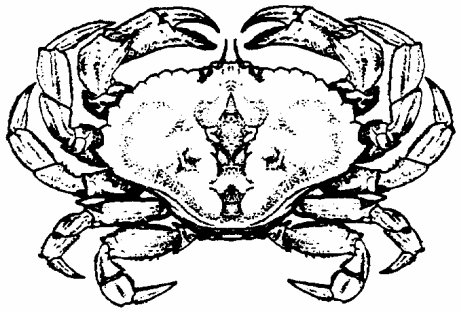

Rock crab of the inshore waters of Quebec in 2003

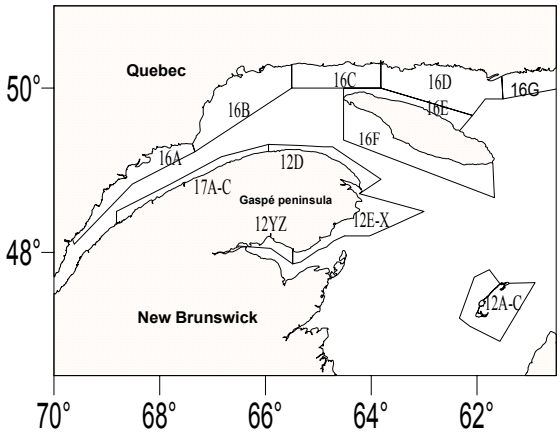

Figure 1. Rock crab fishing areas in Quebec.

Background

In Quebec, commercial fishing of rock crab began in 1988, but the fishery did not really begin to take off until 1995. Since 1996, the tonnage and value of landings have gradually increased. The main fishing areas for rock crab in Quebec are the Magdalen Islands (12A-C), Chaleur Bay (12E-Z) and the north shore of the Gaspé Peninsula (12D).

As soon as the rock crab fishery began, DFO introduced a management plan to control its development and maintain the reproductive potential of rock crab populations. Rock crab is a major prey species for lobster; this interaction between the two species justifies very cautious management of the rock crab fishery to prevent any overfishing.

The minimum legal carapace width has been set at 102 mm (4 inches), creating an exclusively male-directed fishery. The number of licences and traps are limited, as is the crabbing season. An overall quota has been set for Areas 12Y and 12Z in Chaleur Bay, while individual quotas have been issued for fishers in the Magdalen Islands.

Summary

- Landings of rock crab in Quebec increased gradually between 1996 and 2002, when they peaked at 1,761 t. In 2003, landings totalled 1,628 t, down 7.5% from 2002. Landings in the Magdalen Islands remained stable between 2002 and 2003 at just over 700 t. On the north shore of the Gaspé Peninsula, landings dropped by 20% during the same period to 291 t after rising sharply by 55% between 2001 and 2002. In Chaleur Bay, landings decreased from 676 t in 2002 to 618 t in 2003, but have generally remained stable since 2000.
- Yields in the Magdalen Islands have been high since the fishery opened in 1995 and have been relatively stable in the Gaspé Peninsula since 1997. In all areas, the size structure of the crabs caught has remained stable since harvesting began, and average size remains well above the minimum legal size.
- In order to maintain moderate harvesting levels, it is recommended that quotas not be increased and that management measures be implemented to prevent fishing effort to increase significantly from current levels.

Biology

The rock crab *(Cancer irroratus)* is found along the east coast of North America, from Labrador to South Carolina. This species is associated with various bottom types, ranging from bedrock to soft bottoms. Commercial-size crab and, more generally, those bigger than 50 mm (size corresponds to carapace width) live on sandy or muddy bottoms, while a smaller portion of the adult population share rocky bottoms, where lobster also occur, with individuals smaller than 50 mm. Berried female rock crabs show a marked preference for soft bottoms, where they can bury themselves and in which they form their aggregations.

