MEASURING & SAMPLING SOILS OF STREAMBANKS

Have you seen people out on streambanks with a funny type of aluminum tripod and hanging tape, or seen others driving steel with a hand-held sledge? It is all part of a study.

Massey Burke hands the soil sampler up to Philip Brownsey

Lake Champlain suffers from excess phosphorus, and reduction of phosphorus is a high priority for the Lake Champlain Basin Program. The "point source" phosphorus pollution from wastewater treatment plants makes up only 20% of the phosphorus entering the lake. The rest (80%) comes from general runoff from streets, yards, and agricultural fields which is called "nonpoint source" pollution. A good bit of money has been put toward upgrading treatment plants, establishing best management practices on farms, reducing road runoff and educating the public about lawn care. However, no one has looked at the possibility of eroding streambanks as a possible significant contributor to phosphorus loading.

That is what BRASS is trying to determine with a small grant form the Lake Champlain Basin Program. With only a year to study phosphorus contribution from eroding embankments, BRASS had to select banks we were fairly sure would erode whether we have high water conditions during the spring or not. (Ideally, we would be looking at streambanks with varying soils and adjacent land uses.) So, BRASS selected nine badly eroding stream reaches that are mostly on agricultural lands or are fields formerly used for agriculture.

Massey drives the soil sampler into the base of a streambank.

This year, we are establishing five cross-sections at each of the nine sites, measuring the bank profiles at the cross-sections, driving at least three 4-foot pieces of steel rebar into each bank cross-section, and taking at least three soil samples from different soil horizons along the bank profile.

Over the winter, the BRASS laboratory will analyze the amount of phosphorus in the soil samples, using a desorbed phosphorus analysis that predicts the amount of phosphorus that would be lost to the river if the soil were eroded. (The aquatic equivalent of this test, dissolved phosphorus, has been used already in several aquatic studies in the Champlain Valley, and should allow BRASS some direct comparatives to these other works.)

Then, early next summer we will again measure the profile of all of the 45 cross-sections. The measurements, plus the amount of steel rebar that is exposed, will allow us to document the amount of soil lost during one season. This can be correlated with the laboratory analyses to arrive at the total phosphorus contributions from the cross-sections.

Dennis Kalma measuring with plumbed tape off the ruled horizontal rod.

But, what's the aluminum tripod? It is a rig conceived of by Dennis Kalma, the BRASS Laboratory director who is the principal investigator for this study. Two aluminum legs, joined at the top, then spread and placed at the bottom of the streambank, hold up the third aluminum rod that butts up to a steel pin driven into the top of the bank. This third horizontal rod is ruled at every tenth of an inch and is leveled and attached to the two legs and to the steel pin. Then, either a folding rule or a cloth measuring tape that is weighted with a plumb bob is used to measure the bank profile every tenth of an inch. (Even though BRASS owns a surveyor's laser level, this home-made device is far more precise.)

If you drive the steel rods and pins into the bank, how do you find the same exact spots next summer? Good question. Each pin at the top of the bank is backed up by another pin about 4-feet away, in case flood water or ice gouge out huge cavities. The pins are sighted out across the river to be able to record their degree inclination, then they are sighted back to a single monument pin and measurements between pins are carefully recorded.

And, how do you keep the soil samples separate? Each soil sample is placed into a labeled plastic bag. For double assurance, that bag is placed within another containing a paper label. Field forms that are used to record the all bank profile measurements are also used to note which soil samples came from what locations, how many bank pins were installed, and how many duplicate soil samples were collected.

Dennis with a mirror-sighting pocket transit

Philip removes the soil sample into a pre-labeled plastic bag.

Fussy, fussy, time consuming documentation, but that is what a lot of science is about. Fortunately, Massey Burke, the Student Conservation Association volunteer who helped plant trees on Jerold Sherman's floodplain in the spring, came back to help us for a week during her vacation. She brought with her another SCA volunteer, Philip Brownsey.