



Snow Crab of the St. Lawrence Estuary and the Northern Gulf of St. Lawrence (Areas 13 to 17 and 12A, 12B and 12C) in 2002

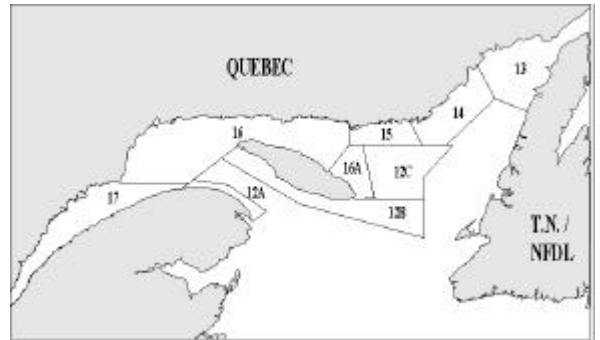


Figure 1. Snow crab management areas in the northern Gulf of St. Lawrence.

Background

The commercial snow crab fishery in the St. Lawrence Estuary and the northern Gulf of St. Lawrence began to intensify in the late 1970s. The northern Gulf is divided into five traditional snow crab management areas, numbered 13 to 17 from east to west. Three other areas (12A, 12B and 12C), previously classified as exploratory, were added in 2001. Management by total allowable catch (TAC) was gradually introduced in the region between 1985 and 1995. The fishery is directed exclusively at males with a carapace width (CW) of at least 95 mm.

Male snow crab stop growing after their terminal moult. Prior to this terminal moult, the males are considered adolescents and can be recognized by their small claws; afterward, they are considered adults and can be recognized by their large claws. Following their terminal moult, males range in size from 40 to 165 mm. Males reach legal size at about nine years of age. Recruitment in snow crab varies over an intrinsic cycle of about eight to nine years, generally characterized by five years of moderate to high recruitment (the recruitment wave) followed by three or four years of low recruitment (the recruitment trough). The current phase of the recruitment cycle can be detected in the fishery by regular monitoring of the catch (size, CPUE and shell condition) and of fishing effort and is confirmed by scientific trap and trawl surveys.

In the northern Gulf, the two westernmost snow crab management units (areas 17 and 16) are well into the declining phase of a recruitment wave. Normally, at this stage of the recruitment cycle, the biomass should be high, the average size of the crab should be on the rise because of the accumulation of old crab, and recruitment should be falling. This decline in recruitment will in turn cause biomass to decrease over the following years, during which fishing yields and catches should therefore decline as well. This recruitment-wave effect appears to be more pronounced and to show up earlier in the western part of the northern Gulf (Area 17) than in the eastern part (Area 13).

Summary

- **General:** All of the snow crab stocks are either in a declining recruitment phase or at very low levels of commercial biomass; this is why advices for the 2003 season recommend sizeable reductions in the catch to adjust the harvest to the biomass available. In areas 17 and 16, both the TAC and the actual catch hit record highs in the past two years, and the forecast medium-term recruitment is low, so further reductions in TAC will likely be recommended in coming years in order to contain the decline in harvestable biomass, to ensure a decent increase in the average size of the males, and to protect the reproductive potential of these stocks. In areas 15, 14 and 13, how events unfold will depend on whether the existence of a recruitment wave is confirmed and, if it is, how large an increase in commercial biomass results from it.
- **In Area 17,** both the TAC and the actual catch in 2001 and 2002

- reached heights never before equalled in the history of this fishery.
- Though the current level of harvestable biomass is still high, starting in 2003, it will begin to decline on both shores of the estuary, and this trend will continue through at least 2005. Consequently, the harvest must be reduced immediately in order to reflect the lower biomass observed in the two research surveys, to protect the spawning stock and to leave a sufficient reserve to slow the decline in yields in coming years.
 - **In Area 16**, both the TAC and the actual catch in 2000, 2001 and 2002 reached heights never before equalled in the history of this fishery.
 - From 2000 to 2002, the catches and natural mortality exceeded recruitment, preventing any accumulation of biomass. As a result of this deliberate strategy of aggressive harvesting during the last recruitment wave, the commercial biomass is far smaller than was expected at the wave's height. The average size of the legally harvestable crab has been falling since 1997-1998 and is far smaller than what is expected at this phase of the cycle.
 - Recruitment to legal size will drop sharply in 2003, and the projected recruitment figures for the coming four years are below average. The harvestable biomass will therefore continue to decline.
 - **In Area 15**, the recruitment wave that was perceptible further west was not detected until 2002, and recruitment has been low since 1996.
 - The harvestable biomass has therefore fallen substantially and hit a very low level in 2002. Recruitment should be up in 2003. A sharp increase in the abundance index for adult males measuring 78 to 95 mm CW was observed in the 2002 post-season trap survey, which could be the harbinger of an impending recruitment wave.
 - **In Area 14**, the recruitment wave that is perceptible farther west has not yet been detected, and recruitment has been low since 1996.
 - The fishing effort in this area is intense and has been on the rise since 1996. The harvestable biomass has therefore fallen substantially, so that its current level is low. In 2003, yields (CPUE) are expected to rise to levels comparable to those for 1999, but the abundance of legal-size crab will remain fairly low compared with the average. However, a sharp increase in the abundance index for adult males measuring 78 to 95 mm CW was observed in the 2002 post-season trap survey, which could point to an impending recruitment wave.
 - **In Area 13**, the historical data on the fishery show that after a period of high yields (up to 15 kg/trap) in the mid-1980s, this stock collapsed rapidly in the space of two to three years, with yields falling to around 5 kg/trap, and it has never recovered since. The fishing effort in this area is too high for the biomass available.
 - Commercial yields of snow crab in Area 13 fell again in 2002, and the TAC was not reached, even though it had been reduced by 30 % for this

year and even though the fishing season was extended. Recruitment has been less than total mortality for several years, so the harvestable biomass is currently very low.

- In the samples taken at sea during the fishing season, the numbers of legal-size crab were very low compared with those in the size classes immediately below them. This finding shows that few legal-size crab survive the season and suggests that the fishery is relying essentially on annual recruitment. The harvestable biomass can be expected to remain very low in 2003 and could diminish even further unless the expected recruitment wave materializes. The notable rise in the abundance index for adult males size 78 to 95 mm in the 2002 post-season trap survey may be a leading indicator of this wave.
- This stock is now considered to be in critical condition and will definitely not be able to support the current level of fishing effort without substantial and possibly irreparable damage. Its reproductive potential might be severely compromised. Significant steps must be taken rapidly to allow a substantial increase in the harvestable biomass which includes the best male spawners.
- **Areas 12A, 12B and 12C** did not acquire permanent status until 2001. They are located at the fringes of the traditional inshore fishing grounds of the estuary and the northern Gulf. The information available on these areas is limited, so it is hard to issue scientific advices or recommendations. The advices for these areas

have therefore been based on the adjacent traditional fishing areas: Area 17 (for Area 12A) and Area 16 (for Area 12B).

- For 2003, it is recommended that the catch be reduced by about 15 % in Area 12A and 35 % in Area 12B. We have not issued any advices for Area 12C, both because of its heterogeneous nature—it consists of two banks that are separated by a channel and that are contiguous with Area 15 to the north and areas 12B and 16A to the south—and because of the scarcity of information about it. We suggest that this area be divided up and that the resulting parts be incorporated into the respective adjacent areas.

The Fishery

Location and historical context

This snow crab fishery is now divided into nine management areas (Figure 1). Areas 12A, 12B and 12C, which had exploratory status from 1994 through 2000, received permanent status in 2001, and Area 16A was established in 2002.

Snow crab is fished with baited traps. Conical steel models, such as the Japanese trap measuring 1.2 m in diameter at the base and the conical trap measuring 1.8 m in diameter at the base, are the most popular types. Since 1990, the fishery in the more westerly areas (17, 16, 16A, 15, 12A, 12B and 12C) has opened at ice break-up (March-April) and generally closed after 10 to 14 weeks (June-July). In the areas farther east (14 and 13), until 1999, the opening of the fishery was often delayed because the ice cover stayed longer.

The season generally did not begin until June, and it ended in October or November. Since 2000, however, the situation has been different. The fishery has begun on May 1 and ended in August or September.

The snow crab fishery in the St. Lawrence Estuary and the northern Gulf of St. Lawrence began in the late 1960s. From 1968 to 1971, vessels from Quebec and New Brunswick landed catches of about 1,000 t from around Port Cartier on Quebec's Middle North Shore. Subsequently, a limited inshore fishery took place, with annual landings of roughly 200-300 t until the late 1970s. The fishery experienced a boom from 1979 to 1985, when the number of participants, fishing effort, geographic extent and landings all increased substantially.

