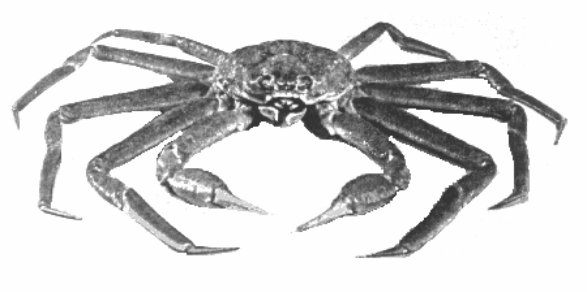

Snow Crab of the Estuary and Northern Gulf of St. Lawrence (areas 13 to 17 and 12A, 12B and 12C) in 2003

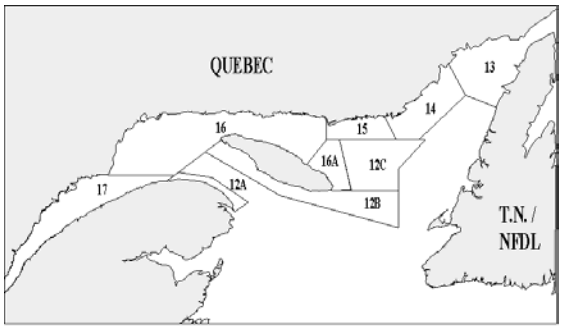

Figure 1. Snow crab management areas in the Estuary and Northern Gulf of St. Lawrence.

Background

The commercial snow crab fishery in the estuary and northern Gulf of St. Lawrence intensified starting in the late 1970s. The northern Gulf is divided into five traditional management areas, numbered 13 to 17 from east to west; three other areas (12A, 12B and 12C), previously classed as exploratory, were added in 2001. A new area, Area 16A, which is adjacent to Area 16, was created in 2001 to help Area 13 fishers who were experiencing hardship. A management approach based on the TAC (total allowable catch) 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. The male is referred to as an adolescent (recognized by its small claws) prior to the terminal moult and as an adult afterward (large claws). After the terminal moult, adult males range in size from 40 to 165 mm (CW). Males reach legal size (95 mm CW) at about 9 years of age. Recruitment in snow crab is assumed to be periodic or sporadic. Where recruitment is periodic, 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 tracked through regular monitoring of catches (CW, CPUE and shell condition) and effort, and is confirmed by research trap and trawl surveys.

Summary

- **In general,** the large reductions in the TAC that were recommended last year for the entire region (and ratified in most cases) in order to bring harvesting into line with stock productivity, had the effect of stabilizing the CW value for legal-size crab, which had fallen off in most areas. This measure also helped to halt the decline in biomass indices and even boosted the indices in some areas. However, all the snow crab stocks are either still in a declining recruitment phase or their commercial biomass levels are low. That is why the advice for the 2004 fishing season generally consists in recommending that the status quo be maintained or that catches be reduced substantially. The reference period for stock status comparisons is 1990-1997 and corresponds to the previous recruitment cycle.
- **In Area 17**, the short-term trend is positive since the crab will be large and their condition good (shell condition 3). However, the medium-term outlook is negative since decreases in biomass, recruitment and CW are anticipated, possibly continuing into 2006, based on the results of the trawl surveys conducted on the north shore until 2002.

The postseason trap survey also points to a sharp decrease in prerecruits, which normally spells a large decline in recruitment. Catches need to be reduced immediately in light of the observed decrease in biomass, in order to protect the spawning stock and cushion the effect of the drop in yields over the coming years.

- **In Area 16,** the stock appears to have responded well to the sharp reduction in the TAC implemented last year (increase in commercial biomass and the CW of legal size crab in the trap survey) but stock status is still precarious (small size and decrease in recruitment forecast over the medium term) relative to the corresponding period of the previous recruitment cycle (1990-1997). Consequently, it is recommended that the status quo be maintained in 2004 in order to build up a commercial biomass, as it is going to decrease rapidly in the medium term as recruitment falls off.
- **In Area 15,** since the commercial biomass is small and there is no indication that stock status will improve considerably in the medium term, it is recommended that the status quo be maintained in 2004 with the aim of mitigating the effect of the decline in recruitment that can be anticipated if Area 15 follows a downtrend like that seen in areas 16 and 14 nearby.
- **In Area 14,** in light of the improvement observed in the commercial biomass in 2003 (fishery) and that expected next year (trawl survey), a 15% increase in catches in 2004 should not affect stock status in this area.
- **Area 13** was placed under moratorium last year owing to the critical state of the resource. The trap survey results for the northern and southern portions of the area give no indication that the situation will improve appreciably in the short term, although a slight increase in the CW of legal-size crab is expected next year. The harvestable biomass is expected to remain at a very low level in 2004.

