Purpose
Sediment samples are treated with hydrogen peroxide to destroy most organic matter, leaving charcoal intact. Samples are passed through a 125 μm sieve and the >125 μm fraction is kept, dried onto a petri dish, and counted. This relatively large charcoal is likely to come from local fires rather than ones farther away, thus recording fire history in the immediate vicinity of the lake (for a thorough review of procedures and interpretations, see Whitlock and Larsen 2001).

Materials
50 mL Erlenmeyer flasks (24)
Plastic 100x15 Petri dishes (24)
Core cleaning microslides (with rounded corners)
Sharpie
Cut-tip 3 cc syringes (24) or other volumetric samplers
Wash bottle of 6% hydrogen peroxide (H_2O_2) mixed from 30% standard solution
Data sheets (electronic or hard copy)
DI water (low purity is OK)

Equipment
Dishpan
Wash basket
Drying oven
Binocular microscope
Counting stage ("coaster") to fit Petri dishes (see Fig. 1)
Count sheets (see Fig. 1)

Safety
Gloves, lab coat, goggles when working with hydrogen peroxide

Day 1

Fill out data sheet with sample depths, lake name, your name, date, volume used, etc. Label each flask with core name and sample depth.

Clean surface of core by scraping with round-cornered microscope slide.

Take 24 1.0 cc samples from predetermined intervals (e.g., every 0.5 cm) down the core. (2 cc samples have been necessary near the surface of some cores to get enough charcoal to count.) Put each sample into a clean, labeled flask. Drop each syringe into a dishpan of soapy water when you're finished with it.

Add ~25 mL 6% H_2O_2 to each flask. Swirl gently to disaggregate sediment. If sediment sticks to side of flask, rinse down with a few mL of H_2O_2.

Cover flask with aluminum foil cap. Place in drying oven at 50°C for ~24 hours. Don't allow the samples to dry out.

Disassemble and wash syringes. Use a wash basket for the rinsing and drying steps.

Day 2

Label sides of the bottom half of each Petri dish with core name and depth and a vertical line to align with a designated point on the coaster.

Remove samples from oven and pour each through a 125 μm sieve. Rinse gently with DI water until clean.

From above, rinse material to one edge of the sieve. Then, holding the sieve sideways (i.e., with the plane of the sieve perpendicular to the floor), rinse from the underside of the sieve into the Petri dish while turning the sieve upside down.

Add ~10-15 mL 6% H_2O_2 to each dish.
Optional: add ~2mL detergent solution (dilute [0.5%] sodium hexametaphosphate) to each dish to disperse charcoal.

Place dishes in drying oven. Cover with paper towels or sheet of foil to prevent contamination. Leave at 50°C until all liquid is evaporated (12-48 hours). When dry, the charcoal pieces (along with various other non-charcoal components such as other plant fragments, mineral grains, sponge spicules, etc) will be stuck to the bottom of the Petri dish. Place lid on Petri dish. *Note:* due to static electricity, some charcoal pieces may stick to the lid. Do not attempt to brush off, instead, count these pieces separately.

Counting Procedure

Set-up: To make a counting stage ("coaster," see Fig. 1), take two squares of cardboard just larger than the Petri dish and tape graph paper to one side, face up. Cut a hole in the other piece for the Petri dish to sit in. Tape these two pieces together so that when the Petri dish sits in the coaster, the graph paper can be seen through the bottom of the Petri dish. Lines may be added on to the graph paper to match the counting sheet. You may want to subdivide each square into quadrants, as this makes it easier to keep track of what has been counted. (A Sabrina-modified version of the counting sheet is available to match what is actually seen in the Petri dish, which is round, but the counting sheet is square.) Draw a line on the coaster to match up to the ones on the Petri dishes. If you ever need to go back and check something, this will help you locate it.

We have used two counting procedures, one simple and one more complex. The simple one just involved a count of grass (which is easily distinguished) vs. non-grass charcoal. The more complex counting system counts frequencies of different categories, which are

described in Beth's PowerPoint presentation [which is available on the Core Lab lunchroom PC now, and may be on the Website eventually]. The basic approach is just to count a quadrant of the dish at a time (but this will definitely vary – some people may want to count in rows or columns), and then tally up everything in each category type.

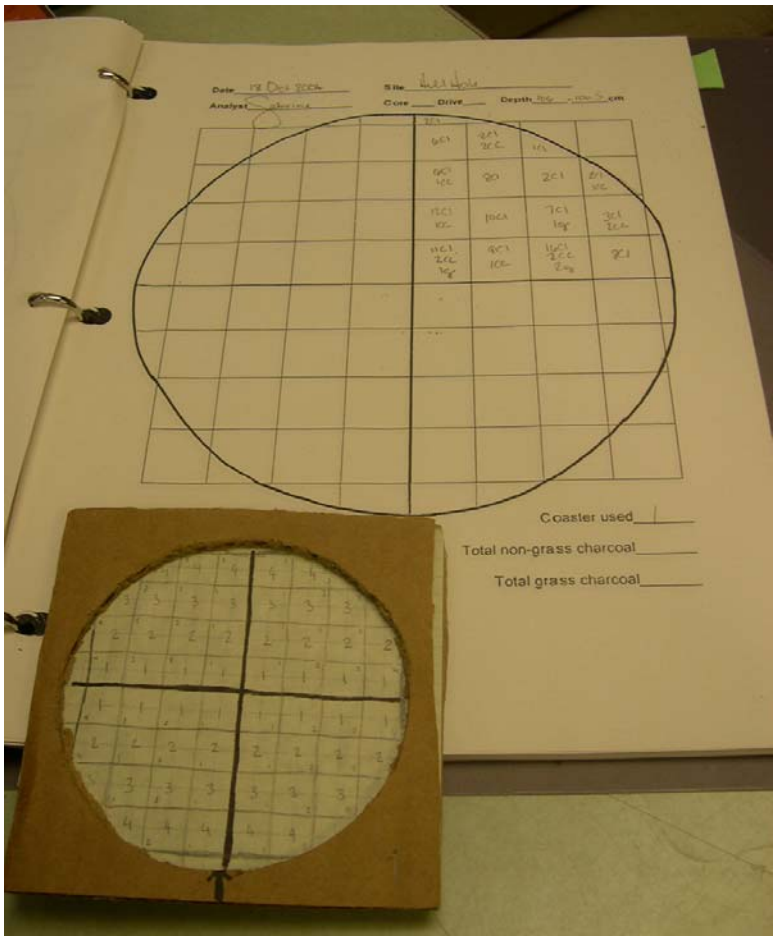

Figure 1. Counting sheet and "coaster" used to hold Petri dish. Photo courtesy of S. Curran.

Reference:

Whitlock, C. and C. Larsen 2001. Charcoal as a fire proxy. *In* J.P. Smol , H.J.B. Birks and W.M. Last, eds., *Tracking Environmental Change Using Lake Sediments. Volume 3: Terrestrial, Algal, and Siliceous Indicators.* Kluwer Academic Publishers, Dordrecht, The Netherlands.