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GEOLOGICAL SURVEY OF CANADA  
PAPER 88-7

# GEOLOGICAL SURVEY OF CANADA RADIOCARBON DATES XXVIII

collated by

R. McNeely

1989



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RADIOCARBON DATES XXVIII**

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This Date List, GSC XXVIII, is the seventeenth 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 XXVIII

### Abstract

This list presents 450 radiocarbon age determinations made by the Radiocarbon dating Laboratory. All samples dated more than five years ago have now been reported in date lists. The total number (445) of samples from various areas are as follows: Newfoundland (29); Nova Scotia (9); Prince Edward Island (17); New Brunswick (19); Québec (30); Ontario (92), including 45 from the Great Lakes region (New York-6; Ohio-6; Michigan-6); Saskatchewan (4); Alberta (13); British Columbia (28); Yukon Territory (41); Northwest Territories, mainland (58); Northwest Territories, Arctic Archipelago (98); U.S.A. - New York (2); Michigan (3); Alaska (1). Archeological samples (10) have not been presented separately, but are noted in the Index. Tables 1 and 2 summarize the details of background and standard counts for the 2 L and 5 L counters during the period from November 17, 1986 to December 6, 1988. In addition to the samples dated, Table 3 lists the samples (60) on which the dating was not completed (i.e. abandoned) for a variety of reasons, such as insufficient gas produced, etc. Table 4 lists the samples (4) which gave anomalous ages and were deemed not worth publishing. These samples are included here for completeness.

### Résumé

Ce rapport présente les résultats de 450 datations effectuées par le laboratoire de datation au radiocarbone. Tous les résultats des datations faites il y a plus de cinq ans ont maintenant été présentés sous forme de listes de datations. Les échantillons datés, au nombre de 445, proviennent des régions suivantes: Terre-Neuve (29); Nouvelle-Ecosse (9); Ile-du-Prince-Edouard (17); Nouveau-Brunswick (19); Québec (30); Ontario (92), dont 45 dans la région des Grand-Lacs (New York-6; Ohio-6; Michigan-6); Saskatchewan (4); Alberta (13); Colombie-Britannique (28); Yukon (41); Territoires du Nord-Ouest, continent (58); Territoires du Nord-Ouest, archipel arctique (98); U.S.A. - New York (2), Michigan (3), Alaska (1). Les résultats des datations effectuées sur des échantillons archéologiques (10) ne sont pas présentés séparément, mais sont notés dans l'index. 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 17 novembre 1986 au 6 décembre 1988. En plus des échantillons datés, le tableau 3 présente les échantillons (60) pour lesquels la datation n'a pas été complétée (i.e. abandonnée) pour des raisons variées, telle une production insuffisante de gaz, etc. Le tableau 4 présente les échantillons (4) qui ont livré des âges anormaux qu'on n'a pas jugé bon de publier. Ces échantillons sont inclus ici afin de livrer un rapport complet.

### INTRODUCTION<sup>1</sup>

This publication includes all of the samples that have been dated more than five years ago and not published in a "date list". All samples dated more than two years ago that have not been included in a 'GSC Date List' during the last twenty-five years will be published in the next year. The presentation of dates within each section or subsection of this text are ordered from east to west. All GSC dates, up to and including GSC-3600, are now accessible on a computer data base. 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 data base is available from Dr. D.A. St-Onge, 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 recent review of laboratory operations the reader is referred to Lowdon (1985).

During the period from November 1986 through November 1988, both the 2 L counter (Dyck and

<sup>1</sup> The date list has been compiled by R. McNeely from descriptions of samples and interpretations of age determinations provided by the collectors and submitters.

Fyles, 1962) and the 5 L counter (Dyck et al., 1965) were operated continuously. The 2 L counter was operated at 2 atmospheres (atm) throughout this period, and the 5 L counter was operated at 1 atmosphere, except for July through October 1987 and June through August 1988 when the 5 L counter was operated at 4 atmospheres (high pressure).

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 one-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  $^{14}\text{C}$  half-life of  $5568 \pm 30$  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  $^{14}\text{C}$  (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  $\pm 2$  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  $^{13}\text{C}/^{12}\text{C}$  ratios ( $\delta^{13}\text{C}$ ) were available, a "correction" for isotopic fractionation was applied to the sample age, and the  $\delta^{13}\text{C}$  value reported. For terrestrial and nonmarine organic materials, and bones (both terrestrial and marine) the ages are conventionally corrected to a  $\delta^{13}\text{C} = -25.0\text{‰}$  PDB, whereas, marine shell ages are unconventionally corrected to a  $\delta^{13}\text{C} = 0.0\text{‰}$  PDB; freshwater shell ages are not corrected. All  $\delta^{13}\text{C}$  determinations were made on aliquots of the sample gas used for age determinations. Since 1975 all  $\delta^{13}\text{C}$  values have been 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  $\delta^{13}\text{C}$  determinations were done by the GSC Geochronology

Section (R.K. Wanless, Head) and by Teledyne Isotopes, Westwood, New Jersey.

## Acknowledgments

Appreciation is expressed to I.M. Robertson (1964 to present), S.M. Chartrand (1969 to 1976), J.E. Tremblay (1976 to 1980), A.M. Telka (1980 to 1986), and L.M. Maillé (1986 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. Lichti-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. Lichti-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	R.P. Beukens
(AMS) dating:	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.

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W. Spirito, L. Brouillette, J. Cousineau, J. Wilhem, and P. Merriam assisted in the preparation of this report and the development of the 'Date Locator File'.

**Table 1.** Monthly average count rate for backgrounds and the number of individual counts (N) made during the period November 1986 through November 1988

Month	2 L Counter (2 atm)		5 L Counter (1 or 4 atm)		
	cpm*	(N)	cpm*	(N)	
December 1986	1.195 ± 0.018	(4)	2.355 ± 0.022	(5)	
January 1987	1.213 ± 0.018	(4)	2.422 ± 0.036	(4)	
February	1.279 ± 0.019	(4)	2.489 ± 0.028	(4)	
March	1.258 ± 0.026	(4)	2.494 ± 0.040	(4)	
April	1.249 ± 0.019	(4)	2.438 ± 0.036	(4)	
May	1.239 ± 0.019	(4)	2.362 ± 0.026	(4)	
June	1.237 ± 0.023	(3)	2.380 ± 0.031	(3)	
July					
August	1.089 ± 0.023	(6)	2.810 ± 0.021	(9)	HP
September	1.055 ± 0.022	(4)	2.845 ± 0.042	(3)	HP
October	1.109 ± 0.034	(4)	2.904 ± 0.023	(6)	HP
November	1.148 ± 0.018	(4)	2.174 ± 0.025	(4)	
December 1987	1.103 ± 0.020	(4)	2.187 ± 0.036	(4)	
January 1988	1.144 ± 0.026	(3)	2.257 ± 0.031	(3)	
February	1.122 ± 0.034	(4)	2.222 ± 0.025	(4)	
March	1.089 ± 0.019	(4)	2.144 ± 0.024	(4)	
April	1.062 ± 0.028	(4)	2.145 ± 0.025	(4)	
May	1.016 ± 0.018	(4)	2.094 ± 0.026	(4)	
June	0.994 ± 0.021	(4)	2.695 ± 0.020	(7)	HP
July	1.038 ± 0.027	(4)			
August	1.035 ± 0.018	(4)	2.777 ± 0.039	(8)	HP
September	1.053 ± 0.017	(4)	2.113 ± 0.024	(4)	
October	1.052 ± 0.017	(4)	2.152 ± 0.024	(4)	
November 1988	1.059 ± 0.029	(4)	2.122 ± 0.043	(4)	

\*cpm = counts per minute

HP - High Pressure = 4 atmospheres

**Table 2.** Monthly average net count rate for oxalic acid standards (No)\* and the number of individual counts(N) made during the period November 1986 through November 1988

Month	2 L Counter (2 atm)		5 L Counter (1 or 4 atm)		
	cpm**	(N)	cpm**	(N)	
December 1986	18.135 ± 0.080	(4)	28.054 ± 0.127	(4)	
January 1987	18.105 ± 0.096	(3)	28.020 ± 0.124	(3)	
February	17.997 ± 0.108	(3)	27.986 ± 0.127	(3)	
March	18.068 ± 0.147	(3)	28.099 ± 0.122	(3)	
April	18.141 ± 0.094	(3)	28.142 ± 0.121	(3)	
May	18.136 ± 0.097	(3)	28.257 ± 0.209	(3)	
June	18.124 ± 0.106	(3)	28.093 ± 0.164	(3)	
July					
August	17.981 ± 0.078	(4)	107.347 ± 0.197	(5)	HP
September	18.203 ± 0.102	(3)	107.021 ± 0.286	(2)	HP
October	18.160 ± 0.100	(3)	106.563 ± 0.299	(2)	HP
November	18.222 ± 0.097	(3)	28.203 ± 0.123	(3)	
December 1987	18.162 ± 0.179	(3)	28.091 ± 0.126	(3)	
January 1988	18.195 ± 0.093	(2)	28.219 ± 0.266	(2)	
February	18.141 ± 0.126	(3)	28.031 ± 0.113	(3)	
March	18.206 ± 0.094	(3)	27.947 ± 0.117	(3)	
April	18.241 ± 0.155	(3)	28.219 ± 0.124	(3)	
May	18.217 ± 0.097	(3)	28.208 ± 0.143	(3)	
June	18.078 ± 0.096	(3)	107.110 ± 0.259	(3)	HP
July	18.075 ± 0.093	(3)			
August	18.029 ± 0.088	(3)	107.073 ± 0.257	(4)	HP
September	18.090 ± 0.096	(3)	28.204 ± 0.118	(2)	
October	17.959 ± 0.159	(3)	28.079 ± 0.127	(3)	
November 1988	18.169 ± 0.099	(3)	28.206 ± 0.127	(3)	

\*No = 95% of the net activity of the NBS Oxalic Acid Standard

\*\*cpm = counts per minute

HP - High Pressure = 4 atmospheres

## Laboratory crosscheck sample

### *Jordan River, Vancouver Island*

Wood (Douglas fir) from the east side Uglow Creek, west of the Jordan River, on the west coast of Vancouver Island, British Columbia (47°27.2'N, 124°3.7'W) was collected live by an operator for Raynier Canada Ltd. in December, 1960. A slab from the trunk was shipped to the GSC for use in the Radiocarbon Dating Laboratory. The growth rings were counted by W. Dyck and sub-samples of discrete ages taken for dating. A number of preparations from this sample, especially of rings '1110-1114', have been dated over the last 20 years as internal checks on the GSC counters.

#### GSC-22(1) 2. (rings 1110-1114) (ca. 1100 years BP)

In September 1973, 12.0 g (dry weight) was treated with hot base, hot acid, and distilled water rinses.

##### Counting times:

October 1973:

One 3-day count in the 5 L counter

Uncorrected:	1110 ± 50
Corrected:	1150 ± 50

March 1974:

One 5-day count in the 1 L counter

Uncorrected:	1030 ± 130
Corrected:	1080 ± 130

September 1974:

One 3-day count in the 2 L counter

Uncorrected:	1040 ± 130
Corrected:	1080 ± 130

This gas preparation, labelled GSC-22(1) 2, was stored in glass for ca. 2.5 years.

##### Re-counted in May 1976:

Two 1-day counts in the 2 L counter

Uncorrected:	1110 ± 60
--------------	-----------

#### GSC-22(1) 3.

In November 1977, 11.0 g (dry weight) was treated with hot base, hot acid, and distilled water rinses.

##### Counting times in January 1978:

One 3-day count in the 2 L counter

Uncorrected:	1220 ± 50
Corrected:	1230 ± 50

One 3-day count in the 5 L counter

Uncorrected:	1270 ± 50
Corrected:	1290 ± 50

##### Re-counted in March 1978:

Three 1-day counts in 5 L counter

Uncorrected:	1170 ± 70
--------------	-----------

This gas preparation, labelled GSC-22(1) 3, was stored in a glass for ca. 4.5 years.

##### Re-counted in April 1982:

Two 1-day count in the 5 L counter

Uncorrected:	1060 ± 50
--------------	-----------

Two 1-day count in the 2 L counter

Uncorrected:	1180 ± 60
--------------	-----------

#### GSC- 22(1) 4.

In April 1982, 9.4 g (dry weight) were treated with hot base, hot acid, and distilled water rinses.

##### Counting time:

May 1982:

Two 1-day counts in the 5 L counter

Uncorrected:	1190 ± 60
Corrected:	1200 ± 60

August 1982:

Two 1-day counts in the 2 L counter

Uncorrected:	1120 ± 70
Corrected:	1140 ± 70

This was the last aliquot of rings '1110-1114'.

This gas preparation, labelled GSC-22(1) 4, was stored in a glass for ca. 5.5 years.

##### Re-counted in December 1987:

One 1-day count in the 5 L counter

Uncorrected:	1230 ± 80
--------------	-----------

If  $\delta^{13}\text{C}$  aliquots were taken then the ages were "corrected" to -25‰, otherwise, the uncorrected age is reported. No calibration has been applied to these ages. Except for two counts in January, 1978 the age determinations have all been within 100 years of the expected age. The 1978 counts improved by March of that year.

Although the test was not rigorously controlled, the storage of the  $\text{CO}_2$  gas in glass collection vessels would appear to be satisfactory for as long as 5 years.

## GEOLOGICAL AND ARCHEOLOGICAL SAMPLES

### Eastern Canada

#### Newfoundland (Labrador)

GSC-2588. South Aulatsivik Island,  $7850 \pm 130$   
Nain Archipelago  $\delta^{13}\text{C} = + 2.6\text{‰}$ .

Marine shells (sample JPJ-77-1; *Mya truncata* Linné; identified by W. Blake, Jr.) from southeast South Aulatsivik Island, Nain Archipelago, Labrador, Newfoundland ( $56^{\circ}40'0''\text{N}$ ,  $61^{\circ}23'40''\text{W}$ ), at an elevation of 36 m, were collected by J.P. Johnson, Jr. on July 12, 1977; submitted by J.P. Johnson, Jr.

The sample (11.5 g dry weight) was treated with an acid leach to remove ten per cent of the outer material. The age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 2.09.

Uncorrected age,  $7800 \pm 130$ .

GSC-3092. Ikudliayuk Fiord  $7990 \pm 90$   
 $\delta^{13}\text{C} = + 1.4\text{‰}$ .

Marine pelecypod shells (sample JPJ-78-20; *Mya truncata* Linné; identified by W. Blake, Jr.) from Ikudliayuk Fiord, Labrador, Newfoundland ( $60^{\circ}4'32''\text{N}$ ,  $64^{\circ}34'21''\text{W}$ ), at an elevation of 2.0 m, were collected by J.P. Johnson, Jr. on August 22, 1978; submitted by J.P. Johnson, Jr.

The sample (24.3 g dry weight) was treated with an acid leach to remove ten per cent of the outer material. The age estimate is based on one 3-day count in the 2 L counter with a mixing ratio of 1.00.

Uncorrected age,  $7970 \pm 90$ .

GSC-3123. Ramah Bay  $7960 \pm 280$   
 $\delta^{13}\text{C} = + 1.1\text{‰}$ .

Marine shells (sample JPJ-78-5; *Balanus crenatus*; identified by W. Blake, Jr.) from head of Ramah Bay, Labrador, Newfoundland ( $58^{\circ}52'4''\text{N}$ ,  $63^{\circ}21'12''\text{W}$ ), at an elevation of 21 m, were collected by J.P. Johnson, Jr. on July 31, 1978; submitted by J.P. Johnson, Jr.

The sample (4.4 g dry weight) was treated with an acid leach to remove five per cent of the outer material. The age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 5.50.

Uncorrected age,  $7940 \pm 280$ .

#### Hebron Fiord series

A series of samples from head of Hebron Fiord, Labrador, Newfoundland ( $57^{\circ}59'36''\text{N}$ ,  $63^{\circ}10'28''\text{W}$ ) was collected by J.P. Johnson, Jr. on July 25, 1978; submitted by J.P. Johnson, Jr.

GSC-3096. Hebron Fiord (I)  $4610 \pm 220$   
 $\delta^{13}\text{C} = + 2.1\text{‰}$ .

Marine pelecypod shells (JPJ-78-4; 10.5 g dry weight; *Mya truncata* Linné; identified by W. Blake, Jr.), from an elevation of 4.0 m, were treated with an acid leach to remove ten per cent of the outer material. The age estimate is based on three 1-day counts in the 2 L counter with a mixing ratio of 2.29.

Uncorrected age,  $4580 \pm 220$ .

GSC-3368. Hebron Fiord (II)  $6660 \pm 310$   
 $\delta^{13}\text{C} = - 0.7\text{‰}$ .

Marine shells (JPJ-78-3; 3.8 g dry weight; *Serripes groenlandicus* / *Clinocardium ciliatum*; identified by W. Blake, Jr.) from an elevation of 1.0 m, were not leached before processing. The age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 7.46.

Uncorrected age,  $6670 \pm 310$ .

#### Groswater Bay series

A series of piston core samples from Groswater Bay, Labrador Shelf, Newfoundland was dated to provide a chronology for changes in the paleoceanography and paleosedimentation along the margin of the Laurentide Ice Sheet. They also assist in deciphering the sediment dynamics of the inner Labrador Shelf.

A piston core (79018-92) from the entrance to Groswater Bay, Labrador Shelf, Newfoundland ( $54^{\circ}6.1'\text{N}$ ,  $56^{\circ}50.7'\text{W}$ ), in water a depth of 109 m, was collected by G. Vilks on August 1, 1979. The total core length was 4.5 m, consisting of alternating layers of mud, silty mud, sand and gravel; sample submitted by I.A. Hardy.

GSC-3274. Groswater Bay (I)  $5180 \pm 330$   
 $\delta^{13}\text{C} = -23.3\text{‰}$ .

Marine sediment (Hu 79-018-092 (84.5-103 cm); 196.3 g wet weight) was treated with hot acid, (slightly calcareous) and distilled water (base treatment omitted). The age estimate is based on one 3-day count in the 2 L counter with a mixing ratio of 9.01.

Uncorrected age,  $5160 \pm 330$ .

A piston core (79018-94A) taken from near the entrance to Groswater Bay, Labrador Shelf, Newfoundland ( $54^{\circ}9.6'\text{N}$ ,  $56^{\circ}43.3'\text{W}$ ), in a water depth of 95 m, was collected by G. Vilks on August 1, 1979. The total length of core was 8.41 m, consisting

of silty clay, and a few layers of sand and gravelly mud; samples submitted by G. Vilks.

GSC-3126. Groswater Bay (II) 15 300 ± 640  
 $\delta^{13}\text{C} = -24.8\text{‰}$ .

Marine sediment (Hu 79018-94A (350-375 cm); 555.43 g dry weight) was treated with hot acid and water rinses (base treatment omitted). The age estimate is based on one 5-day count in the 2 L counter with a mixing ratio of 7.76.

Uncorrected age, 15 300 ± 640.

GSC-3125. Groswater Bay (III) 7110 ± 240  
 $\delta^{13}\text{C} = -0.2\text{‰}$ .

Marine shells (Hu 79018-94A (360-366 cm); 3.15 g dry weight; *Clinocardium ciliatum*; identified by F. Wagner) were not leached prior to processing. The age estimate is based on one 3-day count in the 2 L counter with a mixing ratio of 7.46.

Uncorrected age, 7110 ± 240.

A piston core (79018-95) from Groswater Bay, Labrador Shelf, Newfoundland (54°6.8'N, 56°40.78'W), in a water depth of 139 m, was collected by G. Vilks on August 1, 1979. The total core length was 8.19 m consisting mainly of clay grading to sandy silt towards the surface; samples submitted by G. Vilks.

GSC-2993. Groswater Bay (IV) 13 900 ± 700  
 $\delta^{13}\text{C} = -21.1\text{‰}$ .

Marine sediment (Hu 79018-95: (118-133 cm); 440 g wet weight) was treated with hot acid, and water rinses (base treatment omitted). The age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 4.88.

Uncorrected age, 13 900 ± 700.

GSC-3014. Groswater Bay (V) 11 000 ± 440  
 $\delta^{13}\text{C} = -24.3\text{‰}$ .

Marine sediment (Hu 79018-95: (365-380 cm); 457 g dry weight) was treated with hot acid and water rinses. The age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 5.16.

Uncorrected age, 11 000 ± 440.

GSC-2977. Groswater Bay (VI) 20 400 ± 1650  
 $\delta^{13}\text{C} = -25.7\text{‰}$ .

Marine sediment (Hu 79018-95: (760-775 cm); 490 g wet weight) was treated with hot acid and water rinses (base treatment omitted). The age estimate is based on one 3-day count in the 2 L counter with a mixing ratio of 7.35.

Uncorrected age, 20 400 ± 1650.

Additional information is available in Vilks and Wang, 1981, and Vilks et al., 1984.

#### Cartwright Saddle series

A series of core samples were taken from Cartwright Saddle, Labrador Shelf, 100 km northeast from Cartwright, Newfoundland.

A piston core (73027-11) was taken in a basin called Cartwright Saddle (54°37.7'N, 56°12.6'W) in a water depth of 493 m. The total core length was 8.8 m, consisting mainly of silty clay. The core was collected by G. Vilks on September 22, 1973; samples submitted by G. Vilks.

GSC-2560. Cartwright Saddle (I) 11 700 ± 490  
 $\delta^{13}\text{C} = -24.3\text{‰}$ .

Marine sediment ((2) 73027-11 (465-475 cm); 220 g wet weight) was treated with hot acid and distilled water (base treatment omitted). The age estimate is based on one 4-day count in the 2 L counter with a mixing ratio of 10.7.

Uncorrected age, 11 700 ± 490.

A piston core (73027-12) was taken from Cartwright Saddle (54°36.3'N, 56°15.0'W), in a water depth of 577 m. The total core length was 12.2 m, consisting mainly of silty clay. The core was collected by G. Vilks on September 22, 1973; samples submitted by G. Vilks.

GSC-2565. Cartwright Saddle (II) 13 400 ± 770  
 $\delta^{13}\text{C} = -19.0\text{‰}$ .

Marine sediment ((4) 73027-12 (490-500 cm); 240 g wet weight) was treated with hot acid and distilled water (base treatment omitted). The age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 8.51.

Uncorrected age, 13 300 ± 770.

Comment (G. Vilks): Three pollen episodes were recorded in the core. At the approximate time of this sample (the third floral episode), there was a continuous regional presence of sedge-shrub tundra vegetation from as early as 21 ka BP. Due to the poor adaptation of *Salix* pollen to long distance transport, its presence suggests that Cartwright Saddle remained a seasonally open-water depositional environment during the late Wisconsinan. Extensive areas of tundra vegetation were located within 100 km of the marine basin throughout this time, probably including much of the inner continental shelf above 100 m present water depth. The presence

Additional details can be found in Vilks and Mudie (1978), Vilks (1980, 1981), Fillon et. al. (1981), Josenhans et. al. (1986).

## Lake Melville series

A series of core samples was taken from Lake Melville, Labrador, Newfoundland. A piston core (79018-109) was taken from the deepest basin of Lake Melville (53°48.8'N, 59°11.6'W), in a water depth of 203 m. The total core length of 12.49 m consisted of fine clay with a few dropstones. The core was collected by G. Vilks on August 3, 1979; samples submitted by G. Vilks.

GSC-3149. Lake Melville (I)       $4360 \pm 110$   
 $\delta^{13}\text{C} = -24.6\text{‰}$ .

Marine sediment (Hu 79018-109: (255-270 cm); 327.7 g wet weight) was treated with hot acid and water rinses (base treatment omitted). The age estimate is based on one 2-day count in the 2 L counter with a mixing ratio of 2.41.

Uncorrected age,  $4360 \pm 110$ .

GSC-3160. Lake Melville (II)     $6170 \pm 186$   
 $\delta^{13}\text{C} = -24.‰$

Marine sediment (Hu 79018-109; (680-695 cm); 405.4 g wet weight) was treated with hot acid and water rinses (base treatment omitted). The age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 1.88.

Uncorrected age,  $6150 \pm 130$ .

A piston core (79018-111) was taken from the deepest part of Lake Melville (53°49.2'N, 59°11.7'W), in a water depth of 203 m. The total core length was 14 m, consisting of bioturbated clay; the lower half of the core contained methane. The core was collected by G. Vilks on August 3, 1979; samples submitted by G. Vilks.

GSC-3199, Lake Melville (III) 4090 ± 90  
 $\delta^{13}\text{C} = -24.8\text{‰}$ .

Marine sediment (Hu 79018-111: (280-300 cm); 503 g wet weight) was treated with hot acid and water rinses (base treatment omitted). The age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 1.46.

Uncorrected age,  $4090 \pm 90$ .

GSC-3165. Lake Melville (IV)  $6650 \pm 170$   
 $\delta^{13}\text{C} = -23.5\text{‰}$ .

Marine sediment (Hu 79018-111: (880-895 cm); 341.2 g wet weight) was treated with hot acid and water rinses (base treatment omitted). The age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 2.40.

Uncorrected age,  $6630 \pm 170$ .

GSC-3185. Lake Melville (V)  $7530 \pm 120$   
 $\delta^{13}\text{C} = -23.4\text{‰}$ .

Marine sediment (Hu 79018-111: (1030-1050 cm); 440 g wet weight) was treated with hot acid and water rinses (base treatment omitted). The age estimate is based on one 3-day count in the 2 L counter with a mixing ratio of 2.21.

Uncorrected age,  $7510 \pm 120$ .

A piston core (79018-131) was taken in upper Lake Melville off Epinette Peninsula (53°33.6'N, 59°46.4'W), in a water depth of 154 m. The total length of the core was 4.84 m; with laminated silty clay in the lower half grading into bioturbated clay towards the surface. The core was collected by G. Vilks on August 5, 1979; samples submitted by G. Vilks.

GSC-3020. Lake Melville (VI)  $3730 \pm 150$   
 $\delta^{13}\text{C} = -24.4\text{‰}$ .

Marine sediment (Hu 79018-131: (130-145 cm); 350 g dry weight) was treated with hot acid and distilled water (base treatment omitted). The age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 2.70.

Uncorrected age,  $3720 \pm 150$ .

GSC-3063. Lake Melville (VII)  $5110 \pm 220$   
 $\delta^{13}\text{C} = -25.1\text{‰}$ .

Marine sediment (Hu 79018-131: (230-245 cm); 310 g dry weight) was treated with hot acid and water rinses (base treatment omitted). The age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 3.28.

Uncorrected age,  $5120 \pm 220$ .

GSC-3004. Lake Melville (VIII)  
uncorrected  $6610 \pm 720$

Marine sediment (Hu 79018-131: (380-395 cm); 420 g wet weight) was treated with hot acid and water rinses (base treatment omitted). The age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 12.7.

Additional information is available in Vilks and Mudie, 1983.

#### L'Anse aux Meadows series

A series of samples from the Viking site, L'Anse aux Meadows, Newfoundland (51°35.7'N, 55°32.1'W), at an elevation of ca. 1.9 m, was collected by M. Kuc during the summers of 1973 and 1974; submitted by W. Blake, Jr. and M. Kuc.

GSC-2048. L'Anse aux Meadows (I)  
uncorrected 1810 ± 50

Peat (Monolith 8, No. 1; 22.2 g dry weight; unpublished GSC Bryological Report No. 283 by M. Kuc) was treated with hot base, hot acid, and distilled water rinses. The age estimate is based on one 2-day count in the 5 L counter with a mixing ratio of 1.00.

GSC-2051. L'Anse aux Meadows (II)  
uncorrected 640 ± 50

Wood (Monolith 2, No. 3; 11.7 g dry weight; *Larix laricina*; identified by L.D. Wilson (unpublished GSC Wood Report No. 74-28)) was treated with hot base, hot acid, and distilled water rinses. The age estimate is based on two 1-day counts in the 5 L counter with a mixing ratio of 1.00.

GSC-2055. L'Anse aux Meadows (III)  
uncorrected 1590 ± 50

Peat (Monolith 8, No. 3; 21.2 g dry weight; unpublished GSC Bryological Report No. 284 by M. Kuc) was treated with hot base, hot acid, and distilled water rinses. The age estimate is based on one 2-day count in the 5 L counter with a mixing ratio of 1.00.

GSC-2059. L'Anse aux Meadows (IV)  
uncorrected 1340 ± 60

Peat (Monolith 8, No. 5; 25.0 g dry weight; unpublished GSC Bryological Report No. 285 by M. Kuc) was treated with hot base, hot acid, and distilled water rinses. The age estimate is based on two 1-day counts in the 5 L counter with a mixing ratio of 1.00.

GSC-2069. L'Anse aux Meadows (V)  
uncorrected 1600 ± 60

Wood (Monolith 8, No. 2; 11.8 g dry weight; *Larix laricina*; identified by L.D. Wilson (unpublished GSC Wood Report No. 74-28)) was treated with hot base, hot acid, and distilled water rinses. The age estimate

is based on two 1-day counts in the 5 L counter with a mixing ratio of 1.00.

GSC-2071. L'Anse aux Meadows (VI)  
uncorrected 1780 ± 280

Wood (Monolith 1, layer 3; 1.0 g dry weight; unpublished GSC Bryological Report No. 287) was treated with hot base, hot acid, and distilled water rinses. The age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 8.87.

GSC-2076. L'Anse aux Meadows (VII)  
uncorrected 2150 ± 60

Wood (Monolith 2, No. 1; 11.5 g dry weight; *Abies balsamea*; identified by L.D. Wilson (unpublished GSC Wood Report No. 74-28)) was treated with hot base, hot acid, and distilled water rinses. The age estimate is based on two 1-day counts in the 5 L counter with a mixing ratio of 1.00.

GSC-2088. L'Anse aux Meadows (VIII)  
uncorrected 1470 ± 60

Wood (Monolith 8, No. 4; 6.1 g dry weight; *Picea*; identified by L.D. Wilson (unpublished GSC Wood Report No. 74-28)) was treated with hot base, hot acid, and distilled water rinses. The age estimate is based on two 1-day counts in the 5 L counter with a mixing ratio of 1.45.

General comment (D.R. Grant): The L'Anse aux Meadows archeological site in northern Newfoundland is primarily a settlement that Scandinavian (Norse) peoples occupied about 1000 years ago. The Norse houses are situated on a raised terrace at 4 m elevation. About 1 m of peat with driftwood at its base covers the terrace and its frontal slope down to present tide level. However, stratigraphy of the deposit, based on two trenches (sampled by Kuc, as well as by D.R. Grant, R.J. Mott, A.M. Davis and others) reveals that the site was occupied by five cultural groups over the last 5000 years. The Norse were the last before the present fishing community (Wallace, 1986).

These dates are on peat and wood from various layers and levels. They were in support of paleoecological and palynological studies by Kuc (1975) and Mott (1975b) aimed primarily at deducing the climate and vegetation, and incidentally at estimating maximum paleosea-level heights, before, during, and after the period of Norse occupation. Their studies yield the first detailed local interpretations since Wenner's (1947) qualitative regional reconnaissance of peat-bog stratigraphy, but



they are not generally reflected in such later works as Henningsmoen (1977) and Davis et al. (1988).

Before Kuc's dates were available, sea level at time of Norse occupation was estimated first by Grant (1972, 1975) to have been 1.5 m above present based on shells in raised beaches, then by Henningsmoen (1977) to have been 0.5 - 1.0 m above present, based on basal gyttja dates in emerged basins. However, as Kuc (1975) concluded from these dates, relative sea level clearly had regressed from the foot of the 4 m occupational terrace before 2 ka, leaving a driftwood accumulation at 3 m which dates  $2500 \pm 60$  to  $2150 \pm 60$  BP (GSC-1987, -2076; Blake, 1988). High tide abandoned the driftwood and a bog began to accumulate; its basal layers show that sea level was below 2 m elevation by  $1780 \pm 280$  BP to  $1810 \pm 50$  BP (GSC-2071, -2048). About half the peat thickness had accumulated by  $1600 \pm 60$  BP to  $1340 \pm 60$  BP (GSC-2069, -2055, -2088, -2059) or well before Norse occupation. GSC-2051 ( $640 \pm 50$  BP) lies above levels containing rare artifacts and thus shows that sea level had regressed below 2 m after departures of the Norse.

As to changes in vegetation and climate, the organic sequence and dates led Kuc (1975) to conclude that the "general geobotanical character, vegetation zones, and plant communities" had not changed appreciably during the last millennium. From study of the same exposure, Davis et al. (1988) reached the same conclusion. There is, however, qualitative evidence of recent climatic change. Most peat bogs rest on a forest layer (Grant, in press) showing that a formerly wooded landscape suffered extensive paludification. Moreover, Henningsmoen (1977) dated palsa formation at the site as evidence of ground ice formation and attributed it to the Little Ice Age. Dionne (1983) concurred for a site in nearby Québec. The implied recent climatic deterioration is evidently not reflected in the vegetation succession.

## Nova Scotia

GSC-71.                      Yarmouth  
                                 uncorrected                       $100 \pm 60$

Marine shells (*Littorina littorea*; identified by A.H. Clarke) from Yarmouth, Nova Scotia ( $43^{\circ}45'N$ ,  $66^{\circ}0'W$ ), at an elevation of ca. 0 m, were collected in 1910; submitted by A.H. Clarke in 1961.

The sample (33.0 g dry weight) was treated with an acid leach to remove twenty per cent of the outer material. The age estimate is based on one 3-day plus one 1-day count in the 2 L counter with a mixing ratio of 1.00.

GSC-72.                      Indian Point,  
                                 St. Margaret's Bay                      modern

A live collection of marine shells (*Littorina littorea*; identified by A.H. Clarke) from Indian Point, St. Margaret's Bay, Nova Scotia ( $44^{\circ}38'N$ ,  $63^{\circ}57'W$ ), at an elevation of about 0 m, was made by P.M. Taschereau on February 15, 1962; submitted by A.H. Clarke.

The sample (31.5 g dry weight) was treated with an acid leach to remove twenty per cent of the outer material. The age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 1.00.

Uncorrected age, modern (102.2% std).

Comment (A.H. Clarke): The results of the original archeological age determination for *Littorina littorea* (GSC-71) were published in Clarke and Erskine (1961). They provided the first solid information about the presence of this important European marine snail, in North America, in pre-Columbian time.

The specimens (GSC-72) were submitted by A.H. Clarke to check on the reliability of the date for archeological material (GSC-71), that is, to see if living specimens would produce modern dates (e.g., were not ingesting and depositing fossil (old) carbon).

GSC-3550.                      Joggins  
                                 uncorrected                       $11\,400 \pm 100$

Compressed fibrous peat (sample 0-4-82; cf. unpublished GSC Plant Macrofossil Report No. 82-31 by J.V. Matthews, Jr.) from 2 km north of Joggins on road to Lower Cove, Nova Scotia ( $45^{\circ}43'N$ ,  $64^{\circ}28'W$ ), at an elevation of 6-7 m, was enclosed in sand. Collected by R. Stea and P. Finck on June 30, 1982; submitted by R. Stea.

The sample (80.0 g dry weight) was treated with hot base, hot acid (noncalcareous), and distilled water. The age estimate is based on one 3-day count in the 5 L counter with a mixing ratio of 1.00.

Comment (R. Stea): The dated peat layer is underlain by a reddish brown, gravelly diamicton and sand, and overlain by less than 1 m of greenish sand (Stea et al., 1986). The organic site at Lower Cove is north of the Shulie Lake Phase (Late Wisconsinan) ice limit (Stea et al., 1986). Palynological analysis reveals shrub-tundra conditions at the time of deposition. This and other buried late-glacial organic sites in Nova Scotia attest to a climatic oscillation equivalent to the Allerod/Younger Dryas of Europe (Mott et al., 1986).

If the underlying diamicton at Lower Cove is glaciogenic, then the 1700 year or greater discrepancy between the Lower Cove and Spencers Island delta dates (12.6 - 14.3 ka; Stea and Wightman, 1987) indicates the persistence of ice

north of the Shulie Lake Phase limit, verifying the geomorphological data. Another indication of the age of the end of the Shulie Lake Phase comes from a cored bog north of the limit near Sand River that bottomed in the Shulie Lake Till. Palynomorphs from the base of this bog revealed a truncated sequence correlative with pollen zones 6 and 5 of the Leak Lake and Basswood Road Lake cores (R.J. Mott, personal communication, 1985). Mott estimated that the basal sediment started to accumulate about 10 ka. The date of  $9830 \pm 100$  BP (GSC-2772; Lowdon and Blake, 1981) on peat lying above outwash at West Brook is another indication of late ice in the Chignecto Peninsula region.

Ice may have also been persistent in the areas south of the Minas Basin. Evidence of marine overlap is lacking in the areas along the south shore of the Minas Basin east of Avon River. Hadden (1975) invoked a persistent ice cover in the Hants-Colchester Lowlands to explain a relatively young bog-bottom date of  $9187 \pm 255$  BP (I-7080).

#### Joggins Site series

A series of samples from the Joggins Site, 2 km north of Joggins on the road to Lower Cove, Nova Scotia ( $45^{\circ}43'N$ ,  $64^{\circ}28'W$ ), at an elevation of 3 m, was collected by R.J. Mott on July 4, 1984; submitted by R.J. Mott.

GSC-3924. Joggins Site (I)  $11\,100 \pm 120$   
 $\delta^{13}C = -25.1\text{‰}$ .

Peat and organic sand sample (MS-84-32 Upper 2 cm; 298.2 g wet weight) was treated with hot base, hot acid (noncalcareous), and distilled water rinses to neutral pH. The age estimate is based on one 3-day count in the 5 L counter with a mixing ratio of 1.00.

Uncorrected age,  $11\,100 \pm 120$ .

GSC-3915. Joggins Site (II)  $11\,800 \pm 110$   
 $\delta^{13}C = -26.4\text{‰}$ .

Peat and organic sand sample (MS-84-32 Basal 2 cm; 296.6 g wet weight) was treated with hot base, hot acid (noncalcareous), and distilled water rinses to neutral pH. The age estimate is based on one 3-day count in the 5 L counter with a mixing ratio of 1.00.

Uncorrected age,  $11\,800 \pm 110$ .

Comment (R.J. Mott): GSC-3915 is a date for the beginning of organic accumulation at this site as the climate warmed following deglaciation, and vegetation began to move into the area. Pollen analysis indicates that a wet, sedge (Cyperaceae) covered area surrounded by shrub and herb tundra-like vegetation dominated by willow (*Salix*) and buffaloberry (*Shepherdia canadensis*) existed at the site. GSC-3924 is the date on the cessation of organic deposition presumably caused by severe climatic deterioration that decimated the vegetation and

induced the activation of various periglacial processes. This site is one of numerous buried sites, with similar age and stratigraphy located throughout the Maritimes, that has been correlated with the Allerod/Younger Dryas event of Europe (Mott et al., 1986).

GSC-2742. Parrsboro  $4240 \pm 60$   
 $\delta^{13}C = -29.9\text{‰}$ .

Lake sediment (sample GIL-I-562-575) from Gilbert Lake, 6 km north of Parrsboro, Nova Scotia ( $45^{\circ}28.5'N$ ,  $64^{\circ}20.5'W$ ), was collected by J.G. Ogden, III, in July, 1977; submitted by D. Wightman.

The sample (30.4 g dry weight) was treated with hot acid and water rinses (base treatment omitted). The age estimate is based on one 3-day count in the 5 L counter with a mixing ratio of 1.00.

Uncorrected age,  $4320 \pm 60$ .

GSC-3378. River Denys  $11\,000 \pm 90$   
 $\delta^{13}C = -27.5\text{‰}$ .

Lake (pond) sediment (sample MS-81-12) from a site in the Georgia-Pacific Gypsum Corp. quarry, about 7 km south of River Denys, Cape Breton Island, Nova Scotia ( $45^{\circ}48.4'N$ ,  $61^{\circ}12.9'W$ ), at an elevation of about 30.0 m, was enclosed in silty clay. A thin (3 cm) organic horizon overlying up to 10 cm of reddish grey, silty clay with sand lenses and pebbles is overlain by up to 90 cm of purplish grey, silty clay. This sediment package occupies depressions in the surface of the thick, red stony till of the area. Collected by R.J. Mott and V.K. Prest on August 12, 1981; submitted by R.J. Mott and D.R. Grant.

The sample (52.9 g wet weight) was treated with hot acid (noncalcareous) and distilled water (base treatment omitted). The age estimate is based on one 3-day count in the 5 L counter with a mixing ratio of 1.00.

Uncorrected age,  $11\,100 \pm 90$ .

Comment (R.J. Mott): The organic horizon is correlative with many buried organic beds in Cape Breton Island and Nova Scotia mainland that formed following deglaciation as the climate warmed and that were subsequently buried by mineral sedimentation when the climate reverted to colder conditions (Mott et al., 1986). Pollen analysis shows that shrub and herb tundra type vegetation occupied the landscape.

The site is significant for reconstructing the climate and deglaciation of southern Cape Breton Island (Grant, in press). The exposure is well below the 60-70 m level of an ice-dammed lake (glacial Lake Bell) that is inferred for the River Denys Lowland from perched deltas on the surrounding slopes. The sediments above and beneath the organic bed are, therefore, of considerable significance if either or both are of glaciolacustrine origin. If only

the underlying clay is glaciolacustrine, the lake and the ice mass that dammed the valley predate 11 ka. By contrast, if only the overlying clay is glaciolacustrine, the lake and ice mass postdate 11 ka, and the clay is considerably younger than previously postulated. If both are of glaciolacustrine origin, lowering or draining of the glacial lake during deposition of the organic bed is implied. Reworking of local sediments by solifluction, mass wasting, etc., is an alternative for the overlying sediments if they are not glaciolacustrine (Mott et al., 1986).

GSC-3407. East Milford  
uncorrected 5960 ± 60

Conifer wood (sample P1-81-44-No. 5 (967G. 185); *Tsuga canadensis*; identified by R.J. Mott (unpublished GSC Wood Report No. 82-41)) from East Milford Gypsum Quarry, about 8 km south of Shubenacadie, Nova Scotia (45°0'N, 60°25'W), at an elevation of less than 30 m, was collected by W. Take in 1959, while excavating a karst depression infilled with Quaternary sediments. The twig was enclosed in organic silt. Sample submitted by R.J. Mott.

The sample (11.5 g dry weight) was treated with hot base, hot acid (noncalcareous), and distilled water. The age estimate is based on one 3-day count in the 5 L counter with a mixing ratio of 1.00.

Comment (R.J. Mott): The succession of organic and inorganic sediments filling the karst depression in the gypsum bedrock was thought to contain several organic horizons representing various interglacial or interstadial intervals (Prest, 1970). Although the sequence did contain some older, probably interglacial intervals, the fresh, uncompressed and undeformed nature of plant and animal remains in the upper part of the sequence suggests relatively young age. This date shows that at least part of the sequence is postglacial.

GSC-2105. Miller Creek Quarry  
uncorrected 8100 ± 50

Wood (sample 8385/51; *Pinus strobus*; identified by L.D. Wilson (unpublished GSC Wood Report No. 74-35)) from Miller Creek Quarry, Fundy Gypsum Company, Hants County, Nova Scotia (45°1'N, 64°3.6'W), at an elevation of 37 m, was enclosed in till. Collected by R.H. MacNeill in 1965; submitted by V.K. Prest.

The sample (49.5 g dry weight) was treated with base, acid, and distilled water rinses. The age estimate is based on one 3-day count in the 5 L counter with a mixing ratio of 1.00.

Comment (V.K. Prest): The date of 8100 ± 50 BP suggests that the wood was collected from till that was slumped into a karst depression. At Milford Quarry near Lantz, Nova Scotia, where both wood, bones and shells were encountered in a deep

depression and reported as probably interglacial, the wood gave a date of 5960 ± 60 BP (GSC-3407). Elsewhere in the quarry, wood from the tills overlying the gypsum gave dates of >33 800 BP (GSC-33) and > 50 000 BP (GSC-1642; Lowdon and Blake, 1973).

#### Prince Edward Island

GSC-133. Charlottetown  
uncorrected 625 ± 135

Organic (fluvic acid extract) matter (sample Soil B) from near Charlottetown, Prince Edward Island (46°5'N, 63°5'W), at an elevation of ca. 0 m, was enclosed in soil (Bh horizon). Collected, treated, and submitted by M. Schnitzer.

The sample (5.0 g dry weight) was given special treatment (cf. comments). The age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 1.00.

Comment (M. Schnitzer): Fulvic acid extracted from the Bh horizon of the Armadale soil (a poorly drained podzol) in Prince Edward Island was dated. The fulvic acid was extracted with 0.5 M NaOH under nitrogen from the soil; the extract was then passed over a H-resin to remove the sodium ion, and then freeze-dried. The fulvic acid, as submitted to the laboratory, was a dark brown powder. Its elemental analysis was as follows: 50.9% C, 3.6% H, 1.0% N, 0.6% S, and 43.9% O; all of these data are on a moisture and ash free basis. Its ash content was 0.75%.

#### East Baltic Bog series

A series of core samples from peat bog 12.8 km east of Souris, Prince Edward Island (46°24' 30"N, 62°9' 0"W) was collected by T.W. Anderson in July, 1973 using the GSC piston corer; samples submitted by T.W. Anderson.

GSC-2473. East Baltic Bog (1) 7000 ± 70  
δ<sup>13</sup>C = -27.3‰.

Woody peat (East Baltic Bog 1; 12.5 g dry weight), from an elevation of 40.73 m, was treated with hot base, hot acid, and distilled water. The age estimate is based on one 3-day count in the 5 L counter with a mixing ratio of 1.00.

Uncorrected age, 7040 ± 70.

Additional information: This sample dates the hemlock (*Tsuga*) rise in this core.

GSC-2509. East Baltic Bog (II) 4020 ± 60  
 $\delta^{13}\text{C} = -27.4\text{‰}$ .

Peat, woody (East Baltic Bog 2; 14.75 g dry weight), from an elevation of 42.33 m, was treated with hot base, hot acid, and distilled water. The age estimate is based on one 3-day count in the 5 L counter with a mixing ratio of 1.00.

Uncorrected age, 4050 ± 60.

Additional information: This sample dates the hemlock (*Tsuga*) minimum in this core.

GSC-2847. Georgetown  
uncorrected 6110 ± 70

Sandy peat (sample AP-78-1) from peat bog, 2 km northwest of Georgetown, Prince Edward Island (46°11'55"N, 62°33'20"W), at an elevation of 21.41 m, was collected by T.W. Anderson and R.J. Mott on August 3, 1978; submitted by T.W. Anderson.

