



SNOW CRAB OF THE ESTUARY AND NORTHERN GULF OF ST. LAWRENCE (AREAS 13 TO 17 AND 12A, 12B AND 12C) IN 2004

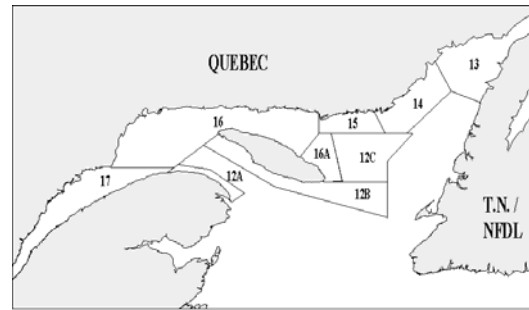
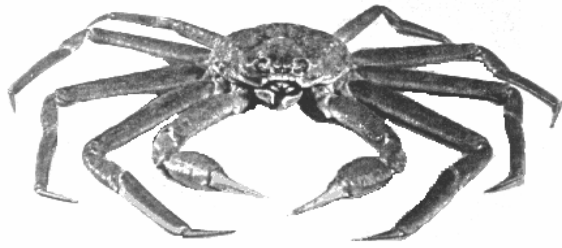


Figure 1: Snow crab management areas in the Estuary and the northern Gulf of St. Lawrence.

Context

The snow crab fishery in the Estuary and the northern Gulf of St. Lawrence began in the late 1960s. The fishery experienced a boom from 1979 to 1985, and a management approach based on the TAC (total allowable catch) was gradually introduced between 1985 and 1995. The northern Gulf of St. Lawrence is divided into five traditional 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 (Figure 1). A new area, Area 16A, which is adjacent to Area 16, was created at the end of 2001 to help Area 13 fishers who were experiencing hardship.

Landings have varied depending on the recruitment waves and troughs that have affected the fishery (Figure 2), with maximum levels recorded in 1995 (7,879 t) and 2002 (10,372 t). Landings have been declining since 2002 owing to the lower TACs established in response to the overfishing reflected in the indices, particularly in Area 16.

The fishery is directed exclusively at males with a carapace width (CW) of at least 95 mm. Since 1985, the fishery has automatically been closed in the area concerned when the proportion of white crab (crab that has recently moulted) in catches has exceeded 20%, in order to minimize the mortality of these very fragile crabs that will be available to the fishery 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 a chance to reproduce.

SUMMARY

- **In general**, most stocks are nearing the end of their recruitment wave, as evidenced by the decreasing commercial biomass levels and low recruitment. In addition, in 2004, the catches essentially consisted of intermediate-shell crabs, whose catchability is high and which will disappear in the medium-term. Accordingly, the advice for the 2005 fishing

season generally consists in recommending that the status quo be maintained to avoid hindering the recovery now occurring in some areas and to prevent any further deterioration in the stocks whose commercial biomass levels are currently low. The crab making up the new recruitment wave should have already settled on the seafloor in some areas and should begin contributing to the fishery in 2007–2008. The reference period for stock status comparisons in traditional areas is 1990–1997, which corresponds to the previous recruitment cycle.

- **In Area 17**, a 15% increase in the TAC is recommended.
- **In Area 16**, it is recommended that the status quo be maintained in the coming year in order to bolster the commercial biomass, which is set to decline quickly in the medium-term as recruitment falls off.
- **In Area 15**, it is recommended that the status quo be maintained in order to stabilize the stock in the longer term.
- **In Area 14**, it is recommended that the status quo be maintained so that the expected increase in the CPUE in 2005 helps to stabilize the stock over the longer term.
- **Area 13** has been under a moratorium since 2003. Re-opening of the area will not be recommended until the corresponding criteria have been met. It is recommended that the moratorium be maintained in 2005. In light of the slow recovery of the stock, it is also recommended that no crab be harvested in the area until the moratorium is lifted.
- **In Area 12A**, which depends largely on neighboring areas 17 and 12, the ambiguity of the current stock status indicators and the anticipated decline in the exploitable biomass suggest that the harvesting level should be similar to that in 2004.
- **In Area 12B**, it is recommended that the status quo be maintained for 2005.
- **In Area 12C**, a lower TAC is recommended for 2005 because no improvement is foreseen in the short term.

DESCRIPTION OF THE ISSUE

Species Biology

Snow crab stop growing after their terminal moult. The male is referred to as an adolescent (recognized by its small claws) prior to the terminal moult and as an adult (large claws) afterward. Adult males range in size from 40 mm to 165 mm. Males reach legal size (CW of 95 mm) at about nine years of age. Snow crab recruitment is presumed to be either periodic or sporadic: when sporadic, as in traditional areas 13 to 17, it varies over an intrinsic cycle of eight or nine years. The recruitment situation in the fishery can be determined through the regular monitoring of catches (size, CPUE and carapace condition) and effort, and confirmed by scientific trap and trawl surveys.

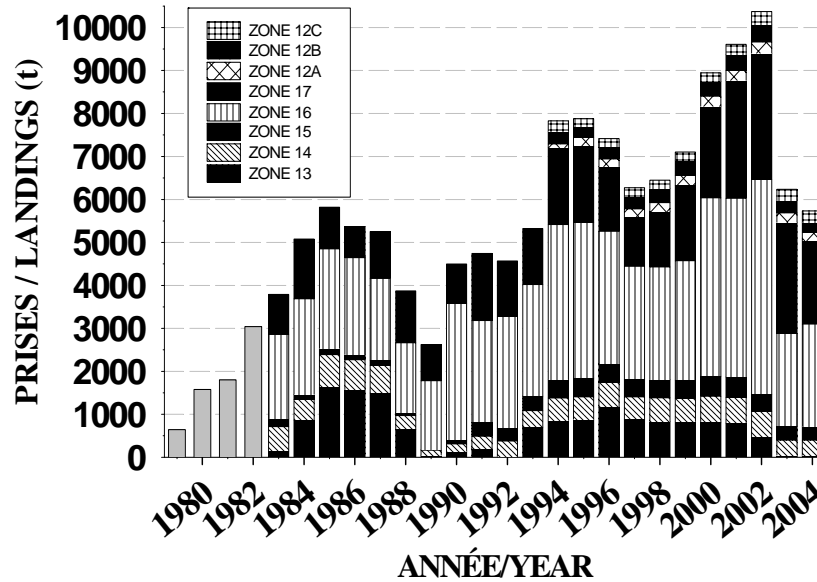


Figure 2. Snow crab landings in the Estuary and northern Gulf of St. Lawrence. The grey bars indicate the years where landings were not differentiated.

ASSESSMENT

Fishing data derived from logbooks, processing plant purchase slips and dockside weighing summaries, along with catch sampling data obtained from the Observers Program and DFO samplers, are the basis for the analyses of all areas. In 2004, a trap-based research survey was carried out in all fishing areas and the findings were incorporated into the stock status analyses. The results of the 2004 trawl surveys, done in areas 13, 14 and 16, were also used.

The raw CPUE data for the fishery have been standardized since 2001 using a multiplicative model to take account of changes caused by the different fishing strategies employed and environmental constraints. Since recruitment is presumed to be periodic or sporadic, the recent fishery data for the traditional fishing areas have been compared to a reference period (1990–1997), corresponding to the last recruitment cycle in the fishery.

