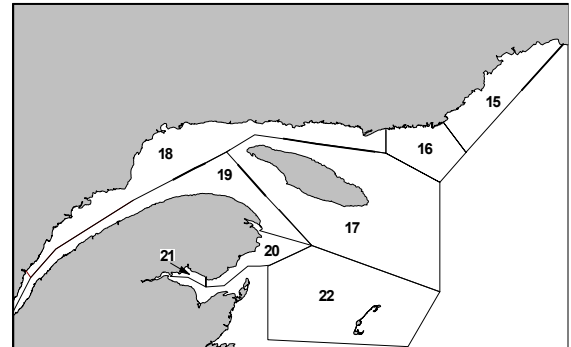




## Lobster of the Inshore Waters of Quebec in 2001

### Background

A program to increase minimum catch size by 1 to 2 mm per year was introduced in 1997 in all lobster fishing areas (LFAs) in Quebec. The purpose of these increases is to double egg production per recruit from the 1996 levels. In 2001 the minimum legal size rose to 81 mm (carapace length) in LFAs 17, 19, 20 (A1-A2) and 22, and 80 mm in LFAs 15, 16, 18, 20 (A3-B8) and 21, compared with 76 mm between 1957 and 1996. So far, these size increases appear to have enabled egg production per recruit to increase by about 60%. To achieve the objective of doubling egg production per recruit, it is therefore necessary to continue increasing catch size for a few years yet. In recent years, marked changes in the size composition of stocks and the number of berried females have occurred in a number of fishing areas. The expected benefits of increasing the legal size are increasingly evident and correspond to the forecasts of a calculation model. However, the exploitation rate for commercial-size lobster continues to be high. A substantial reduction in fishing effort should be considered, to reduce the fishery's dependence on annual recruitment and obtain the full benefits of the increase in minimum legal size, which are reduced if the exploitation rate increases. Measures to increase egg production among larger females would be desirable, because of potential benefits associated with the quality of their eggs and larvae.



Quebec lobster fishing areas.

### Summary

- Quebec lobster landings totalled 3,314 t in 2001, which is comparable with the figures for 1999 and 2000. In 2001, 66% of landings came from the Magdalen Islands, 29% from the Gaspé, 4% from Anticosti Island, and 1% from the North Shore. Landings in the Magdalen Islands have increased over the last two years. Landings for Gaspé as a whole were down in 2001, to 954 t, which is 14% less than last year. Overall, however, they are still above the average for the past 10 years. Landings on the North Shore and Anticosti Island saw a slight decline in 2001.
- In 2001, catch rates in the Magdalen Islands declined slightly in numbers, but the weight increased compared to 2000. In the Gaspé, in LFAs 20A and 20B, yields in number were down from the past two years, but decreases in weight were less pronounced. Yields for LFA 21, like those for the North Shore (LFAs 15 and 16), were up slightly but remain low, compared to other areas.
- The increase in the minimum legal size has caused significant changes in the

structure of the lobster populations of the Gaspé and the Magdalen Islands. Depending on the area, the mean size of lobsters landed has increased by 3 to 4 mm and mean weight has risen 10 to 15% since 1996. However, exploitation rates (measured for commercial-size males) remain high in the Magdalen Islands (around 75%), the Gaspé (around 85%) and probably on the North Shore as well. The exploitation rate on Anticosti Island is lower (around 20%).

- Thus far, egg production per recruit appears to have increased by about 60% in the Magdalen Islands and the Gaspé compared with 1996 figures. The target is an increase of 100%. Abundance of spawning females increased in many areas in 2001.
- In the Magdalen Islands, recruitment indices suggest that the level of landings in 2002 could be comparable to that in 2001, whereas in the Gaspé we can probably expect a slight decrease.

### **Biological**

The American lobster, *Homarus americanus*, ranges along the west coast of the Atlantic from Labrador to Cape Hatteras. Adults prefer rocky substrates where they can take shelter, but also live on sandy or even muddy bottoms. While commercial-size lobster are generally found at depths of less than 35 m, they are also fished by an offshore fleet along the outer Scotian Shelf at depths to 450 m.

Females reach sexual maturity at a carapace length of about 79 mm in the southern part of the Magdalen Islands, about 82 to 84 mm in the northern part of these islands and in the Gaspé, and over 90 mm along the North Shore and around Anticosti Island. In general, females have a two-year reproductive cycle, spawning one year and moulting the next. A female spawning for the first time can produce nearly 8,000 eggs,

while a large female of 127 mm (jumbo size) can lay up to 35,000 eggs. Once released, the eggs remain attached to the female's swimmerets for 9 to 12 months, until the planktonic larvae emerge the following summer. The larvae's planktonic phase lasts from 3 to 10 weeks, depending on the water temperature. Following metamorphosis, the postlarval lobster (Stage IV), which now resemble adults, drift down from the surface layer to settle on the bottom. During the first few years of their benthic life, until they reach a length of about 40 mm, lobsters lead a cryptic existence, concentrating in habitats that offer many hiding places. In the Magdalen Islands and the Gaspé, lobsters are estimated to reach minimum legal size between 6 and 8 years of age, after having moulted 15 to 20 times.

### **Fishery management**

The lobster fishery is managed by controlling fishing effort. The number of licences and the number of traps per licence are limited. In 2001, there were 623 active licences in Quebec's three maritime sectors: the Magdalen Islands (324), the Gaspé (205) and the North Shore (94). There are eight main lobster fishing areas (LFAs 15 to 22) (Figure 1) and 41 subareas. The trap limit per licence is 250, except for the Magdalen Islands and Anticosti Island, where it is 300. The use of traps larger than the standard size is limited by a policy of equivalence, in force since 1995. In LFAs where 250 standard traps are authorized, a total of 175 large traps is permitted, and in LFAs where 300 standard traps are authorized, 210 large traps are permitted. In the Magdalen Islands, however, large traps were completely banned in 1997. To reduce the catch of undersized lobster, escape vents on traps have been mandatory since 1994.