Male and female rock crabs grow to different sizes. Males can reach 140 mm, while females rarely exceed 100 mm. Breeding occurs in the fall after the females have moulted and while their carapaces are still soft. Males moult in winter so that their carapaces have fully hardened by spawning season. Carapaces harden completely in two to three months. Females reach sexual maturity at about 60 mm, while males do so at a slightly larger size (≈70 mm). Females lay their eggs, then keep them under their abdomens for nearly 10 months. A 60 mm female can lay 125,000 eggs, while a 90 mm female can lay up to 500,000. The eggs hatch the summer after they are laid, 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 (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 regions further south suggest that rock crab may attain commercial size at about five or six years of age and live to about seven years.

The rock crab is omnivorous and displays a certain amount of opportunism in its diet. Lobster has never been shown to constitute a significant portion of the rock crab's diet, but analyses of lobster stomach contents indicate that rock crab is a major prey for lobster throughout the lobster's life cycle, even from the earliest larval stage.

Resource management

The rock crab management plan is intended to control the fishery's development and protect the reproductive potential of rock crab populations. The rock crab fishery is managed by controlling fishing effort. The number of licences and traps is limited, as is the crabbing season. The fishery is also managed by fishing areas (Figures 1, 2 and 3), so that fishing effort can be distributed more evenly. Quotas are also set in many areas. Rock crab are harvested by lobster fishers during lobster season when rock crab are an authorized by-catch. Outside the lobster season, rock crab can be taken only by rock crab licence holders who practise a directed fishery. Directed fishing licences are permanent in the Magdalen Islands and exploratory in the other areas. A minimum legal carapace width of 102 mm is in effect. Females are thus excluded from the fishery, because they rarely reach this size. In the Magdalen Islands in 2003, 14 fishers held directed fishing licences for rock crab, with individual quotas of 45.5 t. An overall quota of 681 t was set, which included not only individual quotas from the directed fishery, but also the rock crab by-catch landed by lobster fishers. Each fisher could use up to 100 traps in Areas 12A and 12B, and 125 traps in Area 12C (Figure 2). These fishers were allowed to fish in one, or in some cases two, of the three areas. A control area (12C1), closed to rock crab harvesting, was created in 2000 between Areas 12C and 12B to protect a portion of the reproductive stock so that its natural processes can be monitored. In the Gaspé Peninsula in 2003, there were 12 licence holders in the northern fishing areas (Areas 17A to 17C and 12D1 to 12D7) and 28 licence holders

in the southern areas (Areas 12E to 12Z) (Figure 3). An annual quota of 375 tons was authorized for the entirety of Areas 12Y and 12Z. There are no additional quotas in the Gaspé, where the number of traps per fisher ranges from 60 to 150.

Stock status in 2003

Landings

In Quebec, rock crab are harvested mainly off the Gaspé Peninsula and in the Magdalen Islands. The fishery only truly took off in 1995, when 829 t were landed. Landings increased gradually, from 687 t in 1996 to 1,761 t in 2002. In 2003, landings totalled 1,628 t, down 7.5% (133 t) from 2002. In 2002, Quebec landings accounted for 22% of the total Atlantic rock crab catch.

In the Magdalen Islands, landings totalled 705 t in 2003, a decrease of 12 t from the record 717 t recorded in 2002 (Table 1), accounting for 43% of all Quebec landings. All holders of directed fishing licences have been active since 1998 and individual quotas were reached in 2002 and 2003. The rock crab by-catch landed by lobster fishers in the Magdalen Islands totalled 71 t in 2003, 25 t fewer than in 2002, but 48% more than the average for the years 1998 to 2002. Since the three fishing areas (12 A-B-C) were established in 1997, fishing effort

