

Quaternary Vertebrates of Québec: a Summary Les vertébrés du Quaternaire au Québec : les connaissances actuelles

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Résumé de l'article

Au Québec, le seul représentant connu de la mégafaune nord-américaine disparue est un Mastodonte d'Amérique dont les restes ont été découverts à la pointe de Chambord, au Lac-Saint-Jean. Les mammifères marins ont joué un rôle de premier plan en ce qui a trait à notre connaissance des vertébrés du Quaternaire québécois depuis que, vers 1749, Per Kalm a été informé de la découverte d'un squelette de baleine non loin du Saint-Laurent. Cinq espèces de baleines bien adaptées aux conditions côtières ont été identifiées dans des dépôts tardi-glaciaires de l'époque de la Mer de Champlain. Les ossements découverts sont ceux de bélugas, mais aussi ceux de narvals, de marsouins communs, de rorquals à bosse et communs et de baleines boréales. Des restes de phoques (annelés, du Groenland, barbus et communs) ont aussi été identifiés, de même que ceux de morsés, mis au jour à Sainte-Julienne-de-Montcalm et à Saint-Nicolas. Les sablières de Saint-Nicolas (poissons de fond, oiseaux marins, phoques annelés et bélugas) et de Saint-Césaire (poissons, eiders, phoques annelés et bélugas) ont livré une importante quantité de fossiles de vertébrés de la Mer de Champlain ainsi que de l'information paléoenvironnementale. Plusieurs restes de vertébrés en bon état ont été trouvés dans des concrétions calcaires d'Eardley et de Breckenbridge, dans la région de Gatineau. Il est possible que la faune cavernicole prenne une importance accrue lors de l'établissement de la séquence de la faune vertébrée du Quaternaire québécois. Les découvertes faites dans les cavernes situées près de Saint-Elzéar et de La Rédemption, en Gaspésie, et dans les cavernes Mine et Laflèche, dans la région de Gatineau, en ont d'ores et déjà fourni un aperçu fascinant. Une liste de dates au radiocarbone obtenues à partir des spécimens de vertébrés du Quaternaire découverts au Québec est fournie.

Notes

QUATERNARY VERTEBRATES OF QUÉBEC: A SUMMARY

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ABSTRACT The only representative of the extinct North American megafauna known from Québec is an American mastodon from Pointe de Chambord, Lac-Saint-Jean. Marine mammals have played a prominent part in our knowledge of the Quaternary vertebrates of Québec since Per Kalm was informed of a whale skeleton found inland from the St. Lawrence River about 1749. Five species of whales particularly adapted to inshore conditions have been reported from Late-glacial deposits of Champlain Sea age. The bones represent mainly white whales, but also narwhals, harbour porpoise, humpback, common finback and bowhead whales. Seals (ringed, harp, bearded and harbour) have also been discovered, and walrus remains are known from Sainte-Julienne-de-Montcalm and Saint-Nicolas. Sandpits at Saint-Nicolas (bottom-dwelling fishes, seabirds, ringed seal and white whale) and Saint-Césaire (fish, eider duck, ringed seal and white whale) have yielded important Champlain Sea vertebrate fossils, as well as paleoenvironmental information. Many well-preserved vertebrate remains have been found in calcareous nodules from Eardley and Breckenridge in the Gatineau area. Perhaps cave faunas will become increasingly important in sorting out the Quaternary vertebrate faunal sequence in Québec. The finds from caves near Saint-Elzéar and La Rédemption in Gaspésie, as well as Mine and Lafèche caves in the Gatineau region have already yielded fascinating insights. A list of radiocarbon dates on Quaternary vertebrates from Québec is provided.

RÉSUMÉ *Les vertébrés du Quaternaire au Québec : les connaissances actuelles.* Au Québec, le seul représentant connu de la mégafaune nord-américaine disparue est un Mastodonte d'Amérique dont les restes ont été découverts à la pointe de Chambord, au Lac-Saint-Jean. Les mammifères marins ont joué un rôle de premier plan en ce qui a trait à notre connaissance des vertébrés du Quaternaire québécois depuis que, vers 1749, Per Kalm a été informé de la découverte d'un squelette de baleine non loin du Saint-Laurent. Cinq espèces de baleines bien adaptées aux conditions côtières ont été identifiées dans des dépôts tardi-glaciaires de l'époque de la Mer de Champlain. Les ossements découverts sont ceux de bélugas, mais aussi ceux de narvals, de marsouins communs, de rorquals à bosse et communs et de baleines boréales. Des restes de phoques (annelés, du Groenland, barbus et communs) ont aussi été identifiés, de même que ceux de morses, mis au jour à Sainte-Julienne-de-Montcalm et à Saint-Nicolas. Les sablières de Saint-Nicolas (poissons de fond, oiseaux marins, phoques annelés et bélugas) et de Saint-Césaire (poissons, eiders, phoques annelés et bélugas) ont livré une importante quantité de fossiles de vertébrés de la Mer de Champlain ainsi que de l'information paléoenvironnementale. Plusieurs restes de vertébrés en bon état ont été trouvés dans des concrétions calcaires d'Eardley et de Breckenridge, dans la région de Gatineau. Il est possible que la faune cavernicole prenne une importance accrue lors de l'établissement de la séquence de la faune vertébrée du Quaternaire québécois. Les découvertes faites dans les cavernes situées près de Saint-Elzéar et de La Rédemption, en Gaspésie, et dans les cavernes Mine et Lafèche, dans la région de Gatineau, en ont d'ores et déjà fourni un aperçu fascinant. Une liste de dates au radiocarbone obtenues à partir des spécimens de vertébrés du Quaternaire découverts au Québec est fournie.