From 1987 to 1989, landings for the entire region tumbled from 5,255 t to 2,622 t (Figure 2). This drop was accompanied by marked decreases in the catch per unit effort and ever-greater catches of white crab, both as direct results of the passage of a recruitment trough centred on the 1977-1979 year-classes. Beginning in 1990-1991, the white crab problem gradually disappeared, catch per unit effort rose and landings increased to a record 7,879 t in 1995, thanks to the arrival of a recruitment wave made up of the 1980-1984 year-classes. Landings slipped somewhat in 1996 (7,416 t) and 1997 (6,274 t), as a result of the decrease in the TAC in all areas, then rose again from 1998 (6,447 t) to 2001 (9,611 t). In 2002, the catch increased to 10,374 t as the combined result of increases in TAC in areas 17 (+11 %), 16 (+19 %),

12A (+10 %), 12B (+12 %) and 12C (+27 %) and decreases in areas 15 (-15 %) and 13 (-30 %). The total landings for 2002 (preliminary figure established on November 28) represent a record high.

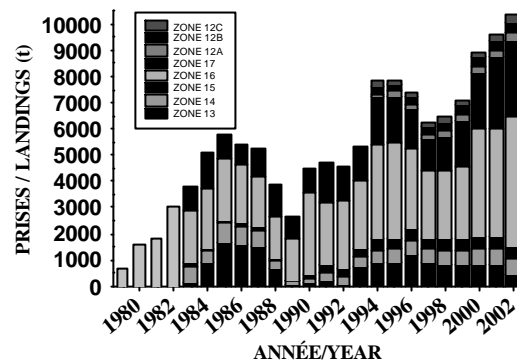


Figure 2. Snow crab landings in the St. Lawrence Estuary and the northern Gulf of St. Lawrence.

Fishery management

The fishery was originally managed by controlling fishing effort, but a TAC was gradually introduced in each of the fishing areas between 1985 and 1995. The number of traps authorized per licence varies from 100 to 200 Japanese traps, depending on the area, but fishers may substitute one regular trap (maximum volume 2.1 m³) for two Japanese traps (maximum volume 0.44 m³).

As everywhere else in Canada, the minimum legal size is set at a carapace width of 95 mm, and the landing of females is prohibited. Since 1985, once the limit of 20 % white crab (crab that have moulted recently) has been exceeded in the catch at sea in any given area, the fishery in that area has

been closed automatically to minimize mortality of these very fragile crabs that will be available to the fishery in the following year. In addition, white crab and adolescent males may be returned to the water during the fishing season to enhance their value and give them more time to reproduce.

Resource status

The status of the snow crab populations in areas 17 to 13, 12A, 12B and 12C is determined annually from the available information. Areas 12A, 12B and 12C did not acquire permanent status until 2001. Before that, they were monitored annually, but no official recommendation was made by DFO. The analyses for all areas are based on data from fishing vessels' logbooks, processing plants' purchase receipts, summaries of dockside weighing of the catch, and sampling of the fishery by the DFO observers and samplers program. In 2002, a research survey was conducted with traps in all of the fishing areas, and the results were incorporated into the analyses of the crab stocks. The results of two research surveys conducted with trawls in areas 17 and 16 were also used.

Two new indices, the standardized CPUE and the Annual Weighted Condition Index, were introduced in 2001 and 2002, respectively. The raw CPUE data from the fishery have been standardized using the multiplicative model (Robson 1966, Gavaris 1980) that is already commonly used in assessments of stocks of other commercial species, such as shrimp, herring, and cod, to account for the changes caused by the various fishing

strategies used. Variables used in the analysis included the types of traps, the amount of time that they were submerged, the time of year that the fishing season took place, and how long it lasted. The condition of the crabs was estimated in 2002 using the new Annual Weighted Condition Index (AWCI). This index is calculated by weighting the number or percentage of the crabs in each of five shell states (measured in the field) according to the sum of the total values (for $i = 1$ to 5, $\text{Sum}(\text{value}_{\text{state } i} \times \text{state}_i) / \text{Sum of total values}$).

Snow crab in Area 17

There are 22 active licence holders in Area 17. The first total allowable catch (TAC) was set at 1,300 t in 1992 (Table 1). In 2002, the fishery opened on March 25 and closed on July 30, and the TAC was raised by 11 % (to 3,020 t). Special allocations of 490 t (40 t more than in 2001) and an experimental deep-water fishing quota of 195 t (only 90 t of which was caught) were set aside for non-crabbers. The catch recorded as at November 28, 2002 showed that the TAC had been caught.

Resource status in 2002

In the commercial fishery, the non-standardized average yield of Japanese traps, which had been rising almost continuously since 1998, rose again, by 5 %, from 2001 to 2002 (from 13.9 kg/trap to 14.6 kg/trap). This small increase came from both shores of the estuary. From 2001 to 2002, yields rose by 4 % (from 17.6 to 18.3 kg/trap) on the north shore and by 2 % (12.8 to 13.1 kg/trap) on the south shore

Table 1. Catch and effort data for Area 17.

Year	1983 à 1989 ⁴	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
TAC	-	-	-	1300	1300	1820	1820 ⁵	1547 ⁵	1315 ⁵	1315 ⁵	1775 ⁵	2130 ⁵	2725 ⁵	3020 ⁵
Catches ¹	1022	910	1562	1289	1305	1788	1774	1502	1156	1285	1758	2130	2741	2935
Effort ²	121.8	137.9	173.6	107.4	90.6	124.2	155.6	153.3	141.0	149.4	147.7	136.5	197.2	201.0
CPUE standardized	5.9 ⁶	5.0	7.4	10.8	12.2	12.5	9.4	8.9	7.2	7.1	8.9	13.3	12.5	11.3
CPUE ³ non stand. Total	8.5	6.6	9.0	12.0	14.4	14.4	11.4	9.8	8.2	8.6	11.9	15.6	13.9	14.6
North shore	8.4	7.7	10.0	12.4	15.2	15.7	11.7	10.3	7.7	7.4	8.7	17.5	17.6	18.3
South shore	7.4	5.3	7.8	11.5	13.2	11.4	9.7	9.3	8.5	9.2	13.1	14.8	12.8	13.1

- 1 Landings in metric tonnes, as at November 28 for 2002
- 2 Standardized effort, in thousands of Japanese trap hauls
- 3 Gross catch per unit effort, in kilograms per Japanese trap
- 4 Calculated average for these years
- 5 Including special allocations
- 6 Calculated for the period from 1985 to 1989

(Table 1). The standardized average yield, though still higher than the average for 1985 to 2001, has been falling since 2000 (Table 1). The proportion of the catch that came from the south shore (51 %) was lower than in 2001 (when it was 53 %), but the fishing effort on this shore was high, representing 59 % of the total effort deployed in Area 17. As in 2001, this additional effort on the south shore was attributable chiefly to temporary allocations and an experimental fishing quota, which were caught mainly in the southeastern part of this area.

After having risen from 2000 to 2001, the Annual Weighted Condition Index (AWCI), which reflects the condition of the crabs sampled at sea and at dockside each year, fell from 2001 to 2002. Its values in 2002 were close to the averages for 1994 to 2001: 3.0 at sea and 2.8 at dockside, which means that the condition of the crab caught at sea and landed in 2002 was

intermediate between new crab and old crab. The mean CW of the legal-size crabs caught at sea has been trending upward since 1999 (107.6 mm) and rose again, to 110.2 mm, in 2002. However, the size of the males on landing has held steady at about 110.0 mm since 2000. The proportion of prerecruits measuring 78 to 95 mm CW (ADO⁻¹) has been low and held steady at around 3 % since 2000.

The annual postseason trawl survey carried out on the north shore of the estuary in Area 17 between late July and early August since 1992 showed that the abundance of commercial-size crab has remained relatively steady at around 35 crab/10,000 m² since 1999 (Figure 3). The abundance of the commercial fraction of the crab in the 2002 survey (34.9 crab/10,000 m²) is close to the average for the years 1992 to 2001 (35.9 crab/10,000 m²). This relative stability is attributable both to the regular, nearly continuous arrival of

new recruits (16.3 crab/10,000 m² in 2002) and to the relatively large residual biomass left on the bottom (18.6 crab/10,000 m² in 2002) since 2000. In 2002, total mortality, comprising natural and fishing mortality, was estimated at 51 % for the north shore, exceeding the 47 % average for the nine preceding years. The mean CW of the legal-size crab caught at sea has been stable since 1997, but its value in 2002, 105.8 mm, was much lower than the 107.9 mm average for the years 1992 to 2001.