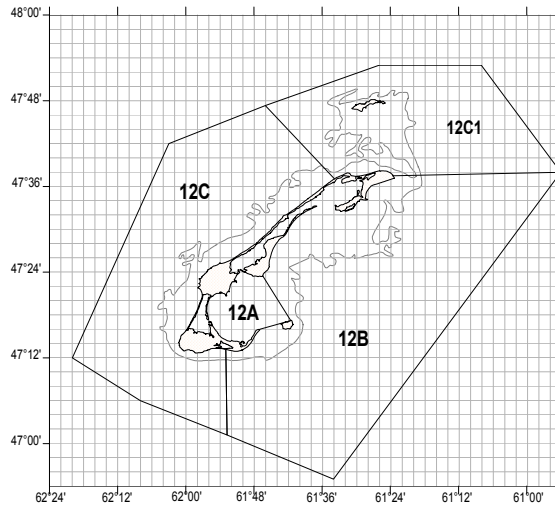

Figure 2. Rock crab fishing areas in the Magdalen Islands.

has been distributed throughout the Magdalen Islands. Catches are made mainly in Plaisance Bay (Area 12A), the western part of Area 12B, and the eastern and southern sectors of Area 12C, generally at depths of less than 20 metres. The harvesting season takes place mainly from mid-August to early November.

In the Gaspé Peninsula, landings totalled 909 t in 2003, down 13% (134 t) from 2002 (Table 1). In 2003, landings in the Gaspé accounted for 56% of the total rock crab catch in Quebec. Along the northern shore of the Gaspé Peninsula (Areas 17 and

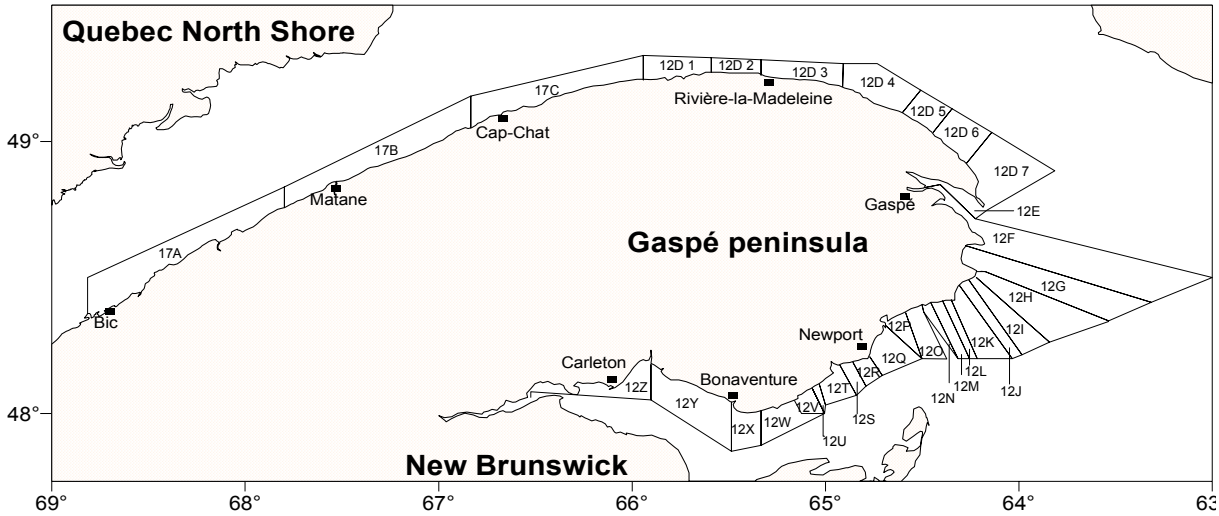

Figure 3. Rock crab fishing areas in the Gaspé Peninsula.

Table 1. Rock crab landings (t) in Quebec, 1995 to 2003.