INTRODUCTION

Perhaps the earliest known connection between Québec and ice age mammals involves the 1739 expedition from Montréal under the leadership of Charles Le Moyne, Baron de Longueuil. His party found fossil bones and teeth while travelling down the Ohio River toward the Mississippi. But it was not until 1799 that the great French anatomist Baron Cuvier first recognized that the specimens belonged to an elephant-like animal he called mastodon ("nipple tooth" because of the characteristic paired cusps), now known as the American mastodon (*Mammuth americanum*) (Harrington, 1996).

Marine mammals have played a prominent part in our knowledge of the Quaternary vertebrate history of Québec since Per Kalm (1749), a Swedish botanist, was informed of a whale skeleton found inland from the St. Lawrence River by the commander of Fort Saint-Frédéric. According to Hubbard (1887), the skeleton represented a large whale (probably of

Champlain Sea age) and was found "some French miles" from Québec City, and "one French mile" (about 4 km) inland from the St. Lawrence River.

The purpose of this summary is to provide brief descriptions of: the Lac-Saint-Jean mastodon – the only representative of the Pleistocene megafauna reported from Québec; vertebrates that lived in and around the Champlain Sea, highlighting some of the most remarkable specimens; faunal remains from caves in Gaspésie (near Saint Elzéar and La Rédemption) and Gatineau regions (Mine and Lafèche); as well as certain vertebrate species that lived in Québec during the Quaternary based on a current list of more than 30 radiocarbon dates on bone. Quaternary vertebrate localities mentioned in this summary are mapped (Fig. 1).

THE LAC-SAINT-JEAN MASTODON

A molar tooth of an American mastodon (*Mammuth americanum*) was found on Pointe de Chambord, a peninsula jutting into Lac-Saint-Jean (Piérard and Tremblay, 1980). It is the only representative of the extinct North American megafauna