  Re-opening of the area will not be recommended until the target levels for criteria retained (the median CW of legal-size adults must be 104 mm and the NUE of legal-size crab must be 7 crab/trap in the postseason trap surveys) are reached in both sectors. The moratorium should be maintained in 2004, since the targets set for re-opening the area were not met.
- In light of the available information and the short time series involved, the recommendation for **Area 12A** was formulated by taking into account the advice for the adjacent traditional fishing area (Area 17): a reduction in catches is necessary to respond to the decline in biomass and recruitment.
- **In Area 12B,** in 2002 and 2003, catches and natural mortality exceeded recruitment and seriously depleted the residual biomass that had accumulated in recent years. Based on the available information (which basically concerns only to the western sector of the area), catches must be reduced to allow the stock status indicators to stabilize.
- **In Area 12C,** the trap survey done at the end of the 2003 fishing season shows a slight increase in the commercial CPUE for 2004. However, the proportion of prerecruits in the commercial fishery and the abundance indices for prerecruits and recruits derived from the postseason trap survey are low, which suggests that there will be no appreciable improvement in stock status in the short term. Consequently, it is recommended that the status quo be maintained in 2004.

The fishery

Location and historical context

Snow crab is fished with baited traps. Conical steel models, such as the 1.2 m

diameter Japanese trap and the conical trap measuring 1.8 m in diameter at the base, are the most popular types. The territory is now divided into nine management areas (Figure 1). Areas 12A, 12B and 12C, which have had exploratory status since 1994, were granted permanent status in 2001, and a new area (16A) was created in 2001 (fished for the first time in 2002) to assist Area 13 fishers.

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. Since then, landings have fluctuated in relation to the recruitment waves and troughs that have affected the fishery (Figure 2), with maximum catches being recorded in 1995 (7,879 t) and 2002 (10,372 t).

Landings have exhibited a downtrend since 2002 as a result of a recruitment trough, and they totalled 6,662 t (preliminary data) in 2003.

Fishery management

As elsewhere in Canada, the minimum legal size is set at a carapace width of 95 mm, and the fishery targets only males. Since 1985, once the limit of 20% white crab (crab that have recently moulted) in catches at sea has been exceeded, the fishery has automatically been closed in the area concerned to minimize mortality of these very fragile crabs that will be available to the fishery the following year. White crab and adolescent males may be returned to the water during the fishing season to enhance their value and give them more of a chance to reproduce.

Resource status

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 2003, a trap-based research survey was carried out in all the areas and the findings were incorporated into the stock status

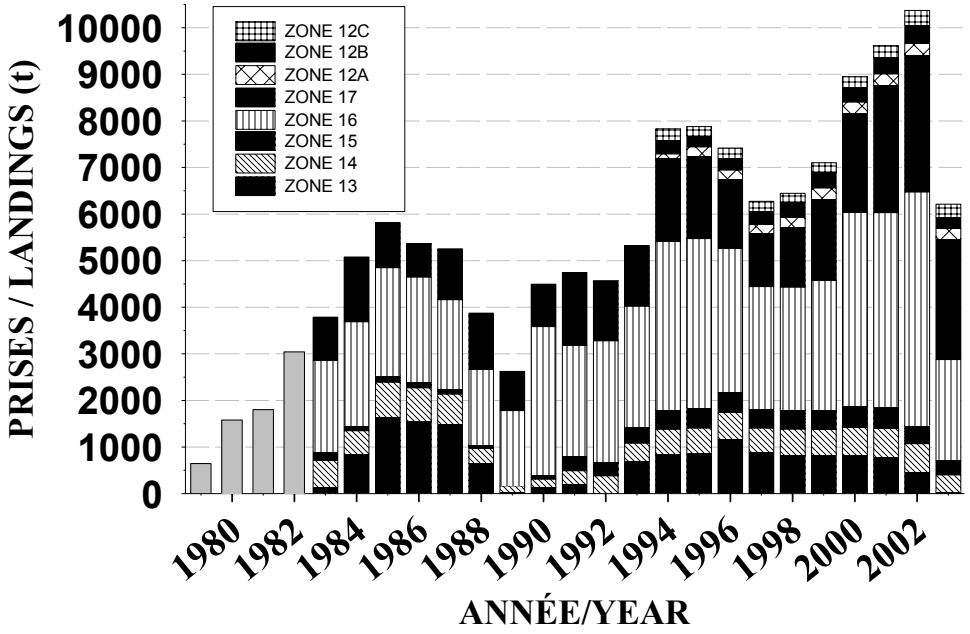

Figure 2. Snow crab landings in the estuary and the northern Gulf of St. Lawrence. Data for 2003 are preliminary.

analyses. The results of trawl surveys, done in areas 16, 14 and 13, were also used.

The raw CPUEs for the fishery have been standardized since 2001 using a multiplicative model to take account of changes caused by the different fishing strategies employed to keep yields optimal. Since recruitment is believed to be periodic or sporadic, the recent fishery data for the traditional fishing areas have been compared to a reference period (1990-1997), which corresponds to the last recruitment cycle in the fishery.

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). The fishing season opened on April 1 and ended on July 30 in 2003. The TAC was set at 2,567 t in 2003, which represents a decrease of 15%. A 390-t special allocation was set aside for non-crabbers. Catches recorded as at December 29, 2003 showed that the TAC had been caught.

