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PAPER 91-7

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RADIOCARBON DATES XXXI

Collated by

R. McNeely and P.K. Jorgensen

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Natural Resources Canada
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This Date List, GSC XXXI, is the twentieth to be published directly in the Geological Survey's Paper series. Lists prior to GSC XII were published first in the journal Radiocarbon and were reprinted as GSC Papers. The lists through 1967 (GSC VI) were given new pagination, whereas lists VII to XI (1968 to 1971) were reprinted with the same pagination.

GEOLOGICAL SURVEY OF CANADA RADIOCARBON DATES XXXI

Abstract

This list presents 298 radiocarbon age determinations made by the Radiocarbon Dating Laboratory, Geological Survey of Canada, plus 13 AMS dates done by IsoTrace Laboratories, 1 date by Beta Analytical Inc., and 6 dates made at the Saskatchewan Research Council in Saskatoon, Saskatchewan. All samples dated more than 2 years ago have now been reported in date lists. The total number (314) of samples from various areas are as follows: Newfoundland (40); Nova Scotia (22); New Brunswick (2); Québec (51); Ontario (4); Manitoba (9); Saskatchewan (3); Alberta (3); British Columbia (48); Yukon Territory (19); Northwest Territories, mainland (5); Northwest Territories, Arctic Archipelago (103); United States of America - New York State (1); Washington State (5). Tables 1 and 2 summarize the details of background and standard counts for the 2 L and 5 L counters during the period from January 8, 1991 to January 15, 1992.

Résumé

Ce rapport présente les résultats de 298 datations effectuées par le laboratoire de datation au radiocarbone, Commission géologique du Canada, en plus de 13 datations AMS effectuées par d'autres laboratoires, de 1 datation effectuées par Beta Analytical Inc., et de 6 datation effectuées par le council researche du Saskatchewan à Saskatoon. Tous les résultats des datations faites il y a plus de deux ans ont maintenant été présentés sous forme de listes de datations. Les échantillons datés, au nombre de 314, proviennent des régions suivantes: Terre-Neuve (40); Nouvelle-Ecosse (22); Nouveau-Brunswick (2); Québec (51); Ontario (4), Manitoba (9); Saskatchewan (3); Alberta (3); Colombie-Britannique (48); Yukon (19); Territoires du Nord-Ouest, continent (5); Territoires du Nord-Ouest, archipel arctique (103); États Unis d'Amérique - État New York (1); État Washington (5). Les tableaux 1 et 2 résument les valeurs de bruit de fond et d'étalonnage des compteurs de 2 L et 5 L, de la période allant du 8 janvier 1991 au 15 janvier 1992.

INTRODUCTION[1]

This publication includes all the samples that have been dated more than 2 years ago and not published in a "date list". The presentation of dates within each section or subsection of this text is ordered from east to west. All GSC dates, up to and including GSC-5000, are now accessible on a computer database. The 'Date Locator File' provides convenient, fast access to our dates by allowing the user to interactively select indexed parameters, such as laboratory number, submitter, locality, material, age range, to retrieve samples (McNeely, 1988). Supplementary information on this database is available from Dr. J-S. Vincent, Director, Terrain Sciences Division, Geological Survey of Canada.

Sample gas preparation and purification were carried out as described in Lowdon et al. (1977). Carbon dioxide gas proportional counting techniques have been discussed by Dyck (1967). For a review of laboratory operations the reader is referred to Lowdon (1985).

During the period from January 1990 through December 1990, both the 2 L counter (Dyck and Fyles, 1963) and the 5 L counter (Dyck et al., 1965) were operated continuously. The 2 L counter was operated at 2 atmospheres throughout this period, and the 5 L counter was operated at 1 atm, except for February, and May and June when the 5 L counter was operated at 4 atmospheres ('High Pressure').

[1] The date list has been compiled by R. McNeely and P.K. Jorgensen from descriptions of samples and interpretations of age determinations provided by the collectors and submitters.

On a monthly basis, the counting rates for backgrounds and standards were within statistical limits. The average background and oxalic acid standard counting rates, and the number of 1-day counts used to determine the average are shown in Tables 1 and 2, respectively.

Age calculations during the report period were done on a microcomputer (VICTOR 9000). Calculations are based on a ^{14}C half-life of 5568 ± 30 years and 0.95 of the activity of the NBS oxalic acid standard. Ages are quoted in radiocarbon years before present (BP), where "present" is taken to be 1950. The error assigned to each age has been calculated using only the counting errors of sample, background, and standard, and the error in the half-life of ^{14}C (Lowdon and Blake, 1973). Nonfinite dates (i.e., greater than ages) are based on a 4 sigma criterion (99.9% probability), whereas finite dates are based on a 2 sigma criterion (95.5% probability) and, therefore, are unconventionally reported with an error term of ±2 sigma. In addition, all GSC dates are rounded according to the following criteria:

Age (years BP)	Significant figures
0 - 99	1
100 - 999	2
1000 - 9999	3
>10 000	3
nonfinite	2

If $^{13}C/^{12}C$ ratios ($\delta^{13}C$) were available, a "correction" for isotopic fractionation was applied to the sample age, and the $\delta^{13}C$ value reported. For terrestrial and nonmarine organic materials, and bones (both terrestrial and marine) the ages are conventionally corrected to a $\delta^{13}C$ = -25.0‰ PDB, whereas, marine shell ages are unconventionally corrected to a $\delta^{13}C$ = 0.0‰ PDB; freshwater shell ages are not corrected. All $\delta^{13}C$ determinations were made on aliquots of the sample gas used for age determinations. Since 1989, all $\delta^{13}C$ values have been determined under contract by the OCGS Stable Isotope Facility, Carleton University / University of Ottawa, Ottawa, Ontario. From 1975 to 1989, the $\delta^{13}C$ were determined under contract by R.J. Drimmie of the Department of Earth Sciences, University of Waterloo, Waterloo, Ontario, or by Waterloo Isotope Analysts, Inc., Kitchener, Ontario (R.J. Drimmie, chief analyst) using the same equipment as at the University of Waterloo. Prior to that time some $\delta^{13}C$ determinations were done by the GSC Geochronology Section (R.K. Wanless, Head) and by Teledyne Isotopes, Westwood, New Jersey.

Acknowledgments

Appreciation is expressed to S.M. Chartrand (1969 to 1976), J.E. Tremblay (1976 to 1980), A.M. Telka (1980 to 1986), L.M. Maillé (1986 to 1989, and 1991 to present) and M. Leflar (1990), I.M. Robertson (1964 to 1989), and J. Brennan (1989 to present) for the preparation, purification, and counting of samples in the laboratory. Supervision of laboratory operations has been as follows: W. Dyck (1960 to 1965), J.A. Lowdon (1965 to 1981), and R. McNeely (1981 to present).

Identification of materials used for dating or associated with the dated material has been carried out by the following specialists:

Algae (marine):	R.K.S. Lee and W.H. Adey
(freshwater):	J.P. Smol
Arthropods (fossil):	J.V. Matthews, Jr.
Barnacles:	C.G. Rodrigues
Diatoms:	S. Federovich and J.P. Smol
Macrofossils (plant):	J.V. Matthews, Jr., M. Kuc, and N.F. Alley
Molluscs:	A.H. Clarke, Jr., M.F.I. Smith, the late W.H. Dall, R. Hebda, F.J.E. Wagner, C.G. Rodrigues, and J.E. Dale
Mosses:	M. Kuc, J.A. Janssens, and W.A. Weber
Pollen:	R.J. Mott, S. Federovich, N.F. Alley, and J.E. Shepperd
Vertebrates:	C.R. Harington
Wood:	R.J. Mott, L.D. Wilson (née Farley-Gill), H. Jetté, and G. Argus
Ancillary Analyses:	
Accelerator mass spectrometry (AMS) dating:	R.P. Beukens IsoTrace Laboratory, (U of T), Toronto
Amino acid ratios:	I. Moffat (N.W. Rutter), University of Alberta;
X-ray diffraction: (on shell material)	A.C. Roberts and R.N. Delabio, Mineralogy Section, GSC.

The GSC clientele extend their sincere thanks to them.

M. Lanoix, R.J. Richardson, J.A. Snider, J.E. Dale, and K.E. Rolko, all former summer students or technical assistants, assisted in the processing and examination of samples prior to submission to the laboratory. Since 1986 the submitters have been responsible for the (physical) preparation of their sample materials, with supervision from laboratory personnel, prior to submission.

W. Spirito, L. Brouillette, and J. Cousineau assisted in the development of the 'Date Locator File'. D. Atkinson, S. McCuaig, D. Russell, and P.K. Jorgensen assisted in the preparation of GSC date lists.

Table 1. Monthly average count rate for backgrounds and the number of individual counts (N) made during the period January through December 1991.

Month	2 L Counter (2 atm) cpm*	(N)	5 L Counter (1 or 4 atm) cpm*	(N)
January	1.094 ± 0.019	(4)	2.149 ± 0.028	(4)
February	1.150 ± 0.032	(2)	2.741 ± 0.034	(6)
			2.153 ± 0.088	(3)
March	1.101 ± 0.023	(3)	2.255 ± 0.036	(2)
April	1.099 ± 0.023	(3)	2.233 ± 0.035	(2)
May	1.057 ± 0.020	(4)	2.521 ± 0.023	(6)
June			2.483 ± 0.038	(3)
	1.087 ± 0.025	(3)	2.107 ± 0.038	(2)
July	1.065 ± 0.026	(4)	2.048 ± 0.039	(4)
August	1.110 ± 0.028	(4)	2.055 ± 0.028	(4)
September	1.213 ± 0.021	(4)	2.186 ± 0.033	(4)
October	1.224 ± 0.025	(3)	2.196 ± 0.038	(3)
November	1.216 ± 0.026	(3)	2.287 ± 0.039	(3)
December	1.188 ± 0.059	(3)	2.107 ± 0.027	(4)

* cpm = counts per minute

Table 2. Monthly average net count rate for oxalic acid standards (No)** and the number of individual counts (N) made during the period January through December 1991.

Month	2 L Counter (2 atm) cpm*	(N)	5 L Counter (1 or 4 atm) cpm*	(N)
January	18.531 ± 0.106	(3)	28.117 ± 0.107	(4)
February	18.513 ± 0.124	(2)	99.955 ± 0.788	(2)
			28.109 ± 0.195	(1)
March	18.696 ± 0.163	(1)	28.572 ± 0.180	(1)
April	18.484 ± 0.104	(2)	28.426 ± 0.139	(2)
May	18.411 ± 0.103	(2)	102.618 ± 0.351	(1)
June			102.012 ± 0.477	(2)
	18.225 ± 0.161	(2)	28.490 ± 0.183	(1)
July	18.277 ± 0.188	(2)	28.302 ± 0.166	(2)
August	18.388 ± 0.133	(2)	28.334 ± 0.123	(2)
September	18.379 ± 0.137	(2)	28.173 ± 0.146	(2)
October	18.875 ± 0.275	(2)	28.279 ± 0.131	(2)
November	18.122 ± 0.101	(2)	28.354 ± 0.135	(2)
December	18.396 ± 0.155	(1)	28.215 ± 0.129	(2)

* cpm = counts per minute
** No = 95% of the net activity of the NBS Oxalic Acid Standard

EASTERN CANADA

Newfoundland

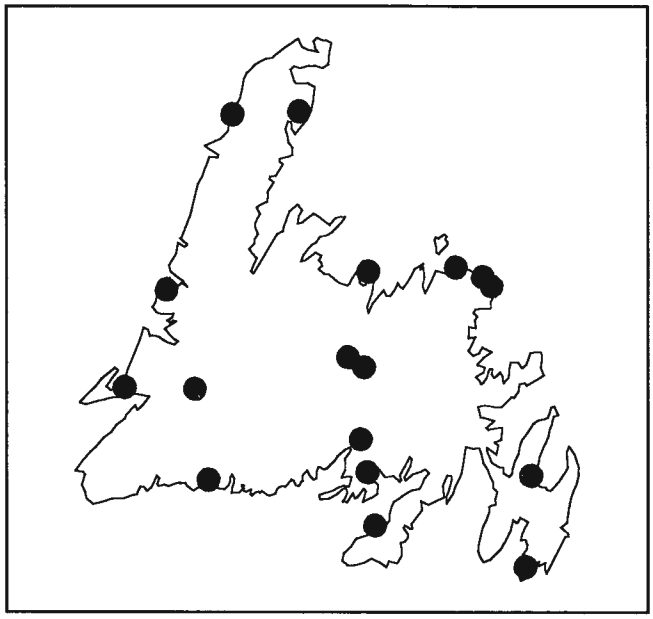

Figure 1. Radiocarbon dated sites in Newfoundland.

GSC-4882. Pound Cove 8140 ± 80
$\delta^{13}C = -25.2‰$

The wood (*Abies balsamea*; identified by H. Jetté (unpublished GSC Wood Report No. 89-45)) was enclosed in peat. Sample 8209-022 was collected by D.L. Forbes on September 2, 1982, from a small cove 0.5 km south of Pound Cove, opposite Pound Cove Island, northwest Bonavista Bay, Newfoundland (49°10.27′N, 53°33.27′W), at an elevation of 0 m; submitted by J. Shaw.

The sample (10.9 g dry weight) was treated with hot base, hot acid, and distilled water rinses (noncalcareous). The treated sample (3.6 g) yielded 8.06 L of CO_2 gas. The age estimate is based on three counts for 3570 minutes in the 5 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 10.373 ± 0.078, 2.151 ± 0.026, and 28.579 ± 0.127 cpm, respectively.

The uncorrected age is 8140 ± 80.

Comment (J. Shaw): This date complements a number of dates which have been used to constrain a Holocene relative sea-level curve for the region between Cape Freels and Hamilton Sound, on the northeast coast of Newfoundland (Shaw and Forbes, 1990). It confirms that relative sea level was below 0 m at 8.1 ka BP.

St. Shotts Series

A series of peat samples from about 2 km northwest of St. Shotts, Newfoundland (46°38′N, 53°35′W), at an elevation of 67.5 m, were collected by T.E. Irwin and A.M. Davis on August 29, 1989; submitted by T.E. Irwin and A.M. Davis.

GSC-4871. St. Shotts (I) 2640 ± 80
$\delta^{13}C = -27.5‰$

The basal peat, sample 1 (139.6 g wet weight), was treated with cold base, hot acid, and distilled water rinses (noncalcareous). The treated sample (8.3 g) yielded 6.09 L of CO_2 gas. The age estimate is based on two counts for 2205 minutes in the 2 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 12.848 ± 0.082, 1.070 ± 0.019, and 17.936 ± 0.117 cpm, respectively.

The uncorrected age is 2680 ± 80.

GSC-4937. St. Shotts (II) 3270 ± 50
$\delta^{13}C = -27.4‰$

The basal peat, sample 22 (159.0 g wet weight), was treated with hot base, hot acid, and distilled water rinses (noncalcareous). The treated sample (7.0 g) yielded 7.90 L of CO_2 gas. The age estimate is based on one count for 3910 minutes in the 5 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 18.628 ± 0.078, 2.105 ± 0.027, and 28.136 ± 0.132 cpm, respectively.

The uncorrected age is 3310 ± 50.

GSC-4931. St. Shotts (III) 3480 ± 60
$\delta^{13}C = -27.1‰$

The basal peat, sample 16 (125.0 g wet weight), was treated with hot base, hot acid, and distilled water rinses (noncalcareous). The treated sample (7.6 g) yielded 8.25 L of CO_2 gas. The age estimate is based on two counts for 2000 minutes in the 5 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 18.160 ± 0.104, 2.105 ± 0.027, and 28.136 ± 0.132 cpm, respectively.

The uncorrected age is 3520 ± 60.

GSC-4932. St. Shotts (IV) 3500 ± 80
$\delta^{13}C = -26.7‰$

The peat, sample 11 (93.6 g wet weight), was treated with hot base, hot acid, and distilled water rinses (noncalcareous). The treated sample (4.4 g) yielded 4.30 L of CO_2 gas. The age estimate is based on two counts for 2000 minutes in the 2 L counter with a mixing ratio of 1.05. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 11.514 ± 0.084, 1.083 ± 0.019, and 17.862 ± 0.102 cpm, respectively.

The uncorrected age is 3530 ± 80.

GSC-5062. St. Shotts (V) 3610 ± 80
$\delta^{13}C = -26.5‰$

The basal peat in a 108 cm core, sample I 9 (154.7 g wet weight), was treated with hot base, hot acid, and distilled water rinses (noncalcareous). The treated sample (8.1 g) yielded 4.69 L of CO_2 gas. The age estimate is based on two counts for 2000 minutes in the 2 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 11.353 ± 0.081, 1.049 ± 0.019, and 17.851 ± 0.099 cpm, respectively.

The uncorrected age is 3640 ± 80.

GSC-4921. St. Shotts (VI) 3800 ± 60
$\delta^{13}C = -28.7‰$

The basal peat, sample 28 (113.7 g wet weight;), was treated with cold base, hot acid, and distilled water rinses (noncalcareous). The treated sample (10.1 g) yielded 8.13 L of CO_2 gas. The age estimate is based on two counts for 2050 minutes in the 5 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 17.496 ± 0.101, 2.189 ± 0.023, and 28.283 ± 0.127 cpm, respectively.

The uncorrected age is 3860 ± 60.

GSC-5061. St. Shotts (VII) 4600 ± 90
$\delta^{13}C = -27.3‰$

The basal peat in a 114 cm core, sample I 5 (126.4 g wet weight), was treated with hot base, hot acid, and distilled water rinses (noncalcareous). The treated sample (8.3 g) yielded 7.54 L of CO_2 gas. The age estimate is based on two counts for 1800 minutes in the 5 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 15.846 ± 0.122, 2.047 ± 0.042, and 28.236 ± 0.193 cpm, respectively.

The uncorrected age is 4640 ± 90.

GSC-4928. St. Shotts (VIII) 5040 ± 80
$\delta^{13}C = -27.7‰$

The basal peat, sample 6 (81.9 g wet weight), was treated with hot base, hot acid, and distilled water rinses (noncalcareous). The treated sample (8.56 g) yielded 9.57 L of CO_2 gas. The age estimate is based on two counts for 2020 minutes in the 5 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 15.029 ± 0.112, 2.189 ± 0.023, and 28.283 ± 0.127 cpm, respectively.

The uncorrected age is 5080 ± 80.

Comment (T.E. Irwin): These eight dates in the St. Shotts series are all basal dates on peat taken from a blanket bog 2 km west of St. Shotts on the Avalon Peninsula of Newfoundland.

GSC-4928 (5040 ± 80) is from a water-collecting (sensu Tallis, 1991) site on the upper slope and indicates initiation of paludification during a relatively warm and dry period (Macpherson, 1982). GSC-5061 (4600 ± 90), -4921 (3800 ± 60), -5062 (3610 ± 80), -4932 (3500 ± 80), -4931 (3480 ± 60), and -4937 (3270 ± 50) indicate either rapid spread or general in situ growth of peat up and across the slope within a fairly narrow time frame when conditions were optimal in terms of warmth and moisture. GSC-4871 (2640 ± 80) is from near the upslope edge of the bog where expansion has slowed to a near standstill or halted during the current colder and wetter period.

The pattern of dates suggest paludification and rapid blanket bog formation on the landscape occurred during warmer conditions. A change to colder and wetter conditions and possibly also landform constrains have retarded lateral expansion of this blanket bog.

GSC-5060. St. Shotts (IX) 940 ± 70
$\delta^{13}C = -26.8‰$

The peat sample 5 A (215.0 g wet weight), was treated with hot base, hot acid, and distilled water rinses (noncalcareous). The treated sample (8.5 g) yielded 8.75 L of CO_2 gas. The age estimate is based on two counts for 2680 minutes in the 5 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 25.024 ± 0.112, 2.047 ± 0.042, and 28.236 ± 0.193 cpm, respectively.

The uncorrected age is 970 ± 70.

Comment (T. Irwin): GSC-5060 is from a stratigraphic disconformity marked by a layer of Ericaceae roots in the peat of the blanket bog.

GSC-5057. St. Shotts (X) 1150 ± 70
$\delta^{13}C = -26.5‰$

The peat sample 7 (45-50 cm; 187.1 g wet weight), was treated with hot base, hot acid, and distilled water rinses (noncalcareous). The treated sample (8.0 g) yielded 8.95 L of CO_2 gas. The age estimate is based on two counts for 2000 minutes in the 5 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 24.397 ± 0.122, 2.047 ± 0.042, and 28.236 ± 0.193 cpm, respectively.

The uncorrected age is 1170 ± 70.

Comment (T. Irwin): GSC-5057 is on peat from the 45 - 50 cm depth in a 142 cm core. This core is near the core with a basal date of 5040 ± 80 (GSC-4928). It marks a vegetational change in local (bog) pollen from Ericaceae and *Myrica* to Cyperaceae in the core, as well as an increase in the rate of peat accumulation.

GSC-5058. St. Shotts (XI) 2090 ± 50
$\delta^{13}C = -27.4‰$

The peat sample 16 (50-55 cm; 220.2 g wet weight), was treated with hot base, hot acid, and distilled water rinses (noncalcareous). The treated sample (8.1 g) yielded 8.94 L of CO_2 gas. The age estimate is based on one count for 2910 minutes in the 5 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 21.668 ± 0.094, 2.074 ± 0.027, and 28.244 ± 0.132 cpm, respectively.

The uncorrected age is 2130 ± 50.

Comment (T. Irwin): GSC-5058 is from the 50-55 cm depth in a 112 cm peat core with a basal date of 3480 ± 60 (GSC-4931). It dates a change in local pollen from Cyperaceae- to Ericaceae-dominated peat in the core.

GSC-5059. St. Shotts (XII) 2380 ± 60
$\delta^{13}C = -26.2‰$

The peat sample 28 (100-105 cm; 210.3 g wet weight), was treated with hot base, hot acid, and distilled water rinses (noncalcareous). The treated sample (8.0 g) yielded 8.72 L of CO_2 gas. The age estimate is based on two counts for 2000 minutes in the 5 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 20.964 ± 0.111, 2.074 ± 0.027, and 28.244 ± 0.132 cpm, respectively.

The uncorrected age is 2400 ± 60.

Comment (T. Irwin): GSC-5059 was taken from a depth of 100-105 cm in a 173 cm long core, with a basal date of 3270 ± 50 (GSC-4937). It marks a decline in Cyperaceae pollen and a rise of Ericaceae in the peat.

Man Point Series

Three of a set of five samples collected at Man Point, a peat- covered beach- and dune-ridge foreland on the northeast coast of Newfoundland. The objective was to provide a chronological framework for a phase of coastal progradation at relative sea levels close to the present datum, with subsequent development of a domed peat bog up to 2.9 m thick overlying the prograded sequence.

GSC-4509. Man Point (I)
uncorrected 2740 ± 60

The peat was enclosed in sand and peat. Sample 87302-12 was collected by J. Shaw and D.L. Forbes in September 1987 from a beach- and dune-ridge foreland at Man Point, about 4 km to the southeast of the settlement of Doting Cove, District of Fogo, Newfoundland (49°26.14′N, 53°54.00′W), at an elevation of 1.10 m; submitted by D.L. Forbes.

The sample (22.0 g dry weight) was treated with hot base, hot acid, and distilled water rinses (slightly calcareous). The age estimate is based on two 1-day counts (2590 minutes) in the 5 L counter with a mixing ratio of 1.00.

Comment (D.L. Forbes and J. Shaw): The sample was collected from the basal 40 mm of a 1.02 m thick, well humified, herbaceous peat with wood and disseminated sand, exposed along the coast at Man Point. The lower part of the peat section, characterized by relatively high amounts of shrub pollen (*Myrica, Alnus,* and *Salix*), is overlain by herbaceous peat rich in *Sphagnum*, and by *Sphagnum* peat on the eroded margin of a mire that developed into a raised bog, overlying the sand and scattered gravel of the beach- and dune-ridge complex (Shaw and Forbes, 1990). The age is younger than that of two other lower peat samples from further landward in the ridge system (GSC-4520; and GSC-4662, 3.0 ka, McNeely and Jorgensen, 1992), consistent with the lateral expansion of the peat from initial growth in the lowest and wettest swales. This sample indicates that the seaward part of the ridge complex has an

age of at least 2.5 ka, suggesting that the Holocene transgression had attained a level close to present sea level by that time.

GSC-4520. Man Point (II) 3150 ± 90
$\delta^{13}C = -35.4‰$

The peat was enclosed in peat and sand. Sample 87302-032 was collected by J. Shaw and D.L. Forbes in September 1987 from a beach- and dune-ridge foreland at Man Point, about 4 km southeast of the settlement of Doting Cove, District of Fogo, Newfoundland (49°26.10′N, 53°53.85′W), at an elevation of 1.14 m; submitted by D.L. Forbes.

The sample (54.0 g wet weight) was treated with hot base, hot acid, and distilled water rinses (slightly calcareous). The age estimate is based on two 1-day counts (2350 minutes) in the 5 L counter with a mixing ratio of 1.00.

The uncorrected age is 3320 ± 90.

Comment (D.L. Forbes): This sample was collected from the base of an eroding peat cliff at Man Point, in a setting similar to that of GSC-4509. The peat thickness here was about 2 m, although it was as little as 0.5 m nearby on top of dune ridges. This date is the oldest yet obtained from the thick freshwater peat that overlies the Man Point foreland. It indicates that the prograded beach-ridge complex had developed at a sea level close to the present prior to 3 ka BP.

GSC-4592. Man Point (III) 2980 ± 90
$\delta^{13}C = -22.7‰$

The peat was enclosed in peat and sand. Sample 87302-039 was collected by J. Shaw in September 1987 from a sedge marsh at the head of the lagoon landward of the Man Point foreland, about 4 km southeast of the settlement of Doting Cove, Fogo District, Newfoundland (49°25.80′N, 53°54.00′W), at an elevation of -0.15 m; submitted by D.L. Forbes.

The sample (17.8 g dry weight) was treated with hot acid and distilled water rinses; base treatment was omitted (noncalcareous). The age estimate is based on two 1-day counts (2330 minutes) in the 2 L counter with a mixing ratio of 1.00.

The uncorrected age is 2940 ± 90.

Comment (J. Shaw and D.L. Forbes): This sample was from the lowermost 50 mm of organic sediments, overlying grey-brown lagoonal sand containing foraminifera, at a depth of 1.20 m down-core (0.15 m below mean sea level). The overlying organic deposits consisted of 0.95 m of red-brown peat (progressively greyer and less organic with depth) overlain by 0.25 m of dark-brown freshwater peat. The lowest 0.60 m of the lower peat contained *Zostera maritima* remains, foraminifera of the brackish water species *Jadammina macrescens*, and a large amount of pollen of *Plantago maritima* and Chenopodiaceae. These indicators suggest that relative sea level (mean water level) had reached an elevation of about -0.7 m by 3 ka BP (Shaw and Forbes, 1990), and that the foreland was in existence by this time, a conclusion supported by other dates in the series.

Grand Beach Series

A series of wood samples from the barrier beach near the settlement of Grand Beach, north coast of Burin Peninsula, Newfoundland (47°09′00″N, 55°29′00″W), at a depth of 0.1 m, were collected by J. Shaw and D.L. Forbes on September 24, 1986; submitted by J. Shaw.

GSC-4903. Grand Beach (I) 4310 ± 70
$\delta^{13}C = -24.7‰$

The wood, sample 86304-026 (47.9 g wet weight; *Picea*; identified by H. Jetté (unpublished GSC Wood Report No. 89-50)), enclosed in peat and gravel, was treated with hot base, hot acid, and distilled water rinses (noncalcareous). The treated sample (8.6 g) yielded 8.47 L of CO_2 gas. The age estimate is based on two counts for 2030 minutes in the 5 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 16.483 ± 0.101, 2.161 ± 0.033, and 28.156 ± 0.180 cpm, respectively.

The uncorrected age is 4300 ± 70.

Comment (J. Shaw): The sample is from a low, peat-covered gravel terrace, which extends from the rear of a sand and gravel barrier beach into the adjacent tidal lagoon. The stump was in a rooted position at the base of freshwater peat, 80 cm thick. The date resolves the uncertainty as to whether or not the terrace might be part of the extensive network of flood deltas at the rear of the transgressive barrier. It now appears that the terrace is an extension of the nearby gravel deposits, which feed sediment to the littoral system in the region. The date provides a minimum for regression of sea level from the terrace (see GSC-4705, McNeely and McCuaig, 1991).

GSC-4913. Grand Beach (II) 4720 ± 80
$\delta^{13}C = -27.6‰$

The basal peat, sample 86304-028 (44.8 g wet weight), enclosed in peat and gravel, was treated with cold base, hot acid, and distilled water rinses (noncalcareous). The treated sample (6.9 g) yielded 4.53 L of CO_2 gas. The age estimate is based on two counts for 2010 minutes in the 2 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 10.011 ± 0.076, 1.073 ± 0.016, and 18.101 ± 0.100 cpm, respectively.

The uncorrected age is 4760 ± 80.

Comment (J. Shaw): Basal peat from the same location as GSC-4903. This date extends the minimum date from regression of sea level from the terrace back another 0.4 ka.

GSC-4542. Cape Freels 1630 ± 50
$\delta^{13}C = -27.6‰$

The sandy peat was enclosed in sand and peat. Sample 87302-040 was collected by J. Shaw and D.L. Forbes in September 1987 from about 10 km southeast of Lumsden, at Cape Cove, Cape Freels, Bonavista North District, Newfoundland (49°14.00′N, 53°29.00′W), at an elevation of 4.71 m; submitted by D.L. Forbes.

The sample (133.0 g wet weight) was treated with cold base, hot acid, and distilled water rinses (slightly calcareous). The age estimate is based on two 1-day counts (2320 minutes) in the 5 L counter with a mixing ratio of 1.00.

The uncorrected age is 1670 ± 50.

Comment (D.L. Forbes): The sample was collected from the lowermost 30 mm of a 0.30 m thick peat unit resting on a former dune surface that was subsequently buried by renewed dune growth. The site was in coastal dunes at the back of a wide sandy beach toward the south end of Cape Cove and the peat unit could be traced landward where it merged with peat in a spruce woodland on the slope behind the dunes. Immediately underlying the compacted dry woody peat was a layer of leached grey sand overlying red-brown sand over indurated dark red-brown to black sand. The dunes developed in this underlying sand predated the peat by an unknown interval (possibly short). The timing and cause of the renewed dune activity, probably before 1 ka BP, remain unclear. The age of the peat is consistent with evidence from nearby Deadman's Bay (Beta-27233; Shaw and Forbes, 1990) indicating that relative sea level has been close to the present datum for the past 1.8 ka.

Central and Northern Newfoundland Lake Sediment Dates

The dates reported below are on bulk organic lake sediment, submitted to provide minimal dates for deglaciation or isolation and to date specific palynostratigraphic horizons. A number are basal dates from sediment with low organic content, submitted in an attempt to date deglaciation or isolation as closely as possible. It is frequently the case that such a sediment contains high proportions of *Pediastrum*, even exceeding the sparse pollen count from pioneer taxa, and that the $\delta^{13}C$ value is less negative than normal. It is likely, therefore, that a date from such sediment will be too old, for the reasons set out by Sutherland (1980).

In addition, review of the entire data set suggests that lakes with low nutrient status may not be exempt from postglacial hardwater error. The considerations that suggest potential dating anomalies are:

1. A date from basal lake sediment may be used no younger than an adjacent date from marine shells in presumed glaciomarine sediment.
2. Although there is palynological and sedimentological evidence at the Leading Tickles site (Blake, 1983; Macpherson and Anderson, 1985) for a climatic equivalent to the Younger Dryas, no such evidence has been found at other sites with basal dates greater than 11 ka BP where the deterioration should also have been recorded.
3. At some inland sites direct or interpolated dates on the initial *Picea* rise lie within the Younger Dryas interval, 11-10 ka BP. This finding is unexpected, especially in light of the limited available evidence suggesting that spruce did not arrive in Cape Breton Island until after 10 ka BP.

The following published dates are now under suspicion of being too old:

Leading Tickles:	GSC-3608, -3610 (Blake, 1983);
Bay d'Espoir Highway:	GSC-3634 (Blake, 1983); and
Bishop's Falls:	GSC-3647 (Blake, 1983);
Compass Pond:	GSC-3891 (Blake, 1986);
Freeman's Pond:	GSC-3973 (Blake, 1987); and
King's Point:	GSC-3957, -4003 (Blake, 1987).

Neville's Pond Series

A series of lake sediment samples from Neville's Pond, adjacent to, and south of, highway 1, 3.5 km northwest of intersection with highway 65 (renumbered 70), Avalon Peninsula, Newfoundland (47°26.2′N, 53°21.3′W), at an elevation of about 104 m, were collected by J.B. Macpherson on October 11, 1987; submitted by J.B. Macpherson.

GSC-4863. Neville's Pond (I)

uncorrected 9410 ± 130

The lake sediment, gyttja-clay, sample NP 255-263 (97.6 g wet weight), was treated with hot acid, and distilled water rinses; base treatment was omitted (noncalcareous). The treated sample (42.1 g) yielded 2.52 L of CO_2 gas. The age estimate is based on two counts for 4835 minutes in the 2 L counter with a mixing ratio of 1.86. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 5.473 ± 0.075, 1.067 ± 0.019, and 17.658 ± 0.099 cpm, respectively.

Comment (J.B. Macpherson): This sample marks an increase in shrubs and *Lycopodium*. Although *Pediastrum* is still high at the base of the sample, the date agrees with the dated *Betula* rise at Oxen Pond, St. John's (elevation 134 m), 47 km to the east-northeast (9440 ± 360, GSC-3182; Lowdon and Blake, 1981) and is in fair agreement with interpolated dates for the same event from other sites on the northeast Avalon Peninsula. A date of 8420 ± 300 (I(GSC)-4; Isotopes I, 1961; Terasmae, 1963) from Whitbourne Bog, 14 km to the west-southwest, marks the *Picea* rise higher in the pollen sequence; the interpolated date for the *Picea* rise at Neville's Pond is in fair agreement. Thus, GSC-4863 is considered to be about correct and is the minimal date for deglaciation of the site.

GSC-4829. Neville's Pond (II) 11 800 ± 150

$\delta^{13}C = -16.0‰$

The lake sediment, gyttja-clay, sample NP 275-283 (107.0 g wet weight), was treated with hot acid and distilled water rinses; base treatment was omitted (noncalcareous). The treated sample (53.9 g) yielded 2.88 L of CO_2 gas. The age estimate is based on one count for 2535 minutes in the 2 L counter with a mixing ratio of 1.52. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 4.209 ± 0.069, 1.090 ± 0.023, and 17.970 ± 0.101 cpm, respectively.

The uncorrected age is 11 700 ± 150.

Comment (J.B. Macpherson): A 306 cm core was obtained in a water depth of 185 cm with a modified Livingstone corer 5 cm in diameter from the central area of this small lake. The core consisted of gyttja (0-245 cm), clay-gyttja (245-291 cm) with a 1 cm layer of clay at 265 cm, overlying silty clay (291-306 cm). Samples were submitted from the clay-gyttja; 255-263 cm (GSC-4863) and 275-283 cm (GSC-4829).

The 1 cm clay layer within the basal clay-gyttja is almost devoid of pollen but otherwise is not associated with any interruption of the expected pollen sequence. It probably marks a local episode of soil instability.

This sample is the oldest basal lake sediment date so far recorded from the Avalon Peninsula. The associated pollen assemblage is representative of a sparse herb - low shrub tundra, but a high *Pediastrum* count and less negative than normal $\delta^{13}C$ value suggests that the date may be too old (Sutherland, 1980). It is older than the basal date from Golden Eye Pond (elevation 208 m; 10 100 ± 250, GSC-3136, Lowdon and Blake, 1981), 24 km to the south-southeast; the only other basal lake sediment date from the Avalon Peninsula exceeds 10 ka BP.

Pool's Cove Series

A series of lake sediment samples from 7.5 km southwest of the community of Pool's Cove, Newfoundland (47°38′N, 55°30′50″W), at an elevation of 150 m, were collected by S. Vardy on July 11, 1989; submitted by S. Vardy and J.B. Macpherson.

GSC-5028. Pool's Cove (I) 8300 ± 120

$\delta^{13}C = -26.1‰$

The lake sediment, silty gyttja, sample 'Pool's 210-215' (92.1 g wet weight; spruce-fir pollen assemblage; identified by S. Vardy), was treated with hot base, hot acid, and distilled water rinses (noncalcareous). The treated sample (13.4 g) yielded 4.19 L of CO_2 gas. The age estimate is based on two counts for 1600 minutes in the 2 L counter with a mixing ratio of 1.07. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 6.310 ± 0.079, 0.990 ± 0.030, and 17.773 ± 0.104 cpm, respectively.

The uncorrected age is 8320 ± 120.

Comment (S. Vardy): The dated sample was obtained from higher in the same core as GSC-4945, and dates increases in *Picea glauca, P. mariana*, and *Abies* pollen, indicating the establishment of an open spruce-fir woodland. This date provides a control for GSC-4945, and both dates are believed to be good.

GSC-4945. Pool's Cove (II) 9710 ± 120

$\delta^{13}C = -23.1‰$

The lake sediment, basal silty gyttja, sample 'Pool's 245-250' (94.0 g wet weight; birch-tundra pollen assemblage with abundant *Pediastrum*; identified by S. Vardy), was treated with hot acid and distilled water rinses; base treatment was omitted (noncalcareous). The

treated sample (17.0 g) yielded 2.47 L of CO_2 gas. The age estimate is based on one count for 3920 minutes in the 2 L counter with a mixing ratio of 1.79. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 5.351 ± 0.067, 1.083 ± 0.019, and 17.862 ± 0.102 cpm, respectively.

The uncorrected age is 9680 ± 120.

Comment (S. Vardy): A 280 cm long core was obtained in a water depth of 680 cm from a circular basin of a small, irregularly shaped headwater pond. The top 200 cm of the core consisted of gyttja, underlain by silty gyttja (200-253 cm below the sediment-water interface) and silty/sandy clay (253-280 cm depth). The dated sample is from just above the transition to organic sediment, at 245-250 cm depth. The pollen assemblage from the sample indicates a birch-shrub tundra vegetation. The date therefore provides a minimum age for deglaciation of the site.

"Moose Pond" Series

A series of lake sediment, samples from "Moose Pond" (unofficial name), 13.5 km east of the community of Milltown-Head on Bay D'Espoir, Newfoundland (47°56′N, 55°33′30″W), at an elevation of 135 m, were collected by S. Vardy, D.N. Proudfoot, and J.B. Macpherson on July 10, 1989; submitted by J.B. Macpherson.

GSC-4960. "Moose Pond" (I) 8660 ± 110
$\delta^{13}C = -25.8‰$

The lake sediment, gyttja, sample Moose 335-340 (30.0 g wet weight; birch-shrub tundra pollen assemblage), was treated with hot acid and distilled water rinses; base treatment was omitted (noncalcareous). The treated sample (19.1 g) yielded 3.59 L of CO_2 gas. The age estimate is based on one count for 4000 minutes in the 2 L counter with a mixing ratio of 1.23. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 6.130 ± 0.055, 1.026 ± 0.023, and 18.054 ± 0.143 cpm, respectively.

The uncorrected age is 8680 ± 110.

Comment (S. Vardy): The dated sample was obtained from 335-340 cm below the sediment-water interface. It dates an increase in *Picea* (both *P. glauca* and *P. mariana*) and *Abies* pollen and provides a control for GSC-5029 taken from the same core sample; both dates are considered good.

GSC-5029. "Moose Pond" (II) 10 000 ± 170
$\delta^{13}C = -25.1‰$

The lake sediment, basal silty gyttja, sample Moose 365-370 (94.8 g wet weight; birch-shrub tundra pollen assemblage with *Pediastrum*; identified by S. Vardy), was treated with hot base, hot acid, and distilled water rinses (noncalcareous). The treated sample (44.5 g) yielded 1.99 L of CO_2 gas. The age estimate is based on two counts for 3705 minutes in the 2 L counter with a mixing ratio of 2.25. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 5.100 ± 0.098, 0.990 ± 0.030, and 17.773 ± 0.104 cpm, respectively.

The uncorrected age is 10 000 ± 170.

Comment (S. Vardy): A 400 cm core was obtained in a water depth of 280 cm using a modified Livingstone corer, 5 cm in diameter. Silty/sandy clay at the base of the core (374-400 cm below the sediment-water interface) was overlain by silty gyttja (337-374 cm depth) grading upwards into gyttja (0-337 cm depth). The dated sample (365-370 cm) is from just above the transition to organic sediment, and provides a minimum age for deglaciation of the site. Pollen analysis indicates that a birch-shrub tundra vegetation had already been established.

GSC-4840. Southeast Arm 10 500 ± 160
$\delta^{13}C = -18.1‰$

The lake sediment, gyttja-clay, sample 'CC 550-555', was collected by J.B. Macpherson on July 18, 1985 from headwater pond of stream draining northwest to Southeast Arm, New Bay, 7.7 km southeast of Cottrell's Cove, Notre Dame Bay, adjacent to, and on east side of, highway 352, Newfoundland (49°25.8′N, 55°13.8′W), at an elevation of about 54 m; submitted by J.B. Macpherson.

The sample (51.4 g wet weight) was treated with hot acid and distilled water rinses; base treatment was omitted (noncalcareous). The treated sample (15.7 g) yielded 1.85 L of CO_2 gas. The age estimate is based on one count for 3650 minutes in the 2 L counter with a mixing ratio of 2.42. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 4.909 ± 0.079, 1.077 ± 0.015, and 17.836 ± 0.153 cpm, respectively.

The uncorrected age is 10 400 ± 160.

Comment (J.B. Macpherson): The dated sample (550-55 cm below the sediment-water interface) is from the basal clay-gyttja from a core 573 cm in length taken with a modified Livingstone corer 5 cm in diameter in a water depth of 90 cm. The core consisted of gyttja (0-520 cm), clay-gyttja (520-563 cm), and silty clay with grit (below 563 cm). The site is believed to be above the marine limit.

This "Younger Dryas" event was recorded in a search for further evidence to the west-northwest, but none was found (13 200 ± 300, GSC-3608; 10 500 ± 140, GSC-3610; Blake, 1982, Macpherson and Anderson, 1985). These dates are now considered to be too old (McNeely and McCuaig, 1991). The date is "minimal for deglaciation" but is probably too old, as the $\delta^{13}C$ value is less negative than normal and *Pediastrum* abundant (Sutherland, 1980). The pollen assemblage of the dated sediment indicates sedge-shrub tundra.

Northwest Gander River Pond Series

A series of lake sediment samples from "Northwest Gander River" Pond (unofficial name), 2 km south of Northwest Gander River and 50 km south of Bishop's Falls, Newfoundland (48°34′30″N, 55°25′W), at an elevation of 160 m, were collected by S. Vardy, D.N. Proudfoot, and J.B. Macpherson on July 6, 1989; submitted by J.B. Macpherson.

