Magdalen Islands, 1999.

**Catch rates**

For all fishing areas in the Magdalen Islands, the average yields, based on logbooks, have varied little since 1997, remaining relatively high (12 to 14 kg per trap) (Table 4). In areas 12A and 12B, the yields have stayed at high levels since 1995. In 1999, yields were slightly higher than in 1998 in Area 12A (15.8 kg per trap compared with 14.8) and Area 12B (16.9 kg per trap versus 13.5). Yields held steady in Area 12C, at 10 to 12 kg per trap, somewhat lower than in areas 12A and 12B. In the exploratory areas (12D-E-F), which are located in deeper water, the yields were less than 10 kg per trap, except in Area 12E.

In the Gaspé, the calculated yields show an increasing gradient from the eastern portion of the peninsula (areas 12E-P) toward the head of Chaleur Bay (12Y-Z). For areas 12E-P, the information is highly fragmentary, but the yields based on dockside sampling ranged from 4 to 8 kg per

trap from 1997 to 1998 (Table 5). The yields based on logbooks held steady in areas 12 Q-X from 1997 to 1999, at 5 to 6 kg per trap. In Area 12Y, the yields for 1998 and 1999 were comparable (about 6 kg per trap), but lower than those for 1996 and 1997. In addition, the dockside sampling for this area indicated a 50% decline in yield from 1998 to 1999. In Area 12Z, yields taken from logbooks ranged from 9.8 to 10.6 kg per trap from 1997 to 1999. However, these yields are much lower than those observed in 1995 and 1996, when rock crab first started to be taken in this area.

Table 4. Rock crab CPUE (kg per trap), 1995 to 1999. Data from logbooks.

Fishing Area	1995	1996	1997	1998	1999
<i>Gaspé</i>					
16A				5.8	
16B				2	
17		2.6	3.7	6.9	6.8
12D		4.8	8.9	2.7	3.4
12E-P				4.7	
12Q-X		7.2	5.6	5.5	5.8
12Y		9.3	8.1	6.2	6.3
12Z	14.8	16.1	10.6	10.6	9.8
<i>Magdalen Islands</i>					
12A	13.7	17.9	12.3	14.8	15.8
12B	15.2	17.6	15.3	13.5	16.9
12C	10.5		12.5	10.2	11.6
12D					6.8
12E					13.1
12F				9.2	7.3
12G				6.7	
12H				21.4	
<b>Total A-C</b>	<b>13.5</b>		<b>13.6</b>	<b>11.8</b>	<b>13</b>

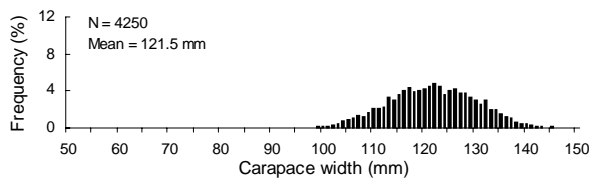
The average size of the rock crab landed in the Magdalen Islands has changed very little since 1997. In 1999, it remained large—121.5 mm (Figure 5). The average size in

Area 12C is slightly smaller (119 mm in 1999). In the Gaspé, for areas 12E-Z as a whole, a review of the size structures for rock crab shows no major changes from 1995 to 1999, and the average sizes have ranged from 110 to 117 mm since 1995.

An examination of the size structures shows that this is not a recruitment fishery, because the average size far exceeds the minimum legal size (102 mm).

*Table 5. Rock crab CPUE (kg per trap), 1995 to 1999. Data from dockside sampling. The number of samples is shown between parentheses.*

Fishing Area	1995	1996	1997	1998	1999
16				5.2 (2)	7.8 (2)
17			0.9 (1)	2.6 (1)	
12D			3.2 (1)	3.3 (1)	
12E-P	4.1 (10)	8.6 (1)	8.4 (4)	4.2 (7)	6 (6)
12Q-X	6.9 (19)	10.6 (4)	4.1 (3)	5.8 (6)	5.5 (9)
12Y		12.7 (7)	9.4 (3)	10 (1)	4.4 (6)
12Z	20.8 (1)	15.7 (4)	12.6 (4)	7.8 (6)	10.9 (3)
12A-C	14.5 (6)		12.5 (6)	14.5 (16)	12.3 (14)



*Figure 5. Size-frequency distribution of rock crab in the Magdalen Islands, based on dockside sampling in 1999.*

### **Conclusions and recommendations**

The rock crab fishery in Quebec has grown significantly since 1995, even though certain areas still receive very little fishing effort. In 1999, landings of rock crab in Quebec reached a record high, 1200 t. The main areas being fished are still the Magdalen Islands and Chaleur Bay. There is still very

little rock crab fishing taking place in the other sectors—the northern part of the Gaspé and the North Shore region.

The intensity of the fishing effort to date in the Magdalen Islands does not seem to have had any impact on the rock crab or on its main predator, the lobster. Commercial yields have held steady and size structures have remained similar since 1997. As a measure to protect lobster, it is recommended that overall fishing intensity not be increased. The overall quota should therefore stay the same in 2000. It is also important to maintain areas 12A, 12B, and 12C so as to distribute the fishing effort throughout the Magdalen Islands, though it might be possible to reorganize the spatial distribution of this effort and of the catches within areas 12B and 12C. It is estimated that if fishers in the exploratory areas established in 1998 were allowed to do all their fishing in traditional areas 12 A-B-C, fishing intensity in these areas would increase by about 15%. We believe that the resource could support an increase of this magnitude.

This assessment suggests that in 1998 and 1999, the Gaspé rock crab stocks held fairly steady, but were still lower than in 1995 to 1997. Yield and average size also remained stable in most areas in 1998 and 1999. The existing management measures can be retained in all areas in 2000. In areas 12Y and 12Z, although the fishery is managed by quotas, it would not be desirable to increase fishing effort at this time, and it is suggested that the total number of traps in 2000 be kept the same as in 1999. It is strongly recommended that the fishers be required to maintain and turn in logbooks recording their catch.

Not enough data are available to determine the status of the stocks in the North Shore region (areas 16 A to 16 C). Hence it is impossible to say whether a substantial

increase in the fishing pressure in these areas would be well advised. However, we recommend that the fishery along the north shore of Anticosti Island be developed gradually and cautiously, as was done for the fishery in the Magdalen Islands.

In light of the worries expressed by many parties concerning the possible impact of the rock crab fishery on lobster, we wish to stress again the need to develop the rock crab fishery slowly and cautiously. Harvesting of rock crab will reduce the abundance of large crabs in these waters. This decreased abundance should not have any immediate negative impact on lobsters, since lobsters do not prey on crabs of this size. Negative impacts on lobster could be expected only if the numbers of small crabs, on which lobsters do feed, were to fall to the point that lobster found them harder to come by. This situation could arise if there were recruitment overfishing. Such overfishing can be prevented, however, by maintaining a minimum legal size greater than sexual maturity size, so as to protect reproductive potential, and by controlling development of this young fishery, so as to keep exploitation rates moderate. The two species interact sufficiently to justify tight, cautious management of the rock crab fishery to prevent any overfishing.

Our knowledge of the rock crab's ability to withstand fishing pressure over the long term is still only partial. This fishery will have to be monitored closely in order to assess the state of the resource and the impacts of fishing operations on the rock crab populations. The system of logbooks is essential for determining the state of the resource, and it is therefore imperative that the fishers fill these logs out.

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***Correct citation for this publication:***

DFO, 1999. *Rock crab of the inshore waters of Quebec in 1999*. DFO – Science, Stock Status Report C4-02 (2000).

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ISSN 1480-4913

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