Resource status in 2003

In the commercial fishery, the standardized CPUE is high and falls within the 95% confidence interval of the mean (CI95%) for the reference period, although there has been a downward trend since 2000 (Table 1). The proportion of catches and fishing effort that comes from the south shore versus the north shore was high in 2003 (70% and 68% respectively). The surplus effort that has been observed for the south shore since 2001 can be attributed above all to the temporary allocations caught mainly in the southeastern sector of the area.

The mean CW of legal-size crab caught at sea, which had been following an uptrend since 1999 (107.6 mm), rose again in 2003, to111.4 mm. Although this value has been rising, it has consistently remained below the CI95% of the reference period. The mean CW of males at dockside, which has also been increasing since 2001, was 112.4 mm in 2003. The proportion of prerecruits between 78 mm and 95 mm CW (ADO^{-1}) has been low and stable since 2000 (around 3%). There has also been a decrease in the relative proportion of new crab

Table 1. Catches and fishing effort in Area 17.

Year	1983 to 1989[4]	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TAC	--	--	--	1300	1300	1820	1820[5]	1547[5]	1315[5]	1315[5]	1775[5]	2130[5]	2725[5]	3020[5]	2567[5]
Catches[1]	1022	910	1562	1289	1305	1788	1774	1502	1156	1285	1758	2130	2741	2935	2593
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	177.6
CPUE standardized	5.8[6]	4.9	7.3	10.6	12.0	12.4	9.4	8.9	7.2	7.0	8.9	13.2	12.4	11.3	11.0
CPUE non stand.[3] 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	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	17.5	18.7	16.6
South shore	7.4	5.3	7.8	11.5	13.2	11.4	9.7	9.3	8.5	9.3	13.0	14.8	12.8	12.9	13.9

1 Landings in metric tonnes, as at December 29 for 2003

2 Standerdized effort, in thousands of Japenese trap hauls

3 Non standardized catch per unit effort, in kilograms per Japenese trap

4 Calculated average for these years

5 Including special allocations

6 Calculated for the period from 1985 to 1989

(conditions 1 and 2) versus old crab (conditions 4 and 5) sampled at sea.

The results of the research trap survey, for which the series began in 1996 on the north shore and in 1999 on the south shore, are generally consistent with those observed in the fishery and show that the harvestable biomass on the north and south shores is still high (42.6 and 72.7 kg/conical trap respectively); however, recruitment has been declining since 2000 on the north shore and since 2002 on the south shore. The mean CW of legal-size crab was greater than in 2002 on the north shore (107.9 mm in 2003) and much greater relative to 2001 on the south shore (109.9 mm in 2003). An increase in old crab (conditions 4+5) at the expense of new crab (conditions 1+2) was also observed on the north and south shores**.** The number of adolescents between 78 and 95 mm CW (ADO^{-1}) fell 63% in 2003 (1.5 kg/conical trap) on the north shore but remained low and stable (2.0 kg/conical trap) on the south shore relative to 2002. Note that the annual postseason trawl survey conducted on the north shore of the estuary between 1992 and 2002 showed that the abundance of the year-classes that will reach legal size over the three years as of 2003 would be lower than in 2002.

Outlook for 2004

While the commercial biomass is still fairly high in this area, a decrease is expected to occur, continuing at least into 2006 because of the decline in recruitment. The mean CW of crab at dockside should increase for one or two years and then decrease. A reduction in catches needs to be implemented immediately in light of the observed decline in biomass, in order to protect the spawning stock and provide a cushion against falling yields over the coming years. *We therefore recommend a 25% reduction in the catch level in 2004, which corresponds to a 15% reduction in the TAC based on the rate of decrease in the TAC from 1995 to 1997 (during the previous recruitment trough), to which an adjusted by 10% was done to reflect the difference in CW of legal-size crab between the reference period and 2003. Since the commercial biomass is set to contract appreciably in the medium term owing to a marked decrease in recruitment, and since old crab will be increasingly numerous in catches, we recommend as a conservation measure that these crab be targeted effective immediately in order to lessen the impact on yields and on the quality of crab in landings.*

Snow crab in Area 16

Thirty-nine fishers hold regular snow crab fishing licences for Area 16. In 2003, the TAC (2,167 t) was 57% lower than in 2002 (Table 2). Area 16A, created in 2001, was not fished in 2003, and no temporary allocation was granted. The fishery opened on April 14 and ended on August 2 and the TAC was caught.

Resource status in 2003

The standardized CPUE for the fishery is low and has been declining since 1999. The current value is well below the CI95% for the reference period and represents the lowest level recorded since 1999. The mean CW of legal-size crab at sea, which fell sharply from 1998 to 2002, levelled off throughout the area in 2003, at 106.6 mm. This value is nonetheless below the CI95% for the reference period. The mean CW of crab at dockside has been stable since 2001 (108.7 mm in 2003). The proportion of adolescents between 78 and 95 mm CW (ADO^{-1}) in catches, which will reach legal size at the next moult, stood at 4% throughout the area, which is lower than in 2002. The proportion of prerecruits (ADO^{-1}) decreased in the west (4%) from the 2002 level but has been stable in the east (4%) since 2000.