GSC-4951.	"Northwest Gander River" Pond (I)	8960 ± 120 $\delta^{13}C$ = -25.1‰

The lake sediment, gyttja, sample 'NWGR 160-165' (70.0 g wet weight; birch-shrub pollen assemblage with some *Picea*; identified by S. Vardy), was treated with hot acid and distilled water rinses; base treatment was omitted (noncalcareous). The treated sample (9.7 g) yielded 2.49 L of CO_2 gas. The age estimate is based on one count for 3950 minutes in the 2 L counter with a mixing ratio of 1.75. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 5.920 ± 0.071, 1.026 ± 0.023, and 18.054 ± 0.143 cpm, respectively.

The uncorrected age is 8960 ± 120.

Comment (S. Vardy): The dated sample (160-165 cm below the sediment-water interface) is from the base of the gyttja layer of the same core as GSC-5027. This marks the initial rise of *Picea* (mainly *P. glauca*) pollen, and the date is considered to be good.

GSC-5027.	"Northwest Gander River" Pond (II)	10 200 ± 240 $\delta^{13}C$ = -18.3‰

The lake sediment, basal gyttja-clay, sample NWGR 185-190 (81.7 g wet weight; sedge-shrub tundra pollen assemblage with abundant *Pediastrum*; identified by S. Vardy), was treated with hot base, hot acid, and distilled water rinses (noncalcareous). The treated sample (33.7 g) yielded 1.32 L of CO_2 gas. The age estimate is based on one count for 3000 minutes in the 2 L counter with a mixing ratio of 3.49. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 5.056 ± 0.145, 0.990 ± 0.030, and 17.773 ± 0.104 cpm, respectively.

The uncorrected age is 10 100 ± 240.

Comment (S. Vardy): A 231 cm core of lake sediment was obtained in a water depth of 202 cm using a modified Livingstone corer of 5 cm diameter. The dated sample (185-190 cm below the sediment-water interface) is from near the bottom of a layer of fibrous clay-gyttja (165-192 cm), underlain by silty clay (192-220 cm) and stony clay (220-231 cm) and overlain by gyttja. The pollen assemblage from the dated level indicates a sedge-shrub tundra vegetation. The sample was dated to provide a minimum age for the deglaciation of this site and is thought to be reasonably good. The presence of abundant *Pediastrum* in the sample and the fact that the $\delta^{13}C$ ratio (-18‰) is less negative than the normal range for gyttja suggest the possibility of aquatic photosynthesis, which might have incorporated older carbon into the sediment, leading to an anomalously old date (cf. Blystad and Selsing, 1989; Aravena, 1990; Macpherson, 1990). However, the date does not appear to be too old in the regional context, since it is similar to, or younger than, most other dated lake sediments from central and northern Newfoundland.

GSC-4985.	Miguels Lake	7330 ± 100 $\delta^{13}C$ = -28.1‰

The lake sediment, basal gyttja (birch-shrub pollen assemblage; identified by S. Vardy), sample 'Miguels 541-546', was collected by S. Vardy, D.N. Proudfoot, and J.B. Macpherson on July 7, 1989, from 2.5 km west of Miguels Lake and 30 km south of the town of Grand Falls, Newfoundland (48°40′50″N, 55°37′20″W), at an elevation of 180 m; submitted by J.B. Macpherson.

The sample (25.0 g dry weight) was treated with hot acid, and distilled water rinses; base treatment was omitted (noncalcareous). The treated sample (6.4 g) yielded 3.11 L of CO_2 gas. The age estimate is based on one count for 3595 minutes in the 2 L counter with a mixing ratio of 1.43. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 7.181 ± 0.067, 1.013 ± 0.022, and 17.992 ± 0.133 cpm, respectively.

The uncorrected age is 7380 ± 100.

Comment (S. Vardy): The dated sample is the basal 5 cm of a 546 cm lake core collected in a water depth of 164 cm, using a modified Livingstone sampler, 5 cm in diameter. The entire core consisted of gyttja, with the basal sediments

resting on bedrock or a boulder. The pollen assemblage from the dated sample is indicative of an open woodland, with some *Picea* present, which in combination with the absence of basal inorganic sediment, suggests that the date is too young for deglaciation of the site, but it is considered a good age for the sample.

GSC-4861. "Lily Pad Pond" Lake
uncorrected 8400 ± 110

The wood (deciduous, possibly *Salix*; identified by R.J. Mott (unpublished GSC Wood Report No. 89-30)) was enclosed in sandy gyttja. Sample AP-85-8 was collected by T.W. Anderson on July 13, 1985 from "Lily Pad Pond" Lake (473-478 cm below lake bottom), about 7.5 km northwest of Conche Harbour, northwest Newfoundland (50°55′10″N, 55°59′10″W), at an elevation of 184 m; submitted by T.W. Anderson.

The sample (4.4 g dry weight) was treated with hot base, hot acid, and distilled water rinses (noncalcareous). The treated sample (3.3 g) yielded 3.59 L of CO_2 gas. The age estimate is based on two counts for 2250 minutes in the 2 L counter with a mixing ratio of 1.27. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 6.207 ± 0.070, 1.067 ± 0.019, and 17.658 ± 0.099 cpm, respectively.

Comment (T.W. Anderson): The sample occurs at the base of the organic (gyttja) lake sediment sequence over sandy clay. The date provides a minimum age for ice retreat in northwest Newfoundland and a reliable check on lake sediment dates from this area.

Mosquito Cove Series

A series of peat samples from a salt marsh deposit and a shell sample were collected from Mosquito Cove, about 3 km north of Castors River Settlement, St. Barbe North District, Newfoundland by J. Shaw and D.L. Forbes in September 1987.

GSC-4868. Mosquito Cove (I) 1220 ± 60
$\delta^{13}C$ = -24.8‰

The silty peat was enclosed in silty peat. Sample 87302-052 was collected on September 13, 1987 at (50°56.43′N, 56°56.80′W), from an elevation of 0.96 m (mwl); submitted by J. Shaw.

The sample (448.7 g wet weight) was treated with cold base, hot acid, and distilled water rinses (moderately calcareous). The treated sample (89.0 g) yielded 6.71 L of CO_2 gas. The age estimate is based on two counts for 2031 minutes in the 5 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 24.312 ± 0.137, 2.189 ± 0.023, and 28.283 ± 0.127 cpm, respectively.

The uncorrected age is 1220 ± 60.

Comment (J. Shaw): This sample is from the base of a silty peat, interpreted as a salt marsh deposit, which overlies marine silty sand at the same location as GSC-4856. The date indicates that by 1.2 ka relative sea level was between +1.0 and -0.1 m at the site, and probably closer to the top of this range.

GSC-4717. Mosquito Cove (II) 1450 ± 70
$\delta^{13}C$ = -24.0‰

The silty peat was enclosed in silty peat and fine sand. Sample 87302-054 was collected by J. Shaw on September 21, 1987 at (50°56.52′N, 56°56.70′W), from an elevation of 0.7 m (mwl); submitted by D.L. Forbes.

The sample (114 g wet weight) was treated with hot base, hot acid, and distilled water rinses (noncalcareous). The treated sample (81.7 g) yielded 3.64 L of CO_2 gas. The age estimate is based on two counts for 2190 minutes in the 2 L counter with a mixing ratio of 1.18. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 15.124 ± 0.104, 1.109 ± 0.018, and 18.080 ± 0.095 cpm, respectively.

The uncorrected age is 1430 ± 70.

Comment (D.L. Forbes): The sample is the lowest 5 cm of sedge peat, 60 cm thick, at the edge of a narrow band of salt marsh. The peat is silty below 30 cm depth and overlies pebbly sand. Mean sea level was in the approximate range of +0.7 to -0.4 m when the peat began to accumulate.

GSC-4856. Mosquito Cove (III) 8470 ± 180
$\delta^{13}C$ = +1.8‰

The marine shell fragments (*Macoma calcarea*; identified by A. Cole) were enclosed in silty fine sand. Sample 870302-051 was collected on September 13, 1987 at (50°56.43′N, 56°56.80′W), from an elevation of 0.66 m (mwl); submitted by J. Shaw.

The sample (8.1 g dry weight) was treated with an acid leach to remove the outer 10% of the sample. The treated sample (7.5 g) yielded 1.56 L of CO_2 gas. The age estimate

is based on two counts for 2075 minutes in the 2 L counter with a mixing ratio of 2.86. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 6.238 ± 0.121, 1.077 ± 0.015, and 17.836 ± 0.153 cpm, respectively.

The uncorrected age is 8440 ± 180.

Comment (J. Shaw): The sample was contained in silty sand and was 30 cm below 30 cm thick salt-marsh peat, which is capped by 10 cm of freshwater peat, close to the shore of a sheltered inlet. The date indicates that the silty sand is much older than the overlying organic deposits and was deposited during the period of higher sea levels in the region. The overlying organic deposits are dated by GSC-4868 (1220 ± 60) and GSC-4717 (1450 ± 70).

"Woody Hill Brook" Pond Series

A series of lake sediment samples from "Woody Hill Brook" Pond alongside highway 480, about 7 km north of Burgeo, Newfoundland (47°40′45″N, 57°37′40″W), at an elevation of 160 m, were collected by T.W. Anderson on August 1, 1989; submitted by T.W. Anderson.

GSC-4999. "Woody Hill Brook" Pond (I) — 10 400 ± 110; $\delta^{13}C = -24.2‰$

The lake sediment, gyttja sample AP 89-2 (138.2-140.7 cm; 210.0 g wet weight), was treated with hot acid, and distilled water rinses; base treatment was omitted (noncalcareous). The treated sample (68.4 g) yielded 3.66 L of CO_2 gas. The age estimate is based on one count for 4244 minutes in the 2 L counter with a mixing ratio of 1.22. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 4.916 ± 0.053, 1.013 ± 0.027, and 18.000 ± 0.102 cpm, respectively.

The uncorrected age is 10 400 ± 110.

Comment (T.W. Anderson): The sediment sample occurs at the base of an upper gyttja sequence above grey and buff pebbly clay that overlies stratified detritus gyttja with sandy clay bands and moss layers, which in turn, overlies sandy clay. The sample provides an age for onset of regional warming marked by the sediment change from clay to gyttja and by a pollen change from herb-dominated assemblages to a second shrub-dominated assemblage comprising mainly *Betula glandulosa* (shrub birch) and *Myrica gale* (sweet gale). The onset of regional warming is correlated with the post-Younger Dryas retreat of the North Atlantic polar front.

GSC-5001. "Woody Hill Brook" Pond (II) — 11 100 ± 120; $\delta^{13}C = -21.6‰$

The lake sediment, gyttja sample AP 89-2A (151.3-153.3 cm; 175.0 g wet weight), was treated with hot acid and distilled water rinses; base treatment was omitted (noncalcareous). The treated sample (59.9 g) yielded 3.37 L of CO_2 gas. The age estimate is based on one count for 5000 minutes in the 2 L counter with a mixing ratio of 1.33. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 4.547 ± 0.053, 1.013 ± 0.027, and 18.000 ± 0.102 cpm, respectively.

The uncorrected age is 11 100 ± 120.

Comment (T.W. Anderson): The sample occurs at the top of the lower gyttja unit below grey and buff pebbly clay. The sample dates gyttja deposition and a period of climatic amelioration just prior to a change to colder conditions with clay deposition. The climate change is reflected in the pollen record by a transition from shrub-dominated assemblages of *Salix* (willow) and Ericaceae (heath family), to herb-dominated assemblages of Cyperaceae (sedge family), *Oxyria digyna* (mountain-sorrel), *Artemisia* (sage), Caryophyllaceae (pink family), Saxifragaceae (saxifrage family), and Gramineae (grass family). The period of climatic amelioration is attributed to a northward retreat of the North Atlantic polar front. The colder climate corresponds to a southward readvance of the North Atlantic polar front (Younger Dryas cooling).

Southwest Brook Series

A series of lake sediment samples from an unnamed lake on south side of Southwest Brook, on highway, 44 km east of Stephanville, Newfoundland (48°27′45″N, 57°59′32″W), at an elevation of 145 m, were collected by T.W. Anderson on August 20, 1986; submitted by T.W. Anderson.

GSC-5041. Southwest Brook (I) — 8550 ± 220; $\delta^{13}C = -33.8‰$

The lake sediment, gyttja, sample AP-86-9C (314-320 cm; 82.7 g wet weight), was treated with hot base, hot acid, and distilled water rinses (noncalcareous). The treated sample (9.9 g) yielded 2.44 L of CO_2 gas. The age estimate is based on two counts for 2000 minutes in the 2 L counter with a mixing ratio of 1.84. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 6.044 ± 0.148, 1.032 ± 0.028, and 17.834 ± 0.163 cpm, respectively.

The uncorrected age is 8690 ± 220.

Comment (T.W. Anderson): The sample dates a second rise in spruce (*Picea*) pollen, which followed a period of shrub birch (*Betula glandulosa*) dominance; tree birch (*B. papyrifera*) replaced shrub birch shortly after this time. The second rise in spruce reflects the onset of regional warming following a cool period which is correlated with the second eastward discharge of glacial Lake Agassiz via the Great Lakes and Ottawa and St. Lawrence River valleys (Anderson and Lewis, 1992).

GSC-4499. Southwest Brook (II) 11 500 ± 110
$\delta^{13}C = -20.4‰$

The lake sediment, gyttja, sample AP-86-9 (397-400 cm; 210.1 g wet weight), was treated with hot acid and distilled water rinses; base treatment was omitted (slightly calcareous). The age estimate is based on one 3-day count (4200 minutes) in the 2 L counter with a mixing ratio of 1.00.

The uncorrected age is 11 500 ± 110.

Comment (T.W. Anderson): The sample was taken from the top of the lower gyttja unit below a grey-buff clay. The sample dates a warm interval with gyttja deposition prior to the onset of cooling and clay deposition. The clay deposition is correlated with the Younger Dryas cool period of the North Atlantic Ocean. The date is too old by some 400 years because of a hardwater error based on a comparison with the more reliable, pre-Younger Dryas date of 11.1 ka (GSC-5001).

Trout River Series

A series of wood samples from 10 km east-northeast of Trout River, Newfoundland (49°29.9′N, 58°4′W), at an elevation of 330 m, were collected by P.A. Egginton and A.S. Dyke on August 20, 1987 and submitted for dating by P.A. Egginton.

GSC-4506. Trout River (I)
uncorrected 300 ± 60

The wood sample 87 EK N-3 (12.4 g dry weight; *Larix laricina*; identified by R.J. Mott (unpublished GSC Wood Report No. 87-35)), enclosed in sandy diamicton, was treated with hot base, hot acid, and distilled water rinses (noncalcareous). The age estimate is based on two 1-day counts (2390 minutes) in the 2 L counter with a mixing ratio of 1.00.

GSC-4522. Trout River (II) 350 ± 60
$\delta^{13}C = -23.9‰$

The wood sample 87 EK N-4 (11.2 g dry weight; *Larix laricana* (tamarack); identified by R.J. Mott (unpublished GSC Wood Report No. 87-35)), enclosed in a sandy diamicton, was treated with hot base, hot acid, and distilled water rinses (noncalcareous). The age estimate is based on two 1-day counts (2350 minutes) in the 2 L counter with a mixing ratio of 1.00.

The uncorrected age is 330 ± 60.

Romaines River Series

A series of samples were collected by D.R. Grant from 0.7 km west of the mouth of Romaines River, near the village of Romaines, on the coast of St. Georges Bay, Newfoundland (Island; 48°33.22′N, 58°41.02′W), at an elevation of 6-8 m; submitted by D.R. Grant.

GSC-4858. Romaines River (I) 12 800 ± 130
$\delta^{13}C = +1.9‰$

The marine shells (*Hiatella arctica, Mya truncata*, and *Macoma calcarea*; identified by D. Grant) were enclosed in silt. Sample 85-GS-45, collected on August 27, 1985 (31.5 g dry weight), was treated with an acid leach to remove the outer 20% of the sample. The treated sample (24.9 g) yielded 5.47 L of CO_2 gas. The age estimate is based on one count for 3810 minutes in the 2 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 3.651 ± 0.038, 1.077 ± 0.015, and 17.836 ± 0.153 cpm, respectively.

The uncorrected age is 12 700 ± 130.

S-3047. Romaines River (II)
uncorrected 13 345 ± 230

The bone (*Balaena mysticetus*; identified by C.R. Harington) was enclosed in silt. Sample 88-GS-01 (probably the 14th-15th lumbar vertebra of a Bowhead whale NMC 45042 and GSC paleontology Collection No. 104326) was collected on May 20, 1988.

Comment (D.R. Grant): On one hand, and taking account of the error range, the shell and bone ages are in reasonable agreement, considering they derive from the same horizon, yet are on different materials. They are thus considered to corroborate one another. On the other hand, the 12.8 ka shell date appears too young in relation to the 13 100 ± 180

date (GSC-4095; Blake, 1988) on shells in the immediate overlying gravel. The greater age of the stratigraphically higher shells may possibly be explained if they were reworked from the older underlying muds upslope by falling sea level, but this scenario is considered unlikely as most are intact. Despite the imperfect sequence, the three dates are considered to be in reasonable agreement, and an average age of about 13 ka BP is imputed to the series. This dated section (Grant, 1987, 1991) is in the marginal zone of the Robinsons Head Readvance and relates to an associated deglacial relative sea level of about 21 m.

Labrador

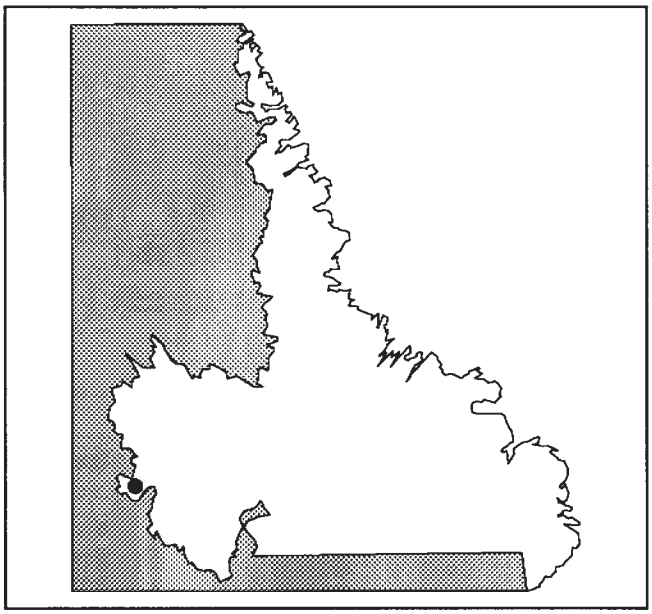

Figure 2. Radiocarbon dated sites in Labrador.

GSC-4489 HP. Wabush

uncorrected >50 000

The wood fragments (*Picea* or *Larix*?); identified by R.J. Mott (unpublished GSC Wood Report No. 87-25)) were enclosed in muddy sand. Sample 87 KY 8 was collected by R.A. Klassen and F. Thompson on July 8, 1987 from a cutwall, on the east pit haul road, Wabush Mines, Wabush, Labrador, Newfoundland (52°58.8′N, 66°54.3′W), at an elevation of 550 m; submitted by R.A. Klassen.

The sample (42.3 g dry weight) was treated with hot base, hot acid, distilled water rinses, slightly calcareous. The age estimate is based on three 2-day counts (6700 minutes) in the 5 L counter with a mixing ratio of 1.00.

Comment (R.A. Klassen): The wood fragments were enclosed in organic-rich, sandy lake sediments, 1-2 m thick. The lake sediments overlie till and are inturn overlain by two compositionally distinct tills. The Quaternary stratigraphy exposed during 1987 and 1988 along the margins of Scully Mine at Wabush was complex and might include other organic-bearing, waterlain sediments. A preliminary description of these deposits can be found in Klassen and Thompson, 1987, and Klassen et al., 1988.

Nova Scotia

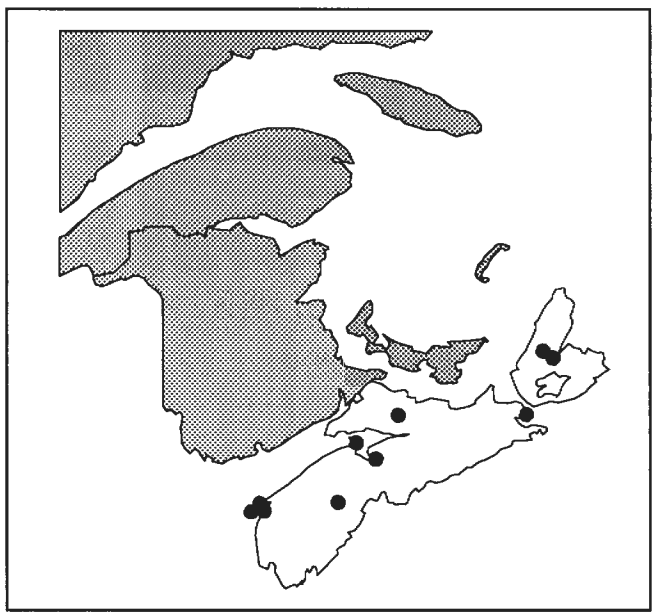

Figure 3. Radiocarbon dated sites in Nova Scotia.

GSC-4865. Baddeck Bog 9050 ± 100
$\delta^{13}C = -27.6‰$

The well-decomposed basal organic silt was enclosed in peat and silt. Sample MS-85-06 (606-610 cm) was collected by R.J. Mott and H. Jetté on August 5, 1985, from Baddeck Bog, about 2 km northwest of Baddeck, Cape Breton Island, Nova Scotia (46°6.75′N, 60°46.33′W), at an elevation of about 60 m; submitted by R.J. Mott.

The sample (60.5 g wet weight) was treated with cold base, hot acid, and distilled water rinses (noncalcareous). The treated sample (14.1 g) yielded 3.85 L of CO_2 gas. The age estimate is based on one count for 3260 minutes in the 2 L counter with a mixing ratio of 1.18. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 5.691 ± 0.055, 1.067 ± 0.019, and 17.658 ± 0.099 cpm, respectively.

The uncorrected age is 9100 ± 100.

Comment (R.J. Mott): This sample provides a basal date for the bog site that occupies a large shallow depression west of Bras d'Or Lake. It is somewhat younger than basal dates from lake sites on Cape Breton Island and simply dates the beginning of bog development.

GSC-4414. Third Lake O'Law 12 400 ± 130
$\delta^{13}C = -31.0‰$

The lake sediment, basal silty gyttja, sample MS-86-13 (1150-1165 cm) was collected by R.J. Mott and H. Jetté on July 26, 1986 from a lake at the headwaters of Lake O'Law Brook, about 22.5 km northwest of Baddeck, Cape Breton Island, Nova Scotia (46°15'N, 60°57.2'W), at an elevation of about 96 m; submitted by R.J. Mott.

The sample (128.7 g wet weight) was treated with hot acid and distilled water rinses; base treatment was omitted (noncalcareous). The age estimate is based on one 3-day count (4200 minutes) in the 2 L counter with a mixing ratio of 1.16.

The uncorrected age is 12 500 ± 130.

Comment (R.J. Mott): The lengthy sediment sequence in the deep, narrow bedrock basin occupied by Third Lake O'Law points to sediment focussing in the deepest part of the basin. A sediment core totalling 1228 cm and comprising 1165 cm of organic lake sediment (gyttja) over banded silt and clay was obtained. The core does not record a late-glacial lithological sequence seen in many other lake sites throughout the Maritimes that is indicative of a climatic oscillation correlative with the Allerød / Younger Dryas of Europe and the North Atlantic (Mott et al., 1986). Therefore, GSC-4414 is considered to be an anomalous date and the organic sediment at the interval dated is probably about 10 ka old.

Manassette Lake Series

A series of organic lake sediment samples from Manassette Lake, about 2.75 km southwest of St. Francis Harbour on the north coast of Chedabucto Bay, about 13 km east-northeast of Guysborough, Nova Scotia (45°26.1'N, 61°20.67'W), at an elevation of about 20 m, were collected by R.J. Mott and H. Jetté on July 24, 1989; submitted by R.J. Mott.

GSC-4965. Manassette Lake (I) 8630 ± 90
$\delta^{13}C = -29.7‰$

The organic lake sediment sample 89-MS-17 (255-258 cm; 115.2 g wet weight), enclosed in organic lake sediment, was treated with hot acid and distilled water rinses; base treatment was omitted (noncalcareous). The treated sample (34.2 g) yielded 3.93 L of CO_2 gas. The age estimate is based on one count for 3920 minutes in the 2 L counter with a mixing ratio of 1.08. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 6.051 ± 0.048, 1.030 ± 0.018, and 17.892 ± 0.101 cpm, respectively.

The uncorrected age is 8710 ± 90.

GSC-4964. Manassette Lake (II) 9910 ± 110
$\delta^{13}C = -29.2‰$

The organic lake sediment sample 89-MS-17 (297-300 cm; 133.4 g wet weight), with clay and organic sediment above, was treated with hot acid and distilled water rinses; base treatment was omitted (noncalcareous). The treated sample (35.9 g) yielded 4.96 L of CO_2 gas. The age estimate is based on one count for 2330 minutes in the 2 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 5.165 ± 0.055, 1.030 ± 0.018, and 17.892 ± 0.101 cpm, respectively.

The uncorrected age is 9980 ± 110.

Comment (R.J. Mott): The lake sediment core revealed 300 cm of algal gyttja and clayey gyttja overlying laminated grey clay to a depth of at least 2 m below the base of the organic sediments. Within the clay about 85 cm below the contact is a 10 cm thick seam of slightly organic clay with minor organic detrital fragments with too low an organic content for conventional dating methods.

GSC-4929. Wentworth Valley 10 700 ± 100
$\delta^{13}C = -27.3‰$

The wood (*Salix*; identified by R.J. Mott (unpublished GSC Wood Report No. 89-37)) was enclosed in clayey silt. Sample MS-89-20 was collected by R.J. Mott and R. Stea on August 14, 1989, from Wentworth Valley, about 1 km east-southeast of Wentworth Station and 5 km south of Wentworth at the ski resort beside highway 104, Nova Scotia (45°36.5'N, 63°33.73'W), at an elevation of 60 m; submitted by R.J. Mott.

The sample (9.3 g dry weight) was treated with hot base, hot acid, and distilled water rinses (noncalcareous). The treated sample (5.3 g) yielded 5.93 L of CO_2 gas. The age estimate is based on one count for 3960 minutes in the 2 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 4.675 ± 0.043, 1.083 ± 0.019, and 17.862 ± 0.102 cpm, respectively.

The uncorrected age is 10 800 ± 100.

Comment (R.J. Mott): The dated wood sample was recovered from an organic detritus layer near the base of a 3 m-thick unit of banded clay and silt and clayey silt and sand. Organic detritus and wood fragments occurred throughout the unit, which overlay gravel and was overlain by sand and coarse gravel. A wedge of diamicton intruded the unit from the east and probably represented reworked till derived from adjacent slopes. The wood was probably derived from upvalley in an area of reactivation or rejuvenation of ice in the Cobequid Highlands that dates from the cooling interval that interrupted climatic warming following general deglaciation of the region. The cooling is correlated with the Younger Dryas event of Europe that followed the Allerød interstadial (Mott et al., 1986; Stea and Mott, 1989).

GSC-5000 HP. Miller Creek — 11 100 ± 90; $\delta^{13}C$ = -27.2‰

The wood (*Picea*; identified by R.J. Mott (unpublished GSC Wood Report No. 90-23)) was enclosed in black, organic clay-silt. Sample MC-A/87 (PL-88-18) was collected by R. Stea in 1987 from Miller Creek Gypsum Quarry, Hants County, Nova Scotia (45°00′50″N, 64°02′40″W), at an elevation of about 15 m; submitted by R.J. Mott.

The sample (45.5 g dry weight) was treated with hot base, hot acid, and distilled water rinses. The treated sample (39.7 g) yielded 42.15 L of CO_2 gas. The age estimate is based on one count for 1000 minutes in the 5 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 25.432 ± 0.168, 2.477 ± 0.021, and 102.221 ± 0.494 cpm, respectively.

The uncorrected age is 11 200 ± 90.

Comment (R.J. Mott): Because the wood sample was found near the top of a 1-1.5 m thick bed of black organic clay/silt in a karst depression in Gypsum bedrock and was apparently overlain by about 10 m of till, the wood was thought to be of interglacial/interstadial age (Stea and Mott, 1990). Pollen analysis of the organic sediment revealed a spruce (*Picea*) dominated profile similar to the coniferous forest spectra characterizing many interglacial/interstadial deposits in Nova Scotia (Mott et al., 1982; Mott and Grant, 1985). Therefore, a 'High Pressure' date was conducted to obtain as old a nonfinite age as possible.

The late-glacial age obtained necessitates correlation with other buried late-glacial interstadial deposits found throughout the Maritimes (Mott et al., 1986). The site provides further evidence that spruce trees had migrated into parts of Nova Scotia by 11 ka BP and grew at this locality in significant numbers. The size of the log (>30 cm) used for dating indicates that the climate was conducive to the growth of relatively large trees. Presumably, subsequent climatic deterioration during the Younger Dryas interval caused slumping of surrounding till into the karst depression, or local glaciers were regenerated and overrode the site (Stea and Mott, 1989).

Blomidon Site Series

A series of peat samples from Blomidon Site at Blomidon on southeast coast of Blomidon Peninsula, North Mountain, about 15 km north of Wolfville, Nova Scotia (45°13.5′N, 64°22.56′W), at an elevation of about 23 m, were collected by R.J. Mott on July 22, 1989; submitted by R.J. Mott.

A roadside ditch exposure revealed 35 cm of compact fibrous peat with abundant twigs buried by up to 1.7 m of red, sandy/silty diamicton. Several centimetres of grey silty-sand with minor organic seams occur beneath the peat and above the underlying till. Grey, clayey silt with organic seams (10 cm thick) overlies the peat.

GSC-4969. Blomidon Site (I) — 10 600 ± 90; $\delta^{13}C$ = -29.0‰

The peat sample 89-MS-16 (top 2 cm; 100.6 g wet weight), enclosed in organic silt/sand and peat, was treated with hot base, hot acid, and distilled water rinses (slightly calcareous). The treated sample (35.1 g) yielded 9.44 L of CO_2 gas. The age estimate is based on one count for 3920 minutes in the 5 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 7.520 ± 0.058, 2.074 ± 0.030, and 28.375 ± 0.130 cpm, respectively.

The uncorrected age is 10 700 ± 90.

GSC-5391. Blomidon Site (II) — 11 200 ± 100; $\delta^{13}C$ = -27.5‰

The peat sample 89-MS-16 (1 cm interval at 7 cm below top; 49.8 g wet weight), enclosed in organic silt/sand and

peat, was treated with cold base, hot acid, and distilled water rinses (noncalcareous). The treated sample (12.2 g) yielded 10.5 L of CO_2 gas. The age estimate is based on one count for 3710 minutes in the 5 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 7.011 ± 0.057, 2.234 ± 0.029, and 28.421 ± 0.132 cpm, respectively.

The uncorrected age is 11 200 ± 100.

GSC-4968. Blomidon Site (III) 11 700 ± 110
$\delta^{13}C = -28.6‰$

The peat sample 89-MS-16 (basal 3 cm; 101.7 g wet weight; unpublished Palynological Report No. 89-20), enclosed in organic silt/sand and peat, was treated with hot base, hot acid, and distilled water rinses (noncalcareous). The treated sample (8.7 g) yielded 5.24 L of CO_2 gas. The age estimate is based on one count for 3930 minutes in the 2 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 4.143 ± 0.040, 1.030 ± 0.018, and 17.892 ± 0.101 cpm, respectively.

The uncorrected age is 11 800 ± 110.

Comment (R.J. Mott): Palynological results indicate that at about 11.7 ka BP sparse vegetation dominated by sedges (Cyperaceae) and various other herbaceous taxa characterized the area. Soon after, willow (*Salix*) shrubs were abundant bordering the depression where peat began to accumulate. Shrub birch (*Betula*) may have been present. Shrub birch became abundant as vegetation developed. Spruce (*Picea*) also began to invade the area about the same time and by 11.2 ka BP had formed an open spruce woodland. Shortly after 11.2 ka BP, probably at about 10.8 ka BP judging by other sites in Nova Scotia, climatic deterioration caused profound vegetation changes in the region. Spruce trees were decimated to be replaced by shrub birch and then willow as the climate continued to cool. By 10.6 ka BP, increased solifluction and other mass-wasting processes caused the organic sediments to be inundated by mineral sedimentation that eventually buried the site (Stea et al., 1992). This climatic oscillation has been correlated with the Allerød / Younger Dryas event of Europe (Mott et al., 1986).

Canoran Lake Series

Canoran Lake is located about 11.5 km east-northeast of the town of New Germany, Nova Scotia (44°35.9′N, 64°34′W), at an elevation of about 99 m. A pollen profile for Canoran Lake, with a basal date of 11 700 ± 160 (GSC-1486, Lowdon and Blake, 1968), was reported by Railton (1975). The pollen profile and lithological sequence reported suggested that a late-glacial climatic oscillation may be recorded at the site, and the lake was re-cored in 1985 by R.J. Mott and others using a modified Livingstone sampler to obtain sediments for radiocarbon dating of other levels in the sequence. Although the same stratigraphic sequence was encountered, the new core penetrated a much thicker postglacial sedimentary package. Overlying pinkish brown clay in the core below 654 cm is banded silty clay and dark brown silty gyttja with organic content increasing to about 614 cm below the mud / water interface. Upwards in the core, pinkish brown silty clay with lower organic content occurs to 596 cm depth and is overlain with light to dark brown gyttja to the surface. The samples were submitted by R.J. Mott.

GSC-4461. Canoran Lake (I) 10 100 ± 100
$\delta^{13}C = -24.7‰$

The silty gyttja sample MS-85-20 (593-596 cm; 118.0 g wet weight), with gyttja above and clay below, was treated with hot acid and distilled water rinses; base treatment was omitted (noncalcareous). The age estimate is based on one 4-day count (5400 minutes) in the 2 L counter with a mixing ratio of 1.21.

The uncorrected age is 10 100 ± 100.

GSC-4462. Canoran Lake (II) 11 200 ± 150
$\delta^{13}C = -27.7‰$

The silty gyttja sample MS-85-20 (614-617 cm; 95.8 g wet weight), with gyttja below and clay above, was treated with hot acid and distilled water rinses; base treatment was omitted (noncalcareous). The age estimate is based on three 1-day counts (3750 minutes) in the 2 L counter with a mixing ratio of 1.14.

The uncorrected age is 11 200 ± 150.

Comment (R.J. Mott): The Railton (1972) date of 11 700 ± 160 (GSC-1486, Lowdon and Blake, 1968) for the base of the dateable organic sediment in the core appears to be a reliable age based on the pollen profile and can be used as a minimum for deglaciation of the area and pre-dates the migration of spruce woodland into the area. These two dates bracket the more minerogenic layer that is coincident with lower abundance of spruce pollen. This phenomenon at numerous other sites throughout the Maritimes has been attributed to a deterioration of the climate following postglacial warming that is correlative with the Allerød / Younger Dryas event of Europe (Mott et al., 1986). Renewed warming by 10.1 ka BP saw the rejuvenation of spruce woodlands. These dates confirm this interpretation.

"Sandy Cove" Lake Series

A complete postglacial sequence of lake sediment totalling 1330 cm was recovered from a small unnamed lake north of the town of Sandy Cove on Digby Neck about 30 km southwest of Digby, Nova Scotia (44°29.5′N, 66°5.6′W), at an elevation of about 15 m. The lake occupies a kettle in a spillway across Digby Neck that terminates in a large outwash delta on the Bay of Fundy coast. Reddish-coloured fine gravel below 1330 cm is overlain by banded, stiff silty gyttja with macroscopic plant remains, including willow (*Salix* sp.) twigs, that increases in organic content to 1234 cm depth in the core. Upward to 1185 cm depth, organic content declines and the sediment contains bands of pebbles and clay. Above 1185 cm, organic content increases and dark algal gyttja occurs to the mud / water interface. The core was collected with a modified Livingstone sampler by R.J. Mott and others on July 16, 1986; submitted by R.J. Mott.

GSC-4467. "Sandy Cove" (I) 10 400 ± 120
$\delta^{13}C = -27.2‰$

The silty gyttja sample MS-86-8 (1178-1185 cm; 124.1 g wet weight) was treated with hot acid and distilled water rinses; base treatment was omitted (noncalcareous). The age estimate is based on one 3-day count (4200 minutes) in the 2 L counter with a mixing ratio of 1.31.

The uncorrected age is 10 500 ± 120.

GSC-4433. "Sandy Cove" (II) 11 700 ± 140
$\delta^{13}C = -29.8‰$

The silty gyttja sample MS-86-8 (1234-1240 cm; 135.0 g wet weight) was treated with hot acid and distilled water rinses; base treatment was omitted (slightly calcareous). The age estimate is based on two 1-day counts (2200 minutes) in the 2 L counter with a mixing ratio of 1.13.

The uncorrected age is 11 800 ± 140.

GSC-4460. "Sandy Cove" (III) 13 300 ± 130
$\delta^{13}C = -26.7‰$

The silty clayey gyttja sample MS-86-8 (1319-1324 cm; 86.4 g wet weight) was treated with hot acid and distilled water rinses; base treatment was omitted (noncalcareous). The age estimate is based on one 4-day count (5520 minutes) in the 2 L counter with a mixing ratio of 1.26.

The uncorrected age is 13 300 ± 130.

TO-3343. "Sandy Cove" (IV) 12 320 ± 90

The wood fragments (*Salix* sp.; identified by R.J. Mott) were enclosed in lake sediment, silty clay. Sample 86-MS-08 (1326-1328 cm) weighed 0.018 g (dry weight).

Comment (R.J. Mott): The lithologic sequence and dates obtained confirm that the basal part of the core records a late-glacial climatic oscillation that is seen at numerous sites throughout the Maritimes and has been correlated with the Allerød / Younger Dryas event of Europe and the North Atlantic Ocean (Mott et al., 1986). The similarity of the conventional bulk sediment date (GSC-4460) and the AMS date (TO-3343) on willow twigs from 2 cm below suggests that the bulk sediment date is reliable. The two dates farther up in the core bracket the mineral sediment interval that relates to the Younger Dryas cooling. These bulk sediment dates are reasonable for the event based on dates from other reliably dated sites. However, pollen analysis is required to determine how the increments dated compare with the climatic changes recorded by the vegetation.

"Church Point" Series

"Church Point" Lake is a small unnamed lake located about 1 km east of the town of Church Point and about 1.5 km east of the shore of St. Marys Bay, Nova Scotia (44°20.25′N, 66°6.15′W). The lake is situated behind a raised beach ridge at about 24 m elevation that is related to the high late-glacial sea level in the area (D.R. Grant, personal communication, 1985). The core penetrated 728 cm below the mud / water interface into grey clay. Over the clay at 676 cm depth, organic content increases to form greenish brown silty gyttja to 636 cm. The organic content declines to lower values above, before increasing again above 624 cm depth. The sediment above is coarsely banded and massive dark greenish brown and black gyttja to the surface. The core was collected with a modified Livingstone sampler by H. Jetté and others; samples submitted by R.J. Mott.

GSC-4568. "Church Point" (I) 10 400 ± 130
$\delta^{13}C = -27.4‰$

The silty gyttja sample MS-85-21 (620-624 cm; 87.1 g wet weight) was treated with hot acid and distilled water rinses; base treatment was omitted (noncalcareous). The age estimate is based on two 1-day counts (2100 minutes) in the 2 L counter with a mixing ratio of 1.27.

The uncorrected age is 10 500 ± 130.

GSC-4476. "Church Point" (II) 12 300 ± 130
$\delta^{13}C = -28.4‰$

The silty gyttja sample MS 85 21 (636-641 cm; 123.2 g wet weight), enclosed in gyttja and clay, was treated with hot acid and distilled water rinses; base treatment was omitted (noncalcareous). The age estimate is based on one 3-day count (4200 minutes) in the 2 L counter with a mixing ratio of 1.00.

The uncorrected age is 12 400 ± 130.

GSC-4448. "Church Point" (II) 14 300 ± 150
$\delta^{13}C = -24.1‰$

The organic silty clay sample MS-85-21 (670-676 cm; 157.8 g wet weight), with gyttja above and clay below, was treated with hot acid and distilled water rinses; base treatment was omitted (slightly calcareous). The age estimate is based on one 3-day count (4200 minutes) in the 2 L counter with a mixing ratio of 1.24.

The uncorrected age is 14 300 ± 150.

Comment (R.J. Mott): The sedimentary sequence is similar to that at many other lake sites throughout the Maritimes where a late-glacial climatic oscillation has been correlated with the Allerød / Younger Dryas event of Europe (Mott et al., 1986). The dates GSC-4568 and GSC-4476 that bracket the layer of decreased organic content are older than expected, especially the latter, for the cooling event suggesting that the ages are somewhat anomalous due to contamination by old carbon. The basal date may also be spurious as it is much older than basal dates from other sites in the area (GSC-4433, -4443, -4460, and TO-3343).

Brier Island Bog Series

Brier Island Bog is located in a bedrock depression about 0.5 km southeast of the lighthouse on the Bay of Fundy coast of Brier Island at the end of Digby Neck, Nova Scotia (44°14.75′N, 66°23.3′W) at an elevation of about 15 m. Sediments containing abundant marine shells below 730 cm from the bog surface overlain by freshwater sediments indicate that a small lake formed as isostatic rebound lifted the the basin above sea level. Subsequent infilling of the lake led to formation of a peat bog. Abundant fragmented remains of a variety of marine organisms occur in coarse sand and gravel from 730 to 790 cm below the bog surface. The overlying lake sediments increase in organic content from finely laminated clayey gyttja to mottled gyttja and massive clayey gyttja at 663 cm depth. Lower organic content characterizes the more clayey gyttja to about 640 cm where organic content increases in the massive light brown gyttja. Peat overlies the gyttja at 500 cm depth. The site was sampled with a Hiller Peat borer for the peat and a modified Livingstone sampler for the underlying sediments by R.J. Mott and others; samples submitted by R.J. Mott.

GSC-4494. Brier Island Bog (I) 10 300 ± 120
$\delta^{13}C = -17.5‰$

MS-85-22 (630-635 cm) is from the interval in the lake sediment above the minerogenic layer where the organic content increases. The slightly clayey gyttja sample (76.7 g wet weight) was treated with hot acid and distilled water rinses; base treatment was omitted (noncalcareous). The age estimate is based on one 3-day count (4200 minutes) in the 2 L counter with a mixing ratio of 1.76.

The uncorrected age is 10 200 ± 120.

GSC-4556. Brier Island Bog (II) 11 100 ± 120
$\delta^{13}C = -20.5‰$

MS-85-22 (663-670 cm) is from the lake sediment below the minerogenic layer. The clayey gyttja sample (99.3 g wet weight) was treated with hot acid and distilled water rinses; base treatment was omitted (slightly calcareous). The age estimate is based on one 3-day count (4200 minutes) in the 2 L counter with a mixing ratio of 1.51.