The lobster fishery takes place in spring and lasts 9 to 12 weeks, depending on the LFA.

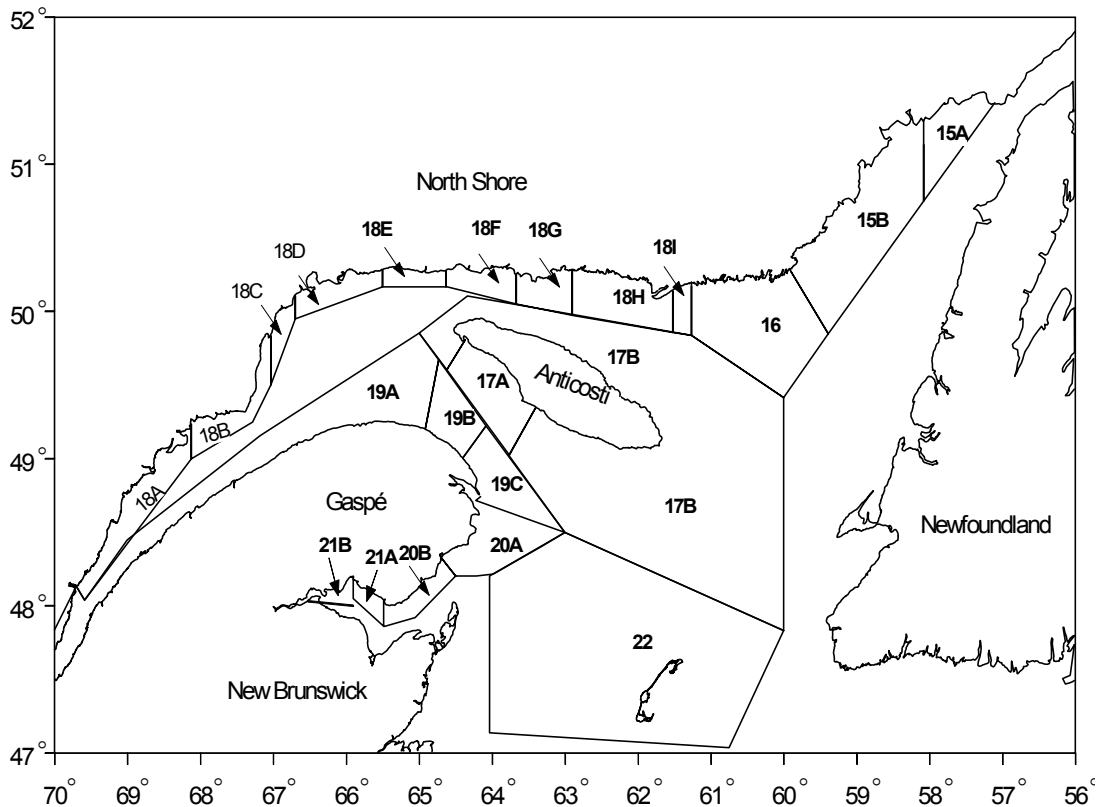


Figure 1. Quebec lobster fishing areas.

The fishery is regulated by a minimum size limit and a requirement to return berried females to the sea, with the objective of conserving reproductive potential. Since 1997, minimum catch size has increased 1 or 2 mm annually, or every two years, depending on the region. In 2001, the minimum legal size rose to 81 mm (carapace length) in LFAs 17, 19, 20 (A1-A2) and 22, and 80 mm in LFAs 15, 16, 18, 20 (A3-B8) and 21, compared with 76 mm between 1957 and 1996. These increases are aimed at doubling egg production per recruit over the 1996 level. V-notching of berried females is done on a voluntary basis in some sectors of the southern Gaspé. Since 1994, V-notched females must be thrown back.

#### **Conservation approach**

The conservation approach for all lobster stocks in Atlantic Canada is determined by the 1995 Fisheries Resource Conservation

Council (FRCC) report. The FRCC's general conservation objective is to maintain stocks at an optimum level for the whole range of possible environmental conditions, by conserving a sufficient spawning biomass to allow continuing strong production of juveniles. To achieve this objective, measures must be taken to boost egg production, reduce the exploitation rate and effective fishing effort, and improve stock structure by increasing the number of moult-groups. The FRCC's reasoning is based on the concept of egg production per recruit (E/R), which is a relative measure of a population's reproductive potential. The FRCC considered E/R too low and recommended that it be doubled from the 1996 level. This recommendation has recently been confirmed by a national working group assigned to examine the issue of lobster conservation.

### ***Stock status in 2001***

Stock status assessments are based primarily on analyses of data from three sources: landings, sampling done on board fishing vessels at sea, and catch and effort data from index fishers' logbooks. A trawl survey conducted off the Magdalen Islands provides additional information on this stock.

Quebec lobster landings totalled 3,314 t in 2001 (Table 1, Figure 2), which is comparable to the 1999 and 2000 figures of 3,214 t and 3,413 t respectively. They were 14% below the historic peak of 3,835 t achieved in 1992. Landings fell in 1997, the year that the program for increasing the minimum legal size began. They have since increased. Total Quebec landings for 2001 were below the 10-year average but equivalent to the 25-year-average. Distribution of landings in 2001 was as follows: 66% from the Magdalen Islands (LFA 22), 29% from the Gaspé (LFAs 19, 20 and 21), 4% from Anticosti Island (LFA 17) and 1% from the North Shore (LFAs 15, 16 and 18).