The sample (206 g wet weight) was treated with hot acid and distilled water (base treatment omitted). The age estimate is based on two 1-day counts in the 5 L counter with a mixing ratio of 1.00.

#### MacLaughlin Pond series

A series of samples from MacLaughlin Pond, 5.6 km (3.5 mi) east-northeast of Mt. Stewart, Prince Edward Island (46°23'0"N, 62°47'48"W) was collected by T.W. Anderson and R.J. Mott on August 1, 1978; submitted by T.W. Anderson.

GSC-2908. MacLaughlin 2080 ± 130  
Pond (I)  $\delta^{13}\text{C} = -30.9\text{‰}$ .

Lake sediment, gyttja (AP-78-4 (44-50 cm); 49.5 g wet weight) from an elevation of 24.0 m, was treated with hot acid and distilled water (base treatment omitted). The age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 3.71.

Uncorrected age, 2170 ± 130.

GSC-3036. MacLaughlin 3660 ± 80  
Pond (II)  $\delta^{13}\text{C} = -32.0\text{‰}$ .

Detrital lake sediment, gyttja (AP-78-5 (77-88 cm); 48.5 g wet weight), from an elevation of 23.67 m, was treated with hot acid and distilled water (base treatment omitted). The age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 1.38.

Uncorrected age, 3770 ± 80.

GSC-3058. MacLaughlin 5060 ± 90  
Pond (III)  $\delta^{13}\text{C} = -30.6\text{‰}$ .

Lake sediment, fibrous gyttja (AP-78-6 (117-123 cm); 52.5 g wet weight), from elevation of 23.27 m, was treated with hot acid and distilled water (base treatment omitted). The age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 1.20.

Uncorrected age, 5160 ± 90.

GSC-2887. MacLaughlin 8050 ± 100  
Pond (IV)  $\delta^{13}\text{C} = -31.1\text{‰}$ .

Lake sediment, detrital gyttja (AP-78-3 (178-181 cm); 45.1 g wet weight), from an elevation of 22.7 m, was treated with hot acid and distilled water (base treatment omitted). The age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 1.00.

Uncorrected age, 8150 ± 100.

GSC-2891. MacLaughlin 9670 ± 130  
Pond (V)  $\delta^{13}\text{C} = -27.8\text{‰}$ .

Lake sediment, basal silty gyttja above red clay (AP-78-2 (210.5-213.5 cm); 80.7 g wet weight) from an elevation of 22.4 m, was treated with hot acid and distilled water (base treatment omitted). The age estimate is based on one 3-day count in the 2 L counter with a mixing ratio of 1.64.

Uncorrected age, 9710 ± 130.

#### Portage Bog series

A series of core samples from peat bog 1.6 km north-northwest of Portage, Prince Edward Island (46°40'25"N, 64°4'30"W) was collected by T.W. Anderson in July, 1973 using a GSC piston corer; submitted by T.W. Anderson.

GSC-2629. Portage Bog (I) 3430 ± 70  
 $\delta^{13}\text{C} = -27.0\text{‰}$ .

Fibrous peat (PORTAGE BOG 1 (417-423 cm); 8.7 g dry weight), from an elevation of 3.43 m, was treated with hot base, hot acid, and distilled water. The age estimate is based on two 1-day counts in the 5 L counter with a mixing ratio of 1.00.

Uncorrected age, 3460 ± 70.

Additional information: This sample dates the beech (*Fagus*) rise in this core.

GSC-2626. Portage (II) 490 ± 60  
 $\delta^{13}\text{C} = -27.4\text{‰}$ .

Fibrous peat (PORTAGE BOG 2 (77-82 cm); 147 g wet weight), from an elevation of 6.83 m, was treated with hot base, hot acid, and distilled water. The age estimate is based on two 1-day counts in the 5 L counter with a mixing ratio of 1.00.

Uncorrected age, 530 ± 60.

Additional information is available in Anderson, (1967). The basal date on this core (623-628 cm) is 9880 ± 150 BP (GSC-773, Lowdon and Blake, 1968).

#### East Bideford Bog series

A series of core samples from East Bideford Bog, about 4.0 km northeast of Ellerslie, Prince Edward Island (46°38'N, 63°54'W), was collected by T.W. Anderson on July 24, 1973 using a GSC piston corer; submitted by T.W. Anderson.

GSC-2647. East Bideford 8070 ± 80  
 Bog (I)  $\delta^{13}\text{C} = -31.8\text{‰}$ .

Peat, well decomposed (TB-68-28A (531-534 cm); 114.9 g wet weight) from an elevation of 2.3 m, was treated with hot base, hot acid, and distilled water. The age estimate is based on one 3-day count in the 5 L counter with a mixing ratio of 1.00.

Uncorrected age, 8180 ± 80.

GSC-2649. East Bideford 2140 ± 60  
 Bog (II)  $\delta^{13}\text{C} = -27.3\text{‰}$ .

Woody peat (TB-68-28B (425-430 cm); 98.7 g wet weight), from an elevation of 3.3 m, was treated with hot base, hot acid, and distilled water. The age estimate is based on one 3-day count in the 2 L counter with a mixing ratio of 1.00.

Uncorrected age, 2180 ± 60.

GSC-2655. East Bideford 1960 ± 120  
 Bog (III)  $\delta^{13}\text{C} = -24.8\text{‰}$ .

Peat, well decomposed (TB-68-28C (320-325 cm); 111.0 g wet weight), from an elevation of 4.39 m, was treated with hot base, hot acid, and distilled water. The age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 1.00.

Uncorrected age, 1960 ± 120.

GSC-2659. East Bideford 1130 ± 80  
 Bog (IV)  $\delta^{13}\text{C} = -26.2\text{‰}$ .

Peat, well decomposed (TB-68-28D (245-251 cm); 44.2 g wet weight), from an elevation of 5.1 m, was treated with hot base, hot acid, and distilled water.

The age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 1.34.

Uncorrected age, 1150 ± 80.

GSC-2662. East Bideford 390 ± 80  
 Bog (V)  $\delta^{13}\text{C} = -25.0\text{‰}$ .

Peat, well decomposed (TB-68-28E (141-147 cm); 89.4 g wet weight), from an elevation of 6.2 m, was treated with hot base, hot acid, and distilled water. The age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 1.54.

Uncorrected age, 390 ± 80.

The basal sample from this core GSC-1494 (TB-68-28 (635-640 cm)) was dated at 8000 ± 140 BP (uncorrected) (Lowdon and Blake, 1973); another "basal" sample from this bog (574-578 cm) was dated at 8430 ± 150 BP (GSC-775; Lowdon and Blake, 1968).

GSC-2740. North Cape Bog 7650 ± 80  
 $\delta^{13}\text{C} = -24.2\text{‰}$ .

Lake sediment, basal sandy gyttja (sample PC-60-68; 122-124 cm) from North Cape Bog, about 12 km northeast of Tignish, Prince Edward Island (47°3'N, 64°1'W), at an elevation of 6.4 m, was enclosed in peat (above) and sand (below). The sample was collected by V.K. Prest on August 27, 1968; submitted by T.W. Anderson.

The sample (195 g wet weight) was treated with hot acid and distilled water rinses (base treatment omitted). The age estimate is based on two 1-day counts in the 5 L counter with a mixing ratio of 1.00.

Uncorrected age, 7640 ± 80.

Comment (T.W. Anderson): The gyttja overlying sand and underlying peat implies that "ponding" preceding peat growth. Pollen analysis carried out across the sand-gyttja contact in a core collected farther inland in the same bog shows high percentages of both tree pollen such as *Betula* (birch), *Pinus* (pine), and *Tsuga* (hemlock), and of shrubs and herbs such as *Alnus* (alder), *Myrica* (sweet gale), *Nemopanthus* (catberry), *Osmunda* (flowering fern), *Equisetum* (horsetail), and Lycopodiaceae (club mosses), but with decreasing *Picea* (spruce). The presence of these shrubs and herbs indicates fen-like conditions and paludification. Such conditions are common at the margins of peat bogs. Thus the dated organics may represent the edge of a much larger, deeper, and older peat deposit which has been subjected to extensive coastal erosion (Anderson, 1980).

## New Brunswick

GSC-2562. St-Raphael-sur-Mer  
uncorrected 8710 ± 80

Basal peat (sample B-1135) from cote érodée, 0.3 km l'est de St-Raphael-sur-Mer, New Brunswick (47°47'57"N, 63°33'10"W), at an elevation of 4.7 m, was enclosed in peat (above) and sand (below). The sample was collected by C. Gauthier on August 25, 1977; submitted by C. Gauthier.

The sample (30.1 g dry weight) was treated with hot base, hot acid, and water rinses. The age estimate is based on one 3-day counts in the 5 L counter with a mixing ratio of 1.00.

### Poucette Lake series

Poucette Lake is located about 20 km northwest of Port Elgin, New Brunswick (46°9'30"N, 64°17'20"W), at an elevation of 28 m. A core 565 cm long was obtained with a modified Livingstone piston corer from beneath 2.5 m of water. The lake is situated in an area of morainal sediments above the limit of marine submergence (Rampton et al., 1984). The core showed dark brown algal gyttja that grades into reddish, clayey gyttja to a depth of 455 cm, overlying 10 cm of black clayey gyttja and brownish red clay with minor organic content to a depth of 517 cm. This overlies stiff, brownish red clay and soft, pinkish red clay at the base of the core. Core was collected August 15, 1978 by R.J. Mott et al.; submitted by R.J. Mott.

GSC-3462. Poucette Lake (I)  
uncorrected 9560 ± 120

Lake sediment, gyttja (algal) (MS-78-10 (390-395 cm); 90.6 g wet weight) was treated with hot acid (noncalcareous) and distilled water (base treatment omitted). The age estimate is based on one 3-day count in the 2 L counter with a mixing ratio of 1.54.

GSC-2814. Poucette Lake (II) 10 500 ± 170  
 $\delta^{13}\text{C} = -27.3\text{‰}$ .

Lake sediment, mottled clayey gyttja (MS-78-10 (463-468 cm); 100.3 g wet weight) was treated with hot acid and distilled water (base treatment omitted). The age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 1.89.

Uncorrected age, 10 600 ± 170.

Comment (R.J. Mott): GSC-3462 is a date on the beginning of the pine (*Pinus*) pollen rise following the decline in spruce (*Picea*) and maximum in *Betula*

(birch) pollen in early Holocene. GSC-2814 is a date on the beginning of organic accumulation at the site and is a minimum date for deglaciation of the area. Pollen analysis shows that the late glacial climatic oscillation detected at many sites throughout southern New Brunswick and Nova Scotia (Mott et al., 1986) is not represented at this site. Organic accumulation began during the latter part of the climatic reversal when herb and shrub tundra prevailed. The spruce maximum is seen shortly after 10.5 ka at the beginning of early Holocene warming.

### Marcelville series

A series of samples from 2.5 km southwest of Marcelville, New Brunswick (46°38'N, 65°34'W), at an elevation of 100 m, was collected by R.W. Wein and M.P. Burzynski on November 21, 1976; submitted by R.W. Wein.

GSC-2653. Marcelville (I)  
uncorrected 1800 ± 60

Peat (MB-1; 9.5 g dry weight) was treated with hot base, hot acid, and distilled water. The age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 1.00.

Comment (R.W. Wein): This sample was collected from 70-80 cm depth below the Despres Lake Bog in order to assist in dating the charcoal rain and therefore fire history of the area. The date occurs in Burzynski (1984) and Wein et. al. (1986).

GSC-2644. Marcelville (II)  
uncorrected 4090 ± 60

Peat (MB-2; 11.9 g dry weight) was treated with hot base, hot acid, and distilled water. The age estimate is based on two 1-day counts in the 5 L counter with a mixing ratio of 1.00.

Comment (R.W. Wein): This sample was collected from 141-151 cm below the surface of the Despres Lake Bog. The radiocarbon date was used to interpret charred particle input to the bog as a measure of fire frequency in the general area. The radiocarbon date occurs in Burzynski (1984) and Wein et. al. (1986).

### Teagues Lake series

A series of core samples from Teagues Lake, about 18 km east of Bathurst, New Brunswick (47°36.9'N, 65°25'W), at an elevation of ca. 90 m, was collected by R.J. Mott on August 16, 1978; submitted by R.J. Mott. Sediments collected below 1.3 m of water with a modified Livingstone piston corer



totalled 860 cm; 750 cm of brown algal gyttja that is more clayey at the base overlies pinkish brown clay with minor organics and moss fragments, soft pinkish red clay and pinkish brown silty clay with pebbles at the base of the core.

GSC-3466. Teagues Lake (I) 8340 ± 260  
 $\delta^{13}\text{C} = -29.1\text{‰}$ .

Lake sediment, dark brown gyttja (MS-78-11 (630-635 cm); 97.7 g wet weight) was treated with hot acid (noncalcareous), and distilled water (base treatment omitted). The age estimate is based on one 3-day count in the 2 L counter with a mixing ratio of 3.21.

Uncorrected age, 8410 ± 260.

GSC-2751. Teagues Lake (II) 10 500 ± 150  
 $\delta^{13}\text{C} = -25.2\text{‰}$ .

Lake sediment, dark brown gyttja (MS-78-11 (745-750 cm); 89.0 g wet weight) was treated with hot acid and distilled water (base treatment omitted). The age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 1.44.

Uncorrected age, 10 500 ± 150.

Comment (R.J. Mott): GSC-3466 dates the beginning of the increase in pine (*Pinus*) pollen following the decline in spruce (*Picea*) and maximum in birch (*Betula*) pollen. GSC-2751 dates the beginning of organic accumulation at the site and is a minimum for deglaciation of the area. This date differs considerably from shell dates along the coast (Rampton et al., 1984) indicating late ice over the land or a lag before organic sediments began to accumulate. The late glacial climatic oscillation found throughout southern New Brunswick and Nova Scotia (Mott et al., 1986) is not represented at this site. The pollen sequence is the same as at Island Lake where the basal date is deemed spurious. This site obviously began accumulating organic sediments near the end of the climatic reversion about 10.5 ka.

#### Cassidy Lake series

A series of core samples from Cassidy Lake, about 17 km south-southwest of Sussex, New Brunswick (45°34.8'N, 65°34.8'W), at an elevation of ca. 134 m, was collected by R.J. Mott on August 6, 1978; submitted by R.J. Mott. A Livingstone piston corer was used to collect a core 778 cm long below about 11.3 m of water. Overlying the basal, reddish brown, silty clay above 750 cm is mottled, silty gyttja, with a moss layer at the base, to about 720 cm. This is

overlain by reddish brown silty gyttja and dark brown algal gyttja to the mud/water interface.

GSC-3452. Cassidy Lake (I) 9320 ± 120  
 $\delta^{13}\text{C} = -30.5\text{‰}$ .

Lake sediment, gyttja (silty) (MS-78-2 (650-655 cm); 95.6 g wet weight) was treated with hot acid (noncalcareous) and distilled water rinses (base treatment omitted). The age estimate is based on one 3-day count in the 2 L counter with a mixing ratio of 1.64.

Uncorrected age, 9400 ± 120.

GSC-2787. Cassidy Lake (II)  
uncorrected 13 100 ± 280

Lake sediment, silty gyttja, and moss (MS-78-2 (744-749 cm); 105 g wet weight) was treated with hot acid and distilled water rinses (base treatment omitted). The age estimate is based on one 3-day count in the 2 L counter with a mixing ratio of 3.31.

Comment (R.J. Mott): GSC-3452 dates the beginning of the pine (*Pinus*) pollen rise following the decline in spruce (*Picea*) and maximum in birch (*Betula*) pollen. This date is similar to those for the same transition recorded in other lakes in southern New Brunswick (eg. GSC-3462; -1643, Lowdon and Blake, 1975), but is older than in lakes from more northerly locations (e.g. GSC-3466, -3492, -3455). GSC-2787 dates the beginning of organic accumulation in the lake and is a minimum for deglaciation. However, caution must be exercised as this age may be spurious due to the presence of old carbonates in the basal sediments. Pollen analysis shows the spruce maximum to occur about 7 cm above material dated, whereas, at Splan Lake (Basswood Road Lake; Mott, 1975a) the spruce maximum dates about 11.3 ka. The late glacial climatic reversal (Mott et al., 1986) occurs during the spruce pollen zone as it does at Splan Lake and is manifested in the pollen spectra in a similar manner. In Cassidy Lake the late glacial is confined to a 30 cm increment at the base of the core making short-term changes difficult to discern.

GSC-2767. Shaddick Lake 10 100 ± 170  
 $\delta^{13}\text{C} = -29.0\text{‰}$ .

Lake sediment, silty sandy gyttja (sample MS-78-7 (253-257 cm)) from Shaddick Lake, about 28 km west-northwest of Newcastle, New Brunswick (47°5.4'N, 65°51.3'W), at an elevation of 44 m, was collected by R.J. Mott on August 13, 1978; submitted by R.J. Mott.

The sample (1230 g wet weight) was treated with hot acid and distilled water (base treatment omitted). The age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 1.45.

Uncorrected age,  $10\ 100 \pm 170$ .

Comment (R.J. Mott): The sample dates the beginning of organic deposition at the site and is a minimum age for melting of the ice block that formed the kettle in glacial outwash. Area may have been washed subsequently by marine or lacustrine waters (Rampton et al., 1984). Pollen analysis shows that sedimentation of organic sediments began at the close of the period of late glacial climatic reversal just prior to 10 ka (Mott et al., 1986).

GSC-2578. Campbellton  $12\ 200 \pm 260$   
 $\delta^{13}\text{C} = +2.2\text{‰}$ .

Marine shells, whole and fragments (sample Cam-98; *Hiatella arctica*; identified by C. Gauthier), from highway 11, east ramp for Campbellton, at intersection, northeast side of New Brunswick (47°59'50"N, 66°39'40"W), at an elevation of 29.4 m, were enclosed in massive silt. The sample was collected by C. Gauthier in 1977; submitted by C. Gauthier.

The sample (6.4 g dry weight) had no treatment prior to processing. The age estimate is based on one 3-day count in the 2 L counter with a mixing ratio of 3.80.

Uncorrected age,  $12\ 100 \pm 260$ .

#### New Maryland Road series

A series of samples from 0.75 km west of New Maryland Road, New Brunswick (45°56'N, 66°40'W), at an elevation of 130 m, was collected by B.A. Sreenivasa and M.P. Burzynski in February, 1976; submitted by R.W. Wein.

GSC-2555. New Maryland Road (I)  
uncorrected  $7620 \pm 80$

Peat (RS-2; 10.0 g dry weight; *Sphagnum*; identified by R.W. Wein) was treated with hot base, hot acid, and distilled water. The age estimate is based on two 1-day counts in the 5 L counter with a mixing ratio of 1.00.

GSC-2600. New Maryland Road (II)  
uncorrected  $5030 \pm 70$

Peat (RS-1; 15.4 g dry weight; *Sphagnum*; identified by R.W. Wein) was treated with hot acid and distilled water (base treatment omitted). The

age estimate is based on two 1-day counts in the 5 L counter with a mixing ratio of 1.00.

Comment (R.W. Wein): The sample for GSC-2555 was collected from 162-172 cm depth and that for GSC-2600 was collected from 81-91 cm depth below the surface of the Regent Street Bog. The dates were used to estimate annual charred particle rain and thereby establish fire frequency for the area. The dates occur in Burzynski (1984) and Wein et. al. (1986).

#### Island Lake series

A series of core samples from Island Lake about 40 km southeast of Campbellton, New Brunswick (47°49'30"N, 65°11'20"W), at an elevation of 290 m, was collected by R.J. Mott on August 18, 1978; submitted by R.J. Mott. More than 750 cm of sediment was penetrated in a core from beneath 8.8 m of water using a modified Livingstone piston corer. The corer penetrated 642 cm of dark brown gyttja and black laminated gyttja overlying 16 cm of black organic silty clay. Below this was about 70 cm of brownish grey to dark grey clay with pebbles at base overlying grey laminated clay.

GSC-3492. Island Lake (I)  $8650 \pm 100$   
 $\delta^{13}\text{C} = -27.5\text{‰}$ .

Lake sediment, algal gyttja (MS-78-12 (495-505 cm); 149.9 g wet weight) was treated with hot acid (noncalcareous), and distilled water (base treatment omitted). The age estimate is based on two 1-day counts in the 5 L counter with a mixing ratio of 1.00.

Uncorrected age,  $8690 \pm 100$ .

GSC-2748. Island Lake (II)  $12\ 300 \pm 210$   
 $\delta^{13}\text{C} = -33.4\text{‰}$ .

Lake sediment, algal to silty gyttja (MS-78-12 (633-638 cm); 103.8 g wet weight) was treated with hot acid and distilled water (base treatment omitted). The age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 2.06.

Uncorrected age,  $12\ 400 \pm 210$ .

Comment (R.J. Mott): GSC-3942 dates the beginning of the increase in pine (*Pinus*) pollen following the decline in spruce (*Picea*) and the increase of birch (*Betula*) pollen. GSC-2748 dates the beginning of organic accumulation and is a minimum for deglaciation of the area. Despite being comparable to shell dates along the coast of Chaleur Bay (Rampton et al., 1984) the age is considerably older than expected based on the pollen spectra of the



basal sediments. The late glacial climatic amelioration and subsequent climatic cooling prior to 10 ka that is found at numerous sites throughout southern New Brunswick and Nova Scotia (Mott et al., 1986) is not readily apparent in this core, suggesting that the actual date for the basal organic sediments is probably between 10 ka and 11 ka, and the evidence for oscillation, if present, is below. Contamination of the basal sediments by old carbonates is suspected.

#### Roulston Lake series

Roulston Lake is located 1.3 km south of Plaster Rock, New Brunswick (46°53.7'N, 67°24'W) at an elevation of about 155 m. A core 446 cm long was obtained with a modified Livingstone piston corer in about 4 m of water. The lake is situated in an area of till and glaciofluvial deposits overlying Mississippian sediments including gypsum; the lake may be a karst depression (Rampton et al., 1984). The core showed 399 cm of brown algal gyttja and banded gyttja over 11 cm of brownish grey silty gyttja, 5 cm of pinkish brown silty clay and banded, silty organic clay to the base of the core. The corer could barely penetrate the underlying reddish brown till that was recovered in another core in a shallower part of the lake. The core was collected by R.J. Mott on August 20, 1978; submitted by R.J. Mott.

GSC-3455. Roulston Lake (I) 8150 ± 130  
 $\delta^{13}\text{C} = -32.8\text{‰}$ .

Lake sediment, algal gyttja (MS-78-15 (348-358 cm); 83.1 g wet weight) was treated with hot acid and distilled water (base treatment omitted). The age estimate is based on one 3-day count in the 2 L counter with a mixing ratio of 2.15.

Uncorrected age, 8280 ± 130.

GSC-2872. Roulston Lake (II) 9930 ± 160  
 $\delta^{13}\text{C} = -24.8\text{‰}$ .

Lake sediment, silty gyttja (MS-78-15 (406-409.5 cm); 75.1 g wet weight) was treated with hot acid and distilled water (base treatment omitted). The age estimate is based on one 3-day count in the 2 L counter with a mixing ratio of 2.64.

Uncorrected age, 9920 ± 160.

GSC-2804. Roulston Lake (III) 11 100 ± 90  
 $\delta^{13}\text{C} = -23.2\text{‰}$ .

Lake sediment, silty, clayey gyttja (MS-78-15 (440-446 cm); 124.6 g wet weight) was treated with hot acid and distilled water (base treatment omitted).

The age estimate is based on one 3-day count in the 5 L counter with a mixing ratio of 1.00.

Uncorrected age, 11 100 ± 90.

Comment (R.J. Mott): GSC-3455 dates the top of the spruce (*Picea*) pollen zone, GSC-2872 the end of the cool period and the beginning of Holocene warming, and GSC-2804 the close of the warm period following deglaciation prior to the climatic reversal. This reversal is seen in the pollen spectra as a change from shrub tundra spectra to those indicative of herbaceous tundra. The climatic oscillation is recorded throughout southern New Brunswick and Nova Scotia (Mott et al., 1986), and this site represents the most northerly New Brunswick locality where it is readily seen in the pollen spectra and the core lithology.

GSC-2557. Lac Unique 12 400 ± 110  
 $\delta^{13}\text{C} = -32.5\text{‰}$ .

Lac Unique is located about 29 km west of Edmundston, New Brunswick (47° 20'N, 68° 44.5'W), at an elevation of 268 m. The core was collected with a modified Livingstone piston corer by R.J. Mott on July 16, 1977 in 6.5 m of water. Silty gyttja 845 cm thick, and laminated at the base, overlies 50 cm of laminated grey clay and basal calcareous, grey sand in the core. Sample MS-77-2 from 835-845 cm below the mud/water interface was submitted by R.J. Mott.

The sample (95 g wet weight) was treated with hot acid and distilled water (base treatment omitted). The age estimate is based on one 3-day count in the 2 L counter with a mixing ratio of 1.00.

Uncorrected age, 12 600 ± 110.

Comment (R.J. Mott): Sample dates the beginning of organic deposition at the site and is a minimum age for deglaciation. The presence of carbonates in the basal sands and high conductivity of the lake water indicates the possibility of contamination of the dated sediment by old carbonates. The age is somewhat older than expected for this area and is considered anomalously old. Preliminary pollen analysis also suggests that date is spurious.

#### Québec

#### Park Forillon series

A series of sediment samples from Park Forillon (Parks Canada), 2 km north-northeast of Cap-aux-os, Québec (48°51'N, 64°19'W), at an elevation of about 326 m, was collected by P. Richard and P. Morisset on

September 12, 1978; samples submitted by P. Richard.

GSC-3024. Park Forillon (I)  
uncorrected 2300  $\pm$  70

Sphagnum peat (FOR 290-300; 9.0 g dry weight; *Spagnum*) was treated with hot base, hot acid, and distilled water. The age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 1.00.

GSC-3019. Park Forillon (II)  
uncorrected 6730  $\pm$  70

Lake sediment, gyttja (FOR 520-530; 26.2 g dry weight) was treated with hot acid and distilled water (base treatment omitted). The age estimate is based on one 3-day count in the 5 L counter with a mixing ratio of 1.00.

Comment (P. Richard): A 0.2 ha circular-shaped plateau bog lying on a col open on Baie de Gaspé gave the following stratigraphy: 0-330 cm: sphagnum peat dated 2300  $\pm$  70 BP (GSC-3024); 330-530 cm: gyttja dated at 6730  $\pm$  70 BP (GSC-3019); 530-585 cm: compact clay and silt with organic debris and traces of marl, overlying compact gravelly material (till? bedrock?). During the accumulation of lake and bog organic sediments, pollen analysis showed a slight shift in dominance from white birch to balsam fir, in an otherwise rather constant boreal fir forest regional environment. The basal clayey sediments are dominated by the pollen of green alder (*Alnus* cf. *crispa*, up to 72% at the base) with *Salix* (4%) and *Populus* (5-8%) restricted to this basal zone. No herb pollen occurs; outstandingly high pollen concentrations (about 325 000 grains/cm<sup>3</sup>). A basal age of 7885 BP could be extrapolated from these high pollen concentrations, but this is far too young for a minimum age for the ice retreat in the area. Alternative explanations involve a delaying of the lake phase by progressive clogging of the basin, combined or not with karstic erosion. The possibility of the late melting-out of an ice block is ruled out on the basis of the physiographic position of the basin on a very small col, and the lack of corresponding geomorphological and sedimentological evidence. The high pollen concentration and the pollen stratigraphy of the basal clay are outstanding and indicate a late colonization of the ridge by plants, compared to neighbouring areas.

GSC-2564. Cap Caribou 5270  $\pm$  500  
St-Lawrence  $\delta^{13}\text{C} = + 1.7\text{‰}$ .  
estuary

Marine shells (sample St 43-3 (72 cm); *Astarte*; identified by J.E. Wagner) from south slope of the St. Lawrence estuary, about 20.5 km due north of Cap Caribou, Québec (48°35.05'N, 68°40.35'W), at a depth

of 147 m, were enclosed in muddy sand. Collected by J. Letendre on March 5, 1976; sample submitted by J. Letendre.

The sample (2.3 g dry weight) was not leached prior to processing. The age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 9.20.

Uncorrected age, 5240  $\pm$  500.

GSC-2501. Cap à l'Orignal 5380  $\pm$  280  
St-Lawrence  $\delta^{13}\text{C} = + 1.9\text{‰}$ .  
Shelf

Marine shells (sample St 8 (22-27 cm); *Hemithyris psittacea*; identified by J. Letendre) from St. Lawrence shelf, 12 km due north of Cap à l'Orignal, Québec (48°28.6'N, 68°48.45'W), at a depth of 33 m, were enclosed in muddy, gravelly sand. Collected by J. Letendre on October 21, 1975; sample submitted by J. Letendre.

The sample (2.5 g dry weight) was not leached prior to processing. The age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 9.65.

Uncorrected age, 5350  $\pm$  280.

#### St-Narcisse Moraine series

GSC-1700. St-Narcisse Moraine  
uncorrected 10 200  $\pm$  160

Marine shells in growth position (sample 20-4-72-1; *Macoma balthica*; identified by W. Blake, Jr.) from gravel pit in the St-Narcisse Moraine, 500 m northeast of Rang No. 2, 1 km southeast on Route Charette-Shawinigan, Québec (46°27'N, 72°53'40"W), at an elevation of ca. 120 m, were enclosed in bed of coarse sand, in a stratified deposit of medium and coarse sand. Collected by S. Occhietti on April 20, 1972; sample submitted by S. Occhietti.

The sample (46.9 g dry weight) was treated with an acid leach to remove twenty per cent of the outer material. The age estimate is based on one 3-day count in the 5 L counter with a mixing ratio of 1.00.

Comment (S. Occhietti): The shells (GSC-1700) were well preserved with valves still articulated, but some were iron-stained. The sample was dated to provide a chronology for the following features:

1. the reworking of the St-Narcisse Moraine by the Champlain Sea (Occhietti, 1980);
2. the elevation of a biocenose of *Macoma balthica*; and
3. the elevation of an intertidal level which gives the elevation of the Champlain sea level (between 128 and 134 m, more probably 130 - 133 m) at 10.2 ka. Mixed with a lateral thanatocenose of *Macoma balthica*, and some *Hiattella arctica*, few *Mya arenaria* shells would indicate the immediate proximity of the

biocenose. This date is in good agreement with GSC-1444 ( $10\,100 \pm 150$  BP; Gadd et al., 1972) from *Hiatella arctica* and *Macoma balthica* collected at the same site, altitude ca. 137 m. The scarcity of *Mya arenaria* could indicate a slight cooling of sea waters between 10.2 and 10.0 ka after an optimum around 10.3 ka (cf. GSC-2101), according to a statistical analysis of  $^{14}\text{C}$  dates of postglacial epicontinental seas of Eastern Canada (Hillaire-Marcel and Occhietti, 1977).

GSC-1729. Rivière à la Fourche (I)  $11\,300 \pm 160$   
 $\delta^{13}\text{C} = -0.5\text{‰}$ .

Marine shells (sample 18.8.71.7; *Portlandia arctica*; identified by W. Blake, Jr.) from the river bank 650 m south of the bridge over Rivière à la Fourche, 4 km southwest of St-Narcisse, Québec ( $46^{\circ}32'5''\text{N}$ ,  $72^{\circ}30'15''\text{W}$ ), at an elevation of ca. 79.5 m, were enclosed in glaciomarine clayey diamicton. Collected by S. Occhietti on June 14, 1972; submitted by S. Occhietti.

The sample (26 g dry weight) was treated with an acid leach to remove twenty per cent of the outer material. The age estimate is based on one 3-day count in the 2 L counter with a mixing ratio of 1.00.

Uncorrected age,  $11\,300 \pm 160$ .

Comment (S. Occhietti): Most of the shells were more than 1 cm long and well preserved with periostracum intact and many articulated. There were some encrusted valves (not dated) and some shells exhibited iron-staining. GSC-1729 dates the glaciomarine deposits accumulated at the margin between the ice sheet and the Champlain Sea, in the Mauricie area. These deposits build the core of the St-Narcisse morainic system and probably mark a stabilization before or during the St-Narcisse episode (Occhietti, 1980). The shells, *Portlandia arctica*, *Balanus hameri*, *Thyasira* sp., and *Lunatia* sp., identified by F. Wagner, indicate cold and deep waters. An age of 11.3 ka is probably an older time limit for the St-Narcisse glacial episode and is within the range of GSC-1526 ( $11\,500 \pm 630$  BP, Gadd et al., 1972) counted from foraminifera collected in St-Narcisse Moraine glaciomarine deposits, 8 km farther northeast.

GSC-1739. Rivière à la Fourche (II)  
 uncorrected  $10\,000 \pm 150$

Marine shells (sample 23.5.72.1; *Hiatella arctica*; identified by S. Occhietti) from the north slope of St-Narcisse Moraine, on the right bank of Rivière à la Fourche, on the north side of the bridge, 4 km southwest of St-Narcisse, Québec ( $46^{\circ}32'20''\text{N}$ ,  $72^{\circ}30'40''\text{W}$ ), at an elevation of 98 m, were enclosed in the first sandy bed of marine silts, 2 cm above sandy till. Collected by S. Occhietti on June 5, 1972; submitted by S. Occhietti.

The sample (26.5 g dry weight) was treated with an acid leach to remove twenty per cent of the outer material. The age estimate is based on one 3-day count in the 2 L counter with a mixing ratio of 1.00.

Comment (S. Occhietti): Because the sample was collected at the lowest part (below 9 m) of marine clay and silt, it should date the beginning of marine sedimentation on the north slope of St-Narcisse Moraine. In fact 10 ka may date a thanatocenose of a subcommunity of *Hiatella arctica* living in coarse deposits (Hillaire-Marcel, 1972) with *Mytilus edulis*, *Balanus crenatus*, and with rare *Macoma balthica*. Since most *Mytilus* shells are complete, the original growth site was proximate, probably the upper part of the moraine slope. It is possible that at 10 ka, the Champlain Sea was at 98-128 m (Occhietti, 1980), and that the land was isostatically depressed 100 to 128 m. Nevertheless, with 9 m of marine fossiliferous sediments above containing *Mya arenaria*, *Macoma balthica*, the age of 10 000 seems too young.

GSC-2045. Rivière St. Maurice  
 uncorrected  $11\,100 \pm 90$

Marine shells (sample 30-6-73; *Portlandia arctica*; identified by S. Occhietti) from the left bank of Rivière St. Maurice, 1.5 km upstream (southeast) from La Gabelle dam, 3.5 km east of St-Etienne-des-Grès, Québec ( $46^{\circ}26'15''\text{N}$ ,  $72^{\circ}43'40''\text{W}$ ), at an elevation of approximately 11 m, were enclosed in thick glaciomarine deposits at the base of the section. Collected by S. Occhietti in 1973; submitted by S. Occhietti.

The sample (40.0 g dry weight) was treated with an acid leach to remove ten per cent of the outer material. The age estimate is based on one 4-day count in the 5 L counter with a mixing ratio of 1.00.

Comment (S. Occhietti): This sample (GSC-2045) dates the glaciomarine deposits of the St-Narcisse morainic system. The age is in agreement with GSC-1526 ( $11\,500 \pm 630$  BP, Gadd et al., 1972) and GSC-1729 ( $11\,300 \pm 160$  BP, Occhietti, 1980) and confirms a stabilization of the ice margin bordered by the Champlain Sea, along approximately the topographic contact between Precambrian (Grenville) and Paleozoic (St. Lawrence Lowlands) rocks, in the Mauricie area (Shawinigan embayment). The collection site has provided a differentiated fauna, identified by F. Wagner: *Portlandia arctica*, *Balanus hameri*, *Haminoea solitaria*, *Nucula tenuis*, *Buccinum totteni?* Stimpson, *Thyasira* sp., *Lunatia pallida* (?), and a 5 cm long incomplete and crushed neogastropod. This fauna indicates cold and more or less deep marine waters.

GSC-2090. St-Alban (I)  
uncorrected 10 600 ± 160

Marine shells (sample 11.6.74.2.f; *Balanus hameri*; identified by S. Occhietti) from 9.6 km north-northeast of St-Alban on the left bank, at the rapids of Rivière Ste-Anne, Québec (46°47'20"N, 72°0'55"W), at an elevation of approximately 71 m, were enclosed in the base of a 50 m section of mostly marine sediments. Collected by S. Occhietti on June 27, 1974; submitted by S. Occhietti.

The sample (26.7 g dry weight) was treated with an acid leach to remove twenty per cent of the outer material. The age estimate is based on one 3-day count in the 2 L counter with a mixing ratio of 1.00.

Comment (S. Occhietti): The shells were well preserved (wall plates, opercules, soles) and of good size. GSC-2090 dates the local colonization, in deep cold marine waters, by *Balanus hameri*, prior to the sedimentation of the enclosing bed. This bed is 1 m above the base of marine deposits in which are scattered shells of *Balanus hameri*, *Hiattella arctica*, *Portlandia arctica*, *Lunatia pallida*, *Lepeta caeca*, *Macoma balthica*, *Nucula renuis* (?), *Buccinum* sp. (identified by F. Wagner); two fish vertebrae; and casts of eggs(?). Because the section is 2 km south of the St-Narcisse morainic system, and the lower 7 m of stratified marine silts contains abundant blocks and stones, the date should be contemporaneous with the beginning of marine transgression in the area and of the St-Narcisse glacial episode. An age of 10.6 ka appears young for this episode but could be a minimum age (Occhietti, 1976) according to LaSalle and Rondot (1967) who suggested that the moraine ranges in age between 11.0 and 10.5 ka.

GSC-2150. St-Alban (II)  
uncorrected 10 200 ± 90

Marine shells (sample 11.6.74.2.h; *Macoma calcarea*; identified by S. Occhietti) from 9.6 km north-northeast of St-Alban, on the left bank, at the rapids, of Rivière Ste-Anne, Québec (46°47'20"N, 72°0'55"W), at an elevation of ca. 78 m, were enclosed in a 50 m section of mostly marine sediments. Collected by S. Occhietti in June, 1974; submitted by S. Occhietti.

The sample (27 g dry weight) was treated with an acid leach to remove twenty per cent of the outer material. The age estimate is based on one 3-day count in the 2 L counter with a mixing ratio of 1.00.

Comment (S. Occhietti): GSC-2150 dates a thanotocenose of whole large shells of *Macoma calcarea* without periostracum, in a bed 8 m above the base of marine sediments, which marks the termination of abundant blocks in the stratified clay. Below and above this bed, the marine clay contains only abundant *Portlandia arctica*, from deep and cold waters. *Macoma calcarea* corresponds to the end of

floating glacial icebergs. In concert with GSC-2090 (10 600 ± 160 BP), from a *Balanus hameri* zone, about 6.5 m below a *Macoma calcarea* zone, the approximate mean rate of marine sedimentation in the area is 16 mm a year during the dated period.

GSC-2101. Séminaire St-Joseph  
uncorrected 10 300 ± 100

Marine shells (sample 30.4.74; *Mya arenaria*; identified by S. Occhietti) from 250 m northeast of Séminaire St-Joseph, Shawinigan, Québec (46°34'35"N, 72°43'40"W), at an elevation of ca. 129 m, were enclosed in a silt bed in littoral deposits. Collected by S. Occhietti on September 28, 1974; submitted by S. Occhietti.

The sample (46.5 g dry weight) was treated with an acid leach to remove twenty per cent of the outer material. The age estimate is based on one 2-day count in the 5 L counter with a mixing ratio of 1.00.

Comment (S. Occhietti): Shells were abundant, of good size (up to 66 mm long), well preserved, and in places with articulated valves. The sample (GSC-2101) dates a littoral *Mya arenaria* community, close to its original growth site, with *Mytilus edulis*, *Macoma balthica*, *Hiattella arctica*, *Balanus crenatus*. The bed with *Mya* is in the middle of a 12 m continuous sequence of marine sediments and marks a temperature optimum of sea waters. The upper beds with *Hiattella arctica*, *Mytilus edulis*, *Macoma balthica*, and *Balanus crenatus* signify a cooling of sea waters, in agreement with GSC-1444 (10 100 ± 150 BP, Gadd et al., 1972), with GSC-1700 (10 200 ± 160 BP, Occhietti, 1980) and with a statistical analysis on <sup>14</sup>C dates of postglacial epicontinental seas of Eastern Canada (Hillaire-Marcel and Occhietti, 1977).

GSC-3499. Kamouraska River  
uncorrected 5860 ± 60

Wood (sample 82-07-19-13; *Betula*; identified by R.J. Mott (unpublished GSC Wood Report No. 82-32)) from Rivière Kamouraska, 1.5 km southeast of Kamouraska village, Québec (47°34'30"N, 69°51'50"W), at an elevation of 4.8-5.0 m, was collected by L. Hardy on July 19, 1982; submitted by L. Hardy.

The sample (11.1 g dry weight) was treated with hot base, hot acid (noncalcareous), and distilled water. The age estimate is based on two 1-day counts in the 5 L counter with a mixing ratio of 1.00.

GSC-1827. Lac Noir  
uncorrected 240 ± 60

Wood (base of tree) (sample SCA-UF428; *Pinus strobus*; identified by L.D. Wilson (unpublished GSC Wood Report No. 72-64)) from 3.7 km south of Rivière

Bécancour bridge and 0.2 km east of Lac Noir, on east side of Route No. 1, in Lac Black, Québec (46°0.5'N, 71°22'W), at an elevation of 248 ± 3 m, was enclosed in A horizon, buried soil. Collected by W. Shilts on October 25, 1972; submitted by W. Shilts.

The sample (11.5 g dry weight) was treated with hot base, hot acid, and distilled water. The age estimate is based on one 1-day count in the 5 L counter with a mixing ratio of 1.00.

Comment (W.W. Shilts): This sample was a piece of "old looking" wood in a highly coloured and chemically complex road exposure at the base of a slope in the Serpentine Belt. Because of the extensive coloration of the enclosing sediment, it was thought to be either an early postglacial or interstadial paleosol. From the date it is obvious that the sediment is colluvial, possibly mobilized as the result of a forest fire. The unusual composition of drift and soils over the ophiolite complex (very high Fe, Mg, Ni, Co, Cr, etc.) probably accounts for the misleading strong coloration.

GSC-2331. Ste-Clothilde  
uncorrected 7950 ± 100

Sedge peat (sample 75-18-6) from 8.4 km (5.2 miles) south of Ste-Clothilde, Chateauguay County, Québec (45°6'N, 73°39'W), at an elevation of 58 m, was collected by M. Levesque on September 9, 1975; submitted by M. Levesque.

The sample (28.4 g dry weight) was treated with hot base, hot acid, and distilled water. The age estimate is based on two 1-day counts in the 5 L counter with a mixing ratio of 1.00.

GSC-2068. Anger (Papineau)  
uncorrected 6240 ± 70

Wood (root or branch) (sample Eb-2; *Quercus borealis*; identified by R.J. Mott (unpublished GSC Wood Report No. 73-55)) from 0.5 km south of the church, 0.33 km south of Highway 8, Anger (Papineau), Québec (45°31'15"N, 75°29'30"W), at an elevation of 45.7 m, was enclosed in sand and clay. Collected by P.G. Lajoie on September 12, 1973; submitted by P.G. Lajoie.

The sample (13.5 g dry weight) was treated with hot base, hot acid, and distilled water. The age estimate is based on two 1-day counts in the 5 L counter with a mixing ratio of 1.00.

GSC-3415. Eastmain 760 ± 100  
 $\delta^{13}\text{C} = -4.2\text{‰}$

Marine shells (sample 81-08-20-1; *Macoma balthica*; identified by P. Champagne) from 6 km southeast of Eastmain village, Québec (52°12'N, 78°31'W), at an depth of 0.5 m, were enclosed in sand.

Collected by P. Champagne on August 20, 1981; submitted by P. Champagne.

The sample (13.0 g dry weight) was treated with an acid leach to remove ten per cent of the outer material. The age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 2.01.

Uncorrected age, 820 ± 100.

#### Northwestern Québec series

GSC-3386. Lac Matchi Manitou 9120 ± 290  
 $\delta^{13}\text{C} = -28.5\text{‰}$

Lake sediment, gyttja (sample CGC-23 (240-245 cm)) from a circular (175 m) pond, 5 km west of Lac Matchi-Manitou, Québec (47°58'45"N, 77°8'50"W), at an elevation of 384 m, was collected by P. Richard, A. Larouche, and J.J. Veillette on March 16, 1981; submitted by J.J. Veillette.

The sample (89.1 g wet weight) was treated with hot acid (noncalcareous), and distilled water (base treatment omitted). The age estimate is based on one 3-day count in the 2 L counter with a mixing ratio of 3.16.

Uncorrected age, 9180 ± 290.

Comment (J.J. Veillette): The sample is from the base of a 2.45 m sequence at gyttja, taken from a bedrock basin in a water depth of 2.0 m. The site is in the vicinity of the maximum level of glaciolacustrine submergence. The date gives a minimum age for the deglaciation of the area (Veillette, 1988; Richard et al., 1989).

GSC-3401. Lac Crémazie 8960 ± 190  
 $\delta^{13}\text{C} = -26.9\text{‰}$

Lake sediment, gyttja (sample CGC-19 (465-471 cm)) from an oval-shaped (300 by 150 m) pond, 7 km southwest of Lac Crémazie, Québec (47°49'40"N, 77°46'0"W), at an elevation of 361 m, was collected by P. Richard, A. Larouche, and J.J. Veillette on March 20, 1981; submitted by J.J. Veillette.

The sample (114.9 g dry weight) was treated with hot acid (noncalcareous), and distilled water (base treatment omitted). The age estimate is based on one 3-day plus one 1-day count in the 2 L counter with a mixing ratio of 3.16.

Uncorrected age, 8980 ± 190.

Comment (J.J. Veillette): The sample is from the base at a 4.71 m gyttja sequence taken from a bedrock basin in a water depth of 9.35 m. The site is in the vicinity of the maximum level of glaciolacustrine submergence. The date gives a minimum age for the deglaciation at the area (Veillette, 1988; Richard et al., 1989).

GSC-3373. Lac Vergue  
uncorrected 9130  $\pm$  340

Lake sediment, gyttja (sample CGC-20 (440-445 cm)) from a narrow (400 by 125 m) pond near Lac Vergue, 3 km east of Rivière l'Épinette, Québec (47°34'25"N, 77°55'0"W), at an elevation of 358.0 m, was collected by P. Richard, A. Larouche, and J.J. Veillette on March 20, 1981; submitted by J.J. Veillette.