Snow Crab in Area 17

The Fishery

There are 22 active license holders in Area 17. The first total allowable catch (TAC) was set at 1,300 t in 1992 (Figure 3A). The fishing season opened on April 1 and closed on July 31, 2004. The TAC was set at 1,925 t in 2004, which represents a decrease of 25%. A 231 t special allocation was set aside for non-crabbers. Catches recorded as of November 25, 2004 indicated that the TAC had been reached.

Resource Status in 2004

In the commercial fishery, the standardized CPUE has been rising since 2002 and in 2004 it was above the mean for the reference period (Figure 3B). In 2004, 79% of catches were made on the south shore and more than 90% of the crabs sampled at sea were intermediate-shell (condition 3) crabs. The mean CW of legal-size crab caught at sea, which had been rising since 1999 (107.6 mm), rose again in 2004 to 113.8 mm (Figure 3C). It now falls within the 95% confidence interval for the mean (95% CI) of the reference period. Dockside monitoring was not conducted in 2004. The proportion of prerecruits between 78 mm and 95 mm CW (ADO^{-1}) has been low and stable since 1999 (around 2%).

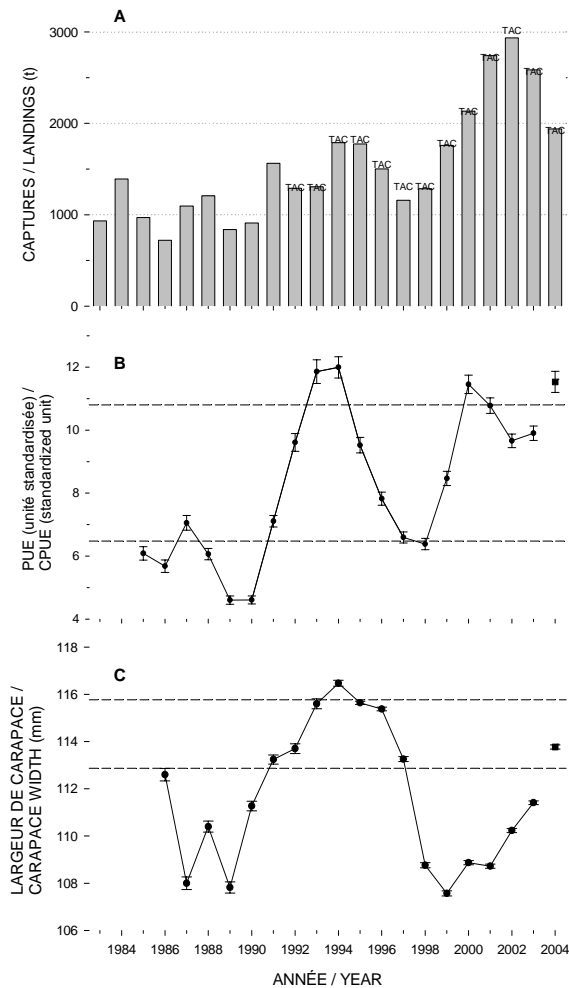


Figure 3. Main parameters estimated during the fishing season for Area 17, 1983–2004: A) landings and TAC; B) standardized CPUE (standard error ± 1); and C) mean carapace width (standard error ± 1) of commercial crabs sampled at sea. The 95% CI for the mean for the 1990–1997 reference period is indicated by dotted lines in graphs B and C.

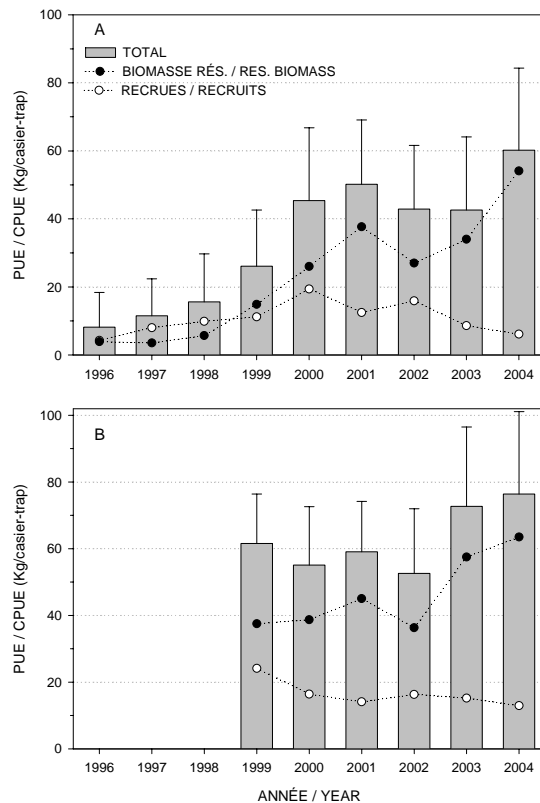


Figure 4. Catch rates (CPUEs) obtained from the postseason survey in Area 17, 1996–2004: A) north shore and B) south shore. The total CPUE is indicated with a standard deviation of 1.

The findings of the postseason trap survey, a data series that began in 1996 on the north shore and in 1999 on the south shore, indicate that the exploitable biomass on the north and south shores remains high (60.2 and 76.4 kg/conical trap, respectively); however, the downward trend in recruitment, which has been seen since 2000 on the north shore and since 2002 on the south shore, continued in 2004 (Figures 4A and 4B). Findings obtained from four new transects added in the easterly part of the south shore in 2004 indicate that the commercial biomass (55.5 kg/conical trap) is lower there than in the western sector (85.9 kg/conical trap). This significant difference may result from the increased of fishing effort in the sector since 2001. The mean CW of legal-size crabs, which has been increasing since 2002 on the north shore, rose by 1 mm in 2004 (108.9 mm) from the 2003 level. On the south shore, the mean CW of legal-size crabs remained unchanged in 2004 (110.2 mm) from the 2003 level. An increase in the number of intermediate-shell crab (condition 3) and old crab (conditions 4+5) at the expense of new crab (conditions 1+2) was also observed on the north and south shores in 2004. The number of adolescents between 78 mm and 95 mm CW (ADO^{-1}) remained low on both shores, as in 2003.

Conclusions and Advice

- The TAC has dropped by 36% since 2002. In 2004, 79% of catches were made on the south shore. Catches sampled at sea consisted mainly of intermediate-shell crab, which are highly catchable.
- Although the commercial biomass will be quite high in 2005, it is expected to fall in the short term owing to a drop in recruitment.
- The mean CW of legal-size crabs should increase slightly on both shores in 2005.
- Although the short-term outlook is positive, with crabs growing to a good size and condition (carapace condition 3), the medium-term prognosis is negative, with a drop in recruitment and biomass expected by 2006 and perhaps continuing beyond then, based on the findings of the trap surveys conducted on both shores.

Considering the fact that the commercial biomass is still high and that the CW of legal-size crabs and the status of spawners do not raise concern, an increase of 15% in the TAC is recommended for 2005. As the commercial biomass will drop substantially in the medium term and will include a significant number of old crab, as a conservation measure, it is recommended that these crab be targeted effectively immediately to minimize the impact on yields and on the quality of the crab that will make up future landings.

Snow Crab in Area 16

The Fishery

A total of 39 fishers hold regular snow crab fishing licenses in Area 16. In 2004, the TAC (2,367 t) was increased by 9% or 200 t over the 2003 level (Figure 5A). This additional TAC was fished exclusively in Area 16A. No temporary allocations were granted in 2004. The fishery opened on April 12 and closed on July 31; the TAC was attained.

