Vermont Monitoring Cooperative 200-Year Soil Monitoring Study
Field Documentation of 2002 Sampling, Initial sample year: Year Zero
July 2003

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Two study areas were used for the location of the 5 Long-term Soil Monitoring plots: 3 plots around Mount Mansfield and 2 plots in the Lye Brook Wilderness Area. The fieldwork was divided into the following steps:

1. Relocation of soil plot corners
2. Set-up of sampling grid
3. Soil pit digging
4. Evaluation of each pit to determine target horizons for sampling
5. Soil descriptions
6. Soil sampling for general long-term study
7. Soil sampling for mercury long-term study
8. Refilling pits
9. Initial sample handling
10. Establishing permanent corner markers and documenting locations

All steps were completed in 2002 with the exception of the final step, which was done in 2003.

The general process used on all plots is as follows, with specific details and variances documented in the table below.

Relocation of Soil Plot Corners
One field crew was responsible for relocation of soil plot corners, previously established during the study design phase. In no cases were the exact corners used, since the initial locations were more general than this detailed plot establishment. A tape and compass were used to measure the length of each 50-meter side. A wooden dowel was placed at each corner as a temporary marker, then baling twine was used to mark each side for field sampling orientation. The plot diagonals were measured to ensure that side lengths and corner angles were as close as possible to an exact square.

Set-up of Sampling Grid
The 50-meter soil plots were large enough to support a grid of 100 potential soil sampling locations over a 200 year period, using a 10 X 10 grid of 5, m2 sampling points. A random numbers system was used to determine which of the 100 potential sampling points would be used during this sampling period, and each soil site had its own array of sample plot numbers. To accurately establish the grids, the south and north sides were flagged every 5 meters, and twine stretched perpendicular to the sides to use as a guide for then measuring to each sampling point. Flags were labeled and placed at each of the 4 sampling point corners.

Soil Pit Digging
Within each sampling point, a 0.7 to 1-m2 soil pit was dug at roughly the center point (depending on obstacles). Tarps were used to hold pit contents to avoid contamination of surrounding soil.

The organic layer was separated from the other soil to facilitate replacing this layer following sampling. Pits were of variable depth (a few cm into the C horizon). Where bedrock prevented adequate sampling of multiple horizons, attempts were made to relocate the pit within the 5-m2 sampling point.

Evaluation of each pit to determine target horizons for sampling
Once all 10 soil pits were dug, examinations were made to determine which horizons would be sampled at that site. At a minimum, an organic layer sample and several other soil horizons were sampled. Not all horizons could be sampled in each pit, based on presence and volume of soil at each horizon.

Soil Descriptions
Used standard USDA-NRCS protocols.

Soil Sampling for General Long-term Study
After soil descriptions were completed, samples were taken from the side of the pit that was described, using a knife and trowel. If Oe was sampled, a larger area of soil surface was peeled backwards and "mined". All samples were collected into 60 ounce clear polyethylene sterile bags (Fisher Scientific), and labeled with soil site, soil pit number, and date. Sample size was dependent on the thickness and continuity of the described horizons.

Soil Sampling for Mercury Long-term Study
Following the general soil sampling, additional samples were collected for mercury analysis using sampling methods that prevent atmospheric contamination of the samples.

Refilling pits
Once all the soil samples were collected, soil from the tarps was replaced into the pits, and topped off with the original organic layer.

Initial sample handling
All samples were collected in 60 ounce clear polyethylene sterile bags (Fisher Scientific). Sample size depended on thickness and continuity of the described horizons.

Lye Brook samples, collected in the field on July 31 and August 1, were photographed by Joe Ibrahim and put out to dry on clean lab countertops (epoxy resin surface?) in Room 20, Hills Building, UVM. All Oa samples were processed August 2, Oe and E August 5, Bhs August 6, Bw and BC August 7. Samples were out of direct sunlight and room temperature was approximately 25 C (air conditioned).

Samples from Mt. Mansfield Ranch and Forehead sites were dried in the same location as the Lye Brook samples after field sampling on August 12 and 13th. Samples from Mt. Mansfield Polkadot site were air-dried in a different room (Hills 226) on black plastic (the same plastic used in the field) after field sampling on September 16th. All samples were stored in the storeroom of Hills 226 in their original plastic bags.