The sample (121.1 g wet weight) was treated with hot acid (noncalcareous) and distilled water (base treatment omitted). The age estimate is based on one 3-day count in the 2 L counter with a mixing ratio of 6.49.

Comment (J.J. Veillette): The sample is from the base of a 4 m gyttja sequence, taken from a bedrock basin in a water depth of 5.90 m. The site is in the vicinity of the maximum level of glaciolacustrine submergence. The date gives a minimum age for the deglaciation of the area (Veillette, 1988; Richard et al., 1989).

GSC-3480. Lac Regan 8190  $\pm$  420  
 $\delta^{13}\text{C} = -27.2\text{‰}$ .

Lake sediment, gyttja with silt (sample CGC-29 (458-471 cm)) from a circular (100 m) pond, 3 km southeast of Lac Regan, Québec (47°4'6"N, 78°1'30"W), at an elevation of 327 m, was collected by P. Richard, A. Larouche, and J.J. Veillette on March 22, 1982; submitted by J.J. Veillette.

The sample (191.3 g dry weight) was treated with hot acid (noncalcareous) and distilled water (base treatment omitted). The age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 2.43.

Uncorrected age, 8220  $\pm$  420.

Comment (J.J. Veillette): The sample is from the base of a 4.55 m gyttja sequence, taken from a bedrock basin in a water depth of 2.5 m. The site is beyond the maximum extent of glaciolacustrine submergence. The dated material was extracted from a zone of transition between the silty sand substrate and gyttja. The uncorrected age was published (Veillette, 1983) with 325 m given as the level of the sampled pond. The date is a minimum age for the deglaciation of the area (Veillette, 1988; Richard et al., 1989).

GSC-3513. Lac à la Truite 8920  $\pm$  170  
 $\delta^{13}\text{C} = -25.6\text{‰}$ .

Lake sediment, gyttja with soil (sample CGC-28 (450-460 cm)), from a teardrop-shaped (60 by 40 m) pond, 11 km east of Lac à la Truite, Québec (47°14'58"N, 78°7'4"W), at an elevation of 394 m, was collected by P. Richard, A. Larouche, and J.J. Veillette on March 22, 1981; submitted by J.J. Veillette.

The sample (161.5 g dry weight) was treated with hot acid (noncalcareous) and distilled water (base treatment omitted). The age estimate is based on one 3-day count in the 2 L counter with a mixing ratio of 2.04.

Uncorrected age, 8930  $\pm$  170.

Comment (J.J. Veillette): The sample is from the base at a 4.45 m sequence of gyttja, taken from a bedrock basin in a water depth of 4.80 m. The site is beyond the maximum extent of glaciolacustrine submergence. The dated material was extracted from a zone of transition between the fine silty sand substrate and gyttja. The date is a minimum age for the deglaciation of the area (Veillette, 1988; Richard et al., 1989).

GSC-3339. Lac Lemay 7050  $\pm$  90  
 $\delta^{13}\text{C} = -27.5\text{‰}$ .

Basal peat (sample CGC-14 (530-540 cm); moss and herbaceous material) from a circular (125 m) kettle pond, 1.5 km east of Lac Lemay, Québec (47°51'48"N, 78°11'50"W), at an elevation of 361 m, was collected by P. Richard, A. Larouche, and J.J. Veillette on March 20, 1981; submitted by J.J. Veillette.

The sample (74.9 g wet weight) was treated with hot acid (noncalcareous) and distilled water (base treatment omitted). The age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 1.00.

Uncorrected age, 7090  $\pm$  90.

Comment (J.J. Veillette): The sample is from the base of a 5.40 m organic sequence taken from a kettle pond in sand and gravel of the Harricana Moraine, in a water depth of 1.70 m. The site is below the maximum level at proglacial Lake Barlow estimated at 370 m. The young age, compared with the surrounding ages, suggests late melt-out conditions. This is supported (P.J.H. Richard, personal communication, 1988) by the absence of pollen zones 1, 2, and 3, and the presence of peat below lacustrine sediments at this site (Veillette, 1988; Richard et al., 1989).

GSC-3434. Lac Béraud 8150  $\pm$  110  
 $\delta^{13}\text{C} = -21.3\text{‰}$ .

Lake sediment, grey gyttja (sample CGC-15 (216-221 cm)) from a circular (300 m) pond, 1.5 km east of Lac Béraud, Québec (47°51'35"N, 78°12'23"W), at an elevation of 358 m, was collected by P. Richard, A. Larouche, and J.J. Veillette on March 20, 1981; submitted by J.J. Veillette.

The sample (41.0 g dry weight) was treated with hot acid (noncalcareous) and distilled water (base treatment omitted). The age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 1.44.

Uncorrected age, 8090  $\pm$  110.



Comment (J.J. Veillette): The sample is from the base of a 2.21 m organic sequence, taken from a kettle in sand and gravel of the Harricana Moraine in a water depth of 6.9 m. The site is below the maximum proglacial lake level estimated at 375 m in this area. The thin organic column and the relatively young age compared with others in the area suggest late melt-out conditions. Pollen zones 1 and 2 (P.J.H. Richard, personal communication, 1988) are present at this site, but are not adequately represented. This possibly explains why the age obtained is characteristic of pollen zone 3 (Veillette, 1988; Richard et al., 1989).

GSC-3486. Lac Mumba 9490  $\pm$  200  
 $\delta^{13}\text{C} = -27.7\text{‰}$ .

Lake sediment, gyttja with silt (sample CGC-18 (370-383 cm)) from a circular (40 m) pond, 4 km east of Lac Mumba, Québec (47°32'30"N, 78°15'45"W), at an elevation of 399 m, was collected by P. Richard, A. Larouche, and J.J. Veillette on March 23, 1982; submitted by J.J. Veillette.

The sample (146.7 g dry weight) was treated with hot acid (noncalcareous) and distilled water (base treatment omitted). The age estimate is based on one 3-day count in the 2 L counter with a mixing ratio of 3.58.

Uncorrected age, 9530  $\pm$  200.

Comment (J.J. Veillette): The sample is from the base of a 4.34 m sequence of gyttja, taken from a steep-sided basin in till in a water depth of 8.15 m. The site is beyond the maximum extent of glaciolacustrine submergence. The dated material was extracted from a zone of transition between the clayey silt substrate and gyttja. The date is a minimum age for the deglaciation of the area. The uncorrected age was published (Veillette, 1983) with 388 m given as the level of the sampled pond and 360 m as the maximum level of the glaciolacustrine submergence; these elevations have been modified (Veillette, 1988; Richard et al., 1989).

GSC-3287. Lac Béraud 8790  $\pm$  140  
 $\delta^{13}\text{C} = -24.3\text{‰}$ .

Lake sediment, grey gyttja (sample CGC-16 (235-240 cm)) from a (800 by 300 m) pond, 2 km northeast of Lac Béraud, near the road between Rapide-2 and Cadillac, Québec (47°59'56"N, 78°16'20"W), at an elevation of 389.0 m, was collected by P. Richard, A. Larouche, and J.J. Veillette on March 20, 1981; submitted by J.J. Veillette.

The sample (102.6 g wet weight) was treated with hot acid (noncalcareous) and distilled water (base treatment omitted). The age estimate is based on one 3-day count in the 2 L counter with a mixing ratio of 2.74.

Uncorrected age, 8780  $\pm$  140.

Comment (J.J. Veillette): Sample is from the base of a 2.44 m gyttja sequence, taken from a bedrock basin in a water depth of 5.7 m. The site is above the maximum level (380 m) reached by the proglacial lake in the area. The date gives a minimum age for deglaciation (Veillette, 1983, 1988; Richard et al., 1989).

GSC-3395. Lac Nodier 8830  $\pm$  250  
 $\delta^{13}\text{C} = -25.7\text{‰}$ .

Lake sediment, greenish gyttja (sample CGC-17 (405-415 cm)) from a pond (150 by 75 m), 3 km north of Lac Nodier, Québec (47°42'40"N, 78°24'40"W), at an elevation of 373 m, was collected by P. Richard, A. Larouche, and J.J. Veillette on March 18, 1981; submitted by J.J. Veillette.

The sample (259.7 g wet weight) was treated with hot acid (noncalcareous) and distilled water (base treatment omitted). The age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 2.47.

Uncorrected age, 8840  $\pm$  250.

Comment (J.J. Veillette): The sample is from the base at a 3.80 m gyttja sequence, taken from a bedrock basin in a water depth of 1.0 m. The site is in the vicinity of the maximum level of glaciolacustrine submergence. The date gives a minimum age for the deglaciation of the area (Veillette, 1988; Richard et al., 1989).

GSC-3471. Lac Potier 9530  $\pm$  280  
 $\delta^{13}\text{C} = -29.8\text{‰}$ .

Lake sediment, gyttja (sample CGC-30 (697-710 cm)) from a circular (75 m) pond, 2 km west of Lac Potier, Québec (47°4'35"N, 78°47'0"W), at an elevation of 340 m, was collected by P. Richard, A. Larouche, and J.J. Veillette on March 22, 1982; submitted by J.J. Veillette.

The sample (123.1 g dry weight) was treated with hot acid (noncalcareous), and distilled water (base treatment omitted). The age estimate is based on one 4-day count in the 2 L counter with a mixing ratio of 3.08.

Uncorrected age, 9600  $\pm$  280.

Comment (J.J. Veillette): The sample is from the base of a 6.96 m gyttja sequence, under 5.50 m of water in a bedrock basin. The site is well above the maximum level of lacustrine submergence which is estimated to be 290 m in the surrounding area. The date provides a minimum age for deglaciation (Veillette, 1988; Richard et al., 1989).

GSC-3467. Lac des Îles, 10 100  $\pm$  180  
 Lac Kipawa area  $\delta^{13}\text{C} = -29.1\text{‰}$ .

Lake sediment, gyttja (sample CGC-36 (602-608 cm)), from a small circular (30 m) pond, 1 km

northeast of Lac des Îles, Lac Kipawa area, Québec (46°54'45"N, 79°10'40"W), at an elevation of 320 m, was collected by P. Richard, A. Larouche, and J.J. Veillette on March 24, 1982; submitted by J.J. Veillette.

The sample (58.0 g dry weight) was treated with hot acid (noncalcareous) and distilled water (base treatment omitted). The age estimate is based on three 1-day counts in the 2 L counter with a mixing ratio of 2.16.

Uncorrected age, 10 200 ± 180.

Comment (J.J. Veillette): The sample is from the base of a 6.0 m gyttja sequence, taken from a kettle in the coarse gravel of the Lake McConnell Moraine in a water depth of 2.25 m. The site is well above the maximum level of glaciolacustrine submergence estimated to be 272 m from the distribution of biological indicators of lacustrine submergence (Dadswell, 1974; Veillette, 1988). The silt underlying the gyttja is slightly calcareous. The date gives a minimum age for the opening of the ice sheet along the longitudinal axis of the Lake McConnell and Harricana Moraine complex (Veillette, 1988; Richard et al., 1989). The uncorrected age was published (Veillette, 1983) with 305 m and 310 m given as the levels of the pond at the sampling site and the level of glaciolacustrine submergence.

GSC-3457. Lac Grenier, 7880 ± 190  
Fabre area  $\delta^{13}\text{C} = -25.2\text{‰}$ .

Lake sediment, gyttja (sample CGC-34 (297-307.5 cm)) from an oval-shaped (150 by 100 m) pond, 0.5 km east of Lac Grenier, Fabre area, Québec (47°11'45"N, 79°16'0"W), at an elevation of 317 m, was collected by P. Richard, A. Larouche, and J.J. Veillette on March 24, 1982; submitted by J.J. Veillette.

The sample (228.6 g wet weight) was treated with hot acid (noncalcareous) and distilled water (base treatment omitted). The age estimate is based on three 1-day counts in the 2 L counter with a mixing ratio of 2.31.

Uncorrected age, 7880 ± 190.

Comment (J.J. Veillette): The sample is from the base of a 2.95 m gyttja sequence, taken from a bedrock basin in a water depth of 3.50 m. The site is above the maximum proglacial lake level estimated to be 300 m in this area. The young age, compared with ages from the surrounding area is not readily explained. Organic accumulation was however thinner here than at most sites and the pollen assemblages and macrofossils (Richard et al., 1989) support the interpretation of stagnant ice (Veillette, 1988) in upper Lake Timiskaming.

GSC-3461. Lac Lorrain 10 400 ± 240  
 $\delta^{13}\text{C} = -25.2\text{‰}$ .

Lake sediment, basal gyttja (sample CGC-35 (509-515 cm)), from a circular (100 m) pond, 1 km east of Lac Lorrain, Ontario (47°6'25"N, 79°35'20"W), at an elevation of 319 m, was collected by P. Richard, A. Larouche, and J.J. Veillette on March 24, 1982; and submitted by J.J. Veillette.

The sample (135.9 g dry weight) was treated with hot acid (noncalcareous) and distilled water (base treatment omitted). The age estimate is based on one 4-day count in the 2 L counter with a mixing ratio of 3.97.

Uncorrected age, 10 400 ± 240.

Comment (J.J. Veillette): The sample is from the base of a 5.12 m gyttja sequence, taken from a bedrock basin in a water depth of 1.0 m. The site is above the maximum level of glaciolacustrine submergence estimated to be 300 m in this area. The gyttja overlies a fine, slightly calcareous gravel containing constituents from the sedimentary Paleozoic carbonate rocks to the north.

## Ontario

### Lamb's Pond series

A series of core samples from Lamb's Pond, 10 km northwest of Brockville, Ontario (44°39'20"N, 75°48'20"W), at an elevation of ca. 105.2 m, was collected by T.W. Anderson on September 28, 1978; submitted by T.W. Anderson.

GSC-3296. Lamb's Pond (I) 8320 ± 120  
 $\delta^{13}\text{C} = -30.7\text{‰}$ .

Lake sediment, gyttja (AP-79-2C (737-743 cm); 107.6 g dry weight) was treated with hot acid (slightly calcareous) and distilled water (base treatment omitted). The age estimate is based on one 3-day count in the 2 L counter with a mixing ratio of 1.98.

Uncorrected age, 8410 ± 120.

GSC-3259. Lamb's Pond (II) 10 200 ± 160  
 $\delta^{13}\text{C} = -30.2\text{‰}$ .

Lake sediment, gyttja (AP-79-2B (793.5-796.5 cm); 115.7 g wet weight) was treated with hot acid (slightly calcareous) and distilled water (base treatment omitted). The age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 2.15.

Uncorrected age, 10 300 ± 160.



GSC-3273. Lamb's Pond (III)  $10\,500 \pm 110$   
 $\delta^{13}\text{C} = -30.0\text{‰}$ .

Lake sediment, gyttja (AP-79-2A (828-831 cm); 116.9 g dry weight) was treated with hot acid (non-calcareous) and distilled water (base treatment omitted). The age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 1.00.

Uncorrected age,  $10\,600 \pm 110$ .

GSC-3088. Lamb's Pond (IV)  $12\,300 \pm 230$   
 $\delta^{13}\text{C} = -24.7\text{‰}$ .

Lake sediment, clayey gyttja (AP-79-2 (841-843.5 cm); 116.0 g dry weight) was treated with hot acid and distilled water (base treatment omitted). The age estimate is based on one 3-day count in the 2 L counter with a mixing ratio of 3.18.

Uncorrected age,  $12\,300 \pm 230$ .

#### Mitchellville series

A series of samples from depression along Highway No. 2, 1.4 km northeast of Mitchellville and 9 km southwest of Mallorytown, Ontario (44°25'28"N, 75°57'47"W), at an elevation of 83.8 m, was collected by T.W. Anderson on August 28, 1980; submitted by T.W. Anderson.

GSC-3146. Mitchellville (I)  $10\,500 \pm 140$   
 $\delta^{13}\text{C} = -30.1\text{‰}$ .

Lake sediment, basal detrital gyttja (AP-4-80 (441.5-443 cm); 94.0 g dry weight) was treated with hot acid and distilled water (base treatment omitted). The age estimate is based on one 3-day count in the 2 L counter with a mixing ratio of 1.98.

Uncorrected age,  $10\,600 \pm 140$ .

GSC-3127. Mitchellville (II)  $9900 \pm 100$   
 $\delta^{13}\text{C} = -26.6\text{‰}$ .

Wood (AP-3-80 (458 cm); 9.1 g dry weight; *Picea*; identified by R.J. Mott (unpublished GSC Wood Report No. 80-28)) was treated with hot base, hot acid, and distilled water. The age estimate is based on two 1-day counts in the 5 L counter with a mixing ratio of 1.00.

Uncorrected age,  $9930 \pm 100$ .

GSC-3163. Mitchellville (III)  $9990 \pm 110$   
 $\delta^{13}\text{C} = -26.1\text{‰}$ .

Plant detritus (organics) (AP-5-80 (448-460 cm); 8.9 g dry weight) was collected on November 22, 1980 and treated with hot acid and distilled water (base treatment omitted). The age estimate is based on one 3-day count in the 2 L counter with a mixing ratio of 1.00.

Uncorrected age,  $10\,000 \pm 110$ .

GSC-3418. Loon Lake  $10\,700 \pm 260$   
 $\delta^{13}\text{C} = -23.5\text{‰}$ .

Lake sediment, basal clayey gyttja (sample AP-1-79 (10.25-10.30 cm)) from Loon Lake, 12.7 km south of Perth, Ontario (44°46'45"N, 76°14'0"W), at an elevation of ca. 102 m, was collected by T.W. Anderson on September 17, 1979; submitted by T.W. Anderson.

The sample (194.0 g dry weight) was treated with hot acid (noncalcareous) and distilled water (base treatment omitted). The age estimate is based on one 3-day count in the 2 L counter with a mixing ratio of 3.65.

Uncorrected age,  $10\,600 \pm 260$ .

GSC-3298. Perth Bog  $8770 \pm 100$   
 $\delta^{13}\text{C} = -26.4\text{‰}$ .

Wood (sample AP-1-81 (467-472 cm); *Populus*; identified by R.J. Mott (unpublished GSC Wood Report No. 81-13)) from Perth Bog, 4 km northwest of Perth, Ontario (44°56'40"N, 76°16'W), at an elevation of 138.6 m, was enclosed in woody fibrous peat. The sample was collected by T.W. Anderson on October 4, 1979; submitted by T.W. Anderson.

The sample (4.0 g dry weight) was treated with hot acid (noncalcareous) and distilled water (base treatment omitted). The age estimate is based on one 3-day count in the 2 L counter with a mixing ratio of 1.54.

Uncorrected age,  $8790 \pm 100$ .

GSC-2237. White Lake  
uncorrected  $3770 \pm 60$

Charcoal (sample CCK-14) from 4.67 km southeast of St. Andrews United Church, 0.40 km east of Hayes Bay, White Lake, Pakenham, Ontario (45°19'22"N, 76°27'12"W), at an elevation of 167.75 m, was collected by C.C. Kennedy on August 4, 1975; submitted by C.C. Kennedy.

The sample (11.1 g dry weight) was treated with hot base, hot acid, and water rinses. The age estimate is based on one 2-day count in the 5 L counter with a mixing ratio of 1.00.

GSC-3372. MacLaughlan Lake  $10\,700 \pm 150$   
 $\delta^{13}\text{C} = -28.6\text{‰}$ .

Lake sediment, sandy gyttja (sample AP-2-81 (11.00-11.04 cm)) from MacLaughlan Lake, 15.5 km southeast of Renfrew and 4.5 km west of White Lake, Ontario (45°21'45"N, 76°33'15"W), at an elevation of

167.71 m, was collected by T.W. Anderson on June 19, 1981; submitted by T.W. Anderson.

The sample (81.1 g dry weight) was treated with hot acid (noncalcareous) and distilled water (base treatment omitted). The age estimate is based on one 3-day count in the 2 L counter with a mixing ratio of 1.90.

Uncorrected age,  $10\,700 \pm 150$ .

GSC-3150. 'Dobber' Lake  $10\,900 \pm 290$   
 $\delta^{13}\text{C} = -27.8\text{‰}$ .

Lake sediment, basal gyttja with FeS (sample AP-2-80 (785.5-788 cm)) from 'Dobber' Lake 15 km west southwest of Pembroke, Ontario ( $45^{\circ}44.75'\text{N}$ ,  $77^{\circ}17.5'\text{W}$ ), at an elevation of 148 m, was enclosed in sand and silt. The sample was collected by T.W. Anderson on August 13, 1980; submitted by T.W. Anderson.

The sample (103.5 g wet weight) was treated with hot acid (noncalcareous) and distilled water rinses to neutral pH (base treatment omitted). The age estimate is based on one 5-day count in the 2 L counter with a mixing ratio of 5.85.

Uncorrected age,  $10\,900 \pm 290$ .

#### Bay of Quinte series

A series of samples from the Bay of Quinte, 610 m off the Trenton shore, Ontario ( $44^{\circ}5'15''\text{N}$ ,  $77^{\circ}32'31''\text{W}$ ) was collected by W.F. Warwick in August, 1970; submitted by W.F. Warwick.

GSC-1628. Bay of Quinte (I)  $800 \pm 190$   
 $\delta^{13}\text{C} = -26.7\text{‰}$ .

Lake sediment, gyttja (LO 0.0-2.0 cm (Trenton core); 7.6 g wet weight) was treated with hot acid and distilled water (base treatment omitted). The age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 3.96.

Uncorrected age,  $830 \pm 190$ .

GSC-1607. Bay of Quinte (II)  $700 \pm 150$   
 $\delta^{13}\text{C} = -26.5\text{‰}$ .

Lake sediment, gyttja (LO 47-48 cm (Trenton core); 17.9 g wet weight) was treated with hot acid and distilled water (base treatment omitted). The age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 2.05.

Uncorrected age,  $730 \pm 150$ .

GSC-1599. Bay of Quinte (III)  $1220 \pm 140$   
 $\delta^{13}\text{C} = -26.0\text{‰}$ .

Lake sediment, gyttja (LO 73-74 cm (Trenton core); 16.3 g wet weight) was treated with hot acid

and distilled water (base treatment omitted). The age estimate is based on one 3-day count in the 2 L counter with a mixing ratio of 2.98.

Uncorrected age,  $1240 \pm 140$ .

Comment (W.F. Warwick): No ancillary data available at this time to account for the inversion in  $^{14}\text{C}$  ages (cf. the inversion in the ages in the sample sequence GSC-1628, -1607, and -1599).

GSC-2490. Stony Lake  
uncorrected  $340 \pm 60$

Carbonized wood (sample Qk-67 938-B; *Acer saccharum*; identified by R.J. Mott (unpublished GSC Wood Report No. 77-15)) from slightly south of Peterborough on County Road No. 6 near the east end of Stony Lake, Ontario ( $44^{\circ}33'44''\text{N}$ ,  $78^{\circ}0'23''\text{W}$ ), at an elevation of 274.39 m, was enclosed in medium to fine sand (midden). The sample was collected by P. Carruthers in June 1967; submitted by P. Carruthers.

The sample (5.4 g dry weight) was treated with hot base, hot acid, and distilled water. The age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 1.11.

GSC-3494. Beeton  $540 \pm 90$   
 $\delta^{13}\text{C} = -26.0\text{‰}$ .

Wood charcoal (sample 1; *Acer*; identified by R.J. Mott (unpublished GSC Wood Report No. 82-8)) from 2.3 km south of the village of Beeton, Ontario ( $44^{\circ}3'66''\text{N}$ ,  $79^{\circ}46'50''\text{W}$ ), at an elevation of 297 m, was enclosed in midden deposits. The sample was collected by M.A. Latta on October 8, 1979; submitted by S.M. Jamieson.

The sample (3.5 g wet weight) was treated with hot base, hot acid (noncalcareous), and distilled water. The age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 1.70.

Uncorrected age,  $550 \pm 90$ .

GSC-3363. Kitchener  $560 \pm 60$   
 $\delta^{13}\text{C} = -25.3\text{‰}$ .

Carbonized wood (sample 1 (AiHd-8); *Acer*; identified by R.J. Mott (unpublished GSC Wood Report No. 81-32)) from 1 km west of Kitchener city limits, on Huron Road, Regional Municipality of Waterloo, Ontario ( $43^{\circ}22'20''\text{N}$ ,  $80^{\circ}31'45''\text{W}$ ), at an elevation of 338.0 m, was enclosed in sand. The sample was collected by J. Redmond on November 4, 1980; submitted by J. Redmond.

The sample (6.1 g wet weight) was treated with hot base, hot acid (noncalcareous), and distilled water. The age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 1.00.

Uncorrected age,  $560 \pm 60$ .

GSC-1224. 'Pakesley' Lake  $4730 \pm 170$   
 $\delta^{13}\text{C} = -21.3\text{‰}$ .

Lake sediment, gyttja (sample LO 67-5 No. 7) from 'Pakesley' Lake, about 0.8 km (0.5 miles) west of Pakesley Station, Ontario ( $45^{\circ}54'50''\text{N}$ ,  $80^{\circ}32'50''\text{W}$ ), at an elevation of 188.11 m, was enclosed in gyttja (above) and sand (below). The sample was collected by C.F.M. Lewis in July, 1967; submitted by C.F.M. Lewis.

The sample (50 g dry weight) was treated with hot acid and water rinses (base treatment omitted). The age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 2.88.

Uncorrected age,  $4670 \pm 170$ .

GSC-1278. 'Still R' Lake  $3790 \pm 160$   
 $\delta^{13}\text{C} = -24.0\text{‰}$ .

Lake sediment, gyttja (sample LO 67-8) from 'Still R' Lake, Ontario ( $45^{\circ}50'10''\text{N}$ ,  $80^{\circ}33'50''\text{W}$ ), at an elevation of 185 m, was enclosed in gyttja (above) and silt (below). The sample was collected by C.F.M. Lewis in July, 1967; submitted by C.F.M. Lewis.

The sample (127 g wet weight) was treated with hot acid and distilled water rinses (base treatment omitted). The age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 2.60.

Uncorrected age,  $3760 \pm 160$ .

GSC-1273. Lake 'D'  $3700 \pm 170$   
 $\delta^{13}\text{C} = -24.0\text{‰}$ .

Lake sediment, gyttja (sample LO 67-6 No. 7) from Lake 'D', near Woleslay Bay, Ontario ( $45^{\circ}53'50''\text{N}$ ,  $80^{\circ}33'50''\text{W}$ ), at an elevation of 184 m, was enclosed in gyttja (above) and clayey silt (below). The sample was collected by C.F.M. Lewis in July 1967; submitted by C.F.M. Lewis.

The sample (56 g wet weight) was treated with hot acid and distilled water rinses (base treatment omitted). The age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 3.25.

Uncorrected age,  $3680 \pm 170$ .

GSC-1182. 'E. Beckanon' Lake  $4080 \pm 160$   
 $\delta^{13}\text{C} = -20.9\text{‰}$ .

Lake sediment, basal silty gyttja (sample LO 67-7 (1115-1130 cm)) from 'E. Beckanon' Lake, Ontario

( $45^{\circ}52'50''\text{N}$ ,  $80^{\circ}34'10''\text{W}$ ) was enclosed in gyttja (above) and silt (below). The lake elevation was 179 m, and the water depth was 5.9 m. The sample was collected by C.F.M. Lewis in July, 1967; submitted by C.F.M. Lewis.

The sample (33 g dry weight) was treated with hot acid and distilled water rinses (base treatment omitted). The age estimate is based on one 3-day count in the 2 L counter with a mixing ratio of 3.95.

Uncorrected age,  $4020 \pm 160$ .

GSC-1412. 'Horny Toad' Lake  
uncorrected  $6170 \pm 400$

Lake sediment, gyttja (sample LO67-1) from 'Horny Toad' Lake, near Rutter, Ontario ( $46^{\circ}3'50''\text{N}$ ,  $80^{\circ}35'0''\text{W}$ ), at an elevation of 191.16 m, was enclosed in gyttja (above) and sand (below). The sample was collected by C.F.M. Lewis in July, 1967; submitted by C.F.M. Lewis.

The sample (30 g dry weight) was treated with hot acid and water rinses (base treatment omitted). The age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 4.94.

GSC-1250. Lake 'A'  $5060 \pm 190$   
 $\delta^{13}\text{C} = -22.9\text{‰}$ .

Lake sediment, sandy gyttja (sample LO 67-3) from Lake 'A', Woleslay Bay, Ontario ( $46^{\circ}6'50''\text{N}$ ,  $80^{\circ}15'10''\text{W}$ ), at an elevation of 199.09 m, was enclosed in gyttja (above) and sand (below). The sample was collected by C.F.M. Lewis in July 1967; submitted by C.F.M. Lewis.

The sample (25.7 g dry weight) was treated with hot acid and water rinses (base treatment omitted). The age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 4.50.

Uncorrected age,  $5020 \pm 190$ .

#### Ellice Bog series

A series of samples from Ellice Bog located about 12 km (7.5 miles) north of Stratford, Ontario ( $43^{\circ}29'\text{N}$ ,  $80^{\circ}56'40''\text{W}$ ), at an elevation of 369 m, was collected by T.W. Anderson on April 30, 1968; submitted by T.W. Anderson.

GSC-1036. Ellice Bog (I)

The first sample of the basal peat (TA-68-2A (229-235 cm)) yielded insufficient gas to be dated (cf. GSC-1023, Table 3).

GSC-3730. Ellice Bog (Ia) 11 400 ± 100  
 $\delta^{13}\text{C} = -32.7\text{‰}$ .

A resampling, in September 1973, of the basal moss peat (TA-68-2A (228.5-232 cm); 39.2 g dry weight) was treated with cold base, hot acid (non-calcareous), and distilled water rinses. The age estimate is based on one 3-day count in the 5 L counter with a mixing ratio of 1.00.

Uncorrected age, 11 500 ± 100.

GSC-1027. Ellice Bog (II)  
uncorrected 33 900 ± 1250

Lake sediment, basal marl/clay (TA-68-2B (253-259 cm); ca. 30 g dry weight) was not pretreated prior to reacting with acid. The age estimate is based on one 4-day count in the 2 L counter with a mixing ratio of 1.00.

Comment (T.W. Anderson): The peat formed on top of lacustrine clay which accumulated in proglacial ponding during the retreat phase of the Port Bruce advance (Karrow, 1984a, b). The date 33 900 ± 1250 (GSC-1027) for the basal lake clay is too old by a few hundred years due to contamination from 'old carbon'. Pollen evidence shows that the lake clays were deposited in a late glacial environment characterized regionally by spruce woodland vegetation and locally by a sedge-bordered lake. Compared to pollen data elsewhere (Mott and Farley-Gill, 1978), an age of about 12 to 13 ka should have been expected.

Sample GSC-1023 ("basal lake clay") produced about 9 L of  $\text{CO}_2$  suggesting that the sample was highly organic, whereas, sample GSC-1036 ("basal moss peat") produced insufficient gas for dating, suggesting that the sample was deficient in organic matter. Thus samples GSC-1023 and -1036 apparently were mislabelled or the respective data sheets were interchanged. The basal peat was, therefore, redated (GSC-3730) and produced a date of 11 500 ± 100 BP, which corresponds exactly with the date for sample GSC-1023. The peat dates the peak (75%) in spruce (*Picea*) pollen after which spruce declines sharply to 10% (Anderson and Lewis, 1985).

#### Maryville Lake series

A series of core samples from Maryville Lake, 8 km southeast of Sauble Beach, 5.6 km east of Lake Huron shore, Bruce Peninsula, Ontario (44°35'30"N, 81°13'30"W), at an elevation of 204 m, was collected by T.W. Anderson and R.J. Mott in September 1973; submitted by T.W. Anderson.

GSC-2251. Maryville Lake (I) 3830 ± 60  
 $\delta^{13}\text{C} = -26.5\text{‰}$ .

Wood (Maryville Lake A; 11.7 g dry weight; *Ulmus americana*; identified by R.J. Mott (unpublished GSC Wood Report No. 75-74)) was treated with hot base, hot acid, and distilled water. The age estimate is based on one 3-day count in the 5 L counter with a mixing ratio of 1.00.

Uncorrected age, 3850 ± 60.

GSC-2270. Maryville Lake (II) 2860 ± 90  
 $\delta^{13}\text{C} = -30.0\text{‰}$ .

Lake sediment, gyttja (Maryville Lake B; 55.2 g wet weight) was treated with hot acid and distilled water rinses (base treatment omitted). The age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 2.09.

Uncorrected age, 2940 ± 90.

GSC-2285. Maryville Lake (III) 2770 ± 90  
 $\delta^{13}\text{C} = -29.5\text{‰}$ .

Lake sediment, gyttja (Maryville Lake C; 57.0 g wet weight) was treated with hot acid and distilled water rinses (base treatment omitted). The age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 1.74.

Uncorrected age, 2840 ± 90.

Comment (T.W. Anderson): The sediment sequence consists of gyttja overlying basal silt. The wood (GSC-2251) is part of a tree trunk which had fallen into the lake where it probably remained suspended until it was buried by gyttja about 1000 years later. Samples GSC-2285 and -2270 are essentially of the same age indicating rapid burial at about 2.8 ka.

#### Silver Lake series

A series of core samples from Silver Lake, 2.4 km south of Sauble Beach, 0.8 km east of Lake Huron shore, Bruce Peninsula, Ontario (44°36'45"N, 81°15'45"W), at an elevation of 185 m, was collected by T.W. Anderson and R.J. Mott on September 1, 1973; submitted by T.W. Anderson.

GSC-2241. Silver Lake (I)  
uncorrected 6200 ± 80

Deciduous wood (Silver Lake A; 4.1 g wet weight) was treated with hot base, hot acid (noncalcareous), and distilled water rinses to neutral pH. The age estimate is based on one 3-day count in the 5 L counter with a mixing ratio of 1.82.

GSC-2281. Silver Lake (II) 6720 ± 120  
δ<sup>13</sup>C = -26.4‰.

Peat (Silver Lake B; 41.7 g wet weight) was treated with hot acid and distilled water rinses (base treatment omitted). The age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 1.84.

Uncorrected age, 6750 ± 120.

Comment (T.W. Anderson): Peat overlies sand and underlies gyttja. The sand - peat sequence probably represents a lagoonal and marshy habitat which had formed in the Silver Lake basin when Lake Huron basin water levels rose to the Nipissing Great Lakes phase. Samples GSC-2281 and GSC-2241 provide two dated points for the Chippewa-Nipissing water level.

GSC-1667. Dyer Bay  
uncorrected 5110 ± 160

Wood charcoal (sample Dyer Bay No. 1) from about 90 m west of Dyer Bay in a gravel pit, 140 m west of present shoreline, Bruce Peninsula, Georgian Bay, Ontario (45°10'0"N, 81°20'46"W), at an elevation of 189 ± 1.5 m, was enclosed in dolomitic cobble beach. The sample was collected by L.P. Stadelmann on December 9, 1971; submitted by L.P. Stadelmann.

The sample (4.5 g dry weight) was treated with cold base for 5 minutes, hot acid, and distilled water. The age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 2.03.

#### Kettle Point Indian Reserve series

A series of samples from the southern boundary of Kettle Point Indian Reserve, east of Lake Huron shore, Ontario was collected by C.F.M. Lewis on November 27, 1968; submitted by C.F.M. Lewis.

GSC-1122. Kettle Point (I) 4310 ± 130  
δ<sup>13</sup>C = -21.4‰.

The site was about 1.2 km (0.75 miles) east of Lake Huron shore (43°10'40"N, 82°0'30"W), at an elevation of 181 m. The sample was enclosed in fine sand (above) and shale till (below). The wood (LO 68-17; 30 g dry weight) was treated with hot base, hot acid, and water rinses. The age estimate is based on one 3-day count in the 5 L counter with a mixing ratio of 1.00.

Uncorrected age, 4250 ± 130.

GSC-1134. Kettle Point (II) 930 ± 130  
δ<sup>13</sup>C = -24.3‰.

The site was about 120 m from Lake Huron shore, Lambton County (43°10.7'N, 82°1.0'W). The sample was enclosed in silt and clay mud (above) and sand (below). The wood charcoal (LO 68-15; 99 g wet weight) was treated with cold base, hot acid, and water rinses. The age estimate is based on two 1-day counts in the 5 L counter with a mixing ratio of 1.00.

Uncorrected age, 920 ± 130.

GSC-1253. Smokey Hollow Lake 1170 ± 160  
δ<sup>13</sup>C = -28.3‰.

Organic lake sediment (sample Core 1 Sample 13.) from Smokey Hollow Lake, Manitoulin Island, Ontario (45°38'N, 82°4' 20"W) was collected by C.F.M. Lewis on June 17, 1969; submitted by C.F.M. Lewis.

The small sample was treated with hot acid and distilled water rinses (base treatment omitted). The age estimate is based on one 5-day count in the 2 L counter with a mixing ratio of 7.46.

Uncorrected age, 1220 ± 160.

GSC-20. Bright Grove  
uncorrected 4275 ± 100

Wood (white oak) from 1.6 km west of Bright Grove, Ontario (43°1'30"N, 82°16'W) was enclosed in beach material (ca. 2.5 m above) Lake Huron. The sample was collected by A. Dreimanis on July 2, 1953; submitted by A. Dreimanis.

The log occurred at the base of a Nipissing beach bar, in reworked Lake Algonquin clay. The material was "buried during the rise of water before the beginning of the Nipissing phase." (McCallum and Dyck, 1960). This crosscheck sample is the same as S-25 (4600 ± 210, McCallum and Dyck, 1960) but somewhat younger in estimated age.

The sample (14.1 g dry weight) was treated with hot base, hot acid, and water rinses. The age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 1.00.

#### Sarnia area series

A series of samples from a drainage ditch north of Highway 7, 3.7 km (2.3 miles) east of Sarnia city limits, Ontario (42°59'5"N, 82°19'20"W), at an elevation of 180 m, was collected by C.F.M. Lewis in July 1968; submitted by C.F.M. Lewis.

- GSC-1115. 60 m north of 5260  $\pm$  140  
Highway 7  $\delta^{13}\text{C} = -24.4\text{‰}$ .
- Basal peat (LO 68-3; 1300 g wet weight) from a section with peat (above) and clay till (below), was collected on July 10, and treated with acid and water rinses (base treatment omitted). The age estimate is based on two 1-day counts in the 5 L counter with a mixing ratio of 1.00.
- Uncorrected age, 5250  $\pm$  140.
- GSC-1133. 140 m north of 4250  $\pm$  140  
Highway 7  $\delta^{13}\text{C} = -24.3\text{‰}$ .
- The wood (LO 68-13; 188 g dry weight) from a section with sand (above) and shale till (below), was collected on July 13, and was treated with hot acid, hot base, and water rinses. The age estimate is based on one 3-day count in the 5 L counter with a mixing ratio of 1.00.
- Uncorrected age, 4240  $\pm$  140.
- GSC-1118. 245 m north of Highway 7
- Freshwater shells (large clams) (LO 68-12; 148 g dry weight), enclosed in porous sand and gravel, were treated with an acid leach to remove the outer twenty per cent of the sample. Approximately one half of the treated material was reacted for each fraction.
- GSC-1118 OF.
- uncorrected 5120  $\pm$  130
- The age estimate for the outer fraction (OF) is based on one 3-day count in the 5 L counter with a mixing ratio of 1.00.
- GSC-1118 IF.
- uncorrected 5070  $\pm$  140
- The age estimate for the inner fraction (IF) is based on two 1-day counts in the 5 L counter with a mixing ratio of 1.00.
- GSC-1510. Thurston  
uncorrected 4800  $\pm$  170
- Wood, part of a large log (sample LO 68-1; *Quercus*; identified by R.J. Mott (unpublished GSC Wood Report No. 71-10)) from Thurston gravel pit, 0.8 km (0.5 miles) west of Blackwell, Ontario (43°0'45"N, 82°20'11"W), at an elevation of 179.8 m, was enclosed in sand. The sample was collected by M. Thurston on July 5, 1968; submitted by C.F.M. Lewis.
- The sample (13.5 g dry weight) was treated with hot base, hot acid, and distilled water. The age estimate is based on one 1-day count in the 5 L counter with a mixing ratio of 1.00.
- GSC-1120. Blackwell modern  
 $\delta^{13}\text{C} = -21.8\text{‰}$ .
- Wood (sample LO 68-6) from the Severn gravel pit, Blackwell, Ontario (43°0'45"N, 82°20'15"W), at an elevation of 180 m, was enclosed in sand. The sample was collected by C.F.M. Lewis on July 13, 1968; submitted by C.F.M. Lewis.
- The sample (22 g dry weight) was treated with hot base, hot acid, and water rinses. The age estimate is based on one 1-day count in the 5 L counter with a mixing ratio of 1.00.
- GSC-608. Sault Ste. Marie  
uncorrected 4030  $\pm$  170
- Peat (sample LO 65 005-e-330) from 90 m, (300 feet) south of Korah Road and Goulais Avenue intersection on west side of Goulais Avenue Road allowance, Sault Ste. Marie, Ontario (46°32.9'N, 82°23.0'W), at an elevation of 194.21 m, was enclosed in peat (above) and silt (below). The sample was collected by C.F.M. Lewis on September 4, 1965; submitted by C.F.M. Lewis.
- The sample (15+ g dry weight) was treated with acid and water rinses (base treatment omitted). The age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 3.59.
- GSC-2293. Gore Bay  
uncorrected 6530  $\pm$  80
- Wood (sample Subins, No. 1; *Thuja occidentalis*; identified by L.D. Farley-Gill (unpublished GSC Wood Report No. 76-5)) from Gore Bay, Manitoulin Island, Ontario (45°55'40"N, 82°27'50"W), at an elevation of 186.25 m, was enclosed in gyttja. The sample was collected by G. Subins on September 26, 1975; submitted by G. Subins.
- The sample (11.1 g dry weight) was treated with hot base, hot acid, and distilled water. The age estimate is based on two 1-day counts in the 5 L counter with a mixing ratio of 1.00.
- GSC-1361. Bruce Mines Bog 460  $\pm$  160  
 $\delta^{13}\text{C} = -22.2\text{‰}$ .
- Coarse plant detritus (basal organics) (LO 66-11-1; unpublished GSC Bryological Report No. 49) from Bruce Mines Bog, Ontario (46°17'50"N, 83°42'50"W), at an elevation of 183 m, was enclosed in peat (above) and silty clay (below). The sample was collected by C.F.M. Lewis in August, 1966; submitted by C.F.M. Lewis.
- The sample (11.7 g dry weight) was treated with hot acid and water rinses (base treatment omitted).

The age estimate is based on one 3-day count in the 2 L counter with a mixing ratio of 3.28.

Uncorrected age,  $410 \pm 160$ .

GSC-1310.      Nettleton Lake  
                         uncorrected       $9140 \pm 170$

Lake sediment, compact basal gyttja (LO 67-22 No. 9) from Nettleton Lake, north of Sault Ste. Marie, Ontario ( $46^{\circ}34'40''\text{N}$ ,  $84^{\circ}22'50''\text{W}$ ), at an elevation of about 305 m, was enclosed in gyttja (above) and sand (below). The sample was collected by C.F.M. Lewis in September 1967; submitted by C.F.M. Lewis.

The sample (23 g dry weight) was treated with hot acid and water rinses (base treatment omitted). The age estimate is based on one 3-day count in the 2 L counter with a mixing ratio of 1.98.

#### Mary Ann Lake series

A series of core samples from Mary Ann Lake, Sault Ste. Marie, Ontario ( $46^{\circ}29.5'\text{N}$ ,  $84^{\circ}29.6'\text{W}$ ), at an elevation of 191.77 m, was collected by C.F.M. Lewis on October 6, 1965; submitted by C.F.M. Lewis.

GSC- 607. Mary Ann Lake (I)  
                         uncorrected       $4710 \pm 150$

Lake sediment, gyttja (LO 65 006 B-bed-432; 35+ g dry weight) was treated with hot acid and distilled water rinses (base treatment omitted). The age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 2.17.

GSC- 567. Mary Ann Lake (II)  
                         uncorrected       $4740 \pm 170$

Lake sediment, gyttja (LO 65 006 B-bed-444; 25+ g dry weight) was treated with hot acid and distilled water rinses (base treatment omitted). The age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 2.43.

GSC-2340.      Fort Severn  
                         uncorrected       $240 \pm 60$

Marine shells (sample 01; *Mytilus edulis*; identified by N. Kozlovic) from 168 km (105 miles) northwest of Fort Severn, Hudson Bay coast, Ontario ( $56^{\circ}43'\text{N}$ ,  $88^{\circ}42'\text{W}$ ), at an elevation of 3 m, were collected from the surface of a beach ridge by K. Kershaw on August 30, 1975; submitted by N. Kozlovic.

The sample (50.0 g dry weight) was treated with an acid leach to remove the outer twenty per cent of

the sample. The age estimate is based on one 3-day count in the 5 L counter with a mixing ratio of 1.00.

#### Great Lakes region

GSC-2252.      St. Lawrence River  
                         uncorrected       $8560 \pm 200$

Basal woody, sandy peat (sample KINGSTON BASIN N8) from St. Lawrence River between Wolfe Island and Howe Island, east of Kingston, Ontario ( $44^{\circ}14'42''\text{N}$ ,  $76^{\circ}15'30''\text{W}$ ), in a water depth of 16 m, was collected by L.M. Johnston, in August, 1973 using a Benthos gravity corer; submitted by T.W. Anderson.

The sample (58.3 g wet weight) was treated with hot acid and distilled water (base treatment omitted). The age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 3.53.

Comment (T.W. Anderson): Peat and peaty marl overlies basal coarse sand and underlies marl and silty clay near the surface. The sand - peat sequence denotes a protected lagoon and marshy habitat which formed in this inter-island area of the upper St. Lawrence River when Lake Ontario water levels were extremely low. The  $^{14}\text{C}$  date provides an age for low-level Early Lake Ontario. The overlying marl and clay units suggest water levels became progressively deeper with time (Anderson and Lewis, 1985).

GSC-2174.      Henderson Harbor  
                         uncorrected       $18\,400 \pm 2000$

Lake sediment, basal marl/gyttja (sample 68-O-18 Stn 22 core 2; 230-233 cm) from Henderson Harbor, east end of Lake Ontario, New York State, U.S.A. ( $43^{\circ}53'41''\text{N}$ ,  $76^{\circ}11'8''\text{W}$ ), in a water depth of 11.6 m, was enclosed in gyttja, above silt and clay. The sample was collected by C.F.M. Lewis on September 9, 1968, using an Alpine piston corer; submitted by T.W. Anderson.