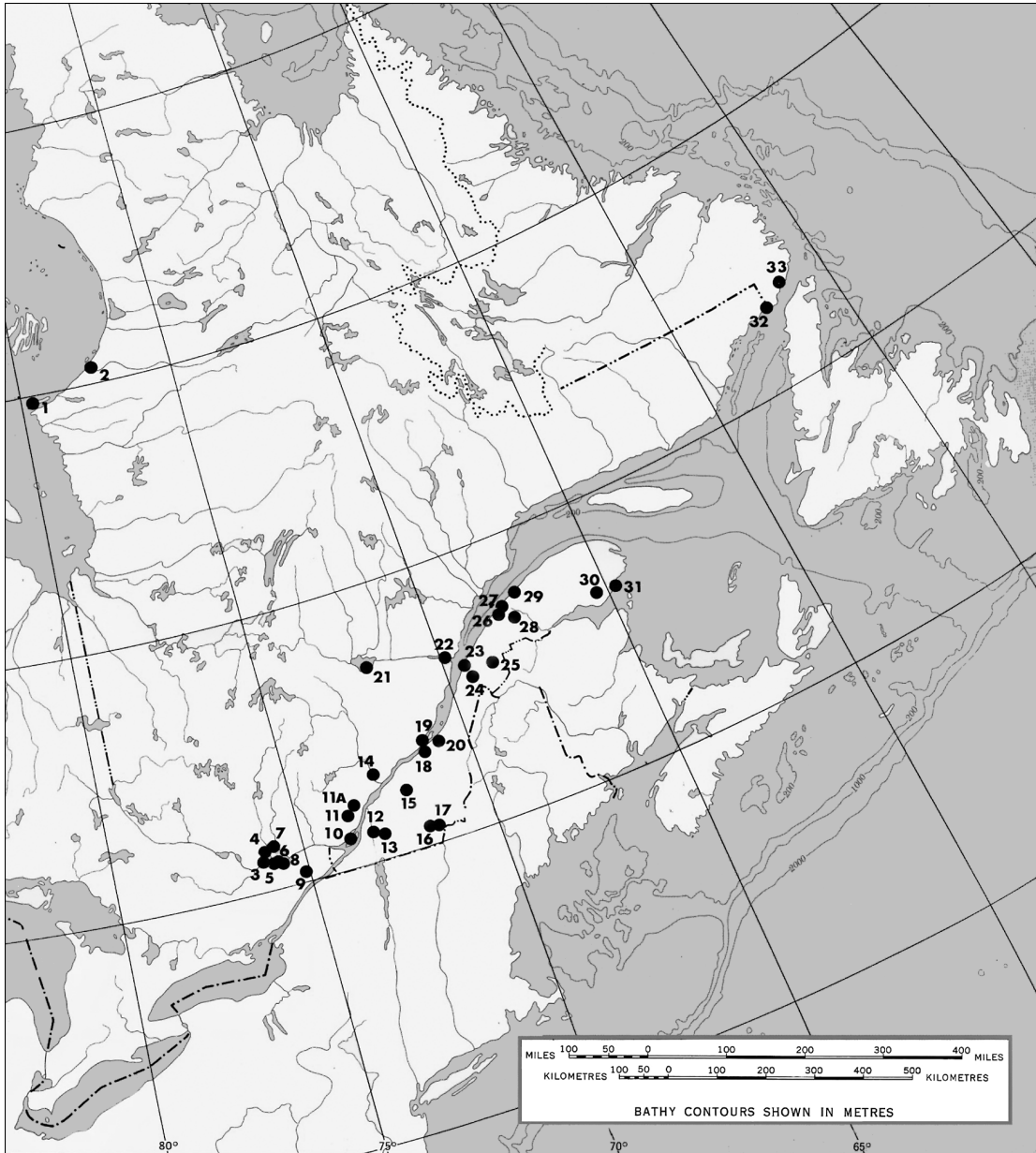


FIGURE 1. Some prominent Quaternary vertebrate localities (from Québec unless specified otherwise) mentioned in the text. Key: 1. Long Island, Nunavut; 2. Kuujjuarapik; 3. Eardley; 4. Mine cave; 5. Breckenridge; 6. Hull (now Gatineau); 7. Lafèche cave; 8. Green Creek, Ontario; 9. Finch, Ontario; 10. Montréal; 11. Sainte-Julienne-de-Montcalm; 11A. Saint-Félix-de-Valois; 12. Mont Saint-Hilaire; 13. Saint-Césaire; 14. Shawinigan; 15. Daveluyville; 16. Sherbrooke; 17. Cookshire; 18. Saint-Nicolas; 19. Québec City; 20. La Durantaye; 21. Pointe de Chambord (Lac-Saint-Jean); 22. Rivière Saguenay mouth; 23. Rivière-du-Loup; 24. Saint-Antoine; 25. Squatec; 26. Bic; 27. Rimouski; 28. La Rédemption; 29. Matane; 30. Saint-Elzéar cave; 31. Anse-aux-Gascons; 32. Blanc-Sablon; 33. Pinware, Labrador.

Principaux lieux identifiés dans le texte où des restes de vertébrés du Quaternaire ont été découverts (au Québec, sauf mention contraire) :
 1. Long Island, Nunavut; 2. Kuujjuarapik; 3. Eardley; 4. Mine cave; 5. Breckenridge; 6. Hull (maintenant Gatineau); 7. caverne Lafèche; 8. Green Creek, Ontario; 9. Finch, Ontario; 10. Montréal; 11. Sainte-Julienne-de-Montcalm; 11A. Saint-Félix-de-Valois; 12. mont-Saint-Hilaire; 13. Saint-Césaire; 14. Shawinigan; 15. Daveluyville; 16. Sherbrooke; 17. Cookshire; 18. Saint-Nicolas; 19. Québec; 20. La Durantaye; 21. pointe de Chambord (Lac-Saint-Jean); 22. embouchure du Saguenay; 23. Rivière-du-Loup; 24. Saint-Antoine; 25. Squatec; 26. Bic; 27. Rimouski; 28. La Rédemption; 29. Matane; 30. caverne de Saint-Elzéar; 31. Anse-aux-Gascons; 32. Blanc-Sablon; 33. Pinware, Labrador.

known from Québec, although a Columbian mammoth molar was found just north of Point Louis XIV on Long Island, Nunavut (Bell, 1898a; Nielsen *et al.*, 1988). This mastodon left lower third molar (LM₃, presently in collections of the Musée Amérindien at Mashtuiatsh, Québec) has been accelerator mass spectrometry radiocarbon dated to >49 980 BP (Beta-173288), so it is too old to bear on the hypothesis of Alexis Dreimanis (1967, 1968) concerning the postglacial dispersal of American mastodons in eastern North America. I suspect that this tooth is closer to the ages (last interglacial or Sangamonian) of other mastodon specimens from Nova Scotia (Miller Creek, East Milford and probably Lower Middle River, Cape Breton Island), New Brunswick (Hillsborough), and northern Ontario (Moose River Basin) (Dawson, 1868; Bell, 1879, 1898a, b; Harington, 1990; Grantham and Kozera-Gillis, 1992; Harington *et al.*, 1993).

VERTEBRATES IN AND AROUND THE CHAMPLAIN SEA

FAUNAS

Five species of whales, particularly adapted to inshore conditions, have been reported from Champlain Sea (an inundation of the St. Lawrence Lowlands by Atlantic Ocean waters between about 12 000 and 9800 years ago) deposits. The bones represent mainly white whales (see Table I for a list of vertebrates from the Champlain Sea and vicinity, including their Latin names), but also harbour porpoise, humpback, common finback and bowhead whales (Harington, 1988; Harington and Occhietti, 1988). Narwhals (*Monodon monoceras*) are rare in the North American fossil record. Two specimens are known from either side of the Baie des Chaleurs in the eastern approaches to the Champlain Sea. Evidently most of a skeleton