The results of the trawl surveys conducted in 2003 in St. Marguerite Bay and in three other sectors of Area 16, showed trends similar to those observed in the fishery. The abundance of legal-size crab was low, but stable relative to 2002, after six consecutive years of decline (St. Marguerite Bay). Immature crab with a CW of between 28 and 40 mm were abundant throughout the area; the abundance of prerecruits with a CW of 40 to 62 mm was moderate in the west and centre, but low in the east; and the abundance of prerecruits with a CW of 62 to 95 mm was lower in the western part of the area than in the eastern part. These results show that recruitment should remain low for another 2 or 3 years at least before a recovery begins. Recruitment of primparous females is up for the first time since 1997. The spermatheca were very full once again.

The indices derived from the research trap survey, which has been conducted in Area 16 every fall since 1994, point to a significant increase in commercial biomass throughout the area. The CPUE of legal-size crab, which has been in decline since 2000, jumped by 131% in 2003 (34.2 kg/conical trap) relative to 2002 (14.8 kg/conical trap). This big increase in the average yield of legal-size crab in 2003 was caused by an increase in the residual biomass (222%) and an increase in recruits (142%). Commercial yields rose substantially in both the western (119%) and eastern (179%) part of the area in 2003. The mean CW of legal-size crab, which has been declining since 1996, bounced back in 2003 throughout the area (105.4 mm). Intermediate-shell crab (condition 3), old crab (conditions 4 and 5) and new crab (conditions 1 and 2) were twice as numerous as in 2002.

The CPUE for adolescent males between 78 and 95 mm CW (ADO^{-1}), which has been rising since 1997, levelled off at 2.8 kg/conical trap in 2003. A 32% increase was noted in the west (2.5 to 3.3 kg/conical trap) but the CPUE remained low and stable in the east, at 1.7 kg/conical trap in 2003.

Table 2. Catches and fishing effort in Area 16.

Year	1983-1989[4]	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TAC	2500[5]	--	2368	2596	2596	3636	3636[7]	3090[7]	2627[7]	2627[7]	2784[7]	4176[7]	4184[7]	4992[7]	2167
Catches[1]	1984	3181	2371	2597	2595	3608	3629	3085	2623	2625	2777	4164	4164	5001	2160
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	226.2
CPUE standardized	6.9[8]	11.6	16.5	18.2	21.8	20.4	22.3	18.3	12.6	10.4	12.0	11.0	10.2	9.8	8.2
CPUE non stand.[3] Total	8.5	12.7	17.2	18.9	20.4	20.2	20.4	20.1	13.4	10.7	13.1	13.9	12.3	11.0	9.5
West	6.0	8.9	14.1	17.4	18.4	21.5	19.8	21.0	13.1	10.3	12.8	13.1	11.5	9.5	7.8
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	14.7
East	10.3[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	11.5	--

1 Landings in metric tonnes, as at December 29 for 2003
2 Standerdized effort, in thousands of Japenese trap hauls
3 Non standardized catch per unit effort, in kilograms per Japenese 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 from 1985 to 1989

Outlook for 2004

Commercial fishery yields fell sharply in 2003 throughout the area, which is in keeping with last year's forecast, despite a large (57%) reduction in the TAC. The commercial CPUE should increase (trap survey) or stabilize in 2004. The mean CW of legal-size crab, which has been declining since 1997 (surveys) or 1998 (fishery), levelled off or rose slightly in 2003, while remaining very small compared with the value recorded for the corresponding period in the previous recruitment cycle (1990-1997). Over the next two or three years, recruitment should decline leading to a decrease in the commercial biomass, judging from the results of the trawl survey conducted in Area 16 in 2003. The trawl survey carried out in Area 16 (except St. Marguerite Bay) suggests that the next recruitment wave is taking shape on the sea bottom and should contribute to recovery in three or four years.

The snow crab stock in Area 16 appears to have responded favourably to the significant reduction in the TAC implemented last year (increase in the commercial biomass and the mean CW of legal-size crab in the trap survey); however, its status is still precarious (small mean CW and drop in recruitment anticipated in the medium term) relative to the corresponding period in the previous recruitment cycle (1990-1997). *Consequently, it is recommended that the status quo be maintained for the coming year to build up the commercial biomass, as it will decrease rapidly in response to the anticipated drop in recruitment.*

Snow crab in Area 15

Area 15 has 8 regular fishers. In 2003, the fishery opened on April 14 and ended on August 2. The TAC (326 t) was reduced by 19% from the 2002 level (400 t), making for a cumulative decrease of 30% over the past two years, and it was caught (Table 3). No temporary allocation was granted in 2003.

Table 3. Catches and fishing effort in Areas 15, 14 and 13.