The sample (111.8 g wet weight) was treated with hot acid and distilled water rinses (base treatment omitted). The age estimate is based on one 4-day count in the 2 L counter with a mixing ratio of 16.3.

Comment (T.W. Anderson): The sample is from the base of a marl unit which underlies sandy gyttja, and overlies massive silty clay, which in turn overlies laminated glaciolacustrine clay. The marl and gyttja accumulated in Henderson Harbor when considerably lower water levels existed in offshore



Lake Ontario. The  $^{14}\text{C}$  date falls within the *Pinus* (pine) pollen maximum and therefore, should be in the 9 to 10 ka range. The date is too old by about 9 ka probably because of hardwater error.

GSC-2115. Amherst Island 8160  $\pm$  120  
 $\delta^{13}\text{C} = -26.3\text{‰}$ .

Basal plant detritus (sample 74-00-102-20A (130.5-132.5 cm); including *Carex*; identified by M. Kuc (unpublished GSC Bryological Report No. 308)) from a site adjacent to southeast coast of Amherst Island, 14 km southwest of Kingston, Lake Ontario (44°9'18"N, 76°39'6"W), in a water depth of 20.4 m, was collected by C.F.M. Lewis and T.W. Anderson on July 13, 1974 using an Alpine piston corer. The sample was submitted by T.W. Anderson.

The sample (68.6 g wet weight) was treated with hot acid and distilled water (base treatment omitted). The age estimate is based on one 3-day count in the 2 L counter with a mixing ratio of 2.53.

Uncorrected age, 8180  $\pm$  120.

Comment (T.W. Anderson): The plant detritus accumulated on a subaerial surface following the draining of glacial Lake Iroquois. The sample dates the early Holocene water level rise in main Lake Ontario controlled by the Cape Vincent sill (Anderson and Lewis, 1985)

#### Lake Ontario (eastern basin) series

A series of core samples from the eastern basin of Lake Ontario, in the state of New York, U.S.A. (43°30.2'N, 76°54.0'W), in a water depth of 224 m, (i.e. -149.4 m, asl), was collected by C.B. Gray on June 12, 1970 using an Alpine piston corer; submitted by C.F.M. Lewis.

GSC-1515. eastern basin (I) 3430  $\pm$  200  
 Lake Ontario  $\delta^{13}\text{C} = -25.9\text{‰}$ .

Lake sediment, mud (LO-E30 101-102 cm; 73 g dry weight) was treated with hot acid and distilled water (base treatment omitted). The age estimate is based on two 1-day counts in the 1 L counter with a mixing ratio of 1.00.

Uncorrected age, 3440  $\pm$  200.

GSC-1504. eastern basin (II) 4000  $\pm$  210  
 Lake Ontario  $\delta^{13}\text{C} = -26.3\text{‰}$ .

Lake sediment, mud (LO-E30 131-132 cm; 60 g dry weight) was treated with hot acid and distilled water (base treatment omitted). The age estimate is based on two 1-day counts in the 1 L counter with a mixing ratio of 1.00.

Uncorrected age, 4020  $\pm$  210.

GSC-1519. eastern basin (III) 4990  $\pm$  240  
 Lake Ontario  $\delta^{13}\text{C} = -28.3\text{‰}$ .

Lake sediment, mud (LO-E30 160-162 cm; 59.8 g dry weight) was treated with hot acid and distilled water (base treatment omitted). The age estimate is based on two 1-day counts in the 1 L counter with a mixing ratio of 1.38.

Uncorrected age, 5040  $\pm$  240.

#### Sodus Bay series

A series of samples from Sodus Bay, on the south coast of Lake Ontario, New York State, U.S.A. (43°15'0"N, 76°57'25"W), in a water depth of 15 m, was collected by C.F.M. Lewis on September 20, 1968 using an Alpine piston corer; submitted by T.W. Anderson and C.F.M. Lewis.

GSC-2012. Sodus Bay (I)  
 uncorrected 4950  $\pm$  260

Lake sediment, peaty gyttja (68-0-18-33-2 (51-56 cm); 21.9 g wet weight) was treated with hot acid and distilled water (base treatment omitted). The age estimate is based on two 1-day counts in the 1 L counter with a mixing ratio of 1.00.

Comment (T.W. Anderson): The sample is at the top of a peat - marl sequence interpreted as a lagoonal deposit behind a baymouth bar (cf. GSC-2017). This sample dates the end of peat accumulation and cessation of the lagoonal habitat conditions. The overlying gyttja and silty clay denote rising lake levels and flooding of the lagoon. The flood event is correlated with the rise of lake levels to peak values at the time of the "Nipissing Flood" superimposed on a transgressive rise in water levels due to differential uplift of the Lake Ontario basin (Anderson and Lewis, 1982).

GSC-2017. Sodus Bay (II)  
 uncorrected 5200  $\pm$  300

Lake sediment, a basal sandy, woody peat (68-0-18-33-3 (122-123.5 cm); 29.5 g wet weight) was treated with hot acid and distilled water (base treatment omitted). The age estimate is based on one 3-day count in the 1 L counter with a mixing ratio of 1.80.

Comment (T.W. Anderson): Peaty marl overlies coarse to medium-fine grained sand. Pollen and plant macrofossils extracted from the peaty marl indicate the sand - peaty marl sequence represents a lagoonal and marsh deposit which formed behind a baymouth bar outside Sodus Bay (Anderson and



Lewis, 1985). A similar baymouth bar and lagoon also existed at Hamilton Harbour. The  $^{14}\text{C}$  dates, GSC-2017 and -2147, provide minimum ages for the initiation of lagoonal conditions at Sodus Bay and Hamilton Harbour, respectively. The contemporaneous accumulation of the peat is interpreted as a regional event associated with baymouth bar and lagoon formation and is correlated with the "Nipissing Flood" into Lake Ontario at the time of the Nipissing Great Lakes (Anderson and Lewis, 1982).

#### Bay of Quinte series

A series of core samples from Bay of Quinte, 6.5 km northeast of Picton, Ontario ( $44^{\circ}2'9''\text{N}$ ,  $77^{\circ}5'0''\text{W}$ ), in a water depth of 11.9 m, was collected by C.F.M. Lewis in 1969; submitted by T.W. Anderson.

GSC-3464. Bay of Quinte (I)  $3550 \pm 80$   
 $\delta^{13}\text{C} = -28.8\text{‰}$ .

Lake sediment, gyttja (69-0-16 PC-2C (215-220 cm); 76.4 g wet weight) was treated with hot acid (noncalcareous) and distilled water (base treatment omitted). The age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 1.32.

Uncorrected age,  $3610 \pm 80$ .

Comment (T.W. Anderson): This sample dates the end of the hemlock minimum (i.e. beginning of the second *Tsuga* maximum), cf. GSC-380 ( $3330 \pm 130$  BP; Lowdon et al., 1971) from Roblin Lake.

GSC-3460. Bay of Quinte (II)  $4790 \pm 80$   
 $\delta^{13}\text{C} = -28.8\text{‰}$ .

Lake sediment, gyttja (69-0-16 PC-2B (320-325 cm); 93.1 g wet weight) was treated with hot acid (noncalcareous) and distilled water (base treatment omitted). The age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 1.00.

Uncorrected age,  $4850 \pm 80$ .

Comment (T.W. Anderson): This sample dates the mid-Holocene initiation of hemlock (*Tsuga*) pollen in the area.

GSC-3300. Bay of Quinte (III)  $6080 \pm 100$   
 $\delta^{13}\text{C} = -28.7\text{‰}$ .

Lake sediment, basal gyttja (69-0-16 PC-2 (378-382 cm); 89.0 g wet weight) was treated with hot acid (noncalcareous) and distilled water (base treatment omitted). The age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 1.00.

Uncorrected age,  $6140 \pm 100$ .

Comment (T.W. Anderson): Gyttja overlies marl which overlies woody peat. The  $^{14}\text{C}$  date provides an age for a change in the Bay of Quinte water levels from a restricted shallow lake with marl deposition to a deep lake with gyttja deposition. The rise in water level is attributed to differential uplift of Lake Ontario basin with lake levels following closely the rising eastern outlets (Anderson and Lewis, 1985); see GSC-2164 ( $5140 \pm 200$  BP) and GSC-2012 ( $4950 \pm 260$  BP).

GSC-3441. Bay of Quinte (IV)  $7920 \pm 120$   
 $\delta^{13}\text{C} = -27.7\text{‰}$ .

Woody basal peat (69-0-16 PC-2A (393.5-397 cm); 51.4 g dry weight) was treated with hot base, hot acid (slightly calcareous), and distilled water. The age estimate is based on one 3-day count in the 2 L counter with a mixing ratio of 1.36.

Uncorrected age,  $7960 \pm 120$ .

Comment (T.W. Anderson): Woody peat overlies silty, sandy clay which overlies laminated clay and underlies marl. The peat denotes marsh-like conditions and hence extremely low lake levels in the Lake Ontario basin. The  $^{14}\text{C}$  date provides a minimum age for low-level early Lake Ontario following a high-level glacial lake phase (Anderson and Lewis, 1985). The sample also dates the *Pinus* (pine) pollen maximum in the pollen profile.

GSC-1551. Toronto Island  
uncorrected  $2810 \pm 1250$

Wood twigs (sample LO(68-0-13)-7 441-442 cm) from 2.2 km on bearing  $196^{\circ}\text{T}$  from the southwestern tip of Toronto Island Lake Ontario ( $43^{\circ}35'36''\text{N}$ ,  $79^{\circ}23'49''\text{W}$ ), in a water depth of ca. 60 m, was enclosed in silty mud. The sample was collected by C.F.M. Lewis on August 15, 1968; submitted by C.F.M. Lewis.

The sample (0.2 g dry weight) was treated with hot base, hot acid, and distilled water. The age estimate is based on one 3-day count in the 1 L counter with a mixing ratio of 18.0.

GSC-1924. Port Weller  
uncorrected  $4130 \pm 160$

Wood (sample NOTL No. 1 (30-32 cm)) from 6.7 nautical miles (ca. 12.5 km) off Port Weller piers (end of west pier), Lake Ontario ( $43^{\circ}21'20''\text{N}$ ,  $79^{\circ}13'25''\text{W}$ ), in a water depth of 28.3 m, was collected

by R. Sandilands on November 17, 1972; submitted by C.F.M. Lewis.

The sample (1.7 g dry weight) was treated with hot base, hot acid, and distilled water. The age estimate is based on one 3-day count in the 2 L counter with a mixing ratio of 7.28.

GSC-1999. western Lake Ontario (i)  
uncorrected 4310 ± 250

Wood (69-0-13 (PC-7) 18 cm; angiosperm?; identified by R.J. Mott (unpublished GSC Wood Report No. 74-2)) from western end of Lake Ontario (43°22'6"N, 79°35'24"W), in a water depth of 74.7 m, was enclosed in fine to medium grained sand. The sample was collected by C.F.M. Lewis in August 1969; submitted by T.W. Anderson and C.F.M. Lewis.

The sample (1.8 g dry weight) was treated with hot base, hot acid, and distilled water. The age estimate is based on two 1-day counts in the 1 L counter with a mixing ratio of 1.00.

Comment (T.W. Anderson): The wood is probably driftwood. The wood and enclosing sand may have been derived from the nearshore zone during a catastrophic storm. The <sup>14</sup>C date corresponds closely with the period of peak lake levels during the "Nipissing Flood" into Lake Ontario (Anderson and Lewis, 1982, 1985).

GSC-1997. western Lake Ontario (ii)  
uncorrected 2670 ± 90

Wood, driftwood? (69-0-13 (PC-2) 343-345 cm; angiosperm; identified by R.J. Mott (unpublished GSC Wood Report No. 74-1)) from western end of Lake Ontario (43°18'54"N, 79°41'0"W), in a water depth of 45.7 m, was enclosed in grey, silty clay. The sample was collected by C.F.M. Lewis in August 1969; submitted by T.W. Anderson and C.F.M. Lewis.

The sample (3.0 g dry weight) was treated with hot base, hot acid, and distilled water. The age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 2.14.

Comment (T.W. Anderson): The wood is undoubtedly a piece of driftwood which had sunk to the bottom of the lake and was eventually buried by silty clay. The date provides a time horizon for determining sedimentation.

GSC-2147. Hamilton Harbour (I)  
uncorrected 5260 ± 90

Lake sediment, silty woody gyttja (sample 68-0-18 Stn. 38 core 2 (240-244 cm)) from Hamilton Harbour, Lake Ontario (43°17'0"N, 79°48'35"W), in a

water depth of 14.9 m, was collected by C.F.M. Lewis on September 22, 1968; submitted by T.W. Anderson and C.F.M. Lewis.

The sample (49.8 g wet weight) was treated with hot acid (noncalcareous) and distilled water rinses to neutral pH (base treatment omitted). The age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 1.40.

Comment (T.W. Anderson): Woody gyttja and peat overlies coarse sand and gravel, and underlies a marl-clay-marl-clayey silt sequence. The sand-'organic'-clay sequence represents a lagoonal deposit behind a baymouth bar (Burlington Bar). see GSC-2017, -2164 for additional comments applicable to this sample.

GSC-2164. Hamilton Harbour (II) 5140 ± 200  
δ<sup>13</sup>C = -32.2‰.

Plant detritus (sample 68-O-17A 390-393 cm) from Hamilton Harbour, Lake Ontario (43°16.8'N, 79°52.2'W), in a water depth of 13.4 m, was enclosed in sand and silt. The sample was collected by C.F.M. Lewis on September 11, 1968; submitted by T.W. Anderson and C.F.M. Lewis.

The sample (101.5 g wet weight) was treated with hot acid and distilled water (base treatment omitted). The age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 6.55.

Uncorrected age, 5250 ± 200.

Comment (T.W. Anderson): The sample is at the top of a sandy, silty plant detritus unit under silty clay. The plant detritus represents a lagoonal deposit behind a baymouth bar (Burlington Bar). see GSC-2012 for additional comments related to this sample.

GSC-1165. Pigeon Bay 5750 ± 180  
δ<sup>13</sup>C = -25.7‰.

Lake sediment; organic, silty clay (sample LO 68-1-7-6-3) from central Pigeon Bay, western Lake Erie, Ontario (41°55.0'N, 82°45.4'W) was enclosed in organic, silty clay. The sample was collected by C.F.M. Lewis in July 1968; submitted by C.F.M. Lewis.

The sample (54 g dry weight) was treated with hot acid and distilled water rinses (base treatment omitted). The age estimate is based on one 3-day count in the 2 L counter with a mixing ratio of 2.02.

Uncorrected age, 5770 ± 180.

GSC-1523. Rattlesnake Basin 10 100  $\pm$  380  
 $\delta^{13}\text{C} = -26.3\text{‰}$ .

Wood (sample LO68-1-7-19-2A) from Rattlesnake Basin, western Lake Erie, state of Ohio, U.S.A. (41°40.0'N, 82°50.8'W), in a water depth of 162.5 m, was enclosed in marly plant detritus/plant detritus. The sample was collected by C.F.M. Lewis on July 23, 1968; submitted by C.F.M. Lewis

The sample (1.0 g dry weight) was treated with hot base, hot acid, and distilled water. The age estimate is based on one 3-day count in the 2 L counter with a mixing ratio of 6.50.

Uncorrected age, 10 100  $\pm$  380.

### Glacial Great Lakes

The following series of dates are part of a synthesis of the glacial history in the Great Lakes region by Lewis and Anderson (in press). The dates are presented from south to north and the stratigraphy and comments for each sample appear in the table at the end of the list (p. 38).

### Western Lake Erie series

#### *Rattlesnake basin*

A series of samples from Rattlesnake Basin, western Lake Erie (41°40'N, 82°50.8'W), in a water depth of 162.5 m, was collected by C.F.M. Lewis on July 23, 1968; submitted by C.F.M. Lewis.

GSC-1125. Rattlesnake 10 400  $\pm$  190  
 Basin (I)  $\delta^{13}\text{C} = -26.1\text{‰}$ .

Fine organic detritus and clay (LO 68-1-7-1-9-1; 88 g wet weight) was treated with hot acid and water rinses (base treatment omitted). The age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 1.00.

Uncorrected age, 10 500  $\pm$  190.

GSC-1384. Rattlesnake 11 000  $\pm$  160  
 Basin (II)  $\delta^{13}\text{C} = -26.2\text{‰}$ .

Peaty, plant detritus (organics) (LO 68-1-7-19-2; 63 g wet weight) was treated with hot acid and water rinses (base treatment omitted). The age estimate is based on one 3-day count in the 2 L counter with a mixing ratio of 1.00.

Uncorrected age, 11 000  $\pm$  160.

#### *Northern Rattlesnake basin*

A series of samples from northern Rattlesnake Basin, (41°42.4'N, 82°53.9'W) was collected by C.F.M. Lewis on July 24, 1968; submitted by C.F.M. Lewis.

GSC-1180. Rattlesnake 10 600  $\pm$  160  
 Basin (III)  $\delta^{13}\text{C} = -26.2\text{‰}$ .

Plant detritus (organics) (LO 68-1-7-18-1; 100 g dry weight) was treated with hot acid and water rinses (base treatment omitted). The age estimate is based on two 1-day counts in the 5 L counter with a mixing ratio of 1.00.

Uncorrected age, 10 600  $\pm$  160.

GSC-1283. Rattlesnake 11 400  $\pm$  160  
 Basin (IV)  $\delta^{13}\text{C} = -27.4\text{‰}$ .

Plant detritus (organics) (LO 68-1-7-18-2; 37.6 g dry weight) was treated with hot acid and water rinses (base treatment omitted). The age estimate is based on two 1-day counts in the 5 L counter with a mixing ratio of 1.00.

uncorrected age, 11 500  $\pm$  160

### *Southern Pigeon Bay*

A series of samples from southern Pigeon Bay, western Lake Erie (41°51.7'N, 82°45.4'W) was collected by C.F.M. Lewis in July, 1968; submitted by C.F.M. Lewis.

GSC-1438. southern Pigeon Bay (I)  
 uncorrected 12 500  $\pm$  310

Plant detritus (organics) (LO68-1-7-7-2; 66 g dry weight) was treated with acid and distilled water (base treatment omitted). The age estimate is based on one 3-day count in the 1 L counter with a mixing ratio of 1.00.

GSC-1450. southern Pigeon Bay (II)  
 uncorrected 11 200  $\pm$  160

Plant detritus (organics) (LO68-1-7-7-1; 66 g dry weight) was treated with acid and distilled water (base treatment omitted). The age estimate is based on two 1-day counts in the 5 L counter with a mixing ratio of 1.00.

### Southern Lake Huron series

A series of samples was taken from southern Lake Huron, northwest of Goderich, Ontario.

A sample from 38.3 km northwest of Goderich (43°53.3'N, 82°14.7'W) was collected by C.F.M. Lewis on June 18, 1969; submitted by T.W. Anderson.

GSC-3656. Goderich (I) 9350  $\pm$  90  
 $\delta^{13}\text{C} = -28.0\text{‰}$ .

Plant detritus (69-2-01 T10; 138.1 g dry weight) was treated with hot acid (slightly calcareous) and distilled water (base treatment omitted). The age

estimate is based on one 3-day count in the 2 L counter with a mixing ratio of 1.00.

Uncorrected age,  $9400 \pm 90$ .

A sample from 42.5 km northwest of Goderich ( $43^{\circ}53.7'N$ ,  $82^{\circ}17.6'W$ ) was collected by C.F.M. Lewis on July 26, 1969; submitted by T.W. Anderson.

GSC-3577. Goderich (II)  
uncorrected  $8890 \pm 100$

Fibrous peat (69-2-01-15; 13.7 g dry weight) was treated with hot base, hot acid (noncalcareous) and distilled water. The age estimate is based on one 3-day count in the 5 L counter with a mixing ratio of 1.36.

Comment (T.W. Anderson): Concentrations of plant detritus and shells occur within silty clay under silty clay with disseminated organics. Pollen analysis by Woodland (1983) on the upper 290 cm of the core showed that the interval rich in plant detritus contains high percentages of *Salix* (willow), Gramineae (grass), and *Equisetum* (horsetail). The environment of deposition resembled a shallow water or marsh-like habitat indicating extremely low lake levels in Lake Huron at 8.9 ka. This sample provides a date for the emergence of the south basin of Lake Huron during the Mattawa lake phase (Lewis and Anderson, in press).

GSC-1136. Catawba Basin  $11\,100 \pm 180$   
 $\delta^{13}C = -25.9\text{‰}$ .

Plant detritus (organics) and silt (sample LO 68-1-7-20-2) from Catawba Basin, western Lake Erie ( $41^{\circ}36.6'N$ ,  $82^{\circ}53.5'W$ ) was enclosed in clayey silt and shells. The sample was collected by C.F.M. Lewis on July 24, 1968; submitted by C.F.M. Lewis.

The sample (146 g dry weight) was treated with hot acid and water rinses (base treatment omitted). The age estimate is based on two 1-day counts in the 5 L counter with a mixing ratio of 1.76.

Uncorrected age,  $11\,200 \pm 180$ .

GSC-1842. Kincardine  $11\,300 \pm 140$   
 $\delta^{13}C = -25.5\text{‰}$ .

Wood (sample K-13; *Larix*; identified by L.D. Wilson (unpublished GSC Wood Report No. 73-9)) from section on south edge of Kincardine, north of the Penetangore River, Ontario ( $44^{\circ}10'N$ ,  $81^{\circ}38'W$ ), at an elevation of 195 m, was enclosed in peaty clay. The sample was collected by T.W. Anderson on August 18, 1972; submitted by T.W. Anderson.

The sample (3.35 g dry weight) was treated with hot base, hot acid, and distilled water. The age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 1.64.

Uncorrected age,  $11\,300 \pm 140$ .

Comment (T.W. Anderson): The fossiliferous peaty clay represents a lagoonal deposit which formed inside a baymouth bar across the mouth of the modern-day Penetangore River. The peaty clay is underlain by till and overlain by fine to medium coarse sand, and interbedded sand, silt, and clay. The lagoonal deposit possibly related to the Kirkfield low-water phase of Lake Algonquin; the  $^{14}C$  date may therefore date the Kirkfield phase. The overlying interbedded sequence possibly represents a subsequent transgression by the high lake phase of main Lake Algonquin (Anderson, 1979).

#### Southwestern Lake Huron series

A series of samples from 21 km southwest of Harrisville, 16 km off the Michigan shore, southwestern Lake Huron ( $44^{\circ}30'36''N$ ,  $83^{\circ}8'0''W$ ), in a water depth of 51 m, was collected by C.F.M. Lewis and T.W. Anderson on September 9, 1971; submitted by T.W. Anderson and C.F.M. Lewis.

GSC-1935. Harrisville (I)  
uncorrected  $9370 \pm 180$

Woody, fibrous peat (71-2-09-3; 30.5 g dry weight) was treated with hot acid and distilled water (base treatment omitted). The age estimate is based on one 2-day count in the 2 L counter with a mixing ratio of 3.31.

GSC-1943. Harrisville (II)  
uncorrected  $8830 \pm 410$

Woody, fibrous peat (71-2-09-4; 29.6 g dry weight) was treated with hot acid and distilled water (base treatment omitted). The age estimate is based on three 1-day counts in the 2 L counter with a mixing ratio of 3.40.

GSC-1965. Harrisville (III)  
uncorrected  $9170 \pm 140$

Woody, fibrous peat (71-2-09-2; 18.4 g dry weight) was treated with hot acid and distilled water (base treatment omitted). The age estimate is based on one 3-day count in the 2 L counter with a mixing ratio of 2.42.

GSC-1982. Harrisville (IV)  
uncorrected 9370 ± 220

Woody, fibrous peat (71-2-09-1; 8.78 g dry weight) was treated with hot acid and distilled water (base treatment omitted). The age estimate is based on one 1-day count in the 2 L counter with a mixing ratio of 2.56.

GSC-1966. Harrisville (V)  
uncorrected 8460 ± 180

Lake sediment, gyttja (plant fibres) (71-2-09-5; 95.2 g wet weight) from about 21 km southwest of Harrisville, about 13 km off the Michigan shore (44°31'21"N, 83°7'42"W), in a water depth of 51 m, was collected by T.W. Anderson and C.F.M. Lewis on September 23, 1971; submitted by T.W. Anderson and C.F.M. Lewis.

The sample was treated with hot acid and distilled water (base treatment omitted). The age estimate is based on one 2-day count in the 2 L counter with a mixing ratio of 3.31.

GSC-1983. Harrisville (VI)  
uncorrected 9680 ± 110

Woody, fibrous peat (71-4-26; 11.15 g dry weight) from about 21 km southwest of Harrisville, about 13 km off the Michigan shore (44°30'42"N, 83°7'30"W) was collected by C.F.M. Lewis on November 2, 1971; submitted by T.W. Anderson and C.F.M. Lewis.

The sample was treated with hot acid and distilled water (base treatment omitted). The age estimate is based on one 3-day count in the 2 L counter with a mixing ratio of 1.75.

Comment (T.W. Anderson and C.F.M. Lewis): Plant detritus or gyttja overlies silty clay and underlies silty clay or sand. The sediment sequence and entrained fossils (pollen, plant macrofossils, insects, molluscs, and ostracods) record an episode of extremely low-water levels in the Lake Huron basin (Anderson and Lewis, 1974). This long period of emergence (9.7 to 8.5 ka) is correlated with the Ottawa-Marquette and Mattawa lake phases (Lewis and Anderson, in press).

GSC-1178. Lake 'C' 8110 ± 170  
Woleslay Bay  $\delta^{13}\text{C} = -25.9\text{‰}$

Lake sediment, basal gyttja (sample LO 67-4) from Lake 'C', about 3.2 km (2 miles) west of Woleslay Bay, Ontario (45°10'0"N, 80°16'0"W), at an

elevation of 206.4 m, was enclosed in gyttja (above) and clay (below). The sample was collected by C.F.M. Lewis in July, 1967; submitted by C.F.M. Lewis.

The sample (103 g dry weight) was treated with hot acid and distilled water rinses (base treatment omitted). The age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 1.84.

Uncorrected age, 8120 ± 170.

#### Bear's Rump Island series

GSC-1397. Bears Rump Island (I)  
uncorrected 9440 ± 160

A peat sample from 3.5 km on a bearing of 018°T from the northeast corner Bear's Rump Island in 31.4 m, of water, Georgian Bay, Ontario (45°20'59"N, 81°32'53"W) was collected by R. Sandilands on August 6, 1969; submitted by C.F.M. Lewis.

Peat (LO 481; 21 g dry weight) was treated with hot acid and water rinses (base treatment omitted). The age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 1.32.

#### Bear's Rump Island

A series of samples from 3 nautical miles (5.55 km) north of northeast corner of Bear's Rump Island, in 53 m of water, Georgian Bay, Ontario (45°22.07'N, 81°31.72'W) was collected by R. Sandilands on September 2, 1972; submitted by C.F.M. Lewis.

GSC-1830. Bear's Rump Island (II)  
uncorrected 9770 ± 220

Wood (420 (2); 2.25 g dry weight; *Salix*; identified by R.J. Mott (unpublished GSC Wood Report No. 72-71)) was treated with hot base, hot acid, and distilled water. The age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 2.89.

GSC-1847. Bear's Rump Island (III)  
uncorrected 7740 ± 360

Wood (420 (1); 0.6 g dry weight; *Populus*; identified by R.J. Mott (unpublished GSC Wood Report No. 72-71)) was treated with hot base, hot acid, and distilled water. The age estimate is based on one 3-day count in the 2 L counter with a mixing ratio of 12.3.

#### Rains Lake series

A series of samples from Rains Lake, southern St. Joseph Island, Ontario (46°6'5"N, 83°54'8"W), at

an elevation of 195 m, was collected by C.F.M. Lewis in September, 1967; submitted by C.F.M. Lewis.

GSC-1365. Rains Lake (I) 7020  $\pm$  200  
 $\delta^{13}\text{C} = -31.2\text{‰}$ .

Lake sediment, gyttja (LO 66-23-1; 10 g dry weight) was treated with hot acid and distilled water rinses (base treatment omitted). The age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 2.06.

Uncorrected age, 7120  $\pm$  200.

GSC-1368. Rains Lake (II) 7090  $\pm$  150  
 $\delta^{13}\text{C} = -26.4\text{‰}$ .

Plant detritus (organics) (LO 66-23-2; 14 g dry weight) was treated with hot acid and water rinses (base treatment omitted). The age estimate is based on one 3-day count in the 2 L counter with a mixing ratio of 1.29.

Uncorrected age, 7110  $\pm$  150.

GSC-1389. Monetville Lake 8250  $\pm$  180  
 $\delta^{13}\text{C} = -28.8\text{‰}$ .

Lake sediment, basal gyttja (sample LO 67-2) from Monetville Lake, Ontario (46°9'50"N, 80°21'0"W), at an elevation of 202 m, was enclosed in gyttja (above) and silt (below). The sample was collected by C.F.M. Lewis in July 1967; submitted by C.F.M. Lewis.

The sample (13.8 g dry weight) was treated with hot acid and distilled water rinses (base treatment omitted). The age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 1.80.

Uncorrected age, 8310  $\pm$  180.

#### Bruce Mines Bog series

A series of samples from Bruce Mines Bog, Ontario (46°17'50"N, 83°42'50"W), at an elevation of 183 m, was collected by C.F.M. Lewis in August, 1966; submitted by C.F.M. Lewis.

GSC-1359. Bruce Mines Bog (I)  
uncorrected 8160  $\pm$  220

Coarse plant detritus (organics) (LO 66-11-2; 7.4 g dry weight) was treated with hot acid and water rinses (base treatment omitted). The age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 2.22.

GSC-1360. Bruce Mines Bog (II) 9560  $\pm$  160  
 $\delta^{13}\text{C} = -26.8\text{‰}$ .

Coarse plant detritus (organics) (LO 66-11-3; 7 g dry weight) was treated with hot acid and water rinses (base treatment omitted). The age estimate is based on one 3-day count in the 2 L counter with a mixing ratio of 1.51.

Uncorrected age, 9590  $\pm$  160.

Comments (Glacial Great Lakes; from Lewis and Anderson, in press):

Lab.

No.	Stratigraphy	Comments
1125	Marly plant detritus	Higher marsh environment
1384	over silty sandy clay under silty clay with disseminated organics	not affected by discharge from Main Lake Algonquin
1180	Plant detritus over	Higher marsh environment
1283	clay till under silty clay	not affected by discharge from Main Lake Algonquin
1438	Plant detritus over	Denotes a marsh
1450	clayey silt and fine sand under clayey silt	environment transgressed due to main Algonquin discharge
3656	Plant detritus under clayey silt	Indicates emergence during Mattawa phase
3577	Plant detritus and shells in silty clay under silty clay	Indicates emergence during the Mattawa phase
1136	Shelly marl and plant detritus over silt and clay under silty clay	Higher marsh environment not affected by discharge from Main Lake Algonquin
1842	Plant detritus and shell layer over stony silty clay till under sand and interbedded sand, silt and clay	A lagoonal deposit (organics) overlain by main Algonquin lake-phase interbedded sand, silt, and clay

1935	Plant detritus or	Indicates a long period
1943	gyttja over silty	of emergence during
1965	clay under silty clay	Ottawa-Marquette
1966	or sand	and Mattawa phases
1982		
1983		
1178	Gyttja over clay	Indicates emergence from Lake Mattawa
1397	Peat under partially laminated clay	Indicates a lake rise following a low-level phase (Middle Lake Hough)
1830	Driftwood enclosed in	Suggests low levels
1847	Lacustrine clay with silt in local offshore basin, now deeply submerged	(early and late Lake Hough) while shoals adjacent to basin were emergent
1365	Sandy silt over	Silt marks Nipissing
1368	coarse plant detritus and under stiff basal gyttja	transgression prior to barrier and lagoon (now Rains Lake) formation
1389	Gyttja over silt	Indicates emergence from Lake Mattawa
1359	Two thin beds of plant	Date 2 low-level episodes
1360	detritus and interbed of grey clay over blue clay, under grey clay and surface bog	(middle and late Lake Stanley) with alternating submergence (clay) by Huron-basin lakes

## Western Canada Saskatchewan

GSC-21. Scrimbit Site  
uncorrected 10 400 ± 140

Wood from Scrimbit (farm) site, southern Saskatchewan, (49°16'N, 105°11'W) was enclosed in kettle hole deposits, that is, lake sediments (gyttja). Samples were collected by B. McCorquodale in 1958; submitted by J. Terasmae.

The sample (approx. 8 g dry weight) was treated with hot base and hot acid. The age estimate is based on three 1-day counts in the 2 L counter with a mixing ratio of 1.00.

Comment (W. Dyck): This age compares favourably with a preliminary age (10.2 ka) from the University of Saskatchewan <sup>14</sup>C Laboratory.

A suite of dates are reported in Rutherford et al. (1979) and are summarized below:

S-80: 11 500 ± 300 BP; conifer trunk, depth = 3.9 m  
S-81: 10 000 ± 250 BP; root and trunk, depth = 4.6 m  
S-83: 11 700 ± 300 BP; cones/needles, depth = 5.2 m  
S-85: 10 400 ± 250 BP; limbs, depth = 3.6 m

GSC-348. Riverhurst  
uncorrected 129 ± 128

Wood sample ('Riverhurst Tree'; *Acer negundo*; identified by R.J. Mott (unpublished Palynological Report No. 65-2)) from South Saskatchewan River valley near Riverhurst, Saskatchewan (50°55'N, 106°56'W) was collected live (cut in late 1963 or early 1964) by R. VanEverdingen and J. Scott; sample submitted by W. Dyck.

The sample (10.6 g dry weight) had no pretreatment prior to processing. The age estimate is based on two 1-day counts in the 5 L counter with a mixing ratio of 1.00.

Comment (W. Dyck): The tree was estimated to be about 65 years old based on a count of the tree-rings although the pith was rotten and therefore indeterminable. Sample dated was taken from near the pith, that is, about 55 to 60 years in age. The tree grew mid-way up the valley slope in an area of limestone bedrock with groundwater seepage above the river level. The sample was dated to ascertain whether 'old' carbon was being incorporated in the wood in this area of 'hardwater'. From the age determined this type of material does not incorporate 'dead' carbon, i.e. no 'hardwater' effect.

GSC-483. Medicine Hat  
uncorrected 240 ± 130

Wood, plant material (sample SF-65-2) from east bank of South Saskatchewan River, 4.8 km northeast of Medicine Hat, Saskatchewan (50°4'30"N, 110°37'10"W) was enclosed in sand, silt, and muck. Collected by A.M. Stalker on August 3, 1965; sample submitted by A.M. Stalker.

The sample (41.5 g dry weight) was treated with hot base, hot acid, and distilled water. The age estimate is based on one 3-day count in the 2 L counter with a mixing ratio of 1.00.

Comment (A.M. Stalker): The sample was gathered during collection of bones that were thought to be of Mid-Wisconsinan age. Subsequent stratigraphic study showed that the site was much younger in age. The bones, that were mostly goat but included some dog, evidently came from a herd of goats kept around 70 years earlier. The true age of the sample should be about 50 BP.

GSC-2052. Prelate  
> 29 000

Humic (organic) matter from a paleosol (sample S-215-68(70)) about 18.4 km north and 9.6 km east of Prelate, Saskatchewan (51°1.5'N, 109°15.3'W), at an elevation of about 642 m, was enclosed in a leached



and oxidized till. Collected by P.P. David in 1968; submitted by P.P. David.

The sample (57.0 g dry weight) had no pretreatment prior to processing. The age estimate is based on one 4-day count in the 2 L counter with a mixing ratio of 1.77.

Comment (P.P. David): The paleosol, developed in oxidized and leached till, was dated to verify the  $20\,000 \pm 850$  BP finite date (S-176, McCallum and Wittenberg, 1965) obtained on a sample from its reference section (David, 1966) situated about 14.5 km west of present site, because the dated Ahb horizon showed evidence of ice thrust not recognized at time of sampling in 1961, and because that sample was not carefully prepared and therefore, probably contained undetected root hairs, the estimated age was much younger. The stratigraphic sequence above the paleosol at the reference section comprises three units of nonglacial deposits interstratified with two till sheets, while at the presently sampled site, the paleosol is overlain (from base up) by 30 cm of stratified marl, 8.2 m of sand, and 30 cm of clay, followed by 35 m of till with lag boulders at top. The single till unit has been correlated with the two tills at the reference section (David, 1969). The new date places the time of burial of the soil to beyond the 29 000 BP range at the end of the "prolonged interval of non-glaciation" (David, 1964, p. 107) during which the soil had formed, and which, formally named the Prelate Ferry Interval (David, 1966), probably corresponds in time with the Watino nonglacial (Fenton, 1984).

## Alberta

GSC-1756. Trout Creek Valley  
uncorrected  $2000 \pm 170$

Wood, charcoal (sample L583, Unit D) from Trout Creek Valley, Porcupine Hills, 25.6 km west-southwest of Claresholm, southwest Alberta ( $49^{\circ}59'N$ ,  $113^{\circ}55'W$ ), at an elevation of about 1166 m, was enclosed in alluvium. Collected by L.P. Stene on August 1, 1970; submitted by L.P. Stene.

The sample (3.3 g dry weight) was treated with cold base (5 min.), hot acid, and distilled water rinses. The age estimate is based on one 1-day count in the 2 L counter with a mixing ratio of 2.55.

Comment (L.P. Stene): The sample was taken from 3 m down from an 8 m terrace in Trout Creek valley, eastern Porcupine Hills, southwestern Alberta. It was a sole  $^{14}C$  sample that occurred in a sequence of seven Holocene terrace levels. The

sample lies in the alluvium of a terrace immediately below a 10 m terrace containing Mazama tephra (ca. 7 ka). The 8 m terrace is well preserved along Trout Creek but does exhibit a variable sedimentary make-up. Thick layers of basal gravel, often partially cemented, occur within many remnants. Fine grained overlying units are sand-rich, but with less induration than the alluvium exhibited by the 10 m terrace. Two terrace levels (at approximately 5 m and 3 m) occur below the sample. The 3 m terrace has a sequence of dates, ranging from 1450 years BP to 100 years BP, associated with an archeological site (DiPk 3 and DiPk 2 (Morkin site)) excavated by Byrne (1973).

GSC-1975. Ponoka  
modern

Organic soil (humic acid extract) (sample Ivarson-1972 (68-73 cm)) from 13.6 km west and 7.2 km south of Ponoka, Alberta ( $52^{\circ}36'N$ ,  $113^{\circ}47'W$ ), at an elevation of 884.0 m, was collected by K.C. Ivarson in October, 1972; submitted by K.C. Ivarson.

The sample (3.8 g dry weight) had no pretreatment prior to processing. The age estimate is based on one 1-day count in the 2 L counter with a mixing ratio of 1.79.

Comment (R.J. Fulton): The sample was collected from a 5 cm sand horizon that was rich in humus and buried 68 cm below the surface by sand (eolian?). Glass shards from within the covering sand 15-30 cm below the surface were tentatively identified as Mazama "O" tephra. A buried soil occurs at many sites throughout the region. This soil is definitely older than 6.6 ka, the age generally accepted for the Mazama "O" tephra (Rubin and Alexander, 1960, p.161). Consequently, GSC-1975 does not date formation of the buried soil but illustrates the difficulty of interpreting radiocarbon ages of buried soils.

## Cooking Lake, Alberta series

A series of samples from Cooking Lake, Alberta ( $54^{\circ}44'N$ ,  $113^{\circ}5'W$ ), at an elevation of 800 m, was collected by C.E. Schweger and M. Hickman on April 8, 1979; submitted by C.E. Schweger.

GSC-3228. Cooking Lake (I)  $1600 \pm 60$   
 $\delta^{13}C = -25.0\text{‰}$

Lake sediment, gyttja (sample Co L 106-124; 21.0 g dry weight) was treated with hot acid (non-calcareous) and distilled water rinses (base



treatment omitted). The age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 1.00.

Uncorrected age,  $1600 \pm 60$ .

GSC-4067. Cooking Lake (II)  $5220 \pm 100$   
 $\delta^{13}\text{C} = -27.3\text{‰}$ .

Organic clay (sample II Co L 325-330; 59.5 g dry weight) was treated with hot acid (noncalcareous) and distilled water rinses to neutral pH (base treatment omitted). The age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 1.73.

Uncorrected age,  $5260 \pm 100$ .

Comment (C.E. Schweger): The importance of these dates is discussed in Hickman (1987).

#### Goldeye Lake series

A series of sediment samples from Goldeye Lake, Alberta ( $52^{\circ}27'\text{N}$ ,  $116^{\circ}12'\text{W}$ ), at an elevation of about 1385 m, was collected by C.E. Schweger and M. Hickman on March 15, 1981; submitted by C.E. Schweger.

GSC-3517. Goldeye Lake (I)  $31\,300 \pm 1100$   
 $\delta^{13}\text{C} = -25.3\text{‰}$ .

Lake sediment (GOL 530-550 (GOL 6); 478.8 g dry weight) was treated with hot acid (strongly calcareous) and distilled water rinses (base treatment omitted). The age estimate is based on one 3-day count in the 2 L counter with a mixing ratio of 1.00.

Uncorrected age,  $31\,300 \pm 1100$ .

GSC-3654. Goldeye Lake (II)  $32\,100 \pm 820$   
 $\delta^{13}\text{C} = -25.2\text{‰}$ .

Lake sediment, clay (GOL 510-530; 484.7 g dry weight) was treated with hot acid (very strongly calcareous) and distilled water rinses (base treatment omitted). The age estimate is based on one 4-day count in the 2 L counter with a mixing ratio of 1.00.

Uncorrected age,  $32\,200 \pm 820$ .

GSC-3662. Goldeye Lake (III)  
uncorrected  $23\,600 \pm 260$

Lake sediment, clay (GOL 450-470; 418.3 g dry weight) was treated with hot acid (very strongly calcareous) and distilled water rinses (base treatment omitted). The age estimate is based on one 4-day count in the 2 L counter with a mixing ratio of 1.00.

GSC-3528. Goldeye Lake (IV)  $14\,500 \pm 180$   
 $\delta^{13}\text{C} = -26.9\text{‰}$ .

Lake sediment (GOL 415-425 (GOL 5); 182.0 g dry weight) was treated with hot acid (very strongly calcareous) and distilled water rinses (base treatment omitted). The age estimate is based on one 3-day count in the 2 L counter with a mixing ratio of 1.00.

Uncorrected age,  $14\,500 \pm 180$ .

GSC-3543. Goldeye Lake (V)  $11\,400 \pm 170$   
 $\delta^{13}\text{C} = -29.1\text{‰}$ .

Lake sediment (GOL 380.5-384.5 (GOL 4); 65.6 g dry weight) was treated with hot acid (strongly calcareous) and distilled water rinses (base treatment omitted). The age estimate is based on one 3-day count in the 2 L counter with a mixing ratio of 1.55.

Uncorrected age,  $11\,400 \pm 170$ .

GSC-3546. Goldeye Lake (VI)  $7420 \pm 100$   
 $\delta^{13}\text{C} = -30.7\text{‰}$ .

Lake sediment (GOL 280-287 (GOL 3); 19.6 g dry weight) was treated with hot acid (moderately calcareous) and distilled water rinses (base treatment omitted). The age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 1.00.

Uncorrected age,  $7510 \pm 100$ .

GSC-3555. Goldeye Lake (VII)  $4960 \pm 90$   
 $\delta^{13}\text{C} = -31.1\text{‰}$ .

Lake sediment (GOL 201-205 plus 205-207 (GOL 2); 16.3 g dry weight) was treated with hot acid (slightly calcareous) and distilled water rinses (base treatment omitted). The age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 1.50.

Uncorrected age,  $5060 \pm 90$ .

GSC-3564. Goldeye Lake (VIII)  $4240 \pm 100$   
 $\delta^{13}\text{C} = -31.5\text{‰}$ .

Lake sediment (GOL 155-160 (GOL 1); 19.0 g dry weight) was treated with hot acid (slightly calcareous) and distilled water rinses (base treatment omitted). The age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 1.87.

Uncorrected age,  $4340 \pm 100$ .

GSC-3576. Goldeye Lake (IX) 2950 ± 90  
δ<sup>13</sup>C = -31.6‰.

Lake sediment (GOL 91-96; 10.9 g dry weight) was treated with hot acid (slightly calcareous) and distilled water rinses (base treatment omitted). The age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 1.99.

Uncorrected age, 3050 ± 90.

Comment (C.E. Schweger): Goldeye Lake (15.4 ha; 13.5 m maximum depth) is situated in a bedrock basin within the western Alberta ice-free corridor and is surrounded by western or montane boreal forest. Winter coring yielded a 575 cm core of gyttja, clay gyttja, and clay, with two tephtras (Mt. St. Helen Y and Mt. Mazama). The nine radiocarbon dates listed here provide geochronology, dating four local pollen zones used to subdivide the fossil pollen record (in preparation). Because of the great age of this record, questions of contamination by older carbon sources, particularly coal, must be raised. The following criteria were used to evaluate the older dates: were coal fragments visible to the naked eye or upon microscopic examination of wet-mount slides; was there an abundance of pre-Quaternary palynomorphs; and was there an abundance of degraded Quaternary pollen grains? No coal fragments were observed in the unprocessed sediment; however, from 530-510 cm, pre-Quaternary palynomorphs and indeterminant pollen averaged 73% and 51%, respectively. On this basis, dates GSC-3517 and GSC-3654 are rejected as providing a reasonably accurate age for the sediments. Over the interval 470-450 cm pre-Quaternary palynomorphs and indeterminant pollen averaged 13% and 1.1%, respectively, and on this basis date GSC-3662 is accepted. By accepting this date of 23 600 ± 260 BP, Coldeye Lake becomes one of the oldest pollen records in Canada from a continuous sequence of primary lacustrine sediment.

#### *British Columbia*

GSC-1542. Mica Creek  
uncorrected 3800 ± 130

Peat (sample FI-27-9-70G; unpublished GSC Bryological Report No. 122 by M. Kuc) from east side of Columbia River at Mica Creek, British Columbia (52°1'15"N, 118°33'30"W), at an elevation of 580 m, was enclosed in peat. The sample was collected by R.J. Fulton on September 27, 1970; submitted by R.J. Fulton.

The sample (250 g dry weight) was treated with hot acid and distilled water (base treatment omitted).

The age estimate is based on one 3-day count in the 5 L counter with a mixing ratio of 1.00.

