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Soil Organic Carbon Content and Quality in Post-Agricultural Northern Hardwood forests

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Abstract
Agricultural practices are known to diminish soil organic carbon (SOC) stocks and alter carbon quality. We surveyed a diverse set of sites in heterogeneous landscapes to determine past land use histories and ages of agricultural abandonment in order to examine changes to and spatial controls on soil carbon pools. Soils were sampled using quantitatively excavated pits, to the extent of the rooting zone. Three regions (i. western New England (WNE); ii. southern Wisconsin; iii. northern Wisconsin) of northern hardwood forests with different patterns of agriculture abandonment, varying soil types and properties, and differing climates were examined. Carbon (C) and nitrogen (N) concentrations were measured and contents calculated using bulk-density relationships. In WNE, soils formerly used for agricultural practices accumulated soil organic carbon (SOC) at a rate of 0.33 Mg ha-1 y-1 for the first century of forest regeneration. Formerly plowed soils accumulated C in the organic (Oe + Oa), 0-10 cm, and deep mineral soil (> 20 cm), while formerly pastured or hayed soils accumulated C in the organic horizons and 10-20 cm portion of the mineral soil. Sites used for subsistence logging showed no accumulation trends. As expected, N accumulated with C, although the patterns of N accumulation were more varied. Physical fractionation of the top 20 cm of mineral soil (the maximum depth to which these soils were plowed) showed that the pool of C associated with soil minerals increased with stand age (0.04 Mg ha-1 y-1), but that modern agricultural soils possessed as much C in this fraction as the oldest forests. A two-month incubation of these soils demonstrated 48% more C was respired (as CO2) in modern agricultural fields than abandoned forests. Multivariate regression tree results demonstrated that the time since agricultural abandonment and climate were important determinants of SOC amounts within the western New England landscape. When those sites were compared with other northern hardwood forest soils from the Adirondack region of New York, the Green Mountains of Vermont, southern Wisconsin and northern Wisconsin, growing season degree-days (GSDD) was the best predictor of SOC totals (48% sums of squares explained), and the warmer regions heavily used for agricultural purposes were separated from the cooler montane forests. These results suggest that fundamental differences exist between the soils that are useful for agricultural purposes and the land that was abandoned or left undisturbed, and demonstrate the importance of regional soil carbon estimates.

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SOIL ORGANIC CARBON CONTENT AND QUALITY IN POST-AGRICULTURAL NORTHERN HARDWOOD FORESTS

John D. Clark

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Soil organic carbon content and quality in post-agricultural northern hardwood forests

DEDICATION

For Jan and Gary Knechtel

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ABSTRACT

SOIL ORGANIC CARBON CONTENT AND QUALITY FROM POST-AGRICULTURAL NORTHERN HARDWOOD FORESTS

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Arthur H. Johnson

Agricultural practices are known to diminish soil organic carbon (SOC) stocks and alter carbon quality. We surveyed a diverse set of sites in heterogeneous landscapes to determine past land use histories and ages of agricultural abandonment in order to examine changes to and spatial controls on soil carbon pools. Soils were sampled using quantitatively excavated pits, to the extent of the rooting zone. Three regions (i. western New England (WNE); ii. southern Wisconsin; iii. northern Wisconsin) of northern hardwood forests with different patterns of agriculture abandonment, varying soil types and properties, and differing climates were examined. Carbon (C) and nitrogen (N) concentrations were measured and contents calculated using bulk-density relationships. In WNE, soils formerly used for agricultural practices accumulated soil organic carbon (SOC) at a rate of 0.33 Mg ha^{-1} y^{-1} for the first century of forest regeneration. Formerly plowed soils accumulated C in the organic (Oe + Oa), 0-10 cm, and deep mineral soil (> 20 cm), while formerly pastured or hayed soils accumulated C in the organic horizons and 10-20 cm portion of the mineral soil. Sites used for subsistence logging showed

no accumulation trends. As expected, N accumulated with C, although the patterns of N accumulation were more varied. Physical fractionation of the top 20 cm of mineral soil (the maximum depth to which these soils were plowed) showed that the pool of C associated with soil minerals increased with stand age (0.04 Mg ha^{-1} y^{-1}), but that modern agricultural soils possessed as much C in this fraction as the oldest forests. A two-month incubation of these soils demonstrated 48% more C was respired (as CO2) in modern agricultural fields than abandoned forests. Multivariate regression tree results demonstrated that the time since agricultural abandonment and climate were important determinants of SOC amounts within the western New England landscape. When those sites were compared with other northern hardwood forest soils from the Adirondack region of New York, the Green Mountains of Vermont, southern Wisconsin and northern Wisconsin, growing season degree-days (GSDD) was the best predictor of SOC totals (48% sums of squares explained), and the warmer regions heavily used for agricultural purposes were separated from the cooler montane forests. These results suggest that fundamental differences exist between the soils that are useful for agricultural purposes and the land that was abandoned or left undisturbed, and demonstrate the importance of regional soil carbon estimates.

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Chapter One

INTRODUCTION

Soils may act as either a source or a sink of atmospheric CO2, and comprise about two-thirds of terrestrial carbon (1500-2400 Gt-C) (Jobbagy and Jackson, 2000; Amundson, 2001). Land use and management can influence soil organic matter dynamics as well as soil carbon stocks by increasing or decreasing rates of decomposition (Kirschbaum, 2000), changing harvest intensity and fire frequency (Johnson, 1992), increasing erosion (Lal, 2003), and altering vegetation and fertility practices (Lal et al., 2003). Agricultural uses have been shown to decrease carbon stocks, however better organic matter management (e.g. no tillage) can improve soil fertility by increasing soil organic matter (SOM) through the limitation of erosional losses and soil aggregate disruption (Jastrow et al., 2007). Organic matter is composed of the living biomass of plants and soil biota, as well as the unrecognizable plant and animal material that has been altered physically and chemically (mostly by soil microorganisms) to the level that it no longer possesses its original structure, known as humus (Amundson, 2001; Brady and Weil, 2007). SOM composition is highly variable, both physically and chemically, and this wide-range of properties adds to the carbon accounting challenge.

Forest to agricultural conversions disturb soils and result in reductions of SOC because inputs from crops are less than those from forest vegetation, soil aggregates are disturbed, conditions for decomposition are improved (e.g. tillage-induced aeration) and erosion increases (Haynes, 2005). The literature demonstrates a wide range of results when agricultural land is returned to native forest or grassland. However, most studies have shown an accumulation of SOC when these conversions occur (Zak et al., 1990; Houghton, 1995; Knops and Tilman, 2000; Knops and Bradley, 2009). Studies synthesizing the literature suggest that SOC increases by 22 – 55% in formerly plowed soils and that formerly pastured land may accumulate or lose soil C (Johnson and Curtis, 2001; Guo and Gifford, 2002; Murty et al., 2002).

An emphasis has been put on understanding the carbon sink potential of soils over the past few decades as the knowledge and understanding of current climate changes has expanded. The main factors driving this research are that, (i) improvements in soil organic matter management, both on the farm and in the forest, could improve the amount of CO2 removed from the atmosphere via photosynthesis, then sequestered in the soil pool; (ii) there is the possibility that soil respiration rates will inrease as growing seasons extend and air temperatures increase, leading to a positive feedback in which greater decomposition allows temperatures to rise at an ever greater rate (Sollins et al., 2007). Due to the inherent variability in soils, management is performed on a local and regional basis and measurements need to be made at this level in order to answer the unknown questions (Heath and Smith, 2000; Heath et al., 2003).

The northeastern U.S. has acted as a C-sink over the past 150 years as rural agricultural land was abandoned and returned to forest. Biomass C and soil organic matter have both increased over this interval (Compton and Boone, 2000; Hall et al., 2002). In New England, European settlers cleared the land during the 18th and early 19th centuries for homesteads and agricultural purposes. The peak of agricultural use in the region occurred about mid-19th century at which point, people began to leave their farms for better employment opportunities in urban centers or for more productive land in the midwestern states (Foster et al., 1998; Foster et al., 2002).

In New England, measurements of soil carbon following release from agricultural use have demonstrated a range of accumulation rates (0.34 – 0.51 Mg ha^{-1} y^{-1}), and study results reflect the fact that soil type, elevation, and vegetation (or forest) were controlled for, as well as the land use history and stand age (Hamburg, 1984; Gaudinski et al., 2001; Hooker and Compton, 2003). However, New England comprises a diverse range of climates, vegetation types and soils, and how land use conversions have influenced SOC amounts is not well understood at broader, regional scales. Few studies have examined carbon accumulation trends in the northern hardwood forests of the Great Lakes region. (Tang et al., 2009) measured carbon stocks in four forests, none of which were disturbed by agricultural practices. In that study, C accumulated over time after an initial loss upon forest regeneration. In Wisconsin, pine plantations are grown on abandoned, often marginal, agricultural soils as a means of keeping the land profitable (Chittenden, 1911). The studies using chronosequences of pine plantations are consistent with the notion that SOC accumulates after crops are replaced by woody species, however the observations from these studies are over short periods of time (about 50 years) because softwood trees are usually harvested at intervals of 40 – 75 years (Wilde, 1964; Pregitzer and Palik, 1996). This thesis aims to improve estimates of carbon stocks in these regions.

Soils in the northeastern and north-central U.S. are underlain by glacial deposits (till, outwash, loess, stratified drift), left behind after the last retreat of the Laurentide ice-sheet (Fenneman, 1938). In western New England, lodgement and ablation tills are the main surficial deposits, with outwash and stratified drift comprising a smaller proportion of the landscape. Soils derived from till are often rocky and highly heterogeneous. In the area of southern Wisconsin we sampled, glacial loess overlies sandstone deposits (Soil Survey Staff, 2010). The soils sampled in northern Wisconsin are derived mostly from glacial outwash deposits and some till. By sampling the range of geologies and soils present in these regions we can examine a host of factors (e.g. parent material, soil texture, elevation, slope, and climate) that can be related to SOC content (Jenny, 1980).

There is likely limited potential for most of the soils we sampled to improve on the amount of SOC currently being stored, unless dramatic climate shifts or socioeconomic pressures force farmers to abandoned their land. Much of the farmed land in the northeastern U.S. was left to return to forest more than 50 years ago, and is probably nearing the pre-agricultural storage amount. In the upper-midwest, much of the land remains profitable for maize, soy, and dairy farming and this land is unlikely to be returned to forest. The same can be said for the small portion of the Berkshire-Taconic landscape that remains in agricultural use. Still, organic matter management can be improved in many agricultural fields and it remains important to quantify the changes in SOC that have taken place over the past two centuries. This thesis contributes to the literature through the measurement of those changes and interpretation of the factors that influence SOC.

The main objectives of the studies contained within this thesis were to (i) determine if the expected C accumulation trends could be observed when sampling over large heterogeneous areas (Chapter 2); (ii) measure the size and rate of the C sink at the landscape level (Chapter 2); (iii) understand how differing agricultural practices have influenced carbon stocks and carbon quality (Chapters 2 and 3); and (iv) determine factors that influence the size and dynamics of C pools and SOC contents (Chapter 2, 3, and 4).

Chapter 2

Chapter 2 quantifies the current SOC stock in western New England soils, while examining the influence of present and former agricultural uses on those amounts. In this study, we developed a chronosequence of sites representative of the region's past history of agricultural practices. Three former uses were examined in conjunction, cultivated cropland, pastured or hayed fields, and woodlot.

General Questions:

(1) What is the rate of carbon accumulation in the post-agricultural land of western New England?

(2) What are the variables that influence SOC amounts on a regional scale?

Chapter 3

Chapter 3 examines the influence of agricultural practices and afforestation on organic matter quality in the western New England region. A subset of the samples from chapter 2 were used to understand the relative stability of SOC. Samples were physically fractionated in order to measure the proportion of C in pools that cycle at different rates. Respired C was also measured to determine the relative amount labile material in soils at different stages of forest regeneration.

General Questions:

(1) Do the agricultural practices of the 18th, 19th, and early 20th centuries impact the current quality of soil organic matter and can we observe this effect over time?

Chapter 4

Chapter 4 is a synthesis of quantitative soil organic matter measurements across a diverse set of sites, spanning the climatic gradient of the northern hardwood forest. Multivariate regression trees are used to examine factors that are contributing to the variability in SOC amounts.

General Questions:

(1) Do agricultural practices have a greater influence on SOC amounts than other variables that have also been found to be determinants of C stocks and is this influence observed over large, spatially distinct regions?

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Chapter Two

Carbon and nitrogen accumulation in post-agricultural forest soils of Western New England

Abstract

The agricultural history of New England is reflected in the species composition, biomass and productivity of the second-growth forests of the region. There are also effects of past agricultural use on soil morphology, soil organic carbon (SOC), nitrogen (N) content, erosion status, and carbon (C) quality, which can be specific to certain types of agricultural use or site-level characteristics. We conducted a survey of SOC amounts in chronosequences comprising 25 second-growth forests whose past uses were determined from floristic characteristics, microtopography, Ap horizons, fence lines, old land-use maps, historical photos, and interviews with landowners. Time-since abandonment was estimated from tree ages, and the chronosequences were bounded by sites currently in agricultural use (n = 6) and minimally disturbed old forest (n = 4). At sites currently used for pasture, hay or row crops, the median amount of soil organic C (to a depth of 55 cm) was 6.5 kg-C m^{-2} compared to 10.3 kg-C m^{-2} in the soils of the oldest forest stands. The chronosequences of aggrading forest sites indicated that nearly all of the SOC-accumulation occurred in the first 100 yr. There were significant trends of SOC-accumulation in the forest floor, upper mineral horizons (0-10 or 10-20 cm) and B-horizons (20-55 cm) of soils that had been used for pasture, hay or row crops, but not for former woodlots. Multivariate regression tree analyses (MRTs) showed

that years since abandonment and growing season degree days (GSDD) were the most important variables related to SOC (68% SS explained). There was a significant trend of N-accumulation (1.3 g-N m^{-2} yr^{-1}) in soils (to a depth of 55 cm) used for cultivated crops, but not for sites used for pasture / hay or woodlot. At its peak in about 1850, farmed land made-up roughly 65% of the region. Steady abandonment of agricultural lands began by the mid 1800's; suggesting that soils of abandoned farms in this region were an important sink for C during the latter half of the 19th century and throughout the 20th century, however their capacity to accumulate SOC in the future is limited.

Introduction

Soil pools of organic C account for about 68% of the carbon in forest biomes (Kimble et al., 2003). World wide, there are approximately 1500-1600 Pg-C of SOC (Schlesinger, 1997; Kimble et al., 2003) to 1 m depth. If greater depths are considered, the SOC pool is perhaps 2400 Pg-C (Batjes et al., 1999; Jobbagy and Jackson, 2000). Changes in SOC pools represent the balance of litter, root turnover, exudates, faunal necromass production, and respiration by soil organisms. Soils of terrestrial ecosystems can be managed to be either sources or sinks of C (Schlesinger, 1990; Turner et al., 1995; Trumbore and Torn, 1997; Kirschbaum, 2000; Post and Kwon, 2000; Johnson and Curtis, 2001; West and Post, 2002; Jandl et al., 2007), and outcomes are determined by the interplay among the global terrestrial carbon cycle, anthropogenic or natural disturbances, and land management (Schlesinger, 1999; Paul et al., 2002; West and Post, 2002; Heath et al., 2003; Kimble et al., 2003).

There is widespread agreement that agricultural practices diminish the amount SOC stored in soil (Zak et al., 1990; Garcia-Montiel and Scatena, 1994; Richter et al., 1999; Goodale and Aber, 2001; Murty et al., 2002; Haynes, 2005; Marin-Spiotta et al., 2009). The studies of Hamburg (1984 a, b) and Hooker and Compton (2003) have addressed C and N-accumulation in post-agricultural land in the northeastern U.S., but determining how much SOC was lost from New England soils used for agriculture is unlikely to be achieved, as it is extremely difficult to determine, at the regional scale, the length of time different parcels were used, the variety of uses, and the SOC content when agriculture began.

The available data from chronosequence studies in New England and the northern lake states are consistent with the generalizations that (1) tillage reduces SOC, and (2) that over periods of 50-200 yr after abandonment of tilled land, SOC accumulates steadily, if not rapidly (Hamburg, 1984b; Knops and Tilman, 2000; Hooker and Compton, 2003; Knops and Bradley, 2009; Tang et al., 2009). Little is known about SOC and N changes in secondary forest soils that previously supported pastures or woodlots. Further, many of the studies that have addressed SOC accumulation have controlled for vegetation and/or soil types and properties, along with the forest age, which limits the amount of information obtainable on the factors controlling SOC in the heterogeneous New England landscapes.

The long-term (> 100 yr) Rothamsted studies of land use conversions are consistent with the generalizations about post-agricultural SOC-accumulation (Poulton et al., 2003). However, other studies from abroad show different results. For instance, Breuer et al. (2006) showed that spatial patterns of SOC were more closely related to parent material and slope than to past land uses, including cultivated cropland, in the Lahn-Dill highlands of Germany. Several synthesis studies suggest that the greatest potential for C-sequestration is in secondary forests on abandoned, plowed agricultural land (Johnson, 1992; Post and Kwon, 2000; Guo and Gifford, 2002; Murty et al., 2002; Paul et al., 2002). Guo and Gifford (2002) show a mean increase in SOC of about 55% when agricultural land is converted to secondary forest; a much greater change than any of the other land use conversions they had data for. However, this figure is generalized from partial soil profile data (mainly the upper horizons) from 9 sites, none of which is in northeastern U.S. Murty et al. (2002) did a similar summary and showed that when SOC-amounts could be calculated (e.g. when bulk densities were known), losses of organic C, when forested land was converted to cultivated cropland, were about 22%.

We designed this study to sample at the regional level, controlling for the last prior agricultural use, and the time since that use was abandoned and the land released for forest regeneration. Using multivariate regression trees (MRTs), we included other variables known, or thought to influence the retention of organic C in forest soils. The most likely factors influencing SOC amounts are elevation, aspect (which affect temperature and rainfall), landscape position or soil drainage class (which account for soils with high or perched water tables), soil texture and species composition (Kulmatiski et al., 2004; Bedison and Johnson, 2009; Johnson et al., 2009).

Twenty-five second-growth northern hardwood forests in western New England (WNE) on land formerly used for agriculture were used to construct chronosequences showing the rate of SOC and N recovery in (1) cultivated cropland, (2) pastured or hayed fields, and (3) woodlots. To put the recovering sites in context, we selected four native forest stands (≥ 250 years-old), which were subject to minimal anthropogenic disturbance to define the endpoint or a steady-state soil organic carbon level (SOC_{max}). We used six sites currently used for row crops or pasture / hay fields as an estimate of the SOC content at the starting point for the chronosequences (SOC_0). There are important caveats related to choosing those sites as endpoints that we discuss further in a later section. We did not control for environmental variables other than stand age, but selected sites whose use and abandonment history we could reconstruct. Sites were selected at a variety of elevations throughout the WNE landscape, and on the main lithologic formations. These are the Taconic slate or phyllite uplands, marble / limestone valleys, and the Precambrian metamorphic rocks of the Berkshire Highlands. All of the sites are within the pre-settlement northern hardwood forest as defined by Cogbill et al. (2002). Most of this forest was cleared and used for subsistence agriculture (Foster et al., 1998a; Foster et al., 1998b; Fuller et al., 1998; Compton and Boone, 2000; Gerhardt and Foster, 2002). In western New England, abandonment of subsistence style farming began in the mid 19th century and continued throughout the 20th century. Forests rapidly invaded fallow land in the region.

The most important species in this forest are sugar maple (Acer saccharum), American beech, (Fagus sylvatica), yellow and white birch (Betula allegheniensis, B. papyfera), and a variety of other hardwood and conifer associates including red and white oak (Quercus rubra, Q. alba), and eastern hemlock (Tsuga canadensis) (Cogbill et al., 2002). The active agricultural remnants are mostly dairy farms in the valleys where slopes are gentle, the growing season is longest, and soils have the highest natural base status (Eutrudepts) due to the carbonate derived till underlying those locales.

Our primary goal was to evaluate the rate of C accumulation and the amount of soil C gained since agricultural land in this region was abandoned, but in context with the other landscape variables that influence SOC amounts. The management of the SOC reservoir may be an important component of climate related policy or a carbon credit program (Subak, 2000). Should global temperatures continue to rise, productivity, litter decomposition and soil respiration will likely be altered (Kirschbaum, 2000; Kimble et al., 2003). Process based models, like CENTURY and PnET, are being used to predict SOC changes, and this data set could be used to better calibrate such models.

Methods

Geography

The geologic regions of WNE are shown in (Fig 2.1). The Taconic, Berkshire and Green Mountains, and the carbonate valleys between these ranges are the main provinces. About 90% of the bedrock is overlain by glacial till; the thickness and composition of which varies depending on location. Gravelly or sandy outwash and terraces of ice-contact stratified drift characterize the lowest lying land along rivers and streams, account for the remaining 10% of the landscape. The abandoned farmland we sampled was underlain by glacial till derived from metamorphic rocks, phyllite and schist, with some currently farmed sites on the calcareous parent material in the marble valleys. The soils of the outwash plains of the region were also farmed but they were not sampled for this study because they don't occupy much of the landscape and very little of that land has been afforested. The sites range from Mt. Washington in southwestern, MA to Gifford Woods state park, near Killington, VT.