Resource Status in 2004

The standardized CPUE, which had been declining since 1999, was up by 36% in 2004 (Figure 5B). However, it currently remains below the mean for the period of reference. More than 95% of the crabs sampled at sea were intermediate-shell (condition 3) crabs and few new and old crabs were observed in samples. The mean CW of legal-size crab sampled at sea, which had stabilized throughout the area in 2003 following a sharp downtrend, increased across the board, reaching 107.2 mm in 2004 (Figure 5C), which is nevertheless below the mean for the reference period. Dockside monitoring was not conducted in 2004. The proportion of prerecruits (ADO⁻¹) was stable in the western sector (4%) and low in the eastern sector, where it has been in decline since 2002 (2% in 2004).

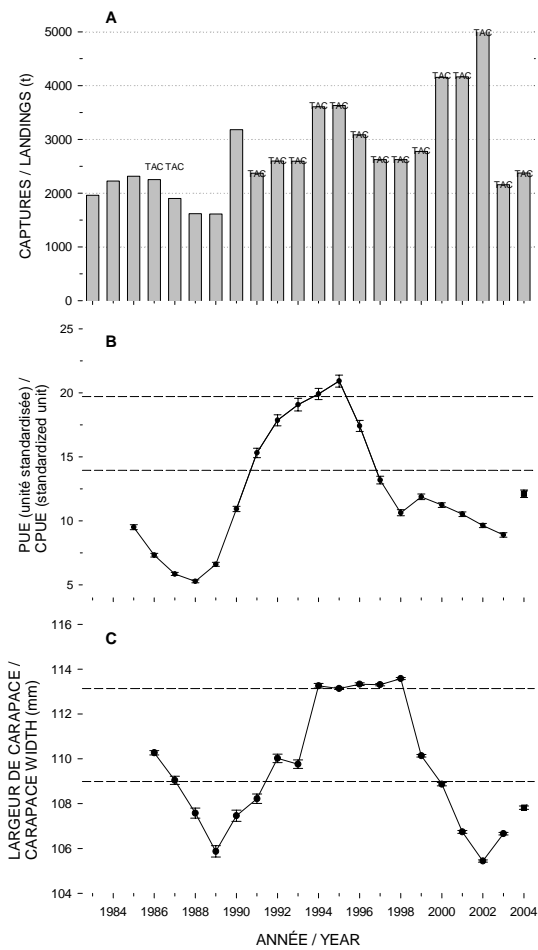


Figure 5. Main parameters estimated during the fishing season in Area 16, 1983–2004: A) landings and TAC; B) standardized CPUE (standard error ± 1); and C) mean carapace width (standard error ± 1) of commercial crabs sampled at sea. The 95% CI for the mean for the reference period (1990–1997) is indicated by the dotted lines in graphs B and C.

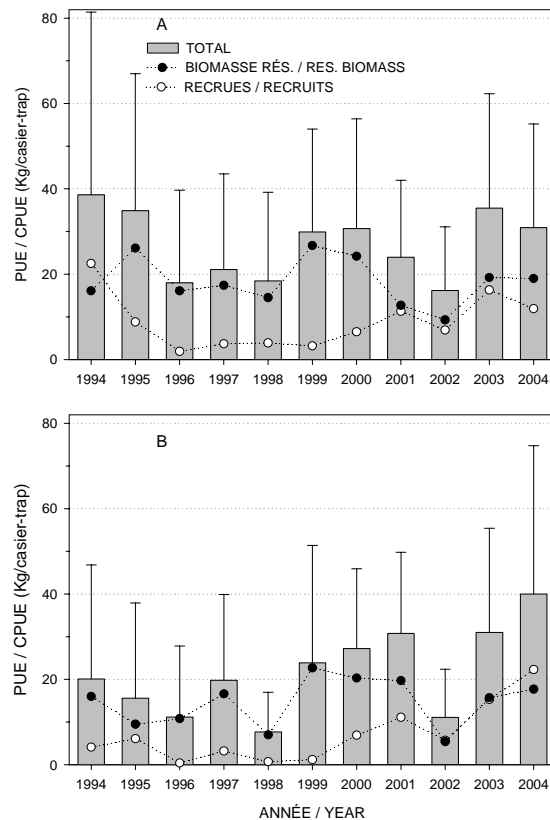


Figure 6. Catch rates (CPUE) obtained from the postseason survey conducted in Area 16, 1994–2004: A) western sector (Pointe des Monts to Mingan) and B) eastern sector (Mingan to Natashquan). The total CPUE is indicated with a standard deviation of 1.

The findings of the postseason trap survey, which has been conducted every fall since 1994, point to a stable commercial biomass level throughout the area compared with 2003. The CPUE of legal-size crab, which increased sharply in 2003, remained stable at 33.5 kg/conical trap in 2004. The CPUE of the residual biomass (18.6 kg/conical trap) remained stable and the CPUE of recruits (14.9 kg/conical trap) fell by 7% from the 2003 level. However, commercial yields in the western part of the area declined by 13% in 2004 (30.9 kg/conical trap), unlike commercial yields in the eastern part of the area (40.0 kg/conical trap), which continue to rise and are now 3.6 times higher than in 2002 (Figure 6A and 6B). While the abundance of intermediate-shell crabs (condition 3) remains high and stable and that of new crabs (conditions 1+2) is dropping in the western sector, the abundance of intermediate-shell crabs in the eastern sector decreased in 2004 and that of new crabs (conditions 1+2) has tripled in two years. The mean CW of legal-size crabs increased in 2004 (106.3 mm), up 2 mm since 2002. The CPUE for adolescent males between 78 mm and 95 mm (ADO^{-1}) in the western part of the area is two times lower (1.5 kg/conical trap) than in 2003, unlike in the eastern sector, where the CPUE is on the rise (2.9 kg/conical trap) and has nearly tripled since 2002. This pattern suggests that the western sector stock is already in a recruitment trough, whereas the eastern sector stock is nearing the end of a recruitment wave.

Trawl surveys conducted in 2003 and 2004 indicate that the crab making up the new recruitment wave has already settled on the seafloor and should begin contributing to the fishery in 2007–2008. The 2004 trawl survey in St. Marguerite Bay, near Sept-Îles, showed an increase in the abundance of legal-size crab since 2002, but the current level is the same as the mean for the reference period. The mean CW of legal-size crab (103.1 mm) has been rising since 2002, but remains significantly below the mean for the reference period. The abundance level of immature crab and adolescents between 28 mm and 78 mm was low compared with that observed between 1994 and 1998. The abundance of adolescents with a CW greater than 78 mm has been declining since 2001, but is equal to the mean for the reference period. The spermatheca of mature females remain very full, and no sperm shortage is expected in the short term.

Conclusions and Advice

- The TAC rose by 9% throughout the area from the 2003 level (+200 t in Area 16A). In 2004, catches were mainly made in the central and eastern parts of the area; intermediate-shell crabs, which are highly catchable, accounted for more than 95% of the catches sampled at sea.
- Although commercial fishery yields increased throughout the area in 2004, the standardized CPUE remains below the mean for the 1990–1997 reference period.
- The mean CW of legal-size crab increased throughout the area in 2004 and will continue to increase in 2005, but remains very low compared with the corresponding point in the previous recruitment cycle (1990–1997).
- Recruitment should continue to taper off in the western sector in the short term. The findings of the trawl surveys conducted in 2003 and 2004 indicate that the crab making up the new recruitment wave has already settled on the seafloor and should begin contributing to the fishery in 2007–2008.