### ***Magdalen Islands – LFA 22***

For the fifth consecutive year, the minimum legal size for lobster taken in the Magdalen

Islands was increased by 1 mm, bringing it to 81 mm in 2001, compared with the 76 mm limit in effect from 1957 to 1996.

### ***Landings***

Lobster landings in the Magdalen Islands totalled 2,178 t in 2001, compared with 2,080 t in 2000 (Table 1; Figure 2). They have been up for the last two years. They were 22% below the 1992 peak of 2,806 t, but only 2% below the average for the past 10 years (2,223 t, 1991-2000). In 2001, 70% of lobster landings in the Magdalen Islands came from the southern part of the islands (Old Harry to Havre Aubert), while 30% came from the northern part (Grosse Île to Millerand). For the area as a whole, the 2001 fishing season took place under weather and climate conditions favourable for the harvesting of lobster.

### ***Catch rates***

Catch rates represent the lobster catch per unit effort (CPUE), expressed in number of lobsters per trap or in kilogram weight per trap. Over the past 17 years, for the Magdalen Islands as a whole, the average annual CPUE of commercial-size lobster has ranged from 0.5 to 1.1 lobster/trap, for an average of 0.8 lobster/trap (Figure 3), which was in fact the figure for 2001 – a 4% decrease from 2000. This was 8% lower

*Table 1. Quebec lobster landings (t) by lobster fishing area, 1991-2001.*

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001*
<b>zone 15</b>	32	37	26	8	12	14	19	18	18	38	26
<b>zone 16</b>	12	16	14	10	12	18	12	15	22	11	17
<b>zone 17</b>	76	98	108	143	137	155	184	130	178	148	136
<b>zone 18</b>	12	5	12	8	17	6	19	7	8	21	3
<b>zone 19</b>	17	18	25	25	40	36	23	32	40	36	30
<b>zone 20</b>	621	797	751	730	985	1016	648	889	981	1053	905
<b>zone 21</b>	64	58	59	51	46	39	37	42	30	26	19
<b>zone 22</b>	2642	2806	2593	2007	2142	2219	1883	1915	1936	2080	2178
<b>TOTAL</b>	3476	3835	3588	2982	3391	3503	2825	3049	3214	3413	3314

\* preliminary data

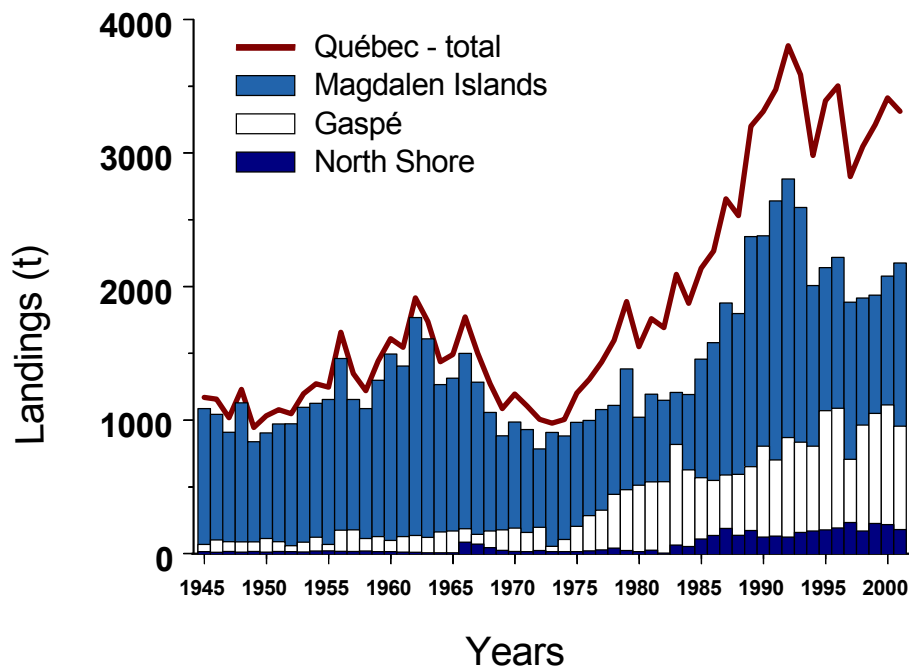


Figure 2. Quebec lobster landings in tonnes, 1945 to 2001.

than the average for 1996, the year before the increase in minimum legal size began. Despite this decrease in the number of lobsters caught, yields in weight rose, as was predictable, since the lobsters fished are now bigger. Catch rates have increased 6% in weight from 2000 and 8% from 1996 (Figure 3). Finally, after a marked drop in 1996 in the northern islands, yields there have risen over the last two years. The catch rates obtained from the index fishers program established in 1991 show the same trends.

#### *Catch composition and exploitation rates*

Following the increases in minimum legal size, there have been changes in the size structure of the lobster catch (Figure 4). The average size of lobsters caught has increased by about 4 mm in 2001 compared with 1996, and average weight by about 15%. The 2001 landings consisted of larger lobsters, and the proportion of “market” lobsters (length  $\geq 83$  mm) was 87% and

90% in the south and north respectively, compared with an average of 63% and 65% from 1993 to 1996. These changes are significant and represent the kind of results expected in a recruitment fishery.