The abundance of the legal-size crab should start to decline in 2003, because the year-classes that will be reaching legal size over the next three years are weaker than the year-classes that preceded them (Figure 3). The abundance figures for adolescent males measuring 78 to 95 mm CW (ADO⁻¹), 62 to 78 mm CW (ADO⁻²) and 40 to 62 mm CW (ADO⁻³) were down by 17 %, 43 % and 21 %, respectively, from 2001 to 2002. The figures for year-classes ADO⁻¹ and ADO⁻² were at about the average for the past ten years, while the figure

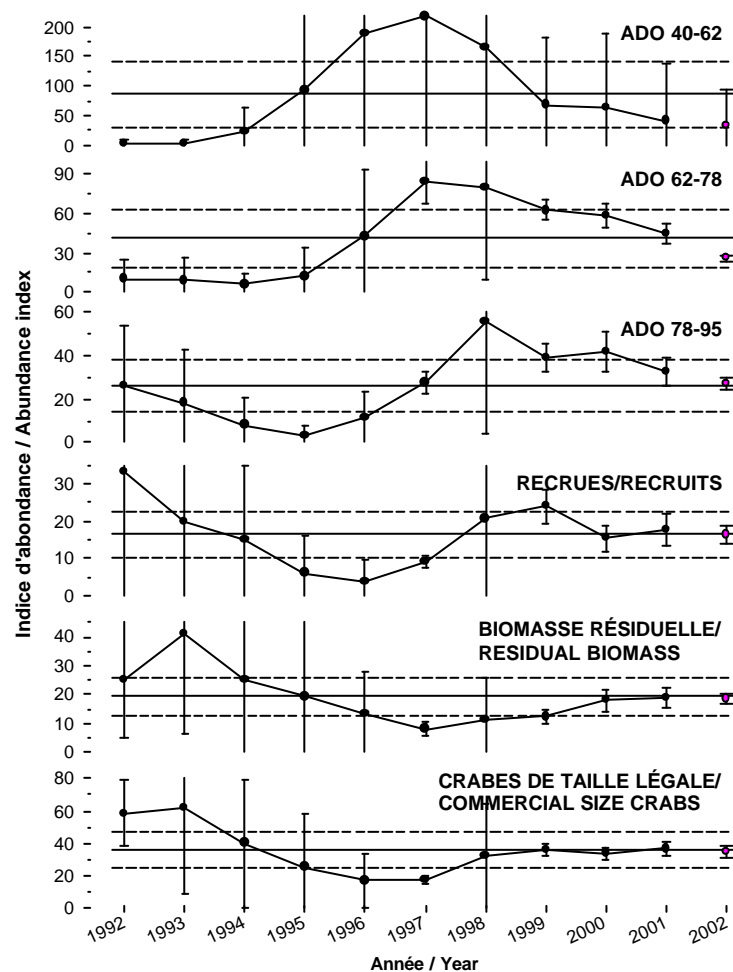


Figure 3. Abundance (± 1 standard deviation) of male snow crab caught in trawl surveys in the St. Lawrence Estuary from 1992 to 2002. The solid line and the dotted lines on each side represent respectively the mean and the 95 % confidence interval for the abundance index from 1992 to 2001.

for year-class ADO⁻³ fell below this average. The 1996-98 year-classes seem weak and could prolong for another three years the recruitment trough that is expected from 2003 to 2005.

The adult females, especially those that have spawned more than once (multiparas), are still abundant on the sea bottom and, given the high recruitment of adult males for the past three years, the problems that might be caused by a shortage of sperm need not be feared in the short term.

The results of the post-season trap survey, for which the time series begins in 1996 for the north shore and 1999 for the south shore, are generally consistent with those from the fishery and from the trawl survey and showed a 15 % decline in the CPUE for commercial-size males on the north shore in 2002 (Figure 4). However, the abundance of commercial-size crab remained high, at 42.9 kg/trap, in 2002, well exceeding the average of 26.2 kg/trap for 1999 to 2001. The lower yield in 2002 is attributable essentially to a 28 % reduction in the residual biomass. The average CPUE for commercial-size crab on the south shore has fluctuated around 57 kg/trap since the survey began in 1999. It fell by 11 % in 2002, essentially because of a 19 % drop in the residual biomass. The condition index for commercial-size crab, after rising regularly from 1998 through 2001 on the north shore and from 2000 to 2001 on the south shore, fell by 2.7 on the north shore and held steady at around 3.0 on the south shore in 2002. The mean CW of the legal-size crab has been stable at 106 mm since 1998 on

the north shore and increased to 106.3 mm on the south shore in 2002. The number of adolescents measuring 78 to 95 mm CW (ADO⁻¹) has been stable on the north shore since 2000. It stood at 4.1 kg/trap in 2002, which exceeded the 2.6 kg/trap average for the period 1996-2001. The number of ADO⁻¹ on the south shore fell by 81 % in 2002, to only 2.3 kg/trap.

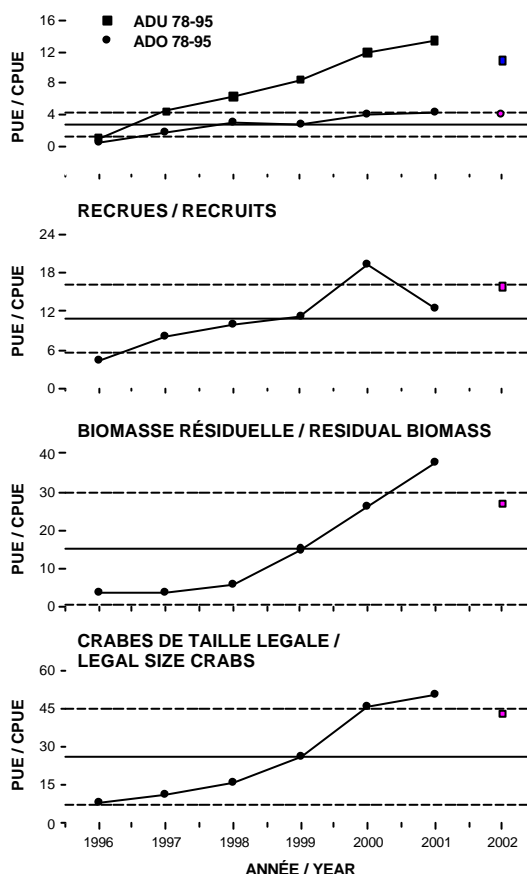


Figure 4. Results of the postseason trap survey on the north shore of the St. Lawrence Estuary (Area 17) from 1996 to 2002. The solid line and the dotted lines on each side represent respectively the mean and the 95 % confidence interval for the abundance index from 1996 to 2001.

Outlook for 2003

In 2001 and 2002, both the TAC and the actual catch reached heights never before recorded in the history of this fishery. The yield (CPUE) of the commercial fishery rose from 1998 to 2000 and has been declining slightly since then. The pattern for the biomass index, as determined from the post-season surveys conducted chiefly on the north shore of the estuary, depends on whether the trap surveys or the trawl surveys are considered. According to the trap surveys, this index rose from 1998 to 2001, then fell in 2002. According to the trawl surveys, it rose from 1998 to 2001, then held steady in 2002. Thus the commercial biomass would appear to still be at high levels, though declining. The mean CW of the legal-size crab also increased over this period, just as would be expected when a recruitment wave is in progress.

Regarding recruitment of legal-size crabs in 2003, the results of the post-season trap surveys just mentioned indicate that it will be comparable to the levels for 2001 and 2002. But the results of the post-season trawl surveys indicate that recruitment will be lower, and that this downward trend will continue for at least three years.

Though the current level of harvestable biomass is still high, it will start to diminish on both shores of the estuary in 2003, and this trend will continue through at least 2005. *Consequently, the harvest must be reduced immediately to reflect the decline in biomass observed in the two surveys, to protect the spawning stock and to leave a sufficient reserve to slow the decline in yields over the coming years.*

We therefore recommend that the catch be reduced by at least 15 % in 2003 compared with the TAC for 2002. Given that the TACs for 2001 and 2002 were far higher than in previous years, substantial cuts in the TAC may be required in the coming years. Since the current commercial biomass contains very few old crab, a larger reduction in the TAC for 2003 might help to limit the size of the reductions that will be required in future years.