Comment (R.J. Fulton): The sample was collected from the base of 325 cm of peat and muck which overlies 75 cm of silty sand (overbank deposits) and coarse gravel. The gravel is at the surface of a terrace which is 3 m above present normal high-water level of Columbia River. The peat contains a 1 cm thick bed of white, coarse grained tephra at 150 cm (identified as Bridge River ash, 2.4 ka, Nasmith et al., 1967) and a 5 cm thick, yellow-brown, fine grained tephra at 250 cm (identified at a nearby site as Mazama tephra, 6.6 ka, Westgate et al., 1970). The sample was taken from 45 cm below the Mazama tephra and consequently provides an apparent age that is at least 2.8 ka too young. The reason for this anomalous age is not known. The date was intended to provide a maximum age for the terrace which underlies the peat. Because of the presence of Mazama tephra in the peat, it is known that the terrace is older than 6.6 ka.

GSC-2877. Mt. Kobau Lake, Osoyoos  
uncorrected 6330 ± 60

Fibrous peat (sample AP-77-2; 133-138 cm) from Mt. Kobau Lake, 21.6 km (13.5 mi) northwest of Osoyoos, British Columbia (49°7'10"N, 119°40'30"W), at an elevation of 1804.2 m, was collected by T.W. Anderson and E.C. Halstead on September 28, 1977; submitted by T.W. Anderson.

The sample (85 g wet weight) was treated with hot base, hot acid, and distilled water. The age estimate is based on one 3-day count in the 5 L counter with a mixing ratio of 1.00.

Comment (T.W. Anderson): The peat sample directly overlies a 10 cm thick ash layer. The <sup>14</sup>C date indicates that the ash layer is Mount Mazama type ash, which dates about 6.6 ka.

GSC-1696. Ashcroft  
uncorrected 6260 ± 400

Lake sediment, gyttja (sample BE2; unpublished GSC Bryological Report No. 170) from 19.4 km southeast of Ashcroft, British Columbia (50°36'10"N, 121°30'15"W), at an elevation of ca. 1360 m, was collected by J.M. Ryder on November 13, 1971; submitted by J.M. Ryder.

The sample (24.5 g wet weight) was treated with hot acid and distilled water (base treatment omitted). The age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 6.92.

GSC-1892. Lytton 7740  $\pm$  150  
 $\delta^{13}\text{C} = -7.9\text{‰}$ .

Marl (sample S58) from 6.5 km north-northeast of Lytton, British Columbia (50°16'40"N, 121°33'15"W), at an elevation of ca. 500 m, was enclosed in silt and sand. The sample was collected by L.J. Anderson on May 14, 1971; submitted by J.M. Ryder.

The sample (23.9 g dry weight) was not treated prior to reacting with acid. The age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 1.27.

Uncorrected age, 7860  $\pm$  150.

GSC-3390. Willow River  
uncorrected 9460  $\pm$  100

Basal muddy peat (sample CIA-81-161-2) from a small bog 1 km west of Willow River, 30 km east of Prince George, British Columbia (53°53.8'N, 122°17.7'W), at an elevation of ca. 755 m was overlain by peat and underlain by silt and clay. The sample was collected by J.J. Clague on September 25, 1981; submitted by J.J. Clague.

The sample (16.2 g dry weight) was treated with hot base, hot acid (noncalcareous), and distilled water. The age estimate is based on two 1-day counts in the 5 L counter with a mixing ratio of 1.00.

Comment (J.J. Clague): GSC-3390 is a minimum date for deglaciation of east-central British Columbia. The dated sample was collected from a 12 cm thick layer of silty peat, peaty silt and sand. This layer is overlain by approximately 3 m of peat and is underlain by lacustrine silt and clay. The lacustrine sediments accumulated in a local (?) pond after this area was deglaciated. The length of time between deglaciation and the beginning of organic sedimentation recorded by GSC-3390 is unknown, but probably is less than 1.5 ka.

GSC-234. Sooke Harbour  
> 38 400

Wood (sample FG-58-80) from cliffs west of the entrance to Sooke Harbour, Vancouver Island, British Columbia (48°30'N, 123°30'W), at an elevation of ca. 4.5 m, was below till. The sample was collected by J.G. Fyles on August 7, 1958; submitted by J.G. Fyles.

The sample (16.4 g dry weight) was treated with hot base, hot acid, and water rinses. The age estimate is based on one 1-day and one 2-day counts in the 5 L counter with a mixing ratio of 1.00.

GSC-417. Cordova Bay  
> 35 000

Marine shell fragments (sample FG-58-70) from Cordova Bay, Vancouver Island, British Columbia (48°31'N, 123°22'W), at an elevation of approximately 0 m, were enclosed in beach gravel beneath silts and sands. The sample was collected by J.G. Fyles on August 1, 1958; submitted by J.G. Fyles.

The sample (43.7 g dry weight) was treated with an acid leach to remove the outer twenty per cent of the sample. The age estimate is based on one 3-day count in the 5 L counter with a mixing ratio of 1.00.

GSC-1267. Cowichan Head 3060  $\pm$  130  
 $\delta^{13}\text{C} = -27.6\text{‰}$ .

Peat (sample FG-63-4a) from Cowichan Head, Saanich Peninsula, Vancouver Island, British Columbia (48°34'N, 123°22'W), at an elevation of about 1.5 m below high tide level, was collected by J.G. Fyles and E.C. Halstead on August 19, 1963; submitted by J.G. Fyles.

The sample (340 g dry weight) was treated with hot acid and water rinses (base treatment omitted). The age estimate is based on two 1-day counts in the 5 L counter with a mixing ratio of 1.00.

Uncorrected age, 3100  $\pm$  130.

GSC-3124. Point Roberts  
uncorrected 13 500  $\pm$  220

Marine pelecypod shells (sample FAB 202S; *Chlamys cf. rubida* Hinds; identified by M.F.I. Smith) from Point Roberts, 5 km southeast of Tsawwassen, British Columbia (48°58.9'N, 123°1.5'W), at an elevation of 53 m, were enclosed in sandy silt: a till-like diamicton. The sample was collected by S.R. Hicock on July 5, 1980; submitted by J.E. Armstrong.

The sample (9.2 g dry weight) was treated with an acid leach to remove ten per cent of the outer material. The age estimate is based on one 3-day count in the 2 L counter with a mixing ratio of 2.52.

Comment (J.E. Armstrong): This is the oldest postVashon date obtained from the Capilano Sediments of the Fraser Lowland (additional information is available in Armstrong, 1981, p. 26).

GSC-3256. Squamish  
uncorrected 5890  $\pm$  100

Wood, charcoal, and silt (sample 81WV-891) from 300 m south of the confluence of Squamish and Cheakamus Rivers, British Columbia (49° 46.6'N, 123° 9.9'W), at an elevation of 15.0 m, was enclosed in silty clay. The sample was collected by

F.W. Baumann, G. Banks, and R. Price on March 31, 1981; submitted by G.J. Woodsworth.

The sample (28.1 g dry weight) was treated with hot acid (noncalcareous) and distilled water (base treatment omitted). The age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 1.27.

GSC-2169. Brandywine Creek  
uncorrected 34 200  $\pm$  800

Wood, charcoal, and organic silt (sample WN-29-74; coniferous; identified by R.J. Mott (unpublished GSC Wood Report No.75-11)) from road-cut on northwest side of Highway 99, 1.3 km northeast of the bridge across Brandywine Creek, British Columbia (50°4'20"N, 123°5'40"W), at an elevation of 550 m, was enclosed in silt. The sample was collected by J.A. Roddick on June 26, 1974; submitted by J.A. Roddick.

The sample (45.3 g dry weight) was treated with hot acid and distilled water rinses (base treatment omitted). The age estimate is based on one 3-day count in the 2 L counter with a mixing ratio of 1.00.

Comment (J.J. Clague): The dated sample was collected from a 2 m long lenticular bed of silt between two basaltic flows. These flows are part of the Pleistocene Garibaldi Group of Mathews (1958). The upper flow, approximately 3 m thick, has a glaciated upper surface and thus apparently is coeval with, or older than, the Late Wisconsinan Fraser Glaciation. On face value, the upper flow appears to be younger than about 34 ka. However, in view of the low amount of  $^{14}\text{C}$  in the sample and the type of material dated (mainly fine organic detritus of uncertain origin), GSC-2169 probably should be considered a minimum limiting date for the enclosing silt bed; if so, the upper flow may be older than 34 ka.

GSC-3215. Lillooet Valley 870  $\pm$  50  
 $\delta^{13}\text{C} = -25.6\text{‰}$ .

Wood (sample SE-MM1; *Abies*; identified by L.D. Farley-Gill (unpublished GSC Wood Report No. 81-2)) from Lillooet Valley, about 60 km west of Pemberton, British Columbia (50°41'N, 123°30'W), at an elevation of 769 m, was enclosed in diamicton. The sample was collected by J.G. Souther on August 3, 1980; submitted by J.G. Souther.

The sample (11.5 g dry weight) was treated with hot base, hot acid, and distilled water. The age estimate is based on two 1-day counts in the 5 L counter with a mixing ratio of 1.00.

Uncorrected age, 880  $\pm$  50.

GSC- 202. Marina Island  
uncorrected 35 400  $\pm$  400

Wood (sample FG-57-73; Pine) from sea cliff on Marina Island, about 0.8 km southeast of Shark Spit, Strait of Georgia, British Columbia (49°21'N, 123°59'W), at an elevation of about 1 m, was enclosed in plant-bearing silts in a sand unit of the Quadra sediments. The sample was collected by J.G. Fyles in August, 1957; submitted by J.G. Fyles.

The sample (47.5 g dry weight) was treated with hot base, hot acid, and water rinses. The age estimate is based on one 3-day count in the 5 L counter with a mixing ratio of 1.00.

Comments (J.G. Fyles): These sand and silts correlate with the upper sand unit of the Quadra Sediments. "At Denman Island and at Dashwood on Vancouver Island (60 and 72 km to the southeast), peat beds beneath the sand unit have radiocarbon ages no older than 30 000 BP (L-221A, L-221B, L-424B, L-424C, and L-424E)." (See L-455B, 35 400  $\pm$  2200 Olson and Broecker, 1961).

GSC-14. Dashwood  
uncorrected 26 000  $\pm$  600

Wood (sample FG-57-29) from Dashwood, Vancouver Island, British Columbia (49°22'N, 123°60'W), enclosed in peat, was collected by J.G. Fyles in 1957; submitted by J.G. Fyles.

The sample (21.8 g dry weight) was treated with hot base and hot acid. The age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 1.00.

GSC- 424. Denman Island  
uncorrected 5680  $\pm$  130

Organic soil (sample FG-63-10c) from north end of Denman Island, on the inland side of a large Indian midden, British Columbia (49°35'N, 124°29'W) was enclosed in gravel and sand. The sample was collected by J.G. Fyles on August 24, 1963; submitted by J.G. Fyles.

The sample (82.0 g dry weight) was treated with hot acid and water rinses (base treatment omitted). The age estimate is based on one 4-day count in the 5 L counter with a mixing ratio of 1.00.

GSC-13. Denman Island  
uncorrected 29 500  $\pm$  800

Wood (sample FG-57-35-C) from Denman Island, British Columbia (49°35.6'N, 124°49.3'W) was

collected by J.G. Fyles in 1957; submitted by J.G. Fyles.

The sample (12.1 g dry weight) was treated with hot base and hot acid. The age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 1.00.

GSC-2849. Moran Lake Bog 11 900  $\pm$  230  
 $\delta^{13}\text{C} = -31.4\text{‰}$ .

Lake sediment, gyttja (sample AP-77-1) from Moran Lake Bog, 25 km northwest of Port Alberni and 4 km north of the eastern end of Great Central Lake, Vancouver Island, British Columbia (49°21'N, 125°0'35"W), at an elevation of about 136.3 m, was collected by T.W. Anderson on October 7, 1977; submitted by T.W. Anderson.

The sample (70.2 g wet weight) was treated with hot acid and distilled water (base treatment omitted). The age estimate is based on one 4-day count in the 2 L counter with a mixing ratio of 2.66.

Uncorrected age, 12 000  $\pm$  230.

Comment (T.W. Anderson): This sample provides a minimum age for deglaciation of the Port Alberni - Great Central Lake region.

GSC-3142. Combers Beach, Tofino  
uncorrected 380  $\pm$  50

Wood (charred) (sample Combers No.4; *Thuja plicata*; identified by L.D. Farley-Gill (unpublished GSC Wood Report No. 80-5)) from Combers Beach, Pacific Rim National Park; 21 km (13 miles) southeast of Tofino, British Columbia (49°2.5'N, 125°42.1'W), at an elevation of 3.9 m, was enclosed in silty clay. The sample was collected by B.D. Bornhold on November 29, 1979; submitted by B.D. Bornhold.

The sample (8.5 g dry weight) was treated with hot base, hot acid, and distilled water (base treatment omitted). The age estimate is based on two 1-day counts in the 5 L counter with a mixing ratio of 1.00.

GSC-1843. Aristazabal Island  
uncorrected 9330  $\pm$  110

Organic detrital mud (sample 94-99-104; unpublished GSC Bryological Report No. 230) from 100 m west of unnamed small lake on Aristazabal Island, British Columbia (52°48'N, 129°16'W), at an elevation of about 125 m, was collected by H. Nichols in June, 1971; submitted by H. Nichols.

The sample (14.6 g dry weight) was treated with hot base (5 min), hot acid, and distilled water. The

age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 1.38.

GSC- 394. Watun River

Marine shells (*Hiatella arctica*, Linné; originally identified as *Saxicava rugosa* (Southerland)) from the bank at mouth of Watun River, Queen Charlotte Islands, British Columbia (53°54'N, 132°5'W), at an elevation of about 2.5 m, were enclosed in stony mud. The sample was collected by G.M. Dawson in 1878; submitted by J.G. Fyles. The sample (27.5 g dry weight) had no treatment prior to processing. Approximately one half of the sample was reacted for each fraction.

GSC- 394 OF.

> 32 000

The age estimate for the outer fraction (OF) is based on one 1-day count in the 5 L counter with a mixing ratio of 2.35.

GSC- 394 IF.

> 33 000

The age estimate for the inner fraction (IF) is based on one 3-day count in the 5 L counter with a mixing ratio of 2.31.

Comment (J.J. Clague): The dated shells were collected in 1878 by G.M. Dawson during a reconnaissance investigation of the Queen Charlotte Islands (Dawson, 1880). The shells apparently came from a dense, stony, silty clay unit of marine of, more likely, glaciomarine origin. Similar sediments, which also have yielded nonfinite radiocarbon dates, are exposed in coastal bluffs of Graham Island southeast of the Watun River site (Clague et al., 1982); these sediments were deposited during one or more glaciations predating the Late Wisconsinan Fraser Glaciation.

#### Cape Ball series

A series of samples was collected from east coast of Graham Island, 13 km north-northeast of Tlell, British Columbia (53°41.7'N, 131°52.8'W).

GSC-3319. Cape Ball (I)  
uncorrected 15 400  $\pm$  190

Organic detritus (including seeds) (81-C-1 (0-25 cm); *Potamogeton*, *Rumex* and *Carex*; identified by B.G. Warner) was collected, from an elevation of 1 m, by R.W. Mathewes and B.G. Warner on July 7, 1981; submitted by R.W. Mathewes.

The sample (29.0 g dry weight) was treated with hot base, hot acid (noncalcareous), and distilled

water. The age estimate is based on one 3-day count in the 2 L counter with a mixing ratio of 1.66.

Comment (R.W. Mathewes): The sample consists of mixed organics retained on a 0.25 mm sieve, after washing 9 kg of laminated sand, silt, and clay from a small basin exposed in the sea cliffs at Cape Ball. The sampled unit overlies outwash gravel and till. The surprisingly old age indicates that the Cape Ball area was ice-free during and subsequent to the late Wisconsin glacial maximum on the Pacific coast. Another small basin 21 m to the north yielded a similar age of  $16\,000 \pm 570$  BP (GSC-3340) from the same stratigraphic level. The significance of these two samples is discussed further in Warner et al., (1982). A detailed study of pollen and plant macrofossils has been carried out by Warner (1984), who also provides paleoenvironmental interpretations for the site.

GSC-3337. Cape Ball (II)  
uncorrected  $11\,100 \pm 90$

Peat (81-C-2-B; 432.0 g dry weight) was collected, from an elevation of 0.8 m, by R.W. Mathewes and B.G. Warner on July 8, 1981; submitted by R.W. Mathewes.

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

Comment (R.W. Mathewes): This sample is a 1 cm slice of silty peat from the base of a 35-40 cm thick peat bed containing abundant woody remains. The peat bed coincides with pollen and macrofossil evidence of conifer forest expansion in this area (Warner, 1984). The peat bed was transgressed by the sea in the early Holocene, depositing littoral muds with abundant marine fossils. Clague et al. (1982) illustrated the sampled section (p. 1789, site 14, unit 3), and discussed the relevant stratigraphy.

GSC-3340. Cape Ball (III)  
uncorrected  $16\,000 \pm 570$

Organic detritus (including seeds) (81-C-2-A (0-40 cm); 21.1 g dry weight; *Potamogeton*, *Rumex* and *Carex*; identified by B.G. Warner) was collected, from an elevation of 0.8 m, by R.W. Mathewes and B.G. Warner on July 8, 1981; submitted by R.W. Mathewes.

The sample was treated with hot base, hot acid (noncalcareous), and distilled water. The age estimate is based on one 5-day count in the 2 L counter with a mixing ratio of 3.10.

Comment (R.W. Mathewes): The sample consists of mixed organics retained on a 0.25 mm sieve after washing 12 kg of laminated sand, silt, and clay from a small basin exposed in the sea cliffs at Cape Ball (Clague et al., 1982). The sampled unit overlies outwash gravel and till. This age is not significantly different from GSC-3319 ( $15\,400 \pm 190$  BP), a similar sample from a basin 21 m south of sample 81-C-2. Both dates are highly significant in establishing early deglaciation in this part of the Queen Charlotte Islands (see discussion and references for sample GSC-3319). A small, poorly preserved twig (cf. *Salix*, identified by R.W. Mathewes) from this unit was radiocarbon dated by the AMS method at  $14\,700 \pm 700$  BP (Mathewes et al., 1985), confirming the unexpectedly early deglaciation at Cape Ball.

GSC-3477. Cape Ball (IV)  $9300 \pm 80$   
 $\delta^{13}\text{C} = -25.2\text{‰}$

Wood (81-C-2-D; 11.0 g dry weight; *Tsuga heterophylla*; identified by R.J. Mott (unpublished GSC Wood Report No. 82-23)) was collected, from an elevation of 7.8 m, by R.W. Mathewes and B.G. Warner on August 8, 1981; submitted by B.G. Warner.

The sample was treated with hot base, hot acid (noncalcareous), and distilled water. The age estimate is based on one 3-day and one 1-day count in the 2 L counter with a mixing ratio of 1.00.

Uncorrected age,  $9300 \pm 80$ .

GSC-3547. Cape Ball (V)  $13\,000 \pm 170$   
 $\delta^{13}\text{C} = -15.5\text{‰}$

Organic detritus (including seeds) (81-C-1-B (35-45 cm); 17.6 g dry weight; *Potamogeton filiformis*, *Carex*; identified by B.G. Warner) was collected, from an elevation of 6.0 m, by B.G. Warner and J.J. Clague on August 4, 1982; submitted by B.G. Warner. The sample was treated with hot acid (noncalcareous) and distilled water (base treatment omitted). The age estimate is based on one 3-day count in the 2 L counter with a mixing ratio of 1.87.

Uncorrected age,  $12\,900 \pm 170$ .

Comment (R.W. Mathewes): The sample consists of mixed organics retained on a 0.25 mm sieve, after washing 9.4 kg of massive sandy silt. The sample unit is from the contact between the massive and the underlying laminated sediments dated at  $15\,400 \pm 190$  BP (GSC-3319). An environmental change occurred around this time, suggested by changes in plant remains (Warner, 1984; Warner et al., 1984).

GSC-3357. Clapp Basin 7190 ± 100  
 $\delta^{13}\text{C} = -27.2\text{‰}$ .

Plant (organic) fragments in sand (sample Shangri-la Bog 75-83) from 5 km due south of Clapp Basin, Shields Eay, Graham Island, British Columbia (53°16'N, 132°25.5'W), at an elevation of 595.0 m, were enclosed in fibrous gyttja (above) and coarse sand (below). The sample was collected by R.W. Mathewes and B.G. Warner on July 19, 1981; submitted by R.W. Mathewes.

The sample (164.5 g wet weight) was treated with hot base, hot acid (noncalcareous), and distilled water. The age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 1.00.

Uncorrected age, 7220 ± 100.

Comment (R.W. Mathewes): The sedimentary basin is a shallow, peat-filled bedrock depression near timberline. Samples for pollen and plant macrofossil analysis have been processed, and the basal radiocarbon date provides an age for paleoecological reconstruction. Other small subalpine basins from the Queen Charlotte Islands are currently under investigation to help assess the significance of this date. It is unlikely to represent local deglaciation. A more likely explanation for the inception of organic matter may be the end of the "early Holocene xerothermic interval" on the south coast of British Columbia (Mathewes and Heusser, 1981). The possibility of root penetration into the base of this shallow (83 cm deep) deposit must be acknowledged. It should be considered a minimum age.

GSC-3332. Nesto Inlet 9960 ± 110  
 $\delta^{13}\text{C} = -29.6\text{‰}$ .

Lake sediment, silty gyttja (sample Little Twin Pond 440-446) from peninsula south of Nesto Inlet, Graham Island, British Columbia (53°33'N, 132°55.4'W), at an elevation of 46 m, was enclosed in gyttja (above) and sandy clay (below). The sample was collected by R.W. Mathewes and B.G. Warner on July 14, 1981; submitted by R.W. Mathewes.

The sample (85.4 g dry weight) was treated with hot acid (noncalcareous), and distilled water (base treatment omitted). The age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 1.00.

Uncorrected age, 10 000 ± 110.

Comment (R.W. Mathewes): The sample was collected with a 5 cm diameter piston corer, from peat

deposits at the edge of the lake basin. Basal date is a minimum for deglaciation of the Nesto Inlet area on the west edge of the coast of Graham Island. An unpublished date of 9260 ± 330 BP (SFU-112) was obtained several hundred metres away from the edge of a similar basin, at 480-490 cm depth in peat. Actual deglaciation of the area was probably around 11 ka, based on an unpublished date on basal organic lake sediments from "Hippa Lake" on Hippa Island, just southwest of the study area (11 100 ± 220 BP, GSC-3760).

## Northern Canada, mainland

### Yukon

GSC-3426. Pelly River  
 uncorrected 8000 ± 90

Peat (sample 81-JJO-0024) from 68 km southeast of Ross River, on the outside of an entrenched meander level right bank of Pelly River, Yukon Territory (61°54'N, 131°8'W), at an elevation of 850 m, was enclosed in peat (above) and gravels (below). The sample was collected by L.E. Jackson, Jr. on July 7, 1981; submitted by L.E. Jackson, Jr.

The sample (40.0 g dry weight) was treated with hot base, hot acid (noncalcareous), and distilled water rinses. The age estimate is based on one 3-day count in the 5 L counter with a mixing ratio of 1.00.

Comment (L.E. Jackson, Jr.): The sample provides a minimum date for deglaciation and dates the initiation of blanket bog in this area following incision of Pelly River through glaciofluvial sediments.

GSC-3573. Caribou River  
 uncorrected 9780 ± 110

Wood (sample HHC 82-1C-35; *Salix*; identified by R.J. Mott (unpublished GSC Wood Report No. 82-54)) from Caribou River, 18 km south of confluence with Peel River, Yukon Territory (66°22'N, 134°20'W), at an elevation of 260 m, was enclosed in sand. The sample was collected by N.R. Catto on July 2, 1982; submitted by N.R. Catto.

The sample (9.7 g wet weight) was treated with hot base, hot acid (noncalcareous), and water rinses. The age estimate is based on one 3-day count in the 2 L counter with a mixing ratio of 1.27.

Comment (N. Catto): This date allows an estimate of the rate of river downcutting.



### Snake River series

A series of samples from a gully, on the south side of gully tributary to the Snake River (from the west), Peel Plateau, Yukon Territory (65°41'N, 133°26.5'W), at an elevation of ca. 455 m, was collected by O.L. Hughes.

GSC-2510. Snake River (I)  
uncorrected 3620 ± 100

Wood (HH62-69 (1976) 35.0 m; 6.8 g dry weight; *Salix*; identified by L.D. Farley-Gill (unpublished GSC Wood Report No. 77-22)) was collected on July 17, 1976, about 400 m from the mouth of the gully; submitted by O.L. Hughes.

The sample was treated with hot base, hot acid and distilled water. The age estimate is based on one 3-day count in the 2 L counter with a mixing ratio of 3.56.

GSC-2599. Snake River (II)  
uncorrected 8420 ± 90

Wood (HH62-69(1976) 44.0 m; 11.3 g dry weight; *Picea*; identified by L.D. Farley-Gill (unpublished GSC Wood Report No. 77-65)) was collected on July 17, 1976, about 400 m from the mouth of the gully; submitted by O.L. Hughes.

The sample was treated with hot base, hot acid and distilled water. The age estimate is based on two 1-day counts in the 5 L counter with a mixing ratio of 1.00.

GSC-2693. Snake River (III)  
uncorrected 11 700 ± 90

The sample (HH 62-69 (1976) 35.3 m - B) was collected on April 17, 1978, about 400 m from the mouth of the gully; the >4 mesh wood (11.5 g dry weight; *Salix*; identified by R.J. Mott (unpublished GSC Wood Report No. 78-20)) was isolated by sieving; submitted by J.V. Matthews, Jr.

The material was treated with hot base, hot acid, and distilled water rinses. The age estimate is based on one 4-day count in the 5 L counter with a mixing ratio of 1.00.

GSC-2745. Snake River (IV)  
uncorrected 11 800 ± 170

The sample (HH 62-69 (1976) 35.3 m - A) was collected on April 17, 1978, about 400 m from the mouth of the gully; the >4 mesh wood (3.9 g dry weight; *Salix*; identified by R.J. Mott (unpublished GSC Wood Report No. 78-20)) was isolated by sieving; submitted by O.L. Hughes.

The material was treated with hot acid and distilled water rinses (base treatment omitted). The age estimate is based on one 3-day count in the 2 L counter with a mixing ratio of 1.92.

GSC-2956. Snake River (V)  
> 35 000

Wood (HH62-69 (1979) Stn. C; 11.3 g dry weight; *Salix*; identified by L.D. Farley-Gill (GSC Report No. 79-57)) was collected on July 12, 1979 at an elevation of approximately 425 m, about 50 m from the mouth of the gully; submitted by O.L. Hughes.

The sample was treated with hot base, hot acid and distilled water rinses. The age estimate is based on one 4-day count in the 5 L counter with a mixing ratio of 1.00.

Comment (O.L. Hughes): At the collecting site, a small stream is incised through Quaternary deposits of a high terrace into siltstone and mudstone of the Lower Cretaceous Arctic Red Formation (Norris, 1984). The terrace deposits comprise, from the bedrock surface up, 1 m of gravel with clasts of mudstone and pebbles and cobbles of quartzite, 5.3 m of gravel, coarse with large boulders at the base, becoming finer upward, with clasts of quartzite, chert, limestone, and sparse granite of Shield provenance, 14.9 m of gravel with interbedded organic silt.

The locality was last glaciated by a lobe of the Laurentide Ice Sheet during the Late Wisconsinan Hungry Creek Glaciation (Hughes et al., 1981). GSC-2745, from 15 cm above the base of the uppermost unit, is minimum for retreat of that lobe from the area. GSC-2599, from a spruce stump in growth position 8.9 m above the base of the uppermost unit is minimum for re-establishment of spruce in the area following Hungry Creek Glaciation. GSC-2510, ostensibly collected at the base of the uppermost unit, is incompatible with the other dates, and is thought to be a spurious date, possibly arising from mislabelling of a field sample or erroneous reading of a label.

In a nearby exposure to the south of the tributary gully, a much thicker sequence of terrace deposits is exposed: 3 m of boulder gravel is overlain by 3 m of organic silt, which is in turn overlain by about 17 m of gravel and 3 m of organic silt. Wood from the lower silt yielded an age of > 31 000 BP (GSC-181, Dyck et al., 1965, p. 15) and silty peat from the base of the upper silt yielded an age of 9750 ± 150 BP (GSC-586, Lowdon and Blake, 1968, p. 232).

## Hungry Creek series

A series of samples from the upper part of Unit 2 on the left bank of Hungry Creek, Yukon Territory (65°34.5'N, 135°30'W), at an elevation of ca. 350 m, was collected by O.L. Hughes in July and September, 1976; submitted by O.L. Hughes. The samples were enclosed in silt, and fine grained sand, with abundant remains of plants and arthropods (Hughes et al., 1981).

GSC-2341. Hungry Creek (I)  
uncorrected 8980 ± 90

This basal peat (Unit 6) overlies silt and silty clay (Unit 5) which in turn overlies Unit 4, the Hungry Creek Till (Hughes et al., 1981, Fig. 3).

The sample (HH72-54-7; 10.1 g dry weight) was treated with cold base (5 min.), hot acid, and distilled water rinses. The age estimate is based on one 3-day count in the 2 L counter with a mixing ratio of 1.11.

GSC-2401. Hungry Creek (II)  
> 40 000

Wood, one rounded detrital piece (HH72-54 (1976) Stn. 6; 5.0 g dry weight; *Picea*; identified by R.J. Mott (unpublished GSC Wood Report No. 76-59)) from near the top of a channel-fill sequence (Unit 3) beneath the Hungry Creek Till (Hughes et al., 1981, Fig. 3). The channel-fill sequence is inset into Unit 2a, and is comprised of sand, silt and minor clay with abundant remains of plants and arthropods. The channel-fill sediments contain granite pebbles of Shield origin that were derived from an advancing Laurentide Ice Sheet.

The sample was treated with hot base, hot acid, and water rinses. The age estimate is based on one 5-day count in the 2 L counter with a mixing ratio of 1.41.

GSC-2422. Hungry Creek (III)  
uncorrected 36 900 ± 300

Beaver-chewed wood (HH72-54 (1976) 14.9 m; 42.4 g dry weight; *Picea*, or *Salix*; identified by L.D. Farley-Gill (unpublished GSC Wood Report No. 76-58), from the upper part of Unit 2, is overlain by Unit 4, the Hungry Creek Till.

The wood was treated with hot base, hot acid, and distilled water. The age estimate is based on one 5-day count in the 5 L counter with a mixing ratio of 1.00.

Comment (O.L. Hughes): GSC-2422 is minimum for the advance of the Laurentide Ice Sheet over the locality during Hungry Creek Glaciation. Hungry

Creek Glaciation, during which the Laurentide Ice Sheet attained its all-time maximum in the region, may have culminated after 36 900 years ago (Hughes et al., 1981). The wood of GSC-2401 was rounded; that factor, and its provenance in glaciofluvial gravel, suggests that it was redeposited from an unidentified source. GSC-2341 is minimum for retreat of the Laurentide Ice Sheet from the locality. Several dates from Mackenzie Valley indicate, however, that the ice sheet had retreated southeastward into Mackenzie Valley by about 11.5 ka (Mackay and Mathews, 1973).

GSC-2971. Hungry Creek  
uncorrected 8700 ± 80

Wood (sample HH79-1; *Salix*; identified by L.D. Farley-Gill (unpublished GSC Wood Report No. 79-53)) from east bank Hungry Creek (about 0.5 km upstream from HH72-54), Yukon Territory (65°34.5'N, 135°30'W), at an elevation of about 335 m, was enclosed in silt, fine grained sand, with abundant organic detritus. The sample was collected by O.L. Hughes on July 6, 1979; submitted by O.L. Hughes.

The sample (11.4 g dry weight) was treated with hot base, hot acid, and distilled water rinses. The age estimate is based on one 3-day count in the 5 L counter with a mixing ratio of 1.00.

Comment (O.L. Hughes): The wood was collected from a forest layer that included cones of *Picea glauca*. The date is therefore minimum for re-establishment of spruce in the area following the Late Wisconsinan Hungry Creek Glaciation. The forest layer is overlain by 5.5 m of gravel, evidence that para glacial gravel continued to aggrade and expand northward along nearby Wind River after 8700 BP.

GSC-2436. Bell River  
> 39 000

Wood (sample HH75-22-2 (15.56 m); *Picea*; identified by L.D. Farley-Gill (unpublished GSC Wood Report No. 77-3)) from left bank Bell River, about 9.6 km (direct distance) above mouth of Rat River, Yukon Territory (67°29'N, 136°44.5'W), at an elevation of ca. 295 m, was enclosed in sand. The sample was collected by O.L. Hughes on June 26, 1975; submitted by O.L. Hughes.

The sample (11.5 g dry weight) was treated with hot base, hot acid, and distilled water rinses. The age estimate is based on two 1-day counts in the 5 L counter with a mixing ratio of 1.00.

Comment (C.L. Hughes): The sample was derived from sand that overlies glaciolacustrine silt and clay. The sand is judged to represent a transitional stage between drainage of a Late Wisconsinan glacial lake in Bell Basin, and the beginning of downcutting of Bell River to its present level. The sample, a single piece of wood with rounded ends associated with detrital coal, plant, and insect remains and other wood, may be recycled from older deposits known to exist in the basin.

#### Ash Bend series

A series of samples from left bank of the Stewart River at Ash Bend, Yukon Territory (63°30'N, 137°16'W) was collected and submitted by O.L. Hughes.

GSC-2400. Ash Bend (I)  
> 39 000

Disseminated 'organics', mainly sedge (HH65-25 (1976) 35.3 m; 30.6 g dry weight) were collected in June, 1976 and treated with hot acid and distilled water rinses (base treatment omitted). The age estimate is based on one 3-day count in the 5 L counter with a mixing ratio of 1.00.

GSC-2429. Ash Bend (II)  
> 43 000

Plant detritus - sedge culms / twigs (HH65-25 (1976) Stn. 4: 38.1-38.2 m; 47.4 g dry weight) was collected on December 22, 1976, and treated with hot acid and distilled water rinses (base treatment omitted). The age estimate is based on one 3-day count in the 5 L counter with a mixing ratio of 1.00.

Comment (O.L. Hughes): At about mid-length of the Ash Bend section, organic silt and sand and peat, with a maximum total thickness of about 13.5 m, occupy a channel that is incised into outwash gravel of Reid age. The gravel is underlain by till of Reid age, which in turn is underlain by gravel that is judged to be advance outwash of Reid Glaciation. A layer of Sheep Creek Tephra (identified by J.A. Westgate) 5-10 cm thick occurs about 5 m above the base of the channel fill (Hughes et al., 1987).

GSC-2400 and -2429 were collected 8 cm and 360 cm above the Sheep Creek Tephra, respectively. Twigs from the tephra yielded an age >42 900 BP (GSC-524; Lowdon and Blake, 1968). The dates are compatible with an age of 75-80 ka for Sheep Creek Tephra based on uranium - series age determinations on bones associated with the tephra at Canyon Creek, Alaska (Hamilton and Bischoff, 1984).

GSC-127. Pelly Farm Site  
uncorrected 2920 ± 140

Charred material, charcoal (sample KfVd-2, L5) from Pelly Farm Site, near junction of Pelly River and Yukon River, Yukon Territory (62°50'3"N, 137°19'55"W) was collected and submitted by R.S. MacNeish.

The sample (6.0 g dry weight) was treated with base, acid, and distilled water rinses. The age estimate is based on one 3-day count in the 5 L counter with a mixing ratio of 1.00.

GSC-2526. Gravel Lake  
uncorrected 6810 ± 70

Lake sediment, basal organic silt (sample Gravel Lk, 8-7-77 A; 244-249 cm) from Gravel Lake on road between Stewart River crossing and Dawson, approximately 24 km west of McQuestern River bridge crossing, Yukon Territory (63°48'N, 137°54'W), at an elevation of 617 m, was enclosed in gyttja (above) and volcanic ash (below). The sample was collected by C.E. Schweger, J.V. Matthews, Jr., R. Vance, and K. Wald on July 8, 1977; submitted by C.E. Schweger.

The sample (17.4 g dry weight) was treated with hot acid and distilled water rinses (base treatment omitted). The age estimate is based on one 3-day count in the 2 L counter with a mixing ratio of 1.00.

Comment (C.E. Schweger): Gravel Lake was piston cored from a boat through 110 cm water. A 267 cm core of organic silt was recovered, the interval 244-249 cm was dated. Pollen preservation throughout the core was poor although the basal sediments did contain abundant *Picea* pollen (cf. Cwynar et al., 1987).

GSC-2538. Barlow Lake 10 100 ± 90  
δ<sup>13</sup>C = -28.4‰.

Lake sediment, basal gyttja (sample Barlow Lk, 7-7-77 406-410 cm) from Barlow Lake 0.6 km (0.4 miles) south of road between Stewart River Crossing and Dawson at about 71 km (44.4 miles) from Stewart Crossing, Yukon Territory (63°45'N, 137°43'W), at an elevation of 580-610 m, was enclosed in gyttja (above) and clay (below). The sample was collected by C.E. Schweger, J.V. Matthews, Jr., R. Vance, and K. Wald on July 7, 1977; submitted by C.E. Schweger.

The sample (15.5 g dry weight) was treated with hot acid and distilled water rinses (base treatment

omitted). The age estimate is based on one 3-day count in the 2 L counter with a mixing ratio of 1.00.

Uncorrected age,  $10\,200 \pm 90$ .

Comment (C.E. Schweger): Barlow Lake was piston cored from a boat through 535 cm water. A 411 cm core of gyttja and organic clay was recovered. The interval 406-410 cm was dated and a basal pollen sample from 411 cm was dominated by *Betula*, 59%; *Salix*, 13%; Cyperaceae, 22%; Gramineae, 2%; and *Artemisia*, 2%. This indicates a late glacial origin for the lake basin sediments (cf. Cwynar et al., 1987).

GSC-2548. Big Reid Lake  $9800 \pm 120$   
 $\delta^{13}\text{C} = -30.2\text{‰}$ .

Lake sediment, basal gyttja (sample MRA-6-28-77-78; 300-305 cm) from Big Reid Lake, south of Stewart River, approximately 72 km (about 45 miles) west-southwest of Mayo, Yukon Territory (63°23'N, 137°15'W), at an elevation of about 550 m, was enclosed in gyttja (above) and clay (below). The sample was collected by C.E. Schweger, J.V. Matthews, R. Vance, and K. Wald on June 28, 1977; submitted by C.E. Schweger.

The sample (9.1 g dry weight) was treated with hot acid and distilled water rinses (base treatment omitted). The age estimate is based on one 4-day count in the 2 L counter with a mixing ratio of 2.07.

Uncorrected age,  $9880 \pm 120$ .

Comment (C.E. Schweger): Big Reid Lake was piston cored from a boat through about 14 m water. A 330 cm core of gyttja and basal clay was recovered. The dated interval, 300-305 cm, came from the lowest gyttja. A basal pollen sample dominated by *Betula*, 54%; *Salix*, 16%; Cyperaceae, 24%; and *Artemisia*, 4% indicates a late glacial origin for the lake sediments. This is unusual in that the lake basin is believed to have formed during the Reid Glaciation (cf. Cwynar et al., 1987).

GSC-3188. Eagle River  
> 43 000

Wood (sample RR 80/4; *Picea*; identified by L.D. Farley-Gill (unpublished GSC Wood Report No. 81-3)) downstream from mouth of creek which flows west from Dempster Highway and about 5 km from Mount Joyal, Eagle River, Yukon Territory (66°41.9'N, 137°2.4'W), at an elevation of about 365.0 m, was enclosed in silty sand. The sample was collected by N.W. Rutter and J.V. Matthews, Jr. on August 6, 1980; submitted by J.V. Matthews, Jr.

The sample (11.3 g dry weight) was treated with hot base, hot acid, and distilled water rinses. The age

estimate is based on one 3-day count in the 5 L counter with a mixing ratio of 1.00.

#### Telluride Creek series

A series of samples from north bank of Telluride Creek, about 6.5 km above its mouth, Haines, Yukon Territory (60°53'N, 138°8'W), at an elevation of 1143 m, was collected by V.N. Rampton in July, 1974; submitted by V.N. Rampton.

GSC-2218. Telluride Creek (I)  
> 41 000

Wood (60 ROA-9A; 11.2 g dry weight; *Picea*; identified by L.D. Wilson (unpublished GSC Wood Report No. 75-54)) was treated with hot base, hot acid, and water rinses. The age estimate is based on one 3-day count in the 5 L counter with a mixing ratio of 1.00.

GSC-2218 HP. Telluride Creek (II)  
> 56 000

Wood (60 ROA-9A; 45 g dry weight; *Picea*; identified by L.D. Wilson (unpublished GSC Wood Report No. 75-54)) was treated with hot base, hot acid, and water rinses. The age estimate is based on one 5-day count in the 5 L counter with a mixing ratio of 1.00.

Comment (V.N. Rampton): The wood for samples GSC-2218, -2218 HP comes from 8 m below the top of a sequence of bedded gravels up to 30 m thick that are overlain by 25 m of interlayered till (2, possibly 3 separate sheets), gravel, and clay; and underlain by 20 m of interbedded pebbly gravels, sand, and silts with organic layers and channel 'fills'. The age of the wood suggests that the gravels and underlying stratified sediments may date from Denton and Struiver's (1967) Silver Nonglacial Interval or older. Extensive thick exposures showing multiple tills and nonglacial sediments are present along Telluride Creek and its tributary Bryson Creek in the immediate vicinity.

#### 'Little Hanging Lake' series

A series of lake sediment samples from 'Little Hanging Lake' (unofficial name) 100 km northeast of Old Crow, Yukon Territory (68°19'N, 138°17'W), at an elevation of 500 m, was collected by L.C. Cwynar and J.C. Ritchie on May 4, 1978; submitted by L.C. Cwynar.

GSC-2864. 'Little Hanging Lake' (I) 10 400 ± 140  
 $\delta^{13}\text{C} = -26.7\text{‰}$ .

Lake sediment, mud (LHL 2 (195'200 cm); 107.4 g dry weight) was treated with hot acid and distilled water rinses (base treatment omitted). The age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 1.00.

Uncorrected age, 10 400 ± 140.

GSC-2857. 'Little Hanging Lake' (II) 22 900 ± 880  
 $\delta^{13}\text{C} = -25.2\text{‰}$ .

Lake sediment, mud (LHL 1 (250'260 cm); 52.6 g dry weight) was treated with hot acid and distilled water rinses (base treatment omitted). The age estimate is based on one 3-day count in the 2 L counter with a mixing ratio of 2.14.

Uncorrected age, 22 900 ± 880.

GSC-126. Little Arm Site uncorrected 3220 ± 140

Charred material, charcoal (sample JiVr-1, L4) from Little Arm Site, Kluane Lake, Yukon Territory (61°25'5"N, 138°58'35"W) was collected and submitted by R.S. MacNeish.

The sample (ca. 5 g dry weight) was treated with base, acid, and distilled water rinses. The age estimate is based on one 1-day count in the 2 L counter with a mixing ratio of 1.00.

GSC-3190. Churchward Hill uncorrected 6620 ± 70

Basal wood (sample T-80-367; *Picea*; identified by R.J. Mott (unpublished GSC Wood Report No. 81-4)) from south bank of creek, 6 km south of Churchward Hill, and 20 km due north of confluence of Engineer Creek and Ogilvie River, Yukon Territory (65°32'N, 138°16'W), at an elevation of about 560 m, was enclosed in 3.1 m of silty sand and peat overlying 8 m of gravel on bedrock cliff. The sample was collected by R. Thomas and V.N. Rampton in August, 1980; submitted by V.N. Rampton.

The sample (11.3 g dry weight) was treated with hot base, hot acid, and distilled water rinses. The age estimate is based on one 3-day count in the 5 L counter with a mixing ratio of 1.00.

Comment (V.N. Rampton): The date relates to alluvial fan sequence on high terrace. A number of dates indicate that thawing of unconsolidated deposits on slopes throughout the southern Porcupine Plateau and northern Ogilvie Mountains has resulted in deposition of silty colluvium and alluvium in most valleys (Thomas and Rampton, 1982) during

much of the Holocene. Dates of 3650 ± 110 BP (BGS-686; 65°51.5'N, 138°2'W), 5070 ± 130 BP (GSC-411; Blake, 1986), 5160 ± 100 BP (BGS-829; 65°51.5'N, 138°2'W), 6190 ± 60 BP (GSC-3236), 6240 ± 70 BP (GSC-2438; Lowdon and Blake, 1979), 10 150 ± 130 BP (BGS-828; 65° 54'N, 137° 5'W) have also been collected from the base of or from within silty alluvium.

GSC-3236. Ogilvie River uncorrected 6190 ± 60

Basal peat (sample R-80-105-2) from east bank of Ogilvie River, 1 km north of eastern tributary and 9.6 km due north of Engineer Creek and Ogilvie River confluence, Yukon Territory (65°26'N, 138°12'W), at an elevation of approximately 570 m, was enclosed in 2.4 m of silt, sand, and peat overlying 12 m of gravel over bedrock. The sample was collected by V.N. Rampton in August, 1980; submitted by V.N. Rampton.

The sample (42.1 g dry weight) was treated with hot base, hot acid (slight reaction), and distilled water rinses. The age estimate is based on one 4-day count in the 5 L counter with a mixing ratio of 1.00.

Comment (V.N. Rampton): This sample contained *Picea* sp. needles (identified by J.V. Matthews, Jr., unpublished GSC Plant Macrofossil Report 81-8), bark beetles and *Notaris* cf. *N. aethiops* Fab. (identified by J.V. Matthews, Jr.; unpublished GSC Arthropod Report 81-9) that indicate a forested environment. Date relates to alluvial fan development on alluvial terrace (cf. GSC-3190).

GSC-2929. Whitestone River uncorrected 40 600 ± 1520

Peat (sample CR67-68-16 (JVM No. 1)) from Whitestone River, Locality 43, outside of third bend below mouth of Chance Creek, Yukon Territory (66°24'30"N, 138°27'W), at an elevation of approximately 400 m, was enclosed in silty peat. The sample was collected by C.R. Harington on August 5, 1967; sieved and submitted by J.V. Matthews, Jr..

The sample (44.6 g dry weight) was treated with hot base, hot acid, and distilled water rinses. The age estimate is based on one 4-day count in the 5 L counter with a mixing ratio of 1.00.