	Année	1983-1989[4]	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TAC	Area 15	--	--	--	--	--	435	435	435	413	422[7]	422[7]	464[7]	469[7]	400[7]	326
	Area 14	667[5]	381	381	381	381	524	524[6,7]	576[7]	518[7]	548[7]	548[7]	603[7]	603[7]	603[7]	351
	Area 13	1 642	889	889	889	889	889	889	1241[7]	931[7]	838	848	848	848	594	50
Catches[1]	Area 15	109.7	93	321	300	339	426	436	435	413	421	422	464	469	399	316
	Area 14	509.4	174	288	361	383	522	525	573	512	546	540	602	602	604	351
	Area 13	918.4	138	201	19	703	859	883	1121	795	838	832	819	795	469	50
Effort[2]	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	28.8
	Area 14	66.7	40.4	60.0	49.4	39.5	46.6	45.3	45.7	47.6	48.6	45.9	51.1	51.0	55.8	23.2
	Area 13	116.5	35.4	64.8	3.6	167.4	190.9	110.4	228.3	205.7	128.3	123.8	118.7	188.8	136.3	15.4
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	10.1
	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	15.0
	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	3.8	5.2
CPUE non stand.[3]	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	11.0
	Area 14	5.2	4.3	4.8	7.3	9.7	11.2	11.6	12.5	10.8	11.2	11.8	11.8	11.8	10.8	15.1
	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	3.3

1 Landings in metric tonnes, as at December 29 for 2003

2 Standerdized effort, in thousands of Japenese trap hauls

3 Non standardized catch per unit effort, in kilograms per Japenese 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 period 1985 to 1988

9 Calculated for period 1985 to 1988

10 Calculated for period 1985 to 1988

Resource status in 2003

The standardized fishery CPUE, in decline since 1996, currently stands at a level within the 95%CI for the reference period. The mean CW of legal-size crab at sea, which has been declining since 1998, fell again in 2003, to 104.0 mm. This value nonetheless falls within the CI95% for the reference period. The mean CW of legal-size crab at dockside has followed a similar trend and stood at 104.5 mm in 2003, or close to the value recorded in 2002. The proportion of prerecruits between 78 and 95 mm CW (ADO^{-1}) was 1%, which is much lower than in 2002 (5%).

The **trap survey**, conducted since 1998, showed that the CPUE of commercial-size crab, which has been rising since 2001, rose again in 2003, from 5.9 to 7.4 kg/Japanese trap. This increase can be attributed mainly to a increase in the abundance of the residual biomass, which went from 2.2 (2002) to 3.6 kg/Japanese trap in 2003. The abundance of adolescents with a CW of 78 to 95 mm (ADO^{-1}) is still low and has remained stable since 1998 (0.5 kg/Japanese trap in 2003). The mean CW of legal-size crab, in decline since 1999, levelled off in 2003 (104.5 mm). The proportion of intermediate-shell crab (condition 3) doubled in 2003 from the 2002 level.

Outlook for 2004

The commercial CPUE has been in decline since 1996 and is very low at present, i.e. within the 95% confidence interval of the mean value for the reference period 1990-1997. The mean CW of legal-size crab has also been decreasing since 1998; however, it is within the 95% CI for the mean of the reference period. The trap survey conducted at the end of the 2003 fishing season points to an increase in the commercial CPUE in 2004. Nonetheless, the proportion of prerecruits in the commercial fishery and the abundance indices for prerecruits and recruits derived from the postseason trap survey are low, which do not point to an appreciable increase in recruitment in the short term.

Since the commercial biomass is low and the stock status shows no sign of significant improvement in the medium term, it is recommended that the status quo be maintained in 2004 so that the anticipated improvement can help to attenuate the drop in recruitment that can be expected if Area 15 follows a downward trend like adjacent areas 16 and 14.

Snow crab in Area 14

Area 14 has 21 regular fishers. In 2003, the fishing season opened on June 6 and ended on September 10, or about 1 month later than the dates recorded in 2002. The quota of 351 t included no temporary allocations and represented a decrease of 42% from 2002 (Table 3). The TAC was caught.

The standardized CPUE from the commercial fishery, which has decreased fairly steadily since 1996, doubled in 2003 and now falls within the 95% confidence interval for the mean of the reference period 1990-1997 (Table 3). The mean CW of commercial-size crab at sea has been on the rise since 2001 and reached 106.4 mm in 2003, a value which falls within the CI95% for the reference period. The mean CW of crab at dockside increased considerably in 2003 (106.8 mm) over 2002 (102.3 mm), marking the first increase since 1997. The proportion of prerecruits with a CW between 78 and 95 mm (ADO^{-1}) was 2%, down from 2002 (4%).

In contrast with the fishery results, **the trap survey,** which has been carried out since 1998 in this area, shows that the CPUE of commercial-size crab dropped 11% in 2003 (5.7 kg/Japanese trap) from the 2002 level (6.4 kg/Japanese trap). This decrease was caused by a decline in the average CPUE

for crab making up the residual biomass in 2003 (3.9 kg/Japanese trap) compared with 2002 (4.9 kg/Japanese trap). The abundance of adolescents between 78 and 95 mm CW has remained low and stable, at 0.2 kg/Japanese trap, since the survey began in 1996. By contrast, the average CPUE for adults with a CW of 78 to 95 mm was up over 2002, at 3.0 kg/Japanese trap in 2003. This finding for adults between 78 and 95 mm CW may point to an increase in recruitment in the medium term. In 2003, the mean CW of legal-size crab (104.4 mm) was similar to the value posted in 2002. The number of intermediate-shell crab supporting the fishery declined sharply in 2003 (-36%) from the 2002 level.