The Area 16 stock responded as expected to the reduction in the TAC implemented in 2003: the commercial biomass stopped declining and legal size has increased modestly in the last two years. However, the extent of the improvement, especially with respect to legal size, remains below expectations. *Consequently, it is recommended that the status quo be maintained for the coming year in order to prevent a sharp drop in the commercial biomass and in legal size as a result of the anticipated drop in recruitment.*

Snow Crab in Area 15

The Fishery

Area 15 has 8 regular fishers. In 2004, the fishery opened on April 12 and closed on August 14. The TAC (327.6 t) was the same as in 2003 (Figure 7A). Temporary allocations totalling 26.5 t were granted to non-crabbers.

Resource Status in 2004

The **standardized fishery CPUE**, in decline since 1996, was up by 38% in 2004, but its current level is equal to the mean for the reference period (Figure 7B). Most (98%) of the crabs sampled at sea were intermediate-shell crabs (condition 3), with few new and old crabs being observed in the samples. For the first time since 1998, the mean CW of legal-size crabs sampled at sea increased in 2004 (106.4 mm) (Figure 7C), but this CW value was equal to the mean for the reference period. Dockside monitoring was not conducted in the area in 2004. The proportion of prerecruits between 78 mm and 95 mm (ADO^{-1}) stood at 2%, remaining low and stable compared with the 2003 level.

The **scientific trap survey**, conducted since 1998, showed that the CPUE of commercial-size crab, which has been rising since 2001, was up again in 2004 from 7.4 (2003) to 11.4 kg/Japanese trap (Figure 8). This increase can be attributed mainly to the residual biomass, which has been on an uptrend since 2002 and which increased by 164% (9.5 kg/Japanese trap) in 2004 compared with 2003, while recruits (1.9 kg/Japanese trap) dropped by half during the same period. The abundance of intermediate-shell crabs (condition 3) has been rising since 2001 and tripled in 2004 compared with 2003. Few new (conditions 1+2) and old (conditions 4+5) crabs were found in the traps. The mean CW of legal-size crabs, which had stabilized in 2003 (104.5 mm) following a downtrend that began in 1999, was up slightly in 2004 (104.9 mm). The abundance of adolescents between 78 mm and 95 mm (ADO^{-1}) remained low and has been stable since 1998 (0.5 kg/Japanese trap in 2004).

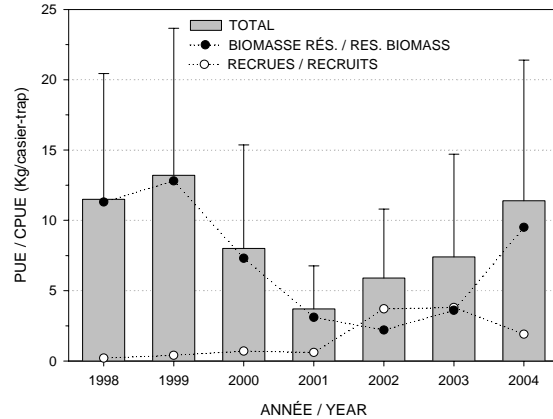
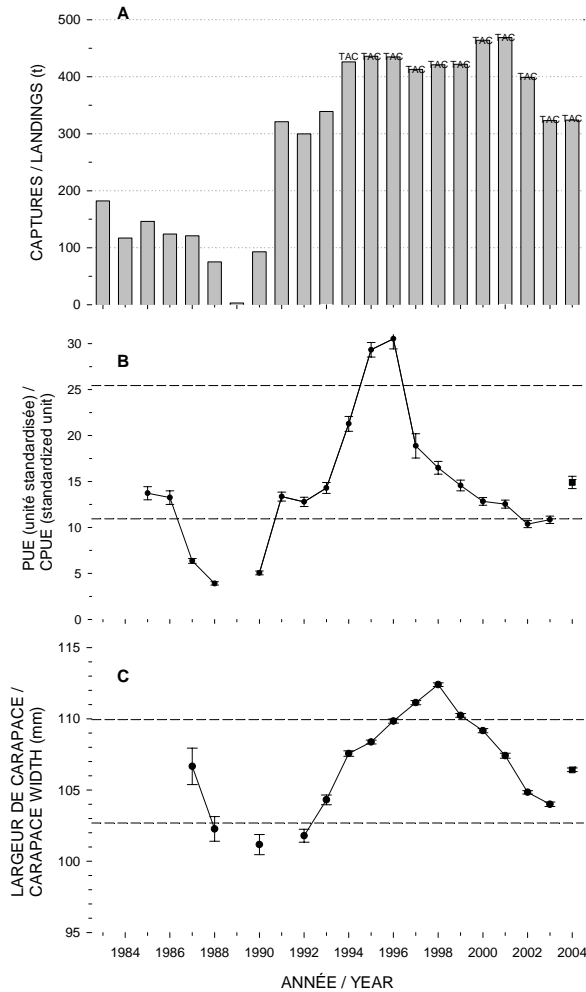


Figure 7. Main parameters estimated during the fishing season in Area 15, 1983–2004: A) landings and TAC; B) standardized CPUE (standard error ± 1); and C) mean carapace width (standard error ± 1) of commercial crabs sampled at sea. The 95% CI for the mean for the reference period (1990–1997) is indicated by the dotted lines in graphs B and C.

Figure 8. Catch rates (CPUE) obtained from the postseason survey conducted in Area 15, 1998–2004. The total CPUE is indicated with a standard deviation of 1.

Conclusions and Advice

- The TAC dropped by 30% between 2001 and 2003 and remained unchanged in 2004. Intermediate-shell crabs, which are highly catchable, accounted for 98% of catches sampled at sea.
- The commercial CPUE, which had been declining since 1996, rose sharply in 2004, equaling the mean for the 1990–1997 reference periods. The trap survey also indicated an increase in the commercial CPUE.

- The mean CW of legal-size crabs, which had been falling since 1998, increased in 2004, equaling the mean for the reference period.
- The proportion of prerecruits in the commercial fishery and the abundance indices for prerecruits and recruits in the postseason trap survey were low and/or declining, suggesting that recruitment is not likely to increase in the short term.

In 2005, the biomass level is expected to be average and near the mean recorded since the start of the trap survey in 1998. *Consequently, it is recommended that the status quo be maintained for the coming year in order to stabilize the stock over the longer term.*

Snow Crab in Area 14

The Fishery

Area 14 has 21 regular fishers. In 2004, the fishing season opened on May 6, one month earlier than in 2003, and closed on August 10. The 2004 quota of 402.5 t represented a 15% increase from the 2003 level and did not include any temporary allocations (Figure 9A). The TAC was met.

The standardized CPUE for the commercial fishery, which had risen sharply in 2003, plummeted by 38% in 2004, but remained within the 95% CI for the reference period mean (Figure 9B). More than 90% of the crabs sampled at sea were intermediate-shell crabs (condition 3), with few new (conditions 1+2) or old (conditions 4+5) crabs observed in the traps. Although the mean CW of legal-size crabs caught at sea dropped by 2 mm in 2004 (104.8 mm) from the 2003 level, it remained within the 95% CI for the reference period mean (Figure 9C). Dockside monitoring was not conducted in the area in 2004. The proportion of prerecruits between 78 mm and 95 mm (ADO^{-1}) was 3%, which is low and comparable to the 2003 value (2%).