Fishing area	1995	1996	1997	1998	1999	2000	2001	2002	2003*
				Magdalen Islands					
12C (North)	51	0	135	186	197	181	224	260	266
12A-B (South)	209	199	315	348	366	407	400	457	439
Total	260	199	450	534	563	588	624	717	705
				North Gaspé Peninsula					
17		2	8	16	16	15	19	40	28
12D		4	49	48	128	167	218	327	263
Total		6	57	64	144	182	237	367	291
				South Gaspé Peninsula					
12E-P	39	21	56	84	125	171	160	160	150
12Q-X	221	147	184	152	164	170	189	192	145
12Y	161	163	165	146	108	145	130	149	112
12Z	148	151	143	120	112	152	166	175	211
Total	569	482	548	502	509	638	645	676	618
Total Gaspé	569	488	605	566	653	820	882	1043	909
				North Shore and Anticosti					
Total			1	8	5	3	20	1	14
Total Québec	829	687	1056	1108	1221	1411	1526	1761	1628

* Preliminary data

12D), catches have risen gradually since 1996, peaking at 367 t in 2002, but dropping to 291 t in 2003. In the southern Gaspé (Areas 12E to 12Z), landings fell from 676 t in 2002 to 618 t in 2003, but have generally remained stable since 2000.

On the North Shore, 14 t were landed in 2003. No directed rock crab fishery has taken place around Anticosti Island since 2002.

Yield

In the Magdalen Islands, the highest yields since the beginning of the fishery in Areas 12B and 12C were recorded in 2003, averaging 20.1 kg/trap and 18.7 kg/trap, respectively. In Area 12A, yields have remained high and stable at approximately 22 kg/trap since 2001 (Table 2).

In the northern Gaspé (specifically Areas 12D1 to 12D7, inclusive), the average yield rose from 5.9 kg/trap in 2001 to 8.7 kg/trap in 2002, dropping to 8.0 kg/trap in 2003 (Table 2).

In the southern Gaspé, average yields show an increasing gradient from the eastern tip of the Peninsula (12E-P) to the head of Chaleur Bay (12Z). From 1997 to 2003, yields were stable in all areas, totalling approximately 5 kg/trap in Areas 12E-P and

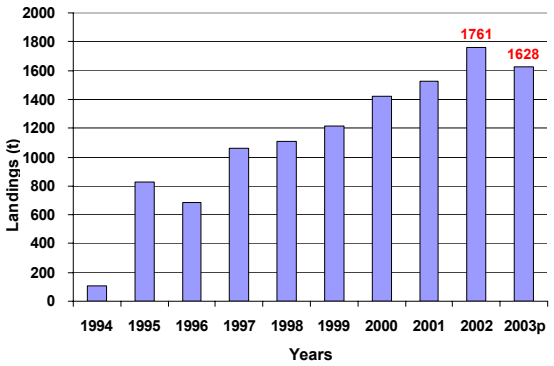

Figure 4. Rock crab landings (t) in Quebec, 1994 to 2003 (2003 data are preliminary).

12Q-X and varying between 6.1 kg/trap and 8.1 kg/trap in Area 12Y. In Area 12Z, yields have ranged from 9.7 kg/trap to 13.7 kg/trap since 1997 (Table 2).

Size frequency distribution

The size frequency distribution of rock crabs taken in the Magdalen Islands (Areas 12A, 12B and 12C combined) has varied little since 1997. The average size of rock crab there has been large ever since the beginning of the fishery in 1995 (Figure 5). In 2003, the average size was 123 mm in Area 12A, 124 mm in Area 12B and 118 mm in Area 12C**.**

The average size of rock crab landed in the Gaspé Peninsula in 2003 ranged from 111 mm to 119 mm, depending on the area. In Chaleur Bay (Areas 12E to 12Z combined), size frequency distributions have remained stable since the fishery began (Figure 6). The average size of rock crab landed in Areas 17 and 12D (northern sector) have increased slightly since 2000, up from 114 mm and 116 mm to 118 mm and 119 mm in 2003.

Report and recommendations

The rock crab fishery in Quebec has grown significantly since 1995. Annual landings increased steadily from 1996 to 2002, peaking at 1,761 t, then dropping 7.5% between 2002 and 2003 to 1,628 t. Most fishing activity continues to take place in the Magdalen Islands and Chaleur Bay; there is very little rock crab fishing on the North Shore.

