



Forest Health Monitoring Soil Measurements

Important Initial Findings

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ABSTRACT

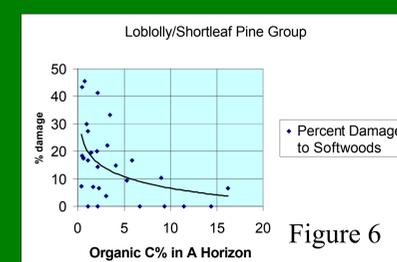
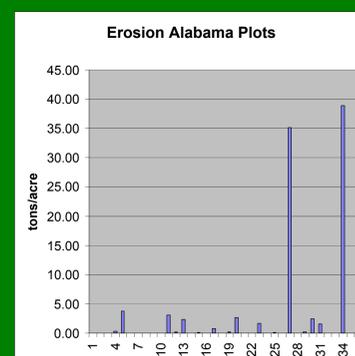
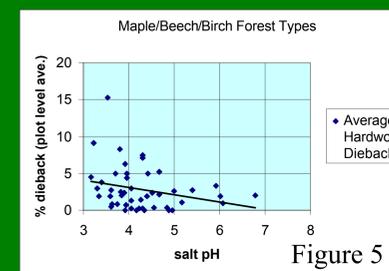
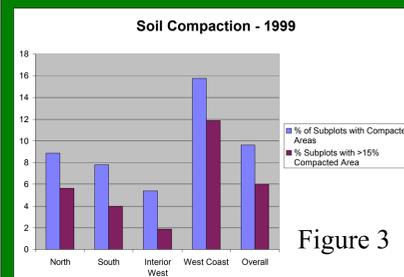
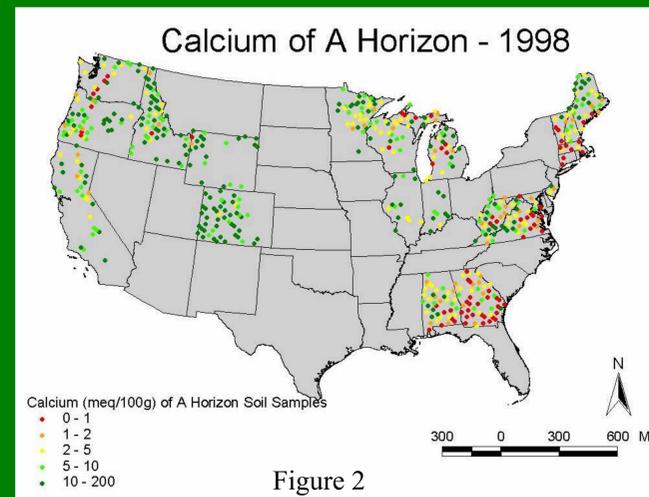
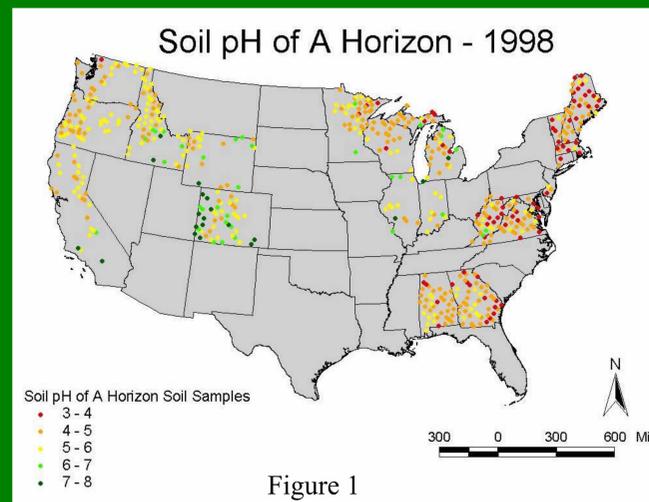
The national Forest Health Monitoring program provides annual evaluations of the ecological condition of forests for the United States. Approximately one thousand plots are visited each year on a five year remeasurement cycle. Measurements designed to assess important issues related to soils were added in 1998. Observational measurements provide for a assessment of erosion potential and evidences of soil compaction. Soil samples are collected to analyze for soil nutrients, carbon and acidity. Soil erosion potential was generally low with the exception of a few recently disturbed sites. In contrast, evidence of soil compaction was found to be widespread. Forests showing symptoms of poor health were often found on the more nutrient deficient soils. Soil acidity reflected expected patterns related to soil genesis and acidic deposition. Bulk density measurements have recently been added to allow for an assessment of changes in soil carbon pools.

INTRODUCTION

The Forest Health Monitoring (FHM) program has been established in the United States to address environmental concerns related to the impacts of air pollution, acid rain, global climate change, and land management practices on forest ecosystem health. An important component of the FHM program is a network of permanent Detection Monitoring plots used to detect status and trends in the condition of forests. This year these plots were incorporated as Phase 3 of the Forest Inventory and Analysis (FIA) program. The plots are found on ALL forest lands (public or private) with one plot for each 100,000 acres of forest land. States have the option of intensifying the network.

OBJECTIVES

To provide an overview of initial findings from the program
To encourage the use and distribution of FHM soils data and information



MATERIALS AND METHODS

Soil compaction: Field crews identify the presence and extent of soil compaction. After estimating the extent of compaction on a subplot, crews record evidences of compaction and the type of compaction.

Soil erosion: Measurements taken are used to estimate soil erosion potential with the Revised Universal Soil Loss Equation. These include % cover estimates (bare soil, litter cover and depth, plant cover and height), slope and slope length.

Soil chemistry: FHM crews collect soil samples from three locations on FHM plots. Forest floor samples are obtained at one of the sampling locations by removing a 30 cm diameter circle. Litter samples are analyzed for total C and N. Beginning in 2000, soil samples have been collected from the 0-10 and 10-20 cm depths using bulk density corers. Soil samples are analyzed for total C and N, soil pH (H₂O and 0.01M CaCl₂), Bray1 P, and exchangeable cations.

RESULTS

Soil compaction The most common evidence of compaction by crews was an increase in the density of the soil in the compacted area when compared to adjacent non-compacted areas. The most common type of compaction identified by crews was compacted trails. Figure 3 presents the percentage of subplots with compacted areas as well as compacted areas exceeding the 15% threshold. It is apparent that the West Coast region identified soil compaction on a larger percentage of their plots than the other regions. When compaction occurred, it often exceeded a 15% threshold.

Soil erosion is generally not a problem on forest plots unless recent disturbance has resulted in bare soil being left exposed. (Figure 4).

Soil Chemistry: Figures 1 & 2 provide some preliminary examples of the regional nature of results provided by the FHM program. Soil chemistry can be a contributing factor to forest health. Forests of the maple/beecech/birch group have higher levels of dieback at lower pH's (fig. 5). Forests of the loblolly/shortleaf pine group are more likely to show symptoms of of tree damage at lower levels of soil organic matter (fig . 6)

CONCLUSIONS

The FHM program provides a unique regional and national view of forest soils and their relationship to forest conditions.

If you have an interest in the FHM database, please send us a note.