In contrast with the fishery results, **the scientific trap survey**, conducted since 1996, showed that the CPUE for commercial-size crab increased by 25% in 2004 (7.1 kg/Japanese trap) from 2003 (Figure 10). This increase is mainly attributable to the residual biomass, whose CPUE rose by 56% in 2004 (6.1 kg/Japanese trap); the mean CPUE for recruits (1.0 kg/Japanese trap) remained low and was below the 2003 level. A sharp increase (79%) in the abundance of intermediate-shell crab (condition 3) was also noted in 2004, with the abundance of new crab (conditions 1+2) remaining low and in decline and the abundance of old crab (conditions 4+5) remaining comparable to the 2003 level. The mean CW of legal-size crabs (104.2 mm) has been stable since 2002. The abundance of adolescents between 78 mm and 95 mm has remained low and stable at 0.2 kg/Japanese trap since the survey was first conducted in 1996.

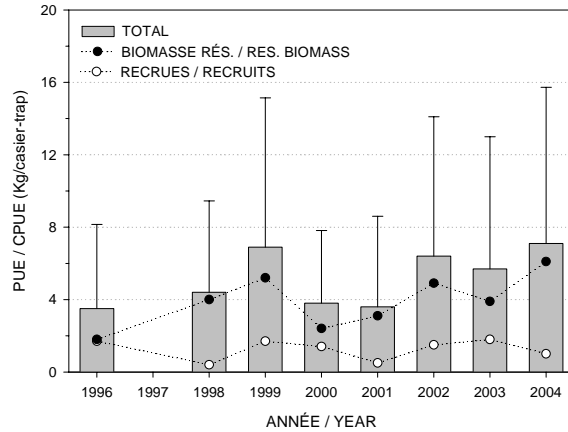
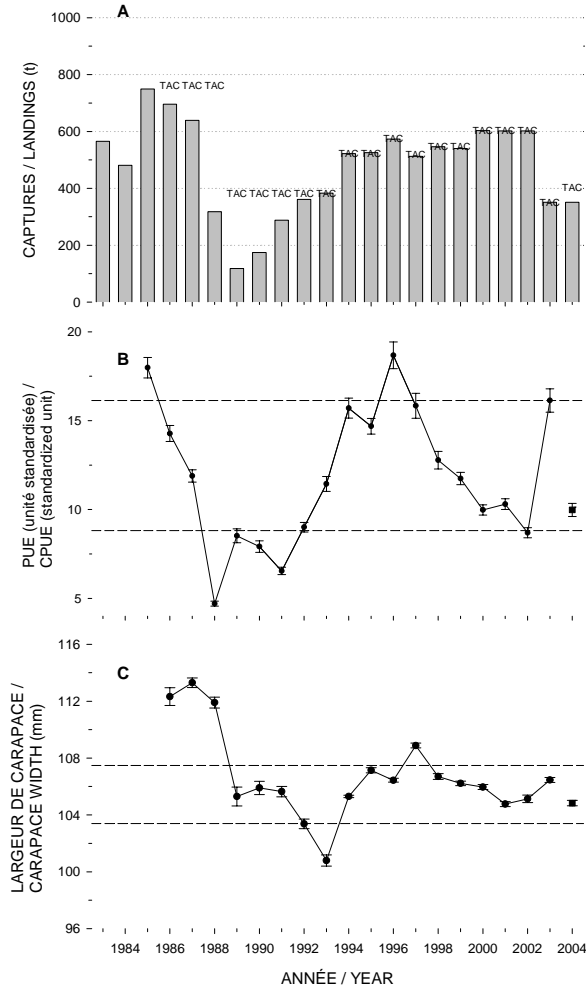


Figure 9. Main parameters estimated during the fishing season in Area 14, 1983–2004: A) landings and TAC; B) standardized CPUE (standard error ± 1); and C) mean carapace width (standard error ± 1) of commercial crabs sampled at sea. The 95% CI of the mean for the reference period (1990–1997) is indicated by the dotted lines in charts B and C.

Figure 10. Catch rates (CPUE) obtained from the postseason survey conducted in Area 14, 1996–2004. The total CPUE is indicated with a standard deviation of 1.

Conclusions and Advice

- The TAC rose by 15% in 2004 following an increase in abundance indices in 2003. Intermediate-shell crabs, which are highly catchable, accounted for more than 90% of catches made at sea.
- However, the CPUE and CW of legal-size crabs again declined during the 2004 fishing season.

- The trap survey results point to an increase in the CPUE in 2005, based mainly on a rise in the CPUE for the residual biomass, with the CPUE for recruits being in decline, with few recruits being found in traps. The indices of recruitment in the short term are negative.

Consequently, it is recommended that the status quo be maintained in 2005 in order for the rise in the CPUE to help stabilize the stock over the longer term.

Snow Crab in Area 13

The Fishery

Forty-three fishers from Quebec and six fishers from Newfoundland shared the regular quota allocated for this area until 2002. In 2003 and 2004, the area was closed and only a 50 t sentinel fishing operation was permitted in order to collect some biological data on this stock (Figure 11A).

The results of the sentinel fishery in 2004 still do not show an appreciable improvement in the standardized CPUE or in the mean CW of legal-size crab; both the CPUE and the mean CW remained comparable to the values recorded in 2003 (Figure 11B and 11C). However, since these indicators come from a fishery in which effort has decreased considerably since 2003, they are not representative of the stock's real status and its evolution since the moratorium.

The number per trap obtained from **scientific trap surveys** was low and has been stable since 2001 both in the northern (2.3 crabs/Japanese trap in 2004) and southern (3.4 crabs/Japanese trap in 2004) sectors of the area. By contrast, the mean and median CWs of legal-size crab have been rising since 2003 in both sectors: the median CW of legal-size adults was 101 mm in the northern part and 106.4 mm in the southern part in 2004, representing an increase of slightly more than 1 mm per year in each sector since 2003. In 2004, in the northern sector the abundance of intermediate-shell crabs (condition 3) dropped slightly, and the abundance of old crabs (conditions 4+5) increased, whereas in the southern sector new crabs (conditions 1+2) were the most abundant in traps. The CPUE of adolescents between 78 mm and 95 mm (ADO^{-1}) was low and has remained stable throughout the area since 1999 (<0.1 kg/Japanese trap in 2004).

The findings of a beam trawl survey covering the northern part of Area 13 and the eastern part of Area 14 in 2004 showed that the abundance of legal-size crab (4.4 crab/ $10,000$ m²) was three times smaller than in 2003. However, this decrease in the commercial portion could be partly explained by the difference in spatial coverage of the two surveys, with the 2003 survey extending farther west in Area 14 and covering only the northwestern sector of Area 13 up to St. Augustin. The mean CW of legal-size crab (102.3 mm in 2004) was unchanged from 2003 and similar to that recorded in 1999–2000 (103.0 mm). The abundance of adolescents between 78 mm and 95 mm (5.7 crab/ $10,000$ m²) was down by 64% from 2003. Furthermore, the 1997, 1998 and 1999 cohorts were not very abundant in 2003–2004, which suggests low recruitment over the longer term.