The exploitation rates for commercial-size male lobster remain high, however, in both the southern and northern parts of the Magdalen Islands, and are increasing steadily (Figure 5). They reached 74% and 65% respectively in 2000. Exploitation rates are calculated for the males and are obtained by measuring the change in abundance of the first moult-group recruited to the fishery compared with the second moult-group one year later. The mortality of females is presumably less high because of their protection when berried. On the whole, the exploitation rate estimated using the trawl survey data indicates the same trends. The rate was 71% for 2000 and 74% for 2001. The proportion of “jumbo” lobster ( $\geq 127$  mm CL) is still very low (< 1%).

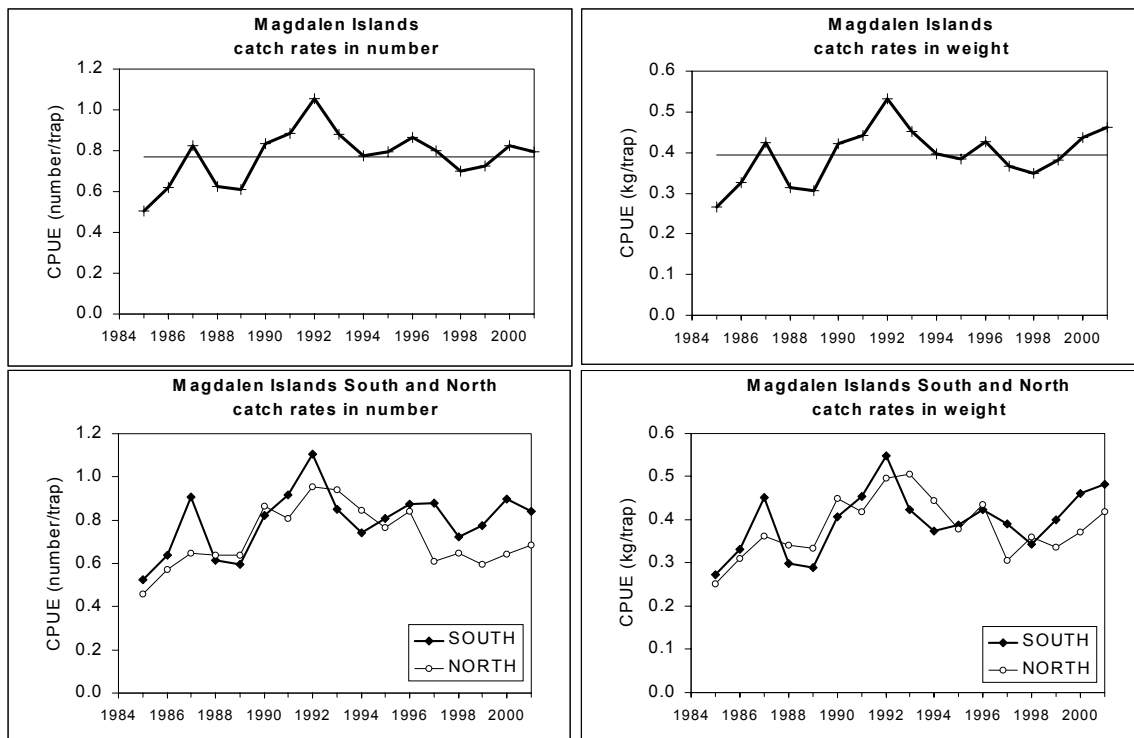


Figure 3. Catch rates (CPUE), in number and weight of commercial-size lobsters per trap. (Top) Annual averages, 1985-2001, for the Magdalen Islands as a whole. The straight line represents the average for the years 1985-2000. (Bottom) Annual averages for the southern and northern Magdalen Islands.

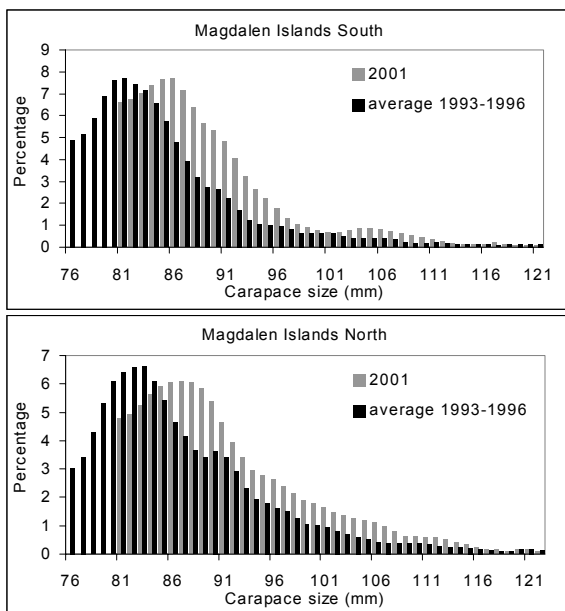


Figure 4. Percentage of catch comprised of the different lobster size classes in the southern and northern Magdalen Islands in 2001 compared with the 1993-1996 average established before the increase in minimum legal size began.

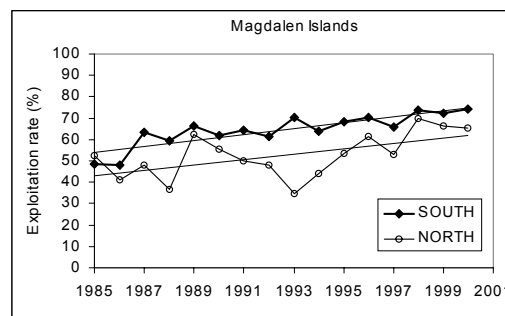


Figure 5. Exploitation rate indices for commercial-size males of the southern and northern Magdalen Islands, 1985-2000. The straight lines illustrate the data trend.

