



ASSESSMENT OF SOFTSHELL CLAM STOCKS IN QUEBEC COASTAL WATERS



DFO, Quebec Region

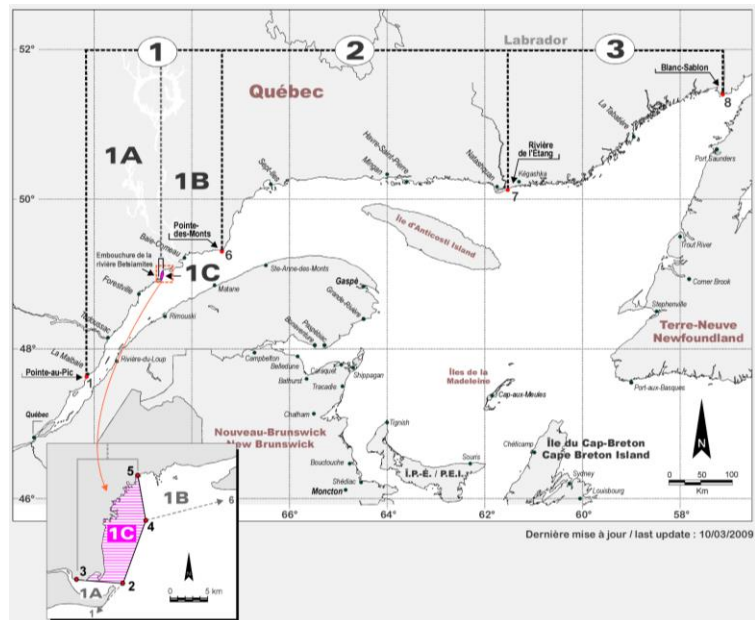


Figure 1. North Shore softshell clam fishing areas.

Context

Softshell clams are found along most of Quebec's shoreline. Recreational harvesting of softshell clams has a long history in Quebec, but this activity is poorly documented. Landings from the commercial fishery are known by region since 1917. This fishery has been practised mainly on the North Shore since the early 1970s and almost exclusively on the Upper North Shore since 1993. Quebec commercial landings reached a peak of 1,207 t in 2000.

Upper North Shore commercial activities are regulated by the number of licenses, a minimum legal size, a season and a landings quota by harvest area. For recreational harvesting, management tools include the season, the minimum legal size and the number of clams harvested per day. Only hand tools are permitted for clam harvesting, except in the Middle North Shore. The main indicators used for monitoring stocks are landings, fishing effort, demographic structure and results of clam surveys conducted from 2016 to 2019.

This Science Advisory Report is from the meeting of February 9, 2023, on the Assessment of Quebec inshore waters softshell clam. Additional publications from this meeting will be posted on the [Fisheries and Oceans Canada \(DFO\) Science Advisory Schedule](#) as they become available.

SUMMARY

- Commercial landings in Quebec have been at historically low levels since 2010. In 2022, landings (10.8 t) reached the lowest level since 1917, while they had peaked in 2000 (1,207 t).
- In 2022, 91.7% of the commercial landings were from the North Shore (9.9 t), mainly from Pointe-aux-Outardes Ouest (9.4 t, sub-area 1B). Landings were significantly lower in sub-area 1A (0.5 t). In the Magdalen Islands, landings constituted only 0.9 t, or 8.3% of the total landings in Quebec. Total allowable catches (TACs) are applied in some areas; however, they were not fully utilized due to low fishing effort.
- Fishing effort has followed the same trend as landings, and has also been very low since 2010. Effort has declined from a high of 12,142 vendor-days in 2002 to 1,111 in 2009. In 2022, there were 198 vendor-days for all of Quebec which represents one of the lowest values since 2002. The decline in effort is explained by the decreased market demands for clams.
- The sharp decline in effort has resulted in a high variability in the catch per unit effort (CPUE) in recent years and makes it difficult to detect trends in recently exploited areas.
- In 2022, the average size of landed clams ranged from 65 to 75 mm on the North Shore and from 56 to 70 mm in the Magdalen Islands. Generally, there is an upward trend in the average size of clams on the Upper North Shore. Additionally, the proportion of sub-legal size (< 51 mm) clams in landings was less than 3% in all exploited shellfish areas.
- Recreational fishing, an activity valued by coastal communities, is permitted on a major portion of Quebec's coastline. While the volume of recreational harvests remains unknown, it may be significant in some areas. It would be important to quantify the effort, removals and size structure of clams harvested during this activity.
- In the absence of an inventory of exploited areas since 2019 and given the low landings, it is not possible to provide an advice on the status of shellfish areas for the upcoming seasons. However, with the recent low commercial fishing effort, there is no concern for the conservation of harvested beds.