Snow crab in Area 16

Thirty-nine fishers hold regular snow crab fishing licences for Area 16, which is one licence more than in 2001. In 2002, the TAC (4,992 t) was 19 % higher than in 2001 (Table 2). The establishment of a new area, 16A, in the southeastern part of Area 16 accounted for 10 % (400 t) of the increase in the TAC for 2002. A temporary allocation of 335 t was available for non-crabbers. The fishery began on April 8 and ended on August 2, and the TAC was caught.

Resource status in 2002

The overall CPUE in 2002 was down by 15 % compared with 2001, from 12.3 to 10.4 kg/Japanese trap (Table 2). This decline in yield was seen in all parts of Area 16: CPUE in 2002 was down 17 % in the western part (from 11.5 to 9.5 kg/Japanese trap), 11 % in the central part (from 13.2 to 11.8 kg/Japanese trap), and 14 % in the eastern part (from 13.3 to 11.4 kg/Japanese trap). The standardized CPUE dropped sharply from 1995 to 1998, rose in 1999, then fell steadily from 2000 through 2002. The standardized CPUE in 2002 was very low, comparable to that preceding

Table 2. Catch and fishing effort in Area 16.

Year	1983 à 1989 ⁴	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
TAC	2 500 ⁵	-	2 368	2 596	2 596	3 636	3 636 ⁷	3 090 ⁷	2627 ⁷	2627 ⁷	2784 ⁷	4176 ⁷	4184 ⁷	4992 ⁷
Catches ¹	1984	3 181	2 371	2 597	2 595	3 608	3 629	3085	2623	2625	2777	4164	4164	5001
Effort ²	257.7	250.5	137.8	137.4	127.2	178.6	177.9	153.5	195.7	245.3	212.0	298.8	338.5	480.9
CPUE standardized	6.9 ⁸	11.6	16.4	18.1	21.7	20.2	22.2	18.4	12.7	10.5	12.0	11.1	10.3	9.7
CPUE non stand. ³ Total	7.7	12.7	17.2	18.9	20.4	20.2	20.4	20.1	13.4	10.7	13.1	13.9	12.3	10.4
West	6.0	8.9	14.1	17.4	18.4	21.5	19.8	21.0	13.1	10.4	12.8	13.1	11.5	9.5
Centre	7.7	12.4	18.2	22.0	23.3	19.7	21.7	18.5	12.2	9.8	12.9	15.7	13.2	11.8
East	10.1 ⁶	15.2	18.7	17.4	19.9	18.5	19.9	21.2	16.2	14.3	14.2	12.6	13.3	11.4

- 1 Landings in metric tonnes, as at November 28 for 2002
- 2 Standardized effort, in thousands of Japanese trap hauls
- 3 Gross catch per unit effort, in kilograms per Japanese trap
- 4 Calculated average for these years
- 5 In effect from 1986 to 1987
- 6 Prior to 1990, the CPUE values for Area 16 east and Area 15 were combined
- 7 Including special allocations
- 8 Calculated for the period 1985 to 1989

the last recruitment wave in 1990-1994. The weighted condition index for the crab as measured at sea has been falling since 1999 and was 2.9 in 2002, reflecting the combined effect of rising recruitment and erosion of the residual biomass during this period.

The mean CW of legal-size crab as measured at sea has been falling rapidly since 1998, and in 2002, it hit 105.4 mm, its lowest value since 1989. This decline in size has followed a similar pattern from the western portion of this area through to the eastern portion, though with a one-year lag in the east. The mean CW of the crab landed has also been falling, since 1997, and hit 106.1 mm in 2002. The proportion of adolescents from 78 to 95 mm CW (ADO⁻¹) in the catch, which will reach legal size after their next moult, has remained stable at around 6 % since

1999 throughout this area. The proportion of prerecruits (ADO⁻¹) has been stable in the west (at 6%) since 1999 and in the east (at 4%) since 2000.

The results of the trawl survey conducted in 2002 in St Marguerite Bay, in the western part of Area 16, showed trends similar to those observed in the fishery. The abundance of legal-size crab has been falling since 2000, because of a decline in the residual biomass over this period. The mean CW of the legal-size crab has also been falling, since 1995. The numbers of prerecruits measuring 78 to 95 mm CW (ADO⁻¹), 62 to 78 mm CW (ADO⁻²) and 40 to 62 mm CW (ADO⁻³) were lower than in 2001, which means that recruitment will be down for at least three years. Recruitment of primiparous females has been very low since 1999,

and the abundance of multiparous females has been falling since 2001, after increasing steadily from 1996 to 2000. The analysis of the spermatophores showed that the females are very well inseminated owing to a sex ratio heavily biased in favour of males.

Indices from the postseason trap survey, conducted every fall since 1994 in Area 16, also showed trends similar to those observed in the fishery and in the beam trawl survey (Figure 5). The CPUE of legal-size crab, which has been falling since 2000, dropped sharply from 2001 to 2002 (to 14.8 kg/trap from 25.9 kg/trap, or 43 %). The yield in the 2002 survey was the lowest recorded since the survey began in 1994. This sharp decline in the average yield of legal-size crab in 2002 was caused both by a 44 % drop in residual biomass (which has been falling since 1999) and by a 41 % decline in the recruits (the first such decline since 1996). Commercial yields in 2002 were down considerably in the western portion of Area 16 (33 %) and by almost twice as much in the eastern portion (64 %). The weighted condition index for the crab, which had been falling since 1996, stabilized at 2.5 in 2002. The mean CW of the legal-size crab, which has been falling since 1996, was 103.9 mm in 2002—the lowest since the survey began in 1994.

The CPUE of adolescent males measuring 78 to 95 mm CW (ADO^{-1}), which had been increasing since 1997 (Figure 5), fell by half from 2001 to 2002 (from 4.2 kg/trap to 2.1 kg/trap). This decrease was seen both in the western portion of Area 16 (4.7 to 2.5 kg/trap)

and in the eastern portion (2.7 to 1.0 kg/trap). The abundance of adult males measuring 78 to 95 mm CW (ADU^{-1}) has been falling for the past two years in the western portion (where it was 7.4 kg/trap in 2002) and for the past year in the eastern portion (where it was 4.5 kg/trap in 2002).

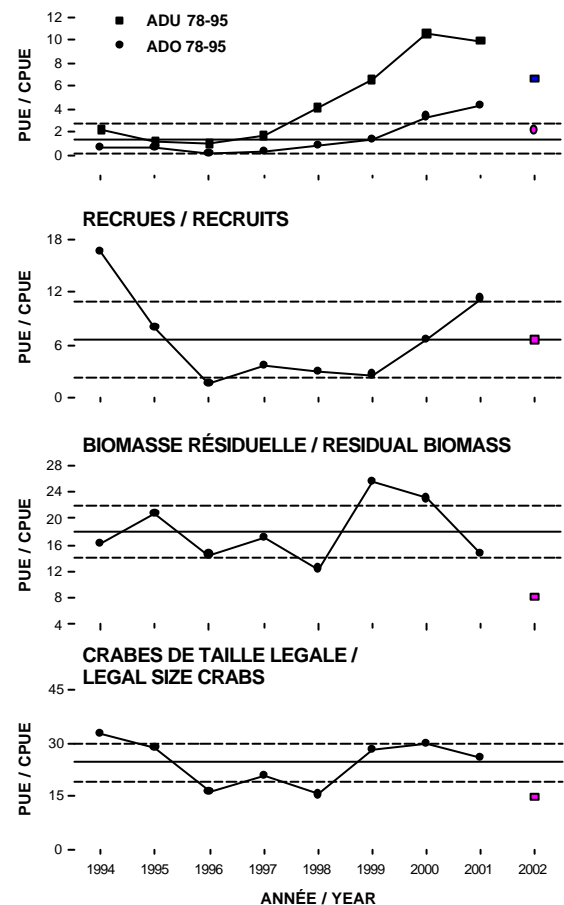


Figure 5. Results of postseason trap surveys in Area 16 from 1994 to 2002. The solid line and the dotted lines on each side represent respectively the mean and the 95 % confidence interval for the abundance index from 1994 to 2001.

Outlook for 2003

In 2000, 2001 and 2002, the TAC and the actual catches reached levels never before equalled in the history of the fishery. The yields from the commercial fishery and the post-season trap survey increased only in 1998 and 1999, when the 1998-2002 recruitment wave was in progress, and have declined gradually since then. This means that the catch plus natural mortality have exceeded recruitment and thus prevented any biomass from building up. As a result of this deliberate strategy of aggressive harvesting during a recruitment wave, the commercial biomass is far smaller than was expected at the height of such a wave. The stock has begun its declining phase, and the biomass is already close to the minimum level observed in 1997 during the preceding recruitment trough.