Comment (C.R. Harington): Much of a skeleton of an adult female woolly mammoth (*Mammuthus primigenius*) was collected by C.R. Harington and P. Lord in 1967. A rib bone from the 'Whitestone Mammoth' yielded a radiocarbon date of 30 300 ± 2000 BP (I-3576; Harington, 1978), and the

associated peat material was sampled to try to obtain paleoenvironmental information about the region where the mammoth died. The peat sample, because of its much older age, does not fulfill this requirement. However, the peat date is reasonable, because the mammoth could have died after becoming mired and sinking into a peat bog deposit that was laid down much earlier.

#### Stokes Point series

A series of samples from 60 km south of Stokes Point, Yukon Territory (68°39'N, 138°45'W), at an elevation of 150 m, was collected by L.C. Cwynar and J.C. Ritchie on May 4, 1978; submitted by L.C. Cwynar.

GSC-2875. Stokes Point (I) 7640 ± 70  
 $\delta^{13}\text{C} = -26.1\text{‰}$ .

Lake sediment (T3B; 140 g dry weight) was treated with hot acid and distilled water rinses (base treatment omitted). The age estimate is based on one 4-day count in the 5 L counter with a mixing ratio of 1.00.

Uncorrected age, 7660 ± 70.

GSC-2869. Stokes Point (II) 8690 ± 120  
 $\delta^{13}\text{C} = -28.5\text{‰}$ .

Lake sediment, mud (T3A; 9.8 g dry weight) was treated with hot acid and distilled water rinses (base treatment omitted). The age estimate is based on one 3-day count in the 2 L counter with a mixing ratio of 1.93.

Uncorrected age, 8750 ± 120.

GSC-2520. Stokes Point (III) 19 500 ± 250  
 $\delta^{13}\text{C} = -25.8\text{‰}$ .

Lake sediment, mud (T2; 50.1 g dry weight) was treated with hot acid and distilled water rinses (base treatment omitted). The age estimate is based on one 5-day count in the 2 L counter with a mixing ratio of 1.92.

Uncorrected age, 19 500 ± 250.

GSC-2521. Stokes Point (IV) 16 800 ± 250  
 $\delta^{13}\text{C} = -25.2\text{‰}$ .

Lake sediment, mud (T1; 64.1 g dry weight) was treated with hot acid and distilled water rinses (base treatment omitted). The age estimate is based on one 3-day count in the 2 L counter with a mixing ratio of 2.36.

Uncorrected age, 16 800 ± 250.

GSC-3204. Old Crow River  
 HH 68-10 locality > 39 000

Peat nodules (sample REM 80-134; REM 80-133) from HH 68-10 locality, on Old Crow River, above mouth of Johnson Creek, Yukon Territory (67°52'N, 139°47.45'W), at an elevation of about 290 m, were enclosed in silt. The sample was collected by R.E. Morlan on August 9, 1980; broken up, sieved, and submitted by J.V. Matthews, Jr..

The sample (37.8 g dry weight) was treated with hot acid and distilled water (base treatment omitted). The age estimate is based on one 3-day count in the 5 L counter with a mixing ratio of 1.00.

GSC-3117. Old Crow  
 uncorrected 2330 ± 50

Wood, an in situ upright stalk with roots attached (sample DH-79-8; *Salix*; identified by L.D. Farley-Gill (unpublished GSC Wood Report No. 80-25)) from approximately 22 km north of Old Crow, Yukon Territory (67°44'N, 139°55'W), at an elevation of approximately 277 m, was enclosed in flood plain sediments, 2 m below terrace top. The sample was collected by D. Harvey and A.V. Jopling on July 29, 1979; submitted by D. Harvey.

The sample (11.6 g dry weight) was treated with hot base, hot acid, and distilled water. The age estimate is based on two 1-day counts in the 5 L counter with a mixing ratio of 1.00.

Comment (D. Harvey): This sample provides a test on the reliability of using floodplain grasses and sedges for dating floodplain activities. It will also provide a maximum age for a significant meander cutoff event.

#### Johnson Creek series

A series of samples from the east bank Old Crow River, about 3.6 km (2.25 miles) below mouth of Johnson Creek, Yukon Territory (67°46'N, 139°55'W) was collected by O.L. Hughes in June, 1968; submitted by O.L. Hughes.

GSC-1173. Johnson Creek (I)  
 > 41 000

Wood (HH 68-7-5a (A); 8 g dry weight; *Picea* or *Larix*; identified by R.J. Mott (unpublished GSC Wood Report PL-69-17)) was treated with hot base, hot acid, and water rinses. The age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 1.00.

GSC-1174. Johnson Creek (II)

>41 000

Wood (HH 68-7-5a (B); 9.5 g dry weight; *Picea* or *Larix*; identified by R.J. Mott (unpublished GSC Wood Report PL-69-17)) was treated with hot base, hot acid, and water rinses. The age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 1.00.

GSC-1192 HP. Johnson Creek (III)

>52 000

Wood (HH 68-7-1a; 130 g dry weight) was treated with hot base, hot acid, and water rinses. The age estimate is based on one 1-day and one 3-day count in the 5 L counter with a mixing ratio of 1.00.

Comment (O.L. Hughes): At the site (designated 'Locality 8' by C.R. Harington), a terrace of Holocene age is underlain (from river level up) by 1.8 m of iron-cemented red-brown sand with interbeds of clay containing wood (GSC-1192 HP), 0.9 m of cryoturbated gravel, 4.9 m of gravel of which the uppermost 1.0 m is cryoturbated, 4.0 m of gravel with discontinuous organic layers throughout (GSC-1173, -1174, from near base) and 1.2 m of organic silt.

Old Crow River was cut down to its present level by 10.7 ka (see comment by O.L. Hughes for GSC-1166, -1167, Lowdon and Blake, 1979, p. 31) and low terraces along the river are latest Wisconsinan and Holocene age. The sediments underlying the terraces may be close in age to the terrace surface, or may be much older sediments into which the terrace has been cut. The sediments from which present samples were collected appear to be older sediments which predate downcutting of Old Crow River and formation of the terrace. There is some possibility, however, that the sediments are much younger and that the wood has been recycled from older deposits.

GSC-1589. Old Crow River

>42 000

Wood and organic detritus (sample HH-69-27-3A; CRH-88; *Picea* or *Larix*; identified by R.J. Mott (unpublished GSC Wood Report No. 71-49)) from east bank of Old Crow River, Old Crow Basin, Yukon Territory (68°6'N, 139°50'W) were enclosed in silty sand, below upper clay. The sample was collected by O.L. Hughes on June 8, 1970; submitted by O.L. Hughes.

The sample (10.4 g dry weight) was treated with hot base, hot acid, and distilled water rinses. The age estimate is based on three 1-day counts in the 5 L counter with a mixing ratio of 1.00.

GSC-2304. Timber Creek

>43 000

Wood (sample HH75-29-2 (3.06-3.18 m); *Salix*; identified by L.D. Farley-Gill (unpublished GSC Wood Report No. 76-11)) from east bank of Timber Creek, about 1.6 km east and south of Kikavick Ridge, Yukon Territory (68°24'N, 139°44'W), at an elevation of about 290 m, was enclosed in silt. The sample was collected by O.L. Hughes and J. Cinq-Mars on July 1, 1975; submitted by O.L. Hughes.

The sample (11.1 g dry weight) was treated with hot acid and distilled water rinses (base treatment omitted). The age estimate is based on one 3-day count in the 5 L counter with a mixing ratio of 1.00.

Comment (O.L. Hughes): Sample is from an exposure cut by Timber Creek into the lower margin of an extensive pediment surface on the east side of Old Crow basin (Hughes, 1972, Map 1319A). Silt 1.4 m thick containing organic layers is underlain by 2.4 m (exposed) of distinctly stratified fluvial gravel and overlain by 5.2 m of gravel without discernible stratification and presumed to be pediment gravel.

The date indicates that the pediment was formed more than 43 ka ago. Pediment formation may have been essentially complete by the end of the Tertiary.

GSC-2988. Porcupine River

uncorrected 6260 ± 60

Basal peat, mainly sedge (>80 mesh sample of 234 HH-3b; unpublished Fossil Arthropod Report No. 79-6 by J.V. Matthews, Jr.) from high terrace on south side the Porcupine River, about 17 km upstream from Yukon-Alaska boundary, Yukon Territory (66°27'N, 140°39'W), at an elevation of 310 m, was under 0.6 m of fibrous peat and above dark grey silt (0.2 m) and gravel (3.7 m). The sample was collected by O.L. Hughes in August, 1962; submitted by O.L. Hughes.

The sample (31.0 g dry weight) was treated with hot base, hot acid, and distilled water rinses. The age estimate is based on one 3-day count in the 5 L counter with a mixing ratio of 1.00.

Comment (O.L. Hughes): A bedrock terrace about 65 m above river level is overlain by 3.5 m of gravel and 2 m of peat and organic silt. The date is minimum for deposition of the gravel.

GSC-2889. 'King Edward Ridge' 6890 ± 110

δ<sup>13</sup>C = -29.0‰

Lake sediment, mud (KEN 1; 95.5-105.5 cm) from 'King Edward Ridge Lake' (north) 41 km northwest



of Old Crow, Yukon Territory (67°55'N, 140°20'W), at an elevation of 300 m, was collected by L.C. Cwynar and J.C. Ritchie on July 1, 1977; submitted by L.C. Cwynar.

The sample (42.7 g dry weight) was treated with hot acid and distilled water rinses (base treatment omitted). The age estimate is based on one 3-day count in the 2 L counter with a mixing ratio of 1.92.

Uncorrected age, 6960 ± 110.

Comment (L.C. Cwynar): This sample dates the formation of a thermokarst lake; dates a minimum in spruce, birch, and alder in the southern Old Crow Flats region.

GSC-3053. Bluefish Cave  
uncorrected 15 500 ± 130

Bone, right scapula (sample MgVo-2/D6-M-4; Bluefish Cave 2; *Mammoth* (cf. *Mammuthus*)) from excavation pit D6 in Bluefish Cave II, 54 km southwest of Old Crow, Yukon Territory (67°8'N, 140°47'W), at an elevation of about 600 m, was enclosed in loess and cryo-clasts; overlain by thick, organic-rich cryo-clastic rubble. The sample was collected by J. Cinq-Mars in August, 1979; submitted by J. Cinq-Mars.

The sample (1331 g dry weight) was treated with 3N HCl, 0.1N NaOH, and distilled water rinses. The age estimate is based on one 3-day count in the 5 L counter with a mixing ratio of 1.00.

#### Northwest Territories (Mainland)

GSC-2152. Migod Site  
uncorrected 5480 ± 120

Charcoal (sample NMC-791 (Level 5, 8N4E); *Salix*; identified by R.J. Mott (unpublished GSC Wood Report No. 75-22)) from Migod Site (KkLn-4), north end, east bank of Grant Lake, Dubawnt River, Northwest Territories (63°43'42"N, 100°26'40"W), at an elevation of 200 m, was enclosed in sand. The sample was collected by P. Kay on July 25, 1974; submitted by B. Gordon.

The sample (3 g dry weight) was treated with cold base, hot acid, and water rinses. The age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 2.72.

Comment (B. Gordon): The date provides an estimate of final melting of Keewatin Ice Divide.

GSC-1781. Ennadai Lake  
uncorrected 4690 ± 140

Peat moss (sample Ennadai 1972 (287-290 cm); unpublished GSC Bryological Report No. 201) from near the north end (east side) of Ennadai Lake, District of Keewatin, Northwest Territories (61°14'40"N, 100°57'0"W), at an elevation of about 311 m, was enclosed in sand (below), peat (above). The sample was collected by H. Nichols and R.N. Starling on August 12, 1972; submitted by H. Nichols.

The sample (19.0 g dry weight) was treated with hot base, hot acid, and distilled water rinses. The age estimate is based on two 1-day counts in the 5 L counter with a mixing ratio of 1.00.

GSC-1840. Thompson Landing  
uncorrected 6170 ± 130

Wood (sample Thompson Landing; *Picea*; identified by L.D. Wilson (unpublished GSC Wood Report No. 73-1)) from Thompson Landing, 20 km north of Great Slave Lake, District of Mackenzie, Northwest Territories (63°4'N, 110°47' 30"W), at an elevation of 200 ± 30 m, was enclosed in peat. The sample was collected by H. Nichols on July 10, 1971; submitted by H. Nichols.

The sample (3.2 g dry weight) was treated with hot base, hot acid, and distilled water rinses. The age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 1.85.

GSC-1783. Port Radium (I)  
uncorrected 5600 ± 140

Fibrous and compact peat (sample Port Radium "A"; unpublished GSC Bryological Report No. 198) from about 7 km east along track from Port Radium to airstrip, District of Mackenzie, Northwest Territories (66°6'N, 117°58'W), at an elevation of approximately 244 m, was enclosed in sand (below), and peat (above). The sample was collected by H. Nichols on June 28, 1971; submitted by H. Nichols.

The sample (22.0 g dry weight) was treated with hot base, hot acid, and distilled water rinses. The age estimate is based on one 2-day count in the 5 L counter with a mixing ratio of 1.00.

GSC-1839. Port Radium (II)  
uncorrected 1560 ± 70

*Sphagnum* peat with oxidized peat (sample Port Radium "C"; *Sphagnum*; identified by H. Nichols) from 0.5 km east along road from Port Radium, above adit of silver mine, District of Mackenzie, Northwest Territories (66°5'N, 118°1'W), at an elevation of

213 m, was enclosed in *sphagnum* peat. The sample was collected by H. Nichols on July 1, 1971; submitted by H. Nichols.

The sample (9.9 g dry weight) was treated with hot base, hot acid, and distilled water rinses. The age estimate is based on one 3-day count in the 5 L counter with a mixing ratio of 1.00.

GSC-2396.           Horn Plateau  
                          uncorrected           8920  $\pm$  110

Organic peat (sample AJC-72-14-4; *Ledum*, *Carex*, *Cladonia*, *Sphagnum*; identified by N.W. Rutter) from Horn Plateau near Mustard Lake, District of Mackenzie, Northwest Territories (61°57'N, 120°6'W), at an elevation of 610 m, was enclosed in organic peat. The sample was collected by A.J. Cooper on June 28, 1972; submitted by N.W. Rutter.

The sample (11.25 g dry weight) was treated with hot base, hot acid, and distilled water rinses. The age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 1.00.

GSC-1841.           Fort Simpson  
                          uncorrected           5250  $\pm$  70

Peat (sample AJC-72-10-4; unpublished GSC Bryological Report No. 225; and unpublished GSC Wood Report No. 73-4) from 29 km (18 miles) northeast of Fort Simpson, District of Mackenzie, Northwest Territories (62°4'N, 121°5'W), at an elevation of approximately 260 m, was enclosed in organic peat. The sample was collected by A.J. Cooper on June 24, 1972; submitted by N.W. Rutter.

The sample (17.5 g dry weight) was treated with hot base, hot acid, and distilled water rinses. The age estimate is based on two 1-day counts in the 5 L counter with a mixing ratio of 1.00.

GSC-1848.           Bulmer Lake  
                          uncorrected           5430  $\pm$  60

Peat (sample AJC-72-12-3; unpublished GSC Bryological Report No. 229) from 32 km (20 miles) south-southwest of Bulmer Lake, District of Mackenzie, Northwest Territories (62°29'N, 121°7'W), at an elevation of about 260 m, was enclosed in organic peat. The sample was collected by A.J. Cooper on June 25, 1972; submitted by N.W. Rutter.

The sample (31.0 g dry weight) was treated with hot base, hot acid, and distilled water rinses. The age estimate is based on one 3-day count in the 5 L counter with a mixing ratio of 1.00.

GSC-1665.           Fort Simpson  
                          uncorrected           8200  $\pm$  140

Wood (sample RR-71-18; *Picea*; identified by L.D. Wilson (unpublished GSC Wood Report No. 71-75)) from gravel pit, 5.3 km south-southeast of Fort Simpson, 1.6 km east of Mackenzie Highway, 60 m west of Mackenzie River, Northwest Territories (61°49'N, 121°18'W), at an elevation of about 122 m, was enclosed in cobbly gravel. The sample was collected by G. Minning and R.N.W. DiLabio in August, 1971; submitted by N.W. Rutter and G. Minning.

The sample (12.0 g dry weight) was treated with hot base, hot acid, and distilled water rinses. The age estimate is based on one 3-day count in the 5 L counter with a mixing ratio of 1.00.

GSC-1837.           Sibbeston Lake / Martin Hills  
                          uncorrected           8280  $\pm$  90

Peat (sample AJC-72-6-10; unpublished GSC Bryological Report No. 224) from 25.5 km (16 miles) northeast of Sibbeston Lake (Martin Hills), District of Mackenzie, Northwest Territories (61°50'N, 122°12'W), at an elevation of about 520 m, was enclosed in organic peat. The sample was collected by A.J. Cooper on June 18, 1972; submitted by N.W. Rutter.

The sample (10.5 g dry weight) was treated with hot base, hot acid, and distilled water rinses. The age estimate is based on one 3-day count in the 5 L counter with a mixing ratio of 1.00.

GSC-2254.           Martin Hills  
                          uncorrected           7960  $\pm$  90

Basal peat (sample RR-4X-73; 185.4-200.7 cm) from immediately northwest of small circular lake on summit of Martin Hills, District of Mackenzie, Northwest Territories (61°48'N, 122°13'W), was enclosed in peat with frozen silt below. The sample was collected by W. Savigny on June 15, 1973; submitted by N.W. Rutter.

The sample (22.5 g dry weight) was treated with hot acid and distilled water rinses (base treatment omitted). The age estimate is based on two 1-day counts in the 5 L counter with a mixing ratio of 1.00.

GSC-2289.           Sibbeston Lake  
                          uncorrected           8260  $\pm$  80

Basal peat (sample RR-12X-73; 2.84-2.92 m) from 13 km east of Sibbeston Lake, District of Mackenzie, Northwest Territories (61°45'N, 122°31'W), was enclosed in peat above till. The sample was collected

by W. Savigny on June 16, 1973; submitted by N.W. Rutter.

The sample (12.7 g dry weight) was treated with cold base (5 min.), hot acid, and distilled water rinses. The age estimate is based on two 1-day counts in the 5 L counter with a mixing ratio of 1.00.

#### Ochre River series

A series of samples from Ochre River, 1.6 km east of the Franklin Mountains and 33.5 km northeast of Wrigley, Northwest Territories (63°30'N, 123°12'W), at an elevation of  $260 \pm 15$  m, was collected by A.N. Boydell on July 12, 1972; submitted by N.W. Rutter.

GSC-1747. Ochre River (I)  
uncorrected  $4470 \pm 140$

Wood (branch) (ANB-72-70; 11.6 g dry weight; *Picea*; identified by L.D. Wilson (unpublished GSC Wood Report No. 72-32)) was treated with hot base, hot acid, and distilled water rinses. The age estimate is based on two 1-day counts in the 5 L counter with a mixing ratio of 1.00.

GSC-1769. Ochre River (II)  
uncorrected  $4450 \pm 150$

Wood and organic material (ANB-72-68; 4.7 g dry weight; *Picea*; identified by R.J. Mott (unpublished GSC Wood Report No. 72-36)) was treated with hot base, hot acid, and distilled water rinses. The age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 1.19.

GSC-1750. Wrigley River  
uncorrected  $5360 \pm 140$

Wood (sample RR-72-12; *Salix*; identified by R.J. Mott (unpublished GSC Wood Report No. 72-31)) from 13 km west of Wrigley Airport on Wrigley River, District of Mackenzie, Northwest Territories (63°13'N, 123°40' 10"W), at an elevation of 122 m, was enclosed in sand. The sample was collected by N.W. Rutter on July 3, 1972; submitted by N.W. Rutter.

The sample (10.7 g dry weight) was treated with hot base, hot acid, and distilled water rinses. The age estimate is based on one 3-day count in the 5 L counter with a mixing ratio of 1.00.

GSC-717. Fisherman Lake  
uncorrected  $4900 \pm 140$

Wood, charcoal (sample HH66 FL 3) from about 365 m west along seismic line from northwest end Fisherman Lake, District of Mackenzie, Northwest

Territories (60°20'N, 123°45'W), about 65 m above the lake, was enclosed in silty clay. The sample was collected by O.L. Hughes on July 28, 1966; submitted by O.L. Hughes.

The sample (130 g dry weight) was treated with hot acid leach and water rinses (base treatment omitted). The age estimate is based on one 3-day count in the 2 L counter with a mixing ratio of 1.00.

Comment (O.L. Hughes): The date is minimum for drainage of a glacial lake that was impounded in the area by the Laurentide ice sheet or by a large outlet glacier of the Cordilleran Ice Sheet that was merged with the Laurentide Ice Sheet.

GSC-2267. Johnson River  
uncorrected  $5490 \pm 80$

Basal silty peat (sample RR-10X-73; 1.33-1.46 m) from 13 km east of Johnson River, District of Mackenzie, Northwest Territories (63°24' 30"N, 124°7'W), was enclosed in peat above a mineral soil. The sample was collected by W. Savigny on June 22, 1973; submitted by N.W. Rutter.

The sample (24.3 g dry weight) was treated with hot acid and distilled water rinses (base treatment omitted). The age estimate is based on two 1-day counts in the 5 L counter with a mixing ratio of 1.00.

#### Dahadinni River series

A series of samples from the west side of Mackenzie River, near Dahadinni River, Northwest Territories (63°30'45"N, 124°17'30"W) was collected by W. Savigny on June 21, 1973; submitted by N.W. Rutter.

GSC-2255. Dahadinni River (I)  
uncorrected  $8300 \pm 90$

Peat (RR-6X-73; 16.0 g dry weight) was treated with hot acid and distilled water rinses. The age estimate is based on two 1-day counts in the 5 L counter with a mixing ratio of 1.00.

GSC-2363. Dahadinni River (II)  
uncorrected  $3460 \pm 50$

Peat (RR-5X-73; 10.9 g dry weight) was treated with hot base, hot acid, and distilled water rinses. The age estimate is based on one 3-day count in the 5 L counter with a mixing ratio of 1.07.

GSC-1788. Wrigley  
uncorrected  $3660 \pm 130$

Wood (sample RR-72-22; *Picea*; identified by L.D. Wilson (unpublished GSC Wood Report No. 72-35))

from 49.8 km northwest of Wrigley, District of Mackenzie, Northwest Territories (63°25'N, 124°25'W), at an elevation of about 300 m, was enclosed in sand. The sample was collected by N.W. Rutter on July 26, 1972; submitted by N.W. Rutter.

The sample (11.3 g dry weight) was treated with hot base, hot acid, and distilled water rinses. The age estimate is based on two 1-day counts in the 5 L counter with a mixing ratio of 1.00.

GSC-2488. Fort Norman  
uncorrected 2670 ± 130

Wood, twigs with bark (sample FN-3-4-2; *Abies*, *Betula*, *Alnus*; identified by R.J. Mott (unpublished GSC Wood Report No. 77-20)) from 6.3 km northeast of Fort Norman, about 8 km upstream on Great Bear River from Mackenzie confluence, District of Mackenzie, Northwest Territories (64°56'35"N, 125°29'45"W), at an elevation of about 68 m, was enclosed in sand (sieved prior to submitting). The sample was collected by W. Savigny on July 4, 1975; submitted by O.L. Hughes.

The sample (3.0 g dry weight) was treated with hot base, hot acid, and distilled water rinses. The age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 2.33.

#### Kelly Lake series

A series of samples from 10 km northeast of Kelly Lake, District of Mackenzie, Northwest Territories (65°35'N, 126°19'30"W) was collected by W. Savigny on June 26, 1973; submitted by N.W. Rutter.

GSC-2379. Kelly Lake (I)  
uncorrected 9600 ± 80

Peat (RR-13X-73; 38.5 g dry weight) was treated with hot base, hot acid, and distilled water rinses. The age estimate is based on one 3-day counts in the 5 L counter with a mixing ratio of 1.00.

GSC-2320. Kelly Lake (II)  
uncorrected 9570 ± 110

Peat (RR-14X-73; 14.3 g dry weight) was treated with hot base, hot acid, and distilled water rinses. The age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 1.00.

GSC-1618. Little Bear River  
>47 000

Wood (sample HH-70-7(Wood); *Picea* or *Larix*; identified by R.J. Mott (unpublished GSC Wood

Report No. 71-52)) from southwest side of Little Bear River, Mackenzie Mountains, District of Mackenzie, Northwest Territories (64°27.5'N, 126°42.5'W), was enclosed in the base of an organic sequence with till above and below. The sample was collected by O.L. Hughes on July 16, 1970; submitted by O.L. Hughes.

The sample (40.0 g dry weight) was treated with hot base, hot acid, and distilled water rinses. The age estimate is based on one 4-day count in the 5 L counter with a mixing ratio of 1.00.

Comment (O.L. Hughes): The sample was collected from the base of a lens of organic silt and peat about 2.5 m thick. The organic lens is underlain by four montane tills, each with a paleosol, and is overlain by a montane till with a paleosol and glaciofluvial boulder gravel of Laurentide origin. The regional and stratigraphic setting suggests that the dated organic lens is of Sangamon age or older.

#### Horton River series

A series of samples from left bank of the Horton River, District of Mackenzie, Northwest Territories (69°46.7'N, 126°51.8'W), at an elevation of 20 m, was collected by J.R. Mackay on June 29, 1982; submitted by W.H. Mathews.

GSC-3563. Horton River (I) >42 000  
 $\delta^{13}\text{C} = -23.7\text{‰}$

Wood (MX82/6/29-1; 11.6 g dry weight; *Picea*; identified by R.J. Mott (unpublished GSC Wood Report No. 82-51)) was treated with hot base, hot acid (non-calcareous) and distilled water rinses. The age estimate is based on one 3-day count in the 5 L counter with a mixing ratio of 1.00.

GSC-3590. Horton River (II) >38 000  
 $\delta^{13}\text{C} = -25.4\text{‰}$

Wood (MX82/6/29-2; 11.3 g dry weight; *Picea*; identified by R.J. Mott (unpublished GSC Wood Report No. 83-8)) was treated with hot base, hot acid (noncalcareous) and water rinses. The age estimate is based on one 3-day count in the 5 L counter with a mixing ratio of 1.00.

Comment (W.H. Mathews): GSC-3590 and -3563 are separate wood fragments from a terrace gravel deposit, with its top surface about 10 m above the present surface of the Horton River. These and other dates (Mathews et al., in press) indicate the wood, and presumably also the terrace gravels, are at or beyond the limit of radiocarbon dating.

### Norman Wells series

A series of borehole samples from southwest of Norman Wells, District of Mackenzie, Northwest Territories (65°7'30"N, 127°7'W), with sand and silt below, was collected by W. Savigny in June 27, 1973; submitted by N.W. Rutter.

GSC-2351. Norman Wells (I)  
uncorrected 4200 ± 70

Peat (RR-1X-73 (57.2-67.3 cm); 13.0 g dry weight) was treated with hot base, hot acid, and distilled water. The age estimate is based on two 1-day counts in the 5 L counter with a mixing ratio of 1.00.

GSC-2327. Norman Wells (II)  
uncorrected 6010 ± 90

Basal peat (RR-2X-73 (113.7-123.2 cm); 28.8 g dry weight) was treated with hot base, hot acid, and distilled water. The age estimate is based on two 1-day counts in the 5 L counter with a mixing ratio of 1.00.

An additional sample from 24 km southwest of Norman Wells, (65°6'N, 127°5'30"W), with silt below, was collected by W. Savigny on June 24, 1973.

GSC-2264. Norman Wells (III)  
uncorrected 6310 ± 80

Basal peat (silty) (RR-8X-73 (1.30-1.40 cm); 98.2 g dry weight) was treated with hot acid and distilled water rinses. The age estimate is based on two 1-day counts in the 5 L counter with a mixing ratio of 1.00.

GSC-2550. Malloch Hill  
uncorrected 2300 ± 70

Organic lake peat (sample TCH-76-1) from 29 km (18 miles) north of Malloch Hill on Cape Bathurst, District of Mackenzie, Northwest Territories (70°14'N, 127°10'W), at an elevation of 110 m, was enclosed in peat with mineral soil above. The sample was collected by T.C. Hutchinson in August, 1976; submitted by M. Havas.

The sample (30.6 g dry weight) was treated with hot base, hot acid, and distilled water rinses. The age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 1.42.

GSC-2765. Iroquois River (I)  
>42 000

Wood (sample HH78-3-3; *Picea*; identified by R.J. Mott) from right bank of an unnamed tributary to the Iroquois River, District of Mackenzie,

Northwest Territories (67°56'N, 129°42'W), at an elevation of approximately 91 m, was enclosed in sand. The sample was collected by O.L. Hughes on July 17, 1978; submitted by O.L. Hughes.

The sample (8.3 g dry weight) was treated with hot base, hot acid, and distilled water rinses. The age estimate is based on one 3-day count in the 5 L counter with a mixing ratio of 1.00.

Comment (O.L. Hughes): The wood, a single rounded piece, was derived from glaciofluvial gravel associated with the Late Wisconsinan Tutsieta Lake phase of the Laurentide Ice Sheet in the Mackenzie Valley, which culminated about 13 ka ago (Hughes, 1987). The wood was probably recycled from older Quaternary organic deposits known to exist in the region.

GSC-2266. Iroquois River (II)  
>39 000

Wood (sample HH-WS73-48(A); *Picea*; identified by L.D. Farley-Gill (unpublished GSC Wood Report No. 76-7)) from Iroquois River bank, 76 km northeast of the Thunder and Mackenzie River junction, 83 km north-northwest of Carcajou Lake, Northwest Territories (67°59.5'N, 129°43'W), at an elevation of about 137 m, was enclosed in coarse sand, fine gravel with detrital coal. The sample was collected by K.W. Savigny in July, 1973; submitted by O.L. Hughes.

The sample (11.2 g dry weight) was treated with hot base, hot acid, and distilled water rinses. The age estimate is based on two 1-day counts in the 5 L counter with a mixing ratio of 1.00.

Comment (O.L. Hughes): The sample was collected 4.5 m below the surface level of a terrace which is thought to be of glaciofluvial origin and related to the Late Wisconsinan Tutsieta Lake phase of the Laurentide Ice Sheet in Mackenzie River Valley. The Tutsieta Lake phase culminated about 13 ka ago (Hughes, 1987). Thus the wood was probably recycled from older Quaternary organic deposits known to occur in the area.

### Reindeer Lake series

A series of samples from Reindeer Lake, on the south shore of the Eskimo Lakes, 45 km southeast of Tuktoyaktuk, Northwest Territories (69°7'5"N, 132°17'W), at an elevation of 35.0 m, was collected by R.W. Spear and J.C. Ritchie on April 28, 1982; submitted by R.W. Spear and J.C. Ritchie.

GSC-3522. Reindeer Lake (I) 3020 ± 60  
δ<sup>13</sup>C = -26.5‰.

Lake sediment, gyttja (RL-55 (50-60 cm); 30.0 g dry weight) was treated with hot acid (non-calcareous) and distilled water rinses (base treatment omitted). The age estimate is based on two 1-day counts in the 5 L counter with a mixing ratio of 1.00.

Uncorrected age, 3050 ± 60.

GSC-3537. Reindeer Lake (II) 5670 ± 70  
δ<sup>13</sup>C = -24.6‰.

Lake sediment, mud (RL-97 (92-102 cm); 28.1 g dry weight) was treated with hot acid (non-calcareous) and distilled water rinses (base treatment omitted). The age estimate is based on two 1-day counts in the 5 L counter with a mixing ratio of 1.00.

Uncorrected age, 5660 ± 70.

GSC-3516. Reindeer Lake (III) 6570 ± 70  
δ<sup>13</sup>C = -25.2‰.

Lake sediment, gyttja with some marl (RL-126 (121-131 cm); 35.2 g dry weight) was treated with hot acid (moderately calcareous) and distilled water rinses (base treatment omitted). The age estimate is based on one 3-day count in the 5 L counter with a mixing ratio of 1.00.

Uncorrected age, 6570 ± 70.

GSC-3488. Reindeer Lake (IV) 13 500 ± 190  
δ<sup>13</sup>C = -31.3‰.

Lake sediment, inorganic gyttja (RL-195 (190-200 cm); 198.4 g wet weight) was treated with hot acid (strongly calcareous) and distilled water rinses. The age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 1.00.

Uncorrected age, 13 600 ± 190.

GSC-3483. Reindeer Lake (V) 14 600 ± 200  
δ<sup>13</sup>C = -27.3‰.

Lake sediment, organic silt (RL-231 (224-238 cm); 344.0 g dry weight) was treated with hot acid (strongly calcareous) and distilled water rinses (base treatment omitted). The age estimate is based on one 3-day count in the 2 L counter with a mixing ratio of 1.00.

Uncorrected age, 14 700 ± 200.

Comment (R.W. Spear): Sedimentation began at Reindeer Lake roughly 15 ka ago, giving this site the most complete pollen record in the northern Mackenzie delta. Prior to 13 ka herb tundra dominated the landscape. Dwarf birch tundra

became established approximately 12 ka. Populations of juniper and poplar occurred locally prior to the arrival in the region of spruce. Spruce populations expanded rapidly 9 ka ago. By the late Holocene, pollen influx indicated that only scattered outliers of spruce were found locally around Reindeer Lake. Treeline had shifted tens of kilometers southward.

Also cf. Mayday Lake series, and Bluffer's Pingo series.

#### Bluffer's Pingo series

A series of samples from Bluffer's Pingo, 10 km southwest of Hutchinson Bay, Tuktoyaktuk Peninsula, District of Mackenzie, Northwest Territories (69°37'N, 132°20'W), at an elevation of 8 m, was collected by R. Spear and J. Kennis on August 7, 1981; submitted by R. Spear and J. Ritchie.

GSC-3465. Bluffer's Pingo (I) 2040 ± 60  
δ<sup>13</sup>C = -27.4‰.

Lake sediment, mud (BLP-22.5 (20-25 cm); 230.3 g dry weight) was treated with hot acid (slightly calcareous) and distilled water rinses (base treatment omitted). The age estimate is based on two 1-day counts in the 5 L counter with a mixing ratio of 1.00.

Uncorrected age, 2080 ± 60.

GSC-3453. Bluffer's Pingo (II) 7430 ± 80  
δ<sup>13</sup>C = -25.1‰.

Lake sediment, mud (BLP-127.5 (125-130 cm); 368.2 g dry weight) was treated with hot acid (slightly calcareous) and distilled water rinses (base treatment omitted). The age estimate is based on two 1-day counts in the 5 L counter with a mixing ratio of 1.00.

Uncorrected age, 7440 ± 80.

GSC-3446. Bluffer's Pingo (III) 9540 ± 110  
δ<sup>13</sup>C = -24.6‰.

Lake sediment, mud (BLP - 195 (190-200 cm); 120.9 g dry weight) was treated with hot acid (slightly calcareous) and distilled water rinses (base treatment omitted). The age estimate is based on two 1-day counts in the 5 L counter with a mixing ratio of 1.00.

Uncorrected age, 9540 ± 110.

Comment (R.W. Spear): This series of dates provides radiometric age control for sediment accumulation in the lake which later formed Bluffer's Pingo. It allows pollen influx to be calculated, which

gives detailed data on the history of plant abundances on this region of the Tuktoyaktuk Peninsula. The oldest sediments with pollen of spruce and birch indicate that populations of these species grew in the region of the site. However, low influx of spruce pollen indicates that Bluffer's Pingo was probably north of treeline throughout the Holocene. Increase in alder pollen indicates that this species invaded the region at approximately 7 ka. Pollen data indicates that the modern vegetation zonation was established in the second half of the Holocene.

Also cf. Reindeer Lake series, and Mayday Lake series.

GSC-1865. "Many Beaver Lake"  
uncorrected 8910  $\pm$  140

Wood (sample HHP-72-34-1-wood; *Salix*; identified by L.D. Wilson (unpublished GSC Wood Report No. 73-5)) from 32 km south-southwest of "Many Beaver Lake", District of Mackenzie, Northwest Territories (65°42'N, 132°24'W), at an elevation of ca. 425 m, was enclosed in till (oxidized and compact). The sample was collected by J. Pilon on June 6, 1972; submitted by J. Pilon.

The sample (2.2 g dry weight) was treated with hot base, hot acid, and distilled water rinses. The age estimate is based on one 3-day count in the 2 L counter with a mixing ratio of 2.64.

Comment (J. Pilon): The wood sample came from a 15-20 cm thick transition zone between the till and the overlying gravels (from which wood was also recovered but not submitted for dating).

The date is minimal for the retreat of the Laurentide Ice Sheet following the culmination of Hungry Creek Glaciation about 30 ka ago. Several dates from Mackenzie Valley to the east suggest that the locality may have been deglaciated by 12 ka.

#### Inuvik area series

A series of samples from an unnamed lake (L1) 15 km southeast of Inuvik, Northwest Territories (68°16'N, 133°29'W), at an elevation of 100 m, was collected by J.C. Ritchie and L. Cwynar on May 2, 1976; submitted by J.C. Ritchie.

GSC-2380. Lake L1 (I) 2150  $\pm$  140  
 $\delta^{13}\text{C} = -31.1\text{‰}$ .

Lake sediment, mud (L1-1 (0-5 cm); 10.1 g dry weight) was treated with hot acid and distilled water rinses (base treatment omitted). The age estimate is

based on two 1-day counts in the 2 L counter with a mixing ratio of 5.08.

Uncorrected age, 2250  $\pm$  140.

Comment (J.C. Ritchie): The top 5 cm of lake sediment was estimated to be less than 100 years old. The  $^{14}\text{C}$  date would appear to indicate the presence of 'old' carbon.

GSC-2377. Lake L1 (II) 10 000  $\pm$  180  
 $\delta^{13}\text{C} = -28.7\text{‰}$ .

Lake sediment, mud (L1-2 (260-270 cm); 52.5 g dry weight) was treated with hot acid and distilled water rinses (base treatment omitted). The age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 2.61.

Uncorrected age, 10 100  $\pm$  180.

Comment (J.C. Ritchie): The sample was taken from 260-270 cm below the mud/water interface and coincident with the beginning of the *Alnus* increase. The estimated age was 4.5 ka to 5 ka.

GSC-2365. Lake L1 (III) 11 400  $\pm$  430  
 $\delta^{13}\text{C} = -29.0\text{‰}$ .

Lake sediment, mud (L1-3 (460-465 cm); 26.6 g dry weight) was treated with hot acid and distilled water rinses (base treatment omitted). The age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 7.58.

Uncorrected age, 11 400  $\pm$  430.

Comment (J.C. Ritchie): The sample was taken from 460-465 cm below the mud/water interface and coincident with continuous *Picea* pollen registration. The estimated age was 9 ka.

GSC-2360. Lake L1 (IV)  
uncorrected 10 500  $\pm$  120

Lake sediment, mud (L1-4 (540-550 cm); 46.5 g dry weight) was treated with hot acid and distilled water rinses (base treatment omitted). The age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 1.00.

Comment (J.C. Ritchie): The sample was taken from 540-550 cm below the mud/water interface in the zone of high *Betula* and NAP registration. The estimated age was 10 ka.

GSC-2352. Lake L1 (V) 12 300  $\pm$  120  
 $\delta^{13}\text{C} = -29.8\text{‰}$ .

Lake sediment, mud (L1-5 (595-605 cm); 39.2 g dry weight) was treated with hot acid and distilled water rinses (base treatment omitted). The age



estimate is based on one 3-day count in the 2 L counter with a mixing ratio of 1.37.

Uncorrected age,  $12\,400 \pm 120$ .

Comment (J.C. Ritchie): The sample was taken from 595-605 cm below the mud/water interface at the beginnings of pollen registration (*Betula* and *NAP*). The estimated age was 11.5 ka.

GSC-2342. Lake L1 (VI)  $7370 \pm 440$   
 $\delta^{13}\text{C} = -26.3\text{‰}$ .

Wood (Li-6 (470 cm); 0.8 g dry weight) was treated with hot base, hot acid, and distilled water rinses. The age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 13.0.

Uncorrected age,  $7400 \pm 440$ .

Comment (J.C. Ritchie): Wood sample (*Picea*) at 470 cm below the mud/water interface. The wood coincided with continuous registration of *Picea* pollen. The estimated age was 9 ka (see GSC-2365).

It was anticipated that this site would yield stratigraphy and chronology similar to those from "M Lake" (Ritchie, 1977). However, problems with 'old' carbon, a wood sample date markedly different from that of the sediment level it was found at and similar date from widely spaced samples, precluded such a comparison.

GSC-2724. Point Separation  $2900 \pm 60$   
 $\delta^{13}\text{C} = -24.4\text{‰}$ .

Wood, in situ stump (sample PSWH-63-1023a; *Picea*; identified by R.J. Mott (unpublished GSC Wood Report No. 78-38)) from right bank (east side) of Mackenzie River, 17.8 km north along river near Point Separation, District of Mackenzie, Northwest Territories ( $67^{\circ}46'\text{N}$ ,  $134^{\circ}10'\text{W}$ ), at an elevation of 30 m, was enclosed in river deposits. The sample was collected by M.L. Parker, W.E.S. Henoch and D.N. Outhet on August 12, 1977; submitted by M.L. Parker and W.E.S. Henoch.

The sample ( $\pm 1.6$  g dry weight) was treated with hot base, hot acid, and distilled water rinses. The age estimate is based on two 1-day counts in the 5 L counter with a mixing ratio of 1.00.

Uncorrected age,  $2890 \pm 60$ .

Comment (M.L. Parker): The date provides a fixed point for a floating tree ring chronology in the Mackenzie River region.

#### Mayday Lake series

A series of samples from Mayday Lake, northwest Richards Island, 50 km west of Tuktoyaktuk, Mackenzie Delta, Northwest Territories ( $69^{\circ}27'\text{N}$ ,  $134^{\circ}16'\text{W}$ ), at an elevation of 32.0 m, was collected by R.W. Spear and J.C. Ritchie on May 1, 1981; submitted by R.W. Spear and J.C. Ritchie.

GSC-3504. Mayday Lake (I)  $4600 \pm 90$   
 $\delta^{13}\text{C} = -27.6\text{‰}$ .

Lake sediment, organic silt (MDL-55 (50-60 cm); 73.0 g dry weight) was treated with hot acid (non-calcareous) and distilled water rinses (base treatment omitted). The age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 1.00.

Uncorrected age,  $4650 \pm 90$ .

GSC-3491. Mayday Lake (II)  $6310 \pm 100$   
 $\delta^{13}\text{C} = -27.6\text{‰}$ .

Lake sediment, organic silt (MDL-195 (190-200 cm); 88.2 g wet weight) was treated with hot acid (noncalcareous) and distilled water rinses (base treatment omitted). The age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 1.00.

Uncorrected age,  $6350 \pm 100$ .

GSC-3481. Mayday Lake (III)  
uncorrected  $8170 \pm 130$

Lake sediment, organic silt (MDL-287.5 (282-293 cm); 86.8 g dry weight) was treated with hot acid (noncalcareous) and distilled water rinses (base treatment omitted). The age estimate is based on two 1-day counts in the 5 L counter with a mixing ratio of 1.00.

GSC-3473. Mayday Lake (IV)  $9670 \pm 90$   
 $\delta^{13}\text{C} = -28.7\text{‰}$ .

Lake sediment, organic silt (MDL-320 (315-325 cm); 92.3 g wet weight) was treated with hot acid (slightly calcareous) and distilled water rinses (base treatment omitted). The age estimate is based on one 3-day count in the 5 L counter with a mixing ratio of 1.00.

Uncorrected age,  $9730 \pm 90$ .

GSC-3470. Mayday Lake (V)  $11\,100 \pm 100$   
 $\delta^{13}\text{C} = -28.5\text{‰}$ .

Lake sediment, silt (MDL-381 (375-387 cm); 142.2 g dry weight) was treated with hot acid (slightly calcareous) and distilled water rinses (base treatment omitted). The age estimate is based on two 1-day counts in the 5 L counter with a mixing ratio of 1.00.

Uncorrected age,  $11\,200 \pm 100$ .

Comment (R.W. Spear): The dates provide a minimum age for the formation of the lake and enable estimates of sediment accumulation rates (and pollen influx) to be calculated. The onset of sedimentation predates the arrival of spruce in the region. Dwarf birch shrub tundra dominated the landscape at 11 ka. Populations of spruce trees became established in the region at roughly 9.5 ka. However, low pollen influx of spruce at Mayday Lake indicates that spruce probably never grew locally. The pollen profile agrees with others in the region and indicates modern vegetation zonation became established in the Mackenzie Delta area after 4 ka.

Also cf. Reindeer Lake series and Bluffer's Pingo series.

GSC-3359. Rat River

$>43\,000$

Peat (organic detritus) (sample HH 62-107 2A-82) from river bluff along Rat River, 40 km northwest of Fort McPherson, District of Mackenzie, Northwest Territories (67°39'N, 135°29'W), at an elevation of 150 m, was enclosed in silt. The sample was collected by N.R. Catto on July 18, 1981; submitted by N.R. Catto.

The sample (15.3 g dry weight) was treated with hot base, hot acid (slightly calcareous), and distilled water rinses. The age estimate is based on one 5-day count in the 5 L counter with a mixing ratio of 1.00.

Comment (N.R. Catto): The sample is autochthonous (J.V. Matthews, personal communication, 1981), and therefore provides a maximum age for the exposure of the till.

#### Fort McPherson series

A series of samples from a river bluff 60 km northwest of Fort McPherson, District of Mackenzie, Northwest Territories (67°43'N, 135°51'W), at an elevation of about 220 m, was collected by O.L. Hughes, and N. Catto on July 26, 1981 and August 7, 1982; submitted by O.L. Hughes.

GSC-3813. Fort McPherson (I)  
uncorrected  $21\,200 \pm 240$

Organic detritus (HHC 81-3 (1982) 48.4 m; 64.0 g dry weight) was treated with cold base, hot acid (non-calcareous), and distilled water rinses. The age estimate is based on one 3-day count in the 5 L counter with a mixing ratio of 1.00.

GSC-3565. Fort McPherson (II)  
 $>42\,000$

Wood (HHC 81-3 82-1a; 11.5 g wet weight; *Picea*; identified by R.J. Mott, (unpublished GSC Wood Report No. 82-52)) was treated with hot base, hot acid (noncalcareous), and distilled water rinses. The age estimate is based on one 3-day count in the 5 L counter with a mixing ratio of 1.00.