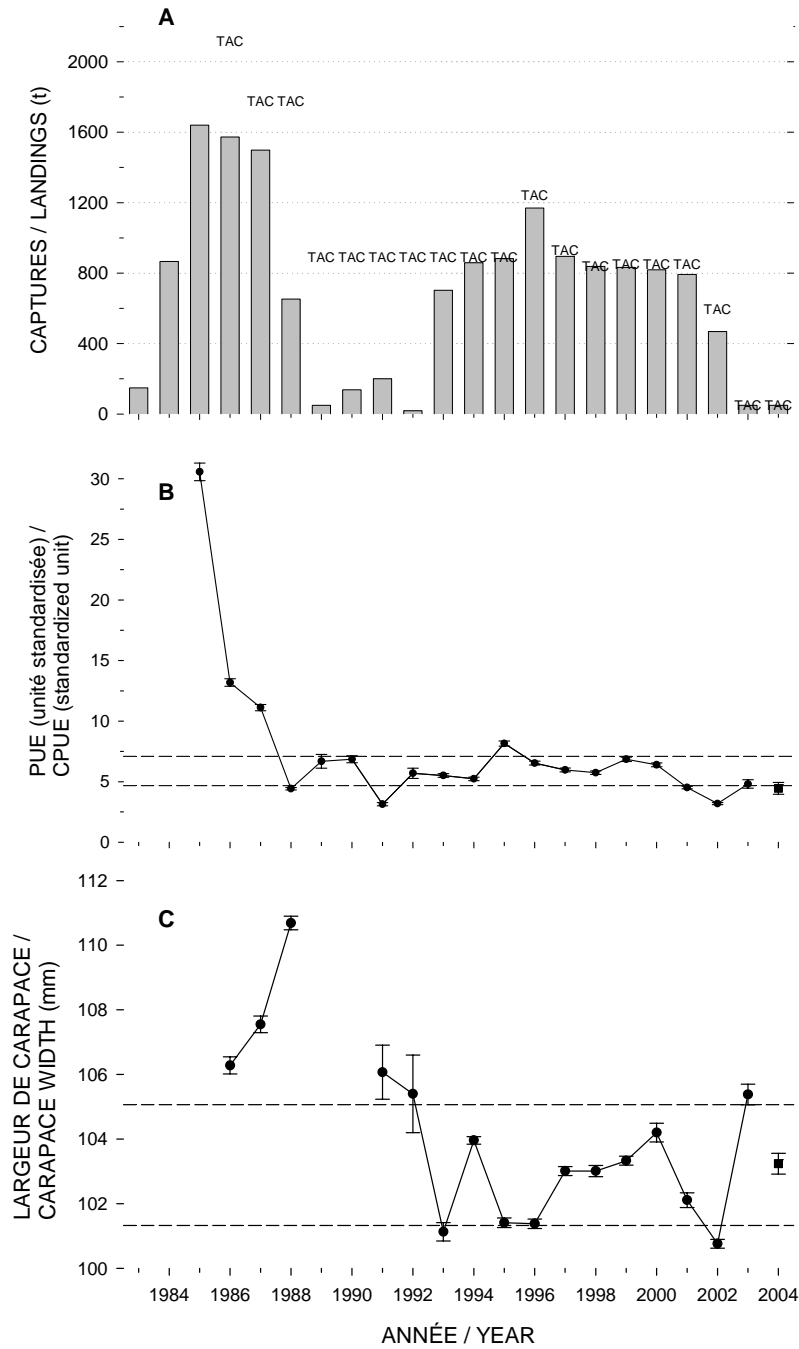


Figure 11. Main parameters estimated during the fishing season in Area 13, 1983–2004: A) landings and TAC; B) standardized CPUE (standard error ± 1); and C) mean carapace width (standard error ± 1) of commercial crabs sampled at sea. The 95% CI for the reference period mean (1990–1997) is indicated by the dotted lines in graphs B and C.

Conclusions and Advice

- This stock has been under a moratorium since 2003, but a 50 t sentinel fishery was authorized in both 2003 and 2004.
- The mean CW of legal-size crab increased in 2003 and 2004, but no changes were noted in the abundance of legal-size crabs, with abundance remaining low.
- The trap surveys conducted in the northern and southern sectors of the area suggest that the exploitable biomass will remain low in 2005, while the CW of legal-size crabs will increase slightly.
- The 2004 trawl survey showed a substantial decline in the abundance of legal-size crabs in comparison with the 2003 survey. However, this situation may be partly attributable to the difference in the spatial coverage of the two surveys. The abundance of immediate prerecruits (Ado. 78–95) was also down from the 2003 level. In addition, the 1997, 1998 and 1999 cohorts were not abundant in 2003–2004, suggesting that recruitment will be low in the longer term.

No re-opening of the area will be recommended until the criteria established in 2003 have been met. The moratorium will be maintained in 2005, as the criteria for re-opening the area were not met in 2004. In addition, given the stock's slow recovery, it is recommended that no harvesting be permitted in this area until the moratorium is lifted.

Snow Crab in Area 12A

The Fishery

Area 12A has had 10 regular fishers since it was created in 1994. The TAC held fairly stable at around 209 t until 1999 (Figure 12A), when it increased gradually until 2002 (259 t). Following a 15% reduction in 2003 (220 t), the TAC remained essentially unchanged in 2004 (198.5 t) and no temporary allocations were granted. In 2004, the fishery opened on March 26 and closed on June 30. The TAC was met.

The standardized CPUE for the commercial fishery, which has been falling since 2002, continued its downward trend (-11%) in 2004 (Figure 12B). Intermediate-shell crabs (condition 3) accounted for more than 70% of catches made at sea. The mean CW (Figure 12C) of legal-size crabs sampled at sea remained stable in 2004 (109.0 mm), after reaching a record high value in 2003 (109.6 mm). Dockside monitoring was not conducted in the area in 2004. The proportion of adolescents between 78 mm and 95 mm (ADO^{-1}) was low (3% in 2004) and has been stable since 2000.

The findings of the **scientific trap survey**, conducted since 2000, indicate that the CPUE of legal-size crab tripled in 2004 (19.8 kg/conical trap) from the previous year (Figure 13). This increase is attributable to both the residual biomass (17.2 kg/conical trap) and recruits (2.6 kg/conical trap), for which the CPUE tripled in 2004. The abundance of intermediate-shell crab (condition 3) quadrupled in traps, compared with 2003, and that of new (conditions 1+2) and old (conditions 4+5) crab also increased. The mean CW of legal-size crab, which has been on the rise since the survey was first conducted, continued to move upward in 2004, reaching

108.9 mm. The abundance of prerecruits between 78 mm and 95 mm (ADO^{-1}) was low (0.5 kg/conical trap in 2004) and has been stable since the survey was initiated.

