



Whelk in Québec Coastal Waters

Basic Information

The waved whelk, *Buccinum undatum*, is found along the west coast of the Atlantic Ocean from New Jersey to Labrador. It is very common in cold water from the tidal zone to depths of 30 metres or more. Adults spend most of their time lying immobile, half buried in sediment. Whelk growth is slow in the northern part of the Gulf of St. Lawrence. Size at sexual maturity varies with sex and fishing area. Fertilization occurs internally, and the females lay their eggs in capsules which are attached to a substrate. The young emerge from the capsules after five to eight months of development.

The whelk fishery is coastal and is often practised from small boat, using pyramid-type traps. Québec waters are divided into 15 fishing areas. The fishery is regulated by controlling the number of licences and the numbers and sizes of traps. The commercial fishery has expanded in the course of the 1990s, with most harvesting occurring on the North Shore.

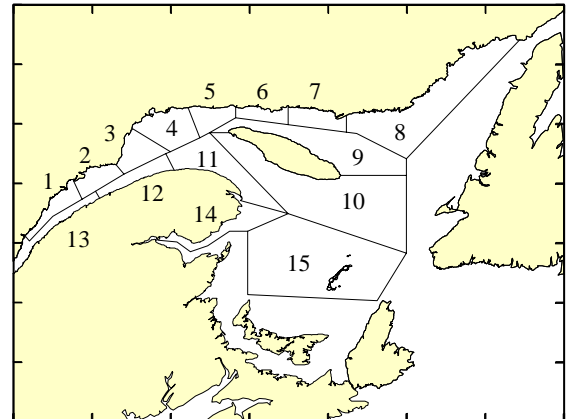


Figure 1. Whelk management units in Québec.

Summary

- The region comprises 15 management units, and the fishery is regulated by controlling the number of licences and the numbers and sizes of traps. In 1999, 281 whelk licences were issued, but only 58 were used.
- Whelk landings in 1999 were 1,430 t, up 70% from 1998 and 25% higher than the average for the past five years. Almost 95% of the year's landings were made on the North Shore.
- In 1999, fishing effort, in terms of number of trips, was up 24% from 1998 and 12% higher than the annual average for 1995 to 1999.
- From 1995 to 1999, yields were relatively stable in most areas, but in areas 5 and 6, where fishing pressure has been heavy for a number of years, yields are in decline.
- Since 1996, the size structure of commercial catches has been relatively stable, but in some areas catches have included a high proportion of specimens that have not yet attained sexual maturity.
- It is essential that minimum legal catch size be set at 70 mm or more, this being

the average size at which 50% of specimens have reached sexual maturity.

- Better measures to control fishing effort are also needed, since it is likely that fishing capacity (a long season and large number of inactive licences) exceeds the productivity of the resource.

Biology

The waved whelk, *Buccinum undatum*, is a gastropod mollusc that is found along the western Atlantic coast from New Jersey to Labrador, including the Gulf of St. Lawrence. It is very common in cold water, from the tidal level to depths of 30 metres or more. The whelk is a necrophagous predator, feeding mainly on polychaetes, molluscs and echinoderms.

In the northern part of the Gulf of St. Lawrence, the whelk grows slowly but can reach a size of 110 mm. According to the literature, its life span is approximately 15 years.

In 1998, a study was conducted to determine size at maturity (H_{50}) applicable in most fishing areas. By convention, this is the size at which 50% of individuals have reached sexual maturity. Sexual maturity in males is attained when the ratio of penis length to shell height reaches 0.5 or more, while in females maturity is defined by a gonad index (ovary and oviduct) of 6% or more.

Size at maturity varies between the sexes and from one area to another (Table 1) and is generally greater in the female. The average size at maturity for all areas studied is 69.5 mm for males and 71.6 mm for females.

Fertilization takes place internally. On the North Shore, the mating season runs from May until July, and the eggs are laid two to three weeks after mating. The eggs are enclosed in chitin capsules stuck together in a clump several centimetres across attached

to a substrate. Each capsule may contain on average 2,700 eggs. In the northern Gulf of St. Lawrence, the young emerge from the capsules after some five to eight months of development. The absence of a planktonic larval stage limits the whelk's capacity for dispersal, thus reducing the chances of quickly recolonizing overfished sites.