### Egg production

The results of a simulation model show that egg production per recruit (E/R) has increased by about 60% since 1996 with the 5-mm increase in minimum legal size. The

objective of the conservation plan is to double E/R (increase it by 100%) compared with 1996 levels. These theoretical results assume that the other major factors in the dynamics of the lobster populations—such as growth, natural mortality, fishing mortality, fecundity, and sexual maturation—have remained unchanged since 1996. The at-sea sampling data indicate that berried females have increased in abundance in recent years, no doubt helping to boost egg production in the stocks. At the end of the 2001 fishing season, in the southern islands the CPUE of berried females was 0.34 lobster/trap, versus 0.28 in 2000 and 0.19 in 1999. In the northern islands, CPUE was 0.18 lobster/trap in 2001 compared with 0.12 in 2000 and 0.11 in 1999. The trawl survey observations also show a marked increase in abundance of berried females. With the increase in minimum legal size, more berried females will have the chance to spawn before being harvested. Over time, the number of berried females in the samples should get higher and higher. The increases observed are in line with expectations.

### ***Recruitment***

The abundance of prerecruits (72-75 mm) as determined from at-sea sampling and of commercial-size lobster ( $\geq 82$  mm) as determined from the trawl survey is high, which suggests that the current landing levels could be maintained in 2002. Annual monitoring of the postlarval lobster (5-10 mm) that settle on the bottom shows that the abundance of the cohorts fluctuates from year to year. However, the peaks and troughs of abundance seem to even out over time on account of the variability of growth. The bottom settling observed in 2001 was more substantial than in 2000, but about three times less strong than in 1999. It is possible, however, that the strong 1999

cohort suffered considerable mortality during the unusually severe storm of fall 2000.

### ***Summary***

The conservation measures taken since 1997 have had a tangible, positive impact on lobster stocks. Egg production has risen, and the growth potential of lobster is better exploited. However, the objective of doubling egg production per recruit has not yet been achieved. It is therefore necessary to continue with the program to increase catch size. However, a sizeable reduction in the fishing effort must also be considered: this will avoid higher mortality among large individuals, improve the size structure of stocks, reduce the fishery's heavy dependence on annual recruitment, and enable larger females to contribute more to egg production. The increase in the minimum catch size will help reduce fishing pressure on juveniles and encourage egg production by primiparous females, i.e., those spawning for the first time. Studies now in progress show that it would be advantageous to increase the reproductive contribution of multiparous females (those spawning for at least the second time). The larvae from these females have characteristics that may indicate better survival potential.

### ***Gaspé – LFAs 19, 20 and 21***

In 2001, the minimum legal size for taking lobster in the Gaspé was increased to 81 mm in LFAs 19 and 20A1-A2. It remained at 80 mm in LFAs 20A3-B8 and 21. The minimum legal size remained unchanged at 76 mm from 1957 to 1996. It rose from 76 to 78 mm in 1997.

### ***Landings***

In 2001, in LFA 20, lobster landings totalled 905 t, a decrease of 14% from 2000 (1,053 t) (Table 1, Figure 6) and about 11% below the

peak attained in 1995 and 1996. However, they were 15% higher than the average for the last ten years (849 t, 1991-2000). In the Gaspé, 95% of landings are from LFAs 20A and 20B. In LFA 19, landings have held steady at around 30 to 40 t per year since 1995. LFA 21 recorded landings of around 20 t in 2001, 15 t in 21A and 4 t in 21B. They have declined since the early 1990s, when they ran at 60 t to 70 t per year. In 21B, an additional 8.5 t were landed by the Listuguj Band as part of a commercial fishery (7 t) and a food fishery (1.5 t).

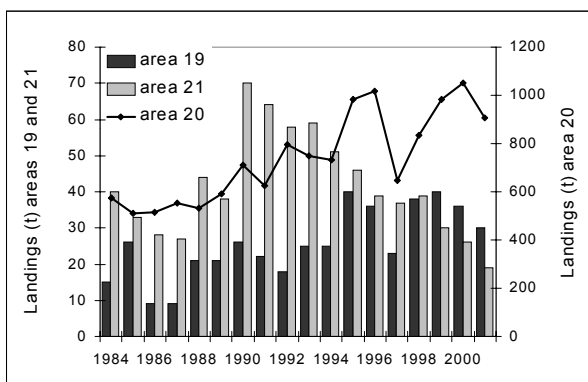


Figure 6. Gaspé lobster landings (t) in LFAs 19, 20 and 21 (1984 to 2001).

**Catch rates**

Catch rates represent the lobster catch per unit effort (CPUE), expressed in number or kilogram weight of lobsters per trap. Since 1986, the average annual CPUE of commercial-size lobster in LFA 20 has

ranged from 0.5 to 0.9 lobster/trap (Figure 7). For LFA 20 as a whole, CPUE from at-sea sampling has been down over the last two years. In 2001, CPUE in numbers was 19% below the average for the past 15 years, although the reduction in weight was less pronounced (7%). The decrease was more substantial around Gaspé and St Godefroi. In the Grande Rivière sector there was less of a decline in CPUE. The catch rates determined from index fishers’ logbooks displayed the same pattern on the whole. Although higher in 2001, the CPUE figures for LFA 21 are around two to three times lower than for LFA 20. The figures measured in LFA 19C in 2001 were slightly higher than in LFA 20.

**Catch composition and exploitation rates**

Following the increases in minimum legal size, there have been changes in the size structure of the lobster catch in the Gaspé (Figure 8). The mean size of lobsters caught in LFA 20 as a whole increased by about 3 mm in 2001 compared with 1996, and mean weight rose by about 10%. The 2001 landings consisted of larger lobsters, and the proportion of “market” lobsters (length ≥ 83 mm) was 74% in 2001, compared with 54% on average from 1993 to 1996. These changes are significant and represent the kind of results expected in a recruitment fishery.