BACKGROUND

Biology

Softshell clams, *Mya arenaria*, are bivalve molluscs found in North American and European coastal waters. This shellfish is found throughout Quebec mainly in river estuaries and bays and lives buried in soft sediments of mud and sand. It is a sedentary species living in beds or aggregations of greater or lesser importance. Clams feed on plankton and suspended particles in the water. As a species that lives in the intertidal zone, it is generally tolerant to variations of temperature and salinity. Temperatures below -2 °C or above 28 °C are lethal for adults. In Quebec, clams take five to seven years to reach the minimum legal size of 51 mm and their maximum size can exceed 110 mm.

The sexes are separate and the sex ratio is usually even. The mean size at which 50% of individuals are sexually mature is 39–46 mm in Quebec. There is only one spawning period per year that occurs mainly in June and July. Male and female gametes are released and

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fertilisation occurs in the water column. After a pelagic larval phase of about five weeks, the larvae metamorphose, take on its adult form and settle on the sea bed.

Harvesting activities and the action of waves and storms can unearth and expose small clams to the surface. Tank and field tests showed that the time clams require to bury themselves is primarily influenced by clam size and water temperature. For example, at 20 °C, a 15–20 mm clam takes approximately one hour to completely bury itself, while at 5 °C, it takes over seven hours. Juveniles (<10 mm) bury themselves in the top few centimetres of sediment.

Experiments on sandy and silty flats showed that the rate of dispersal (or loss) is greater for small clams (15–20 mm) buried in sandy sediments.

Softshell clam populations in the Estuary and northern Gulf of St. Lawrence are genetically different from those in the Magdalen Islands and the southern Gulf, but the origin of recruitment from each bed remains unknown.

General Description of the Fishery

Softshell clam harvesting is a popular activity in the maritime regions of Quebec, because the resource is easily accessible and can be harvested without the use of specialized equipment. Commercial and recreational harvesting take place on the same coastal territory. These two activities are practised at low tide, primarily during spring tides. Maritime Quebec is divided into three large regions: the North Shore, Gaspé – Lower St. Lawrence and the Magdalen Islands. The North Shore is divided into three fishing areas: Area 1 (sub-areas 1A, 1B and 1C) corresponds to the Upper North Shore, Area 2 to the Middle North Shore and Area 3 to the Lower North Shore (Figure 1).

Coastal zones are divided into shellfish areas (Figure 2). In Quebec, as everywhere in Canada, shellfish areas are managed by the Canadian Shellfish Sanitation Program, which determines annually the classification of each area. Approved shellfish beds are open to clam harvesting, including softshell clam, and those conditionally approved are closed for a certain period of the year. No harvesting is permitted in the areas with prohibited status.

In 2022, 132 shellfish areas were classified in the Upper North Shore in which 38 were approved, 8 were conditionally approved and 86 had a prohibited status. For the other regions, there were 29 approved or conditionally approved shellfish areas in the Magdalen Islands and 18 in Gaspé–Lower St. Lawrence.

In Quebec, the minimum legal size is 51 mm for clams regardless of the type of harvest. Harvesting is done exclusively using hand tools (clam fork, shovel, etc.), except in the Middle North Shore where there are two commercial hydraulic dredge licences (inactive for several years). In addition, recreational harvesters cannot harvest more than 300 clams per day (between 5 and 15 kg). Commercial harvesting is permitted only in the Upper North Shore and the Magdalen Islands.