Table 1. Size at sexual maturity (mm) by sex and fishing area.

Region	Area	Male	Female
North Shore	1	65.0	66.2
	2	63.8	68.8
	3	74.4	79.3
	4	71.2	71.1
	5	75.0	79.9
	6	76.5	78.9
	7	57.8	64.6
	8		
Gaspé	11	72.2	65.1
	12	72.5	
	13	66.1	70.5
	14		
Îles-de-la-Madeleine	15		
Mean		69.5	71.6

The adults lead a sedentary life, spending most of their time immobile and half buried in the sediment. It is highly likely that this behaviour, together with the absence of a larval phase, limits mixing with adjoining populations. However, whelk can move quite far and fast when food or predators are present.

The fishery

There are 15 whelk management units in Québec waters. areas 1 to 8 are along the North Shore, areas 9 and 10 encompass Anticosti Island, areas 11 to 14 take in the Gaspé, and area 15 surrounds the Îles-de-la-Madeleine (Figure 1). Hitherto, there has been no commercial fishing on Anticosti Island.

In Québec, the whelk fishery is an inshore fishery, usually practised from small boat,

generally using traps in the shape of a pyramid on a rectangular base.

This fishery is regulated by controlling fishing effort, both by number of licences issued and by the numbers and sizes of traps authorized. In 1999, 281 welk licences were issued, but only 58 were used. The fishery is open year-round, but according to logs book, most of the catch is taken between April and October.

From 1995 to 1998, welk landings hovered around 1,000 t whole weight, peaking at 1,430 t in 1999, a 70% increase over 1998 (Figure 2). In 1999, 95% of welk landings were made on the North Shore, especially in areas 1 and 5 (Table 2). The Gaspé accounted for the remainder; landings in the Îles-de-la-Madeleine were negligible. To date, fluctuations in landings have usually reflected fishing effort rather than changes in resource abundance.

Fishing effort was up 24% in 1999 from 1998, reaching a total of 1,843 trips

(Figure 2). This enhanced effort shows up in all fishing areas along the North Shore.

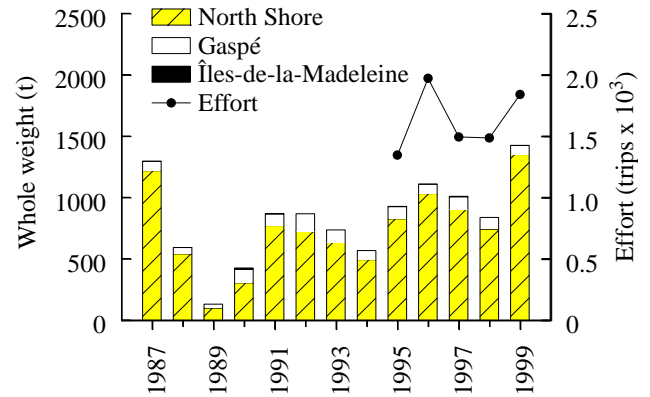


Figure 2. Welk landings (t) by region and total effort (number of trips).

Since 1995, catches per unit effort (CPUE) have generally been less than 7.0 kg per trap, except in areas 1 and 2, where yields have been very high (Table 3). In 1999, they were 18.2 kg per trap in area 1 and 15.0 kg per trap in area 2. Over the last five years, yields have been relatively stable in

Table 2. Welk landings (t of whole weight) by fishing area.

Region	Area	Year													
		1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999*	
North Shore	1							125	54	100	182	200	210	434	
	2							4	11	63	62	42	11	120	
	3	33	2	2	13	27	25	41	33	6	8	14	5	42	
	4	208	39	24	165	170	106	56	68	86	195	68	29	57	
	5	598	239	2		352	236	184	171	273	303	286	349	502	
	6	225	14	2	4	141	160	205	134	182	195	109	108	130	
	7						2		6	7	3	181	29	64	
	8	4	129		13	24	132	24	21	113	86	10	4	5	
Gaspé	11	67	45	26	83	70	70	66	26	56	52	56	49	36	
	12	6	4	5	16	21	21	32	40	23	18	21	27	20	
	13	2	4	1	14	2	51	3	6	21	6	20	18	21	
	14							0	1		1	1	1		
Îles-de-la-Madeleine	15	1	1		8	2				2	2	5		0	
Unknown		155	121	72	113	61	67								
Landings		1300	597	135	430	871	872	739	570	932	1114	1013	840	1430	

* = preliminary data

those areas where landings are below 100 t per year, but in areas 5 and 6, where fishing pressure has been heavy for several years, catches per unit effort are in decline.