TABLE I

Vertebrates of the Champlain Sea and vicinity

Fishes	Sturgeon	<i>Acipenser</i> sp.
	Lake cisco	<i>Coregonus artedii</i>
	Lake trout	<i>Salvelinus namaycush</i>
	Capelin	<i>Mallotus villosus</i>
	Rainbow smelt	<i>Osmerus mordax</i>
	Longnose sucker	<i>Catostomus catostomus</i>
	Atlantic cod	<i>Gadus morhua</i>
	Atlantic tomcod	<i>Microgadus tomcod</i>
	Spoonhead sculpin	<i>Cottus ricei</i>
	Deepwater sculpin	<i>Myoxocephalus thompsoni</i>
	Blenny-like fish	<i>Blennioidea</i>
	Lumpfish	<i>Cyclopterus lumpus</i>
	Threespine stickleback	<i>Gasterosteus aculeatus</i> (<i>trachurus</i> form)
	Atlantic wrymouth	<i>Cryptacanthodes maculatus</i>
Eelpout	<i>Lycodes</i> sp.	
Amphibians	Leopard frog	<i>Rana pipiens</i>
Birds	Eider duck	<i>Somateria</i> cf. <i>S. mollissima</i>
	Oldsquaw duck	<i>Clangula hyemalis</i>
	Thick-billed Murre	<i>Uria lomvia</i>
	Unidentified feather impressions in nodules	Aves
Mammals	Atlantic walrus	<i>Odobenus rosmarus</i>
	Bearded seal	<i>Erignathus barbatus</i>
	Harp seal	<i>Phoca groenlandica</i>
	Ringed seal	<i>Phoca hispida</i>
	Harbour seal	<i>Phoca vitulina</i>
	Bowhead whale	<i>Balaena mysticetus</i>
	Humpback whale	<i>Megaptera novaeangliae</i>
	Common finback whale	<i>Balaenoptera physalus</i>
	Harbour porpoise	<i>Phocoena phocoena</i>
	White whale	<i>Delphinapterus leucas</i>
	Narwhal	<i>Monodon monoceras</i>
	Hare	<i>Lepus</i> cf. <i>L. americanus</i>
	Eastern chipmunk	<i>Tamias striatus</i>
	American marten	<i>Martes americana</i>
	Arctic fox	<i>Alopex lagopus</i>

was reported from a gravel pit at Anse-aux-Gascons. Perhaps during the Late-glacial period (Late Pleistocene – Early Holocene) narwhals entered this deep bay along cracks and shore leads in the summer as the sea-ice began breaking up – the way they presently move into Clyde Inlet on Baffin Island over 2 400 km farther north (Julien, 1968; Harington, 1977).

Seals, such as ringed (the commonest), harp and bearded, have also been discovered. Walrus remains are known from Sainte-Julienne-de-Montcalm and Saint-Nicolas (Bouchard *et al.*, 1993; Chartier *et al.*, 1997). Whale, seal and walrus remains are also known from the eastern approaches to the Champlain Sea (Harington, 1977; Harington and Occhietti, 1988).

Fish (McAllister *et al.*, 1988), amphibian (Holman, 1996; Holman *et al.*, 1997) and bird (Harington and Occhietti, 1980) remains have been found in Late-glacial calcareous clay nodules from sites near Eardley and Breckenridge, as well as Green Creek, Ontario, among other localities (Table I).

I was first alerted to the fact that Champlain Sea vertebrates could be found near Saint-Nicolas when Léo Labrie, then a student at Université d'Ottawa, brought me a bone (CMN 12432) in 1964 found that year directly below a layer of marine mollusc shells in a well excavation. It was a left tibia of a small seal (*Phoca* sp.). Next, I identified a caudal vertebra of a white whale collected in 1972 by Michael Bozozuk from stratified sand at Saint-Nicolas containing marine mollusc shells dated at about 10 000 BP (Harington, 1977). Recent collecting at this sandpit (Chartier *et al.*, 1997; Nancy, 1999) has yielded three species of bottom-dwelling fish (sturgeon, Atlantic wrymouth and eelpout, as well as capelin and a salmonid; two species of seabirds (Thick-billed Murre and Oldsquaw duck); and three species of marine mammals (ringed seal (including a humerus of a pup collected by Bob Boisvert), walrus (a pelvic fragment yielded a radiocarbon date of 9790 ± 60 BP [Beta-115199] and white whale). These bones occur in the upper part of a 5 m-thick unit of cross-bedded sand overlying marine clay and underlying shallow marine silts and clays. Sedimentation seems to have taken place among a series of small islands (skerries) near the entrance to the Champlain Sea that was subjected to 10-m tides (Occhietti *et al.*, 2001). Presumably some of the seabirds nested on the skerries, as was hypothesized earlier for a 10 000 BP eider from near Shawinigan (Harington and Occhietti, 1988).

Similarly, fish, eider duck, ringed seal and white whale remains have been collected from a sandpit at Saint-Césaire. Many of these specimens, assembled over the past 20 years, are in the personal collection of Jean-Marc Morin of Saint-Césaire (Paquette, 1981; Michel Chartier, personal communication, 1999). Both Saint-Nicolas and Saint-Césaire sandpits have benefited from long-term monitoring for vertebrate fossils that, I hope, will continue. While noting that the Champlain Sea age vertebrate fauna should be considered without regard to provincial or national boundaries (Table I), a few outstanding Québec fossils should be mentioned.

SIGNIFICANT SPECIMENS

Some remarkable specimens of Champlain Sea age from Québec include: (1) most of a common finback whale skeleton

found on the Soucy farm 3.6 km southwest of Daveluyville and dated to about 11 400 BP (Janusitis, 1947; Laverdière, 1950; Harington, 1988; Harington and Occhietti, 1988); (2) a nearly complete skeleton of a white whale from Saint-Félix-de-Valois (Société de Paléontologie du Québec, 2002); (3) a virtually complete skeleton of a ringed seal from Wright's brick clay pits, Tétreaucville (now part of Gatineau), which suggests the presence of land-fast ice near the western margin of the sea during winter and spring (Harington and Sergeant, 1972; Harington, 1974); (4) a nearly complete seal skeleton found 2.5 km west of La Durantaye, originally thought to represent a gray or hooded seal, has been identified recently as a bearded seal (Demers et Locat, 1985; this paper); (5) a complete adult walrus skeleton found near Bic by railway construction workers in 1869, buried under 4.5 m of clay and more than 30.5 m asl. The specimen, presented to the Séminaire de Rimouski, probably was destroyed by fire (Huard, 1908); (6) the near-perfect skeleton of a leopard frog found in a clay nodule from Eardley, perhaps the best-preserved ice-age frog in North America, and the first record of an amphibian from Champlain Sea deposits (Holman, 1996; Holman *et al.*, 1997).

