

Whelk in the Coastal Waters of Québec

Basic Information

The waved whelk is found along the west coast of the Atlantic Ocean from New Jersey to Labrador. It is very common in cold water at 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. Fertilization occurs internally.

In the Gulf of St. Lawrence, whelk are harvested in the coastal fishery, often aboard small craft. Pyramid-shaped traps are widely used to harvest the species in Québec. The fishery is regulated through control of the fishing effort, that is, the number of licences and traps. In 1996, 283 whelk fishing licences were issued and at least 115 of them were used. Over the past ten years, landings have varied between 400 and 1,300 tonnes.

Overview of the Whelk

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 molluscs and other invertebrates.

In the northern part of the Gulf of the St. Lawrence, the whelk grows slowly but can reach a size of 110 mm. Its life span is approximately 15 years. The male reaches sexual maturity at 6 years of age, when it is about 70 mm in length (Figure 1). The female reaches maturity a little later, at 7 years of age, when approximately 75 mm in length. Fertilization takes place internally in whelk. Copulation occurs between May and July on the North Shore. However, females appear to lay their eggs only two to three weeks after copulation. The eggs are enclosed in capsules, which can each contain 2,700 eggs on average. In the northern part of the Gulf of the St. Lawrence, juveniles hatch out of

their capsules after 5 to 8 months of development.

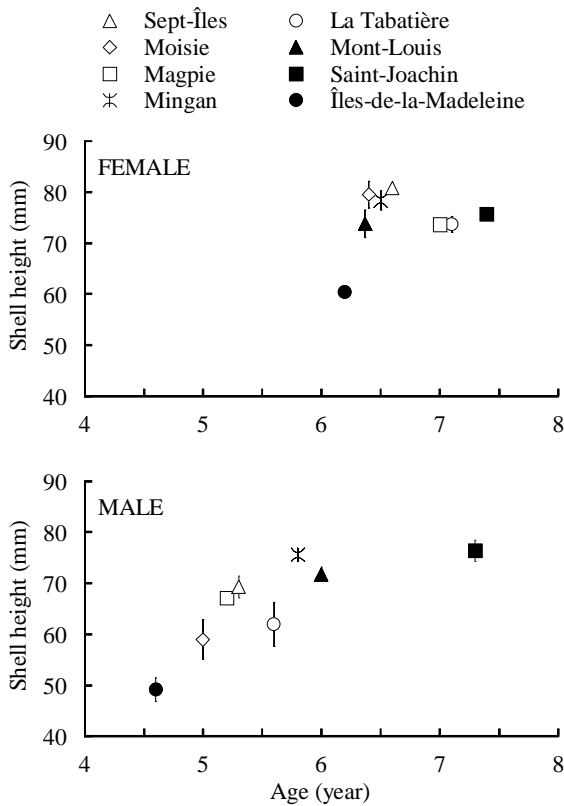


Figure 1. Age and shell height at sexual maturity, when 50 % of the individuals are mature.

Adults are immobile for most of the time, half buried in sediment. This behaviour probably limits mixing with adjacent populations. However, whelk can move fairly quickly when food or predators are present.

The whelk’s sedentary lifestyle makes it vulnerable to overharvesting. The absence of a planktonic larval phase limits its ability to disperse, reducing the possibility of quickly recolonizing overharvested sites.

The whelk’s sedentariness is an important characteristic to take into consideration when developing conservation strategies and harvesting scenarios for the species. As the purpose of resource conservation measures

is to ensure the survival of each population, they must protect the population’s ability to reproduce.

The Fishery

There are 15 whelk harvesting management units in Québec. Areas 1 to 8 are located along the North Shore, Areas 9 and 10 around Anticosti Island, Areas 11 to 14 on the Gaspé Peninsula and Area 15 around the Îles-de-la-Madeleine (Figure 2).