The size structure of commercial whelk catches varies. Since 1996, average sizes within each area have been relatively stable from year to year (Table 4). In 1999, average size was low in areas 1, 2 and 8 on the North Shore, and this phenomenon is even more marked in area 13 in the Gaspé, with an average of 63 mm. In these areas, catches included a high proportion of immature specimens (Figure 3).

Establishment of a minimum legal catch size close to size at sexual maturity would entail return to the sea of a more or less significant portion of catches, depending on area (Table 5), and such returns would be larger in those areas where average catch sizes are low. According to commercial sampling in 1999, a minimum legal size of 70 mm would, in most areas, mean returning to the sea less than 16% of the catch, but in areas

1, 2 and 8 returns would be between 26% and 32% of catches, and in area 13 they would amount to 77%.

Table 3. Catches per unit effort (kg whole weight per trap) of whelk by fishing area, according to commercial sampling.

Region	Area	Year				
		1995	1996	1997*	1998*	1999*
North Shore	1	16.7		23.1	8.0	18.2
	2			23.8		15.0
	3				1.5	7.6
	4	5.7	6.9	7.0	6.8	6.1
	5	4.8		5.0	4.2	2.9
	6	7.5	6.7	8.4	5.5	3.7
	7				2.3	6.2
	8	5.2	1.6	0.4	5.0	5.8
Gaspé	11	3.5	2.3	3.5	6.0	4.4
	12				0.9	
	13				1.2	3.4
	14					
Îles-de-la-Madeleine	15					

* : traps having a time of immersion from 1 to 3 days

Table 4. Average size (mm) of whelk by fishing area according to commercial sampling.

Region	Area	Year							
		1992	1993	1994	1995	1996	1997	1998	1999
North Shore	1			73	68		74	76	73
	2						73	67	74
	3							89	82
	4	71	74	75	72	78	84	82	81
	5	75	80	80	77		79	81	78
	6		81	82	71	78	82	79	86
	7							76	78
	8	59	69	66	74	66	65	71	73
Gaspé	11	84	75	75	74	77	78	76	77
	12		74					76	
	13			61	67	69	65	66	63
	14								
Îles-de-la-Madeleine	15								