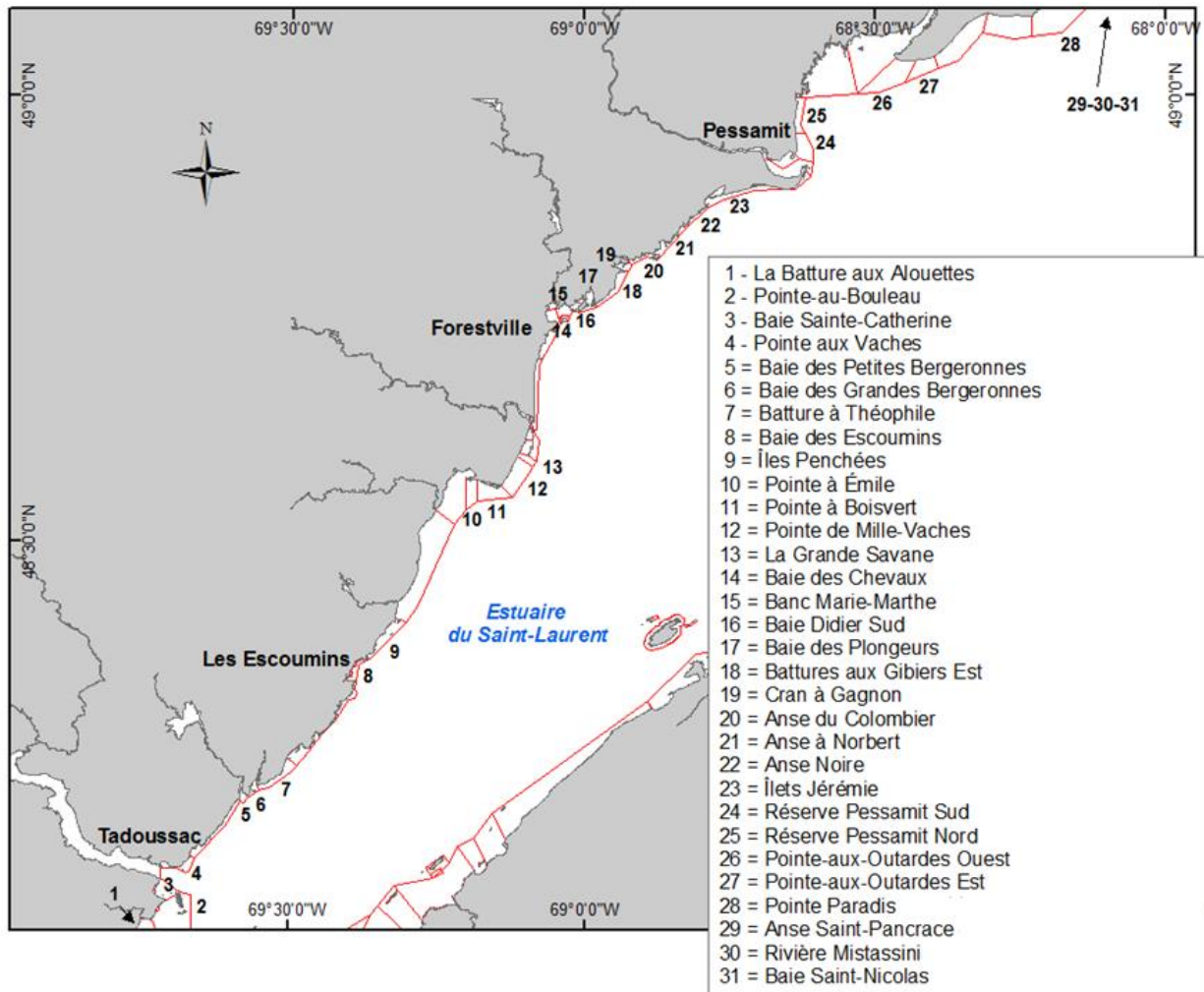


Figure 2. Location of the main shellfish areas on the Upper North Shore.

Starting in 2004, management measures have been implemented to control the commercial manual harvest. These include the minimum legal size, type of fishing gear authorized, a maximum number of licenses, fishing season, participation clause and the requirement to wear a safety vest and keep a logbook. A total allowable catch (TAC) for commercial harvesting was implemented in 2015 in 20 shellfish areas. TACs were readjusted in 2020 based on the results of scientific surveys conducted between 2016 and 2019 (Table 1). Since 2009, the Baie des Chevaux, Banc Marie-Marthe, Baie Didier Sud, Baie des Plongeurs and Cran à Gagnon areas have been exclusively reserved for commercial harvesting. Since 2015, the Baie des Petites Bergeronnes (situated in the Saguenay – St. Laurence Marine Park) is open for a spring recreational harvest that lasts a few weeks. In the Magdalen Islands, commercial harvesting is managed by a fishing season and the obligation to fill out a logbook.

Commercial fishery statistics are quite well documented and known for all shellfish areas since 2002, whereas the quantities harvested recreationally are not documented. The indicators used to assess the status of softshell clam stocks are commercial landings (t), fishing effort (vendor-days), average size (mm) of landed clams, proportion (%) of sub-legal size clams in landings, harvestable area (km²) of beds, average density (number/m²) of 20 to 50 mm clams in the entire bed, density and biomass (t) of legal size clams. The latter four indicators come from surveys

conducted from 2016 to 2019 in several areas on the Upper North Shore. The harvestable area is defined by a minimum of three contiguous stations, with an average density of legal-size clams of ≥ 16 clams/m². Typically, high density stations are found at the same location on the bed. However, this area can occasionally include isolated stations with smaller densities, providing additional harvestable areas.