CAVE FAUNAS

Perhaps cave faunas will become increasingly important in discerning the Quaternary faunal sequence in Québec. The finds from caves near Saint-Elzéar and La Rédemption in Gaspésie, as well as Mine and Laffèche caves in the Gatineau region, have already yielded fascinating insights.

SAINT-ELZÉAR CAVE

This cave, situated on a plateau north of Baie des Chaleurs, has produced remains of 181 amphibians (3 species), 2 reptiles (1 species), 4 birds (4 species), and 4 503 mammals (34 species) (LaSalle and Guilday, 1980, Table 1). Nearly 80 % of these fossils are parts of small mammals, including hares. Several of the species no longer live in the region, and their presence seems to indicate a period of colder climate (*e.g.* arctic shrew [*Sorex arcticus*], arctic hare [*Lepus arcticus*], heather vole [*Phenacomys intermedius*], Ungava lemming [*Dicrostonyx hudsonius*], and least weasel [*Mustela nivalis*]). Sediments containing the fossils suggest a very slow and gradual accumulation, and due to soil chemistry, the bone seems unsuitable for radiocarbon dating. However, maybe a few of the cold-adapted species should be sampled for accelerator mass spectrometry dating.

LA RÉDEMPTION CAVES (TROU OTIS AND SPÉOS DE LA FÉE)

Preliminary collections of faunal remains from sediment in these caves have yielded seven mammal species: eastern long-eared bat (*Myotis septentrionalis* = *Myotis keenii*), Ungava lemming (*Dicrostonyx* cf. *D. hudsonius*), American porcupine (*Erethizon dorsatum*), red fox (*Vulpes vulpes*), grizzly bear (*Ursus arctos*); caribou (*Rangifer tarandus*), and moose (*Alces alces*). Bats and porcupines, which commonly

spend part of their lives in caves or underground shelters, are most frequently represented. The lemming and grizzly bear are of great interest because of their rarity in the faunal record of this part of eastern North America. It is postulated that they occupied Gaspésie when patches of tundra-like habitat existed there, perhaps in early postglacial time. Species other than the lemming and grizzly bear still occupy the region and tend to be common in forested areas (Harington, 1980; Beaupré and Caron, 1986).

MINE CAVE

Located some 20 km northeast of Ottawa, this cave is partly a natural trap that has accumulated many bones and teeth which are useful for paleoecological reconstruction. The upper 100 cm, containing a relatively recent fauna dating back to about 5000 BP, is characterized by black bear (*Ursus americanus*), white-tailed deer (*Odocoileus virginianus*), raccoon (*Procyon lotor*), mouse (*Peromyscus* sp.), and big brown bat (*Eptesicus fuscus*) (Carrier, 1989). The bottom 70 cm of infill, studied by Deschamps, dating between 8230 ± 80 BP and 5020 ± 70 BP contains remains of fishes (minnows? [Cyprinidae?]), amphibians (unidentified frogs and/or toads and/or salamanders), reptiles (unidentified snakes [Squamata]), and 23 taxa of mammals, but no black bear or white-tailed deer. Two species, the woodland vole (*Microtus pinetorum*) and Ungava lemming no longer occupy the area. The former is found mainly in eastern United States, while the latter occurs in northern Québec and Labrador, suggesting Holocene range shifts to the south and north respectively. Most small mammals from the lower infill consist of boreal species (Deschamps and Lauriol, 1999; Eric Deschamps, personal communication, 2000; Lauriol *et al.*, 2003).

LAFLECHE CAVE

The cave is about 27 km north of Gatineau (formerly Hull). Upper and lower levels are joined by an 18-m vertical shaft. Sandy matrix from near the lower (manmade) entrance, and up to 80 cm deep, has yielded an interesting vertebrate fauna: four birds, and approximately 21 species of mammals (Table II). Several arctic-adapted species are represented in this fauna (e.g. Snowy Owl, arctic hare, arctic fox and Ungava lemming) suggesting the presence of tundra-like conditions following the retreat of Laurentide ice from the region in Late-glacial time. Indeed, an arctic fox mandible yielded a date of $10\ 800 \pm 90$ BP (TO-1197) (Table III) contemporaneous with the Champlain Sea. Another date from an unidentified bone is 9310 ± 80 BP (Beta-83094) (Table III).

It is important to note that such species retreated northward with the melting Laurentide Ice Sheet, until, at present, they survive in northernmost Québec and Labrador. Perhaps the evidence for Labrador grizzlies fits this hypothesis too (Pigott, 1999). Also, I recommend that paleontologists or zooarchaeologists study and specifically identify many bones (6 fish, 67 bird, 199 human and 59 other mammal) from four caves near the mouth of the Saguenay River reported by Brassard (Beaupré and Caron, 1986, p. 240-241).