Past Land Use

Sampling sites were selected based on our ability to determine the last agricultural land-use and the time of abandonment. During the European settlement of New England, forest land was gradually cleared for subsistence farms, with most of the cleared land used for hay and pasture (Foster et al., 1998[b]). Wheat, rye and other small grains were grown in cultivated fields, and some of the pastured land was used to produce hay. Based on the land use patterns in central Massachusetts, it is likely that only 5-10% of the WNE landscape was cultivated cropland and most of the grass-covered land was used as pasture rather than for hay (Foster et al., 1998a; Foster et al., 1998[b]). By 1850, New England farmers had begun to move west to farm better ground, or to urban centers for employment opportunities that developed at the beginning of the industrial revolution. Approximately $^{2}/_{3}$ of western New England was cleared by the mid-19th century, and more than half of that has since returned to forest. Most of the remaining farmland supports the waning dairy industry. We evaluated sites at a variety of elevations (242 - 612 m) in three physiographic provinces (the slopes of Taconic slates, marble / limestone valleys, and the Berkshire uplands) where soil properties were known to be different (Fig 2.1).

Developing a land-use history for a given locale often requires on- and off-site investigation. Initially, aerial photos, which date back to the 1930s, and public records offices were useful. Some of the current owners' families have occupied the land in WNE for up to 5 generations, and those individuals often knew the history of the different areas of their farms. For sites with no documented or limited oral history, we used several field criteria to evaluate the last use. Stone walls are ubiquitous in the western New England landscape. Settlers built these walls around the borders of agricultural plots as they cleared their land for plowing. The presence of stone walls demonstrates that some form of agricultural use occurred for a substantial amount of time, as it usually took multiple generations to clear all of the large rocks from each acre of these till-derived soils. The size, orientation and placement on the stem of tree branches on the borders of old fields were useful indicators of cleared areas.

The best evidence of plowing is a mixed, homogeneous Ap horizon. These horizons remain intact and identifiable in acid soils for centuries so long as worms are absent. Long-term plowing tends to leave a surface that lacks the pit and mound microtopography (resulting from wind-throw) that characterizes most New England

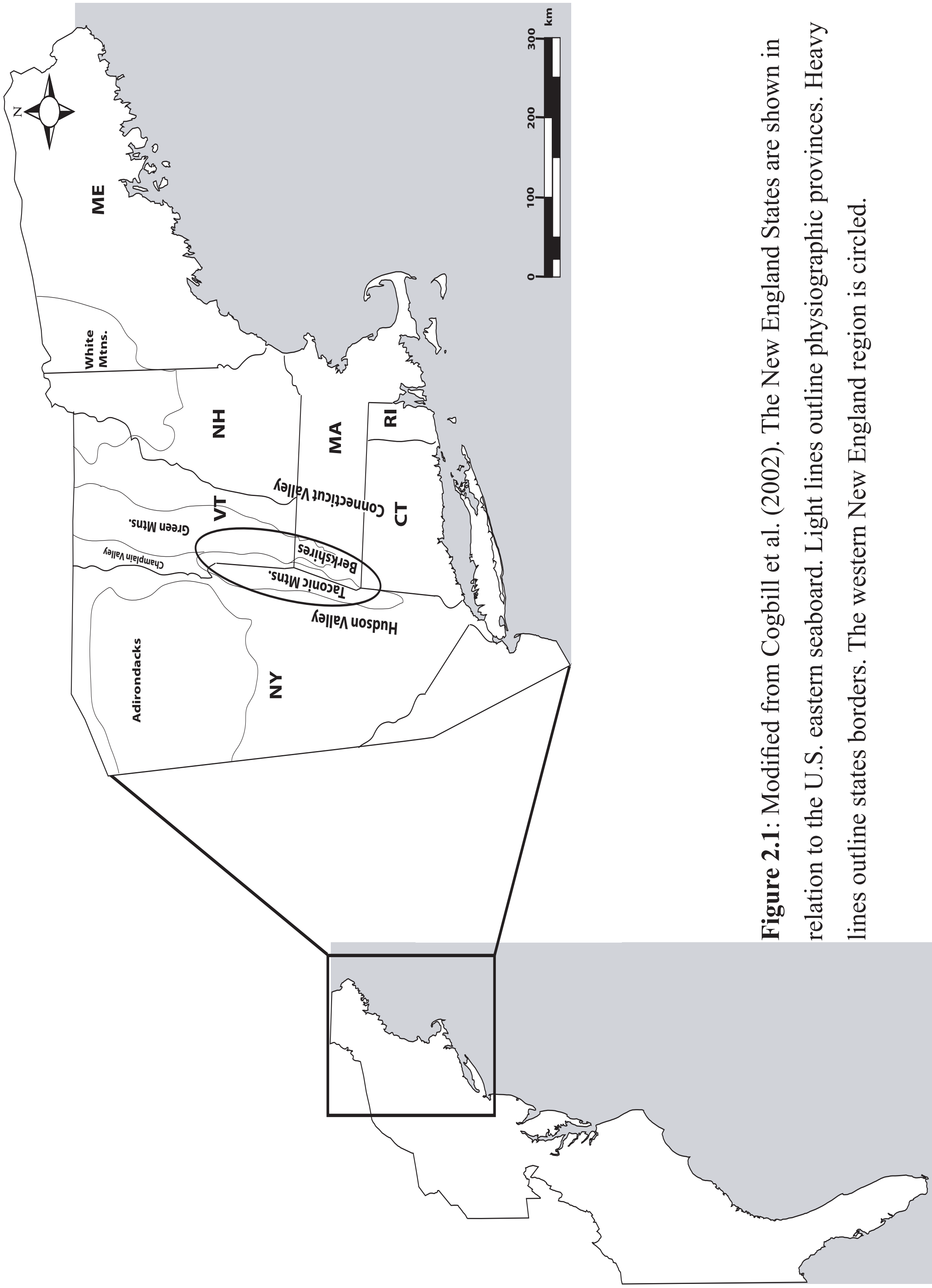


Figure 2.1: Modified from Cogbill et al. (2002). The New England States are shown in relation to the U.S. eastern seaboard. Light lines outline physiographic provinces. Heavy lines outline states borders. The western New England region is circled.

northern hardwood forests. Plow berms (the edge of the field where the plow is turned) are often visible, and even the furrows of the last plowing were present in two cases. White birch, yellow birch and white pine all have seeds that germinate and establish best in bare mineral soil (no forest floor organic horizons), and they are often the dominant species in previously plowed soils.

Formerly pastured and hayed fields are identifiable by the branching pattern of plot-edge trees and microtopography similar to that of plowed land, but with no Ap horizon. Further, remnants of barbed-wire fencing were usually present. Henry W. Art (Williams College, personal communication, July, 2006) has been researching the land use history of the Hopkins Memorial Forest in Williamstown MA for four decades, and has identified useful herbaceous indicators related to past land use. Herbaceous vegetation on abandoned pastures usually includes club-mosses (Lycopodium sp.) but virtually never jack-in-the pulpit (Arisaema triphyllum), starflower (Trientalis borealis), or bloodroot (Sanguinaria Canadensis). Those spring-flowering herbs reproduce by rhizomes and runners, and are capable of spreading only about 10 cm yr^{-1}, and so have not had time to significantly invade sizeable abandoned plowed fields or pastures, even after a century. An important aid in identifying the oldest (170 - 180 yr) agricultural sites was an archived map of Berkshire County, MA made in 1830 (anon.) showing the distribution of wooded and cleared land at that time.

Estimating Forest Age

To determine stand age, we used breast-height cores from the 3-5 largest trees in each plot and averaged their ages. We estimated that it took 10 years after abandonment for the trees to reach breast height, and for some of the analyses, we pooled sites into 25-30 yr categories as at most sites we could not be certain of the precise date of abandonment.

Caveats for Interpreting These Chronosequences

Chronosequences allow for the study of long-term changes in soils without waiting for the decades or centuries it takes to achieve measurable changes (Stevens and Walker, 1970; Walker et al., 2010). There are a number of uncertainties associated with this methodology. A chronosequence may not be an identical substitute for the changes through time at a single location because random disturbance events like insect infestations, severe weather events, and frost injury may delay or alter the course of ecological succession (Johnson and Miyanishi, 2008). Relying on chronosequences to chronicle changes assumes that environmental conditions (e.g. temperature, precipitation, disturbance) have remained constant through the time sequence that is sampled. For this study, we are using a series of aged stands to represent the average course of soil organic C change after farmland is abandoned. A number of site-specific conditions that influence forest productivity and decomposition rates increase the variability of the data gained via this approach. There is little choice when it comes to identifying centennial-scale changes in SOC amounts because the accumulation of carbon in the post-agricultural soils of New England is slow (Hamburg, 1984a; Hamburg, 1984b; Compton et al., 1998; Compton and Boone, 2000; Hooker and Compton, 2003).

By sampling a range of widely scattered sites, we were able to develop three chronosequences of secondary forest, based on the time of abandonment, and the inferred last agricultural use: (1) cultivated cropland (plowed) (2) pastured / hayed fields (not plowed) (3) woodlots (selective or subsistence logging). Establishing sites that are truly representative of initial conditions for the chronosequences is problematic. We used land currently in pasture / hay and row crops as the only option, recognizing that mostly land in the valleys is still farmed, and the soil conditions may not be representative of some of those in the hill farms that were abandoned earliest. Further, the currently farmed land may have been in agricultural use for two centuries, and this does not match the land use history of the highest elevation farms that were used for a century at most, and probably less. Another concern is that current organic-matter management practices likely differ from those of subsistence-style farming.

At the other end of the chronosequences, we used stands with trees ≥ 250 years old whose history consisted of light timber extraction as known by residents of the land or from previous published studies. While there are about two-dozen “old growth” stands in western New England (D’mato et al. 2006, Hall et al. 2002, Henry W. Art personal communication, July, 2006, and Robert T. Leverett personal communication, July, 2006), most escaped harvesting because they were on steep, rocky slopes that made timber extraction difficult. Such conditions are not a good match for the abandoned agricultural land we sampled. Two of the “old forest” sites we sampled (Gifford Woods, VT, and the Beinecke stand in the Hopkins Memorial Forest, MA) were the best matches in terms of slopes for the majority of the abandoned farms. A stand owned by Stanley Brown (Florida Mt., MA) was known by the owner to have never been cut and was steeper than most of the former agricultural sites (33°), but was a reasonable match for one of the abandoned hill farms nearby.

We were not able to sample representative modern woodlots as this practice has mostly disappeared along with the subsistence agriculture of the 19th and early 20th centuries. However, we did compare SOC and N amounts in these plots to the native forest stands, which we used to estimate the maximum amount of SOC.

Soil Sampling

During the summers of 2006 and 2007, 50 × 50 cm quantitative soil pits (Hamburg, 1984a; Huntington et al., 1988) were used to sample the soils. To better represent the soil properties at a site, at least 3 quantitative pits were excavated. Pits at a given site were spaced a minimum of 10 m apart. We removed coarse woody debris and herbaceous material from the surface of the excavated area. Organic horizons (Oi, Oe, and Oa) and mineral soils (0-10 cm, 10-20 cm, and >20 cm to the bottom of the rooting zone) were sampled according to the method described by Hamburg (1984[a, b]) and Huntington et al. (1988). Pedogenic mineral horizons (A, Ap, E, Bh, Bw, C, etc.) were sampled but not used in this study. The data presented in this paper were developed using 110 quantitative soil pits from 35 sites.

Sixteen measurements were averaged for the depth of each layer; allowing for accurate volume estimates of each horizon and its components (rocks, < 2 mm soil, roots). Quantitative pits allow for reasonably precise estimates of < 2 mm bulk-density (Db) and coarse fragment volume, they incorporate small scale soil heterogeneity into measurements, and they allow for mass-per-unit area calculations of roots, rocks, and < 2 mm soil. This method increases the accuracy of soil measurements in rocky, till-derived soils (Hamburg, 1984[a]; Huntington et al., 1988) as long as care is taken to keep the sides of the pit square at depth to limit the error in Db estimates. In some cases, rocks were too large to be removed from the walls of a pit. In these instances, an estimate of the rock weight was used to account for the amount of rock material within the boundaries of the quantitative pit and horizon. When possible, the rock was weighed after the completion of the pit or an equivalent volume of smaller rocks was used to improve this mass estimate. Subsamples of each horizon are taken for laboratory analyses.

Carbon and Nitrogen Analyses

A representative subsample of soil was returned to the laboratory and air-dried. Coarse fragments (> 50 mm) were weighed separately in the field, while weights of coarse fragments (2-50 mm) were determined after sieving air-dried soil subsamples in the lab. To convert coarse fragment mass to volume, a value of 2.65 Mg m^{-3} was used. A < 2 mm soil sample was ground for % C and % N analysis and analyzed in an elemental analyzer using standard procedures (Carlo Erba NA 1500 C/N Analyzer, Fisons Instruments, Beverly, MA). Modern agricultural samples were fumigated with concentrated (12 M) HCl to remove any contribution of inorganic C from calcareous substrate and liming; prior to C and N analysis (Harris et al., 2001). The contribution of inorganic C to the forest soils sampled in this study is negligible due to their natural acidity (Huntington et al., 1989), but some of the modern agricultural soils contained significant amounts of lime. C and N concentrations were calculated for all organic and mineral horizons; then converted to C and N amounts using the Db of the sieved, air-dry soil and the horizon / layer thickness (Th). Results are reported on an oven-dry-weight basis, obtained by drying subsamples at 105 °C for 12 h.

Statistical Analysis

The data were analyzed with JMP (v 7.0.1, SAS Institute, Cary, NC) and statistical significance was evaluated at $P \leq 0.05$. Linear regression was used to examine rates of SOC and N changes across the three chronosequences of former agricultural uses. The oldest forest stands (≥ 250 yr) were not included in these regressions because it is, at this juncture, not clear if they represent the true steady-state SOC of abandoned agricultural soils. Modern agricultural fields are our best estimate of SOC_0 of the afforested soils we sampled, though we recognize that there are differences between these sites and those that make up the chronosequence. The modern agricultural fields were included in regression analyses. Two sites, one abandoned 50 and one abandoned 100 years prior to sampling, were removed from the pastured / hayed regressions because of organic horizon oddities that caused the values to be > 2 se from the mean.

Multivariate regression trees (De'ath and Fabricius, 2000; De'ath, 2002; Kulmatiski et al., 2004; Bedison and Johnson, 2009) were used as an exploratory tool to assess the relative influences of predictor variables on the variation of SOC and N

(Kulmatiski et al., 2004; Bedison and Johnson, 2009; Johnson et al., 2009). This non-parametric technique uses a least squares splitting criterion of both continuous and categorical data to capture higher-order interactions that are not well represented in simple linear models. The binary splitting approach minimizes the within-group sums of squares (SS) while maximizing the between-groups SS for a given level in the tree (De'ath, 2002). Each tree is made up of branches (splits), labeled with the amount of variability a particular split explains, and leaves (nodes), characterized by the multivariate mean of the environmental factors that define it (De'ath, 2002). Each group is defined by the splitting criterion, the group mean, and the sample size. Terminal nodes were maintained at $n \geq 5$; therefore groups where $n \leq 9$ could not be split further. Trees are pruned when splits in the data represent ecologically implausible results.

Pair-wise comparisons of sites were not possible because we were limited by: (1) the availability of sites with documented agricultural land-use histories and (2) not all combinations of factors exist at all locales. Sites were combined into groups of age classes with a 25-30 year range allowing us to determine differences in organic C amounts between age classes using the Tukey-Kramer HSD test. Dunnett's multiple comparison test of group means was used to examine significant differences between age-classes with regard to a reference, in this case, native forest stands (≥ 250 years old). SOC and N data for each age class were normally distributed (Shapiro-Wilk test), however when all age classes were grouped, data were not distributed normally. We then used a Kruskal-Wallis distribution free test (analysis of variance on ranks) to examine significant differences between groups and show all results of the 1-way ANOVA (Table 2.2).

Results

Preliminary analyses indicated that SOC amounts in the > 20 cm layers were strongly correlated with the depth to the bottom of the root zone. Accordingly, to best compare SOC in the sites across the chronosequence, we normalized the C and N contents of the > 20 cm layer depth to the average solum depth, which was 55 cm. Figure 2.2 shows that SOC in currently farmed soils (6.5 kg m^{-2}) was 37% less than in stands of old forest (10.3 kg m^{-2}) while the difference in N content was somewhat smaller (15-35%). Approximately 40% of the difference in SOC was related to the lack of organic horizons in currently-farmed soil profiles, 24% of mineral SOC difference was associated with the 0-20 cm depth (the usual depth for an Ap), and the remaining deficit was attributed to deeper mineral horizons (Fig 2.3,4 $^{b\text{-}d}$). Levels of SOC and N measured in woodlot soils were not different from amounts found in the old forests (Fig. 2.2).

Linear regression was used to examine the rates of organic C and N accumulation in the chronosequences with the result that formerly pastured or hayed fields and cultivated cropland have equivalent rates of SOC-recovery (33 g m^{-2} y^{-1}) (Fig 2.2a). Recovery of SOC to old-forest levels takes approximately a century for both former pasture and cultivated soils, but presumably this can occur more rapidly or slowly depending on site-specific conditions affecting forest productivity and litter decomposition. Nitrogen accumulation is consistent with SOC-accumulation trends for formerly cultivated land (1.3 g m^{-2} y^{-1}), while no trend was observed in former pasture soil (Fig 2.2b). Significant positive trends in C:N ratio were observed for both plowed and pastured soil (r^2 = 0.44-0.58, P = 0.02) (Fig 2.2c).

While SOC accumulates at a similar rate in the organic horizons of formerly cultivated cropland and pasture (Fig 2.3a), there were differences in the rate of accumulation in mineral horizons. The 0-10 cm portion of plowed mineral soils showed a significant accumulation of SOC over time (r^2 = 0.82, P < 0.01, Fig 2.3b), while former pasture did not. On the other hand, in the 10-20 cm mineral soil of former pastures there was a significant positive trend in SOC (r^2 = 0.46, P = 0.01) (Fig. 2.3c) but not for formerly cultivated land. We also observed a significant positive trend in SOC in the deep mineral soil (20-55 cm) of the cultivated cropland sequence (r^2 = 0.41, P = 0.05) (Fig 2.3d), which based on the C content of the modern agricultural sites, appears to have lost about 30% of its organic C during cultivation.

Figure 2.5a and b show the range of SOC and N within age groups of abandoned agricultural land. The Tukey-Kramer HSD comparison of group means demonstrates SOC amounts in modern agricultural fields were significantly different from abandoned fields of all ages as well as native forest stands (Table 2.2). SOC in the youngest forests (20-50 yr and 55-85 yr) are significantly different from older forests and modern agricultural plots (Table 2.2). There was no significant difference among forest stands older than 90 yrs (Table 2.2). Comparison of SOC means using Dunnett's control method, with the most mature forests (> 250 yr) as the reference group, showed modern agricultural fields were significantly different from the oldest forest (Table 2.2). The Kruskal-Wallis non-parametric test yielded results similar to Tukey's and Dunnett's statistics, showing that SOC pools in modern agricultural fields were significantly different from the SOC pools in the oldest forest plots (Table 2.2). One-way ANOVA's of soil N data showed that the apparent increase in N over time was not significant.