The uncorrected age is 11 100 ± 120.

GSC-4443. Brier Island Bog (III) 13 100 ± 390
$\delta^{13}C = -19.2‰$

MS-85-22 (723-730 cm) is the lowermost dateable organic lake sediment above the basal marine sand and gravel. The finely laminated clayey gyttja (216.6 g wet weight) was treated with hot acid and distilled water rinses; base treatment was omitted (slightly calcareous). The age estimate is based on two 1-day counts (2050 minutes) in the 2 L counter with a mixing ratio of 4.27.

The uncorrected age is 13 000 ± 390.

GSC-4431. Brier Island Bog (IV) 13 200 ± 130
$\delta^{13}C = +0.3‰$

MS-85-22 (750-790 cm) is from the marine sand and gravel underlying the sequence of lake sediment and peat. Fragmented remains of marine organisms sieved from the sand and gravel included *Mytilus* and *Balanus* as the main component, but other pelecopods, gastropods, echinoderms

and fish bone fragments were observed. The sample (24.4 g dry weight) was treated with an acid leach to remove the outer 10% of the sample. The age estimate is based on one 3-day count (4200 minutes) in the 2 L counter with a mixing ratio of 1.00.

The uncorrected age is 13 200 ± 130.

Comment (R.J. Mott): Brier Island Bog site provides an opportunity to compare the ages obtained for marine organisms and the freshwater sediments immediately above. The basal lake sediment date appears to be reliable and suggests that the site changed abruptly from a marine to terrestrial environment. The overlying sequence, with organic content of the sediments increasing and then reverting to a more minerogenic sedimentation before changing again to organic deposition, is similar to sedimentary sequences found throughout the Maritimes that are related to a late-glacial climatic oscillation (Mott et al., 1986). The dates bracketing the minerogenic layer corroborate the correlation with the Allerød / Younger Dryas event. Analysis of the pollen, diatoms, and chironomids in the late-glacial part of the sequence provide further corroboration of a climatic oscillation during this time interval (Wilson et al., in press).

New Brunswick

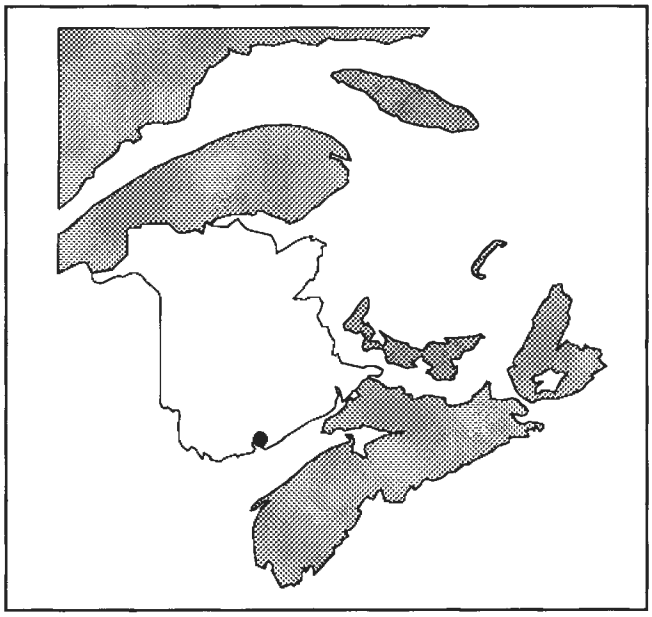

Figure 4. Radiocarbon dated sites in New Brunswick.

GSC-4828. Ping Pong Pond 11 800 ± 140
$\delta^{13}C = -30.3‰$

The lake sediment, basal gyttja was enclosed in gyttja and silt. Sample MS-87-9 (190-192.5 cm) was collected by R.J. Mott and H. Jetté on July 12, 1987, from Ping Pong Pond, about 5.6 km southwest of Rothesay, east of St. John, New Brunswick (45°20.6′N, 65°57.8′W), at an elevation of about 90 m; submitted by R.J. Mott.

The sample (37.2 g wet weight) was treated with hot acid and distilled water rinses; base treatment was omitted (noncalcareous). The treated sample (7.3 g) yielded 5.43 L of CO_2 gas. The age estimate is based on two counts for 2195 minutes in the 2 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 4.041 ± 0.051, 1.077 ± 0.015, and 17.836 ± 0.153 cpm, respectively.

The uncorrected age is 11 900 ± 140.

Comment (R.J. Mott): Date is from basal organic sediments in a small lake in an area of abundant glacial deposits overlying carbonate bedrock. Carbonate content of the basal sediments is high, although marl is not present. A lithologic sequence consistent with that seen in other lakes in the Maritimes indicative of a late-glacial climatic oscillation is not apparent (Mott et al., 1986). Therefore, the age is probably anomalously old due to the hardwater effect and should date about 10-10.5 ka BP. Corroboration of this interpretation by pollen analysis is required.

GSC-4544. Long Lake 12 200 ± 150
$\delta^{13}C = -25.1‰$

The basal clayey gyttja sample MS-87-7 (579-565 cm), with gyttja above and clay below, was collected by R.J. Mott on July 18, 1987, from Long Lake in Rockwood Park, northern suburbs of city of St. John, New Brunswick (45°18.7′N, 66°3.6′W), at an elevation of about 70 m; submitted by R.J. Mott.

The sample (189.4 g wet weight) was treated with hot acid and distilled water rinses; base treatment was omitted (noncalcareous). The age estimate is based on one 3-day count (4200 minutes) in the 2 L counter with a mixing ratio of 1.27.

The uncorrected age is 12 200 ± 150.

Comment (R.J. Mott): A lake sediment sequence totalling 600 cm overlies massive clayey silt with pebbles at the site. The basal lake sediments have increasing organic content upward from laminated clayey silt to organic lake sediment (gyttja) at 556 cm. Organic content declines in the overlying sediment to 535 cm where organic content increases again. This sediment sequence is consistent with that obtained from many other lake sites throughout the Maritimes that record a late-glacial climatic oscillation correlative with the Allerød / Younger Dryas event of Europe and the North Atlantic

(Mott et al., 1986). Although the date may be somewhat anomalous due to hardwater effect (some carbonates are present in the basal lake sediments and in the underlying mineral sediment), the basal organic sediments pre-date the Younger Dryas interval. Preliminary pollen analysis confirms this interpretation. Therefore, the date is an estimate for the beginning of organic deposition at the site and for deglaciation of the area.

Québec

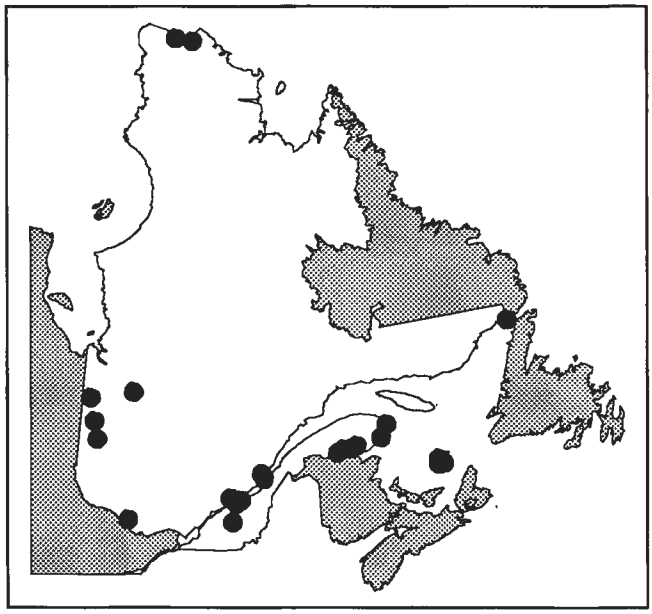

Figure 5. Radiocarbon dated sites in Québec.

Lourdes-de-Blanc-Sablon Series

A series of peat and wood samples from Lourdes-de-Blanc-Sablon, lower north shore of Gulf of St. Lawrence at the head of the Blanc-Sablon River valley, Québec (51°29′N, 57°10′W), at an elevation of about 60 m, were collected by J.C. Dionne on July 25, 1989; submitted by J.C. Dionne.

GSC-4991. Blanc-Sablon (I) 470 ± 50
$\delta^{13}C = -25.7‰$

The peat sample BS-10-89 (8 cm; 32.8 g dry weight), enclosed in peat - wood - organic, was treated with hot base, hot acid, and distilled water rinses (noncalcareous). The treated sample (9.9 g) yielded 9.43 L of CO_2 gas. The age estimate is based on two counts for 2000 minutes in the 5 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 26.498 ± 0.124, 2.079 ± 0.032, and 28.127 ± 0.134 cpm, respectively.

The uncorrected age is 480 ± 50.

GSC-5014. Blanc-Sablon (II) 3940 ± 60
$\delta^{13}C = -25.2‰$

The wood sample BS-11-89 (30 cm; 12.0 g dry weight; *Picea*; identified by H. Jetté (unpublished GSC Wood Report No. 90-20)), enclosed in peat and organic sediment, was treated with hot base, hot acid, and distilled water rinses (noncalcareous). The treated sample (9.1 g) yielded 9.15 L of CO_2 gas. The age estimate is based on three counts for 3000 minutes in the 5 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 17.330 ± 0.107, 2.095 ± 0.026, and 28.326 ± 0.128 cpm, respectively.

The uncorrected age is 3950 ± 60.

GSC-5010. Blanc-Sablon (III) 3980 ± 60
$\delta^{13}C = -26.7‰$

The peat sample BS-9-89 (30 cm; 49.7 g dry weight), enclosed in peat and organic sediment, was treated with hot base, hot acid, and distilled water rinses (noncalcareous). The treated sample (9.0 g) yielded 9.82 L of CO_2 gas. The age estimate is based on two counts for 2000 minutes in the 5 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 17.198 ± 0.102, 2.095 ± 0.026, and 28.326 ± 0.128 cpm, respectively.

The uncorrected age is 4010 ± 60.

GSC-5012. Blanc-Sablon (IV) 5280 ± 60
$\delta^{13}C = -25.2‰$

The peat sample BS-8-89 (60 cm; 37.4 g dry weight), enclosed in peat and organic sediment, was treated with hot base, hot acid, and distilled water rinses (noncalcareous). The treated sample (8.2 g) yielded 7.99 L of CO_2 gas. The age estimate is based on one count for 4244 minutes in the 5 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 14.677 ± 0.068, 2.095 ± 0.026, and 28.326 ± 0.128 cpm, respectively.

The uncorrected age is 5280 ± 60.

GSC-4995. Blanc-Sablon (V) 6080 ± 70
$\delta^{13}C = -28.4‰$

The peat sample BS-7-89 (110 cm; 73.9 g dry weight), enclosed in peat - wood - organic, was treated with hot base,

hot acid, and distilled water rinses (noncalcareous). The treated sample (11.6 g) yielded 8.04 L of CO_2 gas. The age estimate is based on one count for 3595 minutes in the 5 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 13.098 ± 0.073, 2.079 ± 0.032, and 28.127 ± 0.134 cpm, respectively.

The uncorrected age is 6140 ± 70.

GSC-5006. Blanc-Sablon (VI) 6660 ± 90
$\delta^{13}C = -25.9‰$

The wood sample BS-6-89 (130 cm; 12.1 g dry weight; *Salix*; identified by H. Jetté (unpublished GSC Wood Report No. 90-21)), enclosed in peat and organic sediment, was treated with hot base, hot acid, and distilled water rinses (noncalcareous). The treated sample (9.2 g) yielded 9.87 L of CO_2 gas. The age estimate is based on two counts for 2000 minutes in the 5 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 12.338 ± 0.116, 2.095 ± 0.026, and 28.326 ± 0.128 cpm, respectively.

The uncorrected age is 6680 ± 90.

GSC-4990. Blanc-Sablon (VII) 6930 ± 70
$\delta^{13}C = -28.8‰$

The peat sample BS-5-89 (150 cm; 38.9 g dry weight), enclosed in peat - wood - organics, was treated with hot base, hot acid, and distilled water rinses (noncalcareous). The treated sample (9.4 g) yielded 7.88 L of CO_2 gas. The age estimate is based on four counts for 6720 minutes in the 5 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 11.774 ± 0.064, 2.079 ± 0.032, and 28.127 ± 0.134 cpm, respectively.

The uncorrected age is 7000 ± 70.

GSC-5004. Blanc-Sablon (VIII) 7050 ± 90
$\delta^{13}C = -28.9‰$

The peat sample BS-4-89 (160 cm; 69.8 g dry weight), enclosed in peat and organic sediment, was treated with hot base, hot acid, and distilled water rinses (noncalcareous). The treated sample (10.5 g) yielded 8.84 L of CO_2 gas. The age estimate is based on two counts for 2000 minutes in the 5 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 11.678 ± 0.107, 2.095 ± 0.026, and 28.326 ± 0.128 cpm, respectively.

The uncorrected age is 7120 ± 90.

GSC-5003. Blanc-Sablon (IX) 7290 ± 80
$\delta^{13}C = -30.5‰$

The peat sample BS-3-89 (220 cm; 46.7 g dry weight), enclosed in peat and organic sediment, was treated with hot base, hot acid, and distilled water rinses (noncalcareous). The treated sample (20.5 g) yielded 14.93 L of CO_2 gas. The age estimate is based on one count for 2688 minutes in the 5 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 11.300 ± 0.075, 2.095 ± 0.026, and 28.326 ± 0.128 cpm, respectively.

The uncorrected age is 7380 ± 80.

GSC-4952. Blanc-Sablon (X) 8310 ± 100
$\delta^{13}C = -29.0‰$

The peat sample BS-2-89 (285 cm; 130.0 g dry weight), enclosed in peat - wood - organic, was treated with hot base, hot acid, and distilled water rinses (noncalcareous). The treated sample (19.7 g) yielded 9.65 L of CO_2 gas. The age estimate is based on two counts for 2000 minutes in the 5 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 9.976 ± 0.084, 2.014 ± 0.032, and 28.290 ± 0.181 cpm, respectively.

The uncorrected age is 8370 ± 100.

GSC-4946. Blanc-Sablon (XI) 8760 ± 100
$\delta^{13}C = -29.6‰$

The peat sample BS-1-89 (310 cm; 159.0 g dry weight), enclosed in peat - wood - organic, was treated with cold base, hot acid, and distilled water rinses (noncalcareous). The treated sample (39.5 g) yielded 8.69 L of CO_2 gas. The age estimate is based on two counts for 2000 minutes in the 5 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 9.425 ± 0.082, 2.014 ± 0.032, and 28.290 ± 0.181 cpm, respectively.

The uncorrected age is 8830 ± 100.

Comment (J-C. Dionne): Of the eleven dates in this series, ten refer to the main peat cover in a small palsa bog located at the head of the Blanc-Sablon River valley, Québec. GSC-5010 and -5014 date the age for the top of the sphagnum peat at 30 cm depth, while GSC-4952 refers to the base of the peat cover at 285 cm depth. GSC-4946 refers to the lacustrine mineral and organic debris underlying the peat bog at a depth of 310 cm. All dates are in a gradual and normal sequence. GSC-4991 gives the age of the base of the thin (10 cm) lichenic cover of a palsa. The discontinuity between the main peat cover and the lichens at

the surface is probably best explained by erosion that had occurred when the palsa formed, most likely with the inception of the Little Ice Age.

GSC-4959. Havre-Aubert 320 ± 60
$\delta^{13}C = -27.7‰$

The freshwater peat sample 'PIA-890717-B1' (base) was collected by M. Parent and J-M.M. Dubois on September 19, 1989, from beach south of the former Havre-Aubert airport, about 2 km southeast of four way intersection in the village of Havre-Aubert, Iles de la Madeleine, Québec (47°13′00″N, 61°50′30″W), at a depth of 0.6 m; submitted by M. Parent.

The sample (149.0 g wet weight) was treated with cold base, hot acid, and distilled water rinses (noncalcareous). The treated sample (28.5 g) yielded 8.22 L of CO_2 gas. The age estimate is based on two counts for 2000 minutes in the 5 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 27.021 ± 0.125, 2.014 ± 0.032, and 28.290 ± 0.181 cpm, respectively.

The uncorrected age is 370 ± 60.

Le Bassin lagoon Series

A series of peat samples from small valley entering the Le Bassin lagoon, about 730 m southwest of three way intersection at Portage du Cap, Iles de la Madeleine, Québec (47°14′06″N, 61°53′57″W), at an elevation of 0.27 m, were collected by M. Parent and J-M.M. Dubois on August 12, 1986; submitted by M. Parent.

GSC-4949. Le Bassin lagoon (I) 1510 ± 80
$\delta^{13}C = -27.8‰$

The peat sample ANSE (310-320; 33.0 g wet weight), was treated with hot acid and distilled water rinses; base treatment was omitted (noncalcareous). The treated sample (2.3 g) yielded 2.17 L of CO_2 gas. The age estimate is based on one count for 3970 minutes in the 2 L counter with a mixing ratio of 2.23. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 14.828 ± 0.110, 1.013 ± 0.022, and 17.992 ± 0.133 cpm, respectively.

The uncorrected age is 1550 ± 80.

GSC-4942. Le Bassin lagoon (II) 2430 ± 90
$\delta^{13}C = -27.8‰$

The well decomposed peat sample ANSE (490-500; 29.6 g wet weight) was treated with hot acid and distilled water rinses; base treatment was omitted (noncalcareous). The treated sample (2.6 g) yielded 2.40 L of CO_2 gas. The age estimate is based on two counts for 2000 minutes in the 2 L counter with a mixing ratio of 1.86. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 13.122 ± 0.124, 1.083 ± 0.019, and 17.862 ± 0.102 cpm, respectively.

The uncorrected age is 2480 ± 90.

GSC-4941. Le Bassin lagoon (III) 6500 ± 100
$\delta^{13}C = -27.6‰$

The well decomposed peat sample ANSE (569-580; 34.6 g wet weight), enclosed in peat, was treated with hot acid, and distilled water rinses; base treatment was omitted (noncalcareous). The treated sample (6.4 g) yielded 3.87 L of CO_2 gas. The age estimate is based on two counts for 2000 minutes in the 2 L counter with a mixing ratio of 1.16. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 7.906 ± 0.076, 1.083 ± 0.019, and 17.862 ± 0.102 cpm, respectively.

The uncorrected age is 6550 ± 100.

GSC-4834. Le Bassin lagoon (IV) 7520 ± 140
$\delta^{13}C = -24.1‰$

The peat sample ANSE (635-640; 630-635; 37.5 g wet weight), enclosed in lake sediment, was treated with hot acid, and distilled water rinses; base treatment was omitted (noncalcareous). The treated sample (18.5 g) yielded 1.47 L of CO_2 gas. The age estimate is based on one count for 3635 minutes in the 2 L counter with a mixing ratio of 3.06. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 7.011 ± 0.104, 1.077 ± 0.015, and 17.836 ± 0.153 cpm, respectively.

The uncorrected age is 7500 ± 140.

GSC-4872. Millerand wharf 1400 ± 50
$\delta^{13}C = -28.2‰$

The peat, sample MIL-01 (top), was collected by M. Parent and J-M.M. Dubois on August 8, 1985, from along coastal cliff, about 900 m east of Millerand wharf, Iles de la Madeleine, Québec (47°12′52″N, 61°58′34″W), at an elevation of about 13.5 m; submitted by M. Parent.

The sample (59.5 g wet weight) was treated with hot base, hot acid, and distilled water rinses (noncalcareous). The treated sample (16.0 g) yielded 8.36 L of CO_2 gas. The age estimate is based on two counts for 2050 minutes in the 5 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 23.859 ± 0.116, 2.151 ± 0.026, and 28.579 ± 0.127 cpm, respectively.

The uncorrected age is 1450 ± 50.

GSC-4557. l'Anse à la Cabane

uncorrected 6790 ± 60

Sample 87 MS-20 of the basal sandy organic material was collected by R.J. Mott and L.A. Dredge on September 16, 1987, from east side of l'Anse à la Cabane on south coast of Ile du Havre Aubert, Iles de la Madeleine, Québec (47°12.9′N, 61°58.8′W), at an elevation of 0 m; submitted by R.J. Mott and L.A. Dredge.

The sample (126.0 g wet weight) was treated with hot acid and distilled water rinses; base treatment was omitted (noncalcareous). The age estimate is based on one 3-day count (4200 minutes) in the 5 L counter with a mixing ratio of 1.00.

Comment (R.J. Mott and L.A. Dredge): The eroding sea-cliff at this site has exposed a large sediment-filled karst depression in gypsum-bearing bedrock. Purple clay containing dispersed organic remains formed from weathered bedrock lines the depression and extends below sea level. Red drift and yellow sand of variable thickness overlie the clay. A smaller depression within the larger karst depression is filled with up to 40 cm of sand and sandy gravel overlain by an organic sequence of clayey gyttja, fibrous gyttja and peat up to 180 cm thick. The sequence is capped by sand, gravel, and debris related to a roadway that covered the site and led to a wharf located on the coast. The site was originally thought to contain a complete postglacial record, but the basal date indicates that the organic sediments are less than 7 ka old.

GSC-4801. Le Petit Etang 3540 ± 70

$\delta^{13}C = -27.1‰$

The peat, sample Peta (475-480), was collected by M. Parent and J-M.M. Dubois on August 13, 1986, from the bog surrounding Le Petit Etang, about 1.4 km south-southwest of three way intersection of Etang-du-Nord, Iles de la Madeleine, Québec (47°21′37″N, 61°57′13″W), at an elevation of 0.66 m; submitted by M. Parent.

The sample (40.7 g wet weight) was treated with hot acid and distilled water rinses; base treatment was omitted (noncalcareous). The treated sample's age estimate is based on one count for 2135 minutes in the 2 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 11.519 ± 0.079, 1.064 ± 0.019, and 17.975 ± 0.097 cpm, respectively.

The uncorrected age is 3570 ± 70.

GSC-4885. Millerand wharf 3880 ± 70

$\delta^{13}C = -29.3‰$

The peat, sample 880706-2 (top), was collected by M. Parent and J-M.M. Dubois on July 6, 1988, from along coastal cliff, about 710 m east of Millerand wharf, Iles de la Madeleine, Québec (47°12′56″N, 61°58′40″W), at an elevation of about 11 m; submitted by M. Parent.

The sample (66.2 g wet weight) was treated with hot base, hot acid, and distilled water rinses (noncalcareous). The treated sample (11.0 g) yielded 8.58 L of CO_2 gas. The age estimate is based on one count for 3805 minutes in the 2 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 10.970 ± 0.059, 1.070 ± 0.019, and 17.936 ± 0.117 cpm, respectively.

The uncorrected age is 3950 ± 70.

GSC-4466 HP. Millerand

uncorrected >47 000

The marine shell fragments (*Mytilus edulis* and *Balanus crenatus*; identified by M. Parent) were enclosed in sand. Sample 850809-1F was collected by M. Parent and J-M. Dubois on August 14, 1986, from Millerand (Iles-de-la-Madeleine), seacliff south of village, Québec (47°13′5″N, 61°59′2″W), at an elevation of 12.27 m; submitted by M. Parent.

The sample (156.3 g dry weight) was treated with an acid leach to remove the outer 5% of the cleaned shell material. The age estimate is based on four 1-day counts (5050 minutes) in the 5 L counter with a mixing ratio of 1.00.

GSC-4953. Le Bassin lagoon 8680 ± 120

$\delta^{13}C = -28.9‰$

The gyttja was enclosed in organic mud. Sample PIA-890718-B (310-320) was collected by M. Parent and

J-M.M. Dubois on September 18, 1989, from small valley entering the Le Bassin lagoon in the village of Havre-Aubert, at the west end of La Grave, Iles de la Madeleine, Québec (47°14′02″N, 61°50′30″W), at an elevation of about 0.3 m; submitted by M. Parent.

The sample (50.0 g wet weight) was treated with hot acid and distilled water rinses; base treatment was omitted (noncalcareous). The treated sample (13.3 g) yielded 4.20 L of CO_2 gas. The age estimate is based on two counts for 2000 minutes in the 2 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 6.082 ± 0.064, 1.026 ± 0.023, and 18.054 ± 0.143 cpm, respectively.

The uncorrected age is 8740 ± 120.

GSC-4497. Cap-des-Rosiers 13 100 ± 120
$\delta^{13}C = +1.9‰$

The marine shells (*Mya truncata* mainly; identified by J.J. Veillette) were enclosed in clay. Sample 87-VJ-302 was collected by J.J. Veillette on July 17, 1987, from 3.5 km southwest of Cap-des-Rosiers, Gaspésie, Québec (48°50′35″N, 64°15′15″W), at an elevation of 42 m; submitted by J.J. Veillette.

The sample (28.1 g dry weight) was treated with an acid leach to remove the outer 20% of the sample. The age estimate is based on one 3-day count (4200 minutes) in the 2 L counter with a mixing ratio of 1.00.

The uncorrected age is 13 000 ± 120.

Comment (J.J. Veillette): The dated shells consisted of paired whole valves enclosed in massive marine clay at a depth of 2 m and covered by 1.5 m of stratified silt and sand. This site, located near the eastern limit of the Gaspé Peninsula, is the highest dated level of Goldthwait sea transgression in eastern Gaspésie (Veillette, 1988).

GSC-4810. Grande Rivière 1 12 800 ± 150
$\delta^{13}C = +0.7‰$

The marine shells (*Hiatella arctica*; identified by P. LaSalle) were enclosed in glacial diamicton. Sample Grande Rivière 1 was collected by P. LaSalle on September 6, 1988, from 1 km west of Grande Rivière, on the west side of Grande Rivière, south of the bridge on road 132, Québec (48°23.7′N, 64°30.8′W), at an elevation of 2 m; submitted by P. LaSalle.

The sample (19.9 g dry weight) was treated with an acid leach to remove the outer 20% of the sample. The treated sample (16.7 g) yielded 3.57 L of CO_2 gas. The age estimate is based on one count for 2170 minutes in the 2 L counter with a mixing ratio of 1.23. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 3.637 ± 0.058, 1.064 ± 0.019, and 17.975 ± 0.097 cpm, respectively.

The uncorrected age is 12 800 ± 150.

Comment (P. LaSalle): This date is the oldest obtained on marine shells collected on land in the southern part of Gaspé Peninsula. Presumably the ice front must have been still close to this site but to the north of it.

Lac à Raymond Series

GSC-4922. Lac à Raymond (I) 12 000 ± 240
$\delta^{13}C = -29.4‰$

The lake sediment, basal gyttja was enclosed in clay below. Sample MS-89-02 (1026-1032 cm) was collected by H. Jetté, P. Richard, and R.J. Mott on July 7, 1989, from Lac à Raymond, 6 km north of New Richmond, Gaspésie, Québec (48°14′03″N, 65°50′58″W), at an elevation of 50 m; submitted by H. Jetté.

The sample (26.0 g wet weight) was treated with hot acid, and distilled water rinses; base treatment was omitted (moderately calcareous). The treated sample (27.7 g) yielded 1.37 L of CO_2 gas. The age estimate is based on one count for 2930 minutes in the 2 L counter with a mixing ratio of 3.26. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 3.952 ± 0.110, 1.083 ± 0.019, and 17.862 ± 0.102 cpm, respectively.

The uncorrected age is 12 100 ± 240.

TO-1613. Lac à Raymond (II) 10 150 ± 220

Terrestrial remains (*Salix* fragments) from the same layer as GSC-4922 were sent to the IsoTrace Laboratory for AMS dating.

Comment (H. Jetté): GSC-4922 dates the shrub tundra at Lac à Raymond and gives a minimum age for the beginning of organic sedimentation in this lake during deglaciation. The level dated contains a maximum of *Salix* (willow). The presence of carbonates in the sediment and the younger AMS date indicates an anomalous bulk sediment date (GSC) because of the hardwater effect.

GSC-4923. Harriman Lake 13 400 ± 270
$\delta^{13}C = -20.9‰$

The lake sediment, basal gyttja with clay below, sample MS-89-01 (504-510 cm) was collected by H. Jetté, P. Richard and R.J. Mott on July 6, 1989, from Harriman Lake, 6 km north of New Richmond, Gaspésie, Québec (48°14′15″N, 65°50′20″W), at an elevation of 65 m; submitted by H. Jetté.

The sample (100.0 g wet weight) was treated with hot acid and distilled water rinses; base treatment was omitted (moderately calcareous). The treated sample (22.3 g) yielded 1.28 L of CO_2 gas. The age estimate is based on two counts for 2010 minutes in the 2 L counter with a mixing ratio of 2.25. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 3.404 ± 0.108, 1.083 ± 0.019, and 17.862 ± 0.102 cpm, respectively.

The uncorrected age is 13 300 ± 270.

Comment (H. Jetté): The sample dated at Harriman Lake was collected at the same palynological level as the basal date at Raymond Lake (GSC-4922), which is located less than 1 km from Harriman Lake. The date obtained should give a minimum age for organic sedimentation at Harriman Lake and should date the maximum for *Salix* spp. (willow), an indicator of shrub tundra in this area. An anomalous date due to the hardwater effect has been obtained at Raymond Lake (12 000 ± 240, GSC-4922) and corrected by AMS dating to 10 150 ± 220 (TO-1613). It is believed the level dated at Harriman Lake should give the same age. The value obtained at Harriman Lake seems to be anomalously old, also due to the hardwater effect.

GSC-4545. LaButte 12 200 ± 110
$\delta^{13}C = +1.9‰$

The marine shells (*Mya truncata, Hiatella, M. arenaria*; identified by J.J. Veillette) were enclosed in gravelly sand. Sample 87-VJ-44 was collected by J.J. Veillette and M. Cloutier on October 20, 1987, from about 1 km northwest of LaButte, Baie des Chaleurs, Gaspésie, Québec (48°7′10″N, 66°19′0″W), at an elevation of 44 m; submitted by J.J. Veillette.

The sample (32.8 g dry weight) was treated with an acid leach to remove the outer 20% of the sample. The age estimate is based on one 3-day count (4200 minutes) in the 2 L counter with a mixing ratio of 1.00.

The uncorrected age is 12 100 ± 110.

Comment (J.J. Veillette): Shells from this site were previously dated at 13 890 ± 160 (QU-275, Lebuis et David, 1977), which had been the oldest age recorded for Goldthwait sea transgression in Gaspésie. This site, revisited in 1987, is an abandoned borrow pit in deltaic gravelly sand, containing abundant fossiliferous layers from which shells were collected. GSC-4545, about 1.5 ka younger than QU-275, and comparable to several other ages of the marine limit on the north shore of Baie des Chaleurs (Veillette et Cloutier, 1993), suggests that QU-275 seriously over estimated the age of deglaciation and marine transgression in the Baie des Chaleurs area.

GSC-4550. Escuminac 12 400 ± 110
$\delta^{13}C = +0.6‰$

The marine shells (*Hiatella arctica* predominantly; identified by A.S. Dyke) were enclosed in pebbly clay. Sample 87-VJ-42 was collected by J.J. Veillette and M. Cloutier on October 20, 1987, from about 2.5 km northeast of Escuminac, Baie des Chaleurs, Gaspésie, Québec (48°8′25″N, 66°28′31″W), at an elevation of 33 m; submitted by J.J. Veillette.

The sample (24.7 g dry weight) was treated with an acid leach to remove the outer 10% of the sample. The age estimate is based on one 3-day count (4200 minutes) in the 2 L counter with a mixing ratio of 1.00.

The uncorrected age is 12 300 ± 110.

Comment (J.J. Veillette): Paired whole valves and fragments were obtained from a 2 m capping of compact fossiliferous pebbly clay overlying 22 m of marine gravelly sand in a man-made section. Some paired valves show signs of shearing. This date is one of several on the highest fossiliferous marine deposits found on the north shore of Baie des Chaleurs (Veillette et Cloutier, 1993).

GSC-4566. Carleton Centre 11 700 ± 150
$\delta^{13}C = +1.0‰$

The marine shells (*Mytilus edulis*; identified by C.G. Rodrigues) were enclosed in beach gravel and sand. Sample 87-VJ-50 was collected by J.J. Veillette and M. Cloutier on October 21, 1987, from 3 km southeast of Carleton Centre, Baie des Chaleurs, Gaspésie, Québec (48°5′32″N, 66°4′33″W), at an elevation of 4 m; submitted by J.J. Veillette.

The sample (14.5 g dry weight) was treated with an acid leach to remove the outer 5% of the sample. The age

estimate is based on one 3-day count (4200 minutes) in the 2 L counter with a mixing ratio of 1.53.

The uncorrected age is 11 700 ± 150.

Comment (J.J. Veillette): This age, obtained from fossiliferous sand beds containing abundant paired valves of *Mytilus edulis* in gravelly sand near the present coastline and only 4 m above present sea level, can be interpreted as evidence for postglacial sea-level changes previously inferred with a date (GSC-1383, Blake, 1983) in a similar setting in nearby New Brunswick (Thomas et al., 1973).

GSC-4586. Restigouche village 12 000 ± 130
$\delta^{13}C = +4.0‰$

The marine shells (*Hiatella arctica*; identified by J.J. Veillette) were enclosed in clayey silt. Sample 87-VJ-38 was collected by J.J. Veillette and M. Cloutier on October 20, 1987, from about 4 km north of Restigouche village, Baie des Chaleurs, Gaspésie, Québec (48°2′54″N, 66°42′2″W), at an elevation of 27 m; submitted by J.J. Veillette.

The sample (21.2 g dry weight) was treated with an acid leach to remove the outer 10% of the sample. The age estimate is based on one 3-day count (4200 minutes) in the 2 L counter with a mixing ratio of 1.09.

The uncorrected age is 11 900 ± 130.

Comment (J.J. Veillette): This age dates the highest fossiliferous marine deposits found in the western part of the north shore of Baie des Chaleurs (Veillette et Cloutier, 1993). Shells are rare and scattered at the site and the dated shells were collected at the surface of marine clayey silt, over a large area, on the flanks of a man-made excavation.

Ile aux Coudres Series

A wood sample, enclosed in peat (tourbe), from Ile aux Coudres, Pointe de la Prairie, (ravin amont), Québec (47°24′20″N, 70°25′10″W), at an elevation of about 34 m, were collected by D. Brodeur and M. Allard on June 5, 1984; submitted by M. Allard.

GSC-4496. Ile aux Coudres (I)
uncorrected >39 000

The wood sample IAC/84-06-05/1A (56.1 g dry weight) was treated with hot base, hot acid, and distilled water rinses (noncalcareous). The age estimate is based on one 3-day count (4200 minutes) in the 5 L counter with a mixing ratio of 1.00.

GSC-4496 (2L) Ile aux Coudres (II)
uncorrected >41 000

The wood sample IAC/84-06-05/1A (41.9 g dry weight) was not pre-treated. The age estimate is based on one 3-day count (4200 minutes) in the 5 L counter with a mixing ratio of 1.00.

Montmagny airport Series

A series of peat and wood samples from Montmagny airport, Québec (47°30′20″N, 70°30′20″W), at an elevation of about 4 m, were collected by J-C. Dionne on June 20, 1989; submitted by J-C. Dionne.

GSC-4919. Montmagny airport (I) 5790 ± 70
$\delta^{13}C = -29.4‰$

The peat sample Mon-12-89 (57.0 g dry weight) was treated with hot base, hot acid, and distilled water rinses (noncalcareous). The treated sample (36.9 g) yielded 8.08 L of CO_2 gas. The age estimate is based on two counts for 2169 minutes in the 5 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 13.635 ± 0.089, 2.189 ± 0.023, and 28.283 ± 0.127 cpm, respectively.

The uncorrected age is 5860 ± 70.

Comment (J-C. Dionne): Organic matter dated is from a 15 cm thick subunit of interbedded mineral and organic debris overlying them in a freshwater peat layer in the Montmagny 8-10 m terrace. Date is in agreement with two other dates (QU-1328 and UQ-972: 5800 ± 100; Dionne, 1988) from the same locality and equivalent level. Date indicates the beginning of the rising sea level after the mid-Holocene low stand in the St. Lawrence estuary.

GSC-4881. Montmagny airport (II) 6040 ± 70
$\delta^{13}C = -28.6‰$

The peat sample Mon-13-89 (26.6 g dry weight) was treated with hot base, hot acid, and distilled water rinses (noncalcareous). The treated sample (14.6 g) yielded 8.13 L of CO_2 gas. The age estimate is based on three counts for 3805 minutes in the 5 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 13.381 ± 0.083,

2.151 ± 0.026, and 28.579 ± 0.127 cpm, respectively.

The uncorrected age is 6100 ± 70.

Comment (J-C. Dionne): Date is in agreement with three other dates (UQ-650; 6010 ± 90; UL-116: 6040 ± 80; QU-1327: 6050 ± 100) for the top of the main freshwater peat layer (35 cm thick) underlying a former muddy tidal flat deposit exposed in a 6 m high cliff at Montmagny (Dionne, 1988).

GSC-4870. Montmagny airport (III) 6640 ± 70
$\delta^{13}C = -32.3‰$

The freshwater peat sample Mon-14-89 (59.3 g dry weight) was treated with hot base, hot acid, and distilled water rinses (noncalcareous). The treated sample (22.6 g) yielded 8.17 L of CO_2 gas. The age estimate is based on one count for 3800 minutes in the 5 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 12.335 ± 0.070, 2.109 ± 0.032, and 28.604 ± 0.129 cpm, respectively.

The uncorrected age is 6760 ± 70.

Comment (J-C. Dionne): Date is in good agreement with other dates for the base of the main buried freshwater peat layer obtained from the same exposure and from three other exposures in the Montmagny 8-10 m terrace, and ranging from 6420 ± 80 (UL-115) to 6990 ± 90 (UQ-752), with a median of 6760 ± 90 (UQ-260; Dionne, 1988).

GSC-4862. Montmagny airport (IV) 7040 ± 70
$\delta^{13}C = -26.9‰$

The wood sample Mon-15-89 (11.0 g dry weight; deciduous; identified by R.J. Mott (unpublished GSC Wood Report No. 89-27)) was treated with hot base, hot acid, and distilled water rinses (noncalcareous). The treated sample (8.6 g) yielded 9.27 L of CO_2 gas. The age estimate is based on one count for 3600 minutes in the 5 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 11.868 ± 0.070, 2.109 ± 0.032, and 28.604 ± 0.129 cpm, respectively.

The uncorrected age is 7070 ± 70.

Comment (J-C. Dionne): The three dates on the buried freshwater peat layer in the 8-10 m terrace are in good agreement with several (14) dates from three other laboratories for the same exposure and three other exposures in the same area; GSC-4919 corresponds to the beginning of the rising sea level after the mid-Holocene low stand. In respect to depth at which wood occurred in stratigraphic unit 2, GSC-4862 is, however, slightly younger than expected. Please note that all the dates referenced from other laboratories are uncorrected dates. This date is about 500 years younger than expected because the wood collected was 160 cm below the base of the buried freshwater peat layer. Seventeen other dates on wood from the same unit range from 7020 ± 100 (UL-390) for top to 7820 ± 60 (Beta-32323) for base with a median of 7520 ± 110 (UQ-442; Dionne, 1988).

GSC-4996. Saint-Antoine-de-Tilly 10 200 ± 100
$\delta^{13}C = -0.84‰$

The marine shells (*Mya arenaria*; identified by P. LaSalle) were enclosed in sand and gravel. Sample BOURRET-89-1 was collected by P. LaSalle on September 10, 1990, about 3 km due south from Saint-Antoine-de-Tilly, Québec (46°38′20″N, 71°34′05″W), at an elevation of 68 m; submitted by P. LaSalle.

The sample (40.4 g dry weight) was treated with an acid leach to remove the outer 30% of the sample. The treated sample (32.5 g) yielded 6.53 L of CO_2 gas. The age estimate is based on two counts for 3806 minutes in the 5 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 7.933 ± 0.067, 2.079 ± 0.032, and 28.127 ± 0.134 cpm, respectively.

The uncorrected age is 10 200 ± 100.

Comment (P. LaSalle): As the shells were collected in shallow water littoral sediments above a *Balanus*-bearing diamicton, the date is a minimum age for the Saint Nicolas readvance and the emplacement of the Saint Edouard Moraine. This age is consistent with the age obtained on the *Balanus hameri* plates contained in the diamicton at other sites, i.e., circa 11.0 ka BP.

Issoudun Series

A series of marine shells samples from gravel pit about 5 km due west from Issoudun, Québec (46°34′40″N, 71°41′10″W), at an elevation of 90 m, were collected by P. LaSalle on August 21, 1989; submitted by P. LaSalle.

GSC-4997. Issoudun (I) 10 300 ± 90
$\delta^{13}C = +0.3‰$

The marine shells, sample Issoudun 89-2 (54.4 g dry weight; *Hiatella arctica*; identified by P. LaSalle), enclosed

in sand, were treated with an acid leach to remove the outer 30% of the sample. The treated sample (39.5 g) yielded 8.97 L of CO_2 gas. The age estimate is based on one count for 3970 minutes in the 5 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 7.817 ± 0.059, 2.079 ± 0.032, and 28.127 ± 0.134 cpm, respectively.

The uncorrected age is 10 300 ± 90.

Comment (P. LaSalle): GSC-4997 and -4998 bracket the Saint Nicolas glacial readvance. GSC-4997 is a minimum age for that event, since the shells were collected in littoral sediments immediately overlying the *Balanus*-bearing compact diamicton. The plates from the diamicton have been dated at 11 400 ± 90 (GSC-4998). Those two dates bracket the Younger Dryas event in St. Lawrence Valley (LaSalle and Shilts, 1992).

GSC-4998. Issoudun (II) 11 400 ± 90
$\delta^{13}C = +1.0‰$

The marine shells, sample Issoudun 89-1 (39.9 g dry weight; *Balanus hameri*; identified by P. LaSalle), enclosed in till, were treated with an acid leach to remove the outer 30% of the sample. The treated sample (30.4 g) yielded 6.91 L of CO_2 gas. The age estimate is based on one count for 5340 minutes in the 5 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 6.883 ± 0.049, 2.095 ± 0.026, and 28.326 ± 0.128 cpm, respectively.

The uncorrected age is 11 400 ± 90.

Comment (P. LaSalle): This result is in good agreement with other dates obtained on *Balanus hameri* collected in the Québec City area. Since the plates were collected in a compact diamicton associated with the Saint Nicolas readvance, it is a maximum age for that event and the emplacement of the Saint Edouard Moraine. That readvance appears to be correlative with the Younger Dryas events of northwestern Europe (LaSalle and Shilts, 1992).

GSC-4934. Warwick 11 100 ± 90
$\delta^{13}C = +1.4‰$

The marine shells (*Hiatella arctica*; identified by M. Parent) were enclosed in gravel and sand. Sample PIA-79-13B-1 was collected by M. Parent on September 12, 1979, from gravel pit on east side of highway 116, about 1.2 km southwest of four way intersection in Warwick, Québec (45°56′35″N, 72°00′09″W), at an elevation of 137 m; submitted by M. Parent.