The results of a beam trawl survey done in areas 14 and 13 in 2003 show that the abundance of legal-size crab (10.9 crab/10,000 m^2) doubled compared with the level recorded during two similar surveys conducted in 1999 and 2000 in those areas. Furthermore, the abundance of immediate prerecruits (adolescents between 78 and 95 mm CW) was also up 76% over the value recorded for 1999-00. However, the 2003 survey showed also that the abundance of the 1996 and 1997 year-classes was lower than in 1999-2000. The mean CW of legal-size crab (102.4 mm in 2003) was slightly lower than in 1999-00 (103.0 mm). Adult males and primiparous females were present in smaller numbers than in 1999-2000, a sign that spawning stock abundance is low at present.

Outlook for 2004

The CPUE and the mean CW of legal-size crab increased markedly during the fishery in 2003. The results of the trap survey are negative on the whole, however, and indicate that the recovery will not persist in 2004. However, there is still uncertainty about the representativeness of the trap survey, given that these results show little relationship with those of the fishery.

The trawl survey done in 2003 in areas 14 and 13 shows an improvement in the abundance of legal-size crab compared with the results obtained in 1999-2000. The abundance of immediate prerecruits was almost twice as great as in 1999-2000 as well. However, for reasons that are still unclear, the numbers associated with the strong 1993, 1994 and 1995 cohorts that were due to enter the fishery in 2002 and generate a recovery, decreased considerably from their initial level. Furthermore, the 1996 and 1997 cohorts were not very abundant in 2003, which points to weak recruitment in the medium term. Hence, the medium and long-term outlook is fairly negative owing to the prediction of weak recruitment.

In view of the improvement in the commercial biomass in 2003 (fishery) and that expected next year (trawl survey), catches could be increase by 15% in this area in 2004 without affecting stock status.

Snow crab in Area 13

Forty-three fishers from Quebec and six from Newfoundland shared the regular quota for this area until 2002. In 2003, the area was closed and only a 50 t sentinel fishing operation was permitted in order to collect the biological data essential for monitoring the stock (Table 3).

The results of the sentinel fishery in 2003 show an improvement in the standardized CPUE and the CW of legal-size crab. However, fishing effort in the north focussed mainly on the western area near the border with Area 14, and the raw catch rates in the south declined.

The CPUE for commercial-size crab caught in **trap surveys** has been low and stable since 1999 in the north (1.6 kg/Japanese trap in 2003) and in the south (1.8 kg/Japanese trap in 2003). This situation should not change in 2004 since the residual biomass and recruitment were still

very low in 2003 in both sectors, exhibiting values close to the average for 1999 to 2002. The CPUE for adolescents with a CW of 78 to 95 mm (ADO^{-1}) has also been low and stable everywhere since 1999 (0.1 kg/Japanese trap in 2003). The mean CW of legal-size crab, which has been in decline since 1999 in the north and since 2000 in the south, increased by 1 mm in both sectors in 2003. The present values are 101.0 mm in the north and 105.7 mm in the south. Intermediate-shell crab (condition 3) have doubled in number since 2002 in the north. By contrast, contrary to all expectations, new crab (conditions 1 and 2) and intermediate-shell crab (condition 3) decreased sharply in number in the south; old crab (conditions 4 and 5) were already poorly represented.

A workshop focussing primarily on Area 13 was held at the MLI in fall 2003. The main aim of the workshop was to review the data for Area 13 and adjacent areas so as to: 1) determine the criteria for re-opening this area and set related target levels, and 2) establish short and long term strategies for helping the stock to rebuild. The CW and the abundance of legal-size crab derived from research trap survey data were the only criteria retained with respect to re-opening the fishery. The size and abundance (NUE) distributions for adult crab taken in trap surveys in the northern and southern sectors of Area 13 from 1999 to 2003 and for Area 14, an adjacent area occupying the same habitat (Mécatina trough), from 1996 to 2003, were presented. In addition, the data for 2003, when there was no fishing in Area 13, were added to the series in order to determine the immediate effects of the fishing moratorium on the stock. It was quickly determined that:

- the median (the central value dividing a set of data into two equal parts) CW for legal-size adult crab should be used. The minimum CW value for re-opening the fishery was set at 104 mm, a value that has been recorded regularly in Area 14 since the trap surveys began.

Two options were explored for determining the legal-size crab abundance value that should be attained to permit re-opening the area, i.e. doubling the present value (2003) of the NUE to a common target level of 7 crab/trap, or setting the target level at 10 crab/trap, an approximate mean for the NUE observed in postseason surveys in Area 14.

- The option of doubling the present value of the NUE in Area 13 (target set at 7 crab/trap) was retained.

Considering that the fishery will be re-opened gradually, this option represents a more realistic objective for Area 13. In addition, a yield of 7 legal-size crab per trap corresponds to the minimum value observed in Area 14, which is viewed as a suitable goal for Area 13.

Furthermore, the target levels that are set must be met in both sectors (north and south) of Area 13 before a re-opening of the fishery can be envisaged. Similarly, the target level for both of the criteria retained must be attained before the area can be re-opened.