	DF	Sum of Squares	Mean Square	F	p
Between Groups	6	227.7871	37.9645	5.0384	0.0001
Within Groups	103	776.1013	7.535		
Total	109	1003.884			
Forest Age Class	**Mean SOC (kg-C m-2) Alpha 0.05**	**Dunnett's Method Ref. Group: 250 yr Alpha 0.05**		**Kruskal-Wallis**	
		LSD	**p**	**Chi^2**	**p**
0 yr	6.62 c	0.677	0.0079	25.9232	0.0002
20 - 50 yr	7.82 bc	-0.49	0.1526		
55 - 85 yr	8.69 abc	-1.3	0.6092		
90 - 115 yr	10.98 a	-1.71	0.8126		
120 - 150 yr	9.36 abc	-2.07	0.9804		
155 - 185 yr	11.09 ab	-2.41	0.8925		
250 yr	9.94 ab	-2.9	1.0000		

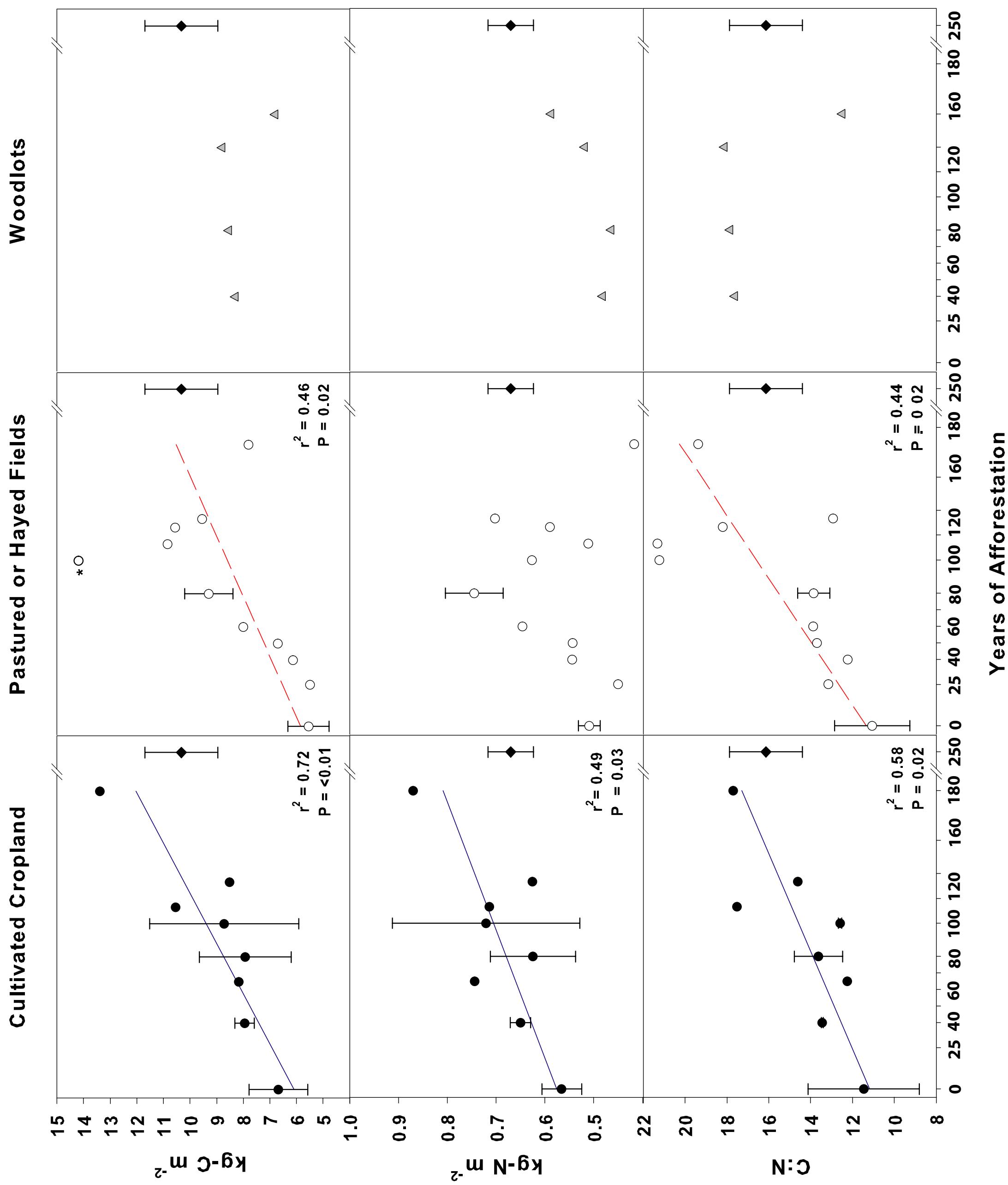
Table 2.2: ANOVA results for SOC storage within forest age groupings. Tukey HSD, Dunnet's Control method, and the Kruskal-Wallis test of means are shown. Groups not connected by the same letter are significantly different

Multivariate regression trees were used to examine factors contributing to variability within the SOC and N data sets for the soil profile to a depth of 55 cm (Table 2.3). The limited number of abandonment age classes restricted the amount of explanation we could extract using this technique. The mean SOC and N values for each age class (n = 20) in the pastured / hayed and cultivated cropland sequences were used in conjunction with the oldest forest sites (> 250 yr) in these tests. We did not analyze woodlot age groups due to the lack of trends observed in the linear regression data, and the small number of sites.

Predictor Variable	Mean (Range)	Description	Data Source
Site			
Stand Age (years)	93 (0-250)	Determined by coring 3-5 largest trees per plot and adding 10 years to the average age of those trees.	Field Determination (This Study)
Former Agricultural Use	categorical	Determined using site characterisitics and land use history information	Field Determination (This Study)
Climate			
Growing Season Degree Days (GSDD)	3208 (2926-3492)	Index of mean daily air temperature and growing season length (Apr. - Sept.) over a 24-year period (1980-2003):: GSDD = (mean daily temperature)* (the number of days with an mean temperature > 4°C)	DAYMET Climate Model (Thornton et al., 1997) available at www.daymet.org (This Study)
Growing Season Precipitation (GSPrecip) (cm)	68 (63-75)	GSPrecip = mean daily precipitation during the growing season (Apr. - Sept.) averaged over a 24-year period (1980-2003):	DAYMET Climate Model (Thornton et al., 1997) available at www.daymet.org (This Study)
Soil			
Rock Volume (m^3)	0.0062 (0-0.0522)	The volume of rock in an excavated mineral layer	Field Measurements (This Study)
Taxonomy (Subgroup)	categorical	The taxonomic soil classification for the soil survey report and the official soil series description (e.g. Eutruchrepts, Spodosols)	Soil Survey Staff, NRCS, USDA http://soils.usda.gov/technical/classification/osd/index.html Accessed February 10, 2008. USDA-NRCS, Lincoln, NE.
Texture	categorical	Textural classification from the official soil series description (e.g. coarse-loam)	Soil Survey Staff, NRCS, USDA http://soils.usda.gov/technical/classification/osd/index.html Accessed February 10, 2008. USDA-NRCS, Lincoln, NE.
Drainage Class	categorical	Soil drainage classification from the official soil series description (e.g. well-drained, moderately well-drained)	Soil Survey Staff, NRCS, USDA http://soils.usda.gov/technical/classification/osd/index.html Accessed February 10, 2008. USDA-NRCS, Lincoln, NE.
Parent Material	categorical	Represented by the underlying till type (basal or lodgement) and the bedrock type (e.g. phyllite, schist, limestone)	Soil Survey Staff, NRCS, USDA http://soils.usda.gov/technical/classification/osd/index.html Accessed February 10, 2008. USDA-NRCS, Lincoln, NE.
Organisms			
Canopy Presence	categorical	Presence or absence of dominant canopy species at each locale	Field Determination (This Study)
Understory Presence	categorical	Presence or absence of dominant understory species at each locale	Field Determination (This Study)
Litter Preseence	categorical	Presence or absence of dominant litter (by species) at each locale	Field Determination (This Study)
Topography			
Elevation (m)	405 (242-612)	Elevation was calibrated using GPS receivers at each site.	Raster data from National Elevation Dataset (1999) published by US Geological Survey available at http://gisdata.usgs.net/ne Gesch et al. (2009) http://pubs.usgs.gov/fs/2009/3053/
Slope (°)	9 (1-33)	Slope of each site determined from a digital elevation model (DEM)	Calculated Using Elevation Data in ESRI ArcGIS Software 380 New York Street, Redlands, CA 92373-8100 USA. (This Study)
Aspect	categorical	Exposure (e.g. N, S, E, W) determined from a DEM	Calculated Using Elevation Data in ESRI ArcGIS Software 380 New York Street, Redlands, CA 92373-8100 USA. (This Study)

Table 2.3: Summary of predictor variables used in Multivariate Regression Tree (MRT) analysis, in this study.

Figure 2.2: SOC (A), N (B), and C:N (C) trends in the total soil profile (organic + mineral soil to 55 cm) for cultivated cropland (closed circles), pastured or hayed fields (open circles), woodlot (shaded triangles), and native forest (diamonds). Values shown are the means of each age group measured in (kg-C or -N $^{m-2}$) or unit-less for C:N, (± 1 SE) where there is replication of an abandonment age. Significant linear regression lines are shown ($P \leq 0.05$). * Points not included in regression analysis.



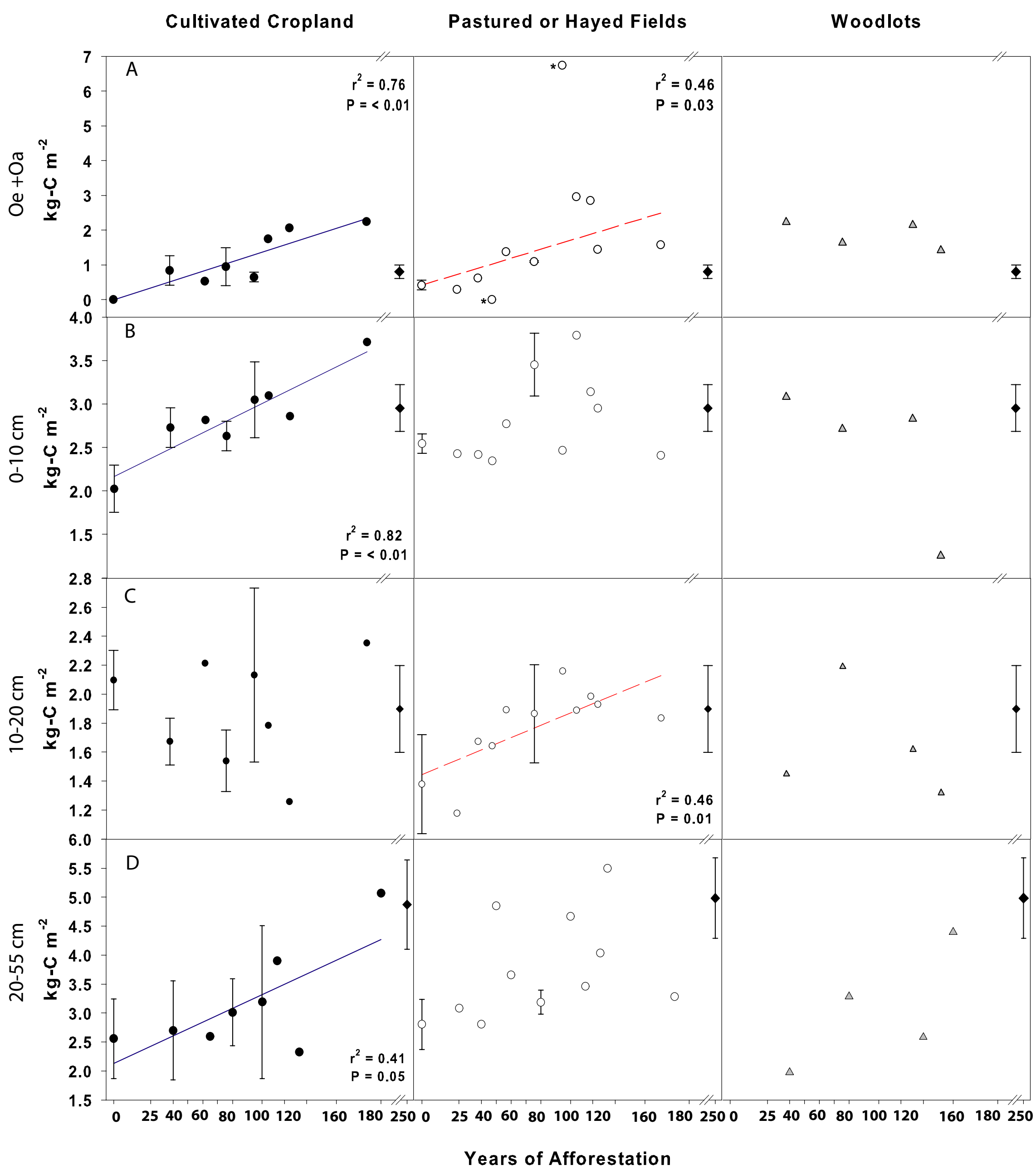


Figure 2.3: SOC trends in the organic (Oe + Oa) (A), plow zone (0 - 10 + 10 - 20 cm) (B and C), and deep mineral (20 – 50 cm) (D) horizons for cultivated cropland (closed circles), pastured or hayed fields (open circles), woodlot (shaded triangles), and native forest (diamonds). Values shown are the means of each age group measured in (kg-C m^{-2}), (± 1 SE) where there is replication of an abandonment age. Significant linear regression lines are shown ($P \leq 0.05$). * Points not included in regression analysis.

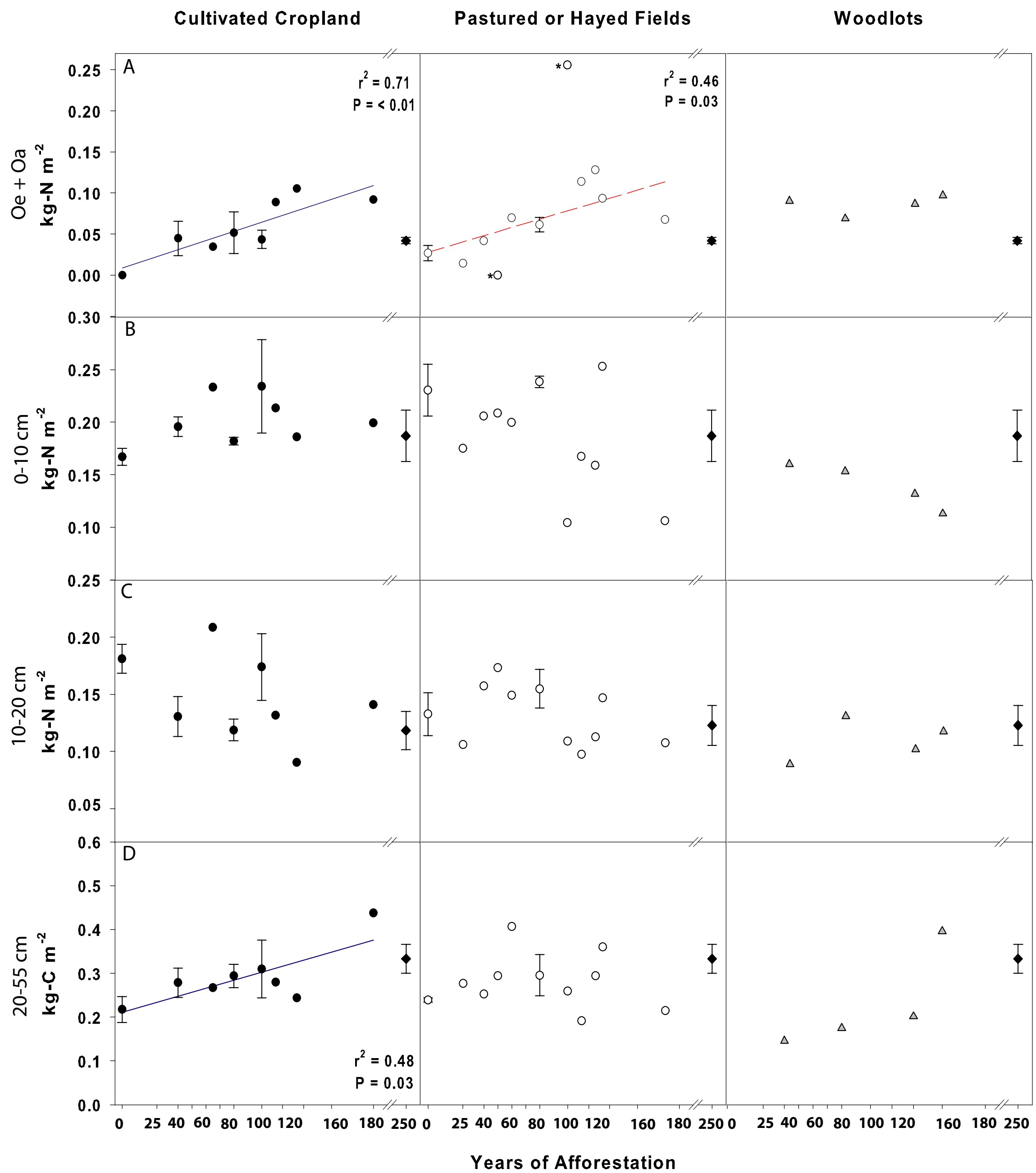


Figure 2.4: Nitrogen trends in the organic (Oe + Oa) (A), plow zone (0 - 10 + 10 - 20 cm) (B and C), and deep mineral (20 – 50 cm) (D) horizons for cultivated cropland (closed circles), pastured or hayed fields (open circles), woodlot (shaded triangles), and native forest (diamonds). Values shown are the means of each age group measured in (kg-N m^{-2}), (± 1 SE) where there is replication of an abandonment age. Significant linear regression lines are shown (P ≤ 0.05). * Points not included in regression analysis.

The MRT in figure 2.6a indicates that the number of years after abandonment (< or > 100 years) accounts for the majority of sums of squares explained (SSE) in the SOC data (48%), with climatic variables growing season degree-days (GSDD) (20% SSE) and growing season precipitation (GSPrecip) (1% SSE) contributing to a lesser extent. When abandonment age is removed as a potential predictor in the MRT analyses, GSDD and GSprecip explain the most variability in the SOC data set (41%), with cooler temperatures and more precipitation being associated with more C. An additional analysis (data not shown) using the mean values for each site (n = 31), showed a significant relationship between parent material and SOC content. Sites having till that was at least partially calcareous had lower amounts of organic C and N. All of these sites are currently used for agricultural purposes, with one exception, an 80-year-old formerly cultivated stand.

Controls on N content are difficult to determine because of the competing effects of chemical fertilization, manure additions and N export in crops in the active cropland and pasture. The MRT analyses indicated that parent material (carbonate vs. phyllite or schist) explains 56% of the sums of squares in the whole-profile N amount. Climatic factors explain a small portion of the variability (Fig. 2.6b). Slope (< or > 8°) explained as much of the variability as GSprecip in the N data set.

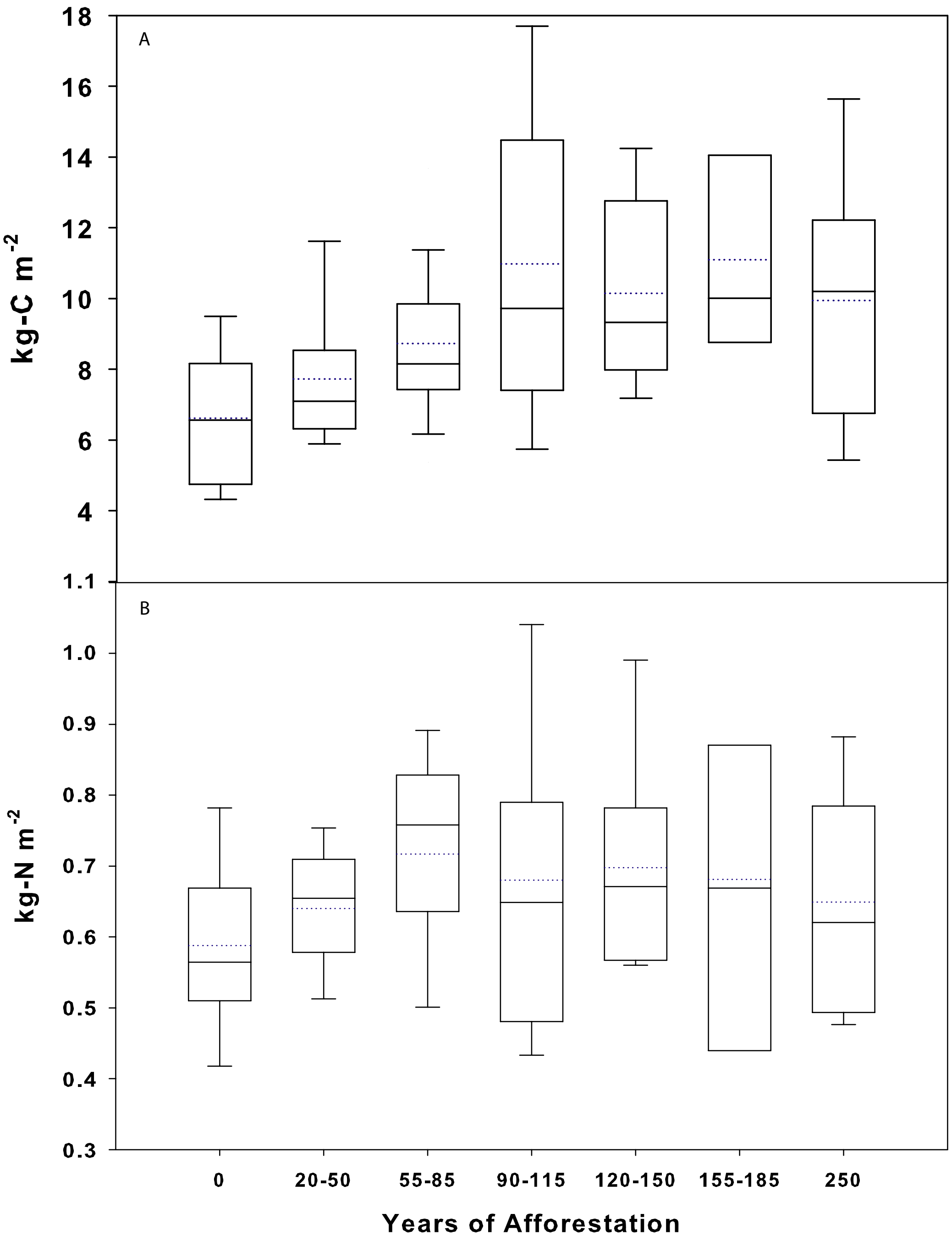


Figure 2.5: Abandonment age groupings of (A) SOC (kg-C m^{-2}) and (B) Soil N (kg-N m^{-2}) for the entire soil profile, organic (Oe + Oa) + mineral soil (0 – 55 cm). Boxes indicate the median and interquartile ranges; bars represent the 5th and 95th percentile. Dotted lines show the mean values for each age grouping.