The mean CW of the legal-size crab has been falling since 1997 (according to the surveys) or 1998 (according to the fishery data) and is far smaller than what is expected during the peak and the declining phase of a recruitment wave.

According to the indices from the post-season trap survey and the trawl survey in St Marguerite Bay, recruitment to legal size will fall sharply in 2003 compared with 2002. The projected recruitment for the coming three years is below average, according to the trawl survey in St Marguerite Bay. The harvestable biomass will therefore continue to decline.

Consequently, it is recommended that the fishing pressure on this stock be cut back substantially. Catches equivalent to those in 1997, 1998 and 1999 (i.e.,

2,675 t) should slow the decline in the commercial biomass and protect the spawning stock until it recovers. However, because the average size of the crab is considerably lower than it was from 1997 to 1999 (19 % lower, by weight), the total catch should be smaller (2,167 t), so that the number of individuals caught will be equivalent to the figures for 1997-1999.

We therefore recommend that the TAC for 2003 be at least 57 % lower than for 2002, which corresponds to a TAC of 2,167 t. If no energetic measures are taken in 2003, the commercial fishing yields can be expected to fall to very low levels, and the mean CW of the legal-size crab can be expected to continue to shrink, with possible negative consequences for the forming of the next recruitment wave.

Snow crab in Area 15

Area 15 has eight regular fishers. In 2002, the fishery opened on April 8 and closed on August 2. The TAC was lowered by 15 % from 2001 to 2002 (from 469 t to 400 t), and all of it was caught (Table 3). Temporary allocations of 47 t were granted to non-crabbers (slightly less than the temporary allocations of 52 t granted in 2001).

Resource status in 2002

The non-standardized CPUE in the commercial fishery continued the decline that began in 1996, falling to 12.1 kg/trap in 2002 (Table 3). This decline in yields is confirmed by the drop in the standardized CPUE for the same period; its value in 2002 was well below the average for 1985 to 2001 and closer to the values in the early 1990s, when

Table 3. Catch and fishing effort in areas 15, 14 and 13.

Year	1983 à 1989 ⁴	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
TAC														
Area 15	--	--	--	--	--	435	435	435	413	422 ⁷	422 ⁷	464 ⁷	469 ⁷	400 ⁷
Area 14	667 ⁶	381	381	381	381	524	524 ^{6,7}	576 ⁷	518.4 ⁷	548 ⁷	548 ⁷	603 ⁷	603 ⁷	603 ⁷
Area 13	1,642	889	889	889	889	889	889	1,241 ⁷	931 ⁷	838	848	848	848	594
Catches¹														
Area 15	109.7	93	321	300	339	426	436	435	413	421	422	464	469	399
Area 14	509.4	174	288	361	383	522	525	573	512	546	540	602	602	604
Area 13	918.4	138	201	19	703	859	883	1,121	795	838	832	819	795	469
Effort²														
Area 15	--	15.2	22.9	22.1	22.3	21.2	17.1	16.0	21.5	22.6	25.0	31.1	31.1	33.0
Areas 13+14	165.6	76.1	116.4	53.5	193.9	212.5	154.7	281.1	242.0	184.5	161.4	167.3	239.8	198.0
CPUE standardized														
Area 15	9.9 ⁸	4.1	13.1	13.6	15.2	23.2	30.8	33.2	19.7	14.7	16.7	11.8	13.3	8.8
Area 14	11.6 ⁹	7.7	6.3	8.8	12.4	17.5	16.0	21.7	15.1	12.9	10.3	8.0	10.1	7.0
Area 13	14.0 ¹⁰	7.6	3.7	5.7	6.2	5.8	8.6	7.2	6.0	4.9	5.7	5.9	4.1	3.5
CPUE non standardized³														
Area 15	--	6.1	14.0	13.6	15.2	20.1	25.5	27.1	19.2	18.6	16.9	14.9	15.1	12.1
Area 14	5.2	4.3	4.8	7.3	9.7	11.2	11.6	12.5	10.7	11.2	11.8	11.8	11.8	10.8
Area 13	5.7	3.9	3.1	5.3	4.2	4.5	8.0	5.1	4.3	6.5	6.7	6.9	4.2	3.3

- 1 Landings in metric tonnes, as at November 28 for 2002
- 2 Standardized effort, in thousands of Japanese trap hauls
- 3 Gross catch per unit effort, in kilograms per Japanese trap
- 4 CPUE values for areas 14 and 13 separated only from 1987 onward
- 5 Calculated average for these years
- 6 In effect only starting in 1986 in areas 14 and 13
- 7 Including special allocations
- 8 Calculated for the period 1985 to 1988
- 9 Calculated for the period 1985 to 1989
- 10 Calculated for the period 1985 to 1989

the stock's abundance was very low. Since yields were declining during this period, while the TAC held steady at around 400 t, the fishing effort during this period increased.

The mean CW of legal-size crab, as measured at sea, has been falling since

1998 and was 104.8 mm in 2002—far lower than the average for the years 1990 to 2001. This decrease in average size has also been observed in the landings of legal-size crab measured at dockside, which averaged 105.4 mm CW in 2002. The Annual Weighted

Condition Index was 3.1 at sea and 3.2 at dockside. These values are close to the average for the years 1994 to 2001 and represent crab in intermediate condition. For the first time since 1994, the proportion of prerecruits measuring 78 to 95 mm CW (ADO^{-1}) hit 5%, exceeding the 2% average for the years 1994 to 2001.

The **trap survey**, which has been conducted since 1998, underwent two major changes in 2002. The number of transects was doubled from 5 to 10, to achieve better coverage, and the number of traps per line was reduced from 10 to 4. The increased number of transects did not change the results significantly: the yields for the various groups of crab were still of the same order of magnitude. The CPUE for commercial-size crab rose in 2002, from 3.7 kg/trap to 5.9 kg/trap (Figure 6). This increase was due chiefly to a fivefold jump in the abundance of recruits, from 0.6 kg/trap in 2001 to 3.7 kg/trap in 2002. The residual biomass, which had been declining since 1999, continued to do so in 2002; the 2002 figure was 2.2 kg/trap, compared with 3.1 kg/trap in 2001. The abundance of adolescents from 78 to 95 mm CW (ADO^{-1}) did increase in 2002, to 0.7 kg/trap, but this is still a low figure. In contrast, the abundance of adults measuring 78 to 95 mm CW jumped by 127% in 2002, to 3.4 kg/trap, which may presage a rise in recruitment in the short-term. The mean CW of the legal-size crab continued the decline begun in 1999 and now stands at 103.7 mm, the lowest figure since the survey began in 1998. The Annual Weighted Condition Index has been falling since 2000 and dropped sharply from 2001 to 2002 (from 3.4 to 2.3),

showing a notable improvement in the condition of the crab, the majority of which should be in clean, hard condition in 2003.

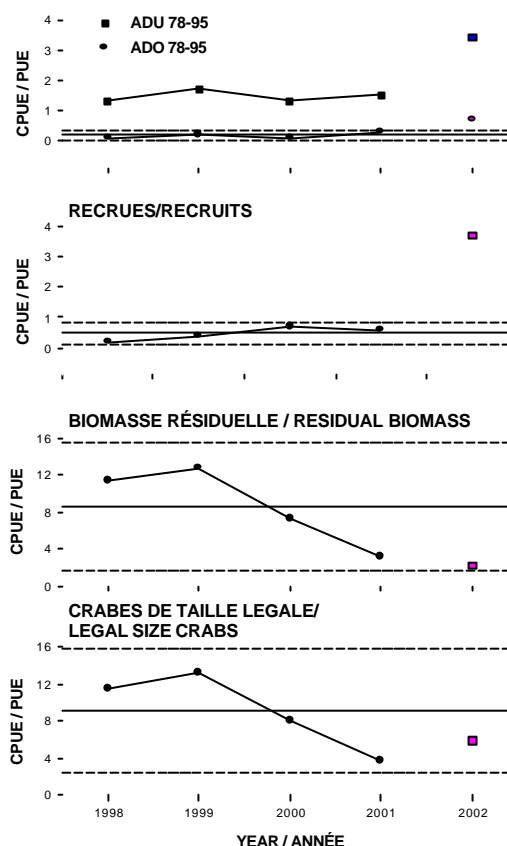


Figure 6. Results of the post-season trap survey conducted in Area 15 from 1998 to 2002. The solid line and the dotted lines on each side represent respectively the mean and the 95% confidence interval for the abundance index from 1998 to 2001.