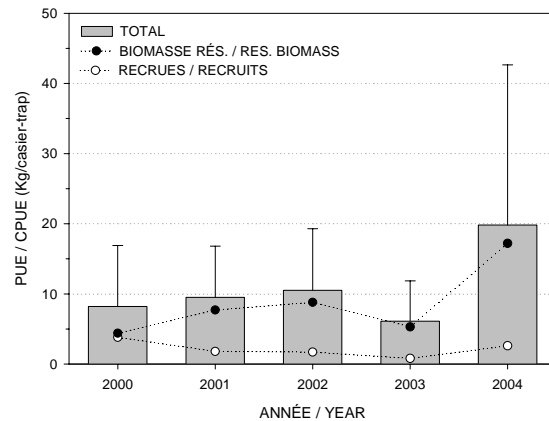
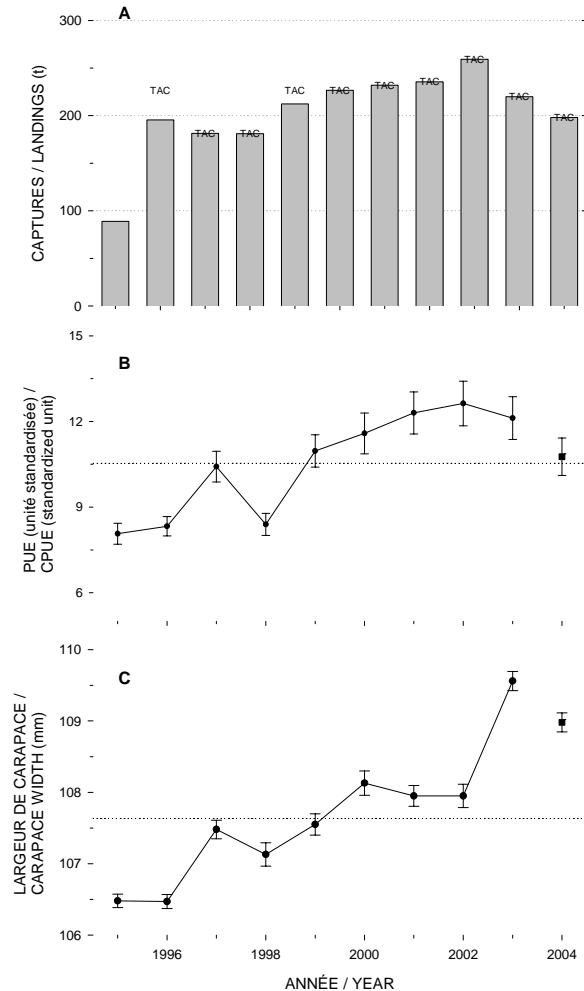


Figure 12. Main parameters estimated during the fishing season in Area 12A, 1995–2004: A) landings and TAC; B) standardized CPUE (standard error ± 1); and C) mean carapace width (standard error ± 1) of commercial crabs sampled at sea. The mean for the 1995–2003 period is indicated by the dotted lines in graphs B and C.

Figure 13. Catch rates (CPUE) obtained from the postseason survey conducted in Area 12A, 2000–2004. The total CPUE is indicated with a standard deviation of 1.

Conclusions and Advice

- The TAC has decreased by 24% since 2002. Intermediate-shell crab, which are highly catchable, accounted for more than 70% of catches made at sea.

- The commercial CPUE (standardized CPUE) has been declining for the last two years and the mean CW of legal-size crab, which had been rising since 1996, appears to have leveled off in 2004.
- However, the trap survey indicates that the exploitable biomass and the CW of legal-size crab should increase in 2005.
- Most of the fishing effort is currently concentrated in the western sector of Area 12A.

This area depends largely on the neighbouring areas 17 and 12. *In view of the ambiguity of the current stock status indicators and the anticipated decline in the biomass, it is recommended that harvesting levels in 2005 be similar to those in 2004.*

Snow Crab in Area 12B

The Fishery

Area 12B has had eight regular fishers since 1995 (it had five fishers in 1994). The TAC was reduced by 30% in 2003 (Figure 14A) and by another 30% in 2004 (198.2 t). However, an additional 40 t was allocated in 2004 to explore the eastern part of the area, where little fishing is done. The total TAC was 238.2 t in 2004 (Table 4). The fishery opened on March 24 and closed on June 30. No temporary allocations were granted. The TAC was met.

The standardized CPUE for the commercial fishery, which had been declining since 2000, rose by 40% in 2004 (Figure 14B). Intermediate-shell crab (condition 3) accounted for a high proportion (90%) of samples taken during the fishing season, with few new (conditions 1+2) and old (conditions 4+5) crabs observed. The mean CW of legal-size crab measured at sea (Figure 14C) has remained stable and near the historical average since 1997 (108.6 mm in 2004). Dockside monitoring was not conducted in the area in 2004. The proportion of adolescents between 78 mm and 95 mm (ADO^{-1}) in catches made at sea has been low and stable for the last two years (2% in 2004).

The findings of the **scientific trap survey**, first conducted in 2001, indicated that the CPUE of legal-size crab dropped by 21% in 2004 (7.0 kg/conical trap, including the six new transects in the eastern sector) from the 2003 level (Figure 15). The CPUE of the residual biomass (7.5 kg/conical trap) remained on a par with the 2003 level, and the CPUE of recruits, on a downward trend since 2001, remained low in 2004 (0.4 kg/conical trap). Intermediate-shell crab (condition 3), in decline since 2001, accounted for 65% of the crab caught in 2004, followed by old (conditions 4+5) crab (29%). The mean CW of legal-size crab (107.7 mm in 2004) has shown a slight upward trend since 2001. The abundance of prerecruits between 78 mm and 95 mm was low and has been stable since the survey was first conducted in 2001 (0.1 kg/conical trap in 2004).

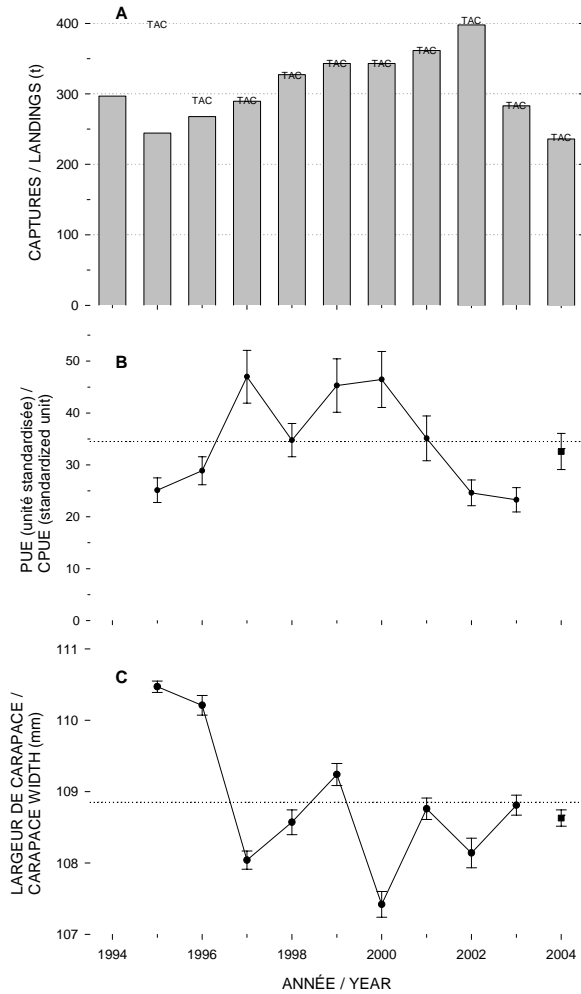


Figure 14. Main parameters estimated during the fishing season in Area 12B, 1994–2004: A) landings and TAC; B) standardized CPUE (standard error ± 1); and C) mean carapace width (standard error ± 1) of commercial crabs sampled at sea. The mean for the 1995–2003 period is indicated by the dotted lines in graphs B and C.

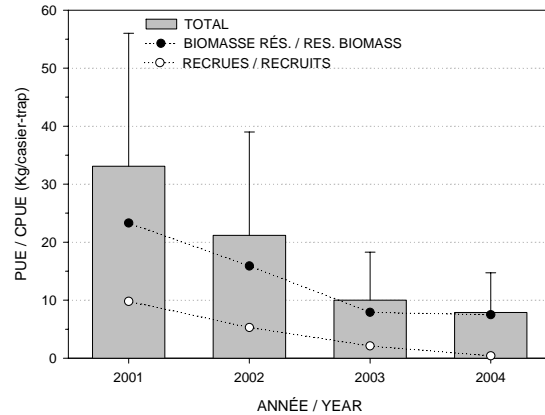


Figure 15. Catch rates (CPUE) obtained from the postseason survey conducted in Area 12B, 2001–2004. The total CPUE is indicated with a standard deviation of 1.