In the Magdalen Islands, the intensity of fishing effort to date does not seem to have had any perceptible impact on rock crab populations. Yields have held steady and size frequency distributions have remained unchanged since 1997. However, the rock crab fishery is still relatively new and its impact on the long-term productivity of populations remains unknown. Only the monitoring of stocks' status over the next few years will give us a better idea of the resource's ability to support the current harvesting rate in the long term. Consequently, it is recommended that fishing intensity in the various crabbing areas in the Magdalen Islands not be increased and that the overall quota of 681 t, including rock crab by-catch landed by lobster fishers, be maintained until 2006.

Table 2. Estimated rock crab yields (kg/trap) based on logbook data.

Fishing area	1995	1996	1997	1998	1999	2000	2001	2002	2003*
				Magdalen Islands					
12A	13.7	17.9	12.3	13.2	16.2	20.3	21.8	22.4	21.8
12B	15.2	17.6	15.3	13.5	16.3	16.7	18.0	17.1	20.1
12C	10.5		12.5	7.7	11.6	12.7	13.8	17.2	18.7
				North Gaspé					
17		2.0	1.8	7.0	6.8	5.8	5.9	4.1	4.4
12D			4.1	2.7	3.5	3.4	5.9	8.7	8.0
				South Gaspé					
12E-P				4.7		5.6	5.0	5.4	6.1
12Q-X		7.2	5.6	5.5	5.1	5.4	4.8	4.6	4.6
12Y		9.3	8.1	6.2	6.1	8.1	7.3	7.3	7.3
12Z	14.8	16.1	10.6	10.6	9.7	11.7	13.7	11.1	13.0