Outlook for 2003

The TAC for Area 15 in 2002 was 15% lower than the historically high levels granted in 2000 and 2001. Prior to 2002, the recruitment wave that was perceptible farther west had not been detected in this area, and recruitment

had been low since 1996. The fishing effort was considerable and was on the rise during this same period. The harvestable biomass therefore declined substantially, so that by 2002, it was at a very low level.

The trap survey conducted at the end of the 2002 fishing season indicates that recruitment should rise in 2003; an increase in yields is therefore expected in 2003, but could be attributable largely to white crab. The proportion of prerecruits in the commercial fishery and the abundance indices for prerecruits and recruits in the post-season trap survey rose sharply in 2002, which may mark the arrival of a recruitment wave.

Until the recruitment wave has become clearly apparent and its size can be measured, it is recommended that fishing pressure in this area be eased. The standardized CPUE for 2001 was comparable to that for the period 1991 to 1993, so a TAC equivalent to that applied in those years (320 t) could slow the decline in biomass and protect the stock's reproductive potential, which might be compromised if the biomass falls any further. Just as for Area 16, an adjustment to the TAC has been calculated to account for the difference in average sizes (+2 % by weight).

We therefore recommend a TAC of 326 t in 2003, representing an 18 % reduction from 2002. Significant benefits for the fishery could result if this level were maintained for a few years, that is, until substantial, sustained growth in the commercial biomass could be seen.

Snow crab in Area 14

Area 14 has 21 regular fishers. In 2002, the fishing season began on May 1 and ended on August 7, one week earlier than in 2001. The quota was 603 t, the same as it had been since 2000, and included temporary allocations of 31 t, which was 7.5 t higher than in 2001 (Table 3). The TAC was caught.

Resource status in 2002

The non-standardized CPUE for the commercial fishery fell by 14 % (from 12.5 to 10.7 kg/trap) between 1996 and 1997, then rose slowly. It stabilized at around 11.8 kg/trap from 1999 to 2001, then fell again, to 10.8 kg/trap, in 2002. The standardized CPUE, however, has fallen steadily since 1996 (Table 3), because of a change in the fishing strategies used (the traps are kept submerged longer, the fishing season begins earlier, and the fishing effort and weekly landings are subject to limitations to accommodate the specific way that the crabs are processed once they reach the plant). The standardized CPUE fell again in 2002, to a level far below the average for the years 1985 to 2001 and approaching the values of the late 1980s, when the stock's abundance was at its lowest.

The mean CW of the legal-size crab caught at sea has been falling since 1997 and hit 105.1 mm CW in 2002. The average size of the crab landed has followed the same pattern and seems to have stabilized at 102.3 mm CW in 2002. The Annual Weighted Condition Index measured at sea has been decreasing since 1999 (it was 3.0 in 2002) while the same index measured at dockside has remained stable, at around

3.0, since 1994. The proportion of prerecruits measuring 78 to 95 mm CW (ADO⁻¹) was 4%—unchanged from 2001, but greater than the 2% average for 1994 to 2001.

The trap survey conducted in this area since 1998 (Figure 7) showed a large, 78% increase in the CPUE for legal-size crab in 2002. From 3.6 kg/trap in 2001, it rose to 6.4 kg/trap in 2002, far higher than the 4.4 kg/trap average for 1996 to 2001. This jump was caused by increases in the abundance of the residual biomass (4.9 kg/trap in 2002, up 60% from 2001) and of the recruits (1.5 kg/trap, three times higher than in 2001). The abundance of adolescents measuring 78 to 95 mm CW has held steady at a low level, 0.2 kg/trap, since the survey began in 1996. In contrast, the adults in this same size range were three times more abundant in 2002 (2.4 kg/trap) than in 2001, which may indicate an increase in recruitment in the medium term. The mean CW of the legal-size crab, after recovering somewhat in 2001, fell again in 2002, to 104.1 mm. This is the lowest value recorded since the survey began in 1996, and less than the 105.1 mm average for the years 1996 to 2001. The Annual Weighted Condition Index has been falling since 1998. Its value in 2002 was 2.7, showing an improvement in the condition of the crab, so that the majority will be “clean and hard” to “intermediate” in 2003.

Outlook for 2003

The TAC for Area 14 was the same in 2002 as in 2001. The recruitment wave that was perceptible farther west has not yet been detected in this area, and the

abundance of recruits has been low since 1996. The fishing effort is high and has been on the rise over this period. The harvestable biomass has therefore decreased to such low levels that steps must be taken to avoid reducing it any further.

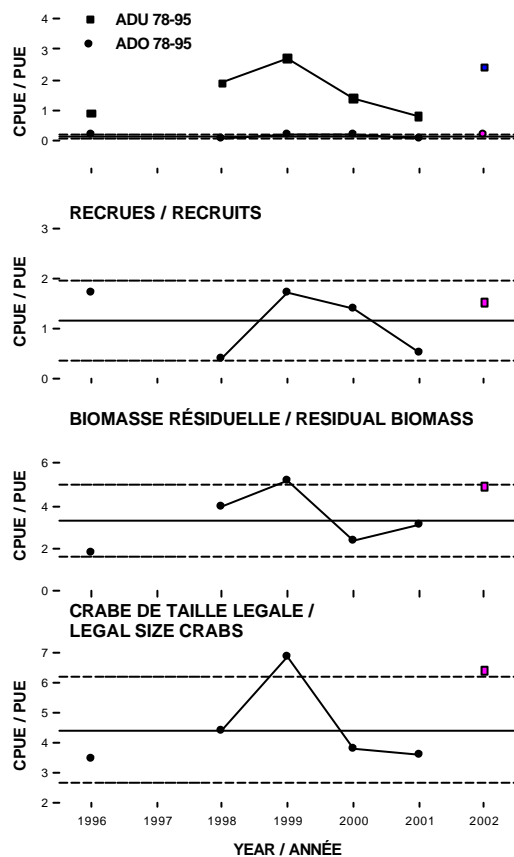


Figure 7. Results of the post-season trap survey conducted in Area 14 from 1996 to 2002. The solid line and the dotted lines on each side represent respectively the mean and the 95% confidence interval for the abundance index from 1996 to 2001.

According to the data from the post-season survey, yields (CPUE) could rise in 2003 to a level comparable with that for 1999, but this figure will still be low

compared with the historic average. The expected recruitment will have little impact in 2003. However, the 2002 post-season trap survey showed a large increase in the abundance index for adult males measuring 78 to 95 mm CW, which could presage the arrival of a recruitment wave. If the recruitment expected in the longer term manifests itself significantly in the fishery, we might see a rapid recovery.

Consequently, the fishing pressure in this area should be reduced. Catches equivalent to those for the period 1991 to 1993 (344 t), which corresponded to the preceding recruitment cycle, and when the value of the standardized CPUE approximated the average for 1985 to 2001, would slow the decline in biomass and protect reproductive potential, which might be compromised if the biomass were reduced any further. Just as for Area 16, an adjustment has been applied to account for the difference in mean sizes (+2 % by weight).

We therefore recommend a TAC of 351 t in 2003. This would represent a 42 % decrease from the TAC for 2002. Significant benefits for the fishery could result if this level were maintained for a few years, that is, until substantial, sustained growth in the commercial biomass could be seen.

Snow crab in Area 13

Forty-three fishers from Quebec and six from Newfoundland share the regular quota in this area, and no temporary allocations have been granted since 1996. The TAC was reduced from 848 t in 2001 to 594 t in 2002 (a 30 % cut) to

relieve some of the fishing pressure on this stock (Table 3). However, as at November 28, 2002, landings for this area totalled only 469 t and the TAC had not been caught, even though the fishing season had been extended for two weeks. The fishery began on May 1 and ended on August 23 in 2002.

Resource status in 2002

The non-standardized CPUE for the commercial fishery, on decline in Area 13 since 2000, fell again from 2001 to 2002. For the area as a whole, it fell by 21 %, from 4.2 kg/trap to 3.3 kg/trap (Table 3), despite a sizeable (25 %) decrease in fishing effort. This decline in yields was seen both in the northern part of Area 13 (where the yield was 3.4 kg/trap, down 17 % from 2001) and in the southern portion (2.7 kg/trap, down 40 % from 2001). The standardized CPUE has shown the same trends since the fishery began, as well as a decline since 2000. Its value in 2002 was the lowest ever recorded and much lower than the average for 1986 to 2001.