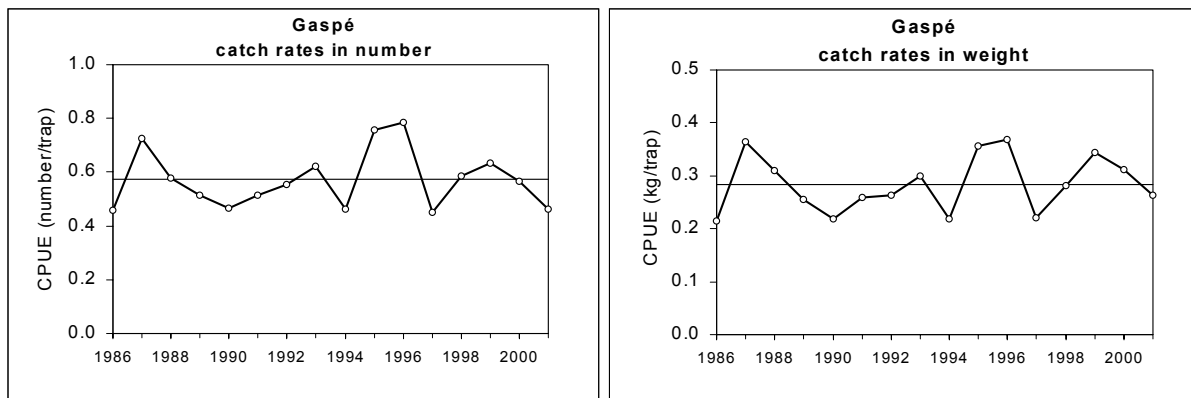


Figure 7. Catch rates (CPUE), in number and weight of commercial-size lobsters per trap. Annual averages, 1986-2001, for the Gaspé (LFA 20). The straight line represents the average for the years 1986-2000.



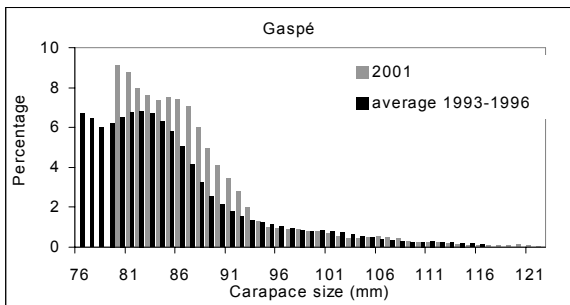


Figure 8. Percentage of catch comprised of the different lobster size classes for the Gaspé in 2001 compared with the 1993-1996 average established before the increase in minimum legal size began.

The exploitation rate for commercial-size male lobster has increased in LFA 20 in recent years, peaking at 86% in 2000 (Figure 9). Exploitation rates are calculated for the males and are obtained by measuring the change in abundance of the first moult-group recruited to the fishery compared with the second moult-group one year later. Mortality of the females is presumably less high because of their protection when berried.

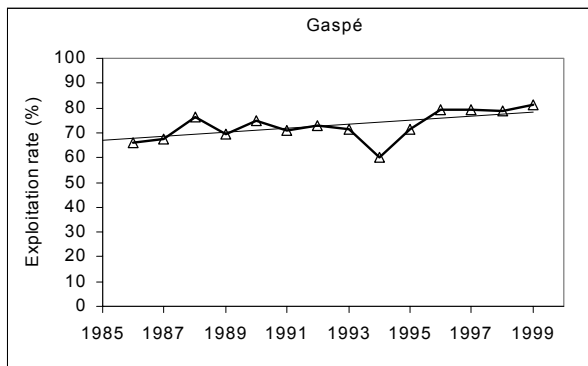


Figure 9. Exploitation rate index for commercial-size males in the Gaspé, 1985-2000. The straight lines illustrate the data trend.

The proportion of large lobster remains low, and “jumbo” lobster (CL  $\geq$  127 mm) accounted for only 0.7% of the catch, by weight, in 2001. Lobsters in LFAs 19 and 21 are larger on average than those in LFA 20. There are also more “jumbo” lobster there:

lobsters are 10% and 4% bigger (in weight) in LFAs 19 and 21, respectively.

**Egg production**

The results of a simulation model show that egg production per recruit (E/R) has increased by about 60% since 1996 with the 4-mm increase in minimum legal catch size. The objective of the conservation plan is to double E/R (increase it by 100%) compared with 1996 levels. These theoretical results assume that the other major factors in the dynamics of the lobster populations—such as growth, natural mortality, fishing mortality, fecundity, and sexual maturation—have remained unchanged since 1996. The at-sea sampling data indicate that berried females have increased in abundance in recent years in LFA 20. At the end of the 2001 fishing season, the CPUE of berried females was 0.55 lobster/trap, versus an average of 0.11 for the 1986-1996 period. With the increase in minimum legal size, more berried females will have the chance to spawn before being harvested. Over time, the number of berried females in the samples should get higher and higher. The increases observed are in line with expectations. However, these increases in the number of berried females might also reflect an increase in the exploitation rate, or changes in fishing locations and strategies.

**Prerecruits**

The abundance level of prerecruits suggests that landings in 2002 could be slightly lower than in 2001. The quantity of prerecruits is very low in LFA 21, and virtually no lobster under the legal size were observed in LFA 19C, suggesting that these two areas could be partly dependent on LFA 20 for their migration recruitment.