TABLE II

Quaternary vertebrates from Lafleche Cave, Gatineau, Québec (identifications by P.M. Youngman, 1990)

Birds	Canada Goose	<i>Branta canadensis</i>
	Partridge or Pheasant or Grouse	Phasianidae
	Snowy Owl	<i>Nyctea scandiaca</i>
	Swallows	Hirundinidae
Mammals	Masked shrew	<i>Sorex cinereus</i>
	Short-tailed shrew	<i>Blarina brevicauda</i>
	Little brown bat	<i>Myotis lucifugus</i>
	Northern long-eared bat	<i>Myotis septentrionalis</i>
	Big brown bat	<i>Eptesicus fuscus</i>
	Eastern pipistrelle	<i>Pipistrellus subflavus</i>
	Arctic hare	<i>Lepus arcticus</i>
	Red squirrel	<i>Tamiasciurus hudsonicus</i>
	Mouse	<i>Peromyscus</i> sp.
	Red-backed vole	<i>Clethrionomys</i> sp.
	Heather vole	<i>Phenacomys intermedius</i>
	Ungava lemming	<i>Dicrostonyx hudsonius</i>
	Meadow vole	<i>Microtus pennsylvanicus</i>
	Arctic fox	<i>Alopex lagopus</i>
	Red fox	<i>Vulpes vulpes</i>
	Black bear	<i>Ursus americanus</i>
American marten	<i>Martes americana</i>	
Ermine	<i>Mustela erminea</i>	
Caribou	<i>Rangifer tarandus</i>	

WHO WAS WHERE, WHEN? IMPLICATIONS OF RADIOCARBON DATES

A summary of radiocarbon dates on Quaternary vertebrates from Québec (Table III) indicates that people were present earlier than 5000 BP, based on 10 direct dates on human bones. On this subject, a review of archaeological sites and changing environment in the St. Lawrence Lowlands shows that the present configuration of the St. Lawrence River was probably attained between 8000 and 6000 BP. The earliest evidence for human occupation of the valley is the Plano site in Rimouski dated at 8150 ± 130 BP (Beta-47978). Therefore, Plano people seem to have been first to occupy the Lowlands as they emerged from Champlain and Goldthwait seas (Chapelaine and LaSalle, 1995). However, Dumais *et al.* (1993) indicate that Squatec in the Temiscouata region of southeastern Québec may be the first early-Paleoindian site in the province, as well as the most northerly site of its age in northeastern North America. The location of this site offers direct access to the south shore of the St. Lawrence River, pointing to the possible presence of Paleoindians on the southern coast of the Goldthwait Sea. McGhee (1989) mentions sites up to 27 m asl between Blanc-Sablon, Québec and Pinware, Labrador that were occupied between 9000 and 8000 BP. Presumably the occupants were descended from Paleoindians who lived south of the Gulf of St. Lawrence.

Since bones of white whales are the commonest found in Champlain Sea deposits, and most have been dated to about 10 500 BP (Harington, 1988), the date of 9500 BP on the Mont Saint-Hilaire specimen seems very young (In this respect, it

TABLE III
Radiocarbon dates on Quaternary vertebrates from Québec¹

Taxon	Measured Date (Normalized) BP	Lab No.	Material	Location	References/Remarks
Fishes (Pisces)					
Swordfish (<i>Xiphias gladius</i>)	340 ± 85 (585 ± 85)	GSC-1855	Rostrum (CMN-12456)	2.25 km WNW of St-Louis-de-Champlain	R. McNeely, GSC carbox database (1999). Not Champlain Sea age – probably imported by humans.
Mammals (Mammalia)					
Human (<i>Homo sapiens</i>)	5240 ± 80 (5340 ± 80)	S-509	Long bones (CMC-360)	Outaouais	Wilmeth (1978), Taillon and Barre (1987) <i>In</i> R.E. Morlan, CMC database (1999).
Human (<i>Homo sapiens</i>)	4900 ± 80 (5000 ± 80)	S-1263	Femur (CMC-889)	Lac des Deux-Montagnes, Montréal area	Cybulski (1978), Marois (1987), Taillon and Barre (1987) <i>In</i> R.E. Morlan, CMC database (1999).
Human (<i>Homo sapiens</i>)	— (4860 ± 50)	Beta-88851	Unspecified bone	SE of Île Morrison, Outaouais	Wilmeth (1978), Taillon and Barre (1987), Clermont and Chapdelaine (1998) <i>In</i> R.E. Morlan, CMC database (1999).
Human (<i>Homo sapiens</i>)	— (4630 ± 40)	Beta-88852	Unspecified bone	SE of Île Morrison, Outaouais	Wilmeth (1978), Taillon and Barre (1987), Clermont and Chapdelaine (1998) <i>In</i> R.E. Morlan, CMC database (1999).
Human (<i>Homo sapiens</i>)	— (4620 ± 40)	Beta-88725	Unspecified bone	SE of Île Morrison, Outaouais	Wilmeth (1978), Taillon and Barre (1987), Clermont and Chapdelaine (1998) <i>In</i> R.E. Morlan, CMC database (1999).
Human (<i>Homo sapiens</i>)	2300 ± 600 (2400 ± 600)	UQ-780	Rib fragments	5 km NW of Trois-Rivières	Clermont, et al. (1986), Taillon and Barre (1987) <i>In</i> R.E. Morlan, CMC database (1999).
Human (<i>Homo sapiens</i>)	1990 ± 100 (2090 ± 100)	S-896	Unspecified bone (CMC-607)	Île Morrison, Outaouais	Taillon and Barre (1987), Spence, et al. (1990) <i>In</i> R.E. Morlan, CMC database (1999).
Human (<i>Homo sapiens</i>)	— (930 ± 65)	Beta-26467	Unspecified bone	Place Royale, Québec	Chapdelaine (1990), Allard and Sequin (1992) <i>In</i> R.E. Morlan, CMC database (1999).
Human (<i>Homo sapiens</i>)	790 ± 100 (890 ± 100)	RL-1831	Unspecified bone	Place Royale, Québec	Chapdelaine (1990), Allard and Sequin (1992) <i>In</i> R.E. Morlan, CMC database (1999).
Human (<i>Homo sapiens</i>)	— (715 ± 70)	Beta-26468	Unspecified bone	Place Royale, Québec	Chapdelaine (1990), Allard and Sequin (1992) <i>In</i> R.E. Morlan, CMC database (1999).
Beaver (<i>Castor canadensis</i>)	3220 ± 60 (3220 ± 60)	GSC-6228	Beaver-cut wood	Rivière des Ha Ha	C.R. Harington (unpublished).
White whale (<i>Delphinapterus leucas</i>)	— (10 700 ± 90)	TO-9996	Vertebra (P-26)	St-Félix-de-Valois	G. Pauzé and Société de Paléontologie du Québec (unpublished).
White whale (<i>Delphinapterus leucas</i>)	9470 ± 170 (9630 ± 170)	Beta-27511	Vertebra	Sandpit, S side of Mont Saint-Hilaire	Harington (1988).
White whale (<i>Delphinapterus leucas</i>)	— (4320 ± 50)	TO-3713	Mandibular teeth (CMN 3051)	Kuujuarapik (Grande Riv. de la Baleine)	C.R. Harington (unpublished).
White whale (<i>Delphinapterus leucas</i>)	500 ± 80 (660 ± 80)	Gif-1819	Unspecified bone	Hudson Bay, Nouveau-Québec	R.E. Morlan, CMC database (1999).
Common finback whale (<i>Balaenoptera physalus</i>)	11 300 ± 90 (11 400 ± 90)	GSC-2871	Vertebra (CR-78-21)	3.6 km SW of Daveluyville	Lowdon and Blake (1981), Harington (1988), Harington and Occhietti (1988).