The sample (31.3 g dry weight) was treated with an acid leach to remove the outer 5% of the sample. The treated sample (26.4 g) yielded 6.09 L of CO_2 gas. The age estimate is based on one count for 3900 minutes in the 5 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 7.110 ± 0.055, 2.105 ± 0.027, and 28.136 ± 0.132 cpm, respectively.

The uncorrected age is 11 000 ± 90.

GSC-4804. Saint-Alban 11 000 ± 120
$\delta^{13}C = +0.6‰$

The marine shells (*Balanus hameri*; identified by P. LaSalle) were enclosed in silty marine clays. Sample Sainte-Anne 1 was collected by P. LaSalle on August 10, 1988, from 20 km northeast of Saint-Alban along the Sainte-Anne River, Québec (46°45.8′N, 72°0.8′W), at an elevation of 60 m; submitted by P. LaSalle.

The sample (46.0 g dry weight) was treated with an acid leach to remove the outer 20% of the sample. The treated sample (36.7 g) yielded 7.35 L of CO_2 gas. The age estimate is based on two counts for 2065 minutes in the 2 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 4.582 ± 0.056, 1.064 ± 0.019, and 17.975 ± 0.097 cpm, respectively.

The uncorrected age is 11 000 ± 120.

Comment (P. LaSalle): Two layers of *Balanus hammeri* remains have been identified along the Sainte-Anne River. The upper layer has been dated at 10 600 ± 160 (GSC-2090; McNeely, 1989). The lower layer of *Balanus hammeri* has yielded an age of 11 000 ± 120 (GSC-4804). This result is in agreement also with ages of *Balanus hammeri* remains obtained elsewhere in the Québec City area.

GSC-4938. Francois-Malherbe 6730 ± 80
$\delta^{13}C = -1.4‰$

The marine shells (*Mya truncata ovata*; identified by R.A. Daigneault) were enclosed in marine silty clay. Sample DKA-89-173 was collected by R.A. Daigneault on September 2, 1989, from 65 km east-southeast of Salluit, 10 m north of the road from Deception Bay to Purtunik; 4.8 km west of bridge over Francois-Malherbe Lake, Ungava Peninsula, Québec (62°06′03″N, 74°24′41″W), at an elevation of 60 m; submitted by R.A. Daigneault.

The sample (38.3 g dry weight) was treated with an acid leach to remove the outer 20% of the sample. The treated sample (29.9 g) yielded 6.80 L of CO_2 gas. The age estimate is based on two counts for 2000 minutes in the 5 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 12.132 ± 0.088, 2.105 ± 0.027, and 28.136 ± 0.132 cpm, respectively.

The uncorrected age is 6760 ± 80.

Comment (R.A. Daigneault): The shells were found in life position, in a massive deposit of silty clay, at the base of a 2 m section. The sample was dated to provide an estimate of the timing of deep water sedimentation in the Deception Bay area.

GSC-4978. Salluit 4120 ± 90
$\delta^{13}C$ = -26.9‰

The plant remains were enclosed in sand. Sample DKA-89 97 was collected by R.A. Daigneault on August 16, 1990, from peninsula 12 km southwest of Salluit, 5 km from mouth of Foucault River, Ungava Peninsula, Québec (62°07′19″N, 75°46′37″W), at an elevation of 3 m; submitted by R.A. Daigneault.

The sample (60.7 g dry weight) was treated with hot base, hot acid, and distilled water rinses (slightly calcareous). The treated sample (22.8 g) yielded 4.83 L of CO_2 gas. The age estimate is based on three counts for 2700 minutes in the 2 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 10.735 ± 0.085, 1.013 ± 0.022, and 17.992 ± 0.133 cpm, respectively.

The uncorrected age is 4150 ± 90.

Comment (R.A. Daigneault): Plant remains (GSC-4978) were found at a depth of 12 m in foreset deltaic sediments. This plant debris presumably came from the erosion of the peat beds resting on the 15 m terrace lying just upstream. This date provides a maximum age for the delta formation at that altitude. GSC-4978 is in agreement with existing relative sea level curves for northern Ungava (Matthews, 1969) and for the Deception Bay area (Ricard, 1989).

GSC-4473. Waltham Station 11 000 ± 150
$\delta^{13}C$ = -2.5‰

The marine shells (*Macoma balthica*; identified by S.H. Richard) were enclosed in gravel, sand, and silt. Sample 85 KAR 1938 was collected by I. Kettles on May 14, 1987, from 11 km (7 miles) south of Waltham Station, on eastern Allumette Island, Québec (45°50′15″N, 76°56′30″W), at an elevation of 135 m; submitted by I. Kettles.

The sample (13.0 g dry weight) was treated with an acid leach to remove the outer 5% of the sample. The age estimate is based on two 1-day counts (2450 minutes) in the 2 L counter with a mixing ratio of 1.67.

The uncorrected age is 11 000 ± 150.

Lac Soscumica Series

A series of peat samples from the shoreline of Lac Soscumica, Québec (50°18′43″N, 77°37′16″W), at an elevation of 245 m, were collected by P. Buteau on July 10, 1988; submitted by J.J. Veillette.

GSC-4802. Lac Soscumica (I) 5770 ± 70
$\delta^{13}C$ = -28.8‰

The peat sample 6631-12po (150.0 g wet weight), enclosed in peat, was treated with hot base, hot acid, and distilled water rinses (slightly calcareous). The treated sample (14.3 g) yielded 9.16 L of CO_2 gas. The age estimate is based on one count for 2320 minutes in the 5 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 13.704 ± 0.087, 2.176 ± 0.025, and 28.320 ± 0.122 cpm, respectively.

The uncorrected age is 5830 ± 70.

Comment (J.J. Veillette): Date provides a minimum age for transition from fen to bog. Sample is from a thin (1 cm) organic layer 1.65 m below surface. Total thickness of peat at this location is 1.95 m.

GSC-4808. Lac Soscumica (II) 6720 ± 60
$\delta^{13}C$ = -29.9‰

The basal peat sample 6631 (195 cm; 267.3 g wet weight), with clay substrate below and peat above, was treated with hot base, hot acid, and distilled water rinses (slightly calcareous). The treated sample (22.6 g) yielded 8.24 L of CO_2 gas. The age estimate is based on one count for 5335 minutes in the 5 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 12.257 ± 0.057, 2.186 ± 0.024, and 28.589 ± 0.128 cpm, respectively.

The uncorrected age is 6800 ± 60.

Comment (J.J. Veillette): Date provides a minimum age for onset of paludification. Sample is from a thin (1.5 cm) horizon of basal organics resting on clay at 1.95 m.

Abitibi Region Series

A series of basal peat samples from the Abitibi region were collected by P. Buteau during the summer of 1985 as part of a peat inventory program in northwestern Québec. J.J. Veillette submitted the samples to obtain minimum ages for the onset of paludification in the region.

GSC-4844. Tascheveau — 3530 ± 60
$\delta^{13}C = -25.8‰$

The basal peat sample 3037-B (150-155 cm), with peat above and clay below, was collected by P. Buteau on July 1, 1985, near the village of Tascheveau, Abitibi, Québec (48°32′00″N, 78°39′15″W), at an elevation of 325 m; submitted by J.J. Veillette.

The sample (26.0 g dry weight) was treated with hot base, hot acid, and distilled water rinses (noncalcareous). The treated sample (18.1 g) yielded 8.24 L of CO_2 gas. The age estimate is based on two counts for 2205 minutes in the 5 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 18.394 ± 0.111, 2.151 ± 0.026, and 28.579 ± 0.127 cpm, respectively.

The uncorrected age is 3540 ± 60.

Comment (J.J. Veillette): Basal organics were collected with a Hiller sampler from a depth of 1.50-1.55 m below the surface at the peat-clay contact.

GSC-4877. Villemontel — 5990 ± 70
$\delta^{13}C = -31.1‰$

The basal peat sample 3008-G (405-410 cm), with peat above and clay below, was collected by P. Buteau on June 22, 1985, near the village of Villemontel, Abitibi, Québec (48°21′07″N, 78°21′07″W), at an elevation of 302 m; submitted by J.J. Veillette.

The sample (24.3 g dry weight) was treated with hot base, hot acid, and distilled water rinses (noncalcareous). The treated sample (19.7 g) yielded 8.24 L of CO_2 gas. The age estimate is based on two counts for 2020 minutes in the 5 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 13.398 ± 0.092, 2.151 ± 0.026, and 28.579 ± 0.127 cpm, respectively.

The uncorrected age is 6090 ± 70.

Comment (J.J. Veillette): Basal organics were collected with a Hiller sampler from a depth of 4.05-4.10 m below the surface at the peat-clay interface.

GSC-4912. Lac des Deux Iles — 6090 ± 70
$\delta^{13}C = -30.1‰$

The basal peat sample 3132-B (480-485 cm), with peat above and clay below, was collected by P. Buteau on August 3, 1985, from Lac des Deux Iles, Québec (49°08′10″N, 78°50′10″W), at an elevation of 314 m; submitted by J.J. Veillette.

The sample (26.0 g dry weight) was treated with hot base, hot acid, and distilled water rinses (noncalcareous). The treated sample (13.9 g) yielded 8.12 L of CO_2 gas. The age estimate is based on two counts for 2060 minutes in the 5 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 13.117 ± 0.089, 2.189 ± 0.023, and 28.283 ± 0.127 cpm, respectively.

The uncorrected age is 6170 ± 70.

Comment (J.J. Veillette): Basal organics were collected with a Hiller sampler from a depth of 4.80-4.85 m below the surface at the peat-clay interface.

GSC-4824. Lac Vebert area — 3830 ± 50
$\delta^{13}C = -26.8‰$

The basal peat sample 3026-C (160-165 cm), with peat above and clay below, was collected by P. Buteau on July 5, 1985, from Lac Vebert area, near Les Mines Selbaie, Québec (49°45′07″N, 79°01′09″W), at an elevation of 268 m; submitted by J.J. Veillette.

The sample (31.4 g dry weight) was treated with cold base, hot acid, and distilled water rinses (slightly calcareous). The treated sample (17.1 g) yielded 8.43 L of CO_2 gas. The age estimate is based on one count for 3635 minutes in the 5 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 17.693 ± 0.078, 2.186 ± 0.024, and 28.589 ± 0.128 cpm, respectively.

The uncorrected age is 3860 ± 50.

Comment (J.J. Veillette): Basal organics were collected with a Hiller sampler from a depth of 1.60-1.65 m below the surface at the peat-clay interface.

Ontario

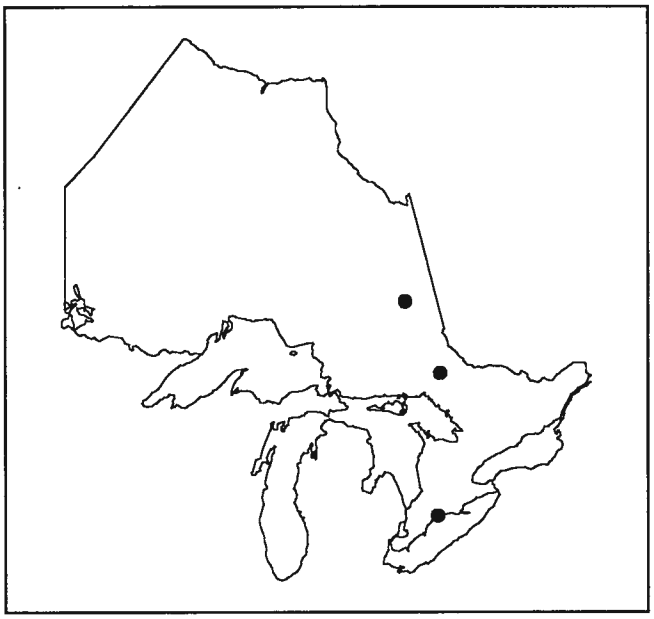

Figure 6. Radiocarbon dated sites in Ontario.

Miron Lake Series

A series of lake sediment samples were collected by T.W. Anderson and C.F.M. Lewis on October 22, 1986, from Miron Lake, 4 km east-northeast of Verner, Ontario (46°25′15″N, 80°04′10″W), at an elevation of 219.3 m; submitted by T.W. Anderson.

GSC-4835. Miron Lake (I) 9940 ± 110
$\delta^{13}C = -32.1‰$

The basal gyttja, (505-510 cm below lake bottom) sample AP-86-18 (266.1 g wet weight), was treated with hot acid and distilled water rinses; base treatment was omitted (slightly calcareous). The treated sample (93.8 g) yielded 4.24 L of CO_2 gas. The age estimate is based on one count for 5335 minutes in the 2 L counter with a mixing ratio of 1.05. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 5.100 ± 0.038, 1.077 ± 0.015, and 17.836 ± 0.153 cpm, respectively.

The uncorrected age is 10 100 ± 110.

Beta-19152. Miron Lake (II) 14 290 ± 170

The lake sediment, basal gyttja, sample AP-86-18 (510-514 cm below lake bottom), was dated by Beta Analytical Inc.

Comment (T.W. Anderson): The sediment sample (GSC-4835) occurred near the base of grey- and brown-banded gyttja over massive grey clay gyttja, which in turn, overlies pinkish-banded clay and interbedded clay and sand. Dating the base of the banded gyttja from 510 to 514 cm (where the organic carbon content was less than 1%) yielded an anomalous age of 14 290 ± 170 (BETA-19152). The banded clay and interbedded clay and sand sequence implies deposition in a large proglacial lake interpreted to be an early Mattawa phase lake (Lewis and Anderson, 1989). The sample dates the time of isolation of the lake basin from this early Mattawa high-level phase lake.

GSC-4837. Timmins 39 100 ± 1470
$\delta^{13}C = -25.2‰$

The wood fragments (*Picea* and *Larix laricina*; identified by R.J. Mott (unpublished GSC Wood Report No. 89-33)) were enclosed in organic silt. Sample 87 DDA 1329 (SMO-66, 75'-76') was collected from a depth of 23 m in a drill core by N. Szabo and R. Gannicott on February 10, 1984, from a site 40 km east-northeast of Timmins, Stock Township, Ontario (48°34′N, 80°48′W), at a site elevation of 249 m; submitted by R.N.W. DiLabio.

The sample (7.6 g dry weight) was treated with hot base, hot acid, and distilled water rinses (noncalcareous). The treated sample (4.0 g) yielded 4.26 L of CO_2 gas. The age estimate is based on one count for 3930 minutes in the 2 L counter with a mixing ratio of 1.06. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 0.140 ± 0.025, 1.073 ± 0.016, and 18.101 ± 0.100 cpm, respectively.

The uncorrected age is 39 100 ± 1470.

Comment (R.N.W. DiLabio): This date was expected to agree with GSC-3875 HP (>51 ka; McNeely and McCuaig, 1991) and GSC-2148 (>37 ka; Lowdon and Blake, 1979) on the Owl Creek Formation, the Missinaibi Formation equivalent in the Timmins area, but during the processing of sample the gas was suspected of having been contaminated with modern ^{14}C. Therefore the age is considered to be anomalous and should be considered a "greater than" date.

GSC-5042 HP. Waite Farm 40 100 ± 450
$\delta^{13}C = -25.7‰$

The wood (*Picea*; identified by R.J. Mott (unpublished GSC Wood Report No. 90-40)) was enclosed in sand and stones. Sample was collected by S. Hicock on July 1, 1989, from east of Waite Farm gulley, west of Boy Scout Camp gravel pit and west of Bradtville, northshore of Lake Erie, 7 km east of Wallacetown and 10.6 km east-southeast of

Dutton, Ontario (42°37′N, 81°23′W), at an elevation of 175 m; submitted by P.F. Karrow.

The sample (40. g dry weight) was treated with hot base, hot acid, and distilled water rinses. The treated sample (33.9 g) yielded 33.75 L of CO_2 gas. The age estimate is based on one count for 4520 minutes in the 5 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 0.690 ± 0.034, 2.477 ± 0.021, and 102.221 ± 0.494 cpm, respectively.

The uncorrected age is 40 200 ± 450.

Comment (P.F. Karrow): This sample was intended as an interlaboratory check sample, the result is younger than expected (Port Talbot II averages 46.0 ka). An age of 40.1 ka may really represent a tree that grew near end of interstadial or may reflect some minor contamination.

Comment (A. Dreimanis): The log was found in glaciolacustrine sand at the base of Late Wisconsinan Catfish Creek Drift, immediately above the contact with the underlying Middle Wisconsinan Tyrconnell Formation Member D (for local stratigraphy cf. Dreimanis, 1987). It was redeposited from Tyrconnell Formation as suggested by the GSC-5042 age determination.

Previous age determinations of Tyrconnell Formation have been obtained from its Member C (Dreimanis, 1987, p. 347). Eight dates on wood and peat range from 42.7 to 49.7 ka BP. The new date is very close to the youngest of the previous age determinations. It dates either the upper part of the deposition or the entire Tyrconnell Formation or, more probably, the upper part of the deposition of Member C. Member C was deposited during the warmest interval of the Middle Wisconsinan Port Talbot interstadial, when the Lake Erie level was below the present one and spruce grew along the north shore of the lake. Member B of Tyrconnell Formation is laminated to massive glaciolacustrine clay and silt, deposited in a higher-level proglacial lake, when the nearest trees could grow only on the nonflooded land north of Lake Erie.

The next younger Plum Point interstadial ages in the Lake Erie basin range from 23 to 28 ka BP (Dreimanis, 1981). An intermediate age determination, between those from Tyrconnell Formation, Member C, and the reworked Plum Point interstadial wood, was reported by Barnett et al., (1987) from Catfish Creek valley (TO-232; 36 530 ± 300). Whether it belongs to the Plum Point or Port Talbot interstadial is not specified by Barnett et al., (op. cit.).

WESTERN CANADA

Manitoba

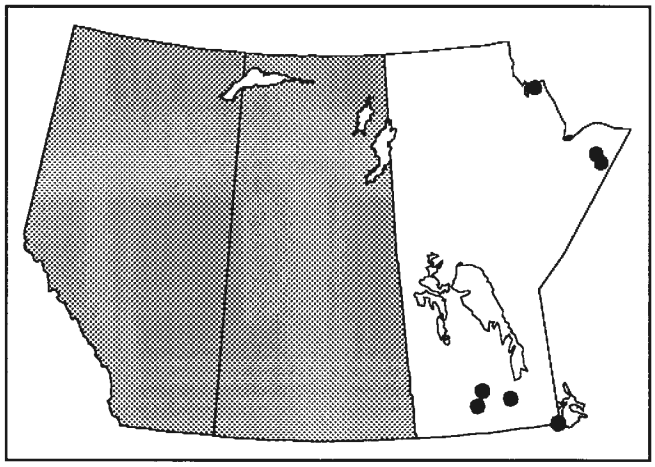

Figure 7. Radiocarbon dated sites in Manitoba.

GSC-4444 HP. Echoing River >51 000

The wood (*Picea*; identified by R.J. Mott (unpublished GSC Wood Report No. 85-7)) was enclosed in peat. Sample 84 DU-115 was collected by L.A. Dredge and E. Nielsen on June 17, 1984, from the right bank of a creek, 6 km above confluence with Echoing River, Manitoba (55°55.1′N, 91°15.0′W), at an elevation of 120 m; submitted by L.A. Dredge.

The sample (44.6 g wet weight) was treated with hot base, hot acid, and distilled water rinses (noncalcareous). The age estimate is based on one 1-day count (5220 minutes) in the 5 L counter with a mixing ratio of 1.00.

Comment (L.A. Dredge): The wood and peat are located near the top of a long sequence of subtill marl, peat, and lacustrine sediments with temperate climate flora and fauna. They are thought to be deposits of the Sangamon Interglaciation (Dredge et al., 1990).

GSC-4471 HP. Gods River >49 000
$\delta^{13}C = -26.1‰$

The wood (*Picea*; identified by R.J. Mott (unpublished GSC Wood Report No. 85-5)) was enclosed in sand. Sample 84 DU-117 Gods River was collected by L.A. Dredge and E. Nielsen on June 17, 1984, from the right bank of Gods River, near Twin Creeks, Manitoba (56°9.5′N, 91°15.0′W), at an elevation of about 80 m; submitted by L.A. Dredge.

The sample (47.3 g dry weight) was treated with hot base, hot acid, and distilled water rinses (noncalcareous). The age estimate is based on two 1-day counts (4550 minutes) in the 5 L counter with a mixing ratio of 1.00.

Comment (L.A. Dredge): The wood was collected from beds of sandy detritus underlying till and is thought to be of Sangamonian age (Dredge et al., 1990).

GSC-4507. Churchill

uncorrected 2380 ± 100

The marine shells (*Macoma baltica*; identified by L. Dredge) were enclosed in beach sand. Sample 87 DU-01 was collected by L.A. Dredge and E. Nielsen on August 14, 1987, from the north side of the coast road at the base of rock ridge, 2.5 km east of the town of Churchill, Manitoba (58°45.1′N, 94°8.6′W), at an elevation of 7 m; submitted by L.A. Dredge.

The sample (19.5 g dry weight) was treated with an acid leach to remove the outer 10% of the sample. The age estimate is based on two 1-day counts (2610 minutes) in the 2 L counter with a mixing ratio of 1.15.

Comment (L.A. Dredge): The shells were collected from an excavation on the Erickson property. The date indicates that sea level stood at the site about 2.4 ka ago.

Buffalo Point Series

A series of wood samples were collected by E. Nielsen and G. Matile on June 19, 1989, from Lake of the Woods, Manitoba (49°00′04″N, 95°15′11″W), at an elevation of 323 m; submitted by E. Nielsen.

GSC-4950. Buffalo Point (I) 9340 ± 80
$\delta^{13}C = -26.4‰$

The wood (*Picea*; identified by R.J. Mott (unpublished GSC Wood Report No. 90-09)) was enclosed in sand. Sample BP-89-3, 1.5 km west of Buffalo Point, (45.8 g dry weight) was treated with hot base, hot acid, and distilled water rinses (noncalcareous). The treated sample (8.1 g) yielded 9.11 L of CO_2 gas. The age estimate is based on one count for 3920 minutes in the 5 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 8.770 ± 0.059, 2.105 ± 0.027, and 28.136 ± 0.132 cpm, respectively.

The uncorrected age is 9360 ± 80.

GSC-4933. Buffalo Point (II) 9400 ± 100
$\delta^{13}C = -26.6‰$

The wood (*Picea*; identified by H. Jetté (unpublished GSC Wood Report No. 90-08)) was enclosed in sand. Sample BP-89-1, 0.8 km west of Buffalo Point, (40.2 g dry weight) was treated with hot base, hot acid, and distilled water rinses (noncalcareous). The treated sample (9.2 g) yielded 10.51 L of CO_2 gas. The age estimate is based on two counts for 2000 minutes in the 5 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 8.700 ± 0.078, 2.105 ± 0.027, and 28.136 ± 0.132 cpm, respectively.

The uncorrected age is 9430 ± 100.

Comment (E. Nielsen): Samples GSC-4933 and -4950 were collected from the base of a 1.7 km long spit, consisting of westward-dipping 3 m high foreset beds. The water level at the time of deposition was 327 m, i.e., 1 m above the surface of the spit. This level is interpreted as the McCauleyville strandline of Lake Agassiz. The 60 years between these two dates may represent the time required for the spit to migrate 700 m westward. Elson's 1964 site (GSC-391, Lowdon et al., 1967) is located at the east end of the spit. Although no organics associated with GSC-391 were found, Elson's upper sand and gravel unit is correlated with the McCauleyville spit; the unit correlating to GSC-391 (9990 ± 160), being bound by laminated sediments, represents the Moorhead disconformity.

GSC-4839. Assiniboine River 7500 ± 80
$\delta^{13}C = -24.6‰$

The wood (deciduous; identified by H. Jetté (unpublished GSC Wood Report No. 89-26)) was enclosed in clay. Sample G.L.-69-1 was collected by G. Lammers in November 1969, from a sewer excavation near the corner of Ruby Street and Palmerston Avenue, about 0.25 km north of the Assiniboine River in downtown Winnipeg, Manitoba (49°52′45″N, 97°10′20″W), at an elevation of 221 m; submitted by E. Nielsen.

The sample (18.5 g dry weight) was treated with hot base, hot acid, and distilled water rinses (noncalcareous). The treated sample (8.5 g) yielded 6.71 L of CO_2 gas. The age estimate is based on two counts for 2195 minutes in the 5 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 11.249 ± 0.082, 2.186 ± 0.024, and 28.589 ± 0.128 cpm, respectively.

The uncorrected age is 7490 ± 80.

Comment (E. Nielsen): The wood sample, collected from a depth of 10.5 m in association with bison bones and large pelecypods (bivalve molluscs, e.g., *Unio*), was deposited as river alluvium by Assiniboine River shortly after the drainage of Lake Agassiz.

GSC-4864. Portage diversion 190 ± 50
$\delta^{13}C = -27.7‰$

The peat was enclosed in clay. Sample EN-89-1 was collected by E. Nielsen on May 19, 1989, from mouth of Portage diversion on Lake Manitoba, 25 km north of Portage la Prairie, Manitoba (50°11′15″N, 98°22′40″W), at an elevation of 248 m; submitted by E. Nielsen.

The sample (386.7 g wet weight) was treated with cold base, hot acid, and distilled water rinses (very calcareous). The treated sample (11.2 g) yielded 7.21 L of CO_2 gas. The age estimate is based on two counts for 2240 minutes in the 5 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 27.773 ± 0.120, 2.109 ± 0.032, and 28.604 ± 0.129 cpm, respectively.

The uncorrected age is 240 ± 50.

Comment (E. Nielsen): The dated sample consisted of organic muck and fibrous plants, associated with muskrat and frog bones and is interpreted as having been deposited in a marsh environment. The exposure on the high-energy foreshore of Lake Manitoba suggests that the barrier beach has transgressed an estimated 60 m in the last 200 years.

Rossendale Series

GSC-4490. Rossendale (I) 9510 ± 90
$\delta^{13}C = -26.9‰$

The wood in peat, associated with marl (*Picea* and *Salix*?; identified by R. Mott (unpublished GSC Wood Report No. 87-26)) was enclosed in marl and sand. Sample KJ-318-86 was collected by R.W. Klassen and J.T. Teller on October 4, 1986, from 4.8 km south and 1.6 km east of Rossendale, (SW1/4 LSD 4, Sec. 35, Tp. 9, Rge. 9, W-P. Mer.), Manitoba (49°47.0′N, 98°35.6′W), at an elevation of 328 m; submitted by R.W. Klassen.

The sample (9.2 g dry weight) was treated with hot base, hot acid, and distilled water rinses (noncalcareous). The age estimate is based on two 1-day counts (2510 minutes) in the 5 L counter with a mixing ratio of 1.00.

The uncorrected age is 9540 ± 90.

TO-534. Rossendale (II) 9600 ± 70

A piece of wood from the same sample as that used for GSC-4490 was dated by the AMS technique at the IsoTrace Laboratory. The age has been corrected for natural and sputtering fractionation to a base of $\delta^{13}C = -25‰$ (the GSC date has been corrected to the same base).

Comment (R.W. Klassen): The wood (*Salix* sp.) sample was recovered from a back-hoe excavation at a depth of about 3 m. The site was located in a shallow gully across the front of the Assiniboine Delta just behind the 9.5 - 10 ka Campbell Beach. Ostracods from the sediments suggest a permanent pond environment (Delorme, 1986) — most likely a backwater between the Campbell Beach and the Delta front. A study of the associated pollen indicates a spruce - pine transition (Mott, unpublished GSC Palynology Report No. 88-10). Two previous dates of about 12.4 ka (Y-165, Preston et al., 1955) and 12.1 ka (GSC-1319, Lowdon et al., 1971) on the peat from these sediments were assumed to provide a minimal age for the delta. These dates and the local stratigraphic — geomorphic relationships indicate a direct relationship to the Campbell Beach and terraces of the same age within the Assiniboine Valley across the delta (Klassen, 1984). Recognition of the Campbell Beach phase and earlier Assiniboine Delta phase as separate events is crucial to deciphering the late glacial history of this region; questionable implications of these dates have been made where this aspect of developmental history has not been clarified (Teller, 1989).

Saskatchewan

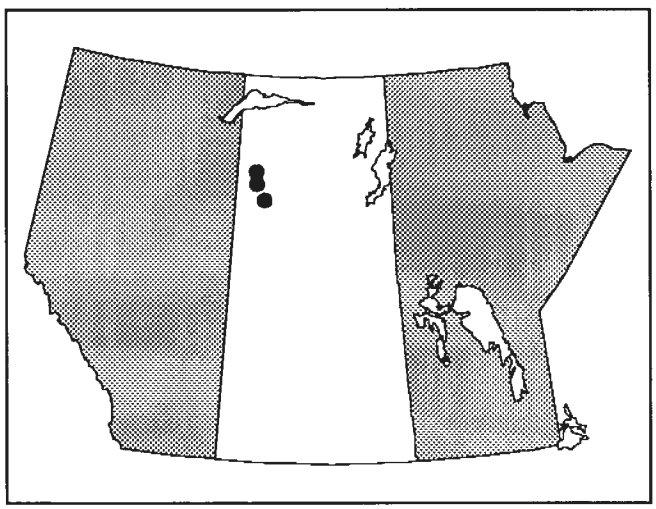

Figure 8. Radiocarbon dated sites in Saskatchewan.

GSC-4821. Nipawin Bay 10 600 ± 120
$\delta^{13}C = -28.4‰$

The lake sediment, basal gyttja, sample AP-88-4 was collected by T.W. Anderson on August 17, 1988, from Nipawin Bay (Frobisher Lakes area; 957-964 cm below lake bottom), about 12 km southeast of Turnor Lake, Saskatchewan (56°24′28″N, 108°33′00″W), at an elevation of 408 m; submitted by T.W. Anderson.

The sample (228.0 g wet weight) was treated with hot acid and distilled water rinses; base treatment was omitted (noncalcareous). The treated sample (91.3 g) yielded 4.28 L of CO_2 gas. The age estimate is based on one count for 2320 minutes in the 2 L counter with a mixing ratio of 1.04. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 4.774 ± 0.055, 1.064 ± 0.019, and 17.975 ± 0.097 cpm, respectively.

The uncorrected age is 10 600 ± 120.

Comment (T.W. Anderson): The sediment sample occurs at the base of greenish-grey gyttja above an organic streaked clay, which in turn, overlies laminated and banded grey and reddish-grey clay. The laminated and banded clay sequence implies deposition in a large proglacial lake that was in contact with the Laurentide ice. The gradational change from clay to organic lake sediment suggests that the site changed gradually to the shallower and more restricted basin of the present embayment with initiation of organic deposition. The date for the basal organic sediments indicates that the Laurentide ice margin had retreated north of the Frobisher Lakes lowland, which connects to the Clearwater River valley and the proglacial lake had drained prior to this date, i.e., about 11 ka BP (Anderson and Lewis, 1992). Also see GSC-4807, Long Lake which is located in the same topographic lowland.

GSC-4807. Long Lake 11 100 ± 150
$\delta^{13}C = -23.5‰$

The lake sediment, basal detritus gyttja, was enclosed in sandy clay. Sample AP-88-1 was collected by T.W. Anderson on August 10, 1988, from Long Lake (695-701 cm below the lake bottom), about 50 km northwest of La Loche, Saskatchewan (56°51′40″N, 108°59′20″W), at an elevation of 414.8 m; submitted by T.W. Anderson.

The sample (387.4 g wet weight) was treated with hot acid and distilled water rinses; base treatment was omitted (noncalcareous). The treated sample (106.5 g) yielded 2.31 L of CO_2 gas. The age estimate is based on one count for 3370 minutes in the 2 L counter with a mixing ratio of 1.95. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 4.554 ± 0.072, 1.064 ± 0.019, and 17.975 ± 0.097 cpm, respectively.

The uncorrected age is 11 000 ± 150.

Comment (T.W. Anderson): The sediment sample occurs at base of a detritus-rich clay interval over interbedded sandy clay and sand, which, in turn, overlies laminated to varved grey clay. The sequence of laminated clay and interbedded, massive sandy clay implies deposition in a large proglacial lake that was in contact with the Laurentide ice. Sand at the top of the sequence was probably a lag deposit that accumulated during the drawdown phase of the proglacial lake. The overlying detritus-rich clay is thought to represent reworked glaciolacustrine clay that was washed into the Long Lake basin prior to stabilization of the slopes by vegetation and onset of organic deposition in the lake. The date for the basal organic sediments indicates that the Laurentide ice margin had retreated north of the topographic lowland (in which Long Lake is situated) connecting to the Clearwater River valley and the proglacial lake had drained by 11 ka BP (Anderson and Lewis, 1992). Isobases on Lake Agassiz suggest that the topographic lowland that lies 20-30 m below the projected Agassiz water surface (Campbell level, here 440-450 m a.s.l.) could have connected the Agassiz basin to the Clearwater valley. Further studies are in progress and others are being planned to confirm if the proglacial lake was glacial Lake Agassiz.

GSC-4832. Fontaine Lake 9230 ± 120
$\delta^{13}C = -27.0‰$

The basal lake sediment, woody, sandy gyttja, sample AP-88-5 (Hole 2) was collected by T.W. Anderson on August 19, 1988, from Fontaine Lake (12.05-12.09 m below lake bottom), about 80 km northwest of La Loche, and about 36 km north of the Clearwater River valley, Saskatchewan (57°12′52″N, 109°03′24″W), at an elevation of 467 m; submitted by T.W. Anderson.

The sample (188.0 g wet weight) was treated with hot acid and distilled water rinses; base treatment was omitted (noncalcareous). The treated sample (59.9 g) yielded 5.45 L of CO_2 gas. The age estimate is based on two counts for 2085 minutes in the 2 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 5.632 ± 0.059, 1.077 ± 0.015, and 17.836 ± 0.153 cpm, respectively.

The uncorrected age is 9260 ± 120.

Comment (T.W. Anderson): The dated sample occurs at the base of black gyttja above sandy stony clay that is interpreted to be till. Date provides a minimum age for deglaciation of the area just north of the Clearwater River spillway.

Alberta

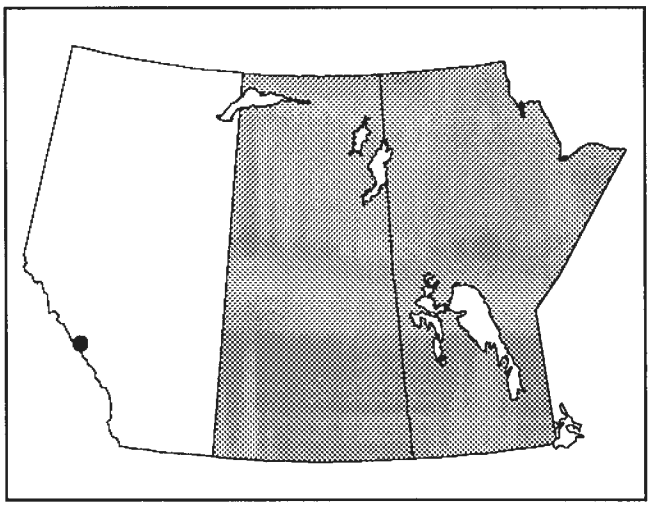

Figure 9. Radiocarbon dated sites in Alberta.

GSC-4947. Peyto 70 ± 50
$\delta^{13}C = -21.6‰$

The wood (*Pinus monticola*; identified by H. Jetté (unpublished GSC Wood Report No. 90-07)) was enclosed in outwash gravels. Sample PS 88-2 was collected by G.H. Holdsworth on August 17, 1988, from 1.2 km south-southeast of the Peyto Lake delta, Alberta (51°42.2′N, 116°31.8′W), at an elevation of 1890 m; submitted by G.H. Holdsworth.

The sample (12.0 g dry weight) was treated with hot base, hot acid, and distilled water rinses (noncalcareous). The treated sample (7.8 g) yielded 7.77 L of CO_2 gas. The age estimate is based on two counts for 2000 minutes in the 5 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 28.071 ± 0.126, 2.105 ± 0.027, and 28.136 ± 0.132 cpm, respectively.

Comment (G.H. Holdsworth): The age was expected to be older, because the stump protruded through gravels and had a sheared top, and the site was where the Little Ice Age moraine at frontal position would have been (Luckman et al., 1993).

Peyto Glacier Series

GSC-4936. Peyto Glacier (I) 2840 ± 60
$\delta^{13}C = -25.0‰$

The wood (*Abies*; identified by H. Jetté (unpublished GSC Wood Report No. 90-06)) was enclosed in morainic till. Sample PME 89-03 was collected by G.H. Holdsworth on August 15, 1989, from 3 km south-southeast of Peyto Lake near the highway between Jasper and Banff (highway 93), Alberta (51°40.88′N, 116°32.37′W), at an elevation of 2180 ± 10 m; submitted by G.H. Holdsworth.

The sample (24.5 g dry weight) was treated with hot base, hot acid, and distilled water rinses (noncalcareous). The treated sample (8.4 g) yielded 7.48 L of CO_2 gas. The age estimate is based on two counts for 2020 minutes in the 5 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 19.766 ± 0.107, 2.105 ± 0.027, and 28.136 ± 0.132 cpm, respectively.

The uncorrected age is 2840 ± 60.

Comment (G.H. Holdsworth): The sample was collected as part of the program to document the Neoglacial of the Rockies (Luckman et al., 1993).

GSC-5157. Peyto Glacier (II) 3140 ± 70
$\delta^{13}C = -23.2‰$

The wood (*Abies*; identified by R.J. Mott (unpublished GSC Wood Report No. 91-03)) was taken from the surface of fresh till. Sample PMW-90-1 was collected by G.H. Holdsworth on June 29, 1990, from Peyto Glacier, 3 km southwest of Peyto Lake on highway 93 (Jasper - Banff), Alberta (51°41′N, 116°33′W), at an elevation of 2210 m; submitted by G.H. Holdsworth.

The sample (14.4 g wet weight) was treated with hot base, hot acid, and distilled water rinses (noncalcareous). The treated sample (8.9 g) yielded 8.05 L of CO_2 gas. The age estimate is based on two counts for 2120 minutes in the 5 L counter with a mixing ratio of 1.00. The count rate for the sample (net) and for monthly backgrounds and standards (net) were 19.393 ± 0.107, 2.255 ± 0.036, and 28.572 ± 0.180 cpm, respectively.

The uncorrected age is 3110 ± 70.

Comment (G.H. Holdsworth): This sample complements the existing set of mid-early Neoglacial wood (tree) fragments collected from in front of, to the east of, and now to the west of, the present glacier tongue. The sample was obviously transported by glacial action (probably entirely at the base) and may have been moved to a higher location than where it originally grew.

British Columbia

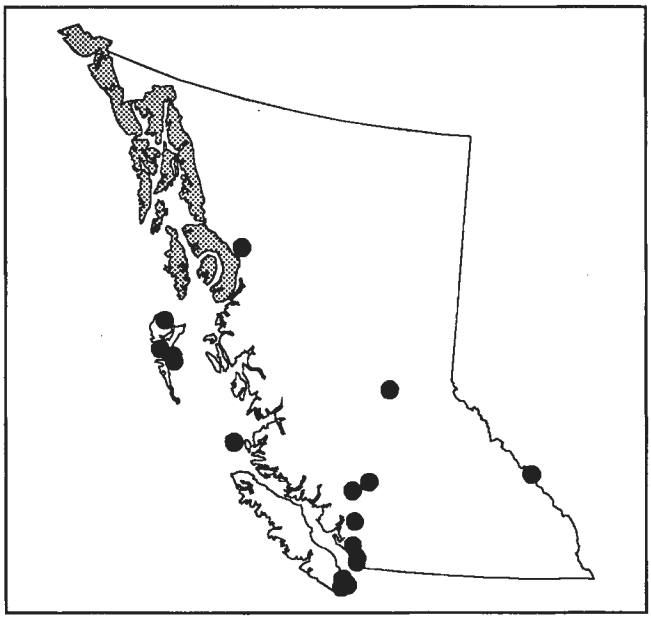

Figure 10. Radiocarbon dated sites in British Columbia.

GSC-5118. Yoho Glacier 2830 ± 80
$\delta^{13}C = -23.1‰$

The wood (*Picea*; identified by R.J. Mott (unpublished GSC Wood Report No. 90-72)) was enclosed in till. Sample Y90-1 was collected by G.H. Holdsworth on September 19, 1990, from about 1 km from the terminus of the Yoho Glacier, 3 km from trailhead, Yoho Valley, British Columbia (51°34.7′N, 116°32′W), at an elevation of 2030 m; submitted by G.H. Holdsworth.

The sample (11.9 g dry weight) was treated with hot base, hot acid, and distilled water rinses (noncalcareous). The treated sample (8.6 g) yielded 8.50 L of CO_2 gas. The age estimate is based on two counts for 2000 minutes in the 5 L counter with a mixing ratio of 1.00. The count rate for the sample (net) and for monthly backgrounds and standards (net) were 19.920 ± 0.110, 2.172 ± 0.034, and 28.328 ± 0.234 cpm, respectively.

The uncorrected age is 2830 ± 80.

Comment (G.H. Holdsworth): The sample was on the surface of till - outwash and had probably been washed out of the till by a stream recently. Many different-sized pieces of similar wood were scattered over an area of more than 5000 m^2. The date is the same as many Peyto Glacier woods indicating a synchrony of advance of both glaciers.

GSC-5120. Downton Lake 2980 ± 80
$\delta^{13}C = -25.2‰$

The wood (*Abies*; identified by R.J. Mott (unpublished GSC Wood Report No. 90-75)) was from a surface collection on a till-covered nunatak. Sample BGW78-1 was collected by O. Mokievsky-Zubok in May 1978, from 25 km west of Downton Lake, British Columbia (50°49′N, 123°35′W), at an elevation of 1740 m; submitted by G.H. Holdsworth.

The sample (11.1 g dry weight) was treated with hot base, hot acid, and distilled water rinses (noncalcareous). The treated sample (8.1 g) yielded 8.07 L of CO_2 gas. The age estimate is based on one count for 3660 minutes in the 5 L counter with a mixing ratio of 1.00. The count rate for the sample (net) and for monthly backgrounds and standards (net) were 19.555 ± 0.084, 2.172 ± 0.034, and 28.328 ± 0.234 cpm, respectively.

The uncorrected age is 2980 ± 80.

Comment (G.H. Holdsworth): Probably an in situ sample because of the special characteristics of the site. The nunatak would have been covered by ice during the "Little Ice Age" (O. Mokievsky-Zubok, personal communication, 1990).

GSC-4406. Fraser River 1980 ± 70
$\delta^{13}C = -25.3‰$

The wood (*Populus*; identified by H. Jetté (unpublished GSC Wood Report No. 87-02)) was enclosed in fluvial gravel. Sample CIA-86-226 was collected by J.J. Clague on September 10, 1986, from the Fraser River, 3 km south of mouth of Naver Creek, 50 km north of Quesnel, British Columbia (53°26.3′N, 122°35.2′W), at an elevation of about 527 m; submitted by J.J. Clague.

The sample (21.0 g wet weight) was treated with hot base, hot acid, and distilled water rinses (slightly calcareous). The age estimate is based on one 3-day count (4200 minutes) in the 5 L counter with a mixing ratio of 1.00.