The mean CW of the legal-size crab measured at sea has been falling since 2000 and fell again from 2001 to 2002, from 102.1 mm to 100.8 mm. This is the lowest value since 1993 and far lower than the average for 1993 to 2001 (102.6 mm). The size structures at sea show an ongoing erosion of the harvestable biomass on the bottom since 1998. This trend seems to have become more pronounced in recent years, making this fishery more and more dependent on recruitment. The mean CW of the crab landed has hovered at around 102.0 mm since 1994

and increased from 100.2 mm in 2001 to 101.0 mm in 2002. The Annual Weighted Condition Index measured at sea rose slightly, to 2.9, in 2002. The same index measured at dockside has been moving upward since 1994 and had a value of 3.2 in 2002. The proportion of prerecruits measuring 78 to 95 mm CW was 1 %, down sharply from the 2001 figure of 6 % and less than the 3 % average for 1994 to 2001.

The CPUE for commercial-size crab **from the trap surveys** has been low and stable since 1999 both in the northern part of Area 13 (where it was 1.1 kg/trap in 2002) and in the southern portion (3.5 kg/trap in 2002) (Figure 8). This situation should not change in 2003, because the residual biomass and recruitment were still very low in both parts of Area 13 in 2002, with values close to the average for 1999 to 2001.

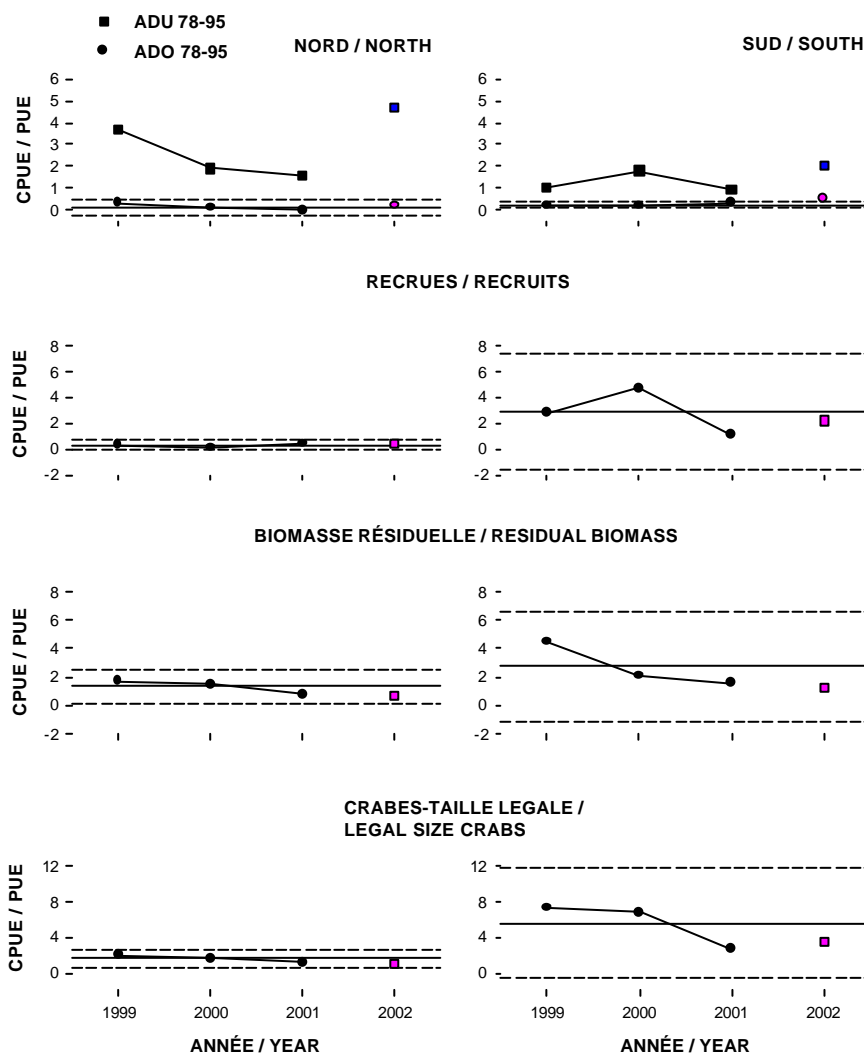


Figure 8. Results of the post-season trap surveys conducted in Area 13 from 1999 to 2002. The solid line and the dotted lines on each side represent respectively the mean and the 95% confidence interval for the abundance index from 1996 to 2001.

The CPUE for adolescent crab measuring 78 to 95 mm CW (ADO^{-1}) has also been low and stable throughout this area since 1999, but the CPUE for adults in this same size range (ADU^{-1}) was at least two times higher in 2002 than in 2001, both in the north (where the value was 4.7 kg/trap) and in the south (2.0 kg/trap), possibly pointing to improved recruitment in the near future. The mean CW of the legal-size crab, which had been on the decline since 1999 in the north and since 2000 in the south, fell again in 2002, to 93.6 mm in the north and 94.6 mm in the south, representing record lows in both cases. These low values show the extent to which the residual biomass has been eroded; the proportion consisting of larger individuals continues to decrease from year to year. The Annual Weighted Condition Index was similar in the two parts of Area 13 in 2002 (2.7 in the north and 2.2 in the south) and shows that most of the crab taken in 2003 will be in "clean and hard" condition.

Outlook for 2003

The history of the fishery in this area shows that after a time of high yields (up to 15 kg/trap in the mid-1980s), the stock collapsed rapidly, in the space of two to three years. Yields fell to about 5 kg/trap, and the stock has never recovered since. The fishing effort in this area is too intense for the biomass available. In 2002, commercial yields fell again, and the TAC was not caught, even though it had been reduced by 30 % from the preceding year and the fishing season had been extended. Recruitment has been lower than total mortality for several years, so the

harvestable biomass is currently very low.

The mean CW of the legal-size crab is approaching the legal limit and has fallen to its lowest value since 1993. In the samples taken at sea during the fishery, legal-size adult crab were much less abundant than those of sub-legal size, which shows that few legal-size crab survive the fishing season and suggests that the fishery relies essentially on annual recruitment.

The harvestable biomass should remain very low in 2003 and could even decline further, unless the expected recruitment wave materializes. The notable increase in the abundance index for adult males in the 78 to 95 mm size class in the 2002 post-season trap survey may be an advance sign of this wave.

The condition of this stock is considered critical. It definitely cannot sustain the current effort without substantial and possibly irreparable damage. Its reproductive potential could be severely compromised. Sweeping measures must be put in place rapidly to allow a substantial increase in the harvestable biomass which includes the best male reproducers.

Consequently, a complete halt to the fishery in this area is essential until a strong, sustained recovery has been observed. In addition, since we find the current fishing capacity to be disproportionate to the stock's production and available biomass, if the fishery is ever reopened, the fishing effort must be cut substantially and permanently to achieve a better balance between this stock's total mortality and its long-term support capacity.

**Snow crab in areas 12A, 12B
and 12C**

These areas were established in 1994 but did not acquire permanent status until 2001, which is why the status of their snow crab populations was not officially assessed by DFO until 2002. The fishery in these areas generally takes place in spring and summer and is managed similarly to the traditional snow crab fishing areas. Fishing effort in areas 12A, 12B and 12C is controlled by limits on the number of fishers, the number of traps and the length of the fishing season, as well as by management rules adapted to each of these areas. A TAC was instituted in all three areas in 1995. The CPUE has not yet been standardized.

Snow crab in Area 12A

Area 12A has had 10 regular fishers since the snow crab fishery began in 1994. The TAC remained relatively steady at around 196 t through 1997 (Table 4), then increased gradually through 2001, when it was 236 t. In 2002, the fishery began on March 28 and ended on July 1. The TAC was increased by 10 % in 2002, to 259 t, and included a temporary allocation of 24 t for non-crabbers. The TAC was caught.

Resource status from 1994 to 2002

From 1994 to 1995, the **non-standardized CPUE for the commercial fishery** (Table 4) fell by half, from 18 kg/trap to 9 kg/trap. It remained at 9 kg/trap in 1996, then rose steadily, to 17 kg/trap in 1997 and

Table 4. Catch and fishing effort in areas 12A, 12B and 12C.