Establishing Permanent Corner Markers and Documenting Locations, 2003

The following field season, plots were re-entered to establish permanent metal stake corner markers and to collect accurate location documentation. Stakes placed in corners are metal with a top brass survey marker "VMC 2002 Soil Plot" and the specific corner. At Lye Brook Wilderness Area, stakes were placed so that the survey markers are below the duff layer. At Mt. Mansfield, stakes are just above the soil surface. At each corner, 2 witness trees were marked using two diagonal bark scribes at DBH and one scribe below ½ m, and a distance and azimuth (magnetic) to the corner was recorded. In addition, the GPS coordinates were captured using a Trimble. Under canopy cover, the accuracy of the GPS corner locations is estimated at 1-3 m. It is anticipated that future relocation of soil plot corners will be accomplished using GPS coordinates to enter the general location, and a metal detector to locate the corner stakes. Witness tree markings will aid corner relocations over short time periods (10-20 years) but will need to be re-established periodically.

People	Affiliations	Location
Don Ross	University of Vermont	Burlington, VT
Sandy Wilmot	Vt Forestry Division	Essex Jct., VT
Scott Bailey	US Forest Service, Northeast Research Station	Durham, NH
Thom Villars	Natural Resource Conservation Service	White River Jct., VT
Nancy Burt	US Forest Service, Green Mountain National Forest	Rutland, VT
Joe Ibrahim	University of Vermont	Burlington, VT
Judy Rosovsky	Vermont Monitoring Cooperative	Essex Jct., VT
Tom Simmons	Vt Forestry Division	Essex Jct., VT
Ron Wells	Vt Forestry Division	Barre, VT
Jennifer Supple	Vermont Monitoring Cooperative	Essex Jct., VT
Audrey Leduc	University of Vermont	Burlington, VT
Guin Fredricksen	University of Vermont	Burlington, VT
Austin Jamison	University of Vermont	Burlington, VT
Rob (ESF)		
Stewart Clark	US Geological Survey	Montpelier, VT
Jamie Shanley	US Geological Survey	Montpelier, VT
Ann Chalmers	US Geological Survey	Montpelier, VT
Larry Walters	US Forest Service, Green Mountain National Forest	Rutland, VT
Jenna Casey	US Forest Service, Green Mountain National Forest	Middlebury, VT

Soil Site	Set up date	Set up crew 1	Set up crew 2	Set up crew 3	Set up crew 4	Set up crew 5	Sampling date	Sampling crew 1	Sampling crew 2	Sampling crew 3	Sampling crew 4	Sampling crew 5	Mercury sampling date	Mercury sampling crew 1	Corner Marking crew 1	Corner Marking crew 2	Corner Marking crew 3	Corner Marking crew 4	
Forehead at Summit	8/13/2002	Don Ross	Sandy Wilmot	Tom Simmons	Audrey Leduc		8/14/2002	Scott Bailey	Thom Villars	Judy Rosovsky	Audrey Leduc		8/14/2002	Stewart Clark	Larry Walters	Nancy Burt	Sandy Wilmot	Thom Villars	
Ranch Brook	8/12/2002	Don Ross	Sandy Wilmot	Ron Wells			8/13/2002	Scott Bailey	Thom Villars	Don Ross	Sandy Wilmot		8/13/2002	Stewart Clark	Larry Walters	Nancy Burt	Thom Villars		
Underhill Polka Dot Trail	9/17/2002	Don Ross	Sandy Wilmot	Jennifer Supple			9/17/2002	Scott Bailey	Thom Villars	Guin Fredricksen	Austin Jamison	Don Ross	9/17/2002	Jamie Shanley	Larry Walters	Nancy Burt	Thom Villars		
Kelley Stand Road	7/31/2002	Don Ross	Sandy Wilmot	Judy Rosovsky	Thom Villars	Scott Bailey	8/1/2002	Scott Bailey	Thom Villars	Audrey Leduc	Rob (ESF)	Don Ross	8/1/2002	Ann Chalmers	Larry Walters	Nancy Burt	Sandy Wilmot	Jenna Casey	
Branch Pond Trail	7/31/2002	Joe Ibrahim	Sandy Wilmot	Judy Rosovsky			8/1/2002	Scott Bailey	Thom Villars	Audrey Leduc	Rob (ESF)	Don Ross	8/1/2002	Ann Chalmers	Larry Walters	Nancy Burt	Sandy Wilmot	Jenna Casey	

Soil Site	Stand Description	Elevation (meters)	Last known harvest	Natural disturbance	Notes
Forehead at Summit		1140			
Ranch Brook		590			
Underhill Polka Dot Trail		695			
Kelley Stand Road		739			
Branch Pond Trail		808			