Other criteria, such as the fullness of the spermatheca, which is a measure of spawning biomass efficiency, together with prerecruit abundance determined during postseason surveys, will be used as part of a strategy for the medium- and long-term maintenance of a given stock, but not as criteria for re-opening an area.

Finally, any decision to re-open the fishery must be made prudently, and careful monitoring must be carried out to avoid a situation where the exploitation rate is much higher than the level the snow crab population is capable of supporting. During the re-opening, scientific advice will be formulated based on the stock's productivity

and its capacity to support harvesting. Such advice will not be predicated on re-establishing the fishery conditions that existed prior to the closure.

Outlook for 2004

The large reduction in the catch level in Area 13 in 2003 permitted an increase in the mean CW of legal-size crab in 2003; however, the positive effects on the abundance of legal-size crab are not really apparent yet. The results of the sentinel fishery carried out in 2003 show a improvement in the biomass and the mean CW of legal-size crab. However, fishing effort in the north focussed mainly on the western part of the area and the raw CPUE in the south declined.

The trap surveys show a light increase of the median CW for legal-size adult crab in the North (98 to 100 mm) and the South (103 to 105 mm) from 2002 to 2003. However, although the NUE increased from 2.7 to 3.7 crabs/trap in the North, it decreased in half in the South (7.5 in 3.7 crabs/trap) between 2002 and 2003. The trap surveys do not point to an appreciable improvement in the short term. The harvestable biomass should remain very low in 2004.

No re-opening of the area will be recommended until the target levels for the criteria selected (median of 104 mm for legal-size adults and NUE of 7 crab/trap for legal-size crab in the trap surveys) have been attained in both sectors. The moratorium should be maintained in 2004, since the criteria for re-opening the area have not been met.

Snow crab in Area 12A

Area 12A has had 10 regular fishers since it was created in 1994. The TAC held fairly stable at around 209 t until 1999 (Table 4), then followed an upward trend until 2002 (259 t). In 2003, the fishery opened on March 28 and ended on June 12. The TAC was reduced by 15% in 2003 (221 t) and no temporary allocations were granted. The TAC was caught.

The **raw CPUE of the commercial fishery** (Table 4) has been fairly stable since 2000-2001 (24 kg/trap in 2003) and it is higher than the average level recorded from 1994 to 2002. The CPUE has not yet been standardized in this area. The mean CW of legal-size crab measured at sea, which held fairly steady from 2000 to 2002, peaked in 2003 (109.6 mm). The mean CW of crab at dockside also increased in 2003 (107.9 mm) over 2001-2002. The proportion of adolescents with a CW between 78 and 95 mm (ADO^{-1}) slid in 2003 (1.3%), reaching a record low level.

The results of the **trap survey**, which has been conducted since 2000, show a drop of 42% in the CPUE of legal-size crab in 2003 (6.1 kg/conical trap) from 2002 (10.5 kg/conical trap). This decrease is due mainly to a decline in the residual biomass, which went from 8.8 to 5.3 kg/conical trap between 2002 and 2003. In 2003, the mean CW of legal-size crab, which has been on the rise since the survey was instituted, remained close to the 2002 level, but still reached the highest value posted since the survey began, at 105.5 mm. The abundance of prerecruits with a CW of 78 to 95 mm (ADO^{-1}) has been very low since the advent of the survey (0.1 kg/conical trap in 2003).

Outlook for 2004

The western part of this area is the main focus of the fishery and exhibits trends similar to those in adjacent Area 17 in terms of recruitment. The commercial CPUE increased in the late 1990s as a recruitment wave took place, but the trend has been downward ever since. The 15% reduction in the TAC in 2003 likely helped to stabilize

Table 4. Catches and fishing effort in Areas 12A, 12B and 12C.

	Year	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TAC	zone 12A	--[1]	227	181	181	227	227	232	236	259[5]	221
	zone 12B	--[1]	399	290	290	327	343	343	362	404[5]	283
	zone 12C	--[1]	227	204	204	194	204	211	243[5]	308[5]	262[5]
Catches[2]	zone 12A	88	196	181	181	212	227	232	236	259	220
	zone 12B	297	244	268	290	327	343	343	362	398	281
	zone 12C	242	193	203	204	193	203	203	243	309	261
Effort[3]	zone 12A	4.6	22.0	20.1	10.0	16.7	13.5	8.6	9.4	10.9	9.3
	zone 12B	10.0	11.4	9.8	7.9	10.3	8.0	6.1	6.1	8.6	10.4
	zone 12C	14.7	14.7	11.2	21.2	11.0	13.6	13.0	13.9	20.8	18.7
CPUE standardized	Zone 12C	22.0	22.1	22.3	9.7	12.6	10.1	10.5	15.9	11.4	14.5
CPUE non stand.[4]	zone 12A	19	9	9	18	13	17	27	25	24	24
	zone 12B	30	21	27	37	32	43	56	60	46	27
	zone 12C	17	13	18	10	18	15	16	17	15	14

1 Control of fishing effort only

2 Landings in metric tonnes, as at December 29 for 2003

3 Effort, in thousands of conical trap hauls in Areas 12A and 12B, and in thousands of Japenese trap hauls in Area 12C

4 Non standardized catch per unit effort, in kilograms per conical trap in Areas 12A and 12B, and in kilograms per Japenese trap in Area 12C

5 Including special allocations

the average CPUE at 24 kg/trap in 2002-2003. The mean CW of legal-size crab has been rising since the fishery began in 1994. The CPUE for prerecruits has been low and stable since the advent of the trap survey in 2000, and there is no sign of a short-term improvement in recruitment.