---

**Summary**

The conservation measures taken since 1997 have had a tangible, positive impact on lobster stocks. Egg production has risen, and the growth potential of lobster is better exploited. However, the objective of doubling egg production per recruit has not yet been achieved. It is therefore necessary to continue with the program to increase catch size. However, a sizeable reduction in the fishing effort must also be considered: this will avoid higher mortality among large individuals, improve the size structure of stocks, reduce the fishery's heavy dependence on annual recruitment, and enable larger females to contribute more to egg production. The increase in the minimum catch size will help reduce fishing pressure on juveniles and encourage egg production by primiparous females, i.e., those spawning for the first time. Studies now in progress show that it would be advantageous to increase the reproductive contribution of multiparous females (those spawning for at least the second time). The larvae from these females have characteristics that may indicate better survival potential.

It will be important in future to closely monitor changes in fishing practices in LFA 21B. The Aboriginal community of Listuguj is considering maintaining a fall fishery. A fall lobster fishery in LFA 21 with a nominal effort equal to that in the spring could result in higher mortality because of higher catchability during that period. If such a fishery were to become intensive, it could have an impact in LFAs 20B and 21A upstream, assuming a downstream-to-upstream migration of lobster in summer and the reverse in late fall.

**North Shore – LFAs 15, 16 and 18**

The minimum legal size for taking lobster on the North Shore was raised from 76 to 78 mm in 1998. It was not increased in 1999, but was raised to 79 mm in 2000 and to 80 mm in 2001.

**Landings**

Depending on the year, lobster landings from the North Shore account for 1% to 2% of total lobster landings in Quebec. Landings recorded in LFA 15 in 2001 totalled 26 t (Table 1). Landings in LFA 15 have been higher over the past two years (28 t and 36 t). They had remained below 20 t since 1994, compared with an average of 35 t for the period of 1984 to 1993. Since 1984, landings in LFA 16 have fluctuated between 10 and 20 t, without showing an overall trend. They were 17 t in 2001 (Table 1). Landings are very low in LFA 18, where the main reason for the marked fluctuations is the estimated unreported catches landed in this area. These estimates probably include quantities fished elsewhere than LFA 18.

**Catch rates**

Catch rates represent the lobster catch per unit effort (CPUE), expressed in number of lobsters per trap. The observed catch rates for the North Shore are low. From 1993 to 2000, average seasonal CPUE ranged from 0.3 to 0.4 lobster/trap. In 2001 it remained at about the same level as in 2000. The catch rates recorded by index fishers in 2001 averaged 0.17 kg/trap. Over the past five years they have varied between 0.14 and 0.18 kg/trap.

LFAs 15 and 16 are close to the northern limit of the lobster's range. These areas are characterized by much colder water than in the Gaspé and the Magdalen Islands, which very likely slows the processes of growth, reproduction, and recruitment.

### *Catch composition and exploitation rate*

In 1998, following the increase in the minimum legal size, a slight increase was observed in the average size of the lobster landed in LFAs 15 and 16. However, this average size decreased in 1999 and 2000. Moreover, in 2000, the size structures appeared much more truncated toward the minimum sizes, indicating a higher exploitation rate. In 2001 there was a marked increase in the average size of lobsters caught. This may be related to the increase in catch size, in which case its effect would be felt later, probably because of slower growth in this region. The increase in size may possibly, however, be related to a change in the sites fished in 2001. Through the 1990s, the size distributions occasionally showed a few modes in the larger size groups, but no jumbo lobsters (CL  $\geq$  127 mm) were ever observed in the samples. Over the years, berried females have been observed, mainly at the end of the season, in proportions that ranged from 5% to 35% between 1993 and 2000. However, the CPUEs indicate that they are not abundant. The average size of berried females is about 90 mm. Observations made in 2000 showed that in LFA 15, sexual maturation of females is delayed until they have reached about 92 mm.

### *Summary*

Egg production per recruit (E/R) has not been calculated for the North Shore LFAs. However, because of large size at sexual maturity and high exploitation rates, E/R can be expected to be low, which justifies the introduction of additional measures to increase it.

### *Anticosti – LFA 17*

In 1998, the minimum legal size for taking lobster off Anticosti Island was raised from

76 to 78 mm. It was subsequently increased to 80 mm in 2000 and to 81 mm in 2001.

### *Landings*

Lobster landings from Anticosti Island generally make up 3% or 4% of total Quebec landings. They rose steadily between 1990 and 1994, and since then have peaked at about 150 t (Table 1). Landings recorded in 2001 were 136 t, 8% lower than the figure for 2000. A dockside monitoring program involving the counting of crates was instituted in 2000 to obtain more reliable landing data.

### *Catch rates*

Since there was no regular at-sea sampling on Anticosti Island, we have no catch rate data for 2001. However, high catch rates (1.6 lobster/trap in the middle of the fishing season and 0.8 at the end) were observed in at-sea sampling conducted in 1997.

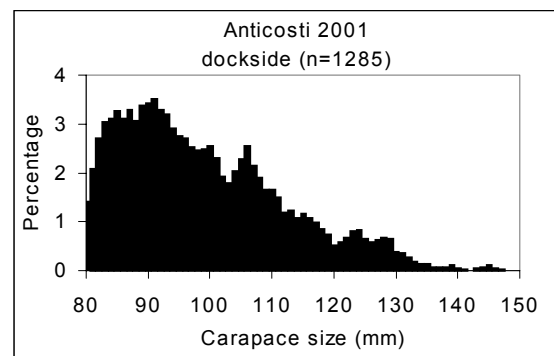


Figure 10. Size frequency distribution for lobster caught at Anticosti Island. Dockside sampling conducted in 2001.