Comment (N. Catto): This sample provides a maximum age for the deposition of the sand/silt couplet unit.

GSC-3371. Fort McPherson (III)  
uncorrected  $21\,300 \pm 270$

Organic detritus (Upper Rat River 3-33a; 15.0 g wet weight) was treated with hot base, hot acid (non-calcareous) and distilled water rinses. The age estimate is based on one 3-day count in the 2 L counter with a mixing ratio of 1.00.

Comment (N.R. Catto): A second sample of organic detritus, obtained from 4.3 m above sample GSC-3371 at this locality, has been  $^{14}\text{C}$  dated at  $21\,200 \pm 240$  BP (GSC-3813). A fragment of *Picea* wood, obtained from a gravel stratum associated with this sedimentary sequence, has also been  $^{14}\text{C}$  dated at  $>42\,000$  BP (GSC-3565). The degree of abrasion evident on the surface of this fragment indicates that the date does not accurately reflect the time of deposition.

The samples date the later lacustrine phase of sedimentation along Rat River valley, induced by the blockage of eastward drainage from McDougall Pass and the Old Crow Basin by Laurentide ice advancing from the east (Catto, 1986). Upper Rat River valley was therefore submerged by a glacially impounded lake at about 21.3-21.2 ka. The locality was not overridden by glacial ice subsequently, suggesting that the Late Wisconsinan maximum position in Rat River valley was located to the east of the all-time glacial maximum in McDougall Pass, in contrast to the situation in the Bonnet Plume Basin to the south.

Assemblages of plant macrofossils, arthropod remains, and palynomorphs from both dated strata

represent mixtures of floodplain, tundra, and fell-field communities.

GSC-3399.      Horn Lake  
                         uncorrected       $8280 \pm 110$

Peat (sample Horn Lake 2-4; *Empetrum*, *Andromeda*; identified by J.V. Matthews, Jr.) from river bluff along Rat River, 70 km northwest of Fort McPherson, District of Mackenzie, Northwest Territories (67°44'N, 136°3'W), at an elevation of 270 m, was enclosed in peat. The sample was collected by N.R. Catto on August 4, 1981; submitted by N.R. Catto.

The sample (290.0 g wet weight) was treated with hot base, hot acid (noncalcareous), and distilled water rinses. The age estimate is based on two 1-day counts in the 5 L counter with a mixing ratio of 1.00.

Comment (N. Catto): This sample dates the commencement of peat deposition and is a minimum age for the outwash gravels.

#### Northern Canada, Arctic Archipelago *Amund Ringnes Island*

GSC-2551.      Panarctic Amund       $9010 \pm 100$   
                         Central Dome       $\delta^{13}\text{C} = +1.0\%$

Marine shells (sample HCA 77 13/7-2C; *Hiatella arctica*; identified by D.A. Hodgson) from Panarctic Amund Central Dome well site, between Temperance Bay and Geologist Bay, Amund Ringnes Island, District of Franklin, Northwest Territories (78°19.5'N, 96°15'W), at an elevation of 60 m, were enclosed in silty clay, and granules and rock fragments. The sample was collected by D.A. Hodgson on July 13, 1977; submitted by D.A. Hodgson.

The sample (27.2 g dry weight) was treated with an acid leach to remove twenty per cent of the outer material. The age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 1.00.

Uncorrected age,  $9000 \pm 100$ .

GSC-2625.      Temperance Bay (I)  $8340 \pm 90$   
    $\delta^{13}\text{C} = +0.8\%$

Marine shells (sample HCA 77 17/7-2B; *Balanus balanus*; identified by W. Blake, Jr.) from 5 km south of head of Temperance Bay, southwest Amund Ringnes Island, District of Franklin, Northwest Territories (78°3'N, 96°46'W), at an elevation of about 20 m, were enclosed in silty clay. The sample was

collected by D.A. Hodgson on July 17, 1977; submitted by D.A. Hodgson.

The sample (39.9 g dry weight) was treated with an acid leach to remove ten per cent of the outer material. The age estimate is based on one 3-day count in the 5 L counter with a mixing ratio of 1.00.

Uncorrected age,  $8320 \pm 90$ .

GSC-2624.      Temperance Bay (II)  
                         uncorrected       $6900 \pm 100$

Organic material (sample HCA 77 10/7-1A; cf. unpublished GSC Palynological Report No. 78-2, and GSC Diatom Report No. 78-3) from 7 km from river mouth, and 10 km north of northwest extremity of Temperance Bay, western Amund Ringnes Island, District of Franklin, Northwest Territories (78°19.5'N, 97°45'W), at an elevation of 28 m, was enclosed in a sandy silt matrix. The sample was collected by D.A. Hodgson on July 10, 1977; submitted by D.A. Hodgson.

The sample (29.2 g dry weight) was treated with hot base, hot acid, and distilled water rinses. The age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 1.00.

#### *Axel Heiberg Island*

GSC-2385.      Expedition Fiord  
                         uncorrected       $280 \pm 100$

Wood (sample 14.4.2; *Salix*; identified by R.J. Mott (unpublished GSC Wood Report No. 76-60)) from Expedition Fiord area, Axel Heiberg Island, District of Franklin, Northwest Territories (79°25'N, 90°32'W), at an elevation of 189 m, was enclosed in sand with some clay and pebbles. The sample was collected by G. Nagel on July 20, 1975; submitted by G. Nagel.

The sample (2.7 g dry weight) was treated with hot base, hot acid, and distilled water rinses. The age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 3.42.

Comment (G. Nagel): The sample was collected in a gully on the lower part of a concave slope near the valley bottom. The organic layer (sample 14.4.2) is about 50 cm below the surface and between 10 and 15 cm above the permafrost table. The organic layer is covered by recent solifluction debris not older than  $280 \pm 100$  BP (uncorrected). On this part of the slope there is minimal fluvial activity, otherwise the solifluction debris and the organic layer would have been removed.

## *Baffin Island*

GSC-1087. Generator Lake  $3690 \pm 140$   
 $\delta^{13}\text{C} = -22.2\text{‰}$ .

Organic matter (sample BDA-68-C-5) from Baffin Island, District of Franklin, Northwest Territories ( $69^{\circ}44'\text{N}$ ,  $71^{\circ}32'\text{W}$ ), was enclosed in deltaic sands. The sample was collected by D.M. Barnett in August, 1968; submitted by D.M. Barnett.

The sample (15 g dry weight) was treated with hot acid, and water rinses (base treatment omitted). The age estimate is based on one 3-day count in the 2 L counter with a mixing ratio of 2.00.

Uncorrected age,  $3650 \pm 140$ .

Additional information is available in Barnett (1967).

GSC-1239. Generator Lake  $1270 \pm 180$   
(north side)  $\delta^{13}\text{C} = -23.2\text{‰}$ .

Detrital organic material (sample BDA-68-C-3) from north side of Generator Lake, Baffin Island, District of Franklin, Northwest Territories ( $69^{\circ}42'\text{N}$ ,  $71^{\circ}42'\text{W}$ ), about 3 m above the lake level, was enclosed in deltaic sands. The sample was collected by D.M. Barnett in 1968; submitted by D.M. Barnett.

The sample (8.8 g dry weight) was treated with hot acid, and water rinses (base treatment omitted). The age estimate is based on one 4-day count in the 2 L counter with a mixing ratio of 12.6.

Uncorrected age,  $1240 \pm 180$ .

Additional information is available in Barnett (1967).

### Generator Lake series (A)

A series of samples from Generator Lake, Baffin Island, District of Franklin, Northwest Territories ( $69^{\circ}42'\text{N}$ ,  $71^{\circ}43'\text{W}$ ) was collected by D.M. Barnett on August 10, 1969; submitted by D.M. Barnett. The samples were enclosed in deltaic sands.

GSC-1621. Generator Lake (A-I)  
uncorrected  $2240 \pm 390$

Detrital organic material (BDA-69-C-5 (2); 2.4 g dry weight; cf. unpublished GSC Bryological Report No. 138) was treated with hot acid and distilled water rinses (base treatment omitted). The age estimate is based on one 5-day count in the 2 L counter with a mixing ratio of 12.6.

GSC-1244. Generator Lake  $3730 \pm 250$   
(A-II)  $\delta^{13}\text{C} = -22.7\text{‰}$ .

Detrital organic material (BDA-69-C-5; 40 g dry weight) was treated with hot acid and water rinses

(base treatment omitted). The age estimate is based on one 3-day count in the 2 L counter with a mixing ratio of 7.63.

Uncorrected age,  $3690 \pm 250$ .

### Generator Lake series (B)

A series of samples from Generator Lake, Baffin Island, District of Franklin, Northwest Territories ( $69^{\circ}41'\text{N}$ ,  $71^{\circ}46'\text{W}$ ) was collected by D.M. Barnett in 1968; submitted by D.M. Barnett. All the samples were enclosed in deltaic sands.

GSC-1168. Generator Lake (B-I)  
uncorrected  $4600 \pm 290$

Detrital organic material (BDA-68-C-1; 7.2 g dry weight) was treated with hot acid and water rinses (base treatment omitted). The age estimate is based on one 3-day count in the 2 L counter with a mixing ratio of 13.7.

GSC-1177. Generator Lake  $1660 \pm 140$   
(B-II)  $\delta^{13}\text{C} = -19.2\text{‰}$ .

Detrital plant material (BDA-68-C-4; 20 g dry weight) was treated with hot acid and water rinses (base treatment omitted). The age estimate is based on one 3-day count in the 2 L counter with a mixing ratio of 3.11.

Uncorrected age,  $1560 \pm 140$ .

Additional samples were collected by D.M. Barnett in July and August 1969.

GSC-1276. Generator Lake  $3090 \pm 170$   
(B-III)  $\delta^{13}\text{C} = -24.1\text{‰}$ .

Detrital organic material (BDA-69-C-3; 10.3 g dry weight) was treated with hot acid and water rinses (base treatment omitted). The age estimate is based on one 3-day count in the 2 L counter with a mixing ratio of 4.86.

GSC-1304. Generator Lake  $2520 \pm 150$   
(B-IV)  $\delta^{13}\text{C} = -22.1\text{‰}$ .

Detrital organic material (BDA-69-C-1; 150 g dry weight) was treated with hot acid and water rinses (base treatment omitted). The age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 1.68.

Uncorrected age,  $2480 \pm 150$ .

GSC-1315. Generator Lake 2620 ± 150  
(B-V)  $\delta^{13}\text{C} = -23.8\text{‰}$ .

Detrital organic material (BDA-69-C-4; 85 g dry weight) was treated with hot acid and water rinses (base treatment omitted). The age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 2.19.

Uncorrected age, 2600 ± 150.

GSC-1325. Generator Lake 1530 ± 160  
(B-VI)  $\delta^{13}\text{C} = -21.7\text{‰}$ .

Detrital organic material (BDA-69-C-6; 25.5 g dry weight) was treated with hot acid and water rinses (base treatment omitted). The age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 3.17.

Uncorrected age, 1480 ± 160.

An additional sample was collected by D.L. Forbes on August 8, 1969; submitted by D.M. Barnett.

GSC-1622. Generator Lake (B-VII)  
uncorrected 2180 ± 240

Detrital organic material (BDA-69-C-6 (2); 8.8 g dry weight; cf. unpublished Bryological Report No. 137) was treated with hot acid and distilled water rinses (base treatment omitted). The age estimate is based on one 4-day count in the 2 L counter with a mixing ratio of 6.85.

GSC-1422. "Ramjet Lake" 160 ± 200  
 $\delta^{13}\text{C} = -27.0\text{‰}$ .

Woody twigs and roots (sample BDA-68-C-6; *Salix*; identified by R.J. Mott (unpublished Palynological Report No. 70-20)) from 2.5 km (1.5 mile) northwest of "Ramjet Lake", northwest corner of Barnes Ice Cap, Baffin Island, District of Franklin, Northwest Territories (69°58'N, 72°33'W), at an elevation of about 404 m, were enclosed in lake sediment. The sample was collected by D.M. Barnett in 1968; submitted by D.M. Barnett.

The sample (5.4 g dry weight) was treated with hot base, hot acid, and distilled water rinses. The age estimate is based on one 1-day count in the 1 L counter with a mixing ratio of 1.00.

Uncorrected age, 190 ± 200.

GSC-3318. Cape Hatt 9530 ± 180  
 $\delta^{13}\text{C} = +1.4\text{‰}$ .

Marine shells (sample 81KY 49; 81KY 69; *Mya truncata*, Linné; identified by W. Blake, Jr.) from

Cape Hatt, at northern end of Milne Inlet, Baffin Island, District of Franklin, Northwest Territories (72°27'0"N, 74°49'0"W), at an elevation of 74 m, were enclosed in coarse muddy gravel. The sample was collected by R.A. Klassen on July 14, 1981; submitted by R.A. Klassen.

The sample (11.2 g dry weight) was treated with an acid leach to remove twenty per cent of the outer material. The age estimate is based on one 3-day count in the 2 L counter with a mixing ratio of 2.45.

Uncorrected age, 9510 ± 180.

Comment (R.A. Klassen): Shells were collected at the proximal end of a large ice contact delta graded to a sea level of about 80 m a.s.l. The shells were largely intact including one paired set, and are thin with good preservation of ornamentation and internal lustre, as well as some periostracum cover. They are interpreted to be contemporaneous with enclosing sediments and to date not only Holocene marine limit but the portion of the northern margin of an outlet glacier of the Laurentide Ice Sheet in Milne Inlet (cf. GSC-3060 and -3062).

GSC-3060. Milne Inlet 7340 ± 70  
 $\delta^{13}\text{C} = +2.4\text{‰}$ .

Marine pelecypod shells (sample 79KY-1099; *Hiatella arctica*; identified by W. Blake, Jr.) from the mouth of Milne Inlet, 6.5 km south of Athole Point, northern Baffin Island, District of Franklin, Northwest Territories (72°27'30"N, 80°30'30"W), at an elevation of about 23 m, were enclosed in sandy silt. The sample was collected by R.B. Needham on July 28, 1979; submitted by R.A. Klassen.

The sample (36.4 g dry weight) was treated with an acid leach to remove ten per cent of the outer material. The age estimate is based on one 3-day count in the 5 L counter with a mixing ratio of 1.00.

Uncorrected age, 7300 ± 70.

Comment (R.A. Klassen): The shells were collected at about 23 m within foreset beds of a large deltaic complex, graded to about 70 m a.s.l. Their fragile, well preserved nature indicates that they are contemporaneous with enclosing sediments. The shells provide a minimum age of deglaciation and of Holocene marine submergence (cf. GSC-3318 and -3062).

#### *Banks Island*

##### Masik River

A sample from Masik River, Banks Island, District of Franklin, Northwest Territories was collected by J.G. Fyles in 1960; submitted by

J.G. Fyles. The peat sample (FG-60-17b (6 m) was treated by a variety of techniques prior to processing to test the efficacy of the techniques.

GSC-4 (1). Masik River  
uncorrected 10 100 ± 200

Peat (6.9 g dry weight) was treated with hot base on 40% of the sample, and hot acid on the complete sample. The age estimate is based on one 1-day plus one 3-day count in the 2 L counter with a mixing ratio of 1.00.

GSC-4 (2). Masik River (II)  
uncorrected 10 050 ± 140

The sample was treated with hot base and hot acid. The age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 1.00.

GSC-4 (3). Masik River(III)  
uncorrected 10 410 ± 150

The sample had no treatment prior to processing (combustion). The age estimate is based on three 1-day counts in the 2 L counter with a mixing ratio of 1.00.

#### Big River series

GSC-2658. Big River (I)  
uncorrected 2530 ± 250

Peat (sample DZ-77-9; cf. unpublished GSC Wood Report No. 78-4) from 126 km inland on the south side of Big River, Banks Island, District of Franklin, Northwest Territories (72°21'N, 122°16'W), at an elevation of about 90 m, was collected by T.J. Day on July 8, 1977; submitted by T.J. Day.

The sample (2.2 g dry weight) was treated with hot base, hot acid, and distilled water rinses. The age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 4.90.

GSC-2610. Big River (II)  
uncorrected 6520 ± 150

Peat (sample DZ-77-18; unpublished GSC Palynological Report No. 78-1) from 51 km inland on the north side of Big River, Banks Island, District of Franklin, Northwest Territories (72°29'N, 123°42'W), at an elevation of 45 m, was collected by T.J. Day on July 16, 1977; submitted by T.J. Day.

The sample (29.6 g dry weight) was treated with hot base, hot acid, and distilled water rinses. The age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 1.00.

GSC-2636. Big River (III)  
uncorrected 2510 ± 60

Peat (sample DZ-77-48) from about 46 km inland along the north side of Big River, Banks Island, District of Franklin, Northwest Territories (72°28'N, 123°53'W), at an elevation of 40 m, was collected by T.J. Day on July 24, 1977; submitted by T.J. Day.

The sample (62.5 g dry weight) was treated with hot base, hot acid, and distilled water rinses. The age estimate is based on two 1-day counts in the 5 L counter with a mixing ratio of 1.00.

GSC-2581. Big River (IV)  
uncorrected 3380 ± 50

Peat (sample DZ-77-35; cf. unpublished GSC Palynological Report No. 77-14) from 45 km inland along north side of Big River, directly opposite mouth of 'White Fox' River, Banks Island, District of Franklin, Northwest Territories (72°27'N, 123°54'W), at an elevation of 38 m, was collected by T.J. Day on July 7, 1977; submitted by T.J. Day.

The sample (46.6 g dry weight) was treated with hot base, hot acid, and distilled water rinses. The age estimate is based on one 3-day count in the 5 L counter with a mixing ratio of 1.00.

#### Kellett River series

A series of samples from upper Kellett River, southern Banks Island, District of Franklin, Northwest Territories (71°54'N, 123°10'W) was collected by H.M. French on July 2 and 3, 1976. Samples (I) and (II) were enclosed in cross-bedded, medium grained sand; submitted by H.M. French.

GSC-2717. Kellett River (I)  
uncorrected 1170 ± 60

Peat (02-2-76; 45.0 g dry weight) was treated with hot acid, and distilled water rinses (base treatment omitted). The age estimate is based on two 1-day counts in the 5 L counter with a mixing ratio of 1.00.

GSC-2395. Kellett River (II)  
uncorrected 3920 ± 80

Wood (02-1-76; 3.8 g dry weight; *Salix*; identified by L.D. Farley-Gill (unpublished GSC Wood Report No. 76-52)) was treated with hot base, hot acid, and distilled water rinses. The age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 1.48.

GSC-2397. Kellett River (III)  
uncorrected 2480 ± 50

Fine organic detritus in 'dryas' peat (03-2-76; 53.5 g dry weight) was treated with hot acid and distilled water rinses (base treatment omitted). The age estimate is based on one 3-day count in the 5 L counter with a mixing ratio of 1.00.

#### Sachs Harbour series

A series of organic samples was collected in the Sachs Harbour area on Banks Island, Northwest Territories during 1981, and submitted by P. Worsley

GSC-3448. Sachs Harbour (I)  
uncorrected 3970 ± 90

Detrital organic material (sample 4) from 35 km southwest of Sachs Harbour, Banks Island, District of Franklin, Northwest Territories (71°50'N, 124°26'W), at an elevation of about 4 m, was enclosed in sand. The sample was collected by I.D. Bryant on July 24, 1981.

The sample (93.4 g dry weight) was treated with hot base, hot acid (slightly calcareous), and distilled water. The age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 1.00.

GSC-3495. Sachs Harbour (II)  
uncorrected 8960 ± 110

Organic detritus (sample 3) from 13 km east-southeast of Sachs Harbour, Banks Island, District of Franklin, Northwest Territories (71°57'N, 124°54'W), at an elevation of about 2.0 m, was enclosed in sand. The sample was collected by P. Worsley on July 13, 1981.

The sample (22.1 g dry weight) was treated with hot base, hot acid (slightly calcareous), and distilled water rinses. The age estimate is based on one 4-day counts in the 2 L counter with a mixing ratio of 1.40.

GSC-3521. Sachs Harbour (III) 6030 ± 80  
 $\delta^{13}\text{C} = -28.8\text{‰}$ .

Fibrous organic material largely in situ (sample 1) from 4 km east Sachs Harbour, Banks Island, District of Franklin, Northwest Territories (71°59'N, 125°7'W), at an elevation of about 2 m, was enclosed in sand. The sample was collected by P. Worsley on August 7, 1981.

The sample (13.8 g dry weight) was treated with hot acid (noncalcareous) and distilled water rinses (base treatment omitted). The age estimate is based on one 3-day count in the 2 L counter with a mixing ratio of 1.00.

Uncorrected age, 6090 ± 80.

GSC-3369. Sachs Harbour (IV)  
uncorrected 9420 ± 400

Wood (sample 2; *Salix*; identified by R.J. Mott (unpublished GSC Wood Report No. 81-40)) from 5 km west of Sachs Harbour, Banks Island, District of Franklin, Northwest Territories (71°59'N, 125°24'W), at an elevation of 3.0 m, from fibrous moss, was enclosed in sand. The sample was collected by P. Worsley on August 8, 1981.

The sample (2.4 g dry weight) was treated with hot base, hot acid (noncalcareous), and distilled water. The age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 6.45.

GSC-2364. Sachs Harbour  
uncorrected 9490 ± 80

Wood (sample 4; *Salix*; identified by H.M. French) from Sachs Harbour, Banks Island, District of Franklin, Northwest Territories (71°57'N, 125°25'W), at an elevation of 2 m, was enclosed in silty clay. The sample was collected by H.M. French on July 27, 1974; submitted by H.M. French.

The sample (10.2 g dry weight) was treated with hot base, hot acid, and distilled water rinses. The age estimate is based on one 3-day count in the 5 L counter with a mixing ratio of 1.00.

#### Worth Point series

A series of samples from about 3.2 km south of Worth Point and Lennie Harbour, Banks Island, District of Franklin, Northwest Territories (72°14.5'N, 125°40.5'W), at elevations of 25 to 70 m, was collected by M. Kuc on July 18 and 19, 1969; samples submitted by M. Kuc.

GSC-2072 HP. Worth Point (I)  
> 52 000

Wood in woody, 'sphagnum' peat (Kuc-1969-tree 208 cm; 50.8 g dry weight; *Larix*; identified by R.J. Mott (unpublished GSC Wood Report No. 74-22)) was treated with hot base (1h), hot acid (1h), and distilled water rinses. The age estimate is based on one 3-day, one 2-day, and one 1-day count in the 5 L counter with a mixing ratio of 1.00.

GSC-1236 HP. Worth Point (II)  
> 53 000

Plant remains - roots, stems, twigs (Kuc - VI (6) - 69; 68 g dry weight; *Betula*; identified by M. Kuc)



were treated with hot base, hot acid, and water rinses. The age estimate is based on two 1-day and one 3-day counts in the 5 L counter with a mixing ratio of 1.00.

GSC-1293. Worth Point (III)  
 $> 43\ 000$

Organics, clay and roots (peat ?) (Kuc-69 (Level 2c/3); 110 g dry weight) were treated with hot acid and water rinses (base treatment omitted). The age estimate is based on one 3-day count in the 5 L counter with a mixing ratio of 1.00.

### *Bathurst Island*

#### Goodsir Inlet series

A series of samples from Bathurst Island, southwest of Goodsir Inlet, District of Franklin, Northwest Territories (75°40'N, 97°40'W), at an elevation of 61 m, was collected by C. Tarnocai on July 25 and 27, 1975; submitted by C. Tarnocai.

GSC-2326. Goodsir Inlet (I)  
 uncorrected  $5070 \pm 60$

Moderately decomposed fen peat (DB3-3; 11.4 g dry weight) was treated with hot base, hot acid, and distilled water rinses. The age estimate is based on one 3-day count in the 2 L counter with a mixing ratio of 1.00.

GSC-2355. Goodsir Inlet (II)  
 uncorrected  $5830 \pm 70$

Moderately decomposed moss peat (DB3-1; 15.9 g dry weight) was treated with hot base, hot acid, and distilled water rinses. The age estimate is based on two 1-day counts in the 5 L counter with a mixing ratio of 1.00.

GSC-2317. Goodsir Inlet (III)  
 uncorrected  $6160 \pm 90$

Moderately decomposed moss peat (DB3-2; 6.9 g dry weight) was treated with hot acid, and distilled water rinses (base treatment omitted). The age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 1.36.

Comment (C. Tarnocai): This set of samples was collected to aid in the determination of the rate of peat deposition in the High Arctic environment. Sample GSC-2326 was collected from 25 cm depth, GSC-2355 from 78 cm depth, and GSC-2317 from 130 cm depth.

As a result of the mislabeling of these samples in the field, the dates have been assigned to incorrect depths on the laboratory forms. The original incorrect information is as follows:

(GSC-2355) 25 cm  $5830 \pm 70$  years;  
 (GSC-2317) 78 cm  $6160 \pm 90$  years; and  
 (GSC-2326) 130 cm  $5070 \pm 60$  years.

Since this peat deposit resulted from natural deposition of plant materials and no visible contamination was observed, the dates should follow the sequence commonly found in other deposits in the area. The revised sequence of dates provides the commonly occurring rates of peat deposition for these time periods. This rate of deposition is greatest in the lower part of the deposit and gradually decreases to nearly zero at the surface.

This Bathurst Island peat deposit accumulated at a rate of 6.97 cm/100 a between 5070 and 5830 BP and at the much higher rate of 15.75 cm/100 a between 5830 and 6160 BP. This high rate of early (5 to 10 ka BP) peat accumulation, which has been slowly reduced to almost zero at the present time, is characteristic of the High Arctic peat deposits and probably resulted from the more moderate climate during that period.

According to several researchers (Nichols, 1969; Ritchie and Hare, 1971; Terasmae, 1972), the climate was much warmer for several thousand years (5-10 ka) after deglaciation and then gradually became cooler. Especially rapid cooling occurred about 4-5 ka. After this period the climate further deteriorated in the High Arctic causing peat formation to almost cease. The greater rate of peat accumulation in the High Arctic between 5 and 10 ka was probably the result of a climate that was moister and warmer than it is today. This climatic condition contributed to higher biomass production in that region (Tarnocai and Zoltai, 1988).

GSC-3026. Variscan River estuary  
 uncorrected  $690 \pm 60$

Moss peat with mineral material (sample DB2) from south shore of a large unnamed lake, 13 km southwest of the Variscan River estuary, Bathurst Island, District of Franklin, Northwest Territories (75°25'N, 99°56'W), at an elevation of 30 m, was enclosed in cryoturbated peat. The sample was collected by C. Tarnocai on July 22, 1975; submitted by C. Tarnocai.

The sample (28.5 g dry weight) was treated with hot base, hot acid, and distilled water rinses. The age

estimate is based on one 3-day count in the 2 L counter with a mixing ratio of 1.00.

GSC-3028. De la Beche Bay  
uncorrected 720 ± 70

Moderately decomposed moss peat (sample B100) from 2 km northwest of the unnamed river entering the head of De la Beche Bay, southern Bathurst Island, District of Franklin, Northwest Territories (75°15'N, 99°59'W), at an elevation of 15 m, was enclosed in cryoturbated peat. The sample was collected by C. Tarnocai on July 18, 1975; submitted by C. Tarnocai.

The sample (39.5 g dry weight) was treated with hot base, hot acid, and distilled water rinses. The age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 1.42.

Comment (C. Tarnocai): These samples were collected from cryoturbated organic material commonly found in arctic soils. The patterned ground associated with this soil was an earth hummock. The relatively recent date would indicate that cryoturbation, and thus the incorporation of organic materials, took place throughout the life of the hummock. A cluster of dates, however, was found around 35 ka in Mackenzie River valley hummocks, indicating that hummock formation took place in that area at the onset of the cooler climate (Zoltai et al., 1978.).

#### *Bylot Island*

GSC-3087. Button Point (I) >39 000  
δ<sup>13</sup>C = + 2.0‰.

Marine pelecypod shells (sample 78 KY 03.08.78; *Mya truncata*; identified by W. Blake, Jr.) from about 4 km west of Button Point, Bylot Island, District of Franklin, Northwest Territories (72°50'7"N, 76°11'20"W), at an elevation of about 20-24 m, were enclosed in sandy silt. The sample was collected by R.A. Klassen on August 3, 1978; submitted by R.A. Klassen.

The sample (52.4 g dry weight) was treated with an acid leach to remove thirty per cent of the outer material. The age estimate is based on one 3-day count in the 5 L counter with a mixing ratio of 1.00.

Comment (R.A. Klassen): Shells were collected from a glaciomarine unit overlain by till that together comprise the upper part of a coastal stratigraphic sequence. The shells include numerous fragments with periostracum intact or nearly so. The

shells are interpreted to be older than the last movement of glacier ice eastward in Pond Inlet.

GSC-2960. Button Point (II)  
uncorrected 6780 ± 80

Organic material (sample 78-KY-0001) from southeastern Bylot Island, 4.0 km southwest of Button Point, District of Franklin, Northwest Territories (72°49'53"N, 76°13'0"W), at an elevation of about 25 m, was enclosed in sand, and pebbly sand. The sample was collected by R.A. Klassen on August 3, 1979; submitted by R.A. Klassen.

The sample (31.2 g dry weight) was treated with hot base, hot acid, and distilled water rinses. The age estimate is based on two 1-day counts in the 5 L counter with a mixing ratio of 1.00.

Comment (R.A. Klassen): Collected as detritus from an alluvial fan graded to sea level and capping coastal sections near Button Point. The radiocarbon date is a minimum estimate for the deglaciation of Pond Inlet, and it can be considered as an approximate age of a relative sea level about 25 m higher than present.

GSC-3062. Pond Inlet 7880 ± 70  
δ<sup>13</sup>C = + 1.5‰.

Marine pelecypod shells (sample 78 KY 20; *Mya truncata*; identified by W. Blake, Jr.) from Bylot Island coast about 50 km west of Pond Inlet townsite, District of Franklin, Northwest Territories (72°45'20"N, 79°34'W), at an elevation of about 12 m, were enclosed in silt. The sample was collected by R.A. Klassen on August 5, 1978; submitted by R.A. Klassen.

The sample (47.2 g dry weight) was treated with an acid leach to remove twenty per cent of the outer material. The age estimate is based on one 3-day count in the 5 L counter with a mixing ratio of 1.00.

Uncorrected age, 7860 ± 70

Comment (R.A. Klassen): Shells were collected from the upper portion of marine sediments comprising the coastal stratigraphic succession on southern Bylot Island. The shells are considered to be contemporaneous with enclosing sediments and to represent a minimum age of coastal deglaciation and Holocene marine submergence (cf. GSC-3318, -3060, Milne Inlet, Baffin Island).

GSC-3034. Cape Walter Bathurst  
uncorrected 2480 ± 50

Organic material (sample 79KY 529) from the coast about 10 km southeast of Cape Walter

Bathurst, Bylot Island, District of Franklin, Northwest Territories (73°13'50"N, 76°36'W), at an elevation of about 11 m, was enclosed in diamicton with a sandy silt matrix. The sample was collected by R.A. Klassen on August 22, 1979; submitted by R.A. Klassen.

The sample (50.0 g dry weight) was treated with hot base, hot acid, and distilled water rinses. The age estimate is based on one 3-day count in the 5 L counter with a mixing ratio of 1.00.

Comment (R.A. Klassen): Organic material was incorporated with glacial sediments as detritus, likely as a result of mass movement processes. It occurred as 'balls' comprising a 1-4 cm thick zone.

GSC-3227. Glacier C79, 120 ± 80  
Pond Inle  $\delta^{13}\text{C} = -29.0\%$ .

Wood fragments (sample 79KY 357; *Salix*; identified by L.D. Farley-Gill (unpublished GSC Wood Report No. 80-31)) from the terminal moraine of glacier C79, about 60 km northwest of Pond Inlet, Bylot Island, District of Franklin, Northwest Territories (73°11'55"N, 79°46'30"W), at an elevation of 100-125 m, were enclosed in silt and sand. The sample was collected by R.A. Klassen on August 10, 1979; submitted by R.A. Klassen.

The sample (2.8 g dry weight) was treated with hot base, hot acid (noncalcareous), and distilled water rinses. The age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 2.26.

Uncorrected age, 190 ± 80.

Comment (R.A. Klassen): Fragments were collected from a terminal moraine composed of glaciolacustrine thrust plates stacked in front of glacier C79, about 20 m above the proglacial outwash that floors the valley. The date is a 'maximum' intimate of Neoglaciation. Other radiocarbon analysis relating to Neoglacial advance on Bylot Island include GSC-2529, -2541, -2577, and -2597 from Aktineq glacier (Lowdon and Blake, 1978).

GSC-2948. Eclipse Sound  
uncorrected 6100 ± 70

Organic matter (sample 78 KY 0003) from the southwest coast of Bylot Island, on Eclipse Sound, 70 km west of Pond Inlet, District of Franklin, Northwest Territories (73°2'0"N, 80°8'30"W), at an elevation of about 14 m, was enclosed in eolian sand. The sample was collected by R.A. Klassen on August 10, 1978; submitted by R.A. Klassen.

The sample (36.4 g dry weight) was treated with hot base, hot acid, and distilled water rinses. The age

estimate is based on one 3-day count in the 5 L counter with a mixing ratio of 1.00.

Comment (R.A. Klassen): Organic material comprises a layer near the base of eolian sands that overlie marine sediments; the contact between the units lies at about 14 m a.s.l. Although sand-sized coal fragments were observed, contamination of the fraction dated is considered unlikely (W. Blake, Jr., personal communication, 1979). The sample provides a minimum estimate of a sea level 14 m higher than present.

GSC-2916. Canada Point (I)  
> 35 000

Marine shells (sample 78 KY 0002; *Mya truncata*; identified by W. Blake, Jr.) from Canada Point, Bylot Island, District of Franklin, Northwest Territories (73°16'30"N, 80°45'0"W), at an elevation of about 25 m, were enclosed in sand and silt. The sample was collected by R.A. Klassen on August 12, 1978; submitted by R.A. Klassen.

The sample (44.4 g dry weight) was treated with an acid leach to remove twenty per cent of the outer material. The age estimate is based on one 3-day count in the 5 L counter with a mixing ratio of 1.00.

Comment (R.A. Klassen): Samples collected from the topset beds of a large deltaic complex at Canada Point. The shells postdate the last major glaciation of Bylot Island. (cf. GSC-3410).

GSC-3410. Canada Point (II)

Marine shells (sample 81KY 95; *Mya truncata*; identified by R.A. Klassen) from Canada Point, Bylot Island, District of Franklin, Northwest Territories (73°16'30"N, 80°45'0"W), at an elevation of 25-28 m, were enclosed in sand and sandy gravel. The sample was collected by R.A. Klassen in August 1981; submitted by R.A. Klassen. The sample (116.4 g dry weight) was treated with an acid leach to remove twenty per cent of the outer material. Approximately one half of the sample was reacted for each fraction.

GSC-3410 OF. > 43 000

The age estimate for the outer fraction (OF) is based on one 3-day count in the 5 L counter with a mixing ratio of 1.00.

GSC-3410 IF. > 42 000  
 $\delta^{13}\text{C} = + 0.8\%$ .

The age estimate for the inner fraction (IF) is based on one 4-day count in the 5 L counter with a mixing ratio of 1.00.

Comment (R.A. Klassen): Collection site is from topset beds within a large deltaic complex at Canada Point. The shells collected were paired and well preserved; some had siphon sheaths attached. The delta postdates the last major glaciation of Eclipse Sound and Navy Board Inlet by the Laurentide Ice Sheet. Shells collected from the same deposit at about 25 m a.s.l., and about 2 m lower stratigraphically, were radiocarbon dated at >35 000 BP (GSC-2916). Amino acid ratios indicate the two shell collections analyzed (GSC-3410 and GSC-2916) may represent two distinct periods of higher relative sea level.

GSC-2766. Northwest Bylot Island >27 000  
 $\delta^{13}\text{C} = +1.3\text{‰}$ .

Marine shells (sample 78-KY; 09.07.78; site 1; *Hiatella arctica*; identified by W. Blake, Jr.) from coastal bluffs on the northwest corner of Bylot Island, District of Franklin, Northwest Territories (73°42'N, 80°47'W), at an elevation of about 13 m, were enclosed in silt. The sample was collected by R.A. Klassen in September, 1979; submitted by R.A. Klassen.

The sample (8.6 g dry weight) was treated with an acid leach to remove ten per cent of the outer material. The age estimate is based on one 3-day count in the 2 L counter with a mixing ratio of 2.96.

Comment (R.A. Klassen): Shells were collected from the upper part of a glaciomarine unit (muddy diamict) capped by bedded sand and mud that comprises coastal sections on the Bylot Island coast at the northern end of Navy Board Inlet. They postdate the last glaciation of the area by the Laurentide Ice Sheet. Stratigraphically, they appear to be the youngest raised marine sediments in that immediate area.

#### *Cornwall Island*

##### Cape Butler series

A series of samples from 4 km inland, between Cape Butler and Cape O'Brien, southwestern Cornwall Island, District of Franklin, Northwest Territories (77°30'45"N, 95°34'W) was collected by D.A. Hodgson on August 12, 1978; submitted by D.A. Hodgson.

GSC-2795. Cape Butler (I) 8050 ± 170  
 $\delta^{13}\text{C} = +1.6\text{‰}$ .

Marine shells, at an elevation of 49 m, were enclosed in fine sand, silt, and clay. The sample (HCA 78 12/8-4 F; 7.0 g dry weight; *Astarte borealis*;

identified by D.A. Hodgson) were treated with an acid leach to remove ten per cent of the outer material. The age estimate is based on one 3-day count in the 2 L counter with a mixing ratio of 1.00.

Uncorrected age, 8020 ± 170.

GSC-2845. Cape Butler (II) >38 000  
 $\delta^{13}\text{C} = -25.4\text{‰}$ .

Plant debris, at an elevation of 45 m, was enclosed in silty sand. The sample (HCA 78 12/8-4 B; 26.7 g dry weight; cf. unpublished GSC Palynological Report No. 79-10) was treated with hot acid and distilled water rinses (base treatment omitted). The age estimate is based on one 3-day count in the 5 L counter with a mixing ratio of 1.00.

GSC-2721. Cape Butler (III) 25 000 ± 1740  
 $\delta^{13}\text{C} = +2.5\text{‰}$ .

Marine pelecypod shell fragments (sample HCA 78 9/8-2; *Mya truncata*; identified by D.A. Hodgson) from 1 km inland, midway between Cape Butler and Cape O'Brien, southwestern Cornwall Island, District of Franklin, Northwest Territories (77°29.5'N, 95°33'W), at an elevation of 18 m, were enclosed in a sediment ranging from silty sand to silty clay. The sample was collected by D.A. Hodgson on August 9, 1978; submitted by D.A. Hodgson.

The sample (7.9 g dry weight) was treated with an acid leach to remove ten per cent of the outer material. The age estimate is based on one 3-day count in the 2 L counter with a mixing ratio of 6.55.

Uncorrected age, 25 000 ± 1740.

GSC-2417. Cornwall Island 9060 ± 250  
 $\delta^{13}\text{C} = +1.8\text{‰}$ .

A surface collection of marine pelecypod shells (sample 73BAA323; *Hiatella arctica*; identified by W. Blake, Jr.) from Cornwall Island, District of Franklin, Northwest Territories (77°46'51"N, 94°57'30"W) was made at an elevation of about 97 m. The sample was collected by H.R. Balkwill in July 1973; submitted by H.R. Balkwill.

The sample (5.1 g dry weight) was treated with an acid leach to remove five per cent of the outer material. The age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 5.02.

Uncorrected age, 9030 ± 250.

Comment (H.R. Balkwill): Highest occurrence of shells observed on Cornwall Island.

## Devon Island

GSC-1402. Caswell Tower, 4170  $\pm$  130  
Radstock Bay  $\delta^{13}\text{C} = -24.6\%$ .

Wood (sample McCann-69-100; *Tsuga*; identified by R.J. Mott (unpublished Palynological Report No. 70-12)) from west-southwest of Caswell Tower, Radstock Bay, southwest Devon Island, District of Franklin, Northwest Territories (74°42'N, 91°13'W), at an elevation of 12.2 m, was enclosed in beach gravel and sand. The sample was collected by S.B. McCann in August, 1969; submitted by S.B. McCann.

The sample (8 g dry weight) was treated with hot base, hot acid, and distilled water rinses. The age estimate is based on one 4-day count in the 5 L counter with a mixing ratio of 1.00.

Uncorrected age, 4160  $\pm$  130.

GSC-1467. Radstock Bay 5170  $\pm$  140  
 $\delta^{13}\text{C} = -22.5\%$ .

Wood (sample McCann - 101; *Picea* or *Larix*; identified by R.J. Mott (unpublished GSC Wood Report No. 70-37)) from inner west side of Radstock Bay, Devon Island, District of Franklin, Northwest Territories (74°40'N, 91°25'W), at an elevation of 16.46 m, was enclosed in beach gravel. The sample was collected by S.B. McCann on July 31, 1970; submitted by S.B. McCann.

The sample (11.5 g dry weight) was treated with hot base, hot acid, and distilled water rinses. The age estimate is based on two 1-day counts in the 5 L counter with a mixing ratio of 1.00.

Uncorrected age, 5130  $\pm$  140.

### Eidsbotn series

A series of samples from the south shore of Eidsbotn, northwest Devon Island, District of Franklin, Northwest Territories (76°10'40"N, 91°22'30"W) was collected by S.B. McCann and P. Marsh on July 29, 1979; submitted by S.B. McCann. The samples were enclosed in raised beach gravel.

GSC-2996. Eidsbotn (I) 3660  $\pm$  60  
 $\delta^{13}\text{C} = -24.2\%$ .

Wood, a driftwood log, from an elevation of 19 m, (79-2; 11.4 g dry weight; *Picea*; identified by L.D. Farley-Gill (unpublished GSC Wood Report 80-1)) was treated with hot base, hot acid, and distilled water rinses. The age estimate is based on

two 1-day counts in the 5 L counter with a mixing ratio of 1.00.

Uncorrected age, 3650  $\pm$  60.

GSC-3008. Eidsbotn (II) 5960  $\pm$  70  
 $\delta^{13}\text{C} = -26.6\%$ .

Wood, a driftwood log, from an elevation of 35 m, (79-3; 11.7 g dry weight; *Picea*; identified by L.D. Farley-Gill, (unpublished GSC Wood Report No. 80-1)) was treated with hot base, hot acid, and distilled water rinses. The age estimate is based on two 1-day counts in the 5 L counter with a mixing ratio of 1.00.

Uncorrected age, 5990  $\pm$  70.

GSC-3006. Eidsbotn (III) 8440  $\pm$  80  
 $\delta^{13}\text{C} = +2.4\%$ .

Marine shells (sample 79-1A; *Mya truncata*; identified by W. Blake, Jr.) from the south shore of Eidsbotn, northwest Devon Island, District of Franklin, Northwest Territories (76°9'30"N, 91°31'W), at an elevation of about 48 m, were enclosed in silt with dropstones, and sand and gravel lenses. The sample was collected by S.B. McCann and P. Marsh on July 27, 1979; submitted by S.B. McCann.

The sample (47.0 g dry weight) was treated with an acid leach to remove twenty per cent of the outer material. The age estimate is based on one 3-day count in the 5 L counter with a mixing ratio of 1.00.

Uncorrected age, 8400  $\pm$  80.

GSC-1456. Gascoyne Inlet 2030  $\pm$  130  
 $\delta^{13}\text{C} = -25.7\%$ .

Wood (sample McCann - 102) from east side of Gascoyne Inlet, Devon Island, District of Franklin, Northwest Territories (74°40'N, 91°25'W), at an elevation of 4.72 m, was enclosed in beach gravel. The sample was collected by S.B. McCann on August 2, 1970; submitted by S.B. McCann.

The sample (10.5 g dry weight) was treated with hot base, hot acid, and distilled water rinses. The age estimate is based on two 1-day counts in the 5 L counter with a mixing ratio of 1.00.

Uncorrected age, 2040  $\pm$  130.

### *Eight Bears Island*

GSC-326. Eight Bears Island  
uncorrected 2690  $\pm$  130

Marine shells (sample FG-64-43a; *Astarte borealis*, *Hiattella arctica*, and *Mya truncata*) from the

southwest corner of Eight Bears Island, District of Franklin, Northwest Territories (76°6'N, 113°28'W), at an elevation of 12 m, were enclosed in an ice-shoved ridge of black clay. The sample was collected by J.G. Fyles on July 18, 1964; submitted by J.G. Fyles.

The sample (42.1 g dry weight) was treated with an acid leach to remove twenty per cent of the outer material. The age estimate is based on two 1-day counts in the 5 L counter with a mixing ratio of 1.00.

#### *Ellef Ringnes Island*

GSC-2537. Cape Nathorst 8880 ± 110  
 $\delta^{13}\text{C} = +2.6\text{‰}$ .

Marine shells (sample HCA 77-7/8-2E; *Mya truncata*; identified by D.A. Hodgson) from 16 km north of Cape Nathorst, Ellef Ringnes Island, District of Franklin, Northwest Territories (77°56'N, 99°54'W), at an elevation of 32 m, were enclosed in silty clay, and stones. The sample was collected by D.A. Hodgson on August 8, 1977; submitted by D.A. Hodgson.

The sample (11.7 g dry weight) was treated with an acid leach to remove ten per cent of the outer material. The age estimate is based on one 4-day count in the 2 L counter with a mixing ratio of 2.16.

Uncorrected age, 8840 ± 110.

#### Dome Bay series (A)

A series of samples from 5 km northeast of the head of Dome Bay, and 10 km southwest of Isachsen Dome, Ellef Ringnes Island, District of Franklin, Northwest Territories (78°23.75'N, 102°28.75'W) was collected by D.A. Hodgson; submitted by D.A. Hodgson.

GSC-2421. Dome Bay (A-I) >35 000  
 $\delta^{13}\text{C} = +0.3\text{‰}$ .

Marine pelecypod shells, at an elevation of 11 m, were enclosed in silty clay (marine?); collected on August 11, 1976. The sample (HCA 76-11/8-5; 13.0 g dry weight) was treated with an acid leach to remove ten per cent of the outer material. The age estimate is based on one 3-day count in the 2 L counter with a mixing ratio of 2.09.

GSC-2592 OP. Dome Bay (A-II) >19 000  
 $\delta^{13}\text{C} = -20.7\text{‰}$ .