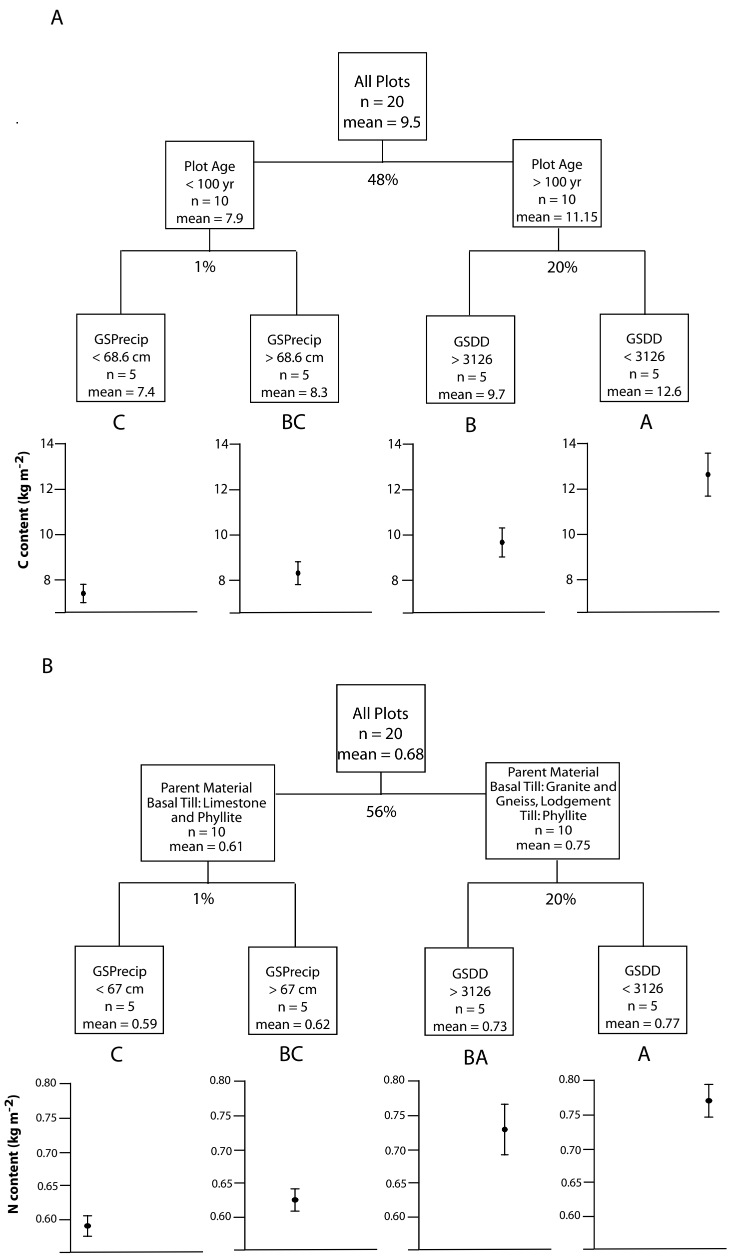


Figure 2.6: Multivariate Regression Trees (MRTs) for organic horizon (Oe + Oa) and mineral soil (to 55 cm depth) for SOC (A) and N (B) content. Individual boxes represent groups determined by the splitting criterion and are defined by the number of sites (n) and the mean C (kg m^{-2}) or N (kg m^{-2}) storage value of those sites. The amount of variability explained by each split is represented as a percentage at each node. Graphs under each terminal group represent the mean ± 1 standard error of that group. Groups not connected by the same letter are significantly different.

Discussion

The soils of abandoned plowed and pastured / hayed land of western New England have accumulated organic C over the last century, but no change was detected in the SOC content of sites formerly used as woodlots. N also accumulated in secondary forest soils that had been plowed, but not in former pastures, nor in woodlots. Sites abandoned during the 19th century have accumulated enough SOC that pools in the top 55 cm are equivalent to those found in the oldest forests (Fig 2.5a). Depending on the choice of starting point of the chronosequence (active farm land or farms abandoned 20-50 years ago), 3-3.7 kg-C m^{-2} accumulated in the soil in about 100 yr. Post-agricultural forests initiated after the mid-20th century have the capacity to accumulate additional SOC, but probably not more than 2.5-3 kg-C m^{-2}.

The results are similar to those shown elsewhere in New England by Hamburg (1984[a, b]) and Hooker and Compton (2003), although the WNE soils accumulate less organic C and at a somewhat slower rate (Table 2.1). There are several possible reasons for the difference. Hooker and Compton (2003) examined acid, sandy well-drained soils of Scituate, RI and Hamburg (1984[a, b]) studied Spodosols in Campton, NH, while our study was done in strongly to slightly acid till-derived soils of the Berkshire-Taconic landscape. The soils of WNE have more rocks and are shallower than the soils studied in central NH and RI, and were less suitable for plowing. Hamburg (1984[a, b]) and Hooker and Compton (2003) accounted for the Oi horizon in their reported organic horizon measurements. We did not include this measurement in our analyses because it can vary in mass and composition depending on the time of the year the samples were taken and the vegetation at each locale. Some combination of these factors is most likely responsible for the differences in SOC-accumulation rates reported in Table 2.1. These results are consistent with the prevalent belief that SOC accumulates in sites converted from cultivated cropland to secondary forest (Houghton, 1995; Houghton et al., 1999; Schlesinger, 1999; Post and Kwon, 2000; Goodale et al., 2002; Guo and Gifford, 2002; Murty et al., 2002; DeGryze et al., 2004).

New England Chronosequence Studies	Location	Length of Chronosequence (Years)	Avg. Depth of Mineral Soil (cm)	SOC Accumulation (Mg ha-1 y-1)	N Accumulation (kg ha-1 y-1)
Hamburg (1984)	Campton, NH	65	50	1	12
Hooker and Compton (2003)	Scituate, RI	115	70	0.52	-0.8
This Study	Western New England	180	55	0.33	13

Table 2.1: Post-agricultural chronosequence studies in the New England states. Accumulation rates for SOC and N for the entire soil profile (organic plus mineral horizons) are shown.

The results for the individual layers sampled are shown in figures 2.3 and 2.4. As there were no forest floor horizons during the period of agricultural use, there were significant positive trends in organic horizon C and N content across the cultivated cropland chronosequence. It is interesting to note that SOC and N mass in the organic horizons under the oldest forest sites were low, approximately equal to those found in the youngest forests. This may be due to the combined effect of sugar maple and high base status soils (Eutrudrepts) in some of the old forest stands. Sugar maple litter is readily decomposable in the northern hardwood forest (Melillo et al., 1982; McClaugherty et al., 1985). The oldest abandoned farmland sites (155-185 yr class) had more forest floor, and they were dominated by red oak and American beech. Litter from those species decomposes more slowly than sugar maple litter (Van Breemen and Finzi, 1998).

Organic horizons of soils previously used for pasture also showed a significant positive trend equal to that observed in the formerly cultivated sites. The organic horizons at one of the old pasture sites are notable because they contain much more SOC than any other measured forest floor. The forest at this site was nearly all 100-yr old hemlock whose litter is notably slow to decompose (McClaugherty et al., 1985; Van Breemen and Finzi, 1998). Also, a pasture site abandoned 50 years ago had essentially no organic horizons for reasons that remain obscure.

Across the chronosequence of abandoned woodlots, organic C and N amounts did not differ, and they were not significantly different from the values in the old-forest plots. This suggests that subsistence woodlots had no impact on the amounts of SOC and N amounts in WNE soils. In this landscape, the former woodlots are on the same soils and slopes as the abandoned plowed or pastured land and their C content might be viewed as a reasonable estimate of SOC_{max} particularly since SOC levels in the former woodlots are not significantly different from those in the oldest forested sites.

Patterns in mineral soil organic C and N across the chronosequences were more varied than those observed in the organic horizons. Several studies have shown both positive and negative trends of SOC-accumulation in the upper mineral horizons of soils that had formerly been plowed (Hamburg, 1984[a]; Hamburg, 1984[b]; Richter et al., 1999; Knops and Tilman, 2000; Paul et al., 2002; Hooker and Compton, 2003; Knops and Bradley, 2009). These changes are mostly observed in the top 20 cm of mineral soil, which is the depth to which plowing homogenizes soil. In the plowed sites sampled in this study, we observed a significant positive trend in SOC in the top 10 cm of mineral soil but no trend in the 10-20 cm portion. Conversely, there was no trend in the 0-10 cm layer in the formerly pastured plots, but a significant positive trend in the 10-20 cm layer. The reasons for these patterns are not clear, though the Ap horizons in tilled plots abandoned prior to about 1870 had thinner Ap horizons than those abandoned later (17.4 ± 3.46 cm for sites ≤ 100 yr, v. 12.4 ± 1.36 cm for sites >100y) and a significant negative trend was observed for Ap horizon thickness with increasing stand age ($r^2 = 0.76$, $P = < 0.01$) (data not shown). Anecdotal information suggests that this may be due to changes in the construction of plows in the mid-19th century, which increased the depth of the plowed zone. In the abandoned plowed plots, there was less organic C in the 10-20 cm layer than the 0-10 cm layer, about 1 kg m^{-2} on average. This is probably due to the reestablishment of a regular supply of litter C that is not yet incorporated deeply into the mineral horizons. We did not identify any significant trends in N in the upper mineral horizons of plowed or pasture sites.

One of the more interesting findings is the significant positive trend in both SOC and N in the deeper mineral horizons of formerly tilled soils. The magnitude of the increase in SOC is approximately 12 g m^{-2} y -1 which is equivalent to the increase in forest floor organic C (13 g m^{-2} y^{-1}). The N gain is about (0.9 g m^{-2} y^{-1}). This result is consistent with the findings of Hooker and Compton (2003) in sandy outwash soils in RI. It is tempting to attribute these gains to the restoration of tree-root C and N inputs after the period of agriculture. We note that there is also a positive (but non-significant) trend in the B-horizon SOC (but not N) in plots that were formerly grazed or hayed, and whether or not there might be real increases under these conditions remains to be investigated.

There are several factors beside agricultural use that influence the size of SOC pools in New England forest soils. The conventional view that the higher elevation farms were established last and abandoned first suggests that variables linked to elevation may contribute to the increased SOC content in the older sites of the chronosequences that tended to be at higher elevations. The most obvious possibility involves the fact that the higher elevations are colder, and this tends to increase SOC by slowing microbial respiration more than photosynthesis (e.g. Jenny, 1980). In assessing the possibility that there are effects of other variables that confound the effects we attributed to age since abandonment, we were guided by the analysis of the controls on SOC pools in northern hardwood forest plots in Vermont that had not been farmed (Johnson et al. 2009). Temperature, species composition, soil drainage class, rock volume and texture were linked to soil organic C pools in that study. We used multivariate regression trees comparable to those used by Johnson et al. (2009), using many different combinations of forest age, former agricultural use, GSDD, GSprecip, soil texture, soil drainage class, parent material, soil taxonomic class (at the subgroup level), slope, landscape position and species composition as candidate predictor variables. The combination of variables that explained the greatest fraction of the sums of squares is shown in figures 2.6a, b. The following indicate that SOC pools are most strongly influenced by time since abandonment, and not by factors related to elevation: (1) The highest elevation (coldest) site in the study (612 m) was an active agricultural site where the soil had been tilled for generations and SOC levels were low; (2) in all but one combination of variables which included time since abandonment, former agricultural use, GSDD and GSPrecip, the first split in the regression tree was time since abandonment, with 100 yrs being the dividing point, and precipitation and temperature were of secondary importance; (3) Two other variables explained a significant proportion of the SS when time since abandonment was removed: (a) base-rich Eutrudepts had lower SOC and these were split from base-poor Spodosols and Dystrudepts. We know of no inherent reason why Eutrudepts should have less SOC than Dystrudrepts, rather they are the level, richer soils of the valleys where agriculture has persisted, hence their association with reduced SOC pools appears to result from the fact that they are still being used for crops and pasture; (b) Rock volume in this study is positively correlated with SOC amount ($r^2 = 0.65$, $P = < 0.001$; data not shown). In the northern hardwood stands of the Green Mountains, which were not farmed, mineral horizon SOC decreased significantly with increased rock volume (Johnson et al. 2009), an expected relationship. Accordingly we believe that the positive correlation between rock volume and SOC pool size in our data is spurious and that higher SOC most strongly reflects longer periods of secondary forest growth.

In this study, we used a set of old forest stands (≥ 250 years in age) to represent the SOC_{max} that could be attained by regrowing forests. We visited several of the known old-growth stands in western New England, most of which occupied rocky, steep slopes that were difficult to log, and certainly would not have been useful for agriculture. We sampled old native stands that were mostly on moderate slopes (8, 11, 23, and 33°) and selected the flat areas within these stands to dig quantitative pits. These sites were most consistent with the nature of the abandoned agricultural land sampled for this study, though they were somewhat rockier. Based on the factors controlling SOC in unfarmed Green Mountain soils (Johnson et al. 2009), the rockiness of the mineral horizons in these four sights might result in SOC amounts that are less than what might be achieved on post-agricultural sites that are less rocky and more level. Given the similarity in SOC pools in the former woodlot sites and these old forest sites, we believe that 10-10.5 kg-C m^{-2} is a reasonable estimate of SOC_{max} under present conditions.

The SOC and N values in 100-yr old stands is as high as we measured in the old forest stands, and the SOC contents range as widely (Fig 2.5a, b). This fits the expectation that as post-agricultural forests age, windthrow and other natural disturbances create organic matter “hot spots”, and implies that our sampling strategy captures the inherent variability of organic C and N amounts in soils of older forests.

Patterns of N recovery in post-agricultural northern hardwood forests are difficult to discern because of the variability of species and productivity associated with natural succession. While ANOVA analyses showed no difference between soil N amounts between age classes, linear regression demonstrated significant positive accumulation trends for the organic horizons and the 20-55 cm portion of the mineral horizons of formerly plowed soils. We speculate that this accumulation may have followed depletion of soil N during the period of agricultural use. Plausible mechanisms include N uptake by crops and its subsequent removal from the site and smaller amounts of N returned to the soil in crop residues compared to the return of litter and root N in mature forest.

Conclusion

The inability to know the minimum SOC pool size during the period of agricultural use makes it difficult to determine the amount of C lost from these soils. However, using the SOC content of soils still in agriculture and the SOC pools in old remnant forests and in secondary forests (>100 yr old) suggests that during the period of agricultural use, the C stocks in soils of this region decreased by 35-40% in the top 55 cm of soil. If 65% of the land had been cleared for farming, this would have resulted in about a quarter of the region's soil C transferred to the atmosphere. It is not feasible to try to estimate the N loss during the agricultural period, because there aren't significant trends in whole-profile N across the chronosequence, and the influence of 6-8 decades of atmospheric N deposition on soil N stocks is unknown.

When these results are applied to questions about the future SOC storage potential of the till-derived soils of western New England, it is important to recognize that much of the SOM loss resulting from agricultural disturbance has already been reversed. Soil C pools take about a century to recover to pre-agricultural levels, (or at least to the levels observed in patches of forest that had not been completely cleared), and given that the maximum level of cleared land occurred about 160 years ago, soils of this region were a strong sink for C throughout the 20th century. However, the capacity of post-agricultural soils of this region to store additional C is waning.

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Chapter Three

Soil carbon quality in a chronosequence of post-agricultural northern hardwood forests in western New England

Abstract

The influence of agricultural land uses on the New England landscape is reflected in the region's soils. Soil morphology, soil organic carbon (SOC) and nitrogen (N) content, and carbon (C) quality are altered when forest land is converted to agricultural fields and modified again when those fields return to forest. We used mineral soil samples from the top 20 cm of 20 known-age post-agricultural northern hardwood forests in western New England to examine the influence of agriculture on particulate and potentially mineralizable organic matter pools. The chronosequences are bounded by land currently in agricultural use (n=6) and native forest stands at least 250 years in age with a history of minimal disturbance (n=4). Chronosequences were developed for abandoned cultivated land and fields used as pasture or for hay. A 62-day incubation showed an average of 48% more potentially mineralizable C in modern agricultural soils, when compared to forested sites, regardless of former use. Physical fractionation of organic matter pools revealed 35% more particulate organic matter (POM) in plowed fields and 40% more in pastured / hayed fields compared to regrowing forests 25-40 years after abandonment. Organic matter associated with silt and clay-size minerals increased with forest age in formerly cultivated soils at rate of 0.04 Mg ha^{-1} y^{-1}, however modern cropland also possessed as much mineral-associated organic matter as the soil of old forests. This suggests that

current management practices preserve more mineral-bound C than former practices or that the soils still being used for cultivated crops are inherently different from those abandoned in the 19th and 20th centuries.

Introduction

The amount of organic matter in forest soils reflects the balance among microbial respiration, root turnover, faunal necromass production and litter inputs. Preservation of carbon within soil organic matter (SOM) pools is determined by the interactions between litter chemistry, temperature, soil aeration, soil minerals and soil microbial communities. Carbon quality may be altered independently of soil C quantities, and may change following disturbance (Balesdent et al. 1998, Del Galdo et al. 2003, DeGryze et al. 2004, An et al. 2008). Understanding how agricultural use impacts C pools can provide improved insights into future changes in C stocks, especially through the testing of carbon cycling models.

Soils of terrestrial ecosystems can be managed to be either sources or sinks of C (Trumbore and Torn, 1997; Kirschbaum, 2000; Post and Kwon, 2000; Jandl et al., 2007) and outcomes are determined by the interplay among the global terrestrial carbon cycle, anthropogenic or natural disturbances, and land management (Schlesinger, 1999; Paul et al., 2002; West and Post, 2002; Heath et al., 2003; Kimble et al., 2003). Tillage reduces soil C stocks and alters the residence time of carbon in the soil profile (Beare et al. 1994, Jastrow 1996, DeGryze et al. 2004, Six et al. 2000, Soon et al 2007, von Lützow et al. 2008). Reduction of organic matter in agricultural fields, when compared to stands of native vegetation, is the result of (i) the removal of organic residues from fields via harvest and the relatively wide-spacing of row crops; (ii) the disruption of soil aggregates by tillage and the resultant exposure of physically protected OM to microbial activity; (iii) favorable conditions for decomposition (e.g., tillage-induced aeration, irrigation, nitrogen and lime additions); and (iv) losses of soil via erosion (Haynes, 2005).

Observed changes in SOM pools due to agricultural disturbance are variable and influenced by the portion of soil examined, as well as the agricultural use (Zak et al., 1990; Garcia-Montiel and Scatena, 1994; Richter et al., 1999; Goodale and Aber, 2001; Murty et al., 2002; Haynes, 2005; Marin-Spiotta et al., 2009). Several synthesis studies suggest that the greatest potential for C-sequestration is in secondary forests on abandoned, plowed agricultural land (Johnson, 1992; Post and Kwon, 2000; Guo and Gifford, 2002; Murty et al., 2002; Paul et al., 2002). In these studies, C-losses from cultivated soils range from 20-55% of initial amounts, while pastured soils have shown both gains and losses after conversion from forested land.

In New England, the studies of Hamburg (1984[a, b]) and Hooker and Compton (2003) have addressed C and N-accumulation in post-agricultural land in the northeastern U.S. Still, it is difficult to know what the carbon stocks were at the time land was cleared for agricultural purposes and how much SOC was lost at a regional scale during the period use. Compton and Boone (2002) used sequential density fractionation to examine organic matter pools in 15N labeled reforested agricultural soils in central Massachusetts. They showed that northern hardwood plots had greater gross nitrification than conifer plots and that light fraction OM incorporated more N than heavy fraction. In a companion study (Compton and Boone, 2000), light fraction C was (36-61%) lower in plowed fields than abandoned woodlots (90-120 year in age), but they did not examine SOC pool recovery.

SOM pools can be classified based on physical and chemical characteristics measured in the laboratory (Six et al., 2000a; Six et al., 2000b; Gregorich et al., 2006). Commonly used procedures fractionate SOM into coarse particulate OM (CPOM), fine particulate OM (FPOM) and mineral-associated OM (MinOM). The most stable pool, MinOM, is composed of OM bound to silt and clay. The proportion of C in this pool has been shown to be greater in less disturbed systems and to have lower decomposition rates (Balesdent et al., 1998; Six et al., 2000b; Six et al., 2002). While there is a continuum of organic matter decomposability, SOM in forested systems generally has longer turnover times than that found in cultivated fields (Balesdent et al., 1998) and turnover time also increases with depth within the soil profile (Gaudinski et al., 2000).