The uncorrected age is 1980 ± 70.

Comment (J.J. Clague): The dated sample is a log from fluvial gravel underlying a low river terrace in central British Columbia. GSC-4406 indicates that the Fraser River in the vicinity of Naver Creek was flowing no more than 10 m above its present level at 2 ka BP (Clague, 1988).

Paradise Creek valley Series

A series of wood samples from the head of Paradise Creek valley, 0.8 km north-northwest of Castle Peak, Chilcotin Ranges, British Columbia (51°5.3′N, 122°58.2′W), at an elevation of 2091 m, were collected by J.J. Clague and R.W. Mathewes on August 27, 1987; submitted by J.J. Clague.

GSC-4962. Paradise Creek valley (I) — 8770 ± 90; $\delta^{13}C = -23.8‰$

The wood (log) sample CIA-87-CP6 (18.3 g dry weight; *Pinus albicaulis*; identified by J. Gonzalez), collected on the surface, was treated with hot base, hot acid, and distilled water rinses (noncalcareous). The treated sample (7.6 g) yielded 7.34 L of CO_2 gas. The age estimate is based on one count for 3950 minutes in the 5 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 9.518 ± 0.063, 2.014 ± 0.032, and 28.290 ± 0.181 cpm, respectively.

The uncorrected age is 8750 ± 90.

GSC-4961. Paradise Creek valley (II) — 8820 ± 90; $\delta^{13}C = -24.3‰$

The wood (log) sample CIA-87-CP5 (14.3 g dry weight; *Abies lasiocarpa*; identified by J. Gonzalez), enclosed in gravel, was treated with hot base, hot acid, and distilled water rinses (noncalcareous). The treated sample (7.7 g) yielded 7.59 L of CO_2 gas. The age estimate is based on one count for 3830 minutes in the 5 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 9.455 ± 0.063, 2.014 ± 0.032, and 28.290 ± 0.181 cpm, respectively.

The uncorrected age is 8800 ± 90.

GSC-4970. Paradise Creek valley (III) — 8860 ± 80; $\delta^{13}C = -24.6‰$

The wood (branch or log) sample CIA-87-CP9 (14.8 g dry weight; *Abies lasiocarpa*; identified by J. Gonzalez), collected on the surface, was treated with hot base, hot acid, and distilled water rinses (noncalcareous). The treated sample (8.2 g) yielded 8.48 L of CO_2 gas. The age estimate is based on one count for 3930 minutes in the 5 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 9.419 ± 0.062, 2.074 ± 0.030, and 28.375 ± 0.130 cpm, respectively.

The uncorrected age is 8860 ± 80.

Comment (J.J. Clague): Conifer logs and branches are common on the surface and in sediments above timberline at Castle Peak. They have yielded ages ranging from about 9.1 to 8.2 ka BP; the three ages reported here (GSC-4961, -4962, and -4970) are part of this data set. These data show that climate in the southern Coast Mountains during the early Holocene was warmer than today (Clague and Mathewes, 1989).

GSC-4591. Paradise Creek valley (IV) — 9010 ± 90; $\delta^{13}C = -22.4‰$

The wood (*Pinus albicaulis*; identified by J. Gonzalez (Forintek Canada Corp)) was enclosed in diamicton (colluvium). Sample CIA-87-CP7 was collected by J.J. Clague on August 28, 1987, from head of Paradise Creek valley, 0.6 km north-northeast of Castle Peak, Chilcotin Ranges, British Columbia (51°5.3′N, 122°58.2′W), at an elevation of 2091 m; submitted by J.J. Clague.

The sample (19.8 g dry weight) was treated with hot base, hot acid, and distilled water rinses (noncalcareous). The age estimate is based on two 1-day counts (2680 minutes) in the 5 L counter with a mixing ratio of 1.00.

The uncorrected age is 8970 ± 90.

Comment (J.J. Clague): This radiocarbon age is one of many in the 8-9 ka range that have been obtained from surface and near-surface logs and branches in the Castle Peak cirque, southern British Columbia (see Clague and Mathewes, 1989; and Clague et al., 1992, for details and a discussion of the radiocarbon ages). The fossil wood occurs above present timberline, indicating that the climate during the early Holocene was warmer than at present.

GSC-4532. Lulu Island — 4580 ± 90; $\delta^{13}C = -25.3‰$

The marsh plants (organics) were sampled from a drill core in sand. Sample AC 7-675 was collected by O.M. Morningstar on August 21, 1986, from 200 m south of Westminster Highway and 100 m west of No. 6 Road on Lulu Island, Richmond, British Columbia (49°10′10″N, 123°3′40″W), at an elevation of 1.0 m; submitted by M.C. Roberts.

The sample (83.8 g wet weight) was treated with hot base, hot acid, and distilled water rinses (noncalcareous). The age estimate is based on two 1-day counts (2590 minutes) in the 5 L counter with a mixing ratio of 1.00.

The uncorrected age is 4580 ± 90.

Comment (M.C. Roberts): This date provides chronological control for an abandoned distributary channel of the Fraser River.

GSC-4485. Delta 7710 ± 140
$\delta^{13}C = -21.2‰$

The wood (*Picea*; identified by R.J. Mott (unpublished GSC Wood Report No. 87-27)) was enclosed in silt. Sample FD87-A1-454.5-4 was collected by J.J. Clague and J.L. Luternauer on March 17, 1987, from northeast corner of intersection of 28th Avenue and 56th Street, Delta, British Columbia (49°3.25′N, 123°3.95′W), at a depth of 138 m; submitted by J.J. Clague.

The sample (3.3 g dry weight) was treated with hot base, hot acid, and distilled water rinses (noncalcareous). The age estimate is based on two 1-day counts (2740 minutes) in the 2 L counter with a mixing ratio of 1.69.

The uncorrected age is 7650 ± 140.

Comment (J.J. Clague): The sample, collected from a sonic drill core at a depth of 138 m below the surface, dates the development of the southern part of the Fraser River delta. The dated wood is from the top of a silty bottomset sequence that is directly overlain by a thick, sandy foreset unit. The foreset unit began to prograde past this site about 7.7 ka BP (Clague et al., 1991).

Gyro Park Series

A series of peat and wood samples from Gyro Park, Cadboro Bay, Victoria, Vancouver Island, British Columbia (48°27.7′N, 123°17.5′W), at an elevation of about 1 m, were collected by J.J. Clague and R.J. Hebda on February 23, 1989; submitted by J.J. Clague.

TO-1540. Gyro Park (I) 1250 ± 70

The wood sample CIA-89-100-37 was enclosed in peat.

GSC-4895. Gyro Park (II) 1450 ± 70
$\delta^{13}C = -29.3‰$

The peat sample CIA-89-100-14 (260.1 g wet weight), enclosed in peat, was treated with hot base, hot acid, and distilled water rinses (noncalcareous). The treated sample (15.0 g) yielded 8.01 L of CO_2 gas. The age estimate is based on two counts for 2030 minutes in the 2 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 14.838 ± 0.090, 1.070 ± 0.019, and 17.936 ± 0.117 cpm, respectively.

The uncorrected age is 1520 ± 70.

GSC-4902. Gyro Park (III) 1960 ± 70
$\delta^{13}C = -28.9‰$

The peat sample CIA-89-100-13 (137.8 g wet weight), enclosed in peat, were treated with hot base, hot acid, and distilled water rinses (noncalcareous). The treated sample (9.56 g) yielded 8.28 L of CO_2 gas. The age estimate is based on two counts for 2060 minutes in the 5 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 21.902 ± 0.113, 2.161 ± 0.033, and 28.156 ± 0.180 cpm, respectively.

The uncorrected age is 2020 ± 70.

S-3195. Gyro Park (IV) 3390 ± 90

The wood bark (two pieces), sample CIA-89-100-23, was enclosed in peat.

S-3197. Gyro Park (V) 3730 ± 90

The wood, sample CIA-89-100-36, was enclosed in peat.

GSC-4896. Gyro Park (VI) 3920 ± 70
$\delta^{13}C = -26.3‰$

The basal wood (single piece) sample CIA-89-100-29 (10.4 g dry weight; *Abies*; identified by R.J. Mott (unpublished GSC Wood Report No. 89-32)), enclosed in peat, was treated with hot base, hot acid, and distilled water rinses (noncalcareous). The treated sample (9.1 g) yielded 7.92 L of CO_2 gas. The age estimate is based on one count for 3980 minutes in the 5 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 17.250 ± 0.077, 2.161 ± 0.033, and 28.156 ± 0.180 cpm, respectively.

The uncorrected age is 3940 ± 70.

S-3196. Gyro Park (VII) 4070 ± 40

The wood (single piece), CIA-89-100-33, was enclosed in muddy peat and peaty mud.

Comment (J.J. Clague): Two metres of freshwater and uppermost intertidal peat overlies intertidal (?) mud at this site. The peat accumulated in response to a rise in sea level during the late Holocene. Several radiocarbon ages at this site and nearby site (see GSC-4869) provide chronological control for paleoecological changes (diatoms, foraminifera, pollen). GSC-4896 is from the base of the peat sequence, directly above sedgy mud.

Height*	Lab. No.	Age
160	TO-1540	1250 ± 70
140	GSC-4895	1520 ± 70
120	GSC-4902	1960 ± 70
55	S-3195	3390 ± 90
45	S-3197	3730 ± 90
0	GSC-4896	3920 ± 70
0	S-3196	4070 ± 90

* above the base (GSC-4896) of this section in cm.

A second group of wood and peat samples from Gyro Park, Cadboro Bay, Victoria, Vancouver Island, British Columbia (48°27.6′N, 123°17.5′W), at an elevation of 0-1 m, were collected by J.J. Clague and R.J. Hebda on October 21, 1988; submitted by J.J. Clague.

TO-2628. Gyro Park (VIII) 2000 ± 60

The charcoal flakes, sample CIA-88-200-16 (0.006 g dry weight), were enclosed in peat.

TO-2629. Gyro Park (IX) 2870 ± 70

The seeds (*Scirpus*) and charcoal fragments, sample CIA-88-200-32 (0.059 g dry weight) were enclosed in peat.

TO-2630. Gyro Park (X) 3380 ± 60

The wood, sample CIA-88-200-38 (0.132 g dry weight), was enclosed in peat.

GSC-4883. Gyro Park (XI)
uncorrected 3220 ± 80

The wood (single piece) sample CIA-88-200-57 (8.4 g wet weight; unidentifiable; R.J. Mott (unpublished GSC Wood Report No. 89-42)), enclosed in peat, was treated with hot base, hot acid, and distilled water rinses (noncalcareous). The treated sample (3.6 g) yielded 3.89 L of CO_2 gas. The age estimate is based on two counts for 2010 minutes in the 2 L counter with a mixing ratio of 1.15. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 12.015 ± 0.090, 1.070 ± 0.019, and 17.936 ± 0.117 cpm, respectively.

GSC-4869. Gyro Park (XII) 4060 ± 70
$\delta^{13}C = -28.7‰$

The peat sample CIA-88-200-58 (67.2 g dry weight), with peat above and sand below, was treated with hot base, hot acid, and distilled water rinses (noncalcareous). The treated sample (10.7 g) yielded 7.28 L of CO_2 gas. The age estimate is based on one count for 3800 minutes in the 2 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 10.575 ± 0.058, 1.067 ± 0.019, and 17.658 ± 0.099 cpm, respectively.

The uncorrected age is 4120 ± 70.

Comment (J.J. Clague): Up to 3 m of freshwater and uppermost intertidal peat overlies littoral sand and intertidal (?) mud at Gyro Park. The peat accumulated in response to a rise in sea level during the late Holocene. Several radiocarbon ages at this site and a nearby site (see GSC-4896) provide chronological control for paleoecological changes (diatoms, foraminifera, pollen). GSC-4896 is from the base of the peat sequence, directly above sand.

Height*	Lab. No.	Age
205	TO-2628	2000 ± 60
125	TO-2629	2870 ± 70
100	TO-2630	3380 ± 60
90	GSC-4883	3220 ± 80
0	GSC-4869	4060 ± 70

* above the base (GSC-4869) of this section in cm.

Colquitz River Park Series

A series of wood samples from Colquitz River Park, 1 km east of Portage Inlet, 0.15 km south of highway 1, Victoria, Vancouver Island, British Columbia (48°27.4′N, 123°23.9′W), at an elevation of 2 m, were collected by J.J. Clague and R.J. Hebda on October 18, 1988; submitted by J.J. Clague.

GSC-4901. Colquitz River Park (I) 20 ± 60
$\delta^{13}C = -27.3‰$

The wood (single piece) sample CIA-88-194-27 (5.1 g dry weight; unidentifiable; R.J. Mott (unpublished GSC Wood Report No. 89-35)), enclosed in sand, was treated with hot base, hot acid, and distilled water rinses

(noncalcareous). The treated sample (4.2 g) yielded 4.10 L of CO_2 gas. The age estimate is based on two counts for 2030 minutes in the 2 L counter with a mixing ratio of 1.08. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 17.725 ± 0.103, 1.086 ± 0.023, and 17.849 ± 0.102 cpm, respectively.

The uncorrected age is 60 ± 60.

TO-1345. Coquitz River Park (II) 180 ± 50

The wood twig, sample CIA-88-194-25 (0.160 g dry weight), was enclosed in sandy organic-rich mud which is overlain by and underlain by sand.

GSC-4899. Colquitz River Park (III) 720 ± 60
$\delta^{13}C = -24.0‰$

The wood (single piece) sample CIA-88-194-13 (4.4 g dry weight; *Pseudotsuga menziesii*; identified by H. Jetté (unpublished GSC Wood Report No. 89-40)), enclosed in organic-rich mud, was treated with hot base, hot acid, and distilled water rinses (noncalcareous). The treated sample (3.7 g) yielded 3.73 L of CO_2 gas. The age estimate is based on one count for 3880 minutes in the 2 L counter with a mixing ratio of 1.20. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 16.441 ± 0.077, 1.070 ± 0.019, and 17.936 ± 0.117 cpm, respectively.

The uncorrected age is 700 ± 60.

GSC-4900. Colquitz River Park (IV) 230 ± 60
$\delta^{13}C = -22.8‰$

The wood sample CIA-88-194-26 (7.0 g dry weight; *Abies*; identified by H. Jetté (unpublished GSC Wood Report No. 89-41)), enclosed in silty sand, was treated with hot base, hot acid, and distilled water rinses (noncalcareous). The treated sample (5.3 g) yielded 5.33 L of CO_2 gas. The age estimate is based on one count for 3980 minutes in the 2 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 17.420 ± 0.072, 1.086 ± 0.023, and 17.849 ± 0.102 cpm, respectively.

The uncorrected age is 200 ± 60.

TO-1344. Coquitz River Park (V) 1900 ± 50

The wood twig, sample CIA-88-194-24 (0.141 g dry weight), was enclosed in peaty mud overlying glaciomarine clay.

GSC-4891. Colquitz River Park (VI) 1980 ± 60
$\delta^{13}C = -27.1‰$

The wood (single piece) sample CIA-88-194-23 (11.1 g dry weight; *Abies*; identified by H. Jetté (unpublished GSC Wood Report No. 89-39)), with clay below and muddy peat above, was treated with hot base, hot acid, and distilled water rinses (noncalcareous). The treated sample (8.4 g) yielded 8.79 L of CO_2 gas. The age estimate is based on two counts for 2030 minutes in the 5 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 22.228 ± 0.113, 2.151 ± 0.026, and 28.579 ± 0.127 cpm, respectively.

The uncorrected age is 2020 ± 60.

Comment (J.J. Clague): About 1.5 m of interbedded mud and peat unconformily overlies late Pleistocene glaciomarine clay at this low-elevation site near Portage Inlet. At least three layers and lenses of sand and silty sand are present within the peat-mud sequence. These may be flood deposits, although the young ages obtained from them suggest that the upper part of the sequence may have been disturbed by some form of human activity. GSC-4891 is from the lag at the top of the glaciomarine clay; GSC-4899 is from organic-rich mud between two sand layers (about 65 cm above base of peat-mud sequence); GSC-4900 is from the lowest sand layer (about 55 cm above base of peat-mud sequence); GSC-4901 is from a lens of sand (about 95 cm above base of peat-mud sequence). Additional radiocarbon ages from this site include 1900 ± 50 (TO-1344) from 20 cm above base of peat-mud sequence; and 180 ± 50 (TO-1345) from 75 cm above base of peat-mud sequence.

Height*	Lab. No.	Age
95	GSC-4901	20 ± 60
75	TO-1345	180 ± 50
65	GSC-4899	720 ± 60
55	GSC-4900	230 ± 60
20	TO-1344	1900 ± 50
0	GSC-4891	1980 ± 60

* above the base (GSC-4896) of the section in cm.

Portage Inlet Series

A series of marine shells and peat samples from north shore of Portage Inlet, adjacent to highway 1, Victoria, Vancouver Island, British Columbia (48°27.8′N, 123°25.4′W), at an elevation of 0 m, were collected by J.J. Clague and R.J. Hebda on June 30, 1988; submitted by J.J. Clague.

GSC-4813. Portage Inlet (I)

uncorrected 2100 ± 90

The marine shells sample CIA-88-177-46 (11.8 g dry weight), enclosed in mud, were treated with an acid leach to remove the outer 10% of the sample. The treated sample (11.1 g) yielded 2.45 L of CO_2 gas. The age estimate is based on two counts for 2080 minutes in the 2 L counter with a mixing ratio of 1.79. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 13.839 ± 0.124, 1.090 ± 0.023, and 17.970 ± 0.101 cpm, respectively.

GSC-4830. Portage Inlet (II) 6220 ± 80

$\delta^{13}C$ = -27.9‰

The peat sample CIA-88-177-40 (14.1 g wet weight), with peat below and silty sand above, was treated with cold base, hot acid, and distilled water rinses (noncalcareous). The treated sample (6.3 g) yielded 3.71 L of CO_2 gas. The age estimate is based on one count for 3710 minutes in the 2 L counter with a mixing ratio of 1.20. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 8.239 ± 0.062, 1.090 ± 0.023, and 17.970 ± 0.101 cpm, respectively.

The uncorrected age is 6260 ± 80.

Comment (J.J. Clague): A terrestrial peat containing Mazama tephra (about 6.8 ka) is sharply overlain by marine sediments, comprising a lower unit of silty sand and an upper unit of shelly mud. The entire sequence is below mean sea level. The stratigraphy and ages indicate that sea level in this area was below its present position in the middle Holocene and that a transgression occurred after 6.2 ka and before 2.1 ka BP.

Helmcken Park Series

Wood and peat samples from Helmcken Park, on the west side of Portage Inlet, 0.35 km south of highway 1, Victoria, Vancouver Island, British Columbia (48°27.6′N, 123°25.7′W), at an elevation of about 1 m, were collected by J.J. Clague and R.J. Hebda on June 30, 1988; submitted by J.J. Clague.

GSC-4836. Helmcken Park (I) 140 ± 80

$\delta^{13}C$ = -25.0‰

The wood sample CIA-88-169-3 (2.1 g dry weight; *Pseudotsuga menziesii*; identified by H. Jetté (unpublished GSC Wood Report No. 89-25)), enclosed in organic-rich mud, was treated with hot base, hot acid, and distilled water rinses (noncalcareous). The treated sample (1.6 g) yielded 1.63 L of CO_2 gas. The age estimate is based on one count for 3740 minutes in the 2 L counter with a mixing ratio of 2.72. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 17.670 ± 0.137, 1.090 ± 0.023, and 17.970 ± 0.101 cpm, respectively.

The uncorrected age is 140 ± 80.

Comment (J.J. Clague): The dated sample is from organic-rich mud that sharply overlies a terrestrial peat in the Helmcken Park marsh. The sample was collected near the contact of these two units, 55 cm below the marsh surface. The young age suggests that the organic-rich mud has been deposited very recently, perhaps as a result of human activity in the area.

GSC-4850. Helmcken Park (II) 450 ± 50

$\delta^{13}C$ = -22.6‰

The peat sample CIA-88-167-7 (36.0 g dry weight), with peat below and mud above, was treated with cold base, hot acid, and distilled water rinses (noncalcareous). The treated sample (15.3 g) yielded 7.39 L of CO_2 gas. The age estimate is based on two counts for 2175 minutes in the 5 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 27.176 ± 0.119, 2.186 ± 0.024, and 28.589 ± 0.128 cpm, respectively.

The uncorrected age is 410 ± 50.

Comment (J.J. Clague): The dated peat is directly overlain by a succession of thin mud layers, which in turn, are overlain by more peat. The dated horizon is about 50 cm below the surface of the Helmcken Park marsh. The mud layers within a dominantly peaty succession were originally thought to record minor sea-level fluctuations or shifts in tidal channels; but the young age at this site and the even younger age at a nearby site (see GSC-4836) raise the possibility that the uppermost sediments in the marsh have been disturbed as a result of human activity.

Saanich Inlet Series

A series of organic marine mud samples from Saanich Inlet, 4 km northwest of Brentwood Bay, British Columbia (48°36.10′N, 123°30.00′W), at a depth of 232 m, were collected by J.J. Clague and P. Bobrowsky on January 4, 1989; submitted by J.J. Clague.

GSC-4925. Saanich Inlet (I) 1900 ± 130
$\delta^{13}C = -30.7‰$

The organic marine mud sample TU89A-003-4 (103-108 cm; 104.3 g wet weight), enclosed in organic marine mud, was treated with hot acid and distilled water rinses; base treatment was omitted (slightly calcareous). The treated sample (29.6 g) yielded 2.01 L of CO_2 gas. The age estimate is based on three counts for 3020 minutes in the 2 L counter with a mixing ratio of 3.94. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 13.938 ± 0.203, 1.083 ± 0.019, and 17.862 ± 0.102 cpm, respectively.

The uncorrected age is 1990 ± 130.

GSC-4908. Saanich Inlet (II) 2350 ± 110
$\delta^{13}C = -21.4‰$

The organic marine mud sample TU89A-003-6b (35-39 cm; 148.5 g wet weight), enclosed in mud, was treated with hot acid and distilled water rinses; base treatment was omitted (slightly calcareous). The treated sample (46.8 g) yielded 1.74 L of CO_2 gas. The age estimate is based on two counts for 2000 minutes in the 2 L counter with a mixing ratio of 2.25. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 13.421 ± 0.165, 1.083 ± 0.019, and 17.862 ± 0.102 cpm, respectively.

The uncorrected age is 2300 ± 110.

GSC-4918. Saanich Inlet (III) 2560 ± 90
$\delta^{13}C = -20.7‰$

The organic marine mud sample TU89A-003-6a (93-98 cm; 123.8 g wet weight), enclosed in mud, was treated with hot acid and distilled water rinses; base treatment was omitted (slightly calcareous). The treated sample (24.45 g) yielded 1.33 L of CO_2 gas. The age estimate is based on one count for 3950 minutes in the 2 L counter with a mixing ratio of 3.32. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 13.272 ± 0.131, 1.073 ± 0.016, and 18.101 ± 0.100 cpm, respectively.

The uncorrected age is 2490 ± 90.

TO-1553 Saanich Inlet (IV) 1940 ± 60

The shell fragments, sample TU89A-003-8 (11 cm), were enclosed in silty clay.

GSC-4909. Saanich Inlet (V) 3120 ± 90
$\delta^{13}C = -21.1‰$

The organic marine mud sample TU89A-003-8 (109-119 cm; 222.3 g wet weight), enclosed in organic marine mud, was treated with hot acid, and distilled water rinses; base treatment was omitted (slightly calcareous). The treated sample (50.5 g) yielded 2.38 L of CO_2 gas. The age estimate is based on two counts for 2060 minutes in the 2 L counter with a mixing ratio of 1.87. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 12.377 ± 0.118, 1.073 ± 0.016, and 18.101 ± 0.100 cpm, respectively.

The uncorrected age is 3050 ± 90.

Comment (J.J. Clague): Holocene sediments in Saanich Inlet comprise alternating rhythmically laminated (varved) and massive units; the latter are sediment gravity flow deposits, possible emplaced as a result of earthquakes (Bobrowsky and Clague, 1990). The dates in this series, supplemented by TO-1553 (1940 ± 60), confirm that the rhythmites are varves and help provide a chronology for the massive units.

Depth*	Lab. No.	Age
5.5	GSC-4925	1990 ± 130
7.8	GSC-4908	2300 ± 110
8.4	GSC-4918	2490 ± 90
10.5	TO-1553	1940 ± 60
11.5	GSC-4909	3050 ± 90

* below sediment/water interface in metres.

Witty's Lagoon Series

GSC-4893. Witty's Lagoon (I) 5030 ± 60
$\delta^{13}C = -26.1‰$

The wood (*Salix*; identified by H. Jetté (unpublished GSC Wood Report No. 89-46)) was enclosed in peat. Sample CIA-88-199-10 was collected by J.J. Clague and R.J. Hebda on October 20, 1988, from Witty's Lagoon, about 15 km west-southwest of Victoria, Vancouver Island, British Columbia (48°23.1′N, 123°31.0′W), at an elevation of about 1 m; submitted by J.J. Clague.

The sample (35.9 g wet weight) was treated with hot base, hot acid, and distilled water rinses (noncalcareous). The treated sample (7.2 g) yielded 7.85 L of CO_2 gas. The age estimate is based on three counts for 3880 minutes in the 5 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 15.248 ± 0.087, 2.151 ± 0.026, and 28.579 ± 0.127 cpm, respectively.

The uncorrected age is 5050 ± 60.

TO-1343. Witty's Lagoon (II) 5500 ± 60

The wood (one piece) was enclosed in peat overlying glaciomarine clay. Sample CIA-88-199-7 (0.141 g dry weight) was collected by J.J. Clague and R.J. Hebda on October 20, 1988, from Witty's Lagoon, about 15 km west-southwest of Victoria, British Columbia (48°23.1′N, 123°31.0′W), at an depth of about 0.5 m; submitted by J.J. Clague.

Comment (J.J. Clague): The dated sample (GSC-4893) is from a terrestrial or uppermost intertidal peat sequence that is about 1 m thick. This sequence extends down to about 0 m (mean sea level datum), indicating that sea level was lower earlier during the Holocene than today. Wood collected from the base of the sequence yielded an age of 5500 ± 60 (TO-1343).

GSC-4874. Shovelnose Creek 2660 ± 60
$\delta^{13}C$ = -22.4‰

The wood charcoal (*Thuja plicata* possibly; identified by R.J. Mott (unpublished GSC Wood Report No. 89-38)) was enclosed in fluvial sand. Sample EN-86-SQ-13 was collected by S.G. Evans on July 25, 1986, from 50 m south of Shovelnose Creek, Squamish River, British Columbia (50°04′00″N, 123°20′25″W), at an elevation of about 140 m; submitted by S.G. Evans.

The sample (5.6 g dry weight) was treated with hot base, hot acid, and distilled water rinses (noncalcareous). The treated sample (3.7 g) yielded 4.62 L of CO_2 gas. The age estimate is based on one count for 5225 minutes in the 2 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 12.951 ± 0.055, 1.070 ± 0.019, and 17.936 ± 0.117 cpm, respectively.

The uncorrected age is 2620 ± 60.

Laboratory Comment: This sample is part of the Mount Cayley Series, for a detailed description refer to McNeely and Jorgensen, 1992 (p. 41-45).

GSC-3965. Queen Charlotte Sound 10 500 ± 200
$\delta^{13}C$ = +2.4‰

The marine shells (*Macoma liparia*; identified by R. Reid) were enclosed in sandy mud. Sample END84B-011-1 was collected by J. Luternauer and K.W. Conway on June 25, 1984, from southeastern Queen Charlotte Sound, British Columbia (51°30.11′N, 128°33.76′W), at a depth of 182 m; submitted by J. Luternauer and K.W. Conway.

The sample (5.6 g dry weight) from a core depth of 3.09 m had no pre-treatment. The age estimate is based on one 3-day count (4200 minutes) in the 2 L counter with a mixing ratio of 3.84.

The uncorrected age is 10 500 ± 200.

Comment (J. Luternauer and K.W. Conway): The sample dates the upper surface of a lag deposit formed during a time of low relative sea level on the continental shelf of western Canada. The deposit is widespread in troughs in the Queen Charlotte Sound area. Other dates pertinent to this event indicate that the erosive interval began as early as 13.5 ka and lasted until about 10.0 ka when sea level rose at the beginning of the Holocene (Luternauer et al., 1989).

GSC-4975. Frank Mackie Glacier 710 ± 50
$\delta^{13}C$ = -25.6‰

The wood (branch broken into two pieces; *Abies*; identified by H. Jetté (GSC wood report No. 90-15)) was enclosed in mud. Sample CIA-89-227 was collected by J.J. Clague and S.G. Evans on August 11, 1989, from Frank Mackie Glacier, 8 km north of Granduc, British Columbia (56°18.8′N, 130°4.4′W), at an elevation of about 622 m; submitted by J.J. Clague.

The sample (14.3 g dry weight) was treated with hot base, hot acid, and distilled water rinses (noncalcareous). The treated sample (7.8 g) yielded 7.72 L of CO_2 gas. The age estimate is based on two counts for 2000 minutes in the 5 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 25.935 ± 0.122, 2.074 ± 0.030, and 28.375 ± 0.130 cpm, respectively.

The uncorrected age is 720 ± 50.

Comment (J.J. Clague): Dated sample is from rhythmically bedded glaciolacustrine sediments overlain by interbedded gravel and diamicton of the Frank Mackie Glacier Neoglacial end moraine. The glaciolacustrine sediments were deposited in a lake impounded by Frank Mackie Glacier when that glacier was more extensive than today and blocked the flow of Bowser River. The overlying gravel and diamicton record the maximum advance of Frank Mackie Glacier during the Little Ice Age. GSC-4975 indicates that the climax of the Little Ice Age in this area occurred after 700 BP.

GSC-4972. Bowser River 3420 ± 90
$\delta^{13}C = -23.0‰$

The wood (branch broken into two pieces; *Abies*; identified by H. Jetté (unpublished GSC Wood Report No. 90-14)) was enclosed in sand. Sample CIA-89-224 was collected by J.J. Clague and S.G. Evans on August 10, 1989, from Bowser River, 2 km north-northeast of Granduc, British Columbia (56°15.7′N, 130°3.3′W), at an elevation of about 653 m; submitted by J.J. Clague.

The sample (20.0 g dry weight) was treated with hot base, hot acid, and distilled water rinses (noncalcareous). The treated sample (5.3 g) yielded 5.14 L of CO_2 gas. The age estimate is based on two counts for 2000 minutes in the 2 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 11.835 ± 0.083, 1.026 ± 0.023, and 18.054 ± 0.143 cpm, respectively.

The uncorrected age is 3390 ± 90.

Comment (J.J. Clague): The dated branch is from glaciolacustrine sediments overlying diamicton. The former were deposited in Tide Lake when Frank Mackie Glacier blocked the drainage in Bowser valley. The latter was deposited by Berendon Glacier when it achieved its maximum extent during the Little Ice Age. The glaciolacustrine sediments at this site are thought to be younger than 700 BP (GSC-4975), thus the dated branch probably is reworked from older sediments.

GSC-4534. Sandspit 710 ± 50
$\delta^{13}C = +0.6‰$

The marine shell fragments were enclosed in gravel. Sample CIA-87-142 was collected by J.J. Clague on June 28, 1987, from 1 km south of Sandspit Airport, Sandspit, British Columbia (53°14.6′N, 131°48.6′W), at an elevation of 4 m; submitted by J.J. Clague.

The sample (33.4 g dry weight) was treated with an acid leach to remove the outer 20% of the sample. The age estimate is based on two 1-day counts (2230 minutes) in the 5 L counter with a mixing ratio of 1.00.

The uncorrected age is 700 ± 50.

Comment (J.J. Clague): GSC-4534 dates the outermost part of a system of spits that developed at the northwest end of Moresby Island during the late Holocene. The sample is 1-2 m above the upper limit of gravel on the modern beach (approximate high water level), suggesting that there has been minor emergence here during the last several hundred years. Shells from gravel at about the same elevation at a nearby site yielded an age of 1720 ± 70 (GSC-2460, Lowdon and Blake, 1980, p. 12-13).

GSC-4516. Gray Bay 1230 ± 80
$\delta^{13}C = +1.9‰$

The marine shells were enclosed in gravel. Sample CIA-87-164 was collected by J.J. Clague on June 28, 1987, from Gray Bay, 15 km southeast of Sandspit, British Columbia (53°7.1′N, 131°42.9′W), at an elevation of 15.5 m; submitted by J.J. Clague.

The sample (46.3 g dry weight) was treated with an acid leach to remove the outer 20% of the sample. The age estimate is based on two 1-day counts (4200 minutes) in the 5 L counter with a mixing ratio of 1.00.

The uncorrected age is 1200 ± 80.

Comment (J.J. Clague): The dated shells were collected from the surface of a marine terrace 15.5 m above mean sea level on Moresby Island. When the sample was submitted, it was expected that it would date to the time the sea stood at the level of the terrace, i.e., sometime between 5.0 and 9.0 ka BP (Clague et al., 1982). The extremely young age of GSC-4516 indicates that the shells significantly postdate the terrace and thus probably have been carried to the site by humans.

GSC-4512. Shields Bay 5920 ± 100
$\delta^{13}C = -24.7‰$

The wood charcoal was enclosed in gravel. Sample CIA-87-202 was collected by J.J. Clague on July 1, 1987, from Shields Bay, 23 km east-southeast of Queen Charlotte City, Queen Charlotte Islands, British Columbia (53°19.4′N, 132°24.6′W), at an elevation of 11 m; submitted by J.J. Clague.

The sample (12.0 g wet weight) was treated with hot base, hot acid, and distilled water rinses (noncalcareous). The age estimate is based on two 1-day counts (2160 minutes) in the 2 L counter with a mixing ratio of 1.53.

The uncorrected age is 5920 ± 100.

Comment (J.J. Clague): The sample is from a littoral gravel that extends up to 13 m above mean sea level at this site on western Graham Island. Relative sea level in this area was 11 m higher 5.9 ka BP than it is today. Subsequent sea level change is explained by tectonic uplift (Clague et al., 1982).

Mary Point Series

GSC-4548. Mary Point (I) 6510 ± 60
$\delta^{13}C = -26.1‰$

The wood (*Tsuga*; identified by R.J. Mott (unpublished GSC Wood Report No. 88-5)) was enclosed in gravel and sand. Sample CIA-87-133-5 was collected by J.J. Clague on June 26, 1987, from Mary Point (Virago Sound), 29 km west of Masset, British Columbia (54°3.2′N, 132°33.9′W), at an elevation of 8 m; submitted by J.J. Clague.

The sample (16.9 g dry weight) was treated with hot base, hot acid, and distilled water rinses (noncalcareous). The age estimate is based on one 3-day count (4200 minutes) in the 5 L counter with a mixing ratio of 1.00.

The uncorrected age is 6530 ± 60.

GSC-4547. Mary Point (II) 7040 ± 70
$\delta^{13}C = +2.4‰$

The marine shells (*Tresus* cf. *capax* (Gould, 1850); "Horse clam" identified by J.E. Dale) were enclosed in gravel and sand. Sample CIA-87-133-5 was collected by J.J. Clague on June 26, 1987, from Mary Point (Virago Sound), 29 km west of Masset, British Columbia (54°3.2′N, 132°33.9′W), at an elevation of 8 m; submitted by J.J. Clague.

The sample (45.6 g dry weight) was treated with an acid leach to remove the outer 20% of the sample. The age estimate is based on one 3-day count (4200 minutes) in the 5 L counter with a mixing ratio of 1.00.

The uncorrected age is 7000 ± 70.

Comment (J.J. Clague): The dated shells (GSC-4547) and wood (GSC-4548) were collected from a gravelly lag at the base of a Holocene raised marine sequence. The gravel apparently was deposited during a transgression that culminated after 6.5 ka BP, when relative sea level was more than 8 m higher than at present. The difference of about 500 years between the shell and wood ages at this site may have resulted from, at least in part, the marine reservoir effect.

NORTHERN CANADA (MAINLAND)

Yukon

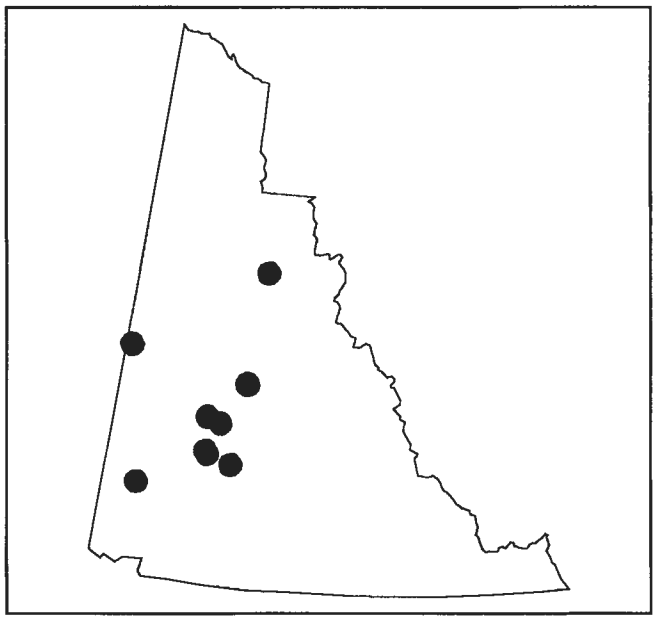

Figure 11. Radiocarbon dated sites in the Yukon.

GSC-3873 HP. Bonnet Plume Basin
uncorrected >52 000

The wood was found below the Bonnet Plume till. Sample HH-72-54 (1976) was collected by O.L. Hughes on July 8, 1976, from Bonnet Plume Basin, Yukon Territory (65°34.5′N, 135°30′W), at an elevation of 335 m; submitted by O.L. Hughes.

The sample (45.0 g dry weight) was treated with hot base, hot acid, and distilled water rinses (noncalcareous). The age estimate is based on one 4-day count (4860 minutes) in the 5 L counter with a mixing ratio of 1.00.

Comment (O.L. Hughes): This sample is part of the Hungry Creek series (GSC-2341, -2401, -2422, and -2971), site HH-72-54 (1976) discussed by the late O.L. Hughes (McNeely, 1989, p. 49-50).

Mayo Series

A series of wood samples were collected by O.L. Hughes and T. Giles in August 1988, from the "Mayo Section" on the left (south) bank of the Stewart River, about 1 km downstream from the village of Mayo, Yukon Territory (63°35′N, 135°55′W). Two other samples were recovered from the "Mayo Indian Village Section" on the right (north) bank of the Stewart River about 4 km downstream from the Mayo townsite (63°35′N, 135°57.5′W). The samples were submitted for dating by the late O.L. Hughes and T.R. Giles.

GSC-4927 HP. "Mayo Section" (I) 35 400 ± 320
$\delta^{13}C = -25.8‰$

The wood (*Salix*; identified by R.J. Mott (unpublished GSC Wood Report No. 88-43)) was enclosed in organic silt, sand. Sample HHT 88098 (95.0 g dry weight), from 1400 m downstream from upper end of exposure at an elevation of 495 m, was treated with hot base, hot acid, and distilled water rinses (noncalcareous). The treated sample (29.2 g) yielded 30.7 L of CO_2 gas. The age estimate is based on one count for 3710 minutes in the 5 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 1.253 ± 0.039, 2.521 ± 0.023, and 102.618 ± 0.351 cpm, respectively.

The uncorrected age is 35 400 ± 320.

GSC-5139 HP. "Mayo Section" (II)
uncorrected 36 700 ± 400

The wood (*Salix*; identified by R.J. Mott (unpublished GSC Wood Report No. 88-43)) was enclosed in sand and silts. Sample HHT-88032 was collected on August 25, 1988, from the upstream end of the "Mayo Section" on the Stewart River, about 20 m from end of the section at an elevation of 492 m.

The sample (37.2 g dry weight) was treated with hot base, hot acid, and distilled water rinses (noncalcareous). The treated sample (33.6 g) yielded 29.76 L of CO_2 gas. The age estimate is based on one count for 5780 minutes in the 5 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 1.052 ± 0.045, 2.483 ± 0.038, and 102.012 ± 0.477 cpm, respectively.

GSC-5142 HP. "Mayo Section" (III)35 900 ± 380
$\delta^{13}C = -26.6‰$

The wood (*Salix*; identified by R.J. Mott (unpublished GSC Wood Report No. 88-43)) was enclosed in sand and silts. Sample HHT-88227 was collected on August 25, 1988, from upstream end of the "Mayo Section" on the Stewart River, about 20 m from end of the section at an elevation of 492 m.

The sample (37.5 g dry weight) was treated with hot base, hot acid, and distilled water rinses (noncalcareous). The treated sample (35.2 g) yielded 33.20 L of CO_2 gas. The age estimate is based on one count for 4347 minutes in the 5 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 1.167 ± 0.048, 2.483 ± 0.038, and 102.012 ± 0.477 cpm, respectively.

The uncorrected age is 35 900 ± 380.

Comment (T.R. Giles): These samples of willow wood were recovered from sand and silt lenses within a thick gravel unit about 5-10 m below the contact with the Late Wisconsinan McConnell till. These three dates corroborate a previous date of 38 100 ± 1330 (GSC-4554; McNeely and McQuaig, 1991) obtained from an in situ willow stump collected by J.V. Matthews, Jr., in 1987 near the base of this section. Finite dates on willow (GSC-4927, -5139, and -5142) and nonfinite dates on spruce (GSC-4920, -4924, and -5152) in this section indicate that willow was the dominant tree in the area, described as a low arctic tundra environment (Matthews et al., 1990; Hughes et al., 1987); the spruce has been reworked from older deposits.

GSC-4920 HP. "Mayo Section" (IV)>51 000
$\delta^{13}C = -23.2‰$

The wood (*Picea*; identified by R.J. Mott (unpublished GSC Wood Report No. 88-43)) was enclosed in gravel. Sample HHT 88214 was collected on August 28, 1988, from 682.5 m downstream from upper end of exposure, at an elevation of 502 m.

The sample (88.9 g dry weight) was treated with hot base, hot acid, and distilled water rinses. The treated sample (31.3 g) yielded 28.4 L of CO_2 gas. The age estimate is based on one count for 5912 minutes in the 5 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 0.049 ± 0.030, 2.477 ± 0.021, and 102.221 ± 0.494 cpm, respectively.

GSC-4924 HP. "Mayo Section" (V)>51 000
$\delta^{13}C = -25.2‰$

The wood (*Picea*; identified by R.J. Mott (unpublished GSC Wood Report No. 88-43)) was enclosed in sand lens in

gravel. Sample HHT 88215 was collected on August 28, 1988, from 689 m downstream from upper end of exposure; at an elevation of 502 m.

The sample (51.6 g dry weight) was treated with hot base, hot acid, and distilled water rinses. The treated sample (40.0 g) yielded 32.5 L of CO_2 gas. The age estimate is based on one count for 5950 minutes in the 5 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 0.059 ± 0.030, 2.477 ± 0.021, and 102.221 ± 0.494 cpm, respectively.