TABLE III (continued)
Radiocarbon dates on Quaternary vertebrates from Québec

Taxon	Measured Date (Normalized) BP	Lab No	Material	Location	References/Remarks
Bowhead whale (cf. <i>Balaena mysticetus</i>)	— (750 ± 60)	Beta-70094	Lumbar vertebra (CR-94-3)	Sherbrooke	C.R. Harington (unpublished), Anonymous (1980).
Bowhead whale (cf. <i>Balaena mysticetus</i>)	— (310 ± 50)	Beta-70093	Lower jaw (CR-94-2)	Cookshire, near Rivière Eaton	C.R. Harington (unpublished), O'Neil (1951).
Arctic fox (<i>Alopex lagopus</i>)	— (10 800 ± 90)	TO-1197	Mandible (CMN 45286)	Lafèche cave, Gatineau	P.M. Youngman (unpublished).
Walrus (<i>Odobenus rosmarus</i>)	10 090 ± 60 (10 500 ± 60)	TO-2224	Skull (MCQ91-117)	Sainte-Julienne-de-Montcalm	Harington (1991), Bouchard, <i>et al.</i> (1993), Harington, <i>et al.</i> (1993), Dyke <i>et al.</i> (1999).
Walrus (<i>Odobenus rosmarus</i>)	9960 ± 50 (10 130 ± 50)	CAMS-43273	Cranium	Les Capucins, Matane	Harington (1975), Dyke <i>et al.</i> (1999).
Walrus (<i>Odobenus rosmarus</i>)	9790 ± 60 (9940 ± 60)	Beta-115199	Ilium (CR-97-61)	Saint-Nicolas	Occhietti <i>et al.</i> (2001).
Walrus (<i>Odobenus rosmarus</i>)	6880 ± 50 (7050 ± 50)	CAMS-43274	Tusk	Îles de la Madeleine	Dyke <i>et al.</i> (1999).
Walrus (<i>Odobenus rosmarus</i>)	710 ± 40 (870 ± 40)	CAMS-43266	Cranium	La Chaloupe, Côte-Nord	Harington (1975), Dyke <i>et al.</i> (1999).
Ringed seal (<i>Phoca hispida</i>)	10 420 ± 50 (10 520 ± 50)	Beta-92375	Left humerus (CMN 41849)	Natural Heritage Bldg. (CMN), Aylmer (now Gatineau)	C.R. Harington (unpublished).
American mastodon (<i>Mammot americanum</i>)	>49 980 (>50 070)	Beta-173288	Third molar (LM3) (MAM 1996.53)	Pointe de Chambord, Lac-Saint-Jean	This paper.
Moose (<i>Alces alces</i>)	4400 ± 130 —	QU-717	Unspecified bone	St-Elzéar cave, Gaspé	LaSalle (1984).
Moose (<i>Alces alces</i>)	4390 ± 120 —	QU-745	Unspecified bone	St-Elzéar cave, Gaspé	LaSalle (1984).
Moose (<i>Alces alces</i>)	410 ± 120 —	QU-714	Unspecified bone	St-Elzéar cave, Gaspé	LaSalle (1984).
Caribou (<i>Rangifer tarandus</i>)	— (40 640 ± 420)	TO-3714	Antler fragment (CMN 43810)	St-Antonin Moraine, S of Rivière- Verte near Rivière-du-Loup	C.R. Harington (unpublished).
Caribou (<i>Rangifer tarandus</i>)	— (2520 ± 80)	AECV-1795c	Unspecified bone	NW of Ivujivik, Nouveau-Québec	Nagy (1997) <i>In</i> R.E. Morlan, CMC database (1999).
Caribou (<i>Rangifer tarandus</i>)	709 ± 94 (709 ± 100)	P-177	Unspecified bone	Riv. Arnaud, Nouveau-Québec	R.E. Morlan, CMC database (1999).
Caribou (<i>Rangifer tarandus</i>)	649 ± 100 (730 ± 105)	P-176	Skull	Riv. Arnaud, Nouveau-Québec	R.E. Morlan, CMC database (1999).
Unidentified	9240 ± 80 (9310 ± 80)	Beta-83094	Unspecified bone	Lafèche cave, Gatineau	S. Occhietti (unpublished).