Post-agricultural forest soils from western New England demonstrate a pattern of steady C-accumulation (33 g-C m^{-2} y^{-1}) for approximately a century after cultivated or pasture / hay fields are abandoned (Clark and Johnson, 2010). C-accumulation occurred in all horizons but was greatest in the forest floor and in the top 20 cm of the mineral soil. Results for formerly pastured or hayed soils were more variable than for land that had been plowed (Clark and Johnson, 2010). Recently abandoned (40 yr) agricultural fields had less total soil C than older abandoned agricultural sites. About 40% of the

SOC difference between modern agricultural fields and the oldest forested sites could be attributed to the loss of forest floor upon agricultural conversion, and 24% of the SOC gain occurred in the top 20 cm of mineral soil (the depth to which fields were plowed). The remainder of the accumulated C was added to subsoils (20-55 cm depth).

We hypothesized that there would not only be less C in soils currently used for agriculture, but greater amounts of labile material from crop residues and manure additions. We evaluated this by using incubation experiments and physical fractionation to measure organic C pools and C mineralization potential of quantitatively sampled soils across chronosequences of abandoned cultivated and pastured / hayed agricultural land. This approach provides an estimate of the decomposability of SOM while our quantitative field sampling strategy allows us to gain insight into the recovery of these pools at the stand and landscape levels.

Methods

Past Land Use

Clark and Johnson (2010), used second-growth northern hardwood forests (n = 25) in western New England (WNE) on land formerly used for agriculture to construct chronosequences showing the rate of SOC and N recovery in (i) cultivated cropland, (ii) pastured or hayed fields, and (iii) woodlot. To put the recovering sites in context, native forest stands ≥ 250 years-old (n=4), which were subject to minimal anthropogenic disturbance, and had similar elevations and slopes to the abandoned agricultural plots, were selected to define the endpoint or a steady-state amount of SOC. Sites currently used for row crops or pasture and hay fields (n=6) were sampled as an estimate of the SOC content at the starting point of the chronosequences. They did not control for environmental variables other than stand age, but selected sites whose use and abandonment history could be reconstructed. Sites were selected at a variety of elevations throughout the WNE landscape, and on the main lithologic formations. These are the Taconic slate or phyllite uplands, marble / limestone valleys, and the Precambrian metamorphic rocks of the Berkshire Highlands. A subset of the abandoned pastured / hayed and cultivated chronosequence samples (n=20), the modern agricultural sites (n=6) and native forest stands (n=4) from Clark and Johnson (2010) were used to examine soil C quality.

All sampled sites are within the pre-settlement northern hardwood forest as determined by Cogbill et al. (2002). More than half of this forest was cleared and used for subsistence agriculture by the middle of the 19th century (Foster et al., 1998a; Foster et al., 1998b; Fuller et al., 1998; Compton and Boone, 2000; Gerhardt and Foster, 2002). Wheat, rye and other small grains were grown in small-cultivated fields, while most of the cleared area was used for pasture and hay. It is likely that only 5-10% of the WNE landscape was used to cultivate crops and most of the grass-covered land was used as pasture rather than for hay (Foster et al., 1998a; Foster et al., 1998b). During the last half of the 19th century, New England farmers began to move to urban centers for employment opportunities that developed at the beginning of the industrial revolution, or west to farm better ground in the Midwestern states. More than half of the cleared land has since returned to woodland. Most of the remaining farmland supports the waning dairy industry.

Estimating Forest Age

Sampling locales were selected based on our ability to determine the time of agricultural abandonment and the last known use. Stand age was determined using the average annual ring count in breast-height cores from the 3-5 largest trees in each plot. It is likely that trees rapidly invaded abandoned agricultural land in western New England (Hooker and Compton, 2003). We estimate that it took 10 years after abandonment for the first trees to reach breast height.

Field Soil Sampling

During the summers of 2006 and 2007, 50 × 50 cm quantitative soil pits (Hamburg, 1984; Huntington et al., 1988) were used to sample the soils. Coarse woody debris and herbaceous material were removed from the surface of the excavated area prior to sampling. Sixteen measurements were averaged for the depth of each layer; allowing for accurate volume estimates of each horizon and its components (rocks, < 2 mm soil, roots). Quantitative pits allow for reasonably precise estimates of < 2 mm bulk-density (Db) and coarse fragment volume, they incorporate small scale soil heterogeneity and they allow for mass-per-unit area calculations of roots, rocks and < 2 mm soil. This method increases the accuracy of soil measurements till-derived soils with significant rock volumes (Hamburg, 1984; Huntington et al., 1988) as long as care is taken to keep the sides of the pit perpendicular at depth to limit the error in Db estimates. In some cases, rocks were too large to be removed from the walls of a pit. In these instances, an estimate of the rock weight was used to account for the amount of rock material within the boundaries of the quantitative pit and horizon. When possible, the rock was removed from the pit wall and weighed after the completion of the pit or an equivalent volume of smaller rocks were used to improve this mass estimate. The samples analyzed in this study are from the top 20 cm of the mineral soil, which is the approximate depth to which plowing occurred in these soils.

Potentially Mineralizable Carbon

Fifty grams of air dried < 2 mm soil from the plow zone (0-10 and 10-20 cm mineral soil portion) was placed in a 1-L mason jar and re-wetted to 55% water-field pore space. Samples were incubated at 25°C and evolved CO_2 measurements were taken at regular intervals for two months (62 days). Measurements were taken daily during the first two weeks of the experiment, every three days for the following three weeks, then weekly for the remainder of the experiment. The first seven days of incubation were not analyzed to remove the effect of a large flush of CO_2 evolved after rewetting air-dried soils (Franzluebbers et al., 2000). This flush is thought to be the result of the decomposition of microbial necromass present in dried soil and lysed by the rewetting process, as well as the rapid growth of microbial biomass in the new ideal environment. Evolved CO_2 measurements were taken using a LI-COR Inc. LI-7000 CO_2 / H_2O Analyzer (Lincoln, NE) in ppm CO_2 (μg CO_2 respired) and converted to the amount respired C per kilogram of soil carbon (g CO_2-C kg^{-1} soil-C) using the whole soil carbon concentration. The measured respired carbon is the potentially mineralized fraction under these laboratory conditions.

Particulate Organic Matter Fractionation

Thirty grams of whole soil from the 0-10 and 10-20 cm samples were shaken overnight in 100 ml of DiH_2O with ten glass beads to disrupt large aggregates. Following Cambardella and Elliot (1993), samples were sequentially wet-sieved into three physically separated size classes using standard sieves; (i) 250-2000 µm (CPOM), (ii) 53-250 µm (FPOM), (iii) < 53 µm (MinOM). Samples were then dried at 50°C for 12 – 24 hours, weighed and prepared for C and N analysis in an elemental analyzer using standard procedures (Carlo Erba NA 1500 C/N Analyzer, Fisons Instruments, Beverly, MA). Modern agricultural samples were fumigated with concentrated (12 M) HCl to remove any contribution of inorganic C from liming; prior to C and N analysis (Harris et al., 2001). While some of the modern agricultural soils contained significant amounts of lime, the contribution of inorganic C to the forest soils sampled in this study is negligible due to their natural acidity (Huntington et al., 1989). C and N concentrations were calculated; then converted to C and N contents using the Db of the sieved, air-dry soil and the horizon / layer thickness (Th). Results are reported on an oven-dry-weight basis, obtained by drying whole-soil subsamples at 105°C for 12 h.

Statistical Analysis

Data were analyzed using multivariate regression trees (MRT), linear regression and one-way ANOVA (JMP v 7.0.1, SAS Institute, Cary, NC). MRT analysis is a non-parametric technique that utilizes both categorical and continuous data to capture higher-order interactions that are not well represented in simple linear models (De'ath and Fabricius, 2000; De'ath, 2002). Although MRT analysis can be used for predictive modeling, we use this method as an exploratory tool to examine the relative influence of predictor variables on the variance within SOM pool data (Kulmatiski et al., 2004; Bedison and Johnson, 2009; Johnson et al., 2009; Clark and Johnson, 2010). Trees are graphically represented by branches (splits), labeled with the amount of variability in percent sums of squares explained (SSE), and leaves (nodes), characterized by the multivariate mean of the set of ecological factors that define it (De'ath, 2002). Each leaf node is defined by the splitting criterion (a suite of predictor variables), a group mean and the number of samples that comprise the group. Terminal nodes were maintained at $n \geq 5$; therefore groups where $n \leq 9$ could not be split further. Trees are pruned when splits in the data result in leaf nodes that represent ecologically implausible results. Table 1 shows the predictor variables used in this study. Statistical significance was evaluated at $P \leq 0.05$ and the Tukey-Kramer HSD test was used to evaluate differences between groups. Modern agricultural fields are our best estimate of the initial OM-pools of the afforested soils we sampled, though we recognize that there are differences between these sites and those that make up the chronosequences of abandonded agricultural fields. Pair-wise comparisons of sites were not possible because we were limited by: (1) the availability of sites with documented agricultural land-use histories and (2) not all combinations of factors exist at all locales.

Results

The proportion of C respired during a 62-day incubation is shown in figure 3.1. Modern agricultural fields (irrespective of agricultural use) had a higher proportion of potentially mineralizable C than the oldest forests. Mean cumulative respired C in plowed fields was 92 g of CO_2-C kg^{-1} soil-C, with the mean respired C for all formerly cultivated forests equaling 61 g CO_2-C kg^{-1} soil-C (Fig 3.1). Similarly, mean cumulative respired C in pastured and hayed fields was 125 g CO_2-C kg^{-1} soil-C with the average for abandoned pastured and hayed soils equal to 65 g CO_2-C kg^{-1} soil-C (Fig 3.1). For sites with independent replicates (error bars in figure 3.1), soils in current agricultural use had a greater proportion of easily mineralizable SOC ($P = 0.06$). There appears to be little difference in the proportion of C that was respired between agricultural uses across the chronosequences of forested sites, thought the lack of replication prevents a formal assessment of this.

The sum of the mass of sieved fractions was within 5% of the whole sample mass (average 99%) and carbon recovery was within 20% for all samples (average 92%). The loss of C during fractionation can be attributed to water soluble C. Fragments of charred material were found in the coarse POM fractions at all sites, but were not quantified.

The C content (kg m^{-2}) of coarse and fine POM fractions were 35% less in the soils of 40-year-old forests than in cultivated fields (Fig 3.2a, b). Coarse and fine POM

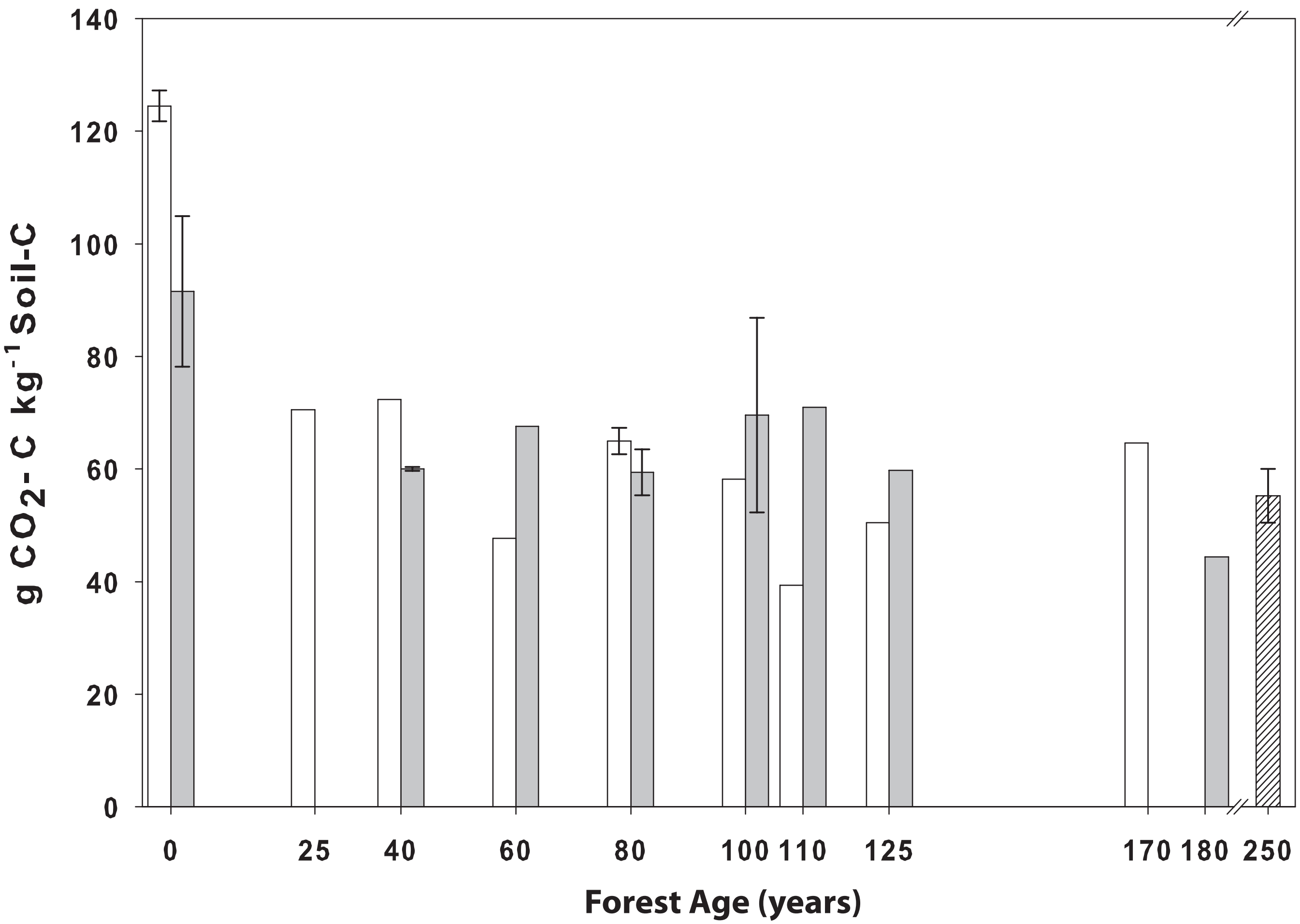


Figure 3.1: Cumulative respired 0-20 cm mineral soil C, over a 62-day incubation, of pastured or hayed land (white bars), cultivated cropland (shaded bars), and native forest stands (striped bars). Bars at age forest age 0 represent modern agricultural sites. (± 1 SE) is shown where there is replication of an abandonment age.

decreased by 16 % after 25 years of forest regeneration and 40% after 40 years in formerly pastured or hayed soils (Fig 3.2a, b). Given the slow development of forest floor organic horizons (Clark and Johnson, 2010), there appears to be a decades-long lag between the loss of easily respired organic residues from farming practices and the regeneration of forest floor organic horizons. Significant trends in C amounts with increasing forest age were not observed in the CPOM or FPOM data.

Mineral-associated OM content (kg m^{-2}) in the top 20 cm of abandoned cultivated soils showed a positive trend with age ($r^2 = 0.41$, $P = 0.05$) (Fig 2c). Soils formerly used for hay and pasture had a similar increase in MinOM though the trend was not significant. The rate of C-accumulation in the mineral associated organic matter fraction was 0.004 Mg $ha^{-1}y^{-1}$ (4 g-C m^{-2} y^{-1}), which was approximately 1/3 of the total C gain in the 0-20 cm layer and 1/10 of the total SOC gain across the chronosequence of abandoned agricultural sites (Clark and Johnson, 2010).

In these soils, most of the organic matter was in the mineral associated pool regardless of forest age or past use (see figures 3.2a-c), and there were no significant trends with increasing forest age in the proportion of the SOM pool accounted for by each of the fractions (data not shown). The proportion of mineralized C was significantly related to the percent of total horizon C each fraction comprises, however these relationships were weak (data not shown). Cumulative respired C was negatively correlated to the proportion of mineral associated OM-C ($r^2 = 0.1$, $P = 0.06$) and positively correlated to the amount of fine POM-C ($r^2 = 0.2$, $P = < 0.01$), while no relationship was observed with coarse POM-C (data not shown).

Multivariate regression analyses of the OM fractions are shown in figure 3.3 a-c. Predictor variables used in the analyses are found in Table 1. CPOM-C as a proportion of bulk sample C was best related to growing season degree-days (GSDD) (37% sums of squares explained (SSE)), with soils having shorter growing seasons and cooler temperatures containing more CPOM (Fig 3.3a). Within the range of sites that had shorter growing seasons, drainage class was also a significant contributor to the total SSE (20%). Soils classified as well drained contained less CPOM-C, while moderately well drained and somewhat excessively drained soils possessed the most CPOM-C. Moderately well drained soils are the wettest in this data set while the somewhat excessively drained site in this node is the oldest pasture (170 yr) and its C status may be related to stand age rather than to drainage class. Slope accounted for a small proportion of the SSE (3%) with sites having a flatter topography containing more C in the coarse POM fraction.

The FPOM fraction was strongly correlated to soil texture (Fig 3.3b). Sandy loam soils had a greater proportion of total C (29% SSE). Mean annual precipitation (MAP) explained 17% of the SS while GSDD explained 6% of the SS in FPOM-C, in silt loam and loam textured soils (Fig 3.3b). Soils with more precipitation and warmer temperatures with longer growing seasons were associated with less fine POM carbon.

Soil texture also explained the most variability (37% SSE) in the MinOM data, but in the opposite direction of the FPOM data (Fig 3.3c). In this case, coarser textured soils possessed a smaller proportion of mineral associated OM carbon, while finer textured

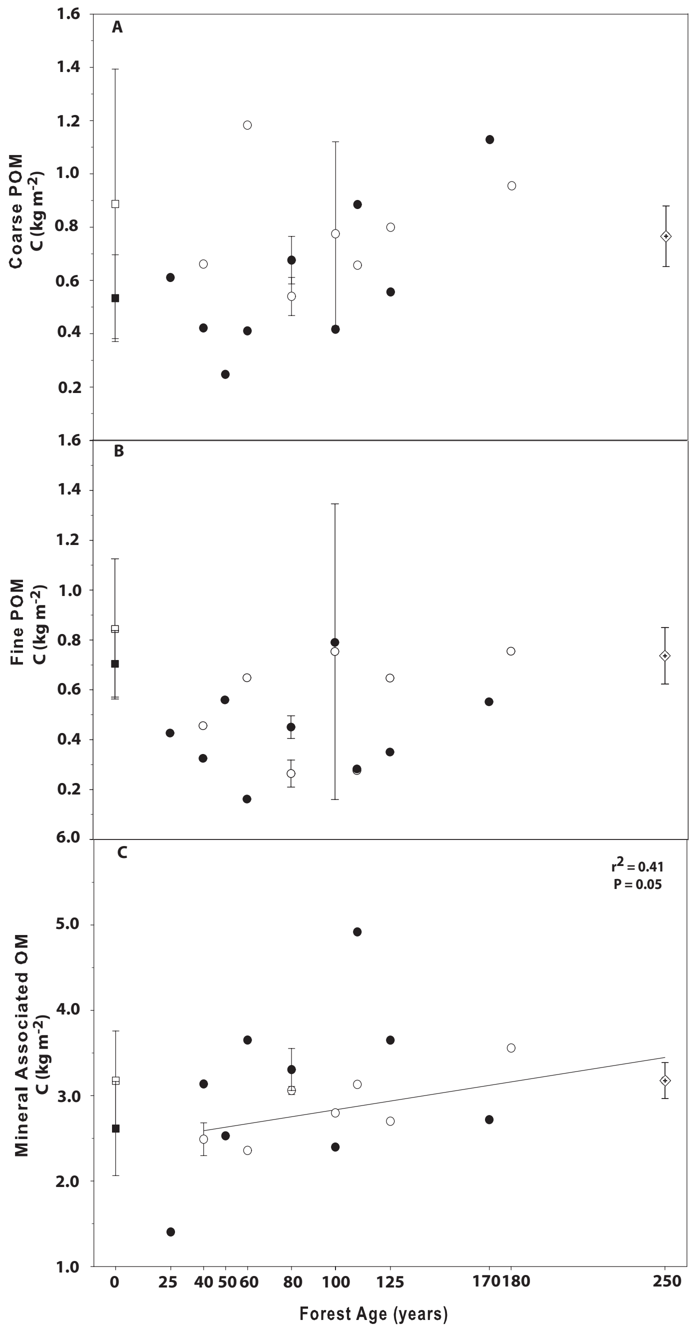
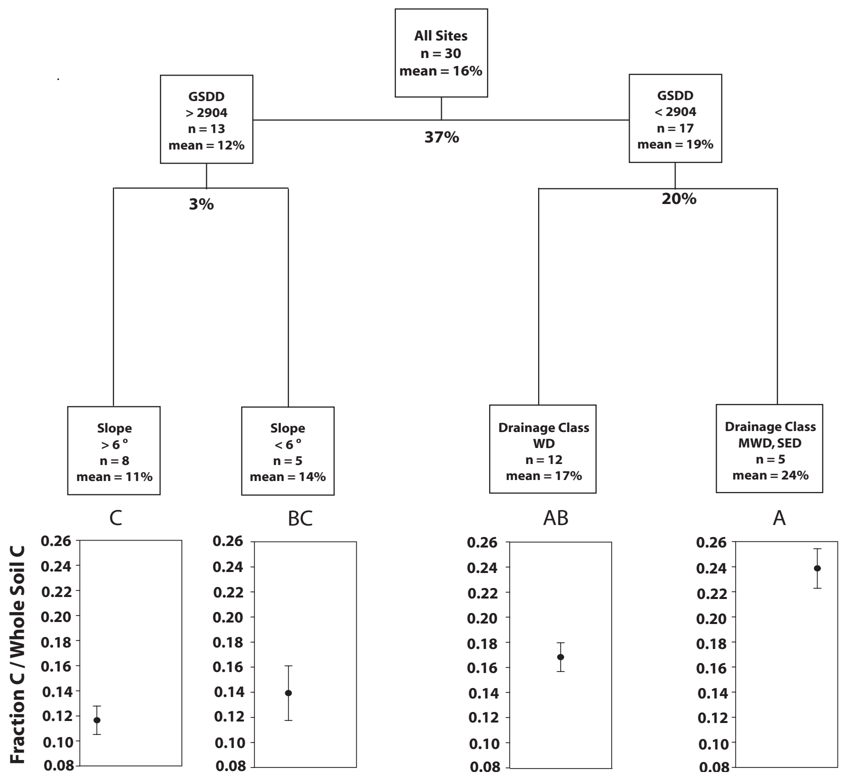
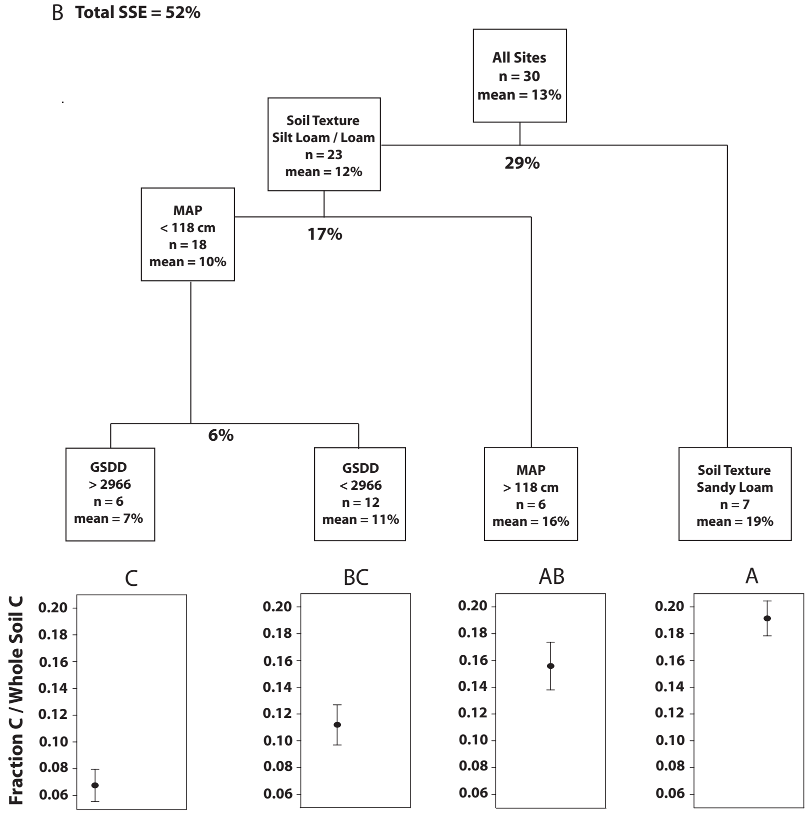