Année		1994	1995	1996	1997	1998	1999	2000	2001	2002
TAC:	zone 12A	--- ¹	227	181	181	227	227	232	236	259 ⁵
	zone 12B	--- ¹	399	290	290	327	343	343	362	404 ⁵
	zone 12C	--- ¹	227	204	204	194	204	211	243 ⁵	308 ⁵
Catches ²	zone 12A	88	196	181	181	212	227	232	236	259
	zone 12B	297	244	268	290	327	343	343	362	398
	zone 12C	242	193	203	204	193	203	203	243	309
Effort ³	zone 12A	4.6	22.0	20.1	10.0	16.7	13.5	8.6	9.4	11.0
	zone 12B	10.0	11.4	9.8	7.9	10.3	8.0	6.1	6.1	8.6
	zone 12C	14.2	14.7	11.2	20.8	9.9	12.9	11.7	12.3	18.2
CPUE ⁴	zone 12A	18	9	9	17	13	17	27	25	23
	zone 12B	30	21	29	38	32	43	56	60	45
	zone 12C	17	13	18	10	18	15	16	17	15

1 Control of fishing effort only

2 Landings in metric tonnes, as at November 28 for 2002

3 Standardized effort, in thousands of conical trap hauls for areas 12A and 12B, and in thousands of Japanese trap hauls for Area 12C

4 Gross catch per unit effort, in kilograms per conical trap for areas 12A and 12B and in kilograms per Japanese trap for Area 12C

5 Including special allocations

27 kg/trap in 2000. In 2001, it fell slightly, to 25 kg/trap, and in 2002, it fell again, by 8%, to 23 kg/trap. This was still higher than the average of 17 kg/trap for the years 1994 to 2001.

The mean CW of the legal-size crab measured at sea rose steadily from 104.7 mm in 1994 to 108.2 mm in 2000 and has remained relatively stable since then (it was 108.0 mm in 2002). The proportion of adolescents measuring 78 to 95 mm CW (ADO^{-1}) in the catch at sea rose from 2% in 1995 to 6% in 1998 before falling rapidly back to 2% by 2001. In 2002, it increased slightly, to 3%, but still remained close to the 4% average for 1994 to 2001.

The results of the **trap survey** conducted since 2000 show a slight rise in the commercial CPUE, from 8.2 kg/trap in 2000 to 10.5 kg/trap in 2002. This rise was basically due to an increase in the residual biomass, which doubled during this period, from 4.4 to 8.8 kg/trap. The abundance of recruits was low, at 1.7 kg/trap, and down sharply from 2000, when it was 3.8 kg/trap. The Annual Weighted Condition Index rose from 2000 to 2001 and held steady at close to 3.0 in 2002, indicating that most of the crab caught in 2003 will be in "intermediate" condition. The mean CW of the legal-size crab has been rising since the survey began and was 105.4 mm in 2002. The abundance of prerecruits measuring 78 to 95 mm CW (ADO^{-1}) was very low: 0.1 kg/trap, down slightly from 0.3 kg/trap in 2000.

Outlook for 2003

The harvestable biomass in this area has grown in recent years as the result of the entry of a recruitment wave into

the fishery. But most of the indicators suggest that this wave is at its peak, and no significant recruitment is expected in the short term.

Snow crab in Area 12B

Area 12B has had eight regular fishers since 1995 (it had five fishers in 1994). The TAC was reduced from 399 t in 1995 to 290 t in 1996 (Table 4), then increased regularly through 2001, when it was 362 t. In 2002, the fishery opened on March 28 and closed on June 29. The TAC was increased by 12%, to 404 t; it included a temporary allocation of 36 t for non-crabbers. The TAC was caught.

Resource status from 1994 to 2002

The non-standardized CPUE for the commercial fishery plummeted 30%, from 30 kg/trap to 21 kg/trap, from 1994 to 1995, then rose again gradually, reaching 60 kg/trap in 2001 (Table 4). It fell by 25%, to 45 kg/trap, in 2002, but remained close to the average of 39 kg/trap for the years 1994 to 2001. The mean CW of the legal-size crab measured at sea rose from 109.6 mm in 1994 to 110.6 mm in 1995, then fell rapidly, to 107.4 mm in 2000, and rose again slightly, to 108.8 mm in 2001. It held steady at 108.1 mm in 2002, close to the average of 109.2 mm for the years 1994 to 2001. The proportion of adolescents measuring 78 to 95 mm CW (ADO^{-1}) in the catch at sea fluctuated around 4% from 1994 to 2001 and remained close to the historical average in 2002 (5%).

The results of the **trap survey** conducted for a second consecutive year show that from 2001 to 2002, the

CPUE for legal-size crab declined by 36 %, from 33.1 kg/trap to 21.2 kg/trap. This decline was due to changes both in residual biomass (down 32 %) and in recruits (down 46 %). The abundance of adolescents measuring 78 to 95 mm CW has remained low and stable at less than 1 kg/trap since 2001. The Annual Weighted Condition Index has remained stable for the two years of the survey (its value was 2.8 in 2002) and shows that most of the crab caught in 2003 will be in "intermediate" condition. The mean CW of the legal-size crab was 107.1 mm in 2002, exceeding the 106.2 mm average for 2001. The abundance of prerecruits measuring 78 to 95 mm CW (ADO^{-1}) was 0.4 kg/trap in 2002—a low figure, even lower than the 0.9 kg/trap recorded in 2001.

Outlook for 2003

The harvestable biomass had grown in recent years as the result of a recruitment wave, and peaked in 2001. In 2002, fishing and natural mortality exceeded recruitment and thus ate away at some of the recently accumulated residual biomass. No increase in recruitment is expected in the short term.

Snow crab in Area 12C

Area 12C has five regular fishers and comprises two banks (its northern and southern sectors) separated by a deep channel that is part of the Jacques Cartier Strait. The TAC fluctuated around 207 t through 2000 (Table 4), then rose gradually, to 308 t by 2002, an overall increase of 46 %. The 2002 fishery opened on April 16 and closed on August 10. Temporary allocations of

89 t were granted to non-crabbers. The TAC was caught.

Resource status from 1994 to 2002

Catches in the southern part of Area 12C have risen sharply since 2000 and accounted for about 72 % of the area's total catch in 2002. **The non-standardized CPUE for the commercial fishery** (Table 4) has fluctuated around 15 kg/trap since 1994. For the area as a whole, it fell from 17 kg/trap in 2001 to 15 kg/trap in 2002, a 15 % decline, but this still equalled the 15 kg/trap average for the years 1994 to 2001.

The mean CW of the legal-size crab measured at sea rose from 109 mm in 1994 to 115 mm in 1997. It then fell rapidly until 2000, when it hit 106 mm, and it remained at that level through 2001 and 2002. This is less than the average for 1994 to 2001, which was 109.5 mm. The proportion of adolescents measuring 78 to 95 mm CW (ADO^{-1}) in the catch at sea remained low (from 1 to 4 %) from 1994 to 2001. It then rose briskly, from 3 % in 2001 to 9 % in 2002, exceeding the average of 2 % for the years 1994 to 2001.

The results of the **trap survey** conducted since 2000 show a gradual decline in the commercial CPUE for the area as a whole ever since the survey began. This CPUE was 7.2 kg/trap in 2000. It then fell to 5.7 kg/trap in 2001 and to 4.9 kg/trap in 2002 (a 14 % drop from 2001 to 2002). This decline was due essentially to a drop in the residual biomass, which fell from 5.0 kg/trap in 2001 to 3.8 kg/trap in 2002. The yields in 2002 were much higher in the

southern part of Area 12C (about 10 kg/trap) than in the northern part (about 4 kg/trap). The abundance of adolescents measuring 78 to 95 mm CW (ADO⁻¹) has been low, fluctuating around 0.2 kg/trap, since 2000. The Annual Weighted Condition Index rose from 2.8 in 2000 to 3.2 in 2002 and shows that most of the crab caught in 2003 will be in "intermediate" condition. The mean CW of the legal-size crab was 105 mm in 2002 and has been stable since the start of the survey.

Outlook for 2003

The indicators on the status of the resource in this area are mixed. The commercial CPUE has fluctuated widely since 1994. Since 2000, more intensive exploitation of the southern part of this area, where the abundance of legal-size crab seems higher, may have helped to keep the yields at their current levels. However, if the results of the trap survey are to be believed, the harvestable biomass in the area as a whole has been falling since 2000. The level of prerecruits has remained very low but stable during this period.

Recommendations for areas 12A, 12B and 12C

These three areas are located along the fringes of the traditional inshore fishing grounds of the estuary and the northern Gulf. The information available on these three areas is limited, so it is hard to issue scientific advices or recommendations concerning them. We have therefore based our opinions for these areas on the information available from the adjacent, traditional fishing

areas: Area 17 (for Area 12A) and Area 16 (for Area 12B).

For 2003, it is recommended that the catch be reduced by about 15 % in Area 12A and 35 % in Area 12B. We have not issued any advice for Area 12C, both because of its heterogeneous nature—it consists of two banks that are separated by a channel and that are contiguous with Area 15 to the north and areas 12B and 16A to the south—and because of the scarcity of information about it. We suggest that this area be divided up and that the resulting parts be incorporated into the respective adjacent areas.

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