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
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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