

Memorandum

To: Rodney Rovang
From: Sarah McGuire Bogen
Re: Sediment accumulation rates in Founders' Pond
Date: 19 September 2007

Chronology

Four AMS radiocarbon dates on plant and charred material from the core, and one date interpreted from the *Ambrosia* pollen rise, provide the basis for the core age model (Table 1). The abrupt *Ambrosia* rise was interpolated to 100 cal yr BP when Euro-American settlers established plow-based agriculture (Bassett and Terasmae 1962). Two additional radiocarbon dates were not used in the age model because their results suggested contamination.

The age model was interpolated linearly from the depths of the dated material (Figure 1). This age model predicts a basal age of 9,080 cal yr BP at a depth of 664 cm. The highest sedimentation rates (1.045 cm/yr) occur in the 155 years since the *Ambrosia* rise. Sedimentation rates between 0.08 cm/yr and 0.1 cm/yr occur between 2225 cal yr BP and 100 cal yr BP. The sedimentation rates between the base of the core and 2225 cal yr BP are 0.05 cm/yr.

Sediment description

Sediment in the core ranged from pink clay to organic peat. The top 30 cm corresponding in the linear interpolation to the past 30 years are organic muck. Below the muck, 15 cm of finer-grained grey silt with some fine-grained organics represent AD 1950 to 1975. Sediment is light in color and fine-grained with increasing organic matter between about AD 1950 and AD 1750. The *Ambrosia* rise occurs at about AD 1850 and at 104.5 cm depth, when dark organic matter becomes more prominent in the sediment. From AD 1750 to about 50 BC sediments were dark brown with coarse graminoid organic matter and some gastropod shells. From 50 BC to about 6250 BC the sediment is light brown to grey, silty loam with varying amounts of gastropod shells and charcoal. The bottom 44 cm (to 9070 cal yr BP) of the core is clay. Of this 13 cm are grey in color and the bottom 12 are pink. A few gastropod shells are found in the grey portion of the clay.

Discussion

Due to the variability of the sediment types in the top of the core, linear interpolation is probably not the best way to model sediment accumulation in Founders' Pond during the past 100 to 200 years. Linear interpolation shows a sediment accumulation rate 10 times greater than the rate it accumulated during the previous 2000+ years. The top 30 centimeters of muck likely represent a much shorter period than 30 years. If the muck is

assumed to represent 5 years, the remaining sediment would have accumulated at 0.78 cm/year since AD 1850. That figure has sediment accumulating 7 times faster since AD 1850 than prior.

Magnetic susceptibility suggests that the first 30-40 cm of the core might not be well-represented by a linear age model. Magnetic susceptibility provides a ratio of the amount of magnetic minerals at 1-centimeter increments along the core. In many systems, peaks in magnetic minerals as measured by magnetic susceptibility suggest periods or events of erosion. A peak in magnetic susceptibility from the top of the core to about 30 cm suggest that the mucky sediment is composed of different minerals than the sediment that composes the remainder of the top 100 cm of the core.

Please let me know if your consultants would like any of the additional data in my library, including:

- High resolution images of the core
- Smear slides of raw sediment
- Raw data used to create depth/age model
- Raw magnetic susceptibility data

Type	Total depth	Age used	Sample number	Measured RC age	2 sigma calibration	Excluded from age-depth model	Material dated
AMS	55.5	145	Beta - 206886	220 +/- 40 ¹⁴ C yr BP	290 to 0 cal yr BP	X	Bulk organic sediment
<i>Ambrosia</i> rise	104.5	100	N/A		N/A		
AMS	122.5	120	Beta - 220149	10 +/- 40 ¹⁴ C yr BP	240 to 230 cal yr BP, 1880 to 1910 cal yr BP, 0 cal yr BP	X	Charcoal and seeds
AMS	189.5	1010	Beta - 216066	1140 +/- 40 ¹⁴ C yr BP	1080 to 940 cal yr BP		Charcoal
AMS	246	1715	Beta - 229069	1890 +/- 40 ¹⁴ C yr BP	1820 to 1610 cal yr BP		Charcoal
AMS	302	2225	Beta - 219941	2210 +/- 40 ¹⁴ C yr BP	2330 to 2120 cal yr BP		Charcoal and seeds
AMS	581.5	7525	Beta - 216067	6670 +/- 40 ¹⁴ C yr BP	7590 to 7460 cal yr BP		Charcoal

Table 1. Radiocarbon dates and *Ambrosia* rise from Founders' Pond.

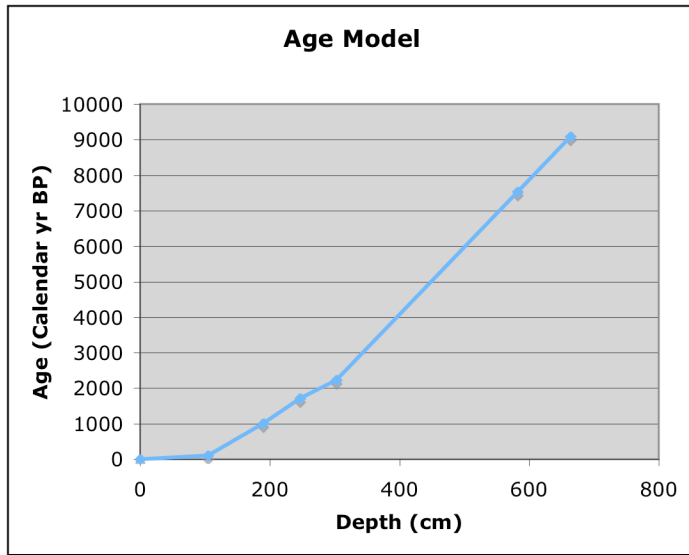


Figure 1. Age model for Founders Pond Core constructed using linear interpolation between dates.

Literature Cited

Bassett, I.J. & Terasmae, J. (1962). Ragweeds, *Ambrosia* species, in Canada and their history in postglacial times. *Canadian Journal of Botany*, **40**, 141-150.