GSC-5152 HP. "Mayo Section" (VI) >51 000 $\delta^{13}C = -25.4‰$

The wood (*Picea*; identified by R.J. Mott (unpublished GSC Wood Report No. 88-43)) was enclosed in sand, silt and gravel. Sample HHT-88038 was collected on August 15, 1988, from 1007 m from the upstream end of the Mayo section, along Stewart River, about 2 km from Mayo, at an elevation of 492 m.

The sample (61.3 g dry weight) was treated with hot base, hot acid, and distilled water rinses (noncalcareous). The treated sample (39.3 g) yielded 36.63 L of CO_2 gas. The age estimate is based on one count for 6530 minutes in the 5 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were -0.147 ± 0.043, 2.483 ± 0.038, and 102.012 ± 0.477 cpm, respectively.

Comment (T.R. Giles): Three samples of spruce wood were collected from within the thick gravel unit, with several thin silt and sand lenses, underlying the Late Wisconsinan McConnell till. These samples were intended to date the deposition of the preglacial gravel sequence and corroborate a 38.1 ka date on willow (Matthews et al., 1990; GSC-4554, McNeely and McQuaig, 1991). Spruce wood provided nonfinite dates while willow wood yielded finite dates in the high 30 ka range, suggesting that spruce was not present in the region at this time but was reworked from older deposits.

GSC-4472 HP. "Mayo Indian Village Section" (I) >47 000 $\delta^{13}C = -25.5‰$

The wood (*Picea*; identified by H. Jetté (unpublished GSC Wood Report No. 87-20)) was enclosed in till. Sample HH60-34 (1985)-5 was collected by O.L. Hughes on June 17, 1985, from about 2.5 km downstream from Mayo, on the right bank of Stewart River, Yukon Territory (63°36′N, 135°56′W), at an elevation of about 475 m; submitted by O.L. Hughes.

The sample (46.1 g dry weight) was treated with hot base, hot acid, and distilled water rinses (noncalcareous). The age estimate is based on one 3-day count (5140 minutes) in the 5 L counter with a mixing ratio of 1.00.

Comment (T.R. Giles): Several other nonfinite dates have been recorded from spruce wood recovered from similar stratigraphic horizons in this section (GSC-331, Dyck et al., 1966; -3931, and -4436, McNeely, 1989), which indicate that they are reworked debris from older deposits and that little or no spruce existed in this region immediately prior to glaciation.

GSC-5123 HP. "Mayo Indian Village Section" (II) >52 000 $\delta^{13}C = -25.7‰$

The wood (*Picea*; identified by R.J. Mott (unpublished GSC Wood Report No. 88-42)) was enclosed in sands and gravel. Sample HHT-880011 was collected by O.L. Hughes and T.R. Giles on June 26, 1988, from 500 m from upstream end of the "Mayo Indian Village Section" on Stewart River, about 4 km downstream from Mayo, Yukon Territory (63°35′N, 135°57.5′W), at an elevation of 500 m; submitted by O.L. Hughes and T.R. Giles.

The sample (50.0 g dry weight) was treated with hot acid, hot base, and distilled water rinses (noncalcareous). The treated sample (29.0 g) yielded 28.0 L of CO_2 gas. The age estimate is based on one count for 3400 minutes in the 5 L counter with a mixing ratio of. The count rates for the sample (net) and for monthly backgrounds and standards (net) were -0.050 ± 0.035, 2.521 ± 0.023, and 102.618 ± 0.351 cpm, respectively.

Comment (T.R. Giles): This sample of spruce wood was recovered from sand and gravel immediately underlying the till of Late Wisconsinan McConnell Glaciation. A date of 29 640 ± 260 (TO-292, Matthews et al., 1990) was obtained from *Corispermum* seeds lower in the section, and our sample was intended to provide a younger maximum age for glaciation.

GSC-4943. D.W.P. Placer Mine 1020 ± 60 $\delta^{13}C = -23.8‰$

The wood fragments (*Picea*; identified by R.J. Mott (unpublished GSC Wood Report No. 89-51)) were enclosed in interstratified peaty sand and peat. Sample 21689 RC4 was collected by L.E. Jackson, Jr., on June 21, 1989, from D.W.P. Placer Mine, 23 km slightly north of due west of Carmacks, Yukon Territory (62°8.26′N, 136°16.26′W), at an elevation of 1250 m; submitted by L.E. Jackson, Jr.

The sample (9.1 g wet weight) was treated with hot base, hot acid, and distilled water rinses (noncalcareous). The treated sample (3.3 g) yielded 3.18 L of CO_2 gas. The age estimate is based on one count for 3910 minutes in the 2 L counter with a mixing ratio of 1.43. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 15.776 ± 0.084, 1.083 ± 0.019, and 17.862 ± 0.102 cpm, respectively.

The uncorrected age is 1000 ± 60.

Comment (L.E. Jackson, Jr.): The sample was taken below the White River Tephra (1.25 ka) which is contained in a succession of forest floor organic sediments buried by recent placer mine pond sediment.

GSC-4510. Pelly River

uncorrected >41 000

The peat was enclosed in sand. Sample BCW-18887-W2 was collected by B. Ward on August 18, 1987, from the north bank of Pelly River about 20 km downstream (west) from the community of Pelly Crossing, Yukon Territory (62°51′N, 136°50′W), at an elevation of 465 m; submitted by L.E. Jackson, Jr. and B. Ward.

The sample (103.7 g wet weight) was treated with hot base, hot acid, and distilled water rinses (slightly calcareous). The age estimate is based on one 5-day count (7200 minutes) in the 2 L counter with a mixing ratio of 1.00.

Comment (B. Ward): The peat underlies Reid age deposits and are associated with two large composite wedge casts (Ward, 1989). Pollen and macrofossils were poorly preserved. Fine-grained sediments associated with the peat are normally magnetized, suggesting an age <760 ka (Jackson et al., 1990).

Revenue Creek Series

A series of wood samples from Revenue Creek Placer mine, 58 km northwest of Carmacks, Yukon Territory (62°20.33′N, 137°16.36′W), at an elevation of 750 m, were collected by L.E. Jackson, Jr. on July 5, 1989; submitted by L.E. Jackson, Jr.

GSC-4963. Revenue Creek (I) >38 000

$\delta^{13}C = -25.9‰$

The wood sample 050789RC-1 (37.0 g wet weight; *Picea*; identified by H. Jetté (unpublished GSC Wood Report No. 90-12)), enclosed in decomposed peat and silt, was treated with hot base, hot acid, and distilled water rinses (noncalcareous). The treated sample (7.6 g) yielded 7.51 L of CO_2 gas. The age estimate is based on one count for 4000 minutes in the 5 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 0.087 ± 0.039, 2.014 ± 0.032, and 28.290 ± 0.181 cpm, respectively.

GSC-4935. Revenue Creek (II) >40 000

$\delta^{13}C = -25.5‰$

The wood sample 050789RC-2 (62.9 g wet weight; *Picea*; identified by H. Jetté (unpublished GSC Wood Report No. 90-05)), enclosed in angular gravel containing peaty lenses, was treated with hot base, hot acid, and distilled water rinses (noncalcareous). The treated sample (7.5 g) yielded 6.71 L of CO_2 gas. The age estimate is based on one count for 3960 minutes in the 5 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 0.036 ± 0.035, 2.105 ± 0.027, and 28.136 ± 0.132 cpm, respectively.

Comment (L.E. Jackson, Jr.): These dates provide a minimum age for thick peaty gravels, sands, and muck, which were deposited during a period of alluviation prior to the McConnell Glaciation and after the younger pre-Reid Glaciation. The fill caps highly productive placer gravels.

"Caitlin Pond" Series

A series of lake sediment samples were collected by L.E. Cwynar on July 10, 1989, from the headwaters of "Caitlin Pond" (unofficial name), Grand Valley Creek, 2.5 km northeast from summit of Volcano Mountain, Yukon Territory (62°56.7′N, 137°21.3′W), at an elevation of 765 m; submitted by L.E. Jackson, Jr.

GSC-4983. "Caitlin Pond" (I) 7230 ± 100
$\delta^{13}C = -27.7‰$

The lake sediment, silty gyttja, was enclosed in gyttja with a large quartzose silt content. Sample 10789 RC 1 (179.0 g wet weight) was treated with hot acid and distilled water rinses; base treatment was omitted (noncalcareous). The treated sample (112.5 g) yielded 5.38 L of CO_2 gas. The age estimate is based on one count for 3000 minutes in the 2 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 7.273 ± 0.057, 1.013 ± 0.022, and 17.992 ± 0.133 cpm, respectively.

The uncorrected age is 7280 ± 100.

Comment (L.E. Jackson, Jr.): This date provides a minimum age for an extensive eruption of lava and lapilli from the north side of Volcano Mountain. It also dates the base of a pollen core extracted from the bottom sediments of "Caitlin Pond". This date is younger than GSC-4984 although it was obtained at a lower depth. However, the two samples came from closely spaced but separate cores.

GSC-4984. "Caitlin Pond" (II) 7350 ± 90
$\delta^{13}C = -27.8‰$

The lake sediment, gyttja, sample 10789 RC 2 (202.0 g wet weight) was treated with hot acid and distilled water rinses; base treatment was omitted (noncalcareous). The treated sample (113.3 g) yielded 6.20 L of CO_2 gas. The age estimate is based on four counts for 5385 minutes in the 2 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 7.164 ± 0.050, 1.013 ± 0.022, and 17.992 ± 0.133 cpm, respectively.

The uncorrected age is 7400 ± 90.

Comment (L.E. Jackson, Jr.): This date provides a minimum age for an extensive eruption of lava and lapilli from the north side of Volcano Mountain. It also dates the sediments at the base of a pollen core extracted from the bottom of "Caitlin Pond".

GSC-4986. Yandley Placer Mine 470 ± 70
$\delta^{13}C = -25.2‰$

The wood and peat (conifer; identified by R.J. Mott (unpublished GSC Wood Report No. 90-10)) were enclosed in gravel. Sample 040789 RC-2 was collected by L.E. Jackson, Jr. on July 4, 1989, from Yandley Placer Mine on Seymour Creek, 50 km northwest of Carmacks, Yukon Territory (62°17.44′N, 137°11.98′W), at an elevation of 750 m; submitted by L.E. Jackson, Jr.

The sample (9.3 g dry weight) was treated with hot base, hot acid, and distilled water rinses (noncalcareous). The treated sample (8.0 g) yielded 8.33 L of CO_2 gas. The age estimate is based on two counts for 3806 minutes in the 2 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 16.957 ± 0.082, 1.013 ± 0.022, and 17.992 ± 0.133 cpm, respectively.

The uncorrected age is 480 ± 70.

Comment (L.E. Jackson, Jr.): The sample was obtained from a modern forest floor buried by placer mine sediments that were mistaken for natural flood plain sediments.

Donjek River Crossing Series

A series of wood and peat samples from a section in an old quarry near Donjek River Crossing, to the south of bridge on east side of Alaska Highway, Yukon Territory (61°38′N, 139°42′W), at an elevation of 900 m, were collected by G. Holdsworth in September 1988; submitted by G. Holdsworth.

GSC-4955. Donjek River Crossing (I) 1130 ± 120
$\delta^{13}C = -24.3‰$

The wood, sample WRAW-88-DQ-01 (2.6 g dry weight; *Picea* probably; identified by R.J. Mott (unpublished GSC Wood Report No. 89-53)), with ash above and soil-clay below, was treated with hot base, hot acid, and distilled water rinses (noncalcareous). The treated sample (1.3 g) yielded 1.23 L of CO_2 gas. The age estimate is based on two counts for 2000 minutes in the 2 L counter with a mixing ratio of 3.45. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 15.711 ± 0.198, 1.026 ± 0.023, and 18.054 ± 0.143 cpm, respectively.

The uncorrected age is 1120 ± 120.

Comment (G. Holdsworth): The wood is below the upper White River Ash layer and in contact with it. It could have been from a tree killed by ash or could have been from a deadfall predating the eruption. The age of this wood is close to the mean age of 1250 ± 100 (Lerbekmo et al., 1975) for the ash. The sample was collected to obtain more support for the improvement of the age of this ash, which is expected to occur in deep ice (cores) in the St. Elias Mountains.

GSC-4966. Donjek River Crossing (II) — 1900 ± 70; $\delta^{13}C$ = -25.5‰

The peat, sample WRAW-88-DQ-02 (67.1 g dry weight), was treated with cold base, hot acid, and distilled water rinses (noncalcareous). The treated sample (14.7 g) yielded 5.56 L of CO_2 gas. The age estimate is based on two counts for 2000 minutes in the 2 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 14.105 ± 0.089, 1.030 ± 0.018, and 17.892 ± 0.101 cpm, respectively.

The uncorrected age is 1910 ± 70.

Comment (G. Holdsworth): The sample was collected directly below the lower White River Ash layer. It gives a maximum age on the ash layer, because organics would have died before the eruption. A mean age of the lower ash layer (Lerbekmo et al., 1975) is 1887 ± 100. This ash should be preserved in deep ice in the St. Elias Mountains, but no coring has been done to sufficient depths yet.

GSC-4488. McDougall Gold Mine, uncorrected — >38 000

The wood (*Picea*; identified by H. Jetté (unpublished GSC Wood Report No. 87-32)) was enclosed in silt and peat. Sample MRA 7-8-87-8 was collected by J.V. Matthews, Jr. and C.E. Schweger on July 8, 1987, from McDougall Gold Mine, "Sixtymile" district, about 30 km from the Yukon — Alaska border and 5 km from Skyline Highway between Dawson and Chicken (64°1′N, 140°44′W), at an elevation of 730 m; submitted by J.V. Matthews, Jr.

The sample (23.9 g dry weight) was treated with hot base, hot acid, and distilled water rinses (noncalcareous). The age estimate is based on one 4-day count (5760 minutes) in the 2 L counter with a mixing ratio of 1.00.

Northwest Territories

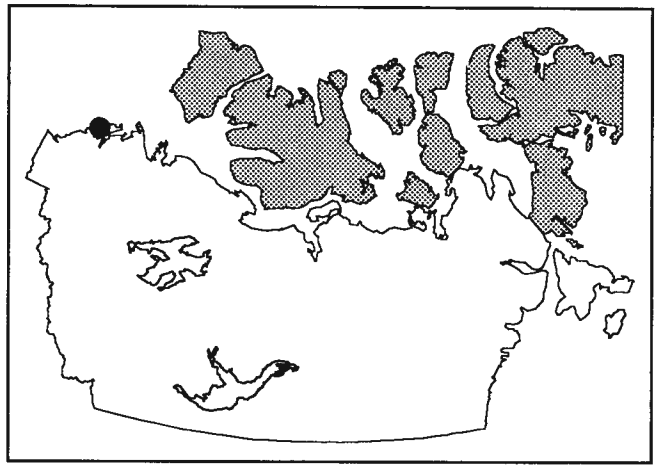

Figure 12. Radiocarbon dated sites on the mainland Northwest Territories.

Tuktoyaktuk Series

A series of lake sediment samples from an unnamed lake about 80 km east-northeast of Tuktoyaktuk, District of Mackenzie, Northwest Territories (69°40′N, 131°10′W), at an elevation of 90 m, were collected by J.C. Ritchie and K. Gajewski on May 11, 1988; submitted by J.C. Ritchie.

GSC-4866. Tuktoyaktuk (I) — 5470 ± 70; $\delta^{13}C$ = -27.6‰

The lake sediment sample SS 1 (113.0 g wet weight), from 92-98 cm below mud-water interface, was treated with hot acid and distilled water rinses; base treatment was omitted (noncalcareous). The treated sample (43.4 g) yielded 6.23 L of CO_2 gas. The age estimate is based on two counts for 2250 minutes in the 5 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 14.402 ± 0.092, 2.109 ± 0.032, and 28.604 ± 0.129 cpm, respectively.

The uncorrected age is 5510 ± 70.

GSC-4873. Tuktoyaktuk (II) — 9840 ± 80; $\delta^{13}C$ = -25.4‰

The lake sediment sample SS 2 (161.1 g wet weight), from 117-123 cm below mud-water interface, was treated with hot acid and distilled water rinses; base treatment was omitted (very calcareous). The treated sample (71.9 g)

yielded 8.10 L of CO_2 gas. The age estimate is based on one count for 5225 minutes in the 5 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 8.385 ± 0.052, 2.151 ± 0.026, and 28.579 ± 0.127 cpm, respectively.

The uncorrected age is 9850 ± 80.

GSC-4910. Tuktoyaktuk (III) 11 300 ± 90
$\delta^{13}C$ = -26.5‰

The lake sediment sample SS 3 (228.0 g wet weight), from 156-164 cm below mud-water interface, was treated with hot acid and distilled water rinses; base treatment was omitted (very calcareous). The treated sample (94.1 g) yielded 7.74 L of CO_2 gas. The age estimate is based on one count for 3928 minutes in the 5 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 6.916 ± 0.053, 2.189 ± 0.023, and 28.283 ± 0.127 cpm, respectively.

The uncorrected age is 11 300 ± 90.

GSC-4914. Tuktoyaktuk (IV) 13 300 ± 120
$\delta^{13}C$ = -26.1‰

The lake sediment sample SS 4 (345.5 g wet weight), from 180-190 cm below mud-water interface, was treated with hot acid and distilled water rinses; base treatment was omitted (very calcareous). The treated sample (105.7 g) yielded 4.17 L of CO_2 gas. The age estimate is based on one count for 3870 minutes in the 2 L counter with a mixing ratio of 1.07. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 3.469 ± 0.040, 1.073 ± 0.016, and 18.101 ± 0.100 cpm, respectively.

The uncorrected age is 13 300 ± 120.

GSC-4905. Tuktoyaktuk (V) 13 800 ± 150
$\delta^{13}C$ = -26.1‰

The lake sediment sample SS 5 (346.2 g wet weight), from 200-210 cm below below pollen-bearing sediment, was treated with hot acid and distilled water rinses; base treatment was omitted (very calcareous). The treated sample (108.3 g) yielded 3.11 L of CO_2 gas. The age estimate is based on one count for 5000 minutes in the 2 L counter with a mixing ratio of 1.42. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 3.204 ± 0.049, 1.086 ± 0.023, and 17.849 ± 0.102 cpm, respectively.

The uncorrected age is 13 800 ± 150.

Laboratory Caveat: Because of the very calcareous nature of this sediment, this date is probably anomalously old (hardwater error).

Comment (J.C. Ritchie): The site was suggested by V. Rampton. It is an elongated lake, part of a small chain running southwards from McKinley Bay, and might have served as a glacial spillway channel. Dates of the deepest organic sediments might have provided useful information relating to deglaciation history. In fact, the oldest date suggests that organic lake sedimentation began less than 15 ka BP. The pollen record, both stratigraphically and chronologically, is typical for sites on the Tuktoyaktuk Peninsula, reported in detail in Ritchie (1984) and in Spear (1983); also see Morisset and Payette (1981).

NORTHERN CANADA, ARCTIC ARCHIPELAGO

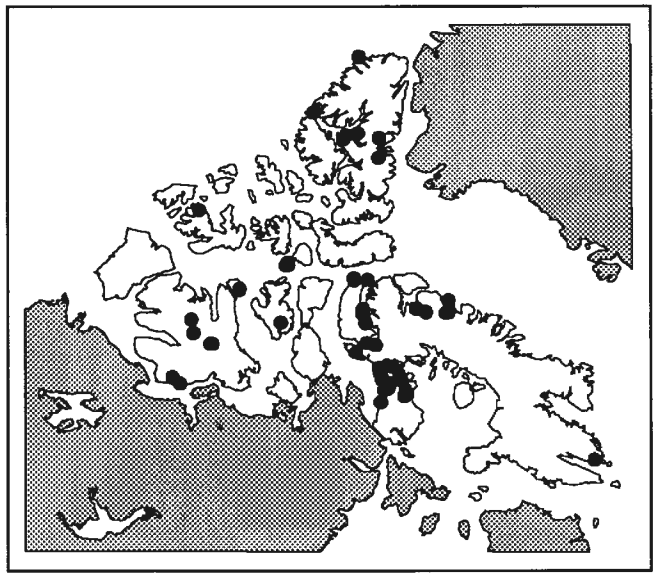

Figure 13. Radiocarbon dated sites in the Arctic Archipelago.

Axel Heiberg Island

GSC-4911. Rens Lake >38 000
$\delta^{13}C$ = +1.1‰

The marine bivalve shells (*Hiatella arctica* and *Astarte*; identified by J. Bednarski) were enclosed in sand. Sample NS.88.37.S was collected by J. Bednarski on July 26, 1988, from 2 km east of Rens Lake, northern Axel Heiberg Island, District of Franklin, Northwest Territories (81°05'N, 92°15'W), at an elevation of 48 m; submitted by J. Bednarski.

The sample (52.0 g dry weight) was treated with an acid leach to remove the outer 30% of the sample. The treated sample (35.9 g) yielded 8.15 L of CO_2 gas. The age estimate is based on two counts for 5080 minutes in the 5 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 0.068 ± 0.042, 2.189 ± 0.023, and 28.283 ± 0.127 cpm, respectively.

Comment (J. Bednarski): This sample was taken from the same site where, in 1961, J. Fyles collected shells that dated 36 600 +3700 -2200 (GSC-139, Dyck and Fyles, 1964). The sample contained some paired valves, which suggests either that parts of Rens Plain may have been either unglaciated during the last glacial stade, or that glacial erosion has been very limited here.

Baffin Island

GSC-4948. Wisell Inlet 10 200 ± 160
$\delta^{13}C = +0.2‰$

The marine shells (*Mya truncata*; identified by G.H. Miller) were enclosed in marine sand within till. Sample M89 BS62 was collected by G.H. Miller and D. Kaufman on August 16, 1989, from Wisell Inlet on the north side of outer Frobisher Bay, southeastern Baffin Island, District of Franklin, Northwest Territories (62°51.2′N, 65°44′W), at an elevation of 65 m; submitted by G.H. Miller.

The sample (14.0 g dry weight) was treated with an acid leach to remove the outer 20% of the sample. The treated sample (11.5 g) yielded 2.60 L of CO_2 gas. The age estimate is based on two counts for 2000 minutes in the 2 L counter with a mixing ratio of 1.75. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 5.066 ± 0.087, 1.026 ± 0.023, and 18.054 ± 0.143 cpm, respectively.

The uncorrected age is 10 200 ± 160.

Comment (G.H. Miller): This date agrees well with numerous others on shells that were incorporated into drift of the Gold Cove readvance (Miller and Kaufman, 1990). The shells lived in outer Frobisher Bay during an ice-free interval immediately preceding the northward advance of Labradorean ice across Hudson Strait and onto southeastern Baffin Island. The shells were found articulated and paired in a block of sand enclosed in carbonate-rich drift just above the local marine limit. The fossiliferous sand was probably transported only a short distance as a coherent, frozen block. The presence of paired shells in drift above the marine limit indicates that such preservation is not unequivocal evidence of a primary marine deposit. This date was published in Miller and Kaufman (1990).

GSC-4585. "The Bastions" 7230 ± 90
$\delta^{13}C = +5.2‰$

The marine mollusc shells (*Macoma calcarea*; identified by J.A. Stravers) were enclosed in deltaic sands. Sample F.V. 87 was collected from lower beds by J.A. Stravers on July 12, 1987, from the south bank of a river, 750 m upstream of Baffin Bay, north of "The Bastions", northern Baffin Island, District of Franklin, Northwest Territories (71°55′N, 74°12.5′W), at an elevation of 15 m; submitted by J.A. Stravers.

The sample (32.2 g dry weight) was treated with an acid leach to remove the outer 20% of the sample. The age estimate is based on two 1-day counts (2230 minutes) in the 2 L counter with a mixing ratio of 1.00.

The uncorrected age is 7150 ± 90.

Aird Point Series

GSC-4539. Aird Point (I) 4740 ± 60
$\delta^{13}C = +2.7‰$

The marine mollusc shells (*Mya truncata*; identified by J.A. Stravers) were enclosed in stratified deltaic sands on a low bedrock shoulder. Sample Aird Point 2 was collected by J.A. Stravers on July 13, 1987, from a stream cut 3.5 km north of Aird Point and 200 m south of shoreline, Cambridge Fiord, northern Baffin Island, District of Franklin, Northwest Territories (71°25′N, 74°43′W), at an elevation of 24 m; submitted by J.A. Stravers.

The sample (44.8 g dry weight) was treated with an acid leach to remove the outer 20% of the sample. The age estimate is based on one 3-day count (4200 minutes) in the 5 L counter with a mixing ratio of 1.00.

The uncorrected age is 4700 ± 60.

GSC-4567. Aird Point (II) 5830 ± 110
$\delta^{13}C = +1.9‰$

The marine mollusc shells (*Mya truncata*; identified by J.A. Stravers) were enclosed in a marine stony mud on a low bedrock shoulder. Sample Aird Point 1A, 1987 was collected by J.A. Stravers on July 13, 1987, from 350 m south of the shoreline protruding into Cambridge Fiord,

3.5 km north of Aird Point, northern Baffin Island, District of Franklin, Northwest Territories (71°25′N, 74°43′W), at an elevation of 44 m; submitted by J.A. Stravers.

The sample (29.7 g dry weight) was treated with an acid leach to remove the outer 20% of the sample. The age estimate is based on two 1-day counts (2050 minutes) in the 2 L counter with a mixing ratio of 1.00.

The uncorrected age is 5800 ± 110.

Omega Bay Series

GSC-4513. Omega Bay (I) 2870 ± 90
$\delta^{13}C = +6.4‰$

The marine mollusc shells (*Mya truncata*; identified by J.A. Stravers) were enclosed in marine stony mud. Sample OB-8-1987 was collected by J.A. Stravers on July 13, 1987, from 30 m southeast of the shoreline at the southern corner of Omega Bay, Cambridge Fiord, northern Baffin Island, District of Franklin, Northwest Territories (71°27′N, 74°56′W), at an elevation of 5 m; submitted by J.A. Stravers.

The sample (38.9 g dry weight) was treated with an acid leach to remove the outer 20% of the sample. The age estimate is based on one 3-day count (4200 minutes) in the 2 L counter with a mixing ratio of 1.00.

The uncorrected age is 2770 ± 90.

GSC-4514. Omega Bay (II) 8810 ± 120
$\delta^{13}C = +0.6‰$

The marine mollusc shells (*Hiatella arctica* and *Macoma*; identified by J.A. Stravers) were enclosed in marine muds. Sample Omega Bay 1987 was collected by J.A. Stravers on July 13, 1987, from a stream cut on the north bank, 2 km upstream from Omega Bay, Cambridge Fiord, northern Baffin Island, District of Franklin, Northwest Territories (71°26.5′N, 74°57′W), at an elevation of 47 m; submitted by J.A. Stravers.

The sample (16.9 g dry weight) was treated with an acid leach to remove the outer 10% of the sample. The age estimate is based on two 1-day counts (2200 minutes) in the 2 L counter with a mixing ratio of 1.50.

The uncorrected age is 8800 ± 120.

GSC-4546. Rannock Arm 7830 ± 100
$\delta^{13}C = +1.4‰$

The marine mollusc shells (*Hiatella arctica*; identified by J.A. Stravers) were enclosed in marine muds. Sample Rannock Arm, Stop 1, 1987 was collected by J.A. Stravers on July 15, 1987, from low bedrock on east side of, and 4.5 km from, the head of Rannock Arm, Cambridge Fiord, northern Baffin Island, District of Franklin, Northwest Territories (71°25.5′N, 75°4′W), at an elevation of 59 m; submitted by J.A. Stravers.

The sample (29.7 g dry weight) was treated with an acid leach to remove the outer 20% of the sample. The age estimate is based on two 1-day counts (2040 minutes) in the 2 L counter with a mixing ratio of 1.00.

The uncorrected age is 7800 ± 100.

GSC-4401. Paquet Bay 6430 ± 100
$\delta^{13}C = +0.5‰$

The marine bivalve shells (*Hiatella arctica*; identified by J.A. Stravers) were enclosed in marine stratified silts. Sample P.B. 15 was collected by J.A. Stravers on July 24, 1986, from 3.5 km southeast of the innermost shore of the east arm of Paquet Bay, Baffin Island, District of Franklin, Northwest Territories (71°43′N, 77°42′W), at an elevation of 58 m; submitted by J.A. Stravers.

The sample (17.0 g dry weight) was treated with an acid leach to remove the outer 10% of the sample. The age estimate is based on two 1-day counts (2150 minutes) in the 2 L counter with a mixing ratio of 1.32.

The uncorrected age is 6420 ± 100.

GSC-4599. Tay Sound 2160 ± 60
$\delta^{13}C = +2.2‰$

The marine mollusc shells (*Mytilus edulis*; identified by J.A. Stravers) were enclosed in sand and shale fragments. Sample Tay Sound 5, 1986 was collected by J.A. Stravers on July 18, 1986, from the north shore of the short peninsula on the inside of the "elbow" in Tay Sound, northern Baffin Island, District of Franklin, Northwest Territories (71°58.5′N, 78°52′W), at an elevation of 7 m; submitted by J.A. Stravers.

The sample (32.6 g dry weight) was treated with an acid leach to remove the outer 20% of the sample. The age estimate is based on two 1-day counts (2390 minutes) in the 2 L counter with a mixing ratio of 1.00.

The uncorrected age is 2120 ± 60.

GSC-4897. Bell Bay 6780 ± 90
$\delta^{13}C = +0.4‰$

The marine shells (*Mya truncata*; identified by J. Hooper and A.S. Dyke) were enclosed in sand. Sample 89-DCA-428 was collected by J. Hooper on July 18, 1989, from 23 km southwest of the head of Bell Bay, northwest Baffin Island, District of Franklin, Northwest Territories (70°45′N, 85°18′W), at an elevation of 69.5 m; submitted by A.S. Dyke.

The sample (27.3 g dry weight) was treated with an acid leach to remove the outer 20% of the sample. The treated sample (21.5 g) yielded 4.37 L of CO_2 gas. The age estimate is based on two counts for 2169 minutes in the 2 L counter with a mixing ratio of 1.03. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 7.790 ± 0.067, 1.073 ± 0.016, and 18.101 ± 0.100 cpm, respectively.

The uncorrected age is 6770 ± 90.

Comment (A.S. Dyke): This in situ shell collection is from a 20 cm thick shell-bearing stratum about 1.5 m below the top of a 5 m high section in laminar deltaic sands. Salt efflorescences were observed along parts of this section. The collection site is 22.5 m below a marine limit delta measured at 92 m a.s.l. The date provides a minimum estimate of the age of marine limit / deglaciation in the Bell Bay — Saputing Lake area.

GSC-4892. Cape Crawford area >35 000
$\delta^{13}C = +1.6‰$

The marine shells (*Hiatella arctica*; identified by A.S. Dyke) were enclosed in stony clay. Sample 89-DCA-237 was collected by A.S. Dyke on August 10, 1989, from 11.8 km southwest of Cape Crawford, east coast of Brodeur Peninsula, northwest Baffin Island, District of Franklin, Northwest Territories (73°39′N, 85°01′W), at an elevation of 0-4 m; submitted by A.S. Dyke.

The sample (28.5 g dry weight) was treated with an acid leach to remove the outer 20% of the sample. The treated sample (23.8 g) yielded 4.83 L of CO_2 gas. The age estimate is based on two counts for 2020 minutes in the 2 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 0.109 ± 0.029, 1.073 ± 0.016, and 18.101 ± 0.100 cpm, respectively.

Comment (A.S. Dyke): This sample consisted mostly of whole valves and some large fragments of unweathered, thick, robust *Hiatella arctica* collected from a small, fresh debris flow of very stony clay (glaciomarine sediment). The stony clay had moved down over a low rock cliff to rest on the modern beach. The in situ stony clay overlies a rock platform 6 m above the active beach. The platform can be traced along a 50 km stretch of the northern Brodeur Peninsula coast. It occurs as well along the north coast of Borden Peninsula and is perhaps best expressed along the north coast of Bylot Island (D.A. Hodgson, personal communication, 1992). The lip of the platform on northern Baffin Island is, in most places, close to 6 m above sea level, suggestive of a Sangamonian age. However, this platform rises inland over a distance of about 1 km to a sharp inner limit at about 40 m. This inner limit is not well exposed on northern Brodeur and Borden peninsulas where it was covered by a variable thickness of younger glacial and glaciomarine sediment but is clearly exposed on northwest Bylot Island. Near Stanley Point on northern Brodeur Peninsula the platform is striated by north-flowing Brodeur Ice Cap and it lies entirely below the limit of postglacial (Holocene) marine submergence. Near the mouth of Navy Board Inlet, on both Borden Peninsula and Bylot Island, the platform is overlain by drift, including lateral moraines and ice-contact marine limit deltas deposited by a large Laurentide outlet glacier that extended to the mouth of the inlet. Thus it is a major regional feature whose geomorphological expression is unparalleled elsewhere in the Arctic Islands.

GSC-4892 would seem to provide a minimum limiting age on this major marine platform but otherwise its age, origin, and significance remain poorly understood. At the site of GSC-4892, the stony glaciomarine clay is 1-3 m thick and contains numerous well striated stones. There is no till above it, but it is overlain by Holocene beach gravel. Shells from similar sediment at Stanley Point, also resting on this platform, dated 9780 ± 90 (GSC-4694; McNeely and Jorgensen, 1992). It seems that at least two generations of glaciomarine sediment rest on the platform.

GSC-4889. Cape Crawford area 9610 ± 100
$\delta^{13}C = +1.4‰$

The marine shells (*Hiatella arctica*; identified by A.S. Dyke) were enclosed in stony silt. Sample 89-DCA-236 was collected by A.S. Dyke on August 8, 1989, from 15.3 km southwest of Cape Crawford, east coast of Brodeur Peninsula, northwest Baffin Island, District of Franklin, Northwest Territories (73°38′N, 85°7.5′W), at an elevation of 40-50 m; submitted by A.S. Dyke.

The sample (21.2 g dry weight) was treated with an acid leach to remove the outer 20% of the sample. The treated sample (16.9 g) yielded 3.61 L of CO_2 gas. The age

estimate is based on one count for 3928 minutes in the 2 L counter with a mixing ratio of 1.23. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 5.487 ± 0.050, 1.073 ± 0.016, and 18.101 ± 0.100 cpm, respectively.

The uncorrected age is 9590 ± 100.

Comment (A.S. Dyke): The shells were collected from actively slumping areas of an old stream-cut face in a raised delta, whose lip at 55 m, records local marine limit for this site near the mouth of Admiralty Inlet. The fan-delta was deposited by meltwater issuing from the retreating Brodeur Ice Cap, and the date is in good agreement with other dates on deglaciation from similar settings (see GSC-4879). The shells were variously preserved, mostly fragmented. Sample submitted for dating consisted of the largest and cleanest pieces after removing the exterior parts by cavitron.

Compton (1964) studied this area and reported raised marine features well above this delta. His 200-240 m delta is clearly on an ice contact lateral kame terrace formed by a lobe of Brodeur Ice Cap and the area he mapped as 210-268 m strandlines has no features that I recognize as strandlines. It is a moderately steep till-covered slope (cf. his Fig. 2), the upper limit of which is nearly horizontal.

GSC-4894. Berlinguet Inlet 7260 ± 100
$\delta^{13}C = +1.0‰$

The marine shells (*Hiatella arctica*; identified by J. Hooper and A.S. Dyke) were enclosed in sand. Sample 89-DCA-526 was collected by J. Hooper on August 11, 1989, from 16 km southeast of the head of Berlinguet Inlet, 9 km south of the south coast, northwest Baffin Island, District of Franklin, Northwest Territories (70°54′N, 86°27′W), at an elevation of 73.5 m; submitted by A.S. Dyke.

The sample (22.8 g dry weight) was treated with an acid leach to remove the outer 10% of the sample. The treated sample (19.6 g) yielded 4.33 L of CO_2 gas. The age estimate is based on three counts for 3030 minutes in the 2 L counter with a mixing ratio of 1.04. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 7.351 ± 0.068, 1.073 ± 0.016, and 18.101 ± 0.100 cpm, respectively.

The uncorrected age is 7240 ± 100.

Comment (J. Hooper): These fragments and whole valves were collected from the surface of a colluviated section in marine sands. The area of sands flanks a marine limit delta 2.5 m above the sample site at an elevation of 76.0 m a.s.l. The date provides a minimum age on marine limit / deglaciation for the western part of Berlinguet Inlet.

GSC-4886. Tikiraq River area 8050 ± 90
$\delta^{13}C = +1.2‰$

The marine shells (*Hiatella arctica*; identified by A.S. Dyke) were on a silty surface. Sample 89-DCA-58 was collected by A.S. Dyke on July 17, 1989, from 11.3 km northwest of the mouth of Tikiraq River, east coast of Brodeur Peninsula, northwest Baffin Island, District of Franklin, Northwest Territories (71°46.5′N, 86°13′W), at an elevation of 78 m; submitted by A.S. Dyke.

The sample (27.4 g dry weight) was treated with an acid leach to remove the outer 20% of the sample. The treated sample (22.2 g) yielded 4.97 L of CO_2 gas. The age estimate is based on one count for 3810 minutes in the 2 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 6.570 ± 0.050, 1.086 ± 0.023, and 17.849 ± 0.102 cpm, respectively.

The uncorrected age is 8030 ± 90.

Comment (A.S. Dyke): This collection, predominantly thin, juvenile *Hiatella arctica* with minor *Mya truncata* and *Clinocardium ciliatum*, come from the wind eroded-surface of stony glaciomarine silt occupying a small basin defined by the marine limit delta terrace at 95 m to the west and a moraine ridge to the east. Shells are exceedingly sparse in this deposit and entirely absent in most occurrences. The sample provides a closely limiting minimum age for the marine limit delta and for retreat of the Admiralty Lobe of Laurentide ice. The site is 10 km south of GSC-4888.

GSC-4888. Tikiraq River area 8060 ± 70
$\delta^{13}C = +1.3‰$

The marine shells (*Mya truncata*; identified by A.S. Dyke) were enclosed in sand. Sample 89-DCA-81 was collected by A.S. Dyke on July 20, 1989, from 18 km northwest of the mouth of Tikiraq River, east coast of Brodeur Peninsula, northwest Baffin Island, District of Franklin, Northwest Territories (71°51′N, 86°18′W), at an elevation of 90 m; submitted by A.S. Dyke.

The sample (30.4 g dry weight) was treated with an acid leach to remove the outer 5% of the sample. The treated sample (27.2 g) yielded 6.20 L of CO_2 gas. The age estimate is based on one count for 3890 minutes in the 5 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 10.395 ± 0.061, 2.189 ± 0.023, and 28.283 ± 0.127 cpm, respectively.

The uncorrected age is 8040 ± 70.

Comment (A.S. Dyke): These shells were collected from foreset sands of a glaciomarine delta marking marine limit at 95 m. The sample was collected directly below the marine limit terrace and provides a direct date on marine limit and on deglaciation. The delta was deposited along the ice front of the retreating Admiralty Lobe of Laurentide ice. The site is 40 km south of GSC-4887 and 62 km south of GSC-4878. Thus 62 km of retreat occurred in about 1 ka.

The collection includes *Hiatella arctica* and *Mya truncata* (dominant) with minor *Clinocardium ciliatum*, *Seripes groenlandicum*, and *Astarte* (or *Macoma*).

GSC-4887. Tiriganialaag River 8870 ± 100
$\delta^{13}C = +1.6‰$

The marine shells (*Hiatella arctica*; identified by A.S. Dyke) were on a gravel surface. Sample 89-DCA-145 was collected by A.S. Dyke on July 27, 1989, from 3.5 km northwest of the mouth of Tiriganialaag River, east coast of Brodeur Peninsula, northwest Baffin Island, District of Franklin, Northwest Territories (72°12.5′N, 86°29′W), at an elevation of 80-85 m; submitted by A.S. Dyke.

The sample (27.5 g dry weight) was treated with an acid leach to remove the outer 20% of the sample. The treated sample (22.7 g) yielded 4.83 L of CO_2 gas. The age estimate is based on two counts for 2001 minutes in the 2 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 6.021 ± 0.062, 1.073 ± 0.016, and 18.101 ± 0.100 cpm, respectively.

The uncorrected age is 8840 ± 100.

Comment (A.S. Dyke): This sample, dominated by *Hiatella arctica* with *Mya truncata* and a few *Astarte* (or *Macoma*), was collected around the shore of a small lake that occupies part of the floor of a kettle developed in prodeltaic stony silt (glaciomarine sediment) a few hundred metres in front of a marine limit delta terrace at 98 m elevation. The delta was formed by lateral meltwater during retreat of the Admiralty Lobe of Laurentide ice. GSC-4887 is a very close minimum limiting date on marine limit and on deglaciation. The site is 22 km proximal to GSC-4878, giving a retreat rate of about 10 km per century.

GSC-4878. Kuuruluk River 9080 ± 100
$\delta^{13}C = +1.5‰$

The marine shells (*Mya truncata*; identified by A.S. Dyke) were enclosed in sand. Sample 89-DCA-217 was collected by A.S. Dyke on August 3, 1989, from 4 km southwest of the mouth of Kuuruluk River, east coast of Brodeur Peninsula, northwest Baffin Island, District of Franklin, Northwest Territories (72°24.5′N, 86°18′W), at an elevation of 92-98 m; submitted by A.S. Dyke.

The sample (30.6 g dry weight) was treated with an acid leach to remove the outer 20% of the sample. The treated sample (24.4 g) yielded 5.59 L of CO_2 gas. The age estimate is based on one count for 4000 minutes in the 5 L counter with a mixing ratio of 1.22. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 9.117 ± 0.072, 2.161 ± 0.033, and 28.156 ± 0.180 cpm, respectively.

The uncorrected age is 9060 ± 100.

Comment (A.S. Dyke): This sample consisted mostly of whole valves of *Hiatella arctica* and *Mya truncata* collected from sand comprising either a thick beach or thin delta deposit extending to 98 m elevation a few hundred metres downslope from the local marine limit beach/washing limit at 106 m. Thus, it is a closely limiting minimum age of deglaciation. This site was deglaciated during the retreat of the Admiralty Lobe of the Laurentide Ice Sheet, which, at its maximum, coalesced with local ice caps on both Brodeur and Borden peninsulas. This site is 15 km proximal to the outermost Laurentide lateral moraine along the west side of Admiralty Inlet that can as yet be definitively assigned a Late Wisconsinan age. Successive farther southward retreat of the Admiralty Lobe is dated by GSC-4887, -4888, and -4886.

Cape York area Series

GSC-4880. Cape York area (I) 9120 ± 90
$\delta^{13}C = +1.3‰$

The marine shells (*Hiatella arctica*; identified by A.S. Dyke) were enclosed in stony clay. Sample 89-DCA-38 was collected by A.S. Dyke on July 14, 1989, from 3.3 km southeast of Cape York, north coast of Brodeur Peninsula, northwest Baffin Island, District of Franklin, Northwest Territories (73°47′N, 86°59′W), at an elevation of 20-28 m; submitted by A.S. Dyke.