ASSESSMENT

Commercial Harvesting

Since 1971, commercial harvesting has been done mainly on the North Shore (Figure 3). In the Magdalen Islands, landings have been low (<3 t) for several years and it is difficult to assess the status of this resource. There has been no commercial harvest in the Middle North Shore, the Lower North Shore, the Lower St. Lawrence or Gaspé since 2008. In 2022, total landings in Quebec were 10.8 t and reached the lowest level since 1917. They comprise of 91.7% of the landings in the North Shore (9.9 t) and 8.3% of the landings in the Magdalen Islands (0.9 t; Table 1).

From 1993 to 1999, landings on the Upper North Shore fluctuated between 289 and 745 t. They reached a peak of 1,173 t in 2000 and declined sharply afterwards. Intensive clam harvesting in numerous areas of the Upper North Shore from 1997 to 2005 (Table 1) suggests that the beds were overharvested. The decrease in landings is primarily due to the reduction in yields (declining resource) and, in turn, to the lack of interest by harvesters in this fishery. This has led to the closure of two softshell clam processing plants on the Upper North Shore. The low landings from 2010 to 2014 and since 2017¹ can be explained by the lack of processing plants. The TACs have not been fully utilised since their introduction in 2015, except in one shellfish area in 2015 and in three areas in 2016 (Table 1).

¹ One plant was open from the spring of 2015 to the fall of 2016 in Forestville.

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Table 1. Softshell clam commercial landings (t, live weight) and current TAC (t, live weight) adjusted in 2020 in the Upper North Shore and cumulative landings by region/sub-area and for Quebec as a whole. Areas marked with an asterisk* are exclusively reserved for commercial fishing.

Sub-area, Area or region	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	TAC
1A- Baie des Petites Bergeronnes	16	32	26	115	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1A- Baie des Grandes Bergeronnes ¹	-	22	100	-	75	28	14	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1A- Batture à Théophile	< 0,1	-	-	-	0,9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0,4
1A- Baie des Escoumins ¹	-	-	-	-	-	62	11	22	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1A- Iles Penchées	5	5	7	2	6	-	-	-	-	-	-	-	-	-	0,3	-	-	-	-	-	-	5
1A- Pointe à Émile	-	2	0,3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
1A- Pointe à Boisvert	125	49	24	21	12	4	1	0,5	-	-	0,1	-	-	-	-	-	-	0,4	0,4	0,5	0,4	0,5
1A- Pointe de Mille-Vaches	32	137	62	20	8	2	0,1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6
1A- Baie des Chevaux *	82	59	45	27	10	4	5	3	1	0,7	2	2	0,6	2	11	3	2	3	1,8	1,4	0,1	20
1A- Banc Marie-Marthe *	233	118	49	11	13	11	13	12	1	0,7	0,3	1	2	16	19	3	1	0,9	2,4	1,1	-	12
1A- Baie Didier Sud *	3	19	12	8	5	2	0,2	0,7	F ²	F	F	F	F	F	2	-	0,7	0,4	0,1	0,1	-	4
1A- Baie des Plongeurs *	30	17	27	32	18	4	0,5	-	F	F	F	F	F	F	3	1	4	0,2	0,8	0,9	-	10
1A- Battures aux Gibiers Est	2	3	0,5	-	-	-	0,4	-	-	-	-	-	-	-	1	F	F	-	-	-	-	0,5
1A- Cran à Gagnon *	27	14	7	3	2	2	1	0,1	-	-	< 0,1	< 0,1	0,4	8 ³	5 ³	1	0,4	0,1	-	-	-	5
1A- Rivière Blanche ¹	-	24	5	-	-	13	11	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1A- Anse du Colombier	10	17	23	22	5	4	3	2	-	-	-	< 0,1	0,1	2	4	0,5	0,5	< 0,1	-	-	-	7
1A- Anse à Norbert	13	0,4	1	0,2	2	0,6	0,2	-	0,1	-	-	0,1	0,1	-	1 ³	-	-	-	-	-	-	1
1A- Anse Noire	4	2	4	4	2	1	< 0,1	0,2	-	-	-	-	-	< 0,1	1 ³	-	-	-	-	-	-	0,5
1A- Îlets Jérémie	31	23	30	35	9	12	8	11	9	-	0,1	< 0,1	0,4	0,1	6	-	-	-	-	0,9	-	15
1B- Pointe-aux-Outardes Ouest ⁴	150	154	136	60	62	24	14	8	-	7	6	6	18	17	19	17	23	16	16	14,9	9,4	30
1B- Pointe-aux-Outardes Est ⁴	-	-	-	19	9	7	12	20	9	3	3	8	2	5	7	-	0,3	0,2	0,1	0,1	-	7
1B- Rivière Mistassini	4	3	2	5	5	-	-	0,1	-	-	-	-	-	-	-	-	-	-	-	-	-	3
1B- Baie Saint-Nicolas	10	15	10	17	9	-	-	-	-	-	-	1	0,1	-	0,1	-	-	-	-	-	-	1
1 C- Réserve Pessamit Sud	154	129	304	214	100	98	80	82	38	-	0,5	-	-	21	5	-	-	-	-	-	-	50
1A et 1B- Other areas ⁵	-	15	10	-	1	0,6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Upper North Shore	930	859	886	614	354	279	176	190	57	11	12	19	23	72	85	26	32	21	21,5	19,9	9,9	-
Sub-area 1A	613	499	318	299	92	46	34	29	11	1	2	3	4	29	53	8	9	5	5,4	4,9	0,5	-
Sub-area 1B	163	172	148	101	87	31	26	27	9	10	9	15	19	22	27	17	23	16	16	15	9,4	-
Sub-area 1C	154	129	304	214	100	98	80	82	38	-	0,5	-	-	21	5	-	-	-	-	-	-	-
Depuration ¹	-	59	115	-	75	103	36	51	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Magdalen Islands	-	-	-	0,1	0,4	0,5	1,0	0,5	0,9	0,1	0,8	1,2	1,3	0,8	0,7	0,9	2,8	2,3	1,5	1,3	0,9	-
Quebec⁶	1 028	883	886	615	354	280	177	190	58	11	13	20	24	73	86	27	35	24	23	21,2	10,8	-