Given the available information and the short data series, the present recommendation is formulated taking into account the advice for the adjacent traditional fishing area (Area 17): a reduction in the catch level is necessary to address the decline in the biomass and recruitment. *We therefore recommend a 15% reduction in catches in 2004 relative to the TAC for 2003 (no CW adjustment is required, in view of the steady increase in the mean CW of legal-size crab since 1994).*

Snow crab in Area 12B

Area 12B has had 8 regular fishers since 1995 (5 fishers in 1994). The TAC was reduced by 30% in 2003 and now stands at 283 t (Table 4). In 2003, the fishery opened on March 29 and ended on July 3 and no temporary allocation was granted. The TAC was caught.

The raw CPUE of the commercial fishery slid 41% from 2002 (46 kg/trap) to 2003 (27 kg/trap), which represents a drop of 55% for the last two years (Table 4). The CPUE is not yet standardized in this area. The mean CW of legal-size crab measured at sea has remained stable and close to the average posted since 1997 (108.8 mm in 2003). The proportion of adolescents with a CW between 78 and 95 mm (ADO^{-1}) at sea (2.1% in 2003), dropped from the 2002 level and is now below the average for 1994-2002 (3.8%).

The results of the **trap survey**, initiated in 2001, indicate a decline of 53% in the CPUE of legal-size crab in 2003 (10.0 kg/conical trap) versus 2002 (21.2 kg/conical trap), which represents a cumulative drop of 51% over the past two years. This decrease is due to a downtrend in the CPUE of the residual biomass (-50%) combined with a decrease in CPUE for recruits (-60%). The abundance of prerecruits with a CW of 78 to 95 mm has been declining since 2001 (< 1 kg/trap). The mean CW of legal-size crab, up slightly since 2001, was 107.4 mm in 2003.

Outlook for 2004

The commercial CPUE rose in the late 1990s as a result of a recruitment wave. It peaked in 2001 and then fell from 46 kg/trap in 2002 to 27 kg/trap in 2003. The mean CW of legal-size crab has been stable since 1997. Recruitment indicators are expected to decrease in the short term.

In 2002 and 2003, catches and natural mortality exceeded recruitment and seriously depleted the residual biomass that had accumulated in recent years. *In light of the available information (which basically concerns only the western part of the area), a reduction in catch level is necessary in order to stabilize the stock status indicators. We recommend that catches be reduced by 30% in 2004 relative to the TAC for 2003.*

Snow crab in Area 12C

Area 12C has 5 regular fishers and features two 2 banks (north and south sectors) separated by a deep channel that is part of Jacques-Cartier Passage. The TAC (Table 4) was reduced by 15% in 2003 (261.8 t). The fishery opened on April 14 and ended on August 16, in 2003. Temporary allocations totalling 81.1 t were granted to non-crabbers. The TAC was attained.

The standardized CPUE for the commercial fishery, used for the first time in 2003, has remained near the 1994-2002 average since 2001. The mean CW of legal-size crab measured at sea has been stable since 2000 and stood at 106.6 mm in 2003, a value below the average recorded for 1995-2002. The proportion of adolescents with a CW between 78 and 95 mm (ADO^{-1}) at sea was 4% in 2003, which represents a large decrease from 2002 (9%), but remains above the average for 1995-02 (2%).

The results of the trap survey, which has been done since 2000, show that the commercial CPUE (5.6 kg/Japanese trap in 2003) was up 14% over 2002. This rise resulted primarily from an increase in the residual biomass, which went from 3.8 to 4.4 kg/Japanese trap between 2002 and 2003. The abundance of adolescents with a CW of 78 to 95 mm (ADO^{-1}) is low and has held steady at close to 0.2 kg/Japanese trap since 2000. The mean CW of legal-size crab increased by 1 mm in 2003 (106.7 mm) relative to 2001-2002.

Outlook for 2004

The commercial CPUE dropped between 1996 and 1997 and has remained at a very low level since then. The mean CW of legal-size crab followed the same trend, dropping sharply between 1997 and 1998, and exhibiting a holding pattern ever since. The trap survey conducted at the end of the 2003 fishing season indicates a slight increase in the commercial CPUE in 2004. Nonetheless, the proportion of prerecruits in the commercial fishery and the abundance indices for prerecruits and recruits in the trap survey are low, which does not point to an appreciable improvement in stock status in the short term.

Consequently, it is recommended that the status quo be maintained in the coming year so that the anticipated increase in the

commercial biomass can provide a cushion against the decreases in abundance that may occur over the longer term if Area 12C follows the downtrend observed in neighbouring areas 16 and 14.

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