The sample (30.8 g dry weight) was treated with an acid leach to remove the outer 20% of the sample. The treated sample (24.9 g) yielded 5.54 L of CO_2 gas. The age estimate is based on one count for 3810 minutes in the 5 L counter with a mixing ratio of 1.15. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 9.078 ± 0.070, 2.161 ± 0.033, and 28.156 ± 0.180 cpm, respectively.

The uncorrected age is 9090 ± 90.

GSC-5233. Cape York area (II)
uncorrected 9260 ± 130

The marine shells (*Hiatella arctica*; identified by A.S. Dyke) were enclosed in surface collection on pebbly silt. Sample CD 49/63 was collected by B.G. Craig on July 16, 1963, from 6.2 km southeast of Cape York, Brodeur Peninsula, Baffin Island, District of Franklin, Northwest Territories (73°46.5′N, 86°55′W), at an elevation of 41 m; submitted by A.S. Dyke.

The sample (12.4 g dry weight) was treated with an acid leach to remove the outer 10% of the sample. The treated sample (11.3 g) yielded 2.43 L of CO_2 gas. The age estimate is based on one count for 3970 minutes in the 2 L counter with a mixing ratio of 1.84. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 5.809 ± 0.079, 1.110 ± 0.028, and 18.388 ± 0.133 cpm, respectively.

S-3138. Cape York area (III)
uncorrected 8820 ± 130

The whale bone (*Balaena mysticetus*; identified by A.S. Dyke) was enclosed in gravel. Sample 89-DCA-28 was collected by A.S. Dyke on July 11, 1989, from 4.2 km southwest of Cape York, north coast of Brodeur Peninsula, northwest Baffin Island, District of Franklin, Northwest Territories (73°47.5′N, 87°08′W), at an elevation of 54 m; submitted by A.S. Dyke.

Comment (A.S. Dyke): GSC-4880 was collected from very fossiliferous stony clay below 1-3 m of gravelly fine sand forming a prominent terrace at 30 m elevation. The gravelly sand is thought to be a beach sediment formed by wave erosion of the stony glaciomarine clay, which underlies most of the broad valley mouth at Cape York. The stones in the clay are up to 1 m in diameter and are commonly heavily striated. They are dominantly granite and gneiss, which contrasts with the low proportion (less than 1%) of the lithologies in the regional till formed by the Brodeur Ice Cap during the Late Wisconsinan. The highest marine sediment in the vicinity is at 73 m. Shells in the sediment are dominantly *Hiatella arctica* and *Mya truncata* but a few fragments of *Balanus* sp. and some *Astarte borealis* occur as well.

The nature of the enclosing sediment indicated ice proximal glaciomarine sedimentation from a calving glacier in Lancaster Sound or Prince Regent Inlet. The Brodeur Ice Cap could not have supplied the abundant Precambrian Shield erratics.

The shells in GSC-4880 are at least 400 and likely about 700 years younger than the 73 m marine limit (see GSC-4879, and GSC-4694; McNeely and Jorgensen, 1992). Furthermore, Prince Regent Inlet was probably free of Laurentide Ice by 9.1 ka BP (Dyke, 1984). Hence, the dropstone (erratic) rich glaciomarine sediment was likely deposited from icebergs hundreds of kilometres beyond any calving Laurentide ice front upglacier from the site. Alternatively, a calving ice front in southern Admiralty Inlet or along eastern Devon Island may have supplied the Precambrian erratics.

GSC-4880 provides a minimum date on a 30 m relative sea level. A date of 8820 ± 130 on a Bowhead whale earbone from a nearby site at 54 m (S-3138) suggests that the shells were deposited in water more than 22 m deep.

Another collection of shells from these stony clays at 41 m dated 9260 ± 130 (GSC-5233).

Several other Bowhead whale remains have been dated from this site. Collectively, the dates indicate that relative sea level fell to present at about 6.0 ka BP and then fell somewhat lower before recovering to its present level.

GSC-4982. Cape York area (IV) 800 ± 50
$\delta^{13}C = -25.1‰$

The wood, driftwood (*Picea*; identified by H. Jetté (unpublished GSC Wood Report No. 90-19)) was on a gravel surface. Sample 89-DCA-22 was collected by A.S. Dyke on July 11, 1989, from 2.6 km southwest of Cape York, north coast of Brodeur Peninsula, northwest Baffin Island, District of Franklin, Northwest Territories (73°47.5′N, 87°04′W), at an elevation of 16.5 m; submitted by A.S. Dyke.

The sample (11.7 g dry weight) was treated with hot base, hot acid, and distilled water rinses (noncalcareous). The treated sample (8.1 g) yielded 7.90 L of CO_2 gas. The age estimate is based on one count for 3000 minutes in the 5 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 25.459 ± 0.101, 2.079 ± 0.032, and 28.127 ± 0.134 cpm, respectively.

The uncorrected age is 800 ± 50.

Comment (A.S. Dyke): Driftwood is exceedingly rare on northwestern Baffin Island in comparison to on islands to the west and north (Dyke and Morris, 1990). This sample is the only wood found above the modern beach along the Lancaster Sound and Price Regent Inlet coasts of Baffin Island. The sample (a piece 40 × 10 × 5 cm) was collected from the surface of raised beach gravel and was dated in

hope of establishing the age of the beach, even though surface samples elsewhere sometimes turn out to be too young for their elevation because of movement by man (Dyke et al., 1991). The age of this wood demonstrates movement and has no significance regarding relative sea level history.

GSC-4879. Cape York area (V) 9500 ± 110
$\delta^{13}C = +1.1‰$

The marine shells (*Hiatella arctica*; identified by A.S. Dyke) were enclosed in sand. Sample 89-DCA-37 was collected by A.S. Dyke on July 13, 1989, from 10.2 km south of Cape York, north coast of Brodeur Peninsula, northwest Baffin Island, District of Franklin, Northwest Territories (73°43′N, 87°01′W), at an elevation of 50-55 m; submitted by A.S. Dyke.

The sample (30.7 g dry weight) was treated with an acid leach to remove the outer 20% of the sample. The treated sample (25.2 g) yielded 5.59 L of CO_2 gas. The age estimate is based on two counts for 2060 minutes in the 2 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 5.482 ± 0.061, 1.086 ± 0.023, and 17.849 ± 0.102 cpm, respectively.

The uncorrected age is 9480 ± 110.

Comment (A.S. Dyke): This sample was collected from a fresh stream-cut face and from shells concentrated in the bed of a gully incised into the marine-limit terrace of an estuarine delta at 62 m elevation. The shells come from horizontally bedded, thinly laminated fine sand with dropstones overlain by a thin cap of topset gravel. The site is at the upstream end of the raised delta, 10 km inland from the open coast, where marine limit appears to be at 73 m. The decline in marine limit upvalley records rebound during deglaciation. The sample consisted entirely of whole valves of *Hiatella arctica* that were thick and clean. Eight valves were submitted for dating.

Shells from an outer coastal site of Stanley Point 55 km to the east dated 9780 ± 90 (GSC-4694; McNeely and Jorgensen, 1992). These shells provide the first date on deglaciation and marine limit along the south side of Lancaster Sound.

GSC-4898. Mathe Point 8950 ± 120
$\delta^{13}C = +2.4‰$

The marine shells (*Mya truncata* and *Hiatella arctica*; identified by A.S. Dyke) were enclosed in stony silt. Sample 89-DCA-416 was collected by J. Hooper on July 13, 1989, from 25 km northeast of Mathe Point, northwest Baffin Island, District of Franklin, Northwest Territories (70°33′N, 88°00′W), at an elevation of 65 m; submitted by A.S. Dyke.

The sample (16.6 g dry weight) was treated with an acid leach to remove the outer 10% of the sample. The treated sample (15.0 g) yielded 3.23 L of CO_2 gas. The age estimate is based on two counts for 2050 minutes in the 2 L counter with a mixing ratio of 1.40. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 5.970 ± 0.075, 1.073 ± 0.016, and 18.101 ± 0.100 cpm, respectively.

The uncorrected age is 8910 ± 120.

Comment (A.S. Dyke): This sample is a surface collection of fragments and whole valves from the top of a kame north of Kimakto Peninsula. The date provides a minimum age on marine limit and deglaciation of this part of the Baffin Island coast. The elevation of the local marine limit was not measured in the vicinity of this shell collection because of a lack of marine limit features.

Ellesmere Island

GSC-4559. Ward Hunt Ice Shelf 8850 ± 80
$\delta^{13}C = -22.5‰$

The wood, driftwood (*Picea*; identified by H. Jetté (unpublished GSC Wood Report No. 88-6)) was enclosed in beach gravel. Sample NCPL87-D10 was collected by D. Lemmen on July 15, 1987, from behind the Ward Hunt Ice Shelf, on the north coast of Marvin Peninsula, east of Cape Discovery Ice Rise, Ellesmere Island, District of Franklin, Northwest Territories (83°3′N, 75°56′W), at an elevation of 0.5 m; submitted by J. England.

The sample (22.0 g wet weight) was treated with hot base, hot acid, and distilled water rinses (noncalcareous). The age estimate is based on two 1-day counts (2650 minutes) in the 5 L counter with a mixing ratio of 1.00.

The uncorrected age is 8810 ± 80.

GSC-4581. Canon Fiord 6620 ± 150
$\delta^{13}C = +2.5‰$

The marine shells (*Mya truncata* and *Portlandia arctica*; identified by J. England) were enclosed in marine silt. Sample CF-5-S-87 was collected by J. England on June 22, 1987, from south-central valley, east of outlet glacier from Agassiz Ice Cap to outer east coast of Canon Fiord,

Ellesmere Island, District of Franklin, Northwest Territories (79°58′30″N, 81°36′W), at an elevation of 34.2 m; submitted by J. England.

The sample (9.4 g dry weight) was treated with an acid leach to remove the outer 10% of the sample. The age estimate is based on two 1-day counts (2230 minutes) in the 2 L counter with a mixing ratio of 2.55.

The uncorrected age is 6580 ± 150.

GSC-4876. Parrish Glacier 6490 ± 90
$\delta^{13}C = +1.4‰$

The marine pelecypod shells (*Hiatella arctica*; identified by W. Blake, Jr.) were enclosed in silt and fine sand. Sample 89-BS-24 was collected by W. Blake, Jr. and K. Collins on May 25, 1989, from about 2.5 km north of the front of Parrish Glacier, in innermost Copes Bay, Ellesmere Island, District of Franklin, Northwest Territories (79°34.1′N, 77°4.0′W), at an elevation of 50 m; submitted by W. Blake, Jr.

The sample (28.9 g dry weight) was treated with an acid leach to remove the outer 20% of the sample. The treated sample (22.9 g) yielded 4.99 L of CO_2 gas. The age estimate is based on two counts for 2070 minutes in the 2 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 7.980 ± 0.070, 1.086 ± 0.023, and 17.849 ± 0.102 cpm, respectively.

The uncorrected age is 6470 ± 90.

Comment (W. Blake, Jr.): The date indicates that the innermost of Copes Bay was ice-free by 6500 years ago. At that time the front of Parrish Glacier was more than 2.5 km behind the position it occupied in 1959.

GSC-4502. Jokel Fiord 90 ± 60
$\delta^{13}C = -24.7‰$

The wood (*Salix* sp.; identified by R.J. Mott (unpublished GSC Wood Report No. 87-34)) was a surface sample. Sample 87-BS-40 was collected by W. Blake, Jr. on August 21, 1987, from about 4.5 km southwest of the head of Jokel Fiord, Ellesmere Island, Northwest Territories (78°45.0′N, 78°24.5′W), at an elevation of about 165 m; submitted by W. Blake, Jr.

The sample (10.6 g dry weight) was treated with hot base, hot acid, and distilled water rinses (noncalcareous). The age estimate is based on one 1-day count (1070 minutes) in the 5 L counter with a mixing ratio of 1.00.

The uncorrected age is 80 ± 60.

Comment (W. Blake, Jr.): This determination provides a minimum age for the medial moraine on which the wood sample was collected.

GSC-5067. "Global Change" camp >37 000
$\delta^{13}C = -27.1‰$

The peat (including *Salix*; identified by R.J. Mott (unpublished GSC Wood Report No. 90-31)) was enclosed in sand. Sample SV 90-2 was collected by D.A. St-Onge on July 3, 1990, from 2.5 km north of "Global Change" camp, east side of Hot Weather Creek, Fosheim Peninsula, Ellesmere Island, District of Franklin, Northwest Territories (79°59′N, 84°25′W), at an unknown elevation about 2 m below surface; submitted by D.A. St-Onge.

The sample (89 g dry weight) was treated with hot base, hot acid, and distilled water rinses (noncalcareous). The treated sample (14.1 g) yielded 7.57 L of CO_2 gas. The age estimate is based on three counts for 3800 minutes in the 5 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 0.055 ± 0.052, 2.047 ± 0.042, and 28.236 ± 0.193 cpm, respectively.

GSC-5067 (2L). "Global Change" camp >37 000
$\delta^{13}C = -27.1‰$

A second count was made in the 2 L counter. The age estimate is based on three counts for 4070 minutes in the 2 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 0.035 ± 0.033, 1.029 ± 0.028, and 18.121 ± 0.154 cpm, respectively.

Comment (D.A. St-Onge): This material does not date a Holocene terrace as was assumed in the field. The twigs show no evidence of transport (i.e., rounded edges) so the organic debris may be part of an older sediment that post-dates the Eureka Sound Formation and is older than 37.0 ka. This accessible site requires further study.

GSC-4838. Hot Weather Creek area 4050 ± 60
$\delta^{13}C = -29.5‰$

The peat, sample EJ-88-127C, was collected by S.A. Edlund on July 30, 1988, from 25 km east of Eureka,

about 2.5 km north of Slidre River and 0.25 km east Hot Weather Creek, Ellesmere Island, District of Franklin, Northwest Territories (79°58′N, 84°28′W), at an elevation of 84 feet m; submitted by S.A. Edlund.

The sample (181.8 g wet weight) was treated with hot base, hot acid, and distilled water rinses (noncalcareous). The treated sample (12.6 g) yielded 8.15 L of CO_2 gas. The age estimate is based on one count for 3740 minutes in the 5 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 16.992 ± 0.083, 2.127 ± 0.043, and 28.373 ± 0.167 cpm, respectively.

The uncorrected age is 4120 ± 60.

GSC-4822. Hot Weather Creek area 4820 ± 70
$\delta^{13}C = -27.9‰$

The peat had silt and sand above and peaty organics below. Sample EJ-88-128A was collected by S.A. Edlund on July 30, 1988, from edge of bluff above a tributary joining in to Hot Weather Creek, 3 km north of Slidre River and 25 km east of Eureka, Ellesmere Island, District of Franklin, Northwest Territories (79°59′N, 84°29′W), at an elevation of 114 m; submitted by S.A. Edlund.

The sample (430.5 g wet weight) was treated with hot base, hot acid, and distilled water rinses (slightly calcareous). The treated sample (14.0 g) yielded 8.35 L of CO_2 gas. The age estimate is based on one count for 2535 minutes in the 5 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 15.482 ± 0.094, 2.127 ± 0.043, and 28.373 ± 0.167 cpm, respectively.

The uncorrected age is 4870 ± 70.

GSC-5066. "Global Change" camp 7940 ± 90
$\delta^{13}C = -27.3‰$

The basal peat, sample SV 90-1, was collected by D.A. St-Onge on July 2, 1990, from 4.5 km south-southwest of "Global Change" camp, Hot Weather Creek, Fosheim Peninsula, Ellesmere Island, District of Franklin, Northwest Territories (79°56′N, 84°32′W), at an unknown elevation; submitted by D.A. St-Onge.

The sample (440.3 g wet weight) was treated with hot base, hot acid, and distilled water rinses (noncalcareous). The treated sample (74.3 g) yielded 10.20 L of CO_2 gas. The age estimate is based on one count for 3970 minutes in the 5 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 10.462 ± 0.070, 2.047 ± 0.042, and 28.236 ± 0.193 cpm, respectively.

The uncorrected age is 7980 ± 90.

GSC-5066 (2L). "Global Change" camp 7910 ± 120
$\delta^{13}C = -27.3‰$

A second count was made in the 2 L counter. The age estimate is based on two counts for 1680 minutes in the 2 L counter. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 6.729 ± 0.073, 1.020 ± 0.024, and 18.094 ± 0.144 cpm, respectively.

The uncorrected age is 7950 ± 120.

Comment (D.A. St-Onge): Given the thickness (2.85 m) and quality of the peat deposit, an age of about 8 ka means that it has the potential for yielding valuable paleoenvironmental information for the "Global Change Observatory" in the Hot Weather Creek area. It should now be a priority to obtain a date from the top of the deposits to determine the time that is bracketed by this deposit.

GSC-4957. Romulus Lake 8230 ± 80
$\delta^{13}C = +2.1‰$

The marine shells (*Mya truncata*; identified by T. Bell) were enclosed in stony silt. Sample RL-14-S-8915 was collected by T. Bell on August 15, 1989, from 3 km west south-west of Romulus Lake, Ellesmere Island, District of Franklin, Northwest Territories (79°51′N, 85°17′W), at an elevation of 110 m; submitted by T. Bell.

The sample (52.0 g dry weight) was treated with an acid leach to remove the outer 20% of the sample. The treated sample (41.4 g) yielded 9.18 L of CO_2 gas. The age estimate is based on one count for 3550 minutes in the 5 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 10.224 ± 0.066, 2.074 ± 0.030, and 28.375 ± 0.130 cpm, respectively.

The uncorrected age is 8200 ± 80.

Comment (T. Bell): This sample consists of paired and fragmented shells collected from stony marine silt that drapes the distal slope of a large moraine on western Fosheim Peninsula. It provides a minimum date on construction of the moraine which is considered to be pre-last glacial in age (Bell, 1992), and demonstrates that relative sea level was between 110 m (sample elevation) and 145 m (local marine limit) above present at 8.2 ka BP.

Lowther Island

Lowther Island Series

A series of driftwood and a shell sample was collected by A.S. Dyke between July 5 and 8, 1989, from Lowther Island, District of Franklin, Northwest Territories; submitted by A.S. Dyke.

GSC-4976. Lowther Island (I) 430 ± 50
$\delta^{13}C = -23.2‰$

The driftwood (*Picea*; identified by H. Jetté (unpublished GSC Wood Report No. 90-16)) was enclosed in gravel. Sample 89-DCA-6 (10.0 g dry weight), collected at an elevation of 2.5-3.0 m, (74°35.4′N, 97°32.7′W), was treated with hot base, hot acid, and distilled water rinses (noncalcareous). The treated sample (7.6 g) yielded 7.13 L of CO_2 gas. The age estimate is based on two counts for 2010 minutes in the 5 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 26.995 ± 0.124, 2.074 ± 0.030, and 28.375 ± 0.130 cpm, respectively.

The uncorrected age is 400 ± 50.

Comment (A.S. Dyke): See GSC-4841, for comments on other driftwood dates from raised beaches on Lowther Island. GSC-4976 and higher-dated samples suggest that the 1 ka shoreline on this island is at 3-4 m and that the present rate of emergence here is about 35 cm per century.

S-3134. Lowther Island (II)
uncorrected 1510 ± 80

The whale ear bone (*Balaena mysticetus*; identified by A.S. Dyke) was enclosed in gravel. Sample 89-DCA-10 (74°35.8′N, 97°30.2′W) was collected at an elevation of 4.5 m.

GSC-4981. Lowther Island (III) 2120 ± 60
$\delta^{13}C = -23.6‰$

The driftwood (*Picea*; identified by H. Jetté (unpublished GSC Wood Report No. 90-18)) was on gravel surface. Sample 89-DCA-16 (10.0 g dry weight), collected at an elevation of 7.5 m, (74°29.4′N, 97°46′W), was treated with hot base, hot acid, and distilled water rinses (noncalcareous). The treated sample (9.3 g) yielded 9.18 L of CO_2 gas. The age estimate is based on two counts for 2010 minutes in the 5 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 21.671 ± 0.113, 2.079 ± 0.032, and 28.127 ± 0.134 cpm, respectively.

The uncorrected age is 2100 ± 60.

Comment (A.S. Dyke): GSC-4981, along with higher- and lower-dated samples, fixes the elevation of the 2 ka shoreline on this island at 7 m.

GSC-4971. Lowther Island (IV) 2340 ± 60
$\delta^{13}C = -24.7‰$

The driftwood (*Picea*; identified by R.J. Mott (unpublished GSC Wood Report No. 90-2)) was on gravel. Sample 89-DCA-1 (14.7 g dry weight), collected at an elevation of 10 m, (74°30.9′N, 97°25.5′W), was treated with hot base, hot acid, and distilled water rinses (noncalcareous). The treated sample (7.9 g) yielded 7.91 L of CO_2 gas. The age estimate is based on two counts for 2000 minutes in the 5 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 21.231 ± 0.112, 2.074 ± 0.030, and 28.375 ± 0.130 cpm, respectively.

The uncorrected age is 2330 ± 60.

Comment (A.S. Dyke): GSC-4971 and GSC-4977 fix the elevation of the 3 ka shoreline on this island at 11-12 m.

GSC-4977. Lowther Island (V) 3540 ± 60
$\delta^{13}C = -24.8‰$

The driftwood (*Picea*; identified by H. Jetté (unpublished GSC Wood Report No. 90-17)) was on a gravel surface. Sample 89-DCA-11 (11.1 g dry weight), collected at an elevation of 14.5 m, (74°36.7′N, 97°30.5′W), was treated with hot base, hot acid, and distilled water rinses (noncalcareous). The treated sample (7.7 g) yielded 7.44 L of CO_2 gas. The age estimate is based on two counts for 2000 minutes in the 5 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 18.266 ± 0.105, 2.074 ± 0.030, and 28.375 ± 0.130 cpm, respectively.

The uncorrected age is 3540 ± 60.

Comment (A.S. Dyke): GSC-4977, along with higher- and lower-dated samples, fixes the elevation of the 4 ka shoreline on this island at 18 ± 1 m.

GSC-4956. Lowther Island (VI) 4620 ± 80
$\delta^{13}C = -24.1‰$

The driftwood (*Picea*; identified by H. Jetté (unpublished GSC Wood Report No. 90-13)) was on a gravel surface. Sample 89-DCA-7 (13.1 g dry weight), collected at an

elevation of 23.5 m, (74°34.9′N, 97°35′W), was treated with hot base, hot acid, and distilled water rinses (noncalcareous). The treated sample (7.4 g) yielded 7.07 L of CO_2 gas. The age estimate is based on two counts for 2000 minutes in the 5 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 15.942 ± 0.100, 2.014 ± 0.032, and 28.290 ± 0.181 cpm, respectively.

The uncorrected age is 4610 ± 80.

Comment (A.S. Dyke): GSC-4956, along with higher- and lower-dated samples, fixes the elevation of the 5 ka shoreline at 25 ± 2 m, which is higher than on Prince of Wales Island where it lies consistently at 20 m (Dyke et al., 1991).

GSC-4940. Lowther Island (VII) 6000 ± 70
$\delta^{13}C = -23.3‰$

The driftwood (*Picea*; identified by R.J. Mott (unpublished GSC Wood Report No. 90-01)) was enclosed in gravel. Sample 89-DCA-9 (13.3 g dry weight), collected at an elevation of 32 m, (74°34′N, 97°35.5′W), was treated with hot base, hot acid, and distilled water rinses. The treated sample (7.0 g) yielded 6.75 L of CO_2 gas. The age estimate is based on two counts for 2000 minutes in the 5 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 13.379 ± 0.092, 2.105 ± 0.027, and 28.136 ± 0.132 cpm, respectively.

The uncorrected age is 5970 ± 70.

Comment (A.S. Dyke): The 6 ka shoreline lies at 32 ± 2 m, slightly above or at the same level as its elevation of 28 ± 2 m on all of Prince of Wales, western Somerset, southern Bathurst, and southwestern Cornwallis islands (see Dyke et al., 1991, Fig. 14H).

GSC-4841. Lowther Island (VIII) 7910 ± 70
$\delta^{13}C = -24.2‰$

The driftwood (*Picea*; identified by H. Jetté (unpublished GSC Wood Report No. 90-03)) was enclosed in gravel. Sample 89-DCA-8 (11.6 g dry weight), collected at an elevation of 58 m, (74°34′N, 97°35′W), was treated with hot base, hot acid, and distilled water rinses (noncalcareous). The treated sample (8.5 g) yielded 8.26 L of CO_2 gas. The age estimate is based on one count for 3870 minutes in the 5 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 10.580 ± 0.062, 2.189 ± 0.023, and 28.283 ± 0.127 cpm, respectively.

The uncorrected age is 7900 ± 70.

Comment (A.S. Dyke): This date is on the highest piece of driftwood yet found in raised beaches on Lowther Island, a small island in the middle of Barrow Strait between Prince of Wales and Bathurst islands. Driftwood collected by R.B. Taylor from Lowther Island at 21.5 m elevation (above high tide) dated 4410 ± 70 (GSC-2224; Lowdon and Blake, 1979).

The driftwood dates are as follows:

Elevation (m)	Age	Lab No.
2.5-3.0	430 ± 50	GSC-4976
7.5	2120 ± 60	GSC-4981
10.0	2340 ± 60	GSC-4971
14.5	3540 ± 60	GSC-4977
23.5	4620 ± 80	GSC-4956
32.0	6000 ± 70	GSC-4940
58.0	7910 ± 70	GSC-4841

In addition a Bowhead whale earbone from a skull in a beach at 4.5 m dated 1510 ± 80 (S-3134, uncorrected for isotopic fractionation or reservoir age). All these dates form an accordant set describing emergence during the last 8 ka. The 8 ka shoreline on Lowther Island lies at 58-60 m, rather than 64 m as shown by Dyke et al., 1991 (Fig. 14F). It, thus, is very close to the elevation of the 8 ka shoreline on Prince of Wales Island (55 ± 3 m), but considerably below the level of that shoreline on southern Bathurst Island (about 80 m).

This series of driftwood dates augments those presented by Dyke and Morris (1990) in a discussion of the chronology of driftwood penetration to the central arctic.

GSC-4890. Lowther Island (IX) 9160 ± 90
$\delta^{13}C = +2.1‰$

The marine shells (*Hiatella arctica*; identified by A.S. Dyke) were on a gravel surface. Sample 89-DCA-5 (29.8 g dry weight), collected at an elevation of 70 m, (74°33.4′N, 97°24′W), was treated with an acid leach to remove the outer 20% of the sample. The treated sample (24.1 g) yielded 5.36 L of CO_2 gas. The age estimate is based on one count for 3890 minutes in the 2 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 5.815 ± 0.045, 1.073 ± 0.016, and 18.101 ± 0.100 cpm, respectively.

The uncorrected age is 9120 ± 90.

Comment (A.S. Dyke): This sample was collected from the shell-rich surface of thin beach gravel overlying till on central Lowther Island. They were the highest shells encountered in a single traverse across the island. The sample consisted mostly of whole valves, which were the

cleanest shells at the site where most shells are weathered, broken, and encrusted with lichen and secondary calcite. The sample submitted to the laboratory was cleaned by cavitron and was free of any apparent contamination.

A clear washing limit on till and a distinct upper limit of raised beaches around the north end of the island at 106 m appears to represent marine limit. The date is, thus, a minimum for marine limit and deglaciation, although it is younger than GSC-322 (9470 ± 150; Lowdon et al., 1967) collected at a reported elevation of 112-119 m.

Lowther Island was overridden during the Late Wisconsinan by Laurentide ice flowing generally northward; it bears a till sheet with Precambrian shield erratics. Large-scale ice moulding of bedrock across the island aligns with striae with an azimuth of 35 degrees on well polished bedrock in the northwest near the site of a prominent cairn erected by R.B. Taylor and J. Savelle. These striae are overprinted by lighter striae with an orientation of 290 degrees or 110 degrees. A sense of flow could not be determined from the outcrop for the younger striae. They could represent coastward flow (290 degrees azimuth) of a remnant local ice cap isolated on the island during deglaciation or a late eastward flow (110 degrees azimuth) of Laurentide ice along Barrow Strait. The former seems more likely in light of the lightly inscribed nature of the younger striae.

Melville Island

GSC-4958. Marie Bay — 10 300 ± 100; $\delta^{13}C = +0.7‰$

The marine pelecypod shells (*Hiatella arctica*; identified by D.A. Hodgson) were from a surface collection on fine-grained sand (glaciomarine rhythmites). Sample HCA-89-9-8-4 was collected by D.A. Hodgson on August 9, 1989, from 13 km northeast of the head of Marie Bay, western Melville Island, District of Franklin, Northwest Territories (76°13.6′N, 114°12.5′W), at an elevation of 5-15 m; submitted by D.A. Hodgson.

The sample (41.0 g dry weight) was treated with an acid leach to remove the outer 20% of the sample. The treated sample (31.7 g) yielded 6.96 L of CO_2 gas. The age estimate is based on one count for 3550 minutes in the 2 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 4.942 ± 0.045, 1.030 ± 0.018, and 17.892 ± 0.101 cpm, respectively.

The uncorrected age is 10 300 ± 100.

Comment (D.A. Hodgson): Please refer to GSC Paper 89-21 (Hodgson, 1992) for an interpretation of this date.

Melville Peninsula

Western Melville Peninsula

A series of marine shell samples from raised marine deposits along the eastern side of Committee Bay, Melville Peninsula, District of Franklin, Northwest Territories, were collected by L.A. Dredge and/or M. Nixon in 1985, 1986, and 1988; submitted for dating by L.A. Dredge. The shells were radiocarbon dated to interpret the glacial history and sea level changes in the area. Sea level curves are presented and interpreted by Dredge (1990).

Brevoort River Series

GSC-4123. Brevoort River (I) — 8970 ± 90; $\delta^{13}C = +1.2‰$

The marine shells (*Mya truncata*; identified by L.A. Dredge) were enclosed in sand. Sample 85 DU 143 was collected by L.A. Dredge on July 24, 1985, from the Brevoort River valley (69°39.8′N, 85°17.8′W), at an elevation of 165 m.

The sample (47.5 g dry weight) was treated with an acid leach to remove the outer 20% of the sample. The age estimate is based on one 3-day count (4200 minutes) in the 5 L counter with a mixing ratio of 1.00.

The uncorrected age is 8960 ± 90.

Comment (L.A. Dredge): The shells are from a section in a small delta along Melville Moraine. They date sea level at about 165 m and provide an approximate age for the moraine and for the time of deglaciation.

GSC-4126. Brevoort River (II) — 3280 ± 60; $\delta^{13}C = +0.1‰$

The marine shells with siphons (*Mya truncata*; identified by L.A. Dredge) were enclosed in medium to fine sand. Sample 85 DU 164 was collected by L.A. Dredge on July 31, 1985, near the mouth of Brevoort River at a waterfall (69°44.0′N, 85°18.5′W), at an elevation of 20 m.

The sample (47.4 g dry weight) was treated with an acid leach to remove the outer 20% of the sample. The age estimate is based on two 1-day counts (2170 minutes) in the

5 L counter with a mixing ratio of 1.00.

The uncorrected age is 3270 ± 60.

Comment (L.A. Dredge): The paired valves were from a section exposing delta foreset beds relating to the 20-25 m waterplane. The beds also contained leaves and twigs.

GSC-4184. Brevoort River (III) 5650 ± 60
$\delta^{13}C = +1.3‰$

The marine shells (*Mya truncata*; identified by L.A. Dredge) were enclosed in deltaic sand. Sample 85 DU-142 was collected by L.A. Dredge on July 24, 1985, from the Brevoort River valley (69°41.6′N, 85°21.0′W), at an elevation of 60 m.

The sample (48.2 g dry weight) was treated with an acid leach to remove the outer 20% of the sample. The age estimate is based on one 3-day count (4200 minutes) in the 5 L counter with a mixing ratio of 1.00.

The uncorrected age is 5630 ± 60.

Comment (L.A. Dredge): Paired valves with siphons were collected from deltaic topset sand beds and provide an age for the 60 m waterplane.

GSC-4222. Brevoort River (IV) 6710 ± 80
$\delta^{13}C = +2.0‰$

The marine shells (*Hiatella arctica*; identified by L.A. Dredge) were enclosed in silt. Sample 85-DU-146 was collected by L.A. Dredge on July 27, 1985, from the Brevoort River valley (69°43.7′N, 85°09.2′W), at an elevation of 110 m.

The sample (25.1 g dry weight) was treated with an acid leach to remove the outer 10% of the sample. The age estimate is based on one 3-day count (4200 minutes) in the 2 L counter with a mixing ratio of 1.00.

The uncorrected age is 6680 ± 80.

Comment (L.A. Dredge): The shells are from the surface of a silt deposit beyond a major outwash delta. The shells provide a minimum age for marine limit at 160 m. They indicate an ice retreat rate from Melville Moraine of 7 km in 2 ka.

GSC-4232. Brevoort River (V) 6000 ± 80
$\delta^{13}C = +1.1‰$

The marine shells (*Hiatella arctica*; identified by L.A. Dredge) were enclosed in sandy marine mud. Sample 85 DU-162 was collected by L.A. Dredge on July 31, 1985, from the Brevoort River valley (69°43.9′N, 85°20.0′W), at an elevation of 75 m.

The sample (48.3 g dry weight) was treated with an acid leach to remove the outer 20% of the sample. The age estimate is based on two 1-day counts (2330 minutes) in the 5 L counter with a mixing ratio of 1.00.

The uncorrected age is 5980 ± 80.

Comment (L.A. Dredge): This sample was collected from a mudboil surface east of Melville Moraine. It was used to control the shape of the uplift curve for the area.

GSC-4454. Brevoort River (VI) 6730 ± 80
$\delta^{13}C = +1.4‰$

The marine shells (*Hiatella arctica*; identified by L.A. Dredge) were enclosed in fine sand. Sample 86 DU-156 was collected by L.A. Dredge on July 19, 1986, from 5 km east of Cape Ellis, Committee Bay (69°38.1′N, 85°23.3′W), at an elevation of 110 m.

The sample (24.6 g dry weight) was treated with an acid leach to remove the outer 10% of the sample. The age estimate is based on one 3-day count (4080 minutes) in the 2 L counter with a mixing ratio of 1.00.

The uncorrected age is 6710 ± 80.

Comment (L.A. Dredge): The shells were collected from a section in a small delta exposing marine topset beds. The date relates to a waterplane at 110 m lying outside Melville Moraine.

GSC-4517. Brevoort River (VII) 6930 ± 80
$\delta^{13}C = +2.6‰$

The marine shells (*Hiatella arctica*; identified by L.A. Dredge) were enclosed in sand. Sample 85 DU-139 was collected by L.A. Dredge on July 20, 1985, from a hillslope 2 km south of the main elbow in Brevoort River, east of a small unnamed lake (69°42.5′N, 85°17.8′W), at an elevation of 110 m.

The sample (26.2 g dry weight) was treated with an acid leach to remove the outer 10% of the sample. The age estimate is based on one 3-day count (4200 minutes) in the 2 L counter with a mixing ratio of 1.00.

The uncorrected age is 6890 ± 80.

Comment (L.A. Dredge): The sample was taken from the surface of a beach lying inside Melville Moraine. It dates the waterplane at 110 m.

Baker Bay Series

GSC-4147. Baker Bay (I) 7970 ± 100
$\delta^{13}C = +1.8‰$

The marine shells (*Hiatella arctica*; identified by L.A. Dredge) were enclosed in sand. Sample 85-DU-112 was collected by L.A. Dredge on July 13, 1985, from Baker Bay valley (69°17.8′N, 85°10.1′W), at an elevation of 160 m.

The sample (14.0 g dry weight) was treated with an acid leach to remove the outer 10% of the sample. The age estimate is based on one 3-day count (4200 minutes) in the 2 L counter with a mixing ratio of 1.50.
The uncorrected age is 7940 ± 100.

Comment (L.A. Dredge): The shells were collected from a beach 20 m below the local marine limit. They provide an approximate age for the 160 m waterplane and for Melville Moraine, which developed when the sea level was at 160-180 m.

GSC-4169. Baker Bay (II) 6150 ± 80
$\delta^{13}C = +1.2‰$

The marine shells (*Hiatella arctica*; identified by L.A. Dredge) were enclosed in fine sand. Sample 85-DU-108 was collected by L.A. Dredge on July 9, 1985, from Baker Bay (69°19.4′N, 85°13.6′W), at an elevation of 60 m.

The sample (48.9 g dry weight) was treated with an acid leach to remove the outer 20% of the sample. The age estimate is based on two 1-day counts (2260 minutes) in the 5 L counter with a mixing ratio of 1.00.
The uncorrected age is 6130 ± 80.

Comment (L.A. Dredge): The shells are from silty foreset beds in a large delta. They date a waterplane that stood at 70-75 m. The sternum of a duck (Anatinae, identified by E. Godfrey, National Museum of Nature) was also enclosed in the sands at this site.

GSC-4221. Baker Bay (III) 6920 ± 80
$\delta^{13}C = +2.2‰$

The marine shells (*Hiatella arctica*; identified by L.A. Dredge) were enclosed in fine sand. Sample 85-DU-105 was collected by L.A. Dredge on July 7, 1985, from the north slope of Baker Lake, whose outlet drains into Baker Bay (69°19.4′N, 85°03.5′W), at an elevation of 120 m.

The sample (25.6 g dry weight) was treated with an acid leach to remove the outer 20% of the sample. The age estimate is based on one 3-day count (4200 minutes) in the 2 L counter with a mixing ratio of 1.00.
The uncorrected age is 6890 ± 80.

Comment (L.A. Dredge): The shells were taken from an exposure in a large delta 5 km inside Melville Moraine. The shells were collected from an upper sand unit just above the silt contact. They provide an approximate age for the 120 m waterplane and for ice recession east of the moraine.

GSC-4225. Baker Bay (IV) 6810 ± 80
$\delta^{13}C = +2.3‰$

The marine shells (*Hiatella arctica*; identified by L.A. Dredge) were enclosed in sand. Sample 85-DU-153 was collected by L.A. Dredge on July 17, 1985, from Baker Bay valley (69°18.7′N, 85°12.0′W), at an elevation of 100 m.

The sample (24.0 g dry weight) was treated with an acid leach to remove the outer 10% of the sample. The age estimate is based on one 3-day count (3980 minutes) in the 2 L counter with a mixing ratio of 1.00.
The uncorrected age is 6780 ± 80.

Comment (L.A. Dredge): The shells were taken from an exposure flanking the upper part of Melville Moraine. The shells were in fine sand that graded upwards into coarse beach sand. The shells date a waterplane somewhat above 100 m.

GSC-4324. Baker Bay (V) 9110 ± 100
$\delta^{13}C = +2.3‰$

The marine shells (*Mya truncata*; identified by L.A. Dredge) were enclosed in silty sand. Sample 86 DU-142 was collected by L.A. Dredge on July 17, 1986, from 18 km southeast of Cape Ellis, Committee Bay (69°30.52′N, 85°21.86′W), at an elevation of 220 m.

The sample (28.6 g dry weight) was treated with an acid leach to remove the outer 20% of the sample. The age estimate is based on two 1-day counts (2410 minutes) in the 2 L counter with a mixing ratio of 1.00.
The uncorrected age is 9070 ± 100.

Comment (L.A. Dredge): The shells were collected from the surface of a pod of marine sand near the marine limit outside Melville Moraine. These shells indicate that deglaciation occurred more than 9.1 ka ago and give an approximate age for the 220-230 m waterplane and marine limit.

GSC-4348. Baker Bay (VI) 8750 ± 80
$\delta^{13}C = +0.6‰$

The marine shells (*Mya truncata*; identified by L.A. Dredge) were enclosed in sand and gravel. Sample 86 DU-172 was collected by L.A. Dredge on July 17, 1986, from 5 km north of Franklin Bay inlet, Committee Bay (69°31.4′N, 85°20.9′W), at an elevation of 174 m.

The sample (40.3 g dry weight) was treated with an acid leach to remove the outer 20% of the sample. The age estimate is based on one 3-day count (4200 minutes) in the 5 L counter with a mixing ratio of 1.00.

The uncorrected age is 8740 ± 80.

Comment (L.A. Dredge): The shells were collected from a deltaic exposure outside Melville Moraine and provide an age for the delta-top waterplane at 186 m. The date is also a minimum for deglaciation.

GSC-4365. Baker Bay (VII) 4920 ± 70
$\delta^{13}C = +1.4‰$

The marine shells (*Hiatella arctica*; identified by L.A. Dredge) were enclosed in medium-grained sand. Sample 86 DU-146 was collected by L.A. Dredge and M. Nixon on July 15, 1986, at the mouth of Corrigal River, Franklin Bay on Committee Bay (69°25.93′N, 85°18.72′W), at an elevation of 22 m.

The sample (40.1 g dry weight) was treated with an acid leach to remove the outer 20% of the sample. The age estimate is based on two 1-day counts (2150 minutes) in the 5 L counter with a mixing ratio of 1.00.

The uncorrected age is 4900 ± 70.

Comment (L.A. Dredge): The shells date delta topset beds at 22 m and a sea level position near that elevation.

GSC-4429. Baker Bay (VIII) 7440 ± 120
$\delta^{13}C = +1.6‰$

The marine shell fragments (*Hiatella arctica*; identified by L.A. Dredge) were enclosed in sandy silt. Sample 86 DU-114 was collected by L.A. Dredge and M. Nixon on July 13, 1986, 8.5 km north of Hopkins Inlet, Garry Bay (69°13.9′N, 85°13.1′W), at an elevation of 160 m.

The sample (12.5 g dry weight) was treated with an acid leach to remove the outer 10% of the sample. The age estimate is based on one 3-day count (4200 minutes) in the 2 L counter with a mixing ratio of 2.34.

The uncorrected age is 7410 ± 120.

Comment (L.A. Dredge): This surface sample was collected from a high-level silt pod in front of Melville Moraine. The shells give a maximum age for the 160 m waterplane and for the time of sea level stabilization associated with the development of the moraine.

GSC-4446. Baker Bay (IX) 6790 ± 70
$\delta^{13}C = +2.2‰$

The marine shells (*Hiatella arctica*; identified by L.A. Dredge) were enclosed in silty sand. Sample 86 DU-78 was collected by L.A. Dredge on July 12, 1986, from 8 km northeast of Hopkins Inlet, Committee Bay (69°14.9′N, 85°2.5′W), at an elevation of 124 m.

The sample (32.6 g dry weight) was treated with an acid leach to remove the outer 10% of the sample. The age estimate is based on one 3-day count (4320 minutes) in the 2 L counter with a mixing ratio of 1.00.

The uncorrected age is 6760 ± 70.

Comment (L.A. Dredge): The shells were collected from the surface of a terrace of marine silty sand, derived from a fine-grained calcareous till. The terrace relates to a sea level at about 125 m. The date provides a minimum age for Melville Moraine, because the site lies to the east of that feature.

GSC-4450. Baker Bay (X) 5900 ± 80
$\delta^{13}C = +1.9‰$

The marine shells (*Hiatella arctica*; identified by L.A. Dredge) were enclosed in sand. Sample 86 DU-94 was collected by L.A. Dredge on July 13, 1986, from Garry Bay, (69°14.9′N, 85°10.3′W), at an elevation of 61 m.