### *Catch composition*

The demographic profile of the Anticosti Island lobster population is characterized by a number of modes. The exploitation rate in this fishing area is far lower than elsewhere (around 20%), and so a population structure characterized by several moult-groups has been maintained. This situation, which the

FRCC considers ideal, is very different from that observed in other LFAs, where additional conservation measures are needed. The average length of commercial-size lobster measured at dockside in 2001 was 100 mm, and jumbo lobster ( $\geq 127$  mm) accounted for 17.5% of the catch by weight. The berried females that were observed during sampling at sea in 1997 were large, because sexual maturation is delayed until they have reached around 92 mm.

### ***Egg production and summary***

Egg production per recruit (E/R) has not been calculated for Anticosti Island. Because of the lower exploitation rates, we can assume E/R to be not as low as elsewhere. However, this fishery might not be able to withstand high exploitation rates, because of the lobsters' slow growth and late sexual maturation. It is therefore important to keep the exploitation rate low in this area, and to increase the minimum legal size to reduce the taking of immature lobster.

### ***General outlook***

The increase in the minimum legal size is reducing fishing pressure on immature lobster and thus promoting the production of eggs by primiparous females, i.e., those that are spawning for the first time. Studies now in progress show that it would also be advantageous to increase the contribution of multiparous females (those spawning for at least the second time). The larvae from larger females are themselves larger and heavier at emergence. It has also been observed that larger, heavier larvae grow faster and are larger at the time that they settle on the bottom. All of these characteristics may indicate better survival potential.

The increase in the minimum legal size will continue to cause changes in both the size

and the composition of the catch. If recruitment remains constant, the number of lobster caught can be expected to decrease. Some lobster will not be taken until a year or two later, when their numbers will have been reduced by natural mortality, which is estimated at about 10 to 15% per year. However, they will be bigger, because the additional moult will have enabled them to increase their weight by about 45%. The greater weight should more than offset the lower numbers, as far as males and immature females are concerned.

As for the mature females, increasing the legal size will allow a larger proportion to spawn before being caught. The number of berried females in the population should rise, and by the same token the number of unberried females caught will decline. Marked changes in this direction have recently been observed in the populations.

So far, nothing has been done to reduce fishing effort and exploitation rates, so the fishery will remain just as dependent as before on annual recruitment. Modelling of egg production per recruit demonstrates that the anticipated benefits of increasing the minimum legal size are reduced if the exploitation rate increases. To protect the resource better, a major reduction in fishing effort or some type of control on catches will eventually have to be considered.

Though it is hard to establish a direct link between the quantity of eggs produced and recruitment to the fishery, higher egg production should at least ensure that this factor never becomes limiting. When environmental conditions are favourable, increased egg production should translate into improved recruitment. Under unfavourable environmental conditions, higher egg production could reduce the risk of stock collapse.

Our ability to predict landings is still poor for most lobster stocks of the inshore waters

of Quebec. However, the trawl survey that has been conducted since 1995 in the southeastern Magdalen Islands seems to offer some potential in this regard. In 2001, the abundance of the lobster that will be available to the fishery in this area in 2002 was high, suggesting that the 2002 landings could be as good as those in 2001. In the Gaspé, an index of recruitment to the fishery is being derived from samples taken using traps with blocked escape vents. The abundance index determined in this way in 2001 was lower than in 2000, which may suggest that landings in 2002 could be slightly lower than they were in 2001.

To better monitor the spatio-temporal evolution of catches and fishing effort, it is recommended that the keeping of logbooks be made mandatory for all inshore lobster fisheries in Quebec.

To conclude, we should mention that the lobster fishers of the Gaspé have expressed concern about the possibility that their conservation efforts in their region may be of greater benefit to New Brunswick fishers. Their fear is that the larvae are being exported and that small lobster returned to the water are migrating to the south shore of Chaleur Bay, where they can be caught because of the smaller minimum catch size in that region. Tagging operations are under way to attempt to respond to some of these concerns.

### **References:**

FRCC. 1995. A Conservation Framework for Atlantic Lobster. 49 pp. + appendices.

Gendron, L. and G. Savard. 2000. État des stocks de homard des eaux côtières du Québec en 2000 et suivi des impacts de l'augmentation de la taille minimale de capture. CSAS Research Document 2000/115, 73 pp.

Gendron, L. and P. Gagnon. 2001. Impact de différentes mesures de gestion de la pêche au homard (*Homarus americanus*) sur la production d'œufs par recrue. Can. Ind. Rep. Fish. Aquat. Sci. 2369: vi + 31 p.

### **For more information:**

Louise Gendron  
Maurice Lamontagne Institute  
850 route de la Mer  
Mont Joli, Quebec  
G5H 3Z4  
Tel. (418)775-0618  
Fax. (418)775-0740  
Email: [gendronl@dfo-mpo.gc.ca](mailto:gendronl@dfo-mpo.gc.ca)

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

DFO, 2002. Lobster of the Inshore Waters of Quebec in 2001. DFO - Science, Stock Status Report C4-05 (2001).

#### **This report is available from the:**

**Regional Stock Assessment Office,**  
Department of Fisheries and Oceans,  
Maurice Lamontagne Institute,  
P.O. Box. 1000, Mont-Joli,  
Quebec, Canada  
G5H 3Z4

**Email:** [Stocksrl@dfo-mpo.gc.ca](mailto:Stocksrl@dfo-mpo.gc.ca)

ISSN 1480-4913

*La version française est disponible à l'adresse ci-dessus.*



Pêches et Océans  
Canada

Fisheries and Oceans  
Canada

Sciences

Science