¹ Restricted or prohibited status area (depuration from 2002 to 2009)

² F = Shellfish area closed for conservation

³ TAC reached

⁴ The Pointe-aux-Outardes area was split into Pointe-aux-Outardes Ouest and Est in 2005

⁵ Baie Sainte-Catherine (depuration), Saint-Paul-du-Nord, La Grosse Pointe et Franquelin (depuration).

⁶ Include all commercial landings in Quebec (North Shore, Gaspé – Lower St. Lawrence and Îles-de-la-Madeleine).

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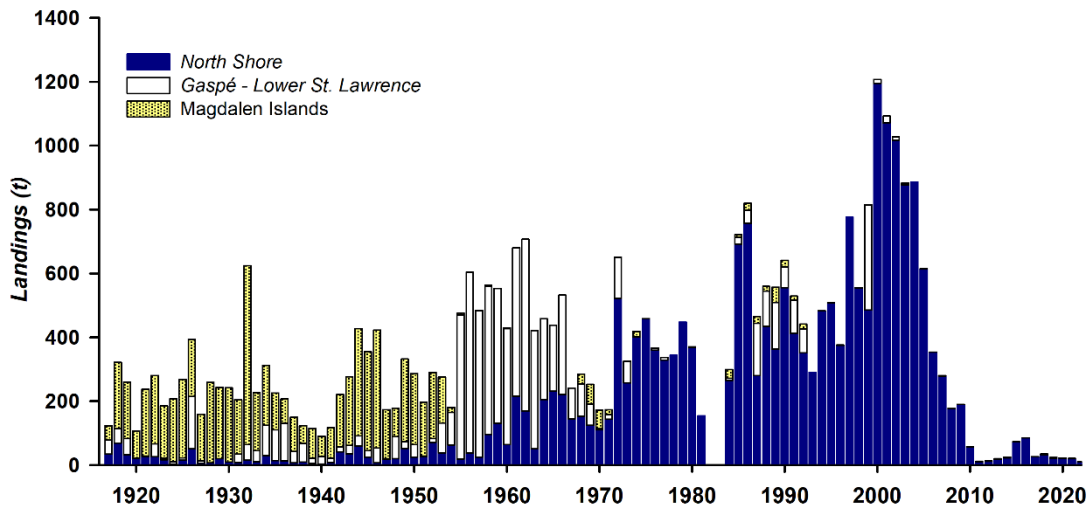


Figure 3. Annual Softshell clam commercial landings by Quebec region.