The sample (33.6 g dry weight) was treated with an acid leach to remove the outer 20% of the sample. The age estimate is based on two 1-day counts (2480 minutes) in the 2 L counter with a mixing ratio of 1.00.

The uncorrected age is 5870 ± 80.

Comment (L.A. Dredge): The shells were collected from exposures in a flight of beach ridges dissected by a stream. They provide the age of a waterplane at about 61 m.

GSC-4465. Baker Bay (XI) 8570 ± 100
$\delta^{13}C = +1.4‰$

The marine shells (*Hiatella arctica*; identified by L.A. Dredge) were enclosed in marine silty sand. Sample 86 DU-245 was collected by L.A. Dredge on July 23, 1986,

from a valley 20 km southeast of Cape Ellis, Committee Bay (69°33.4′N, 85°06.0′W), at an elevation of 190 m.

The sample (37.3 g dry weight) was treated with an acid leach to remove the outer 10% of the sample. The age estimate is based on two 1-day counts (2400 minutes) in the 2 L counter with a mixing ratio of 1.00.

The uncorrected age is 8550 ± 100.

Comment (L.A. Dredge): The shells were collected from the surface of marine silts. The site elevation is 190 m according to the map contours or 150 m according to the altimeter. The date is a minimum for deglaciation and provides a maximum age for Melville Moraine.

GSC-4583. Baker Bay (XII) 6830 ± 130
$\delta^{13}C = +2.9‰$

The marine shells (*Hiatella arctica*; identified by L.A. Dredge) were enclosed in silty sand. Sample 86 DU-183 was collected by L.A. Dredge and M. Nixon on July 22, 1986, from 6 km from the mouth of Corrigal River (69°26.1′N, 85°10.8′W), at an elevation of 80 m.

The sample (13.3 g dry weight) was treated with an acid leach to remove the outer 10% of the sample. The age estimate is based on two 1-day counts (2250 minutes) in the 2 L counter with a mixing ratio of 1.67.

The uncorrected age is 6790 ± 130.

Comment (L.A. Dredge): The shells were collected from the upper part of a glaciomarine delta. They date a segment of Melville Moraine and provide a time of deglaciation. When the molluscs were alive the waterplane was slightly above 80 m.

Garry Bay Series

GSC-4463. Garry Bay (I) 4960 ± 80
$\delta^{13}C = +1.5‰$

The marine shells (*Hiatella arctica*; identified by L.A. Dredge) were enclosed in sand. Sample 86 DU-128 was collected by M. Nixon on July 13, 1986, from Blacks Inlet, Garry Bay (69°3.1′N, 84°42.4′W), at an elevation of 45-50 m.

The sample (25.3 g dry weight) was treated with an acid leach to remove the outer 10% of the sample. The age estimate is based on three 1-day counts (4370 minutes) in the 2 L counter with a mixing ratio of 1.00.

The uncorrected age is 4930 ± 80.

Comment (L.A. Dredge): Thin-walled valves were collected from delta topset or littoral deposits and provide an age for the 50 m waterplane.

GSC-4464. Garry Bay (II) 6300 ± 90
$\delta^{13}C = +1.7‰$

The marine shells (*Hiatella arctica*; identified by L.A. Dredge) were enclosed in fine sand. Sample 86 DU-65 was collected by M. Nixon on July 11, 1986, from 11 km east of Blacks Inlet, Garry Bay (69°0.2′N, 84°15.1′W), at an elevation of 97 m.

The sample (27.5 g dry weight) was treated with an acid leach to remove the outer 10% of the sample. The age estimate is based on two 1-day counts (2050 minutes) in the 2 L counter with a mixing ratio of 1.00.

The uncorrected age is 6280 ± 90.

Comment (L.A. Dredge): Well preserved fragile valves were collected from the surface of a beach. They provide an age for a waterplane at 97 m.

GSC-4816. Garry Bay (III) 6250 ± 80
$\delta^{13}C = +1.5‰$

The marine shells (*Mya truncata*; identified by L.A. Dredge) were enclosed in sand. Sample 88 DU-1212 (Sta 1261) was collected from the right bank of small stream entering the east end of Garry Bay, 2.2 km from its mouth (68°43′37″N, 84°49′07″W), at an elevation of 82 m.

The sample (44.2 g dry weight) was treated with an acid leach to remove the outer 20% of the sample. The treated sample (35.8 g) yielded 7.12 L of CO_2 gas. The age estimate is based on two counts for 2080 minutes in the 5 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 13.073 ± 0.096, 2.127 ± 0.043, and 28.373 ± 0.167 cpm, respectively.

The uncorrected age is 6220 ± 80.

Comment (L.A. Dredge and M. Nixon): Paired and whole valves were extracted from the upper 2 m of a fresh exposure in a small raised delta. The shells give an age for the water plane at 82 m.

GSC-4817. Garry Bay (IV) 5600 ± 70
$\delta^{13}C = +0.9‰$

The marine shells (*Hiatella arctica*; identified by L.A. Dredge) were enclosed in sand. Sample 88 DU-1156

(Sta 1192) was collected from the west bank of a stream entering Garry Bay, 2.7 km upstream from its mouth (68°41′52″N, 85°06′55″W), at an elevation of 69 m.

The sample (43.5 g dry weight) was treated with an acid leach to remove the outer 20% of the sample. The treated sample (34.5 g) yielded 7.07 L of CO_2 gas. The age estimate is based on one count for 3940 minutes in the 5 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 14.154 ± 0.077, 2.127 ± 0.043, and 28.373 ± 0.167 cpm, respectively.

The uncorrected age is 5590 ± 70.

Comment (L.A. Dredge and M. Nixon): Thin walled valves were collected from a stony sand in a raised delta, about 1 m below the surface. The date gives an age for the marine water plane at 69 m.

GSC-4818. Garry Bay (V) 5350 ± 80
$\delta^{13}C = +1.1‰$

The marine shells (*Hiatella arctica*; identified by L.A. Dredge) were enclosed in sand. Sample 88 DU-1401 (Sta 1467) was collected from a small creek 3.25 km east of the east end of Garry Bay (68°45′05″N, 84°40′08″W), at an elevation of 49 m.

The sample (48.0 g dry weight) was treated with an acid leach to remove the outer 20% of the sample. The treated sample (37.9 g) yielded 8.43 L of CO_2 gas. The age estimate is based on two counts for 2140 minutes in the 5 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 14.617 ± 0.098, 2.127 ± 0.043, and 28.373 ± 0.167 cpm, respectively.

The uncorrected age is 5330 ± 80.

Comment (L.A. Dredge and M. Nixon): The shells were collected from the surface of a raised delta and date the 49 m waterplane. The marine limit is 130 m in this location.

GSC-4819. Garry Bay (VI) 5240 ± 80
$\delta^{13}C = +1.4‰$

The marine shells (*Mya truncata* and *Macoma calcarea*; identified by L.A. Dredge) were enclosed in sand. Sample 88 DU-1098 (Sta 1262) was collected from the east bank of small stream entering the east end of Garry Bay, 0.5 km from its mouth (68°44′22″N, 84°51′26″W), at an elevation of 29 m.

The sample (45.2 g dry weight) was treated with an acid leach to remove the outer 20% of the sample. The treated sample (36.1 g) yielded 8.01 L of CO_2 gas. The age estimate is based on two counts for 2160 minutes in the 5 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 14.813 ± 0.098, 2.127 ± 0.043, and 28.373 ± 0.167 cpm, respectively.

The uncorrected age is 5220 ± 80.

Comment (L.A. Dredge and M. Nixon): The shells were collected from the surface of a small, sandy raised marine delta. They provide a date for the marine waterplane which was slightly above the 29 m surface.

GSC-4825. Garry Bay (VII) 2800 ± 70
$\delta^{13}C = +1.8‰$

The marine shells (*Macoma calcarea*; identified by L.A. Dredge) were enclosed in sand. Sample 88 DU-1153 was collected from the right bank of small stream entering into Garry Bay, 1 km upstream from its mouth (68°42′45″N, 85°08′36″W), at an elevation of 18 m.

The sample (22.9 g dry weight) was treated with an acid leach to remove the outer 20% of the sample. The treated sample (18.5 g) yielded 4.14 L of CO_2 gas. The age estimate is based on two counts for 3140 minutes in the 2 L counter with a mixing ratio of 1.06. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 12.728 ± 0.077, 1.090 ± 0.023, and 17.970 ± 0.101 cpm, respectively.

The uncorrected age is 2770 ± 70.

Comment (L.A. Dredge and M. Nixon): The shells were collected from a fresh exposure in fine sands about 1 m below the surface of a small raised delta. This dates the marine waterplane at 18 m.

GSC-4831. Garry Bay (VIII) 6920 ± 90
$\delta^{13}C = +0.2‰$

The thin-walled marine shells (*Hiatella arctica* and *Macoma calcarea*; identified by L.A. Dredge) were enclosed in sand. Sample 88 DU-1301 (Sta 1304) was collected from a raised delta in a valley 9 km southeast of the east end of Garry Bay (68°52′48″N, 84°38′36″W), at an elevation of 100 m.

The sample (26.4 g dry weight) was treated with an acid leach to remove the outer 20% of the sample. The treated sample (21.7 g) yielded 4.72 L of CO_2 gas. The age estimate is based on two counts for 2140 minutes in the 2 L

counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 7.596 ± 0.068, 1.090 ± 0.023, and 17.970 ± 0.101 cpm, respectively.

The uncorrected age is 6920 ± 90.

Comment (L.A. Dredge and M. Nixon): Whole valves were collected from a delta surface, whose apex is at 128 m. The shells date the marine waterplane at about 128 m and provide a date for deglaciation. The marine limit is 130 m in this location.

The oldest dates indicate that Garry Bay opened up around 6.9 ka BP after ice had receded from Melville Moraine along the rest of the coast. Correspondingly, the marine limit is relatively low along the inner part of Garry Bay and is similar in elevation to that behind the moraines in other areas (Dredge, 1990).

GSC-4827. Garry Bay (IX) 2930 ± 60
$\delta^{13}C = +1.3‰$

The marine shells (*Macoma calcarea*; identified by L.A. Dredge) were enclosed in silty sand. Sample 88 DU-1202 (Sta 1306) was collected on an isthmus joining two circular peninsulas on an island in eastern part of Garry Bay (68°46′36″N, 84°50′25″W), at an elevation of 8 m.

The sample (45.6 g dry weight) was treated with an acid leach to remove the outer 20% of the sample. The treated sample (36.6 g) yielded 8.08 L of CO_2 gas. The age estimate is based on two counts for 2095 minutes in the 5 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 19.912 ± 0.106, 2.186 ± 0.024, and 28.589 ± 0.128 cpm, respectively.

The uncorrected age is 2900 ± 60.

Comment (L.A. Dredge and M. Nixon): These shells were collected from the surface of silty marine sand. They probably relate to the waterplane 2-7 m above the collection site.

Selkirk Bay Series

GSC-4786. Selkirk Bay (I) 6450 ± 70
$\delta^{13}C = +1.5‰$

The marine shells (*Hiatella arctica*; identified by L.A. Dredge) were enclosed in a sandy glaciomarine diamicton. Sample 88-DU-1050 (Sta. 1031) was collected by L.A. Dredge and M. Nixon on June 28, 1988, from within the crest of Melville Moraine in a cut by an unnamed river entering Selkirk Bay, 0.5 km from the river mouth (68°12′29″N, 85°45′17″W), at an elevation of 90 m.

The sample (41.0 g dry weight) was treated with an acid leach to remove the outer 20% of the sample. The treated sample (32.8 g) yielded 7.19 L of CO_2 gas. The age estimate is based on one count for 2565 minutes in the 5 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 12.728 ± 0.079, 2.172 ± 0.022, and 28.325 ± 0.122 cpm, respectively.

The uncorrected age is 6430 ± 70.

GSC-4857. Selkirk Bay (II) 6150 ± 90
$\delta^{13}C = +1.3‰$

The marine shells (*Hiatella arctica*; identified by L.A. Dredge) were enclosed in silty glaciomarine till. Sample 88-DU-1040 (Sta. 1034) was collected by L.A. Dredge on June 28, 1988, from 1 km upstream from the mouth of a river emptying into Committee Bay (68°16′N, 85°46′W), at an elevation of 45 m.

The sample (34.0 g dry weight) was treated with an acid leach to remove the outer 20% of the sample. The treated sample (27.3 g) yielded 5.88 L of CO_2 gas. The age estimate is based on one count for 3905 minutes in the 2 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 8.319 ± 0.051, 1.077 ± 0.015, and 17.836 ± 0.153 cpm, respectively.

The uncorrected age is 6130 ± 90.

Comment (L.A. Dredge): These shells give an age for the development of this section of Melville Moraine and a minimum age for the emergence of the land. Glacial ice remained along the moraine in this area at least 400 years after it had receded from Baker and Garry bays, which lie farther north (Dredge, 1990).

Fury and Helca Strait Series

GSC-4378. Fury and Helca Strait (I) 6520 ± 70
$\delta^{13}C = +1.5‰$

The marine shells (*Hiatella arctica*; identified by L.A. Dredge) were enclosed in sand. Sample 86 DU 181 was collected by L.A. Dredge on July 23, 1986, from 7.5 km south of Purfur Cove, Fury and Hecla Strait (69°45.9′N, 84°14.0′W), at an elevation of 121 m.

The sample (26.0 g dry weight) was treated with an acid leach to remove the outer 10% of the sample. The age estimate is based on one 3-day count (4200 minutes) in the 2 L counter with a mixing ratio of 1.00.

The uncorrected age is 6490 ± 70.

Comment (L.A. Dredge): The shells were collected from an exposure of fine littoral sand. They provide a minimum age for the deglaciation of Fury and Hecla Strait and are the highest shells retrieved from this area. The marine limit is at 165 m.

GSC-4389. Fury and Helca Strait (II) 5590 ± 60
$\delta^{13}C = +3.3‰$

The marine shells (*Mya truncata* and *Hiatella arctica*; identified by L.A. Dredge) were enclosed in sand. Sample 86 DU-182 was collected by L.A. Dredge on July 23, 1986, from 7.5 km south of Purfur Cove, Fury and Hecla Strait (69°18.8′N, 84°51.9′W), at an elevation of 40 m.

The sample (50.5 g dry weight) was treated with an acid leach to remove the outer 30% of the sample. The age estimate is based on one 3-day count (4200 minutes) in the 5 L counter with a mixing ratio of 1.00.

The uncorrected age is 5530 ± 60.

Comment (L.A. Dredge): Large valves were collected from an exposure of fine littoral sand directly below beach gravel. The shells provide an approximate age for the 40 m waterplane.

GSC-4430. Fury and Helca Strait (III) 3960 ± 70
$\delta^{13}C = +2.5‰$

The marine shells (*Mya truncata* and *Macoma* / *Astarte*; identified by M. Nixon) were enclosed in sand. Sample 86 DU-190 was collected by M. Nixon on July 27, 1986, 2 km inland from the coast, Purfur Cove area (69°45.6′N, 84°6.0′W), at an elevation of about 22 m.

The sample (47.6 g dry weight) was treated with an acid leach to remove the outer 20% of the sample. The age estimate is based on two 1-day counts (2180 minutes) in the 5 L counter with a mixing ratio of 1.00.

The uncorrected age is 3920 ± 70.

Comment (L.A. Dredge): The shells were collected from an exposure in a beach berm relating to the 22 m sea level position.

GSC-4441. Fury and Helca Strait (IV) 6300 ± 80
$\delta^{13}C = +1.1‰$

The marine shells (*Hiatella arctica*; identified by L.A. Dredge) were enclosed in sand. Sample 86 DU-242 was collected by M. Nixon on July 23, 1986, from a glacial valley 6 km south of Purfur Cove on Fury and Hecla Strait (69°46.5′N, 84°17.3′W), at an elevation of 96 m.

The sample (29.6 g dry weight) was treated with an acid leach to remove the outer 20% of the sample. The age estimate is based on one 2-day count (2640 minutes) in the 2 L counter with a mixing ratio of 1.00.

The uncorrected age is 6280 ± 80.

Comment (L.A. Dredge): The paired valves are from crudely bedded silt in a delta associated with a kame deposit. They date the deglaciation of the southern part of the strait, and the 96 m waterplane. The dates in this vicinity indicate rapid uplift.

GSC-4455. Fury and Hecla Strait (V) 6320 ± 80
$\delta^{13}C = +1.3‰$

The marine shells (*Hiatella arctica*; identified by L.A. Dredge) were enclosed in sand. Sample 86 DU-319 was collected by L.A. Dredge on July 23, 1986, from Fury and Hecla Strait, 3 km inland from coast (69°45.2′N, 84°6.2′W), at an elevation of 79 m.

The sample (40.0 g dry weight) was treated with an acid leach to remove the outer 20% of the sample. The age estimate is based on two 1-day counts (2390 minutes) in the 2 L counter with a mixing ratio of 1.00.

The uncorrected age is 6300 ± 80.

Comment (L.A. Dredge): The shells were collected from a beach ridge. They represent sea level at about 80 m and indicate rapid emergence (deglaciation or neotectonic uplift) of the northern coast of Melville Peninsula.

GSC-4549. Fury and Helca Strait (VI) 5960 ± 70
$\delta^{13}C = +0.9‰$

The marine shells (*Hiatella*; identified by L.A. Dredge) were enclosed in sand and silt. Sample 86 DU-320 was collected by M. Nixon on July 27, 1986, from beach ridge from the east end of an elongate lake, 20 km southeast of Purfur Cove (69°45.5′N, 84°6.0′W), at an elevation of 51 m.

The sample (50.2 g dry weight) was treated with an acid leach to remove the outer 20% of the sample. The age estimate is based on two 1-day counts (2100 minutes) in the

5 L counter with a mixing ratio of 1.00.

The uncorrected age is 5940 ± 70.

Comment (L.A. Dredge): The shells were collected from a prominent beach ridge and are used to indicate the time sea level stood about 50 m above present.

GSC-4562. Fury and Helca Strait (VII) 6320 ± 100
$\delta^{13}C = +0.6‰$

The marine shells, whole and fragments (*Hiatella*; identified by L.A. Dredge) were enclosed in sand. Sample 86 DU-253 was collected by L.A. Dredge and M. Nixon on August 2, 1986, from 2.5 km inland from coast, near Amherst Island (69°40.2′N, 83°37.5′W), at an elevation of 112 m.

The sample (28.4 g dry weight) was treated with an acid leach to remove the outer 20% of the sample. The age estimate is based on two 1-day counts (3690 minutes) in the 2 L counter with a mixing ratio of 1.00.

The uncorrected age is 6310 ± 100.

Comment (L.A. Dredge): The date provides an approximate time for a marine limit at 120 m and deglaciation.

Eastern Melville Peninsula

A series of marine shell samples from raised marine deposits along the eastern side of Melville Peninsula, District of Franklin, Northwest Territories, was collected by L.A. Dredge and/or M. Nixon in 1986 and submitted for dating by L.A. Dredge. The shells have been radiocarbon dated to decipher the glacial history and sea level changes around Foxe Basin. These shells complete the series of dates from eastern Melville Peninsula, which includes GSC-4627, -4693, -4702, -4720, -4743, -4750, -4759, -4792, -4798, -4803, -4809, -4812, and -4814 reported in McNeely and Jorgensen (1992). Sea level curves constructed from these data were presented and interpreted by Dredge (1991).

Lailor Lake Series

GSC-4397. Lailor Lake (I) 5330 ± 80
$\delta^{13}C = -0.2‰$

The marine shells (*Macoma calcarea*; identified by L.A. Dredge) were enclosed in sand. Sample 86 DU-539 was collected by L.A. Dredge on August 8, 1986, from 9 km east of Lac Tremblay (69°16.3′N, 83°3.7′W), at an elevation of 55 m.

The sample (42.8 g dry weight) was treated with an acid leach to remove the outer 20% of the sample. The age estimate is based on two 1-day counts (2330 minutes) in the 5 L counter with a mixing ratio of 1.00.

The uncorrected age is 5330 ± 80.

Comment (L.A. Dredge): This surface collection from a beach berm provides a minimum age for the deglaciation of a remnant, stagnant ice mass on Melville Peninsula.

GSC-4449. Lailor Lake (II) 5320 ± 60
$\delta^{13}C = +2.7‰$

The marine shells, whole valves and fragments of *Mya truncata* (identified by L.A. Dredge) were enclosed in sand. Sample 86 DU-337 was collected by M. Nixon on August 3, 1986, 9 km west of the west end of Lailor Lake (69°12.9′N, 82°44.3′W), at an elevation of 32 m.

The sample (30.8 g dry weight) was treated with an acid leach to remove the outer 20% of the sample. The age estimate is based on one 3-day count (4200 minutes) in the 2 L counter with a mixing ratio of 1.00.

The uncorrected age is 5270 ± 60.

Comment (L.A. Dredge): The shells were collected from sublittoral sands and relate to a sea level at or above 32 m.

GSC-4453. Lailor Lake (III) 5510 ± 70
$\delta^{13}C = +1.3‰$

The marine shells (*Hiatella arctica*; identified by L.A. Dredge) were enclosed in sand. Sample 86 DU-565 was collected by L.A. Dredge on August 9, 1986, from 28 km southwest of Lailor Lake (69°1.1′N, 82°52.4′W), at an elevation of about 75 m.

The sample (33.4 g dry weight) was treated with an acid leach to remove the outer 10% of the sample. The age estimate is based on two 1-day counts (2660 minutes) in the 2 L counter with a mixing ratio of 1.00.

The uncorrected age is 5490 ± 70.

Comment (L.A. Dredge): This surface collection on hummocky till provides a minimum age for the deglaciation of a remnant ice mass. Marine limit is at 90 m locally.

GSC-4536. Lailor Lake (IV) 5470 ± 60
$\delta^{13}C = +2.8‰$

The marine shells (*Mya arenaria* and other fragments; identified by L.A. Dredge) were enclosed in sand. Sample

86 DU-510 was collected by L.A. Dredge and M. Nixon on August 8, 1986, from 9 km east of Lac Tremblay (69°16.3′N, 83°3.7′W), at an elevation of 72 m.

The sample (36.6 g dry weight) was treated with an acid leach to remove the outer 20% of the sample. The age estimate is based on two 1-day counts (2520 minutes) in the 5 L counter with a mixing ratio of 1.00.

The uncorrected age is 5430 ± 60.

Comment (L.A. Dredge): The shells were collected from the surface of a beach ridge. They give an approximate age for a sea level at 72 m and provide a minimum age for remnant ice disintegration.

Kingora River Series

GSC-4426. Kingora River (I) 3970 ± 70
$\delta^{13}C = +0.2‰$

The marine shells (*Serripes groenlandicus*; identified by L.A. Dredge) were enclosed in sand. Sample 86 DU-37 was collected by L.A. Dredge on July 6, 1986, from the right bank of Kingora River, 1 km upstream from the mouth (68°35.5′N, 82°41.2′W), at an elevation of 18 m.

The sample (23.0 g dry weight) was treated with an acid leach to remove the outer 10% of the sample. The age estimate is based on two 1-day counts (2490 minutes) in the 2 L counter with a mixing ratio of 1.00.

The uncorrected age is 3970 ± 70.

Comment (L.A. Dredge): The shells were collected from the upper planar foreset beds in a small delta. They relate to a water plane at 21 m.

GSC-4452. Kingora River (II) 2380 ± 60
$\delta^{13}C = +3.0‰$

The marine shells (*Mya truncata*; identified by L.A. Dredge) were enclosed in sand and gravel. Sample 86 DU-38 was collected by L.A. Dredge on July 6, 1986, from Hall Lake, at the mouth of Kingora River (68°35.5′N, 82°39.4′W), at an elevation of 10 m.

The sample (39.4 g dry weight) was treated with an acid leach to remove the outer 20% of the sample. The age estimate is based on two 1-day counts (2070 minutes) in the 2 L counter with a mixing ratio of 1.00.

The uncorrected age is 2330 ± 60.

Comment (L.A. Dredge): The shells were taken from a fresh exposure of littoral sediments with algal mats. The shells provide an approximate age for sea level at 8 m.

Ajaqutalik River Series

GSC-4413. Ajaqutalik River (I) 6200 ± 100
$\delta^{13}C = +1.3‰$

The marine shells (*Hiatella arctica*; identified by L.A. Dredge) were enclosed in sand. Sample 86 DU-11 was collected by L.A. Dredge on July 1, 1986, from raised delta on Ajaqutalik River, 22 km southwest of Roche Bay (68°18.3′N, 82°54.6′W), at an elevation of 83 m.

The sample (15.2 g dry weight) was not pre-treated. The age estimate is based on two 1-day counts (2230 minutes) in the 2 L counter with a mixing ratio of 1.36.

The uncorrected age is 6180 ± 100.

Comment (L.A. Dredge): The shells were collected from exposed deltaic foreset beds containing algal mats. The delta relates to a waterplane between 90-100 m where the marine limit is at 116 m a.s.l. locally. The date indicates the time of deglaciation of a local ice cap in the central Melville plateau.

GSC-4416. Ajaqutalik River (II) 4210 ± 60
$\delta^{13}C = +1.9‰$

The marine shells (*Mya truncata*; identified by L.A. Dredge) were enclosed in sand. Sample 86 DU-20, 21 was collected by M. Nixon on July 6, 1986, from the right bank of Ajaqutalik River, 2 km upstream from its mouth (68°22.8′N, 82°33.5′W), at an elevation of 26 m.

The sample (48.0 g dry weight) was treated with an acid leach to remove the outer 30% of the sample. The age estimate is based on one 3-day count (4200 minutes) in the 5 L counter with a mixing ratio of 1.00.

The uncorrected age is 4180 ± 60.

Comment (L.A. Dredge): The shells were exposed in the upper sediments of a small delta relating to a water level at about 26 m. Marine limit is 140 m at the coast.

GSC-4451. Ajaqutalik River (III) 3600 ± 60
$\delta^{13}C = +1.4‰$

The marine shells (*Mya truncata*; identified by L.A. Dredge) were enclosed in sandy silt. Sample 86

DU-29 was collected by M. Nixon on July 6, 1986, from the right bank of Ajaqutalik River, 2 km upstream from the mouth (68°22.8′N, 82°33.5′W), at an elevation of 14 m.

The sample (43.4 g dry weight) was treated with an acid leach to remove the outer 20% of the sample. The age estimate is based on two 1-day counts (2580 minutes) in the 2 L counter with a mixing ratio of 1.00.

The uncorrected age is 3580 ± 60.

Comment (L.A. Dredge): The shells were exposed in the topset beds of a small delta relating to a waterplane at about 15 m.

Prince of Wales Island

GSC-4470 HP. Fisher River

uncorrected >49 000

The marine shell fragments (*Hiatella arctica*; identified by A.S. Dyke) were enclosed in gravel and sand. Sample 84 DCA-26 S was collected by T.F. Morris on July 20, 1984, from the west bank of Fisher River, Prince of Wales Island, District of Franklin, Northwest Territories (71°58′N, 98°10′W), at an elevation of about 12 m; submitted by A.S. Dyke.

The sample (121.6 g dry weight) was treated with an acid leach to remove the outer 5% of the cleaned shell material. The age estimate is based on two 2-day counts (6760 minutes) in the 5 L counter with a mixing ratio of 1.00.

Comment (A.S. Dyke): Two 6-10 m sections along the west bank of Fisher River expose glacial and fluvial sediments below till. The lowest unit, exposed in only one of the sections, is a diamicton with striated, angular to sub-angular clasts supported by a compact mud matrix and is interpreted as till. Several metres of overlying gravel, consisting mostly of boulders at the base, fines upward to sand. Imbrication of clasts in this unit indicates southward water flow as in the present Fisher River. The sand is capped by till that extends to the surface. The surface till at the other section is underlain by planar bedded sands.

The fluvial sands in both sections contain abundant but small fragments of redeposited marine shells. A radiocarbon date (GSC-4470 HP), a uranium-series date (UQT-445), and amino acid ratios (AAL-4305) were determined for a sample of *Hiatella arctica* from one section (Dyke et al., 1992, Table 1, p. 25). At face value, the uranium-series date of 35 ka indicates a Middle Wisconsinan age for the fluvial sediments. The radiocarbon determination, however, indicates that the uranium-series age should be regarded as a minimum estimate. The amino acid ratios are similar to those in erratic shells in the surface till on Prince of Wales and Somerset islands. These ratios were considered to represent a Sangamonian age by Dyke and Matthews (1987). Shells (*Hiatella arctica*) in glaciomarine sediment below the till at Cape Hardy, Prince of Wales Island, have similar amino acid ratios and a uranium-series age estimate of 80 ka (UQT-446), indicative of a Late Sangamonian to Early Wisconsinan age.

Stefansson Island

GSC-4483. Stefansson Island 2940 ± 60
$\delta^{13}C = -24.8‰$

The wood, driftwood log (30 cm long; *Picea*; identified by H. Jetté (unpublished GSC Wood Report No. 87-31)), was partly embedded silt and gravel. Sample HCA 86 9 8 103 was collected by C.A. Hawkins on August 9, 1986, from central-east coast Stefansson Island, District of Franklin, Northwest Territories (73°13′N, 104°45′W), at an elevation of 6.5 m; submitted by D.A. Hodgson.

The sample (10.8 g wet weight) was treated with hot base, hot acid, and distilled water rinses (noncalcareous). The age estimate is based on two 1-day counts (2160 minutes) in the 5 L counter with a mixing ratio of 1.00.

The uncorrected age is 2940 ± 60.

GSC-4484. Stefansson Island 8540 ± 100
$\delta^{13}C = +3.4‰$

The marine shells, whole valves (*Hiatella arctica*; identified by D.A. Hodgson) were enclosed in deltaic silt. Sample HCA-86-5-8-8 was collected by D.A. Hodgson on August 5, 1986, from central-east coast of Stefansson Island, District of Franklin, Northwest Territories (73°16′N, 104°44′W), at an elevation of 66 m; submitted by D.A. Hodgson.

The sample (33.3 g dry weight) was treated with an acid leach to remove the outer 20% of the sample. The age estimate is based on two 1-day counts (2160 minutes) in the 2 L counter with a mixing ratio of 1.00.

The uncorrected age is 8480 ± 100.

Victoria Island

GSC-4860. Namaycush Lake >35 000
$\delta^{13}C = -24.9‰$

The wood (*Picea* and *Larix*; identified by R.J. Mott (unpublished GSC Wood Report No. 88-40)), sample 85 NJ 021, was collected by M. Nixon and R. Kelley on July 3, 1985, from 30 km east-southeast of Namaycush Lake, east-central Victoria Island, District of Franklin, Northwest Territories (70°41′N, 107°19′W), at an elevation of 127 m; submitted by D. Sharpe.

The sample (10.0 g dry weight) was treated with hot base, hot acid, and distilled water rinses (noncalcareous). The treated sample (8.7 g) yielded 8.54 L of CO_2 gas. The age estimate is based on two counts for 4835 minutes in the 5 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 0.159 ± 0.042, 2.109 ± 0.032, and 28.604 ± 0.129 cpm, respectively.

Namaycush Lake Series

A series of wood and peat samples from 32 km east-southeast of Namaycush Lake, central Victoria Island, District of Franklin, Northwest Territories (70°41′N, 107°19′W), at an elevation of about 130 m, were collected by M. Nixon on July 8, 1987; submitted by L. Ovenden.

GSC-4505. Namaycush Lake (I) >39 000
$\delta^{13}C = -21.1‰$

The wood, a coniferous driftwood log, sample OG-87-7-8-1MN (13.8 g dry weight), enclosed in fine sand, was treated with hot base, hot acid, and distilled water rinses (noncalcareous). The age estimate is based on one 3-day count (4200 minutes) in the 5 L counter with a mixing ratio of 1.00.

GSC-4558. Namaycush Lake (II)
uncorrected 6940 ± 60

The moss peat sample OG-87-7-8-1 No. 21 (88.3 g wet weight), was treated with hot base, hot acid, and distilled water rinses. The age estimate is based on one 3-day count (4200 minutes) in the 5 L counter with a mixing ratio of 1.00.

GSC-4570. Namaycush Lake (III)
uncorrected 7840 ± 90

The moss peat sample OG-87-7-8-1 No. 4 and No. 5 (112.1 g wet weight), enclosed in sand and peat, was treated with hot base, hot acid, and distilled water rinses (slightly calcareous). The age estimate is based on two 1-day counts (2200 minutes) in the 5 L counter with a mixing ratio of 1.00.

A moss peat sample from 28 km east-southeast of Namaycush Lake, Victoria Island, District of Franklin, Northwest Territories (70°40′N, 107°33′W), at an elevation of about 120 m, was collected by L. Ovenden on July 13, 1987; submitted by L. Ovenden.

GSC-4576. Namaycush Lake (IV) 2310 ± 50
$\delta^{13}C = -24.2‰$

The moss peat sample OG-87-7-13 No. 4 (98.9 g wet weight), enclosed in sand, was treated with hot base, hot acid, and distilled water rinses (slightly calcareous). The age estimate is based on two 1-day counts (2320 minutes) in the 5 L counter with a mixing ratio of 1.00.

The uncorrected age is 2300 ± 50.

A series of sandy moss peat samples from 30 km east-southeast of Namaycush Lake, Victoria Island, District of Franklin, Northwest Territories (70°40′N, 107°30′W), at an elevation of about 120 m, were collected by L. Ovenden on July 20, 1987; submitted by L. Ovenden.

GSC-4587. Namaycush Lake (V) 3090 ± 60
$\delta^{13}C = -28.4‰$

The sandy moss peat sample OG-87-7-20-3 No. 4 (133.0 g wet weight), enclosed in fine sand and moss peat, was treated with hot base, hot acid, and distilled water rinses (moderately calcareous). The age estimate is based on two 1-day counts (2160 minutes) in the 5 L counter with a mixing ratio of 1.00.

The uncorrected age is 3150 ± 60.

GSC-4589. Namaycush Lake (VI) 4170 ± 60
$\delta^{13}C = -28.1‰$

The sandy moss peat sample OG-87-7-20-3 No. 6 (133.0 g wet weight), enclosed in fine sand and moss peat, was treated with hot base, hot acid, and distilled water rinses (moderately calcareous). The age estimate is based on one 2-day count (2610 minutes) in the 5 L counter with a mixing ratio of 1.00.

The uncorrected age is 4220 ± 60.

GSC-4521. Burns Lake 9320 ± 130
$\delta^{13}C$= -27.6‰

The silty moss - sedge peat was enclosed in peat. Sample OG-87-7-18 No. 16 was collected by L. Ovenden and C. Spencer on July 18, 1987, from 45 km south of Burns Lake, central Victoria Island, District of Franklin, Northwest Territories (70°58′N, 110°4′W), at an elevation of 220 m; submitted by L. Ovenden.

The sample (400.0 g wet weight) was treated with hot base, hot acid, and distilled water rinses (slightly calcareous). The age estimate is based on two 1-day counts (2590 minutes) in the 2 L counter with a mixing ratio of 1.00.

The uncorrected age is 9360 ± 130.

GSC-4811. Wilbank Bay 5220 ± 80
$\delta^{13}C$ = +1.2‰

The marine shells (bivalves; *Hiatella arctica*; identified by D. Sharpe) were enclosed in sand and pebbles. Sample 88-SBB-74 was collected by D. Sharpe and T. Warman on July 12, 1988, from 5 km north of Wilbank Bay, east of Richardson Islands, southern coast of Victoria Island, District of Franklin, Northwest Territories (68°38′N, 110°10′W), at an elevation of 43 m; submitted by D. Sharpe.

The sample (23.8 g dry weight) was treated with an acid leach to remove the outer 20% of the sample. The treated sample (19.1 g) yielded 4.10 L of CO_2 gas. The age estimate is based on two counts for 2155 minutes in the 2 L counter with a mixing ratio of 1.08. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 9.403 ± 0.077, 1.090 ± 0.023, and 17.970 ± 0.101 cpm, respectively.

The uncorrected age is 5200 ± 80.

GSC-4805. Wilbank Bay area 9300 ± 80
$\delta^{13}C$ = +0.3‰

The marine shells (*Hiatella arctica* and *Mya truncata*; identified by D. Sharpe) were from a surface collection on sand and silt. Sample 88-SBB-60 was collected by D. Sharpe and T. Warman from 25 km north of Wilbank Bay, southern coast of Victoria Island, District of Franklin, Northwest Territories (68°50′N, 111°14′W), at an elevation of 157 m; submitted by D. Sharpe.

The sample (45.8 g dry weight) was treated with an acid leach to remove the outer 20% of the sample. The treated sample (36.9 g) yielded 8.22 L of CO_2 gas. The age estimate is based on one count for 3855 minutes in the 5 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 8.909 ± 0.058, 2.172 ± 0.022, and 28.325 ± 0.122 cpm, respectively.

The uncorrected age is 9290 ± 80.

GSC-4826. Hadley Bay 8110 ± 80
$\delta^{13}C$ = +1.5‰

The marine shells (*Hiatella arctica*; identified by D. Sharpe) were enclosed in sand. Sample 88-SBB-111 was collected by D. Sharpe and T. Warman on July 19, 1989, from south end of Hadley Bay, Storkerson Peninsula, northeast Victoria Island, District of Franklin, Northwest Territories (71°32′N, 110°47′W), at an elevation of 12 m; submitted by D. Sharpe.

The sample (48.1 g dry weight) was treated with an acid leach to remove the outer 20% of the sample. The treated sample (38.3 g) yielded 6.59 L of CO_2 gas. The age estimate is based on one count for 3710 minutes in the 5 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 10.369 ± 0.072, 2.127 ± 0.043, and 28.373 ± 0.167 cpm, respectively.

The uncorrected age is 8090 ± 80.

UNITED STATES OF AMERICA

New York State

GSC-4498. Clear Pond 12 000 ± 200
$\delta^{13}C$ = -28.0‰

The lake sediment, gyttja, sample AP-86-13 (976-979 cm), was collected by T.W. Anderson on September 21, 1986, from Clear Pond, 20 km southeast of Potsdam, New York, U.S.A. (44°33′0″N, 74°46′30″W), at an elevation of 396 m; submitted by T.W. Anderson.

The sample (140.0 g wet weight) was treated with hot acid and distilled water rinses; base treatment was omitted (slightly calcareous). The age estimate is based on two 1-day counts (2470 minutes) in the 2 L counter with a mixing ratio of 2.37.

The uncorrected age is 12 100 ± 200.

Comment (T.W. Anderson): The sample was taken from the base of the gyttja unit, which grades downward into an

FeS-streaked sandy silt, which is underlain, in turn, by a grey banded clay. The sample dates the rise in spruce pollen. However, the sample is thought to be too old by up to 1.6 ka because of a hardwater error, based on a comparison with a date of 11.2 ka (GSC-3429, McNeely, 1989) for the same rise in spruce pollen at Boyd Pond, New York, 31 km southwest of this site.

Washington State

Nooksack River Series

A series of wood and shell samples from Nooksack River, 4 km west of Deming, Washington State, U.S.A. (48°52'N, 122°17'W), were collected by J.J. Clague on October 15, 1987, and July 13, 1989; submitted by J.J. Clague.

TO-933. Nooksack River (I) 12 250 ± 70

The marine pelecypod valves, sample CIA-87-248-1 (*Nuculana*), were enclosed in stony mud.

TO-1552. Nooksack River (II) 12 470 ± 100

The marine shell, a single valve, sample CIA-87-248-3, was enclosed in stony silty clay.

GSC-4944. Nooksack River (III) 11 500 ± 120
$\delta^{13}C = -27.4‰$

The wood twigs, sample CIA-87-248-5 (4.3 g dry weight; deciduous but not identifiable; R.J. Mott (unpublished GSC Wood Report No. 89-52)), at an elevation of 68 m, were enclosed in peat. The sample was treated with hot base, hot acid, and distilled water rinses (noncalcareous). The treated sample (3.5 g) yielded 3.87 L of CO_2 gas. The age estimate is based on one count for 3900 minutes in the 2 L counter with a mixing ratio of 1.14. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 4.233 ± 0.045, 1.083 ± 0.019, and 17.862 ± 0.102 cpm, respectively.

The uncorrected age is 11 600 ± 120.

GSC-4939. Nooksack River (IV) 12 100 ± 120
$\delta^{13}C = -25.1‰$

The wood, sample CIA-87-248-4 (13.8 g wet weight; a branch of *Pinus ponderosa*; identified by H. Jetté (unpublished GSC Wood Report No. 90-04)), at an elevation of 69 m, was enclosed in mud. The sample was treated with hot base, hot acid, and distilled water rinses (noncalcareous). The treated sample (7.1 g) yielded 7.78 L of CO_2 gas. The age estimate is based on two counts for 2000 minutes in the 5 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 6.268 ± 0.070, 2.105 ± 0.027, and 28.136 ± 0.132 cpm, respectively.

The uncorrected age is 12 100 ± 120.

GSC-4954. Nooksack River (V) 12 200 ± 130
$\delta^{13}C = -25.7‰$

The wood, sample CIA-87-248-2 (11.6 g dry weight; *Pinus contorta / ponderosa*; identified by H. Jetté (unpublished GSC Wood Report No. 90-11)), at an elevation of 53 m, was enclosed in sand. The sample was treated with hot base, hot acid, and distilled water rinses (noncalcareous). The treated sample (5.2 g) yielded 5.46 L of CO_2 gas. The age estimate is based on one count for 3830 minutes in the 2 L counter with a mixing ratio of 1.00. The count rates for the sample (net) and for monthly backgrounds and standards (net) were 3.960 ± 0.043, 1.026 ± 0.023, and 18.054 ± 0.143 cpm, respectively.

The uncorrected age is 12 200 ± 130.

Comment (J.J. Clague): GSC-4939, -4944, and -4954 are from the type section of the Deming Sand, a purported terrestrial (fluvial) sand unit that is underlain and overlain by glaciomarine units (Kulshan and Bellingham drifts). The lower of the two glaciomarine units at this site is underlain by another sand unit. GSC-4954 is from the top of the lower sand unit (50 cm below its contact with the Kulshan glaciomarine drift). GSC-4944 is from a peat layer near the base of the Deming Sand (i.e., within sediments transitional to the underlying Kulshan Drift). GSC-4939 is from sediments 40 cm above this peat bed. Marine shells collected from the lowermost 3 m of the Bellingham glaciomarine drift, above the Deming Sand, gave ages of 12 250 ± 70 (TO-933) and 12 470 ± 100 (TO-1552). Collectively, these ages indicate that the entire sequence at this section was deposited over a short period of time about 12 ka BP. The oldest ages are from the Bellingham Drift (the highest unit), a problem that is presently unresolved. The stratigraphic relationships at this site provide evidence for a regression at the end of deposition of the Kulshan Drift, followed by a transgression that is signalled by the deposition of Deming Sand. This sand is here interpreted to be a deltaic unit.

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INDEX[2]

[2] HP - 'High Pressure' (5 L counter at 4 atmospheres).