Figure 3.2: SOC trends in the 0-20 cm mineral soil for CPOM(A), FPOM (B) and MinOM (C) of cultivated cropland (open squares), pasture and hay fields (closed squares), abandoned plowed fields (open circles), abandoned pastured or hayed fields (closed circles), and native forest (diamonds). Values shown are the means of each age group measured in (kg-C m^{-2}), (± 1 SE) where there is replication of an abandonment age. Significant linear regression lines are shown ($P \leq 0.05$).

A **Total SSE = 60%**



B **Total SSE = 52%**



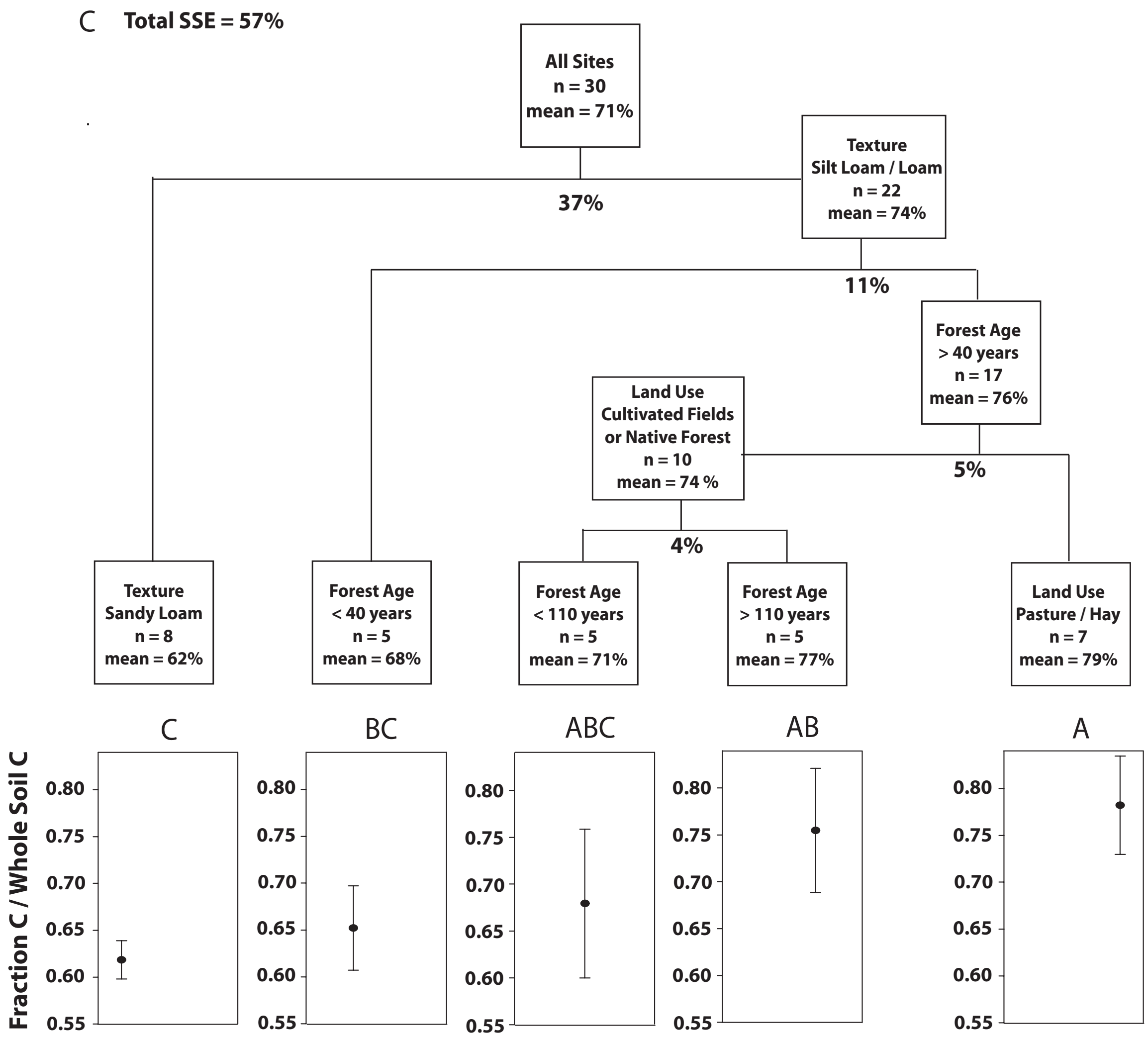


Figure 3.3: MRT for 0-20 cm mineral soil CPOM (A), FPOM (B), and MinOM (C) content. Individual boxes represent groups determined by the splitting criterion and are defined by the number of sites (n) and the mean C as a proportion of the total sample C. The amount of variability explained by each split is represented as a percentage at each node. Graphs under each terminal group represent the mean ± 1 standard error of that group. Groups not connected by the same letter are significantly different. Total SSE is noted.

soils contained a greater proportion of MinOM-C (Fig 3.3c). The largest proportion of C in the mineral-associated fraction (18% SSE) was observed in silt loam and loam forest soils in formerly pastured / hayed land regrowing for at least 40 years. The second greatest proportion of C was observed in cultivated cropland and native forest stands older than 110 years in age (4% SSE) (Fig 3.3c). Total SSE was 57%.

Discussion

The proportion of total C that was respired was greater from soils currently in agricultural use than for forest soils (P = 0.06). Cumulative respiration in modern pastured and hayed fields was higher than plowed soils (P = 0.03); logical reasons are that pasture receives manure inputs throughout the year, soil temperatures are lower, while plowing exposes more surface area to sunlight and oxygen. The rapid decrease in easily respired C in the top 20 cm of mineral soil between active agricultural fields and 40-yr old forest reflects the fact that the remnants of the agricultural residues and amendments decompose rather quickly compared to the incorporation of organic matter into this zone during forest redevelopment. The spatial segregation of litter from mineral horizons is the typical pattern for post-agricultural New England forests.

Labile organic matter may be sorbed to and contained within clay and silt mineral complexes (Kleber et al., 2007). Organic matter chemically bonded to mineral particles has longer turnover times (centuries to millennia) than CPOM and FPOM fractions (decades to a century) (Liao et al., 2006; Koegel-Knabner et al., 2008; Sollins et al., 2009). A number of studies have shown an increase in mineral associated OM-C as forests age (Liao et al., 2006; Hedde et al., 2008; Diochon and Kellman, 2009) and as tillage decreases (Cambardella and Elliott, 1992; Chivenge et al., 2007). The pattern of increasing MinOM-C content (kg m^{-2}) as forests age in this study (Fig 3.2C, $P = 0.05$) is consistent with those findings.

Although the amount of C (kg m^{-2}) in the <53 μm pool increases with stand age across the cultivated chronosequence ($P = 0.05$), the fields currently being plowed in WNE contain as much MinOM-C as most post-agricultural forest soils. While these farms represent the only reasonable estimate of soil conditions present in a formerly cultivated field, it is possible that they may inherently contain greater amounts of mineral-associated C than the hillside farms. Alternatively, modern management practices may be more effective at protecting topsoil than the conservation methods used in the 19th and early 20th centuries. The small portion of the land in this region that remains under active agricultural uses is mostly in the valleys on the deepest soils with the highest base status, (Eutrudepts). Soils at higher elevations and on steeper slopes are usually Dystrudepts and Haplorthods, and contain less clay than the lower elevation soils.

The MRT results showed a significant influence of soil texture on the proportion of C in the mineral associated and FPOM fractions. This is an important finding because practical applications of this research will likely focus on the ability of WNE soils to store the maximum amount of C in the most protected forms. In the end, the soils with the most clay and silt will be able to store the greatest amount of C in the least accessible pool. In order of their importance, texture, time since agricultural abandonment and pastured or hayed rather than cultivated soils, contribute the conditions most conducive to having a high level of mineral-associated C. While this study suggests an important link between the amount of silt and clay sized particles and the capacity of a soil to store OM in protected forms, other factors do influence C-accumulation rates in temperate forests (Foote and Grogan, 2010).

Significant but weak trends were shown between the proportion of C respired in the incubation experiment and the proportion of C in each of the three fractions. Not surprisingly, MinOM-C percent was inversely related to the potentially mineralizable pool ($r^2 = 0.10$, $P = 0.06$). The proportion of fine POM-C was positively and significantly correlated with the easily respired fraction ($r^2 = 0.20$, $P = < 0.01$), while no trend was observed with CPOM-C. Pastured and plowed soils with a sandy loam texture exhibited the greatest proportion of potentially mineralizable C. Those sites (n=2) are found at a higher average elevation (544 m) than the agricultural sites on finer textured soils (n=4, 250 m), and may inherently contain more OM due to the influence of cooler temperatures on decomposition rates. However we don't have enough information to speculate on that question.

The problem of correlated predictor variables in this data set merits discussion. Growing season degree-days is a variable that is often inversely correlated with higher levels of organic matter (Bedison and Johnson, 2009; Johnson et al., 2009; Clark and Johnson, 2010). GSDD was selected as a predictor variable in some of the regression

Predictor Variable	Mean (Range)	Description	Data Source
Site			
Forest Age (years)	92 (0-250)	The average age of the oldest trees at each site	Field Determination: Clark and Johnson (2010)
Former Agricultural Use	categorical	Determined using site characterisitics and land use history information	Field Determination: Clark and Johnson (2010)
Climate			
Growing Season Degree Days (GSDD)	2682 (2480-3198)	Index of mean daily air temperature and growing season length (Apr. - Sept.) over a 24-year period (1980-2003): GSDD = (mean daily temperature)* (the number of days with a minimum temperature > 0°C)	DAYMET Climate Model (Thornton et al., 1997) available at www.daymet.org Joshi et al. (2003) (This Study)
Mean Annual Precipitation (MAP) (cm)	125 (115-141)	The mean annual precipitation amount over a 24-year period (1980-2003)	DAYMET Climate Model (Thornton et al., 1997) available at www.daymet.org (This Study)
Soil			
Texture	categorical	Textural classification from the official soil series description (e.g. coarse-loam)	Soil Survey Staff, NRCS, USDA United States Department of Agriculture. http://soils.usda.gov/technical/classification/osd/index.html Accessed: August, 2010. USDA-NRCS, Lincoln, NE.
Drainage Class	categorical	Soil drainage classification from the official soil series description (e.g. well-drained, moderately well-drained)	Soil Survey Staff, NRCS, USDA. http://soils.usda.gov/technical/classification/osd/index.html Accessed: August, 2010. USDA-NRCS, Lincoln, NE.
Topography			
Elevation (m)	407 (242-612)	Elevation was calibrated using GPS receivers at each site	Raster data from National Elevation Dataset (NED) (1999) published by US Geological Survey available at http://gisdata.usgs.net/ne Gesch et al. (2009) http://pubs.usgs.gov/fs/2009/3053/
Slope (°)	9 (1-33)	Slope of each site determined from a digital elevation model (DEM)	Calculated Using Elevation Data in ESRI ArcGIS Software 380 New York Street, Redlands, CA 92373-8100 USA. (This Study)
Aspect	categorical	Exposure (e.g. N, S, E, W) determined from a DEM	Calculated Using Elevation Data in ESRI ArcGIS Software 380 New York Street, Redlands, CA 92373-8100 USA. (This Study)

Table 3.1: Summary of predictor variables used in Multivariate Regression Tree (MRT) analysis, in this study.

analyses, however the sites with the shortest growing season and coolest temperatures are most often the highest elevation sites, which were abandoned first because of shorter growing seasons, poorer soils and steeper slopes. Thus it is difficult to know whether climate is a real variable in some of the regression trees, or whether time since abandonment is the important contributor.

Conclusion

Current and past farming practices have influenced SOM pools from the western New England region. As we do not know the management practices of individual landowners, nor can we sample these changes as they were occurring, we are unlikely to be able to fully quantify the impact land clearing and agricultural use had on soil carbon quality. However, the current status of OM pools and differences between the soils of present-day farmland and abandoned farmland are observed in this study. Given these results, the legacy of subsistence-style agriculture likely lasts about a century in this landscape. In addition to stand age, other variables especially soil texture, play important roles in determining the ultimate capacity of western New England soils to accumulate protected C. Planning for the effective management of carbon in eastern U.S. forests is largely based on processed-based models. The data provided here and by Clark and Johnson (2010) offer well-constrained temporal trends in post-agricultural C-accumulation that can be used to refine such models, and act as a guide for predicting future SOC capital in post-agricultural aggrading forests.

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Chapter Four

Controls on soil organic carbon storage in contrasting northern hardwood forest regions

Abstract

We determined soil organic carbon (SOC) amounts in 205 quantitative soil pits from 94 sites in 5 northern hardwood forest regions. These were the Adirondack (ADK) region of New York, the Green Mountains of Vermont, the Berkshire – Taconic landscape of western New England, and two regions of mixed agricultural / forested land in southern and northern Wisconsin. These regions cover the range of climate of the northern hardwood forest in the U.S. and they include a wide range of soils, parent material, topography and prior land uses. The amounts of SOC to the bottom of the root zone were used in multivariate regression trees (MRT) to determine relationships between soil organic carbon (SOC) content and a suite of predictor variables likely to influence soil properties. SOC amounts ranged from 6.0 to 26.7 kg m^{-2} among the groups, as identified by the MRT analyses. Growing season degree-days (GSDD) is by far the single best predictor of SOC stocks across the set of regions sampled; 60% sums of squares explained (SSE). Soils from the lower elevation, undulating landscapes with a history of agriculture, contain less than half the SOC of soils in the mountainous regions (mean = 8.7 kg-C m^{-2}, and 19.1 kg-C m^{-2}, respectively), which have cooler, shorter growing seasons. In the set of warmer sites, SOC content was linked to growing season temperature, time since the last agricultural use and soil texture (total SSE = 0.76). At

the cooler sites, drainage class, growing season temperature, slope and rock volume were the most important variables linked to the size of the SOC stocks (total SSE = 0.67). Substantial differences in the amount of SOC across the northern hardwood forest, and in the key determinants of SOC, suggest that attempts to model future (or past) trends in SOC, or develop guidelines for managing SOC will be most effective if done on a region-by-region basis.

Introduction

The majority of the organic carbon in forested ecosystems is stored in soil (1500-2400 Pg-C) (Jobbagy and Jackson, 2000; Amundson, 2001) and amounts of organic carbon currently stored in forest soils reflects a wide variety of influences on rates of litter inputs and microbial decomposition, as well as, erosion rates and past disturbances. In many areas of the eastern U.S., soil carbon pools are changing in response to past changes in land uses and they are expected to continue to change in response to shifts in temperature, growing season length and precipitation, as well as to natural disturbance (e.g. fire) and future land use conversions (Johnson and Curtis, 2001; DeGryze et al., 2004; Abid and Lal, 2008; Abid and Lal, 2009; Bedison and Johnson, 2009).

Current soil carbon models (e.g. CENTURY and PNET) are being used to simulate future changes on soil carbon pools in a wide variety of forested landscapes, with the goals of improved understanding of the C-storage potential of terrestrial systems and developing management strategies for maximizing carbon sequestration (Heath and

Smith, 2000; Johnston et al., 2004). Validating modeled changes in soil carbon pools over large, heterogeneous areas is challenging due to the variety of variables that can influence carbon pools, (Martin et al., 2007), the time and expense involved in quantitatively sampling soils and vegetation, and the difficulty in measuring changes in soil SOC because of high spatial variability and rather slow rates of change (Vance, 2003; Yanai et al., 2003).

The primary goals of this study were to summarize the quantities of SOC in five regions across the geographic range of the northern hardwood forest in order to determine how different SOC contents are, and which landscape and climatic variables best account for the differences. We knew from the prior studies of Kulmatiski et al. (2004), Bedison and Johnson (2009) Johnson et al. (2009) and Clark and Johnson (2010) that the important controls on SOC pool size would likely be different in the different regions, and reasoned that SOC pools would not change uniformly in response to future changes in climate and management practices. We used SOC datasets from northern hardwood forests in the Adirondack (ADK) region of New York, the Green Mountains of Vermont, western New England (WNE) sites from Berkshire and Adams counties Massachusetts and sites in southern (Juneau county) and northern (Price and Oneida counties) Wisconsin (Fig. 1). All soils were collected and processed using the same field and laboratory procedures, and largely by the same personnel. We used multivariate regression trees (De'ath and Fabricius, 2000; De'ath, 2002) to determine the relative influence of site characteristics, soil properties and climatic variables on SOC amounts in those soils.

Presumably, modeling efforts to project future changes, and designers of plans to manage SOC will benefit from region-specific information on the controls on SOC pool size.

Methods and Region Descriptions

Contrasting Northern Hardwood Forest Landscapes

The samples used in our analysis are drawn from (1) Bedison and Johnson (2009) who examined long-term changes in soil chemistry, forest composition and forest structure in the Adirondack region of New York; (2) Clark and Johnson's (2010) assessment of the influence of agricultural histories on soil carbon and nitrogen amounts; (3) Johnson et al.'s (2009) study of the controls on soil organic matter in the Green Mountains of Vermont; and (4) sites in Wisconsin selected for an unpublished study on the effects of past land use and soil texture on SOC amounts. These regions are shown in figure 4.1 and lie within the geographic boundaries of the northern hardwood forest as defined by (Goodman, 1992; Fralish, 2003). At the sites sampled, the most important species were yellow birch (Betula alleghaniensis), beech (Fagus grandifolia) and sugar maple (Acer saccharum), with lesser amounts of paper birch (Betula papyrifera), white ash (Fraxinus americana), and red maple (Acer rubrum). Occasionally red oak (Quercus rubrum), white oak (Quercus alba) and American basswood (Tilia americana) were present as minor species. The conifers encountered include eastern hemlock (Tsuga canadensis), white pine (Pinus strobus), jack pine (Pinus banksiana), and red spruce (Picea rubens).