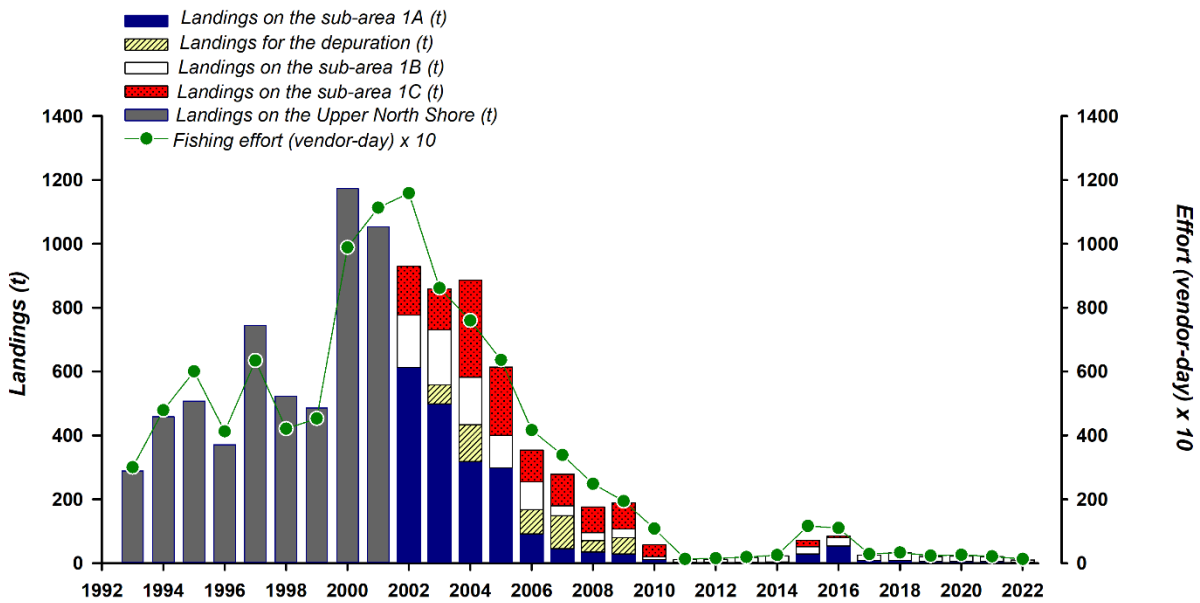


Figure 4. Annual commercial landings of softshell clams by sub-area and fishing effort for all of the Upper North Shore.

Since 2010, commercial landings have only been reported in a few areas: Pointe à Boisvert, Baie des Chevaux, Banc Marie-Marthe, Baie Didier Sud, Baie des Plongeurs, Cran à Gagnon, Anse du Colombier and Îlets Jérémie in sub-area 1A, Pointe-aux-Outardes Ouest and Pointe-aux-Outardes Est in sub-area 1B and Réserve Pessamit Sud in sub-area 1C (Table 1).

There is generally a relatively good relationship between fishing effort and landings on the Upper North Shore (Figure 4). However, the interpretation that overharvesting occurred in the early 2000 is supported by the fact that the decline in landings that began in 2001 clearly preceded the sharp decline in fishing effort that began in 2003. Fishing effort continued to gradually decline, from 11,586 vendor-days in 2002 to 1,083 vendor-days in 2010. The decline in effort and landings is attributable to the ongoing decline in the number of commercial

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harvesters involved in the fishery. In 2022, the effort was 130 vendor-days in the Upper North Shore and represents one of the lowest values since 2002 (Figure 4).

The average annual catch per unit effort (CPUE, kg/vendor-days) is calculated by shellfish harvest area (Table 2). They were relatively stable between 2002 and 2009 (the year prior to the closure of the processing plants). However, the sharp decline in effort has resulted in high variability in CPUE estimates in recent years and makes it difficult to detect trends in recently exploited areas (Table 2).

The average size of clams landed from 2020 to 2022 ranged from 65 to 75 mm (Table 3). Generally, there is an upward trend in the average size of clams of the Upper North Shore. The number of samples per sub-area is sometimes limited given the low fishing effort in recent years. A high proportion of sub-legal size clams (<51 mm) in the landings would be a likely indication that the quantity of legal size clams is low and that harvesters are switching to smaller clams. However, this proportion has been low over the last three years and has remained below 3%.

Sources of Uncertainty

Sharing the territory between commercial and recreational harvesters, combined with the lack of information from the recreational component, makes it difficult to assess the landings and total effort on various beds in the Upper North Shore. It would be important to quantify the effort, removals and size structure of recreational fishery, which is also a source of mortality among juveniles.