* Preliminary data

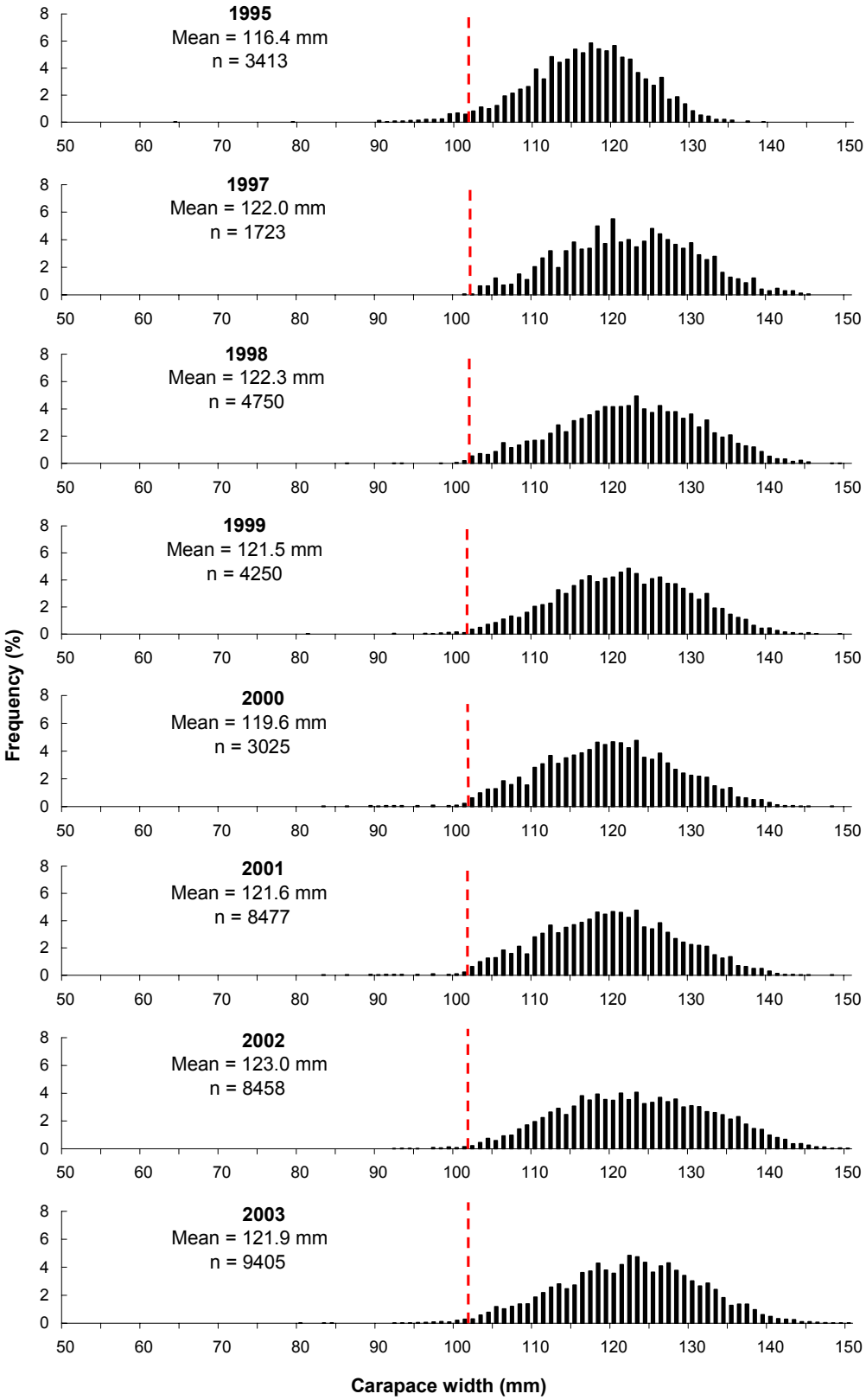

Figure 5. Size frequency distribution of rock crab caught in the Magdalen Islands, 1995 to 2003. The dotted vertical line indicates minimum legal size.