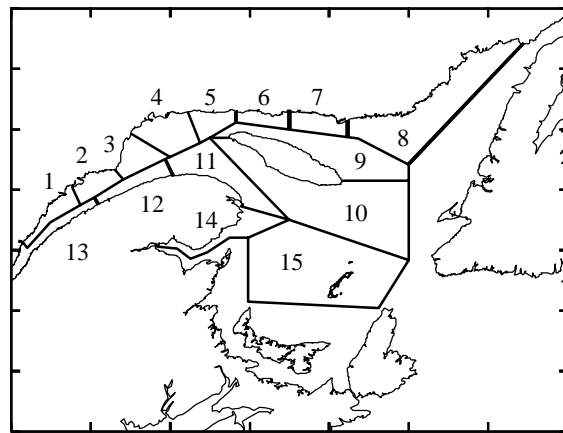


Figure 2. Whelk management units in Québec.

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Since 1995, approximately 1,000 tonnes of whelk have been landed in Québec (Figure 3). In 1996, most whelk were harvested on the North Shore (97%), with the majority of landings coming from Areas 4, 5 and 6 (Table 1).

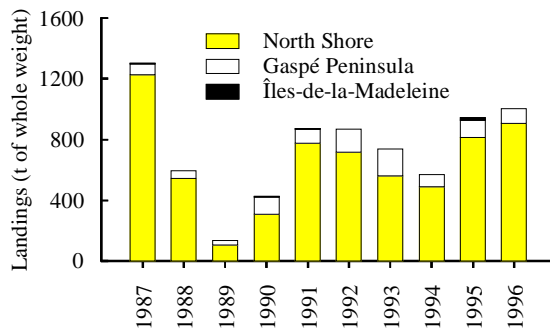


Figure 3. Whelk landings in Québec.

In 1996, there were few landings in the Gaspé Peninsula (3%) and no landings were recorded in either the Îles-de-la-Madeleine or Anticosti Island. Until now, fluctuations

in landings have more often reflected market prices rather than changes in the abundance of the resource.

The little recent data available from the commercial fishery show that catches per unit effort (CPUEs) vary considerably from one area to another. In 1995 and 1996, CPUEs were approximately 17 kg, 7 kg and 3 kg per trap in Areas 1, 4 and 11 respectively. However, within each of these areas, CPUEs did not fluctuate greatly.

There was a wide spread in size structures of whelk catches from commercial samples in 1995 and 1996, which included a large proportion of immature whelk (Figure 4).

Table 1. Welk landings in Québec (preliminary figures in t of whole weight).

	Zone	YEAR										
		1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	
North Shore	1								54	80	153	
	2								11	40	37	
	3	33	2	2	13	27	25	16	24	4	8	
	4	208	39	25	165	170	106	53	60	56	102	
	5	598	239	2		352	237	184	161	186	273	
	6	226	14	2	4	141	160	213	111	119	156	
	7							2		3	7	2
	8	4	129		13	24	132	12	21	113	83	
Anticosti	9											
	10											
Gaspé Peninsula	11	67	44	26	84	70	70	56	12	13	26	
	12	6	4	5	16	22	21	27	20	14	8	
	13	2	4	1	14	2	52	82	2	4	3	
	14								< 1			
Îles-de-la-Madeleine	15	1	1		8	2				13		
Others/Unknown		155	121	72	113	61	67	96	91	294	152	
	Total	1300	597	135	430	871	872	739	570	943	1003	