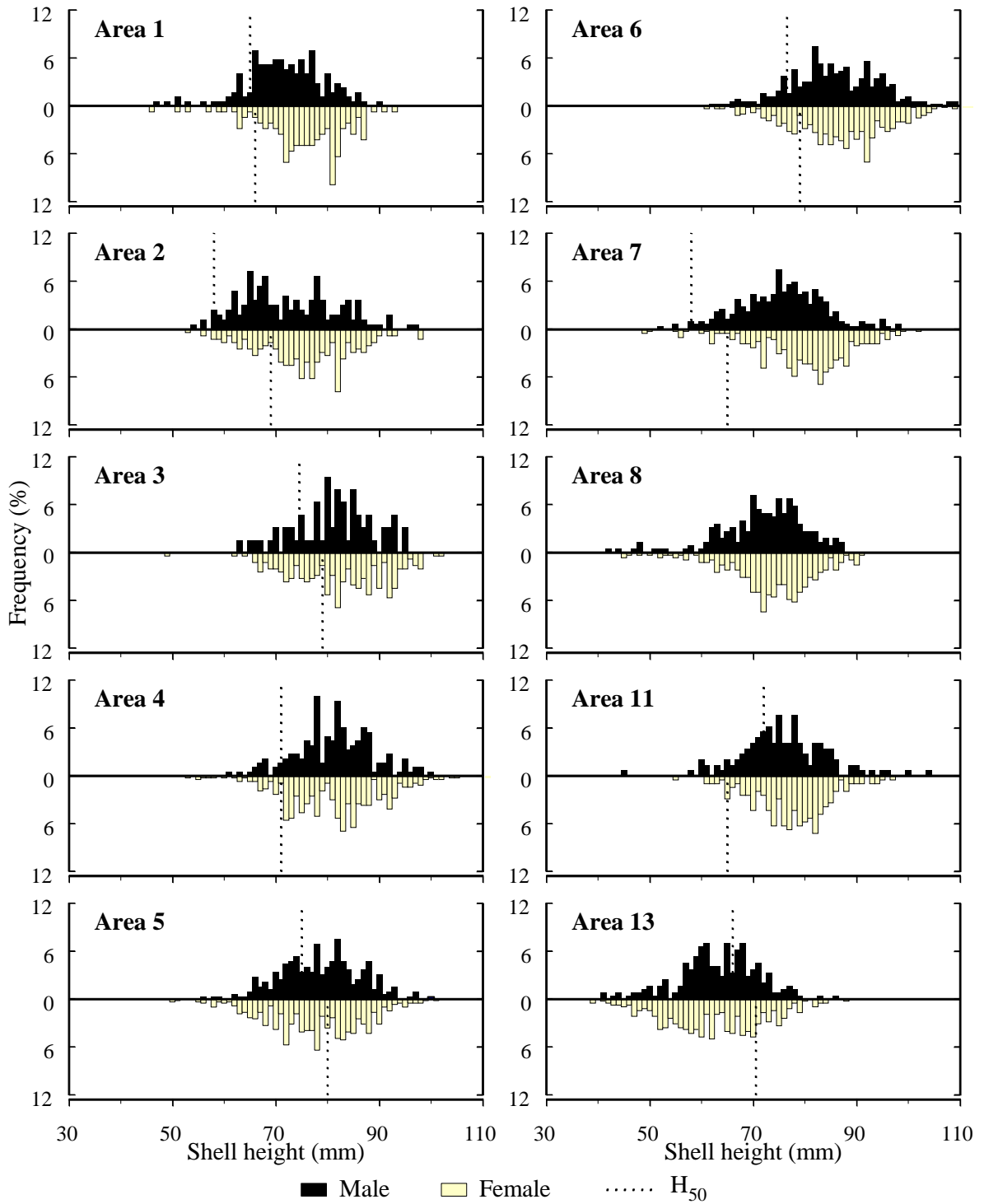


Figure 3. Whelk size structure by fishing area according to commercial sampling in 1999 and estimated size at maturity (H_{50}) in 1998.

Table 5. Returns to the sea (%) of commercial whelk catches in 1999 if a minimum legal catch size had been imposed.

Region	Area	Minimum legal catch size			
		60 mm	65 mm	70 mm	75 mm
North Shore	1	4.1	11.5	29.0	53.8
	2	4.6	14.7	32.3	49.6
	3	0.3	1.3	8.1	20.6
	4	1.0	2.3	7.8	22.6
	5	2.2	5.9	15.8	33.5
	6	0.0	1.0	3.7	9.1
	7	2.4	7.7	16.3	31.2
	8	5.1	13.8	26.4	54.1
Gaspé	11	0.9	5.1	15.9	37.5
	12				
	13	36.0	54.8	76.5	90.5
	14				
Îles-de-la-Madeleine	15				

Conservation measures

The whelk is a sedentary species in which breeding is by copulation and growth is direct (there is no planktonic larval stage to aid dispersal). These biological characteristics make the whelk vulnerable to local overfishing. The absence of measures to protect spawners, the excessive number of inactive licences in circulation (79%) and the long fishing season magnify the overharvesting hazard.

It is therefore essential that a minimum legal catch size equal to or exceeding the size at which 50% of specimens attain sexual maturity be established. In most of the areas studied, a minimum legal size of 70 mm would tend to preserve about 50% of mature whelk. Other management measures would also be needed to exercise better control over fishing effort.

These conservation measures would protect breeding potential, ensure the survival of whelk populations and boost yields.

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