1. Most of these dates are selected from, and more details can be found in *Annotated Bibliography of Quaternary Vertebrates of Northern North America – with Radiocarbon Dates*, edited by C.R. Harington (2003).

would be interesting to radiocarbon date a fifth lumbar vertebra of a bearded seal [CMN 37586] collected by Jacques Bradley from a sandpit on the southeastern flank of Mont Saint-Hilaire. The only other date, on a bearded seal from Champlain Sea deposits near Finch, Ontario is 10 710 ± 80 BP [TO-99]). Evidently the first indication of the presence of white whales in southeastern Hudson Bay is a date of 4320 ± 50 BP (TO-3713) on a partial skeleton (CMN 30501) collected by Franz Mayr in 1975 near Kuujuarapik. So white whales had entered this part of Hudson Bay shortly after the Tyrrell Sea phase of about 8000 to 5000 BP (Dyke and Prest, 1987, Sheet 3).

Two specimens from Sherbrooke (Anonymous, 1980) and Cookshire (O'Neil, 1951) resembling bowhead whale, thought by some to indicate the presence of Champlain Sea deposits, are much younger (about 750 and 370 BP respectively). Likely they are part of a series of large marine mammal bones that are generally younger than 800 BP and have been found as far inland as Michigan. Probably they were transported inland from the Atlantic coast, mainly by native people (Harrington, 1988, p. 236-238).

Walrus had entered the Champlain Sea by about 10 000 BP, the first evidence being from Sainte-Julienne-de-Montcalm (Thibaudeau, 1990; Harrington, 1991; Bouchard *et al.*, 1993; Dyke *et al.*, 1999). They were present about the same time near the entrance to this vast inland sea (Saint-Nicolas) and its eastern approaches (Matane).

Moose are known to have lived in southern Gaspésie (Saint-Elzéar cave) for at least the past 4000 years, but the oldest dated cervid specimen from Québec is on a shed right antler fragment of caribou (40 640 ± 420 BP [TO-3714]) collected in 1961 by Jean-Claude Dionne from a gravel pit opened into the Saint-Antoine Moraine, just south of Rivière-Verte. This small, but significant fossil indicates that caribou occupied the Rivière-du-Loup area in mid-Wisconsinan time. Evidently prehistoric people hunted caribou throughout Québec. But this hunting seems to have been mainly seasonal, providing a supplementary source of nutrition (Piérard, 1979).

CONCLUSION

1. The earliest recorded (1749) Quaternary vertebrate from Québec and Canada is a large whale from Champlain Sea deposits near Québec City.

2. The only representative of the extinct North American megafauna from Québec is an American mastodon specimen from Lac-Saint-Jean. Fresh evidence indicates that this specimen is a left lower third molar, and that it is perhaps of last (Sangamonian) interglacial age according to a recent AMS date (>49 980 BP [Beta-173288]).

3. Five species of whales have been reported from Late-glacial Champlain Sea deposits in the St. Lawrence Lowland, the commonest being the white whale. One of the most complete is a skeleton of this species from Saint-Félix-de-Valois (NE of Montréal) which is presently being studied at the Canadian Museum of Nature. Another excellent skeleton is that of a common finback whale from near Daveluyville.

4. Four species of seals (ringed, harp, bearded and harbour) have been recorded from Champlain Sea deposits, the

most complete skeleton being of a ringed seal from Tétreauville (now Gatineau). A nearly complete skeleton of a bearded seal (originally thought to represent a gray or hooded seal) from near La Durantaye has been identified recently.

5. A complete adult walrus skeleton found near Bic in 1869 was destroyed by fire. The first fossil of this species from the Champlain Sea was found in 1990 at Sainte-Julienne-de-Montcalm (N of Montréal), another specimen being reported from Saint-Nicolas.

6. I predict that polar bear (*Ursus maritimus*) remains will be found in Champlain Sea deposits, particularly because its major prey species, the ringed seal, is not uncommon near the northwestern margins of the Champlain Sea (Gatineau area).

7. The first Quaternary amphibian (a leopard frog skeleton, perhaps the best ice-age frog in North America) came from Champlain Sea deposits at Eardley. Many excellent fish, especially capelin, remains are found in nodules from Eardley and Breckenridge (W of Gatineau).

8. Sandpits at Saint-Nicolas and Saint-Césaire have yielded important fish, bird, ringed seal and white whale remains as well as other paleoenvironmental information.

9. Caves near Saint-Elzéar and La Rédemption in Gaspésie, as well as Mine and Lafèche caves in the Gatineau region have yielded fascinating glimpses of Québec faunas. Perhaps such cave faunas will become increasingly important in sorting out the Quaternary faunal sequence in Québec.

10. A survey of radiocarbon dates on Quaternary vertebrates from Québec (Table III) indicates that Paleoindians reached the Rimouski and Blanc-Sablon areas between 9000 and 8000 BP. Moose are known to have lived in southern Gaspésie (Saint-Elzéar cave) for at least the past 4000 years, but the oldest dated cervid specimen from Québec is a caribou antler fragment (40 640 ± 420 BP [TO-3704]) from a gravel pit near Rivière-Verte.

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