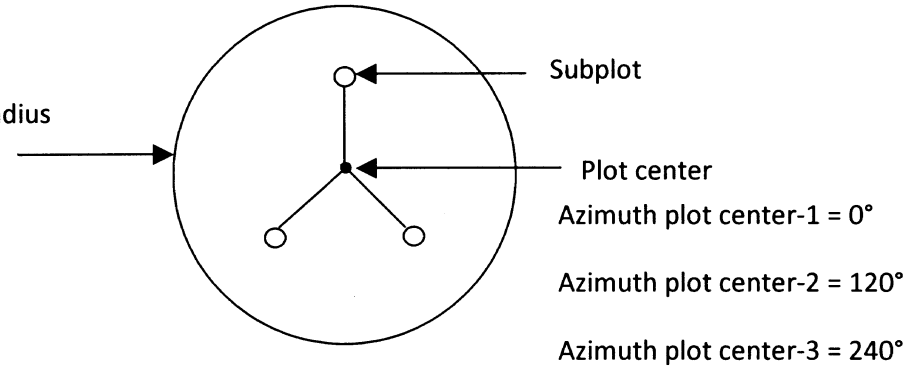
Field Sampling Protocol

1. Introduction

The following forest floor and soil sampling protocol was developed as part of the FIS- Deep soil C project, a joint effort between USDA FS and the University of Minnesota.

The project aims at gathering information concerning soil organic carbon (SOC) content in forest soils up to 1 m depth.

2. Plot layout



Tower Plots Extended

3. Plot location identification

1) Sites selected needs to fall into the FIA definition of forest and belong to a particular soil type.
2) Identify the center of the sampling site and take GPS coordinates. Avoid the point to fall on an area of extreme disturbance such as borrow pit, road grade, etc.
3) Record % hill slope feature if applicable by using a clinometer.

4. Forest floor sampling

For each of the three subplots within the plot; the forest floor will be measured for total forest floor and litter depth, and a sample will be collected for laboratory analysis.

1. Subplot 1 is located 12 feet from plot center due north (0°), subplots 2 and 3 are located at 120 degrees angle from each other.
2. Place a 12 inch bike tire at the center of subplot 1. Using a compass, place 4 soil stakes on the inside of the tube at north, south, east, and west directions.

3. With a sharp trowel tip, cut around the inside of the bike tube through the layer of forest floor, up to the mineral soil layer.

4. Gently lift up on the outer edges of the cut segment of forest floor and pile towards the middle of the circle.

    - ❖ The forest floor should lift up fairly cleanly from the mineral soil surface if cut through.
    - ❖ Collect the entire forest floor within the tire and place in properly labeled paper bag.
    - ❖ Ex for labeling bags correctly:

Site 6, FF, 0°, September 12, 2010

    - ❖ Be careful to correctly identify the boundary between the bottom of the forest floor and the top of the soil surface.
    - ❖ Do not collect any soil with the forest floor sample.
    - ❖ When collecting the forest floor be careful to remove any woody debris and living plant material.

5. Double bag forest floor sample into first a paper bag then a plastic bag properly labeled.

    - ❖ It is important to keep the plastic bag slightly open for ventilation.

6. When the entire forest floor has been removed from the circle, the tire rim can be removed and set aside.

7. Measure to the nearest mm depth of the total forest floor at each direction (north, east, south, and west).

    - ❖ These depths should be easily observable if ruler is placed against the newly cut outer rim of the removed surface.

6. Soil sampling

Soil samples are collected in the same plot where the forest floor was collected. Samples are taken at depths 0-10 cm, 10-20 cm, 20-50 cm, 50-75 cm, and 75-100 cm. Place a tarp next to sampling area and make sure to deposit soil from pit on tarp.

1. From the specially made FIA corer, insert the two metal sleeves. Each metal sleeve will collect a sample of 10 cm depth.

2. Pound core end into newly cleared soil surface and stop when reaching a depth corresponding to the bottom of the corer.

3. To remove the core from the soil, gently wiggle the core in the soil back and forth to loosen it and then pull straight up.

4. Cut any soil that protrudes out of the end of the core.

5. Over a plastic sheet or tarp so as not to lose any soil, unthread the core from the slide hammer, being careful to collect on the sheet any soil that might fall out.

6. With the core held horizontal, gently push the metal sleeves out from the bottom end of the core. The first metal sleeve to come out is the 0-10 cm of soil, the second sleeve is the 10-20 cm of soil. The 0-10 cm sleeve should separate on its own from the other sleeve. If not, use a sharp trowel to cut the sleeves apart as they slid out.

7. Bag and label both the 0-10 cm and 10-20 cm samples by dropping the metal sleeve into the plastic bag and then removing it from the soil *inside the bag.* Collect any soil that may have fallen onto the plastic sheet placed on the ground into the appropriate sample bags.

8. Using a small wire brush clean the core and copper rings and reassemble the parts.

9. Once the core has been reassembled take a small shovel and dig a pit in the same location of the core and leaf litter collection.

    - ❖ The pit needs to be dug to a depth of 20 cm.
    - ❖ When measuring the depth use a ruler and level with the soil surface.
    - ❖ It is important to remove any roots that may be in the way of the auger.

10. Using a bucket auger collect soil from 20-50 cm, then every 25 cm to 1 m.

    - ❖ A different type of auger might be used depending on soil type. For example, a closed bucket auger is best for sandy soil, whereas an

open bucket auger is preferable in presence of soils with higher clay content.

- ❖ It is important to record in field spreadsheet the type of auger used and it's diameter because this will affect future bulk density calculations.

11. Place each sample into appropriately labeled plastic bags and double bag each sample.
12. If a limiting layer is reached and no further sampling can occur, record the depth.

Repeat entire sampling procedure for sites located at 120 and 240 degrees from center of plot.

7. Pedon description

For each soil sampling pit:

1. Describe the pit face from 0-20 cm by recording number of soil horizons, depth of each horizon, color (Munsell Color Book), and estimated texture based on feel method.
2. Below 20 cm, record the color and texture of each soil increment.

Before moving to a different site fill in the pit.