There is a certain level of uncertainty in the calculation of fishing effort expressed as vendor-days and consequently in the catch per unit of effort (kg/vendor-days). The actual number of harvesters involved is unknown. In addition, the harvester/seller ratio may have changed over the years, primarily between the early 2000s when fishing was intensive, and recent years. In this case, the CPUE could reflect performance or the number of harvesters and not the status of the resource. It is essential to make stakeholders in this fishery aware of the importance of having a real picture of the fishing effort deployed. The effort presented is, however, a minimum estimate of the real effort.

Environmental variations (weather conditions or abnormal tidal ranges) can also affect some fishery indicators, such as fishing effort. In addition, the increasing frequency of storm surges, shoreline erosion and reduced ice cover are also variables that could have a negative impact on softshell clam populations, on the recovery of certain beds, especially those in sandy sediments, and on recruitment to the population.

These various sources of uncertainty limit the interpretation of the indicators and could therefore result in a poor fit between the conclusions in this advice and the actual status of the resource.

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Table 2. Catch per unit effort (kg/vendor-days) by shellfish area on the Upper North Shore. Areas followed by an asterisk are reserved exclusively for commercial fishing.*

Sub-area, area or region	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
1A- Baie des Petites Bergeronnes	78	86	91	96	-	-	-	103	-	-	-	-	-	-	-	-	-	-	-	-	-
1A- Baie des Grandes Bergeronnes	-	542	452	-	121	101	105	102	-	-	-	-	-	-	-	-	-	-	-	-	-
1A- Batture à Théophile	-	-	-	-	66	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1A- Baie des Escoumins	-	-	-	-	-	135	87	109	-	-	-	-	-	-	-	-	-	-	-	-	-
1A- Iles Penchées	68	63	72	53	55	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1A- Pointe à Émile	-	36	48	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1A- Pointe à Boisvert	52	56	63	68	52	49	32	76	-	-	21	-	-	-	-	-	-	39	31	40	29
1A- Pointe de Mille-Vaches	82	83	78	64	49	56	43	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1A- Baie des Chevaux *	110	101	106	97	84	87	73	109	76	63	55	94	67	94	88	109	66	134	107	242	41
1A- Banc Marie-Marthe *	103	108	113	83	89	81	92	109	106	69	24	52	63	103	90	73	63	91	113	152	-
1A- Baie Didier Sud *	62	91	96	80	80	93	62	104	-	-	-	-	-	-	111	-	53	121	45	93	-
1A- Baie des Plongeurs *	80	84	96	108	73	63	94	-	-	-	-	-	-	-	123	100	80	64	170	159	-
1A- Battures aux Gibiers Est	70	101	44	-	-	-	76	-	-	-	-	-	-	-	135	-	-	-	-	-	-
1A- Cran à Gagnon *	80	73	96	53	50	59	63	-	-	-	-	-	65	92	81	55	-	46	-	-	-
1A- Rivière Blanche	-	205	240	-	-	98	99	107	-	-	-	-	-	-	-	-	-	-	-	-	-
1A- Anse du Colombier	57	83	88	94	61	53	58	67	-	-	-	-	44	61	48	38	42	14	-	-	-
1A- Anse à Norbert	95	100	83	81	63	60	59	-	-	-	-	-	24	-	41	-	-	-	-	-	-
1A- Anse Noire	86	69	83	99	60	58	-	22	-	-	-	-	-	-	102	-	-	-	-	-	-
1A- Îlets Jérémie	93	87	111	117	107	88	108	127	135	-	-	-	71	-	130	-	-	-	-	-	229
1B- Pointe-aux-Outardes Ouest	-	-	-	92	120	80	52	72	-	85	76	82	75	83	57	101	107	93	80	86	84
1B- Pointe-aux-Outardes Est	-	-	-	83	79	71	55	90	83	62	73	106	73	74	51	-	18	28	14	18	-
1B- Rivière Mistassini	98	145	173	110	93	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1 B- Baie Saint-Nicolas	114	99	106	107	143	-	-	-	-	-	-	84	39	-	45	-	-	-	-	-	-
1 C- Réserve Pessamit Sud	72	110	125	80	57	62	66	86	37	-	63	-	-	34	42	-	-	-	-	-	-

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Table 3. Average size (mm) of clams landed by shellfish area for the Upper North Shore and number of individuals measured by sub-area. Areas followed by an asterisk are exclusively reserved for commercial fishing.*