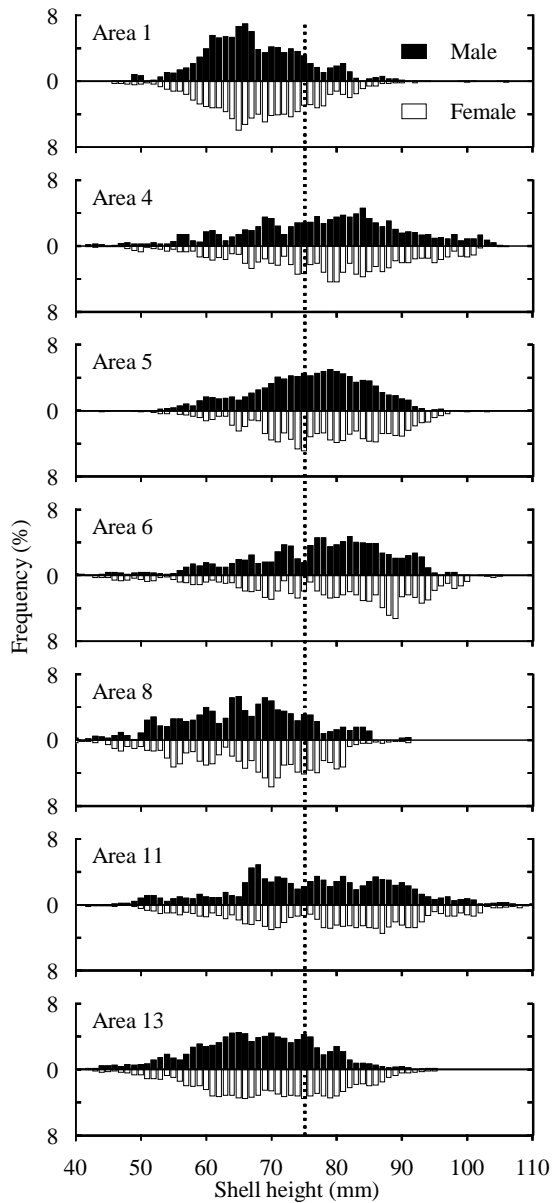


Figure 4. Shell height frequency distribution of whelks in commercial samples in 1995 (areas 1 and 5) and in 1996 (areas 6, 8, 11 and 13). The dotted line indicates the shell height at which 50 % of the individuals are mature.

The mean shell height is particularly small in Area 1 on the Upper North Shore, Area 8 on the Lower North Shore and Area 13 in the Gaspé Peninsula. However, mean shell

height has remained relatively constant within areas over the years (Table 2).

Table 2. Mean shell height of whelks in commercial samples.

Area	1992	1993	1994	1995	1996
1			73	68	
2					
3					
4	71	74	75	72	78
5	75	80	80	77	
6		81	82	71	78
7					
8	59	69	66	74	66
9					
10					
11	84	75	75	74	78
12		74			
13			61	67	69
14					
15					

Inter-regional differences in the size structures of commercial catches could be due to intraspecific variability in growth or the difference in harvesting rates between areas. We are unable to draw any conclusions on the status of the resource on the basis of our current knowledge of the whelk fishery in Québec waters.

Conservation

Experience acquired in managing fishery resources shows that an effective approach to conservation requires the implementation of adequate regulations. As the volume of whelk harvesting is closely related to market development, it is uncertain whether the few regulations currently in effect (to control the effort) are sufficient to avoid localized over-fishing of the resource, given that current fishing power potential is probably greater than the productivity of the resource.

Current fishing practices and the whelk's sedentary habits make this species vulnerable

to overharvesting. The fishing pattern that has developed, namely to catch all whelk regardless of their size, could lead to local overharvesting and destroy the population's reproductive potential.

The use of quotas by management unit would probably not be useful to avoid this type of local overfishing. From a biological and economic point of view, it would be more appropriate to institute a minimum catch size based on size at sexual maturity. This would protect the species' reproductive potential, ensure its survival and increase the yield per recruit.

However, it is difficult to determine the exact target size that would protect a sufficient proportion of spawners and guarantee that the fishery would be maintained. For most of the areas studied (except Îles-de-la-Madeleine, where the whelk's size at maturity is smaller), a minimum legal size of 75 mm (shell height) would allow approximately 50% of breeding females and almost all mature males to be preserved. In the short term, such a measure could have a significant effect on fishing activities in some areas. However, it is possible that a smaller legal size (around 70 mm) would be sufficient to ensure the survival of the resource.

For more information:

Gendron, L. 1992. Determination of the size at sexual maturity of the waved whelk *Buccinum undatum* Linnaeus, 1758, in the Gulf of St. Lawrence, as a basis for the establishment of a minimum catchable size. *J. Shellfish Res.* 11: 1-17.

Gendron, L. 1991. Gestion de l'exploitation du buccin *Buccinum undatum* au Québec: détermination d'une taille minimale de capture. *Can. Tech. Rep. Fish. Aquat. Sci.* 1833: 40 p.

Martel, A., D. H. Larrivée and J. H. Himmelman. 1986. Behaviour and timings

of copulation and egg-laying in the neogastropod *Buccinum undatum* L. *J. Exp. Mar. Biol. Ecol.* 96: 1-13

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