Fire (natural or anthropogenic), insect outbreaks (e.g. gypsy moth) and windthrow can be significant disturbances in northern hardwood forest systems, however major natural stand-clearing events only reoccur every 3-4 centuries in the northeastern U.S. (Howard et al., 2005). Fire is more prevalent in the relatively dry areas of northern Wisconsin where, in years of drought, large fires can occur (Bresee et al., 2004), and there were wild fires a century ago in the Adirondacks that affected some sites used in this study (Bedison and Johnson 2009).

Much of the northern hardwood forest was cleared for agricultural purposes over the last two to three centuries. Typically, forest was converted to subsistence farms, then to dairy farms, with much of the remaining land being logged for the past 150 years. Region C (the Berkshire – Taconic region) was extensively cleared for agriculture during the late 18th and early 19th centuries. The maximum extent of clearing and agricultural use occurred about mid-19th century when the civil war and the industrialization of the north led to extensive farm abandonment that has continued through the present (Foster et al., 1998; Hall et al., 2002). Most of the early farms in this region were designed for subsistence living, and their small footprint allowed forest to rapidly invade abandoned fields. The land that remains in agricultural use in Region C is mostly found in the valleys on the most productive soils (Clark and Johnson, 2010).

Wisconsin was settled during the 19th century and the land cleared through the early 20th century. Large-scale dairy farming and cultivation continue today in this region. Abandoned farmland is often planted with conifer species, primarily red pine

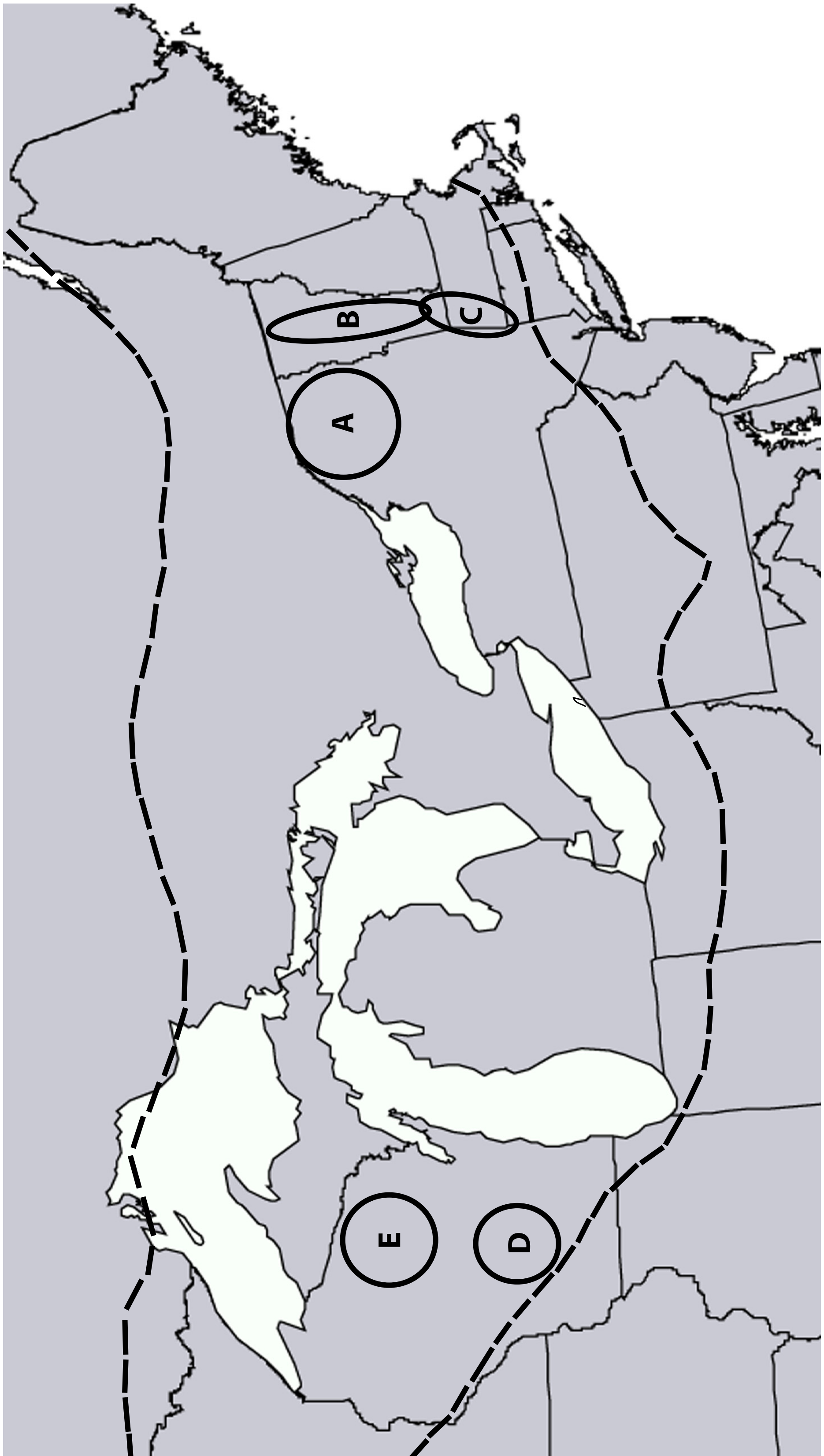


Figure 4.1: The range of northern hardwood forest. Dashed-lines represent the approximate extent of northern hardwood forest. The SOC sampling regions are circled and lettered.

(Pinus resinosa), as a means to keep abandoned or less-productive agricultural land profitable (Chittenden, 1911).

In the Green Mountains (Region B), subsistence farms were rare above 500 m, and most of the sites we sampled were secondary forest above that elevation. The northern hardwood forest in Vermont was extensively logged through the 19th and 20th centuries, and logging remains an important industry.

In the Adirondack Preserve (Region A), human disturbance has been limited over the past century due to legal protection. Prior to the early 1900's, logging was extensive, and wildfires were common over large areas (Schmitt, 1916). A few northern hardwood sites sampled were on abandoned agricultural land, and several sites had charcoal, indicative of past fire(s). A detailed description of the methodology for the determination of land use histories for these regions can be found in Post and Curtis (1968), Bedison and Johnson (2010) and Clark and Johnson (2010).

The SOC data presented in this paper were obtained from measurements made on samples from 205 quantitative soil pits from 94 sites in the 5 regions. All soil samples used in this study were obtained from 50 × 50 cm quantitative pits excavated to the bottom of the root zone (Hamburg, 1984a; Huntington et al., 1988). The SOC data were assembled from three separate studies whose primary objectives differed, as did the criteria for selecting the sampling sites. With a few exceptions, all of the sites in New England and in the ADK were on well-drained, or moderately well-drained soils of northern hardwood stands developed in glacial till. The soils from the southern

Wisconsin locales were developed on loess overlying sandstone, while the soils from the northern Wisconsin sites were developed on glacial till and outwash deposits. The locations of the sites sampled in the Adirondacks were determined by (Heimberger, 1933) in 1930-32, as sites that were typical mature forest on well-drained soils. Heimburger was interested in the range of "forest types" in the Adirondacks, and the variation in soil chemical conditions across the forest types. Along with spruce-fir and pine dominated sites, 22 sites classified as northern hardwoods were sampled again in 1984 and 2005-06 principally to measure changes in soil pH and available Ca that had occurred during 5 and 7 decades of forest growth and acid rain inputs (e.g. Bedison and Johnson 2010). We used the samples collected in 2005-2006 for this study.

The Green Mountain sites were chosen and permanently marked in 1957- 1960 by (Post and Curtis, 1970), whose main objectives were to relate northern hardwood site index to soil and climatic variables. As with Heimburger's sites, the Post and Curtis sites were not randomly selected, rather they were chosen to cover the range of climate and soil conditions experienced by northern hardwoods in the Green Mountains. A.H. Johnson and others (University of Pennsylvania) resampled these sites in 1990-92 (K.A. Johnson et al. 2009).

The western New England and Wisconsin sites were selected for a study of the effects of past agricultural use on SOC pools in second-growth forests. The sites selected for the WNE study were from northern hardwood forests on well-drained soils where the last agricultural use (pasture, tillage, or woodlot) could be determined, and the time of abandonment estimated from stand age and histories provided by landowners. These sites range in age from active farms, year zero or the time when abandonment begins, to old growth stands, at least 250 years in age, on sites more or less equivalent to those once used for agriculture. The Wisconsin sites were selected according to the same criteria with an additional effort made to obtain coarse and fine textured soils.

The question of what this set of sites represents needs to be addressed in order to properly interpret the results. In the northeastern U.S., the sites in the Berkshire - Taconic region, Green Mountains and Adirondacks, span the elevation range of sites occupied by the northern hardwood forest (242 – 790 m). Because climate is related to elevation, the full range of temperature and precipitation experienced by northern hardwoods in the eastern region is included in the sample, and the east-west gradient in precipitation is represented to some degree by including the drier Wisconsin sites, which lie about 1000 km to the west of the New England / Adirondack sites.

With respect to the range of soils occupied by the northern hardwood forest, USDA NRCS soil maps (Soil Survey Staff, 2010) indicate that this forest type occurs on a range of Dystrudepts, Eutrudepts, Spodosols, and Alfisols. County-scale soil maps (Scanu, 1988; Voigtlander, 2006) and the horizons measured in the soil pits we excavated confirm that the range of sites we sampled includes the soils noted above.

Past land use at the sites we sampled can be grouped into three categories: (1) 42 sites represent the higher elevation, colder, steeper and rockier sites where agriculture was not practical, and human disturbance has been limited to logging. Soils at those sites are primarily Spodosols and Dystrudepts. (2) 20 sites represent the lower elevation, warmer, gently rolling landscapes that have a history of agricultural use. These lower elevation sites include Dystrudepts, if the soils are derived from acid till, and Eutrudepts or Alfisols in areas where the till (or loess in Wisconsin) is slightly calcareous. Landscapes included in (1) and (2) are distinctly different with few characteristics in common other than they were northern hardwood forest in the 18th century (Cogbill et al., 2002). There are 32 sites in group (3) which comprises the sites that generally lie in the elevation / climate band between groups (1) and (2) in western New England. This area has a history of subsistence agriculture, but climate and site conditions were marginal for agricultural use, and these are the sites that were mostly abandoned between ca. 1830 and 1950. The soils in this group are largely Dystrudepts.

The climate and site characteristics of these groups represent the array of landscapes in which northern hardwoods grow, including a sufficiently wide range of growing season temperatures and rainfall, and an assortment of slopes, stoniness, substrate base content and disturbance. Accordingly, we expected to capture the full range SOC amounts common in the northern hardwood forest region, and that we could illustrate regional-scale differences in the controls on SOC pools in the different settings.

Carbon Analyses

A representative subsample of 5 horizons (Oe, Oa, 0-10 cm, 10-20 cm, and > 20 cm to the bottom of the rooting zone) in each quantitatively sampled profile was returned to the laboratory and air-dried. Rocks (> 50 mm) were weighed separately in the field, while weights of coarse fragments (2-50 mm) were determined after sieving air-dried soil subsamples in the lab. To convert coarse fragment mass to volume, a density of 2.65 Mg m^{-3} was assumed. A < 2 mm soil sample was ground for %C analysis and combusted in an elemental analyzer using standard procedures (Carlo Erba NA 1500 N Analyzer, Fisons Instruments, Beverly, MA). Samples from active agricultural soils were fumigated with concentrated (12 M) HCl to eliminate inorganic C inputs from liming; prior to C analysis (Harris et al., 2001). The contribution of inorganic C in the current northern hardwood forest soils is negligible due to their natural acidity (Huntington et al., 1989), but some of the modern agricultural soils contained significant amounts of lime. Organic C concentrations were calculated for all organic and mineral horizons; then converted to C amounts using the bulk density of the sieved, air-dry soil and the horizon / layer thickness. Results are reported on an oven-dry-weight basis, obtained by drying subsamples at 105°C for 12 h. SOC amounts include Oe and Oa horizons of the soil surface as well as the mineral soil down to the bottom of the root zone. Oi horizons were not included. Mineral soil samples were scaled to the average depth to the bottom of the rooting zone within each region in order to eliminate bias from very shallow or very deep mineral soils.

Statistical Analysis

The data were analyzed with JMP (v 7.0.1, SAS Institute, Cary, NC) and statistical significance was evaluated at $P \leq 0.05$. Multivariate regression trees (De'ath and Fabricius, 2000; De'ath, 2002) were used to explore the variability within SOC datasets by examining the relative importance of a suite of predictor variables that are known to influence soil properties (Kulmatiski et al., 2004; Bedison and Johnson, 2009; Johnson et al., 2009). MRT analysis is a non-parametric technique that uses a least squares splitting criterion for categorical and/or continuous numerical data to capture interactions that are not well represented in simple linear models. A binary splitting approach minimizes the within groups sums of squares (SS) while maximizing the between groups SS for each division of data within a tree (De'ath, 2002). Graphically, trees are composed of branches (splits), labeled with the amount of variability each split explains, and leaves (nodes), characterized by the multivariate mean of the set of ecological factors that define it (De'ath, 2002). Each node is defined by the splitting criterion (predictor variables), a group mean and the number of samples that comprise the group. Terminal nodes were maintained at $n \geq 5$; therefore groups where $n \leq 9$ were not split further. Trees are pruned when splits in the data represent ecologically implausible results. Significant differences between terminal node means were analyzed using the Tukey-Kramer HSD test. We also used linear and forward multiple regression (JMP) to assess the factors that might have the most value in prediction soil C stocks.

Following the soil forming factors identified by Jenny (1980), we used 9 potential predictor variables representing climate (growing season degree-days, GSDD and mean annual precipitation MAP), parent material (soil texture and rock volume) and topography (drainage class, aspect and slope). We also used the former land use and stand age as categories of past disturbance. We considered vegetation to be the same (e.g. northern hardwoods) and did not try to use species composition as a potential predictor variable because we did not have quantitative vegetation data for all of the sites. The data source and a description of each predictor variable are provided in Table 4.1.

Results

When the whole-profile SOC amounts from the 5 sampled regions are pooled, GSDD explained 60% of the sums of squares, while drainage class and slope accounted for an additional 15% SSE in the colder group of sites (Fig. 4.2). The analysis split the sites at 2589 GSDD, with all but one of the agricultural sites in the warmer group, suggesting that sites with less than 2589 GSDD were too cold even for subsistence farming. The exception is a turnip farm at an elevation of 612 m on Florida Mt., MA, which has a GSDD value of 2550. The SOC content among the terminal leaf nodes varied from 6.0 to 26.7 kg-C m^{-2}, with the largest pools found on moderate slopes at the coldest sites. The smallest SOC amounts are associated with the warmest sites at the scale of this analysis, regardless of past land use.

When the set of warmer sites (> 2589 GSDD) is examined separately, the MRT showed GSDD (> or < 3010) explained 39% of the sums of squares (Fig. 4.3). Stand age (representing the time since agricultural abandonment) was the second split (21% SSE), followed by soil textural class (13% SSE) (Fig. 4.3). Stands older than 96 years with coarser textured soils contained more SOC. The total sums of squares explained in this analysis was 75%. Amongst the colder sites (< 2589 GSDD), the MRT indicated

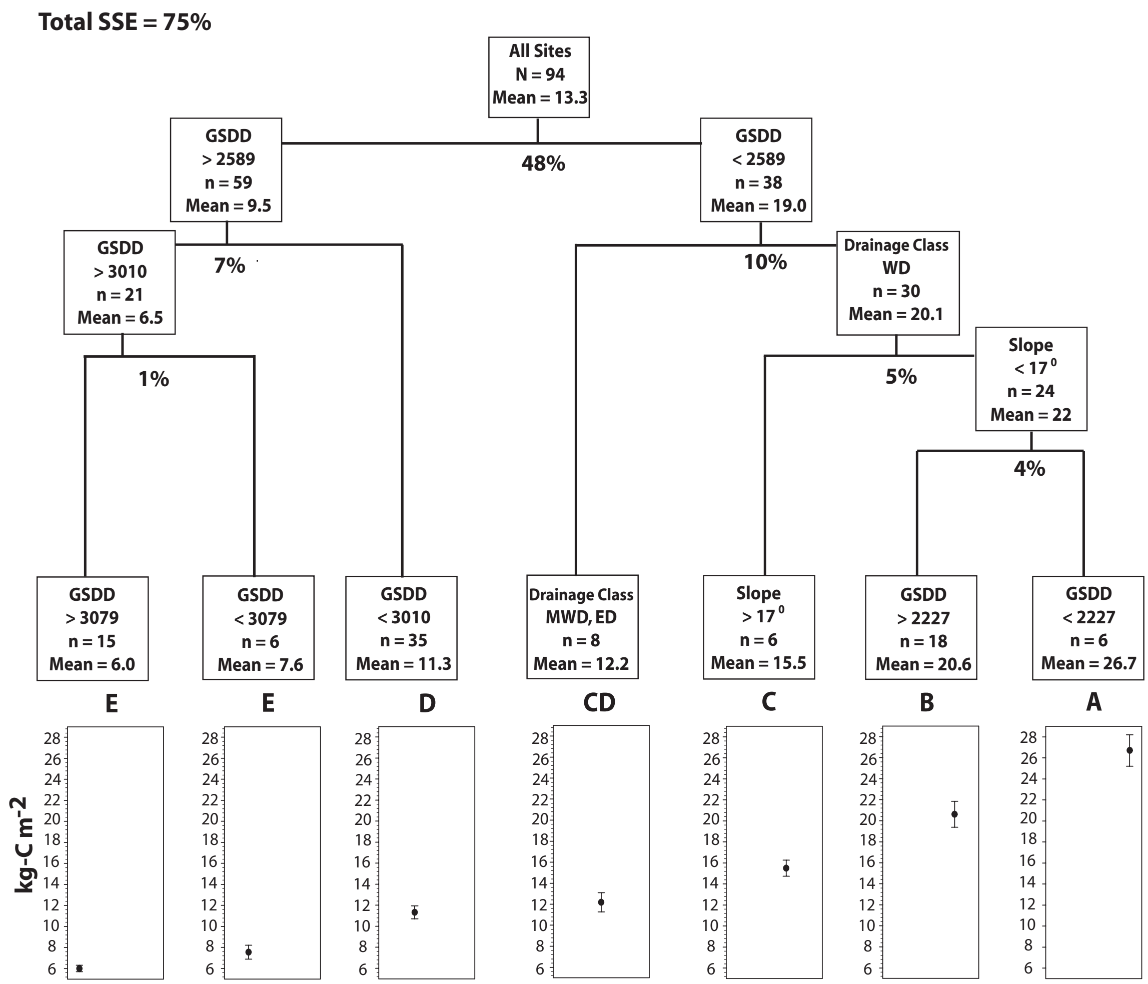


Figure 4.2: MRT for the total quantitative pit SOC of all sites. Individual boxes represent groups determined by the splitting criterion and are defined by the number of sites (n) and the mean (kg-C m^{-2}) value of those sites. The amount of variability explained by each split is represented as a percentage at each node. Graphs under each terminal group represent the mean ± 1 standard error of that group. Groups not connected by the same letter are significantly different. Total SSE is noted. Nodes not connected by the same letter are significantly different.