Shellfish area	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Sub-area 1A																		
Petites Bergeronnes	-	-	-	59	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Îles Penchées	-	-	-	-	-	-	-	-	-	-	-	58	-	-	-	-	-	-
Pointe à Boisvert	59	61	60	58	-	-	-	67	-	-	-	-	-	-	-	-	-	-
Pointe de Mille-Vaches	69	57	66	58	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Baie des Chevaux *	62	58	59	59	56	-	-	67	-	-	60	65	-	72	-	-	-	75
Banc Marie-Marthe *	60	60	64	62	62	-	-	-	-	-	65	65	67	74	73	74	74	67
Baie Didier Sud *	-	50	53	-	52	-	-	-	-	-	-	61	-	72	71	-	-	-
Baie des Plongeurs *	53	50	54	50	-	-	-	-	-	-	-	64	69	71	-	-	72	67
Battures aux Gibiers Est	-	-	-	-	-	-	-	-	-	-	-	64	-	-	71	-	-	-
Cran à Gagnon *	-	49	57	60	58	-	-	-	-	-	59	62	-	-	-	-	-	-
Anse du Colombier	-	57	-	53	57	58	-	-	-	-	58	58	-	-	-	-	-	65
Anse à Norbert	-	-	-	52	-	-	-	-	-	-	-	60	-	-	-	-	-	-
Anse Noire	-	-	-	-	-	-	-	-	-	-	-	58	-	-	-	-	-	-
Îlets Jérémie	-	-	-	55	56	64	-	-	-	-	-	61	-	-	-	-	70	-
Sub-area 1B																		
Pointe-aux-Outardes Ouest	73	73	74	78	71	75	74	69	64	66	69	72	66	65	67	-	-	67
Pointe-aux-Outardes Est	-	64	65	66	71	65	-	-	66	-	66	67	-	-	-	-	-	-
Rivière Mistassini	-	57	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Baie Saint-Nicolas	53	53	-	-	-	-	-	-	-	-	-	60	-	-	-	-	-	-
Sub-area 1C																		
Réserve Pessamit Sud	62	65	61	58	59	62	-	-	-	-	65	74	-	-	-	-	-	-
Number of individual measured																		
Sub-area 1A	2 867	6 090	10 507	7 554	11 027	774	0	294	0	0	6 182	7 241	600	1 493	451	600	750	1 218
Sub-area 1B	7 265	7 425	4 364	5 382	4 506	5 554	600	1 500	1 800	1 994	4 956	4 654	1 200	1 050	900	0	0	308
Sub-area 1C	2 446	3 036	3 618	3 321	3 191	3 547	0	0	0	0	3 032	150	0	0	0	0	0	0

CONCLUSIONS AND ADVICE

Since 2010, landings and fishing effort on the Upper North Shore have been low, due in part to the closure of processing plants. In most shellfish areas, the TACs have not been fully utilised since 2015 (Table 1). The decline in harvesting seems to have facilitated stock recovery in some areas, as shown by the results of recent surveys. However, caution must continue to be exercised. In a context of environmental change, the return to most sustainable harvesting conditions in some areas, such as Pointe à Boisvert, appears to be more problematic. Frequent sediment agitation on the flats, particularly those with sandy sediments, makes it more difficult for young clams to settle and burrow and can compromise recruitment to the population and, in turn, recruitment to the fishery on these beds.

In addition, in the absence of specific information on the source of recruitment to the population on various beds, it is recommended to protect the reproductive potential of each shellfish area.

To mitigate the incidental mortality caused by the fishery, it is recommended to prohibit any harvesting when the air temperature is ≤ 0 °C.

OTHER CONSIDERATIONS

The recommended conservation measures for clams are aimed at preserving the capacity of each bed to regenerate itself. Any approach aimed at maintaining or even increasing the reproductive potential of each shellfish area, either by leaving more adults on the bottom or by creating refuge areas, will have a positive impact on the conservation of the resource. In addition, as the production of gametes is proportional to the cube of the clam's length, there will be a net gain in productivity by allowing individuals to grow.

Finally, timely environmental events (e.g., breaking waves, storms) and shoreline erosion can have a major impact on clam beds and completely reshape their habitat. These effects may also differ from one bed to another. The acidification of the water and changes in salinity could also affect the survival of larvae, juveniles and adults. It would be appropriate to monitor ecosystem status to detect any changes that could affect directly clam populations.

Assessment Schedule

The softshell clam in Quebec's coastal waters is assessed and managed on a three-year cycle. Given the low fishing effort deployed and in accordance with the resource management, no update is planned in the intervening years.

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SOURCES OF INFORMATION

This Science Advisory Report is from the February 9, 2023, regional peer review meeting on assessment of Softshell Clam stocks in Quebec coastal waters. Additional publications from this meeting will be posted on the [Fisheries and Oceans Canada \(DFO\) Science Advisory Schedule](#) as they become available.

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