Conclusions and Advice

- The TAC has been reduced by 41% since 2002. Intermediate-shell crab, which are highly catchable, accounted for more than 90% of the catches made at sea.
- The commercial CPUE, which had been declining since 2001, was up by 40% in 2004. However, this increase is partly attributable to a change in the distribution of fishing effort. The mean CW of legal-size crab has been stable since 1997.
- Short-term recruitment indicators were down.

It is recommended that the status quo be maintained in 2005 to stabilize the commercial biomass, which has been falling since 2001.

Snow Crab in Area 12C

The Fishery

Area 12C has five regular fishers and features two banks (north and south sectors) separated by a deep channel that is part of Jacques-Cartier Passage. The TAC (Figure 16A) was reduced by 15% in 2003 and remained unchanged in 2004 (261.8 t). In 2004, the fishery opened on April 20 and closed on August 11. Temporary allocations totalling 81.1 t were granted to non-crabbers in 2004. The TAC was met.

The standardized CPUE for the commercial fishery plummeted between 1996 and 1997 but has remained stable since then and below the mean for 1994–2003 (Figure 16B). Intermediate-shell crab (condition 3) and old crab (conditions 4+5) respectively accounted for 74% and 24% of the crab sampled at sea. The mean CW of legal-size crab measured at sea, on an upward trend since 2002 (Figure 16C), rose by 2 mm in 2004 (108.6 mm). Dockside monitoring was not conducted in the area in 2004. The proportion of adolescents between 78 mm and 95 mm (ADO^{-1}) in catches made at sea has been declining since 2002 and stood at 2% in 2004.

The findings of the scientific trap survey, conducted since 2000, indicate that the CPUE of legal-size crab was 38% lower in 2004 (3.5 kg/Japanese trap) than in 2003 (Figure 17). The residual biomass (3.2 kg/Japanese trap) decreased by 27% in 2004, whereas the biomass of recruits (0.3 kg/Japanese trap in 2004) has been low since 2000 and was down from the 2003 level (1.2 kg/Japanese trap). Intermediate-shell crabs (condition 3) accounted for the bulk of the catches. The mean CW of legal-size crabs was 1 mm greater in 2004 (107.3 mm) than in 2003. The abundance of adolescents between 78 mm and 95 mm (ADO^{-1}) has been low (0.1 kg/Japanese trap in 2004) and stable since 2000.

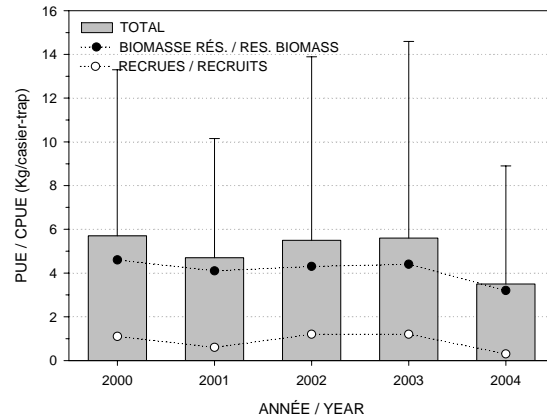
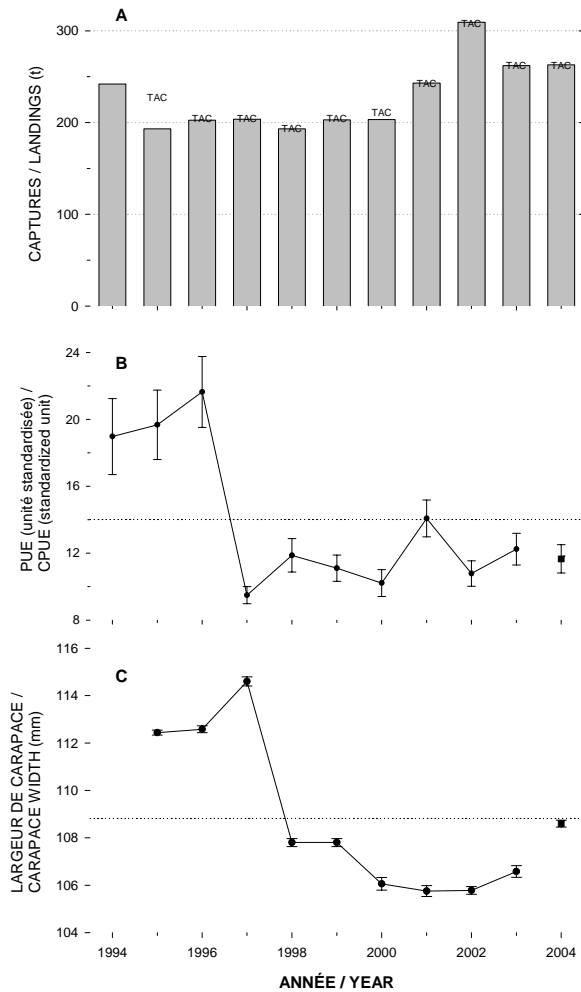


Figure 16. Main parameters estimated during the fishing season in Area 12C, 1994–2004: A) landings and TAC; B) standardized CPUE (standard error ± 1); and C) mean carapace width (standard error ± 1) of commercial crabs sampled at sea. The mean for the period from 1994–1995 to 2003 is indicated by the dotted lines in graphs B and C.

Figure 17. Catch rates (CPUE) obtained from the postseason survey conducted in Area 12C, 2000–2004. The total CPUE is indicated with a standard deviation of 1.

Conclusions and Advice

- The TAC was reduced by 15% between 2002 and 2003 and remained unchanged in 2004. Intermediate-shell crabs, which are highly catchable, accounted for more than 70% of catches made at sea.
- After falling sharply between 1996 and 1997, the commercial CPUE remained stable but below the average level recorded since 1998. The mean CW of legal-size crab also fell between 1996 and 1997, but has been on the rise since 2002.

- The CPUE of legal-size crab in the trap survey indicated a downtrend in 2004, and short-term recruitment indicators were also down.

As no improvement is foreseen in the short term, it is recommended that harvesting levels be reduced in 2005.

Sources of Uncertainty

The quality of scientific advice depends mainly on the accuracy of the parameters obtained through sampling and the subsequent analyses. Information obtained from logbooks and purchase slips during the fishing season affects the accuracy of the parameters that are derived for analysis. For instance, abundance indices and fishing effort calculations may include errors that will affect the data on which scientific advice is based. The selectivity and catchability of traps can vary depending on the type of trap used and trap volume and mesh size, the amount and quality of bait used and the amount of time the trap is in the water. Trap immersion (soak) time can vary with the fishing strategies employed and the prevailing environmental conditions. The selective sorting of catches can also affect the quality of the data obtained.

The abundance and condition indices and the estimates of crab size that are obtained from the trawl and trap surveys depend on the type of gear used and are affected by uncertainties related to catchability variations in the different crab groups targeted. Some types of fishing gear are better suited to given seafloor areas than are other gear types and this factor influences the spatial coverage that is ultimately achieved. The biological characteristics of snow crab can in themselves create sources of uncertainty that impinge on the scientific advice. For instance, the terminal moulting phase, which occurs at various sizes, will affect crab condition and catchability. Natural mortality can also vary with the life stage and condition of the crabs.

SOURCES OF INFORMATION

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