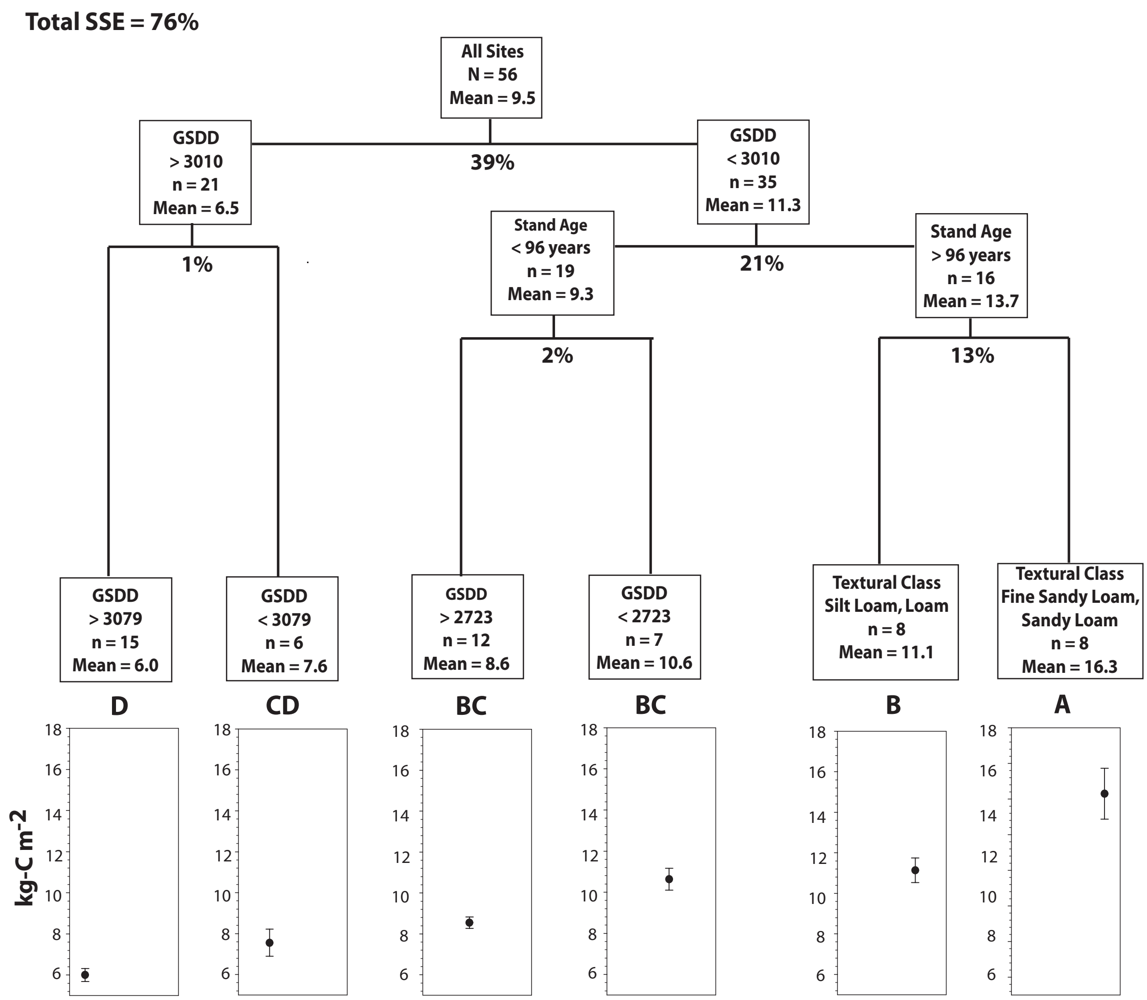


Figure 4.3: MRT for the total quantitative pit SOC of the warmer northern hardwood forest sites. Individual boxes represent groups determined by the splitting criterion and are defined by the number of sites (n) and the mean (kg-C m^{-2}) value of those sites. The amount of variability explained by each split is represented as a percentage at each node. Graphs under each terminal group represent the mean ± 1 standard error of that group. Groups not connected by the same letter are significantly different. Total SSE is noted. Nodes not connected by the same letter are significantly different.

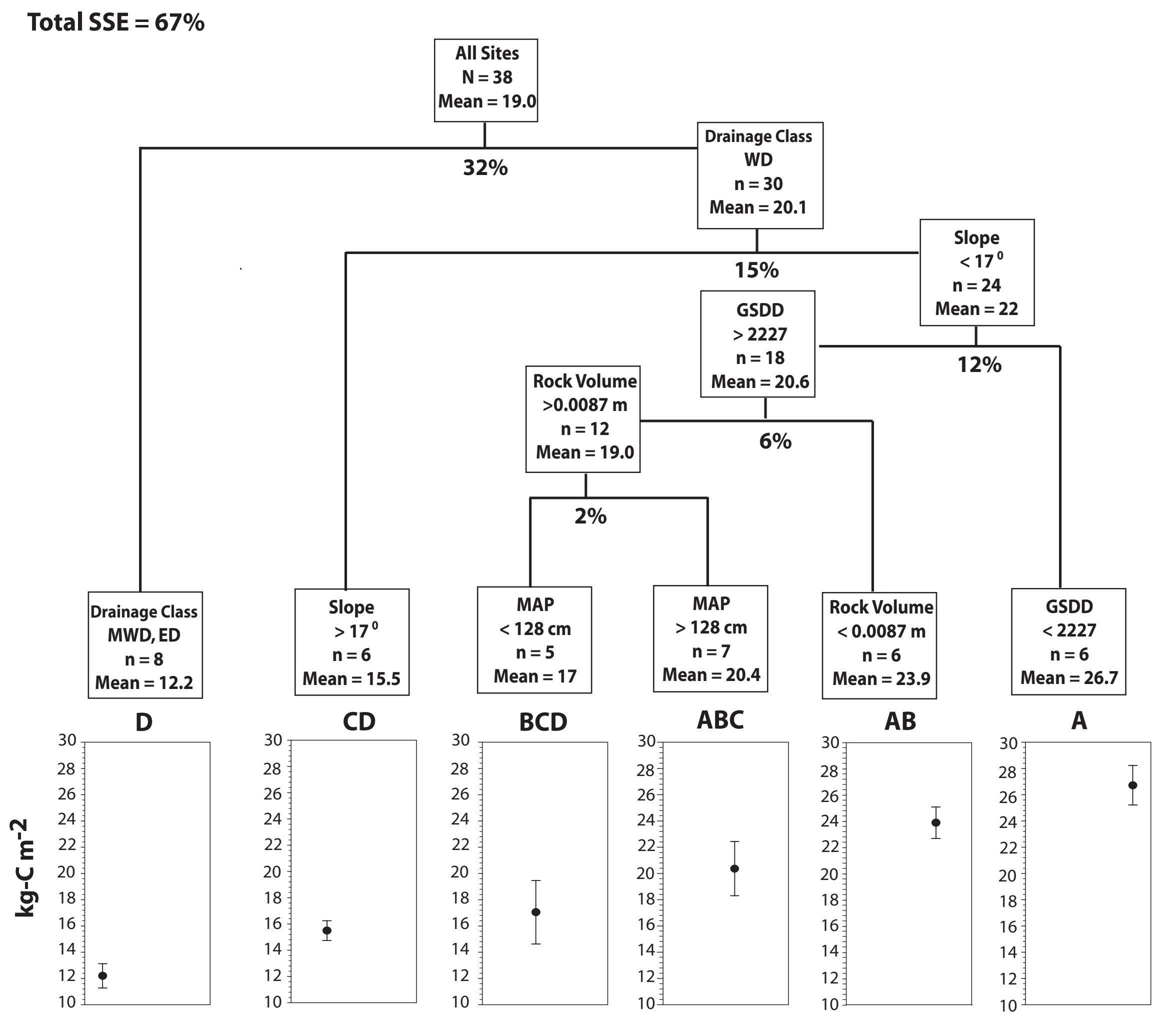


Figure 4.4: MRT for the total quantitative pit SOC of the cooler northern hardwood forest sites. Individual boxes represent groups determined by the splitting criterion and are defined by the number of sites (n) and the mean (kg-C m^{-2}) value of those sites. The amount of variability explained by each split is represented as a percentage at each node. Graphs under each terminal group represent the mean ± 1 standard error of that group. Groups not connected by the same letter are significantly different. Total SSE is noted. Nodes not connected by the same letter are significantly different.

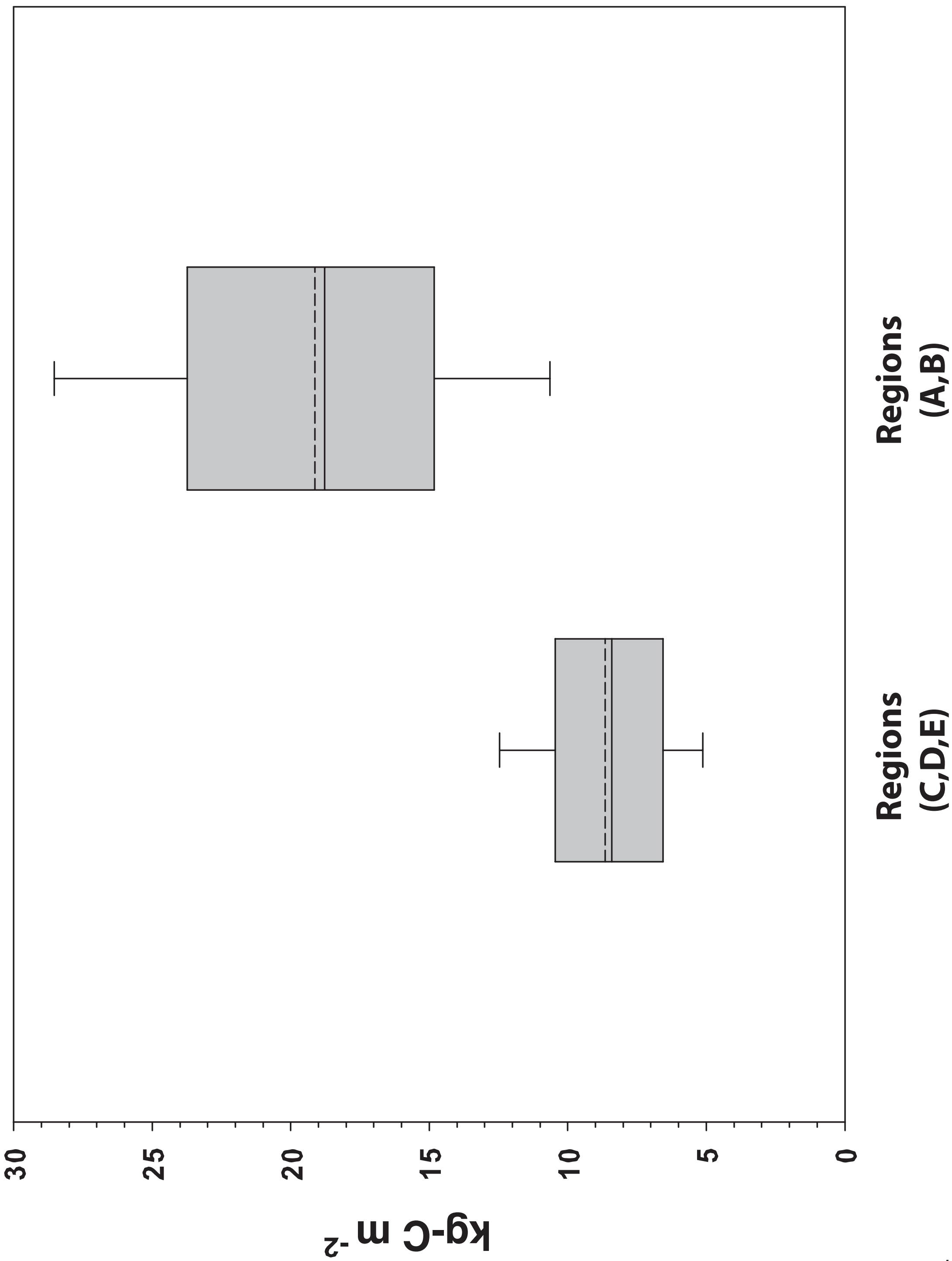
that drainage class explained the most variability (32% SSE), with well-drained soils containing more C (Fig. 4.4). Slope was also an important contributor to the SSE (15%, Fig. 4.4). Within the group of well-drained soils, gentler slopes (< 17°), GSDD (6% SSE), rock volume (6% SSE) and MAP (2% SSE) were the variables explaining the most SS, but their effect was minimal. More precipitation, smaller coarse fragment (rock) volume, and cooler temperatures were associated with more SOC. The total sums of squares accounted for within the set of colder sites was 67%.

MRT analyses of individual horizons (e.g. Oe, Oa, 0-20 cm, > 20 cm) yielded results similar to those observed for the whole soil profile (data not shown). GSDD was the primary factor that split the mineral horizons into groups except in the case of the organic horizons where the initial split was by stand age (time since agricultural use abandonment) at 100 years.

We also used the MRT analysis to examine the factors most likely to be important in determining the amount of SOC in the different regions. When “Region” is used as a variable, the areas representing a mixture of forest, abandoned farmland and active farms (regions C, D, and E) were separated from regions A and B, which are the montane northern hardwood forests (data not shown). That split accounted for 59% of the sums of squares explained (80% SSE by the entire tree). Differences in SOC amounts between the regional groups are shown in figure 4.5.

Within the set of sites that included both agricultural and forested land (regions C, D, and E), the data were split by GSDD (49% SSE) at 3010 GSDD (data not shown).

Figure 4.5: Regional SOC (kg-C m^{-2}) groupings for the entire soil profile, organic (Oe + Oa) + mineral soil. Boxes indicate the median and interquartile ranges; bars represent the 5th and 95th percentile. Dotted lines show the mean values for each age grouping. Groups not connected by the same letter are significantly different.

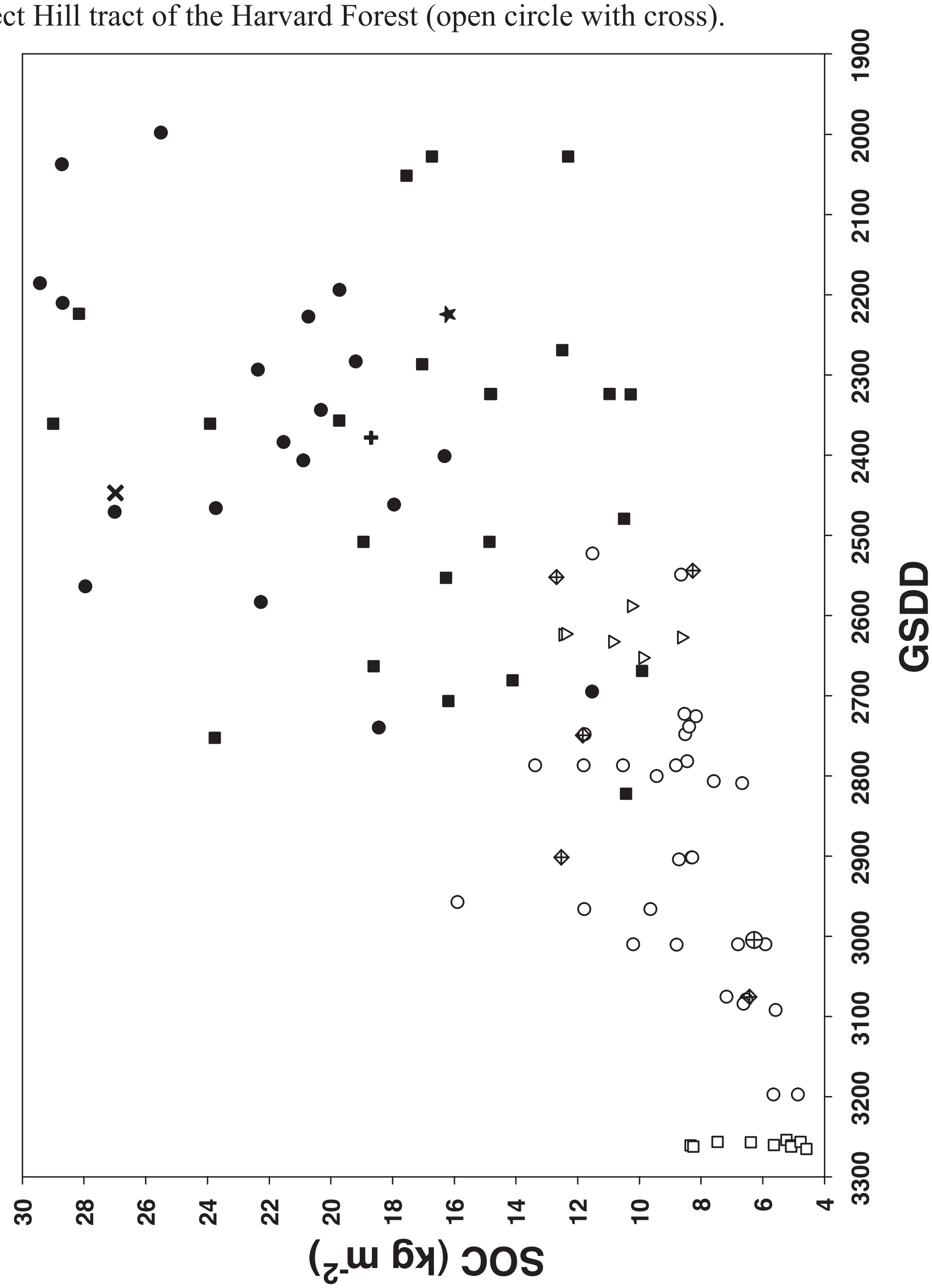


Sites with a GSDD > 3010 are the best for agricultural practices as they have the longest growing seasons and the most productive soils. Stand age explained 11% of the sums of squares in the agricultural regions SOC dataset, with the result of forests greater than a century in age containing more SOC than more recently abandoned sites.

Rock volume was the primary split of SOC amounts in the combined group of Adirondack and Green Mountain sites (34% SSE) (data not shown). More C was associated with soils with less than 0.016 m^3 of coarse (> 2 mm) material. Secondary splits in the data were related to the climate variables GSDD and MAP. MAP (> or < 144 cm) explained 11% of the SS and more precipitation was associated with more SOC. MAP is inversely correlated with GSDD, so whether this is really an effect of MAP is equivocal. In all cases, lower GSDD and more precipitation were related to greater amounts of SOC.

The relationship between vegetation and SOC storage was not examined in this study because we did not have quantitative plot level data for trees in Wisconsin and WNE. Bedison and Johnson (2009) and Kulmatiski et al. (2004) both found that conifers are associated with greater soil C amounts in the Adirondacks and in a Connecticut hardwood forest. Hemlock litter, for instance, is more recalcitrant than other litter; often leading to increased forest floor mass (Melillo et al., 1982; Kulmatiski et al., 2004; Clark and Johnson, 2010).

Figure 4.6: Comparison of GSSD and SOC content for the entire soil profile, organic (Oe + Oa) + mineral soil to the end of the rooting zone) from this study: ADK (closed circles), Green Mtn. (closed squares), WNE (open circles), Southern WI (open squares), Northern WI (open triangles), and Old-Forest stands > 250 years in age (open diamonds with cross). Included reference SOC measurements from other studies: Hubbard Brook watershed 5 (closed star), Campton, NH (cross), Huntington Forest, NY (x), and the Prospect Hill tract of the Harvard Forest (open circle with cross).



Discussion

Growing season degree-days is by far the single best predictor of organic carbon amounts in the soils of this diverse set of northern hardwood forests (Fig. 4.6). This is consistent with the long known relationships among temperature, productivity and decomposition, where increased temperature stimulates microbial activity more than it stimulates productivity so that warmer soils generally have less C than similar soils in colder climates. We sampled northern hardwood stands near the upper elevation limit of this forest type in the Adirondacks and Green Mountains, so that the highest SOC levels (approximately 29 kg-C m^{-2}) probably represent the upper limit of the amount of SOC in well-drained, montane northern hardwood sites. The values for northern hardwood forest soils in the Hubbard Brook, Huntington Forest, Harvard Forest, and Campton, NH research sites (Hamburg, 1984b; Huntington et al., 1988; Johnson and Lindberg, 1992; Bowden et al., 2009) are included in figure 4.6, and they fall well within the range of SOC values obtained in this study. The variability in figure 4.6 hampers a determination of whether the relationship is linear, or if a maximum level of 29 kg-C m^{-2} is reached at about 2500 GSDD, as figure 4.6 might suggest. At the warmest sites, SOC levels are much lower, with the highest values around 12 kg-C m^{-2}, less than half the maximum amounts found in the higher elevation montane soils.

When multiple linear regressions are constructed using the continuous variables listed in table 4.1, variables other than GSDD are seldom significant (data not shown), and it is difficult to account for the variability left in figure 4.6 once GSDD is accounted

Predictor Variable	Mean (Range)	Description	Data Source
Site			
Region	categorical	Northern hardwood soil data sets (Adirondacks, Green Mountains, Berkshire - Taconic Landscape, Wisconsin)	This Study
Stand Age (years)	95 (0-250)	The average age of the oldest trees at each site	Field Determination: Clark and Johnson (2010), Bedison and Johnson (2009), Johnson et al. (2009)
Former Agricultural Use	categorical	Determined using site characterisitics and land use history information	Field Determination: Clark and Johnson (2010), Bedison and Johnson (2009), Johnson et al. (2009)
Climate			
Growing Season Degree Days (GSDD)	2682 (1998-3266)	Index of mean daily air temperature and growing season length (Apr. - Sept.) over a 24-year period (1980-2003): GSDD = (mean daily temperature)* (the number of days with a minimum temperature > 0°C)	DAYMET Climate Model (Thornton et al., 1997) available at www.daymet.org Joshi et al. (2003) (This Study)
Mean Annual Precipitation (MAP) (cm)	120 (84-152)	The mean annual precipitation amount over a 24-year period (1980-2003)	DAYMET Climate Model (Thornton et al., 1997) available at www.daymet.org (This Study)
Soil			
Rock Volume (m^3)	0.018 (0-0.058)	The volume of rock in an excavated mineral layer	Field Measurements: Clark and Johnson (2010), Bedison and Johnson (2009), Johnson et al. (2009), This Study
Texture	categorical	From the official soil series description (e.g. coarse-loam)	Soil Survey Staff, NRCS, USDA, http://soils.usda.gov/technical/classification/osd/index.html Accessed: August, 2010. USDA-NRCS, Lincoln, NE.
Drainage Class	categorical	Soil drainage classification from the official soil series description (e.g. well-drained, moderately well-drained)	Soil Survey Staff, NRCS, USDA http://soils.usda.gov/technical/classification/osd/index.html Accessed: August, 2010. USDA-NRCS, Lincoln, NE.
Topography			
Elevation (m)	467 (242-790)	Elevation was calibrated using GPS receivers at each site