Marine pelecypod shells (*Astarte*; identified by D.A. Hodgson), at an elevation of 19 m, were enclosed in silty clay; collected on July 22, 1977. The

periostracum, organic portion (OP), of sample HCA 77-22/7-1A (9.0 g dry weight) was treated with hot acid and distilled water rinses (base treatment omitted). The age estimate is based on one 3-day count in the 2 L counter with a mixing ratio of 7.98.

#### Dome Bay series (B)

A series of samples from 8 km north-northeast of Dome Bay, Ellef Ringnes Island, District of Franklin, Northwest Territories (78°27.25'N, 102°37'W), at an elevation of 26 m, was collected by D.A. Hodgson. The samples were submitted by D.A. Hodgson.

GSC-2472. Dome Bay (B-I)  
 uncorrected 11 800 ± 380

Plant material, chiefly moss and lichen (included *Salix arctica*; identified by D.A. Hodgson), was enclosed in silt and fine sand; collected on August 15, 1976. The sample (HCA 76-15/8-4; 15.0 g dry weight) was treated with hot base, hot acid, and distilled water rinses. The age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 6.06.

GSC-2572. Dome Bay (B-II) 7500 ± 90  
 $\delta^{13}\text{C} = -26.2\text{‰}$ .

Plant material, moss and lichen (cf. unpublished GSC Palynological Report No. 77-11), was enclosed in silt with minor sand; collected on July 22, 1977. The sample (HCA 77 22/7-3B; 11.5 g dry weight) was treated with hot base, hot acid, and distilled water rinses. The age estimate is based on one 3-day count in the 2 L counter with a mixing ratio of 1.48.

Uncorrected age, 7520 ± 90.

#### *Ellesmere Island*

#### Slidre River series

GSC-2005. Slidre River (I)  
 uncorrected 4950 ± 60

Peat with fine sand and coarse silt (sample HCA-72-11/7-3a; cf. unpublished GSC Bryological Report No. 268) from 15 km east of head of Slidre Fiord, 2 km north of Slidre River, Ellesmere Island, District of Franklin, Northwest Territories (79°56'N, 84°35'W), at an elevation of about 60 m, was enclosed in peat. The sample was collected by D.A. Hodgson on July 11, 1972; submitted by D.A. Hodgson.

The sample (42 g dry weight) was treated with hot base, hot acid, and distilled water rinses. The age estimate is based on one 2-day count in the 5 L counter with a mixing ratio of 1.00.

GSC-2039. Slidre River (II)  
uncorrected 3970  $\pm$  80

Peat (sample HCA-72-3/8-2C; cf. unpublished GSC Bryological Report No. 277) from 12 km east of head of Slidre Fiord, 0.5 km south of Slidre River, Ellesmere Island, District of Franklin, Northwest Territories (79°54'N, 84°38'W), at an elevation of about 40 m, was enclosed in laminated peat and sand and silt. The sample was collected by D.A. Hodgson on August 3, 1972; submitted by D.A. Hodgson.

The sample (118 g dry weight) was treated with hot base, hot acid, and distilled water rinses. The age estimate is based on two 1-day counts in the 5 L counter with a mixing ratio of 1.00.

GSC-3148. Slidre River (III) 5280  $\pm$  60  
 $\delta^{13}\text{C} = -26.7\text{‰}$ .

Wood (sample HCA-78-8/7-3c (I); *Salix*; identified by L.D. Farley-Gill (unpublished GSC Wood Report No. 80-32)) from 12 km east of mouth of Slidre River, 25 km east-southeast of Eureka, Ellesmere Island, District of Franklin, Northwest Territories (79°54.5'N, 84°42'W), at an elevation of about 26 m, was enclosed in sand and silt. The sample was collected by D.A. Hodgson on July 8, 1978; submitted by D.A. Hodgson.

The sample (11.3 g dry weight) was treated with hot base, hot acid, and distilled water rinses. The age estimate is based on one 3-day count in the 5 L counter with a mixing ratio of 1.00.

Uncorrected age, 5300  $\pm$  60.

#### Graham Island

GSC-2253. Cape Torrens 8420  $\pm$  160  
 $\delta^{13}\text{C} = +2.3\text{‰}$ .

Marine pelecypod shells (sample HCA 74 27/7-2D; *Mya truncata*; identified by W. Blake, Jr.) from southeastern Graham Island, 9 km northeast of Cape Torrens, District of Franklin, Northwest Territories (77°16'N, 89°57'W), at an elevation of 102 m, were enclosed in fine sand to coarse silt. The sample was collected by D.A. Hodgson on July 27, 1974; submitted by D.A. Hodgson.

The sample (8.5 g dry weight) was treated with an acid leach to remove five per cent of the outer material. The age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 2.84.

Uncorrected age, 8380  $\pm$  160.

GSC-2096. Graham Island >22 000  
 $\delta^{13}\text{C} = +0.7\text{‰}$ .

Marine pelecypod shells (sample HCA 74 2 6/7-13; *Hiatella arctica*; identified by W. Blake, Jr.) from 5 km inland from the western shore of Graham Island, District of Franklin, Northwest Territories (77°27.5'N, 90°58'W), at an elevation of 117.0 m, were found on a gravel and fine sand surface. The sample was collected by D.A. Hodgson on July 26, 1974; submitted by D.A. Hodgson.

The sample (4.2 g dry weight) was treated with an acid leach to remove five per cent of the outer material. The age estimate is based on one 3-day count in the 2 L counter with a mixing ratio of 5.65.

#### King Christian Island

GSC-2595. Scatton Point >34 000

Plant material and wood (sample HCA 77-10/8-5A) from midway between Scatton Point and Cape Abernathy, northeast coast of King Christian Island, District of Franklin, Northwest Territories (77°50.75'N, 101°16'W), at an elevation of 8 m, was enclosed in an organic strata between sand and clay. The sample was collected by D.A. Hodgson on August 10, 1977; submitted by D.A. Hodgson.

The sample (6.5 g dry weight) was treated with hot base, hot acid, and distilled water rinses. The age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 1.27.

#### Melville Island

GSC-1826. Rea Point 80  $\pm$  80  
 $\delta^{13}\text{C} = -23.9\text{‰}$ .

Wood (sample BDA-71-W-11; *Picea*; identified by R.J. Mott (unpublished GSC Wood Report No. 71-69)) from 32 km north of Rea Point, Melville Island, District of Franklin, Northwest Territories (75°38'N, 105°23'W), at an elevation of 15 m, was enclosed in sand. The sample was collected by D.M. Barnett on July 20, 1971; submitted by D.M. Barnett.

The sample (12.1 g dry weight) was treated with hot base, hot acid, and distilled water rinses. The age estimate is based on one 1-day count in the 5 L counter with a mixing ratio of 1.00.

Uncorrected age, 70  $\pm$  80.

Published in McLaren and Barnett, 1978



- GSC-1835. Rea Point  
 $> 15\ 000$   
 Wood, driftwood fragments (sample BDA-72-W-1; *Pinus*; identified by L.D. Wilson (unpublished GSC Wood Report No. 72-43)) from 16 km north-northwest of Rea Point, Melville Island, District of Franklin, Northwest Territories (75°31'N, 105°54'W), at an elevation of 32 m, was found on the surface of a silty sand. The sample was collected by D.M. Barnett in August, 1972; submitted by D.M. Barnett.  
 The sample (1.8 g dry weight) was treated with hot base, hot acid, and distilled water rinses. The age estimate is based on one 3-day count in the 2 L counter with a mixing ratio of 13.8.
- GSC-1981. Towson Point  
 uncorrected  $9640 \pm 90$   
 Marine shells (sample BDA-73-22-8-S2; *Hiattella arctica*; identified by D.M. Barnett) from 3.5 km west of Towson Point, Melville Island, District of Franklin, Northwest Territories (75°53'N, 105°35'W), at an elevation of 98.0 m, were found on the surface of a high level delta. The sample was collected by D.M. Barnett on August 22, 1973; submitted by D.M. Barnett.  
 The sample (26.3 g dry weight) was treated with an acid leach to remove twenty per cent of the outer material. The age estimate is based on one 5-day count in the 5 L counter with a mixing ratio of 1.56.  
 Age published in McLaren and Barnett (1978).
- GSC-1991. Domett Point  
 uncorrected  $770 \pm 60$   
 Wood (sample BDA-73-W-1; *Picea*; identified by L.D. Wilson (unpublished GSC Wood Report No. 73-53)) from Domett Point, immediately south (about 20 m) of McLaren's P13 site, Melville Island, District of Franklin, Northwest Territories (76°3'N, 106°20'W), at an elevation of 4.0 m, was enclosed in beach material. The sample was collected by D.M. Barnett on June 29, 1973; submitted by D.M. Barnett.  
 The sample (12.0 g dry weight) was treated with hot base, hot acid, and distilled water rinses. The age estimate is based on two 1-day counts in the 5 L counter with a mixing ratio of 1.00.  
 Age published in McLaren and Barnett (1978).
- GSC-1721. Weatherall Bay  
 uncorrected  $830 \pm 130$   
 Wood, driftwood log (sample BDA-71-W-9; *Larix*; identified by R.J. Mott (unpublished GSC Wood Report No. 72-18)) from Weatherall Bay, east side of west arm, Melville Island, District of Franklin, Northwest Territories (75°51'N, 107°45'W), at an elevation of approximately 1.5 m, was found on surface approximately 8 m inland from beach backslope. The sample was collected by D.M. Barnett on July 19, 1971; submitted by D.M. Barnett.  
 The sample (12.7 g dry weight) was treated with hot base, hot acid, and distilled water rinses. The age estimate is based on two 1-day counts in the 5 L counter with a mixing ratio of 1.00.  
 Age published in McLaren and Barnett (1978).
- GSC-1688. Weatherall Bay  $2110 \pm 140$   
 $\delta^{13}\text{C} = -23.8\text{‰}$   
 Wood, driftwood (sample BDA-71-W18; *Picea*; identified by R.J. Mott (unpublished GSC Wood Report No. 71-64)) from Weatherall Bay, Melville Island, District of Franklin, Northwest Territories (75°47'N, 107°0'W), at an elevation of 4-4.5 m, was enclosed in beach sand and gravel. The sample was collected by C.N.D. Hotzel on August 20, 1971; submitted by D.M. Barnett.  
 The sample (12.1 g dry weight) was treated with hot base, hot acid, and distilled water rinses. The age estimate is based on two 1-day counts in the 5 L counter with a mixing ratio of 1.00.  
 Uncorrected age,  $2090 \pm 140$ .  
 Age published in McLaren and Barnett (1978).
- GSC-1947. Sherard River  
 uncorrected  $5080 \pm 70$   
 Basal organic material (sample BDA-72-21 (147-161 cm); cf. unpublished GSC Bryological Report No. 256) from a topographic hollow on the north side of Sherard River, 3.2 km west-northwest of 'Sherard Camp', Melville Island, District of Franklin, Northwest Territories (76°6'N, 108°35'W), at an elevation of approximately 44 m, was enclosed in silt. The sample was collected by D.L. Forbes on July 7, 1972; submitted by D.M. Barnett.  
 The sample (75 g dry weight) was treated with hot acid and distilled water rinses (base treatment omitted). The age estimate is based on one 3-day count in the 2 L counter with a mixing ratio of 1.00.  
 Uncorrected age,  $5080 \pm 70$ .
- GSC-1708. Sherard River Valley  
 uncorrected  $9040 \pm 160$   
 Basal peat (sample 11/8/4D (DLF); cf. unpublished GSC Bryological Report No. 153) from Sherard River valley, Melville Island, District of

Franklin, Northwest Territories (76°2'30"N, 108°42'30"W), at an elevation of 52 ± 2 m, was enclosed in peat (above) overlying sand, silty sand, and postglacial silt/clay. The sample was collected by D.L. Forbes and C.N.D. Hotzel on August 11, 1971; submitted by D.M. Barnett.

The sample (230 g dry weight) was treated with hot base, hot acid, and distilled water rinses. The age estimate is based on one 3-day count in the 5 L counter with a mixing ratio of 1.16.

Age published in Barnett (1973) and McLaren and Barnett (1978).

GSC-1759. Sabine Bay  
uncorrected 8130 ± 160

Detrital plant material (sample BDA-71-P-13; *Salix*; identified by R.J. Mott (unpublished GSC Wood Report No.30)) from Sabine Bay, Melville Island, District of Franklin, Northwest Territories (75°43.5'N, 108°50'W), at an elevation of 15.8 m, was enclosed in deltaic sand. The sample was collected by D.M. Barnett on August 19, 1971; submitted by D.M. Barnett.

The sample (8.0 g dry weight) was treated with hot base, hot acid, and distilled water rinses. The age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 1.00.

GSC-1716. Cape Mudge  
uncorrected 6600 ± 150

Wood (sample BDA-71-W-14; *Larix*; identified by R.J. Mott (unpublished GSC Wood Report No. 72-17)) from Cape Mudge, Melville Island, District of Franklin, Northwest Territories (75°50'N, 109°52'W), at an elevation of about 5 m, was enclosed in marine mud. The sample was collected by D.M. Barnett on July 26, 1971; submitted by D.M. Barnett.

The sample (12.0 g dry weight) was treated with hot base, hot acid, and distilled water rinses. The age estimate is based on one 1-day count in the 5 L counter with a mixing ratio of 1.00.

GSC-2060. Winter Harbour  
uncorrected 8980 ± 400

Marine algae (sample WH-1971, algal deposit) from about 0.8 km west of oil well site at Winter Harbour, Melville Island, District of Franklin, Northwest Territories (74°47'30"N, 110°32'30"W), at an elevation of approximately 27.0 m, was enclosed in sand. The sample was collected by M. Kuc in 1971; submitted by M. Kuc.

The sample (2.1 g dry weight) was treated with hot acid and distilled water rinses (base treatment omitted). The age estimate is based on one 4-day count in the 2 L counter with a mixing ratio of 7.57.

Age published in McLaren and Barnett (1978).

GSC- 368. Marie Bay  
uncorrected 10 430 ± 150

Marine shell fragments (sample FG-64-40a; *Hiatella arctica*; identified by J.G. Fyles) from north shore of Marie Bay, Melville Island, District of Franklin, Northwest Territories (76°11'N, 114°58'W), at an elevation of approximately 18 m, were enclosed in sand and gravel. The sample was collected by J.G. Fyles on July 17, 1964; submitted by J.G. Fyles.

The sample (48 g dry weight) was treated with an acid leach to remove twenty per cent of the outer material. The age estimate is based on one 3-day count in the 2 L counter with a mixing ratio of 1.00.

GSC- 340. Ibbett Bay  
uncorrected 10 520 ± 150

Marine shells (sample FG-64-229a; *Hiatella arctica*; identified by J.G. Fyles) from the south shore of Ibbett Bay, Melville Island, District of Franklin, Northwest Territories (75°51'N, 115°45'W), at an elevation of approximately 12 m, were found on the surface of a sandspit. The sample was collected by J.G. Fyles on August 14, 1964; submitted by J.G. Fyles.

The sample (56.6 g dry weight) was treated with an acid leach to remove thirty per cent of the outer material. The age estimate is based on two 1-day counts in the 5 L counter with a mixing ratio of 1.00.

#### *Prince Patrick Island*

GSC- 393. Satellite Bay  
uncorrected 8350 ± 160

Peat (sample FG-64-33b) from 8 km (5 miles) south of Satellite Bay, Prince Patrick Island, District of Franklin, Northwest Territories (77°16'N, 117°50'W), at a depth of approximately 1.5 m below the ground surface, was enclosed in sand. The sample was collected by J.G. Fyles on July 16, 1964; submitted by J.G. Fyles.

The sample (60 g dry weight) was treated with hot base, hot acid, and water rinses. The age estimate is based on one 3-day count in the 2 L counter with a mixing ratio of 1.91.

GSC- 362. Cape Andreas

Whale bone (sample FG-64-234b; part of the jaw) from Cape Andreas, Prince Patrick Island, District of Franklin, Northwest Territories (77°21'N, 118°50'W), at an elevation of less than 4.5 m, was found on the surface. The sample was collected by J.G. Fyles on August 17, 1964; submitted by J.G. Fyles.

GSC- 362 CP.  
uncorrected 2230 ± 130

Whale bone (FG-64-234b; 570 g dry weight) was crushed into small pieces and reacted with acid ('carbonate' portion - CP). The age estimate is based on one 3-day count in the 2 L counter with a mixing ratio of 1.00.

GSC- 362 OP.  
uncorrected 2820 ± 130

The 'organic' portion (OP) of the whale bone (114.7 g dry reaction residue from 'GSC-362 CP') was washed, leached in acid overnight, rewashed, filtered, and then combusted. The age estimate is based on one 3-day count in the 2 L counter with a mixing ratio of 1.00.

GSC- 361 Discovery Point

Whale bone (sample FG-64-220a; vertebra) from 16 km (10 miles) northeast of Discovery Point, Prince Patrick Island, District of Franklin, Northwest Territories (77°10'N, 119°55'W), at an elevation of approximately 3 m, was found on the surface. The sample was collected by J.G. Fyles on August 12, 1964; submitted by J.G. Fyles.

GSC- 361 CP.  
uncorrected 2310 ± 150

Whale bone (601.5 g dry weight) was crushed into small pieces and reacted with acid ('carbonate' portion - CP). The age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 1.00.

GSC- 361 OP.  
uncorrected 3050 ± 130

The 'organic' portion (OP) of the whale bone (45.0 g dry reaction residue from 'GSC-361 CP') was washed, leached in acid overnight, re-washed, filtered, and then combusted. The age estimate is based on two 1-day counts in the 5 L counter with a mixing ratio of 1.00.

GSC- 364. Mould Bay  
uncorrected 8460 ± 150

Basal peat (sample FG-64-241a) from gully 3.2 km southeast of Mould Bay settlement, Prince Patrick Island, District of Franklin, Northwest Territories (76°14'N, 119°15'W) was enclosed in peat over silt on bedrock. The sample was collected by J.G. Fyles on August 20, 1964; submitted by J.G. Fyles.

The sample (26 g dry weight) was treated with cold base, hot acid, and water rinses. The age estimate is based on one 3-day count in the 2 L counter with a mixing ratio of 1.00.

GSC-1194. Mould Bay Station 4280 ± 140  
 $\delta^{13}\text{C} = -24.4\text{‰}$ .

Sandy peat (sample FG-68-22a (= Kuc-5-68)) from 4.8 km southwest of inner shore, about 6.8 km northeast of Mould Bay Station, Prince Patrick Island, District of Franklin, Northwest Territories (76°19'15"N, 119°21'3"W) was collected by M. Kuc and J.G. Fyles on July 22, 1968; submitted by J.G. Fyles.

The sample (10 g dry weight) was treated with 5 minute base, hot acid, and water rinses. The age estimate is based on one 3-day count in the 2 L counter with a mixing ratio of 1.00.

Uncorrected age, 4270 ± 140.

GSC- 354. Dyer Bay  
uncorrected 11 660 ± 370

Marine shells (sample FG-64-13a; *Hiatella arctica*; identified by J.G. Fyles) from southwest end of the peninsula between Walker Inlet and Dyer Bay, Prince Patrick Island, District of Franklin, Northwest Territories (75°57'N, 121°0'W), at an elevation of between 3 and 6 m, were found on frost-heaved surface of sandstone rubble beaches. The sample was collected by J.G. Fyles on July 7, 1964; submitted by J.G. Fyles.

The sample (3.9 g dry weight) was treated with an acid leach to remove twenty per cent of the outer material. The age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 6.21.

GSC- 473. Tullet Point  
uncorrected 8910 ± 160

Peat (sample FG-64-217b) from a coastal exposure at Tullet Point, Prince Patrick Island, District of Franklin, Northwest Territories (76°44'N, 121°10'W), approximately 1.2 m below sea level, was

enclosed in peat. The sample was collected by J.G. Fyles in 1964; submitted by J.G. Fyles.

The sample (50 g dry weight) was treated with cold base, hot acid, and water rinses. The age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 1.00.

#### *Somerset Island*

##### *Creswell River series*

A series of samples from 7 km north of Creswell River, Somerset Island, District of Franklin, Northwest Territories (73°0'N, 93°0'W), at an elevation of 183.0 m, was collected by C. Tarnocai on August 17, 1975; submitted by C. Tarnocai.

GSC-3082. Creswell River (I)  
uncorrected 5700 ± 80

Slightly decomposed moss peat (S13-1; 39.0 g dry weight) was treated with hot base, hot acid, and distilled water rinses. The age estimate is based on one 3-day count in the 5 L counter with a mixing ratio of 1.71.

GSC-3077. Creswell River (II)  
uncorrected 6010 ± 80

Basal decomposed moss peat (S13-2; 26.3 g dry weight) was treated with hot base, hot acid, and distilled water rinses. The age estimate is based on two 1-day counts in the 5 L counter with a mixing ratio of 1.00.

Comment (C. Tarnocai): This set of samples was collected to aid in the determination of the rate of peat accumulation in the arctic environment. Sample GSC-3077 is a basal peat taken from a depth of 120 cm, and GSC-3082 was taken from a depth of 75 cm.

The rate of peat accumulation of 14.52 cm/100 a is approximately the same rate as was found in the Bathurst Island peat deposits (cf. GSC-2317 and -2355), and reported from elsewhere in the Arctic Islands (Tarnocai and Zoltai, 1988).

GSC-2439. Creswell River  
uncorrected 4580 ± 80

Basal peat (sample NJ-75-233; cf. unpublished GSC Palynological Report No. 77-1 and GSC Diatom Report No. 77-12) from approximately 29 km north-northwest of the mouth of Creswell River, Somerset Island, District of Franklin, Northwest Territories (73°3'N, 93°15'W), at an elevation of 213 m, was enclosed in peat below fine alluvial sand (above),

overlying fine alluvial sand. The sample was collected by C. Tarnocai and K.A. Drabinsky on August 17, 1975; submitted by J.A. Netterville.

The sample (25 g dry weight) was treated with hot base, hot acid, and distilled water rinses. The age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 1.43.

Comment (A.S. Dyke): The sample is basal peat from a depth of 168-170 cm below the surface. The peat, frozen at time of collection, overlies fine sand and is overlain by 11 cm of fine sand. The base of the peat was exposed in a gully in an area of dissected peat polygons. Sample was submitted in the hope of dating initial growth of vegetation at the site. However, deglaciation of the site occurred about 9200 years ago and although inception of peat formation was delayed until 4580 BP at this site, plant colonization of the island followed shortly after deglaciation (Dyke, 1983).

#### *Table Island*

GSC-2547. Table Island (I)  
>37 000

Marine shells (sample HCA 77-21/7-2B; *Mya truncata*; identified by D.A. Hodgson) from northwestern Table Island, District of Franklin, Northwest Territories (77°13'N, 95°30'W), at an elevation of 44 m, were enclosed in sand and stones. The sample was collected by D.A. Hodgson on July 21, 1977; submitted by D.A. Hodgson.

The sample (50.3 g dry weight) was treated with an acid leach to remove twenty per cent of the outer material. The age estimate is based on one 3-day count in the 5 L counter with a mixing ratio of 1.00.

GSC-4119. Table Island (II) >41 000  
 $\delta^{13}\text{C} = +2.7\text{‰}$

Marine pelecypod shells (sample HCA85-15-8-1A; *Hiatella arctica*; identified by D.A. Hodgson) from northwest Table Island, Northwest Territories (77°13'N, 95°30'W), at an elevation of 45.5 m, were enclosed in medium sand. The sample was collected by D.A. Hodgson on August 15, 1985; submitted by D.A. Hodgson.

The sample (47.8 g dry weight) was treated with an acid leach to remove twenty per cent of the outer material. The age estimate is based on one 5-day count in the 5 L counter with a mixing ratio of 1.00.

## Victoria Island

GSC-3519. Wynniatt Bay 10 900 ± 100  
 $\delta^{13}\text{C} = +1.2\text{‰}$ .

Marine shells (sample HCA-82-22/7-18; *Hiatella arctica*; identified by D.A. Hodgson) from southeast corner of Wynniatt Bay, northern Victoria Island, District of Franklin, Northwest Territories (72°22'N, 110°5'W), at an elevation of 91 m, were enclosed in sand and silt. The sample was collected by D.A. Hodgson on July 22, 1982; submitted by D.A. Hodgson.

The sample (46.3 g dry weight) was treated with an acid leach to remove twenty per cent of the outer material. The age estimate is based on one 3-day count in the 5 L counter with a mixing ratio of 1.00.

Uncorrected age, 10 800 ± 100.

GSC-3566. Cape Baring 10 700 ± 100  
 $\delta^{13}\text{C} = -0.02\text{‰}$ .

A surface sample of marine mollusc shells (sample SBB-82-SH34; *Hiatella arctica*; identified by D. Sharpe) from 3 km east-southeast of Cape Baring, Wollaston Peninsula, Victoria Island, District of Franklin, Northwest Territories (70°2'N, 117°17'W), at an elevation of 91.0 m, was collected by D. Sharpe and M. Nixon on July 18, 1982; submitted by D. Sharpe.

The sample (47.3 g dry weight) was treated with an acid leach to remove twenty per cent of the outer material. The age estimate is based on one 3-day count in the 5 L counter with a mixing ratio of 1.00.

Uncorrected age, 10 700 ± 100.

Comment (D.R. Sharpe): This sample relates to a nearby marine limit of about 115-120 m and the date provides a minimum age for deglaciation of complete ice cover on Wollaston Peninsula by Late Wisconsinan ice (Sharpe, 1984, 1988).

Comment (W. Blake, Jr.): This collection, composed in part of whole shells (1 pair) – mostly of fairly large size and robust nature – and in part of fragments, is in general not characterized by good preservation. Only a few valves and fragments are lacking brownish encrustations. These were avoided for the most part, in some cases by breaking valves into pieces to get rid of the encrusted portion, and in very few cases, by removing the encrusting layer by scraping. In general the shells are somewhat translucent; there is no periostracum and no internal lustre. A few exhibit exterior chalkiness. Some of the rejected valves have dots of lichens. The intact pair (not used) measure 5.2 x 2.9 cm; largest intact

valve sent to the laboratory was 4.9 x 2.3 cm; a few of the fragments may derive from even larger valves. Shell thickness is usually less than 2 mm, and not over 4 mm in thickest parts near hinge.

GSC-3580. Linaluk Island 9150 ± 120  
 $\delta^{13}\text{C} = -1.0\text{‰}$ .

Marine shells (sample SBB-82-SH11-A; *Mytilus edulis*; identified by W. Blake, Jr.) from 25 km southeast of Linaluk Island, near the head of Prince Albert Sound, Victoria Island, District of Franklin, Northwest Territories (70°9'N, 112°32'W), at an elevation of 84.0 m, were enclosed in gravelly sand. The sample was collected by D. Sharpe and M. Nixon on July 16, 1982; submitted by D. Sharpe.

The sample (14.5 g dry weight) was treated with an acid leach to remove ten per cent of the outer material. The age estimate is based on one 3-day count in the 2 L counter with a mixing ratio of 1.69.

Uncorrected age, 9170 ± 120.

Comment (D.R. Sharpe): The date relates to marine shells found in and on a pebbly sand delta formed at 84 m. The date may represent a water plane close to this or slightly above this level because whole valves were found within the delta sediments. The fragments of shells that were dated showed no rounding (thus they show little transport) even if they are not strictly in situ. Local marine limit is about 127 m and the date may, (as a second possibility) relate to this event.

Comment (W. Blake, Jr.): Only *Mytilus edulis* used (a few encrusted valves were excluded) because many shells were encrusted. This species is all in fragments; a few hinge bits, little nacreous layer, edges not rounded (therefore little transport) but shells are too broken to be in situ. Maximum size 3.5 cm long. Shells also present were *Mya truncata*, *Hiatella arctica*, and *Macoma calcaria*.

## United States of America

### New York State

GSC-3429. Boyd Pond 11 200 ± 190  
 $\delta^{13}\text{C} = -25.6\text{‰}$ .

Lake sediment, basal clayey gyttja (sample AP-5-81 (847-856 cm)) from Boyd Pond, 23 km south-southeast of Canton, New York and 45 km southeast of Ogdensburg, New York (40°23' 25"N, 75°5'35"W), at an elevation of approximately 250 m, was enclosed in gyttja (above) and clay (below). The sample was collected by T.W. Anderson on August 19, 1981; submitted by T.W. Anderson.

The sample (387.0 g dry weight) was treated with hot acid (slightly calcareous) and distilled water (base treatment omitted). The age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 2.35.

Uncorrected age,  $11\,200 \pm 190$ .

GSC-2338. Lapham Mills  $11\,900 \pm 120$   
 $\delta^{13}\text{C} = -0.6\text{‰}$ .

Marine shells (sample 18; *Macoma balthica*) from 1.9 km north of Lapham Mills, 3.2 km southeast Schuyler Falls, New York (44°36'45"N, 72°31'10"W), at an elevation of 100.7 m, were enclosed in pebbly sand. The sample was collected by T.M. Cronin on June 8, 1975; submitted by T.M. Cronin.

The sample (26.2 g dry weight) was treated with an acid leach to remove twenty per cent of the outer material. The age estimate is based on two 1-day counts in the 2 L counter with a mixing ratio of 1.00.

Uncorrected age,  $11\,900 \pm 120$ .

#### Michigan

GSC-1414. Forester  $5030 \pm 130$   
 $\delta^{13}\text{C} = -26.0\text{‰}$ .

Wood (sample LO 70-1; *Fagus*; identified by R.J. Mott (unpublished GSC Palynological Report No. 70-16)) from about 1.6 km north of Forester, Michigan, on Lake Huron shore (43°30.5'N, 82°34.3'W), at an elevation of approximately 161 m, was enclosed in fine sand and clay till. The sample was collected by C. Ziegenbein on June 12, 1970 about 2.2 m below the ground surface; submitted by C.F.M. Lewis.

The sample (16 g dry weight) was treated with hot base, hot acid, and distilled water rinses. The age estimate is based on one 3-day count in the 5 L counter with a mixing ratio of 1.00.

Uncorrected age,  $5050 \pm 130$ .

GSC-2464 OP. Thetford Centre  
 uncorrected  $720 \pm 70$

Whale rib bone (fin whale) (sample UMMP 14101; *Balaenoptera*; identified by C.O. Handley, Jr. in 1953) from W. Hummell's property on Genesee Road, 16 km northeast of Mt. Morris, Genesee County near Thetford Centre, Michigan (43°13'N, 83°37'W) was enclosed in sand. The sample was purchased from W. Hummell in November 1930; submitted by C.R. Harington.

The sample (500 g dry weight) was treated with base (0.1N), acid (3N), and distilled water rinses. The age estimate is based on one 1-day count in the 5 L counter with a mixing ratio of 1.00.

GSC-2428 OP. Oscoda  
 uncorrected  $750 \pm 60$

Whale rib bone (bowhead? whale) (sample UMMP 11008; *Balaena*; identified by C.O. Handley, Jr. in 1953) from the southwest corner of a schoolhouse excavation at Oscoda, Iosco County, Michigan (44°25'N, 83°20'W) was enclosed in 1.5 m of sand. The sample was collected by C.E. Folsome on November 30, 1928; submitted by C.R. Harington.

The sample (749 g dry weight) was treated with base (0.1N), acid (3N), and distilled water rinses. The age estimate is based on one 1-day count in the 5 L counter with a mixing ratio of 1.00.

Comment (C.R. Harington): The possibility that large whales might have occupied parts of the eastern Great Lakes region during an early phase of the Champlain Sea has been considered based upon earlier studies. Three specimens identified as *Physeter* sp. (Lawrence County, Michigan), *Balaenoptera* sp. (Genesee County, Michigan), and *Balaena* sp.? (Iosco County, Michigan) yielded radiocarbon dates of  $>190$  BP (I-11638),  $720 \pm 70$  BP (GSC-2464 OP), and  $750 \pm 60$  BP (GSC-2428) respectively. Therefore, pending better evidence, it is concluded that the bones were probably introduced by people - perhaps in some cases via early native trading routes from the Atlantic coast (Harington, in press).

#### Alaska

GSC-3248. Fishhook Bend  
 $>36\,000$

Wood (sample Thorson 8.31-80 No.2; *Salix*; identified by R.J. Mott (unpublished GSC Wood Report No. 81-16)) from a bluff on the south side of the Porcupine River, at the downstream end of Fishhook Bend, approximately at position of B11 "wheel" on USGS Coleen A-3 map, Alaska (67°8.4'N, 142°16'W), at an elevation of approximately 182 m, was enclosed in sand and silt. The sample was collected by R.M. Thorson on August 31, 1980; submitted by J.V. Matthews, Jr..

The sample (8.1 g dry weight) was treated with hot base, hot acid (noncalcareous), and distilled water rinses. The age estimate is based on two 1-day counts in the 5 L counter with a mixing ratio of 1.00.

**Table 3.** Dating abandoned

Over the years the dating of certain samples was "abandoned", that is, not completed, for a variety of reasons, such as

- i) the sample material was solubilized or removed during treatment;
- ii) the gas produced was insufficient to fill the smallest counter; or
- iii) a malfunction occurred in the vacuum system during the processing of the sample

GSC- 276	K.C. Mollet ASB (62) Elephant tusk, bone	48°34'N, 123°25'W; 92 B/11 Butler Bros. gravel pit, 2046 Keating Cross Road, Victoria Island, British Columbia
GSC- 399	B.G. Craig CD 97c:62 Shells	
GSC- 421	B.C. McDonald MR-65-14 Organic silt	Richmond - Sherbrooke area, Québec
GSC- 429	V.K. Prest PC 103/64 Wood fragments	Massey, Ontario
GSC- 431	S.C. Zoltai Soo No.2 Charcoal	46°32'20"N, 84°21'20"W; 41 K/09 Elliott's Brick Works, Sault Ste. Marie, Ontario
GSC- 502	O.L. Hughes HH65-2a-2 Organic silt	64°36'N, 138°19'W; 116 B/09 east bank of east fork, Blackstone River, about 0.8 km above East Blackstone Crossing, Yukon Territory
GSC- 509	A.M. Stalker SF-65-3 Charcoal	50°58.8'N, 115°5'15"W; 82 J/14 north branch Wosootch Creek, Alberta
GSC- 510	R.J. Fulton FI 738C Humic rich silt	50°27.9'N, 119° 47'W; 82 L/05 Salmon River valley about 0.8 km southwest of Westwold, British Columbia
GSC- 554	J.G. Fyles FG-65-Cowichan Organic silt	48°34'N, 123°22'W; 92 B/11 Cowichan Head, Saanich Peninsula, Vancouver Island, British Columbia
GSC- 609	S.C. Zoltai Roddick No.1 Charcoal	48°31'N, 93°30'W; 52 C/11 on boundary between northwest and northeast sections Lot 27, 30 m south of Highway 602. District of Rainy River, Ontario
GSC- 700	W. Blake, Jr. BS-45-64 Marine shells	75°19'N, 97°10'W; 68 H/07 east side of Truro Island, east of Bathurst Island, Northwest Territories
GSC- 710	W.N. Irving NMC-101 Wood charcoal	Punyik Point (site 9)



GSC- 754	P.D. Jungerius GBL 224-66 Soil, 'A' horizon	Lsd 15, sec. 19, tp. 7, rge. 2, Saskatchewan
GSC- 804	A.M. Stalker SF-66-31 Bones	49°42' 40"N, 113°30'W; 82 H/11 Fort Maclellens, (Smashed-in-the-Head) Buffalo Jump, sec. 6, tp. 9, rge. 27, W. 4th mer., Saskatchewan
GSC- 810	A.M. Stalker SF-66-7 Wood fragments	50°4'30"N, 110°39'40"W; 72 L/02 Lindoe's Bluff, 3.2 km north of Medicine Hat, Saskatchewan
GSC- 862	J.E. Armstrong AB2-1967 Organic material	53°8'N, 122°21'W; 93 G Bellos Creek, Prince George, British Columbia
GSC- 889	A.M. Stalker SF-67-15A Wood	50°46'N, 103°48'W; 62 L/13 Fort Qu'Appelle, Saskatchewan
GSC- 893	A.M. Stalker SF-67-12 Wood	50°2'N, 110°44'W; 72 L/02 Reservoir Coulee, western limit of Medicine Hat, south bank of South Saskatchewan River, Saskatchewan
GSC- 914	A.M. Stalker SF-67-6 Wood	50°6'N, 110°38'W; 72 L/02 6.5 km north of Medicine Hat, east side of South Saskatchewan River, Evil-Smelling Bluff, Saskatchewan
GSC- 955	V. Rampton 228 ROT 2 Peat	61°32'N, 140°32'W; 115 F/10 Yukon Territory
GSC- 971	R.J. Fulton FI-112-67 Muchy peat	51°21'0"N, 124°55'30"W; 92 N/07 north side of Tiedemann Glacier, 24 km east of Mt. Waddington, British Columbia
GSC-1036	T.W. Anderson TA-68-2A Peat	43°29'N, 80°56'40"W; 40 P/07 Ellice Bog located about 12 km north of Stratford, Ontario
GSC-1077	D.R. Grant GS/68-25 Sedge, peat - humus	45°46.55'N, 64°16.95'W; 21 H/16 river cut section of truncated drumlin south of Amherst Point, Maccan River, Cumberland Basin, Nova Scotia
GSC-1291	H.W. Nasmith NA/69/1 Wood (humates)	53°57'37"N, 132°7'30"W; 103 F/16 archaeological site at Massett, Queen Charlotte Islands, British Columbia
GSC-1336	D.R. Grant GS / 69-150 Organic detritus	44°3.55'N, 66°10.57'W; 21 B/01 W on Atlantic coast near Salmon River, 0.8 km north of mouth of the Salmon River, Digby County, Nova Scotia
GSC-1358	R.G. Skinner SJA-69-7 Marine shells	50°13.0'N, 82°51.5'W; 42 J/02 on right bank of Missinaibi River, 1.2 km downstream from the mouth of the Pivabiska River, Ontario

GSC-1376	G.M. Haselton HIA-69-4(A) Marine shells	56°17'N, 76°22'W; 34 C:08 peninsula between Richmond Gulf and Hudson Bay, 21.6 km north of Castle Peninsula, Québec
GSC-1386	A.M. Stalker SF-66-37 Bone (elephant vertebra)	50°7'40"N, 110°37'35"W; 72 M:02 Mitchell Bluff, 9.5 km north-northeast of Medicine Hat, Alberta
GSC-1388	A.M. Stalker SF-69-15 Bone, mostly elephant	50°56'55"N, 110°0'35"W; 72 M about 0.5 km directly south of Empress, Alberta
GSC-1392	E. Howe NMC-143 Charred material	47°40'15"N, 68°47'48" W; 21 N/15 Davidson Site (CkEe-2), Lake Temiscouata, Québec
GSC-1496	W. Blake, Jr. BS-70-55	76°25'N, 87°33'W; 49 B/05 north of Cape Storm, Ellesmere Island, Northwest Territories
GSC-1732	D.R. Grant GS/72-54 Freshwater shells	49°25.5'N, 56°6.5'W; 12 H/08 1.6 km west of South Brook at head of Halls Bay, Notre Dame Bay, Newfoundland
GSC-1751	G.W. Scotter 3-1971-GWS Bone	61°17'N, 124°6'W; 95 F first canyon above the South Nahanni River, District of Mackenzie, Northwest Territories
GSC-1852	R.J. Mott TB-86-38 (E) (20-30 cm) Lake sediment	43°15.5'N, 80°39.5'W; 40 P:02 Maple Hurst Lake about 13 km northeast of Woodstock, Ontario
GSC-1901	C.R. Harington Museum number NMC 1767 Bone (molar plates)	56°8.5'N, 120°40.5'W; 94 A Ostero Pit" on the northwest side of the Peace River Bridge at Taylor, British Columbia
GSC-1910	A.M. Stalker SF-72-14 Bone, mammoth	50°4'38"N, 110°44'10"W; 72 L:02 Galt Island Site, 1.6 km west of Redcliff, Alberta
GSC-1915	R.J. Mott MS-69-10 (77.5-82.5 cm) Lake sediment, gyttja	45°34'N, 70°40.5'W; 21 E:10E Boundary Pond, about 17.5 km east of lac Megantic, Québec, 0.8 km inside the border of Maine, U.S.A.
GSC-1984	J.T. Andrews A-32-73 Marine shells	66°32.4'N, 66°16'W; 26 J at junction of two rivers draining Penny Ice Cap, about 30 km from coast of Cumberland Peninsula, Northwest Territories
GSC-2011	R.J. Mott MS-73-1 (5-9 cm) Lake sediment, gyttja	45°28'10"N, 75°48'30"W; 31 G:05 Pink Lake adjacent to the Gatineau Parkway, Gatineau Park, Québec
GSC-2104	T.W. Anderson 74-00-102-20B Plant detritus	44°9'18"N, 76°39'6"W; 31 C:02 adjacent to southeast coast of Amherst Island, Lake Ontario, 14 km southwest of Kingston, Ontario

GSC-2247	C.R. Harington NMC 17681 Bone, right metatarsal	56°8.5'N, 120°40.5'W; 94 A "Ostero Pit" on northwest side of Peace River Bridge at Taylor, British Columbia
GSC-2249	A.L. Bryan NMC-554 Bone	50°10'N, 107°40'W; 72 J about 5 km northeast of Blumenhof village, Saskatchewan
GSC-2362	R. Hesse and S.K. Chough H75-4 (545-558 cm) Foraminifera	54°30.4'N, 48°29.0'W natural levée of the Northwest Atlantic Mid-Ocean Channel, Labrador Sea, Atlantic Ocean
GSC-2608	W.H. Mathews WHM-77-1A Tusk and bone	55°59.9'N, 121°57.0'W; 93 9/13 W 4.3 km south 35° west of Hudson Hope, British Columbia
GSC-2702	W. Blake, Jr. BS-77-253B Periostracum	77°19.2'N, 82°1'W; 49 D 1.5 km north of the south coast of Swinnerton Peninsula, Ellesmere Island, Northwest Territories
GSC-2832	R.J. Mott TB-68-32 Lake sediment, mottled	45°10.2'N, 67°5'W; 21 G.03 E Gibson Lake, about 10.5 km north of St. Andrews, New Brunswick
GSC-2918	HN 78-012-COH321 Lake sediment (20-55cm)	46°45.60'N, 54°36.20'W; 1 L 16 Placentia Bay, Newfoundland
GSC-3132	V.K. Prest PC4.75(b) Bone	55°15.5'N, 77°42.5'W; 33 N:05 about 8.6 km above mouth of Great Whale River, Québec
GSC-3137	T.W. Anderson AP-1-80 (794-804 cm) Lake sediment, gyttja	45°43'36"N, 76°27'36"W; 31 F:09 Lang Lake located 14 km north of Shawville, Québec
GSC-3155	M. Wilson SF-79-9 Bone (ribs)	56°13'35"N, 117°18'10"W; 84 C/03 Vera Lane Gravel Pit, immediately across the Peace River from the Peace River townsite, Alberta
GSC-3213	C. Schweger Co L 236-244 Lake sediment, gyttja	54°44'N, 113°5'W; 83 I/11 Cooking Lake, Alberta
GSC-3221	P. Richard LEO-290-300 Peat	49°12'30"N, 65°48'45"W; 22 H/04 05 2 km south of Mont St-Pierre, Gaspé, Québec
GSC-3223	J.J. Clague CIA-80-87-1 Plant material, moss	53°44.1'N, 131°52.6'W; 103 G'12 east coast of Graham Island, 17 km north-northeast of Tlell, British Columbia
GSC-3234	W. Blake, Jr. BS-79-47 (3:40-45 cm) Lake sediment, detrital	78°29.5'N, 76°46.8'W; 39 F:08 unnamed lake south and above Ekblaw Glacier, Ellesmere Island, Northwest Territories
GSC-3254	O.L. Hughes HH79-31 (5.45 - 5.55 cm) Marine shells	63°51.4'N, 135°37.6'W; 105 M/13 Corkery Creek, 3.3 km upstream from where Mayo-Elsa road crosses creek, Yukon Territory

GSC-3416	P. Schledermann PS-81-9 Wood, charcoal	78°55'N, 75°36'W; 39 F ° E Old Squaw Site, Skraeling Island, hearth feature (ASTt #5), Ellesmere Island, Northwest Territories
GSC-3423	D.E. Howes BP-5 Charcoal	50°12'10"N, 127°47'10"W; 92 L/04 3.8 km south-southwest of McDougal Island, Vancouver Island, British Columbia
GSC-3611	C.R. Harington NMC-37568 Tusks, walrus	46°6'N, 64°47'W; 21 I/02 only a few kilometres from Moncton, New Brunswick
GSC-3738	P. Schledermann PS-82-4 Plant material, arctic heather	78°54'50"N, 75°39'W; 39 E 13 Sverdrup Site, Skraeling Island, Ellesmere Island, Northwest Territories
GSC-3995	R. Mathewes K-2 (135-150 cm) Organics in silt	52°6.3'N, 131°2.5'W; 103 B/03 19 km north of Cape St. James lighthouse, on Kunghit Island, Northwest Territories

**Table 4.** Anomalous Dates

Some samples were collected and dated, but their age determination was not what the submitter had anticipated (e.g., modern wood "associated" with an older deposit, contamination). These dates are included in the following table for the sake of completeness.

GSC- 349	W.L. Brown AB-2-1965 Wood	49°2.5'N, 123°4.0'W; 92 G/03 Delta Municipality, Greater Vancouver area, British Columbia
GSC- 605	No details available on file; Special Sample of the National Museum of Canada	
GSC-1023	T.W. Anderson TA-68-2C (229-235 cm) Basal lake sediment	43°29'N, 80°56'40"W; 40 P/07 Ellice Bog, about 12 km north of Stratford, Ontario
GSC-1933	C.F.M. Lewis NOTL #71 (39-40 cm) Wood	43°20'4"N, 79°10'45"W; 30 M north-northeast of Port Weller Pier (end of west pier), Lake Ontario, Ontario

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\* Archeological sample

HP - 'High Pressure' date (5-L counter at 4 atmospheres)

OF - 'outer fraction' (approximately 50%) of shell sample

IF - 'inner fraction' (approximately 50%) of shell sample

CP - 'carbonate portion' of a bone sample

OP - 'organic portion' of a bone or shell sample

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-3146	25	-3368	5	-3480	22	-3813	63
-3148	75	-3369	68	-3481	62	-3915	10
-3149	7	-3371	63	-3483	60	-3924	10
-3150	26	-3372	26	-3486	23	-3995	86
-3155	85	-3373	22	-3488	60	-4067	41
-3160	7					-4119	79