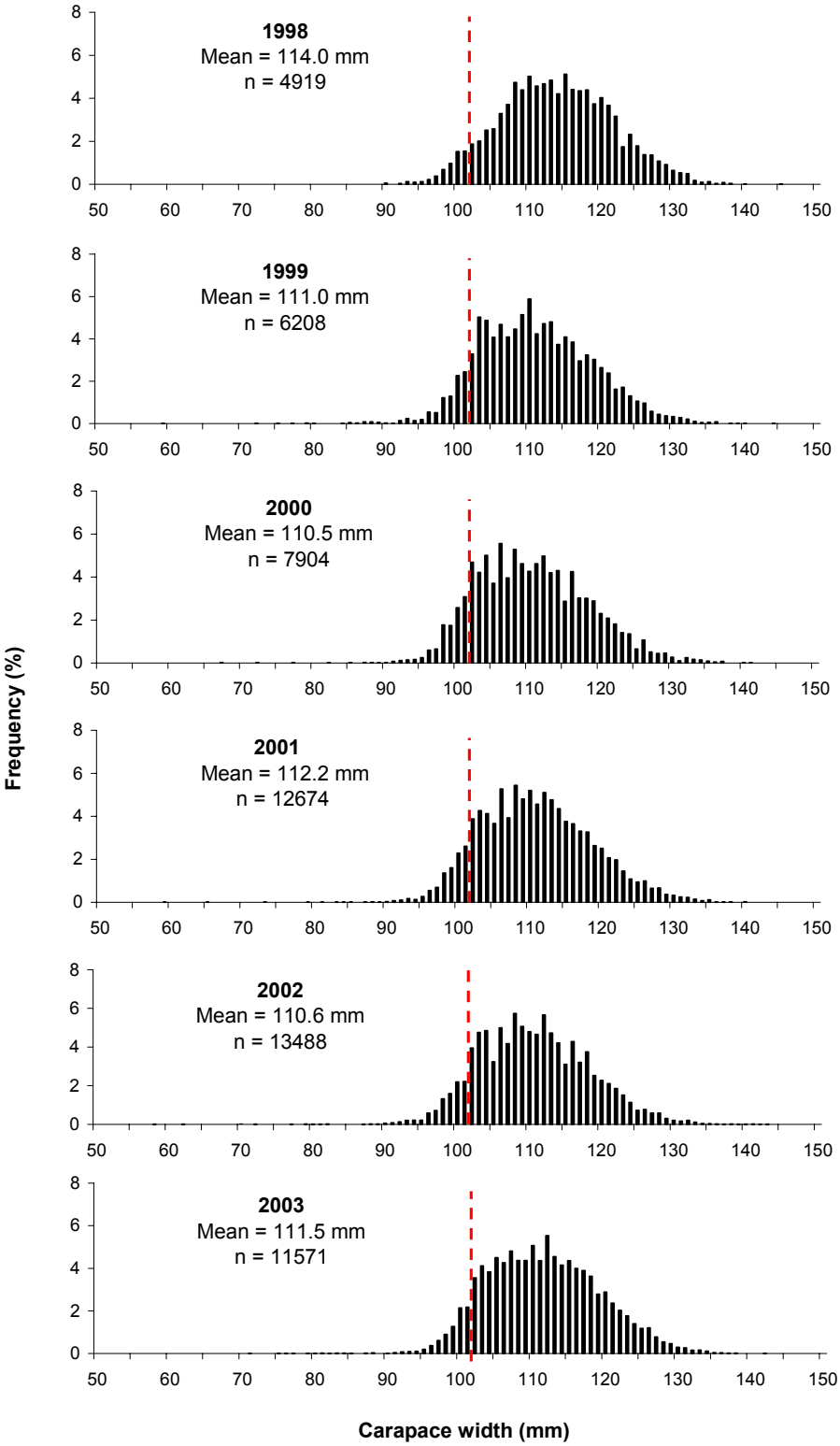

Figure 6. Size frequency distribution of rock crab caught in the southern Gaspé Peninsula (Areas 12E to 12Z), 1998 to 2003. The dotted line indicates minimum legal size.

In the Gaspé Peninsula, stock status indicators have remained virtually unchanged since the fishery began in 1995. However, over the past few years, harvesting has risen sharply in the northern Gaspé. Stock status indicators for the northern and southern Gaspé suggest that current harvesting levels are stable. However, these data are insufficient to determine the rock crab populations' capacity to sustain the same level of fishing intensity in the long term, especially in areas where the highest landings have been recorded. It is recommended that management measures be implemented to prevent fishing effort to increase significantly from current levels. In accordance with a recommendation of the National Committee on the Development of Emergent Species (Gendron and Robinson, 1994), it was suggested that refuges be established in each area of the northern Gaspé as of 2002 to protect a portion of the spawning stock so that the natural processes of rock crab populations can be monitored. For the same reason, it is suggested that areas in the southern Gaspé where there is currently no rock crab fishery be converted into refuges.

Not enough data are available to determine stock status on the North Shore (Areas 16A to 16G).

Conclusion

In light of the concerns expressed by many parties regarding the possible impact of rock crab harvesting on lobster, we wish to stress once again the need to develop the rock crab fishery slowly and cautiously. Harvesting of rock crab will reduce the abundance of large crab in these waters. This decreased abundance should not have any immediate negative impact on lobster, since lobster do no prey on crab of legal size (102 mm or more). Negative impacts on lobster could be expected only if the numbers of small crab, on which lobster do feed, were to fall to the point that lobster found them harder to come by. This situation could arise if recruitment overfishing occurred. It should be possible to prevent such overfishing, however, by maintaining a minimum legal carapace width greater than the size at sexual maturation and implementing control measures to keep harvesting levels moderate. The two species interact sufficiently to justify tight, cautious management of rock crab so as to prevent any overfishing.

Our knowledge of the rock crab's ability to withstand fishing pressure over the long term is still limited. The fishery will have to be monitored regularly to assess the status of the resource and the impacts of fishing operations on rock crab populations. The logbook system is essential for determining resource status. It is therefore imperative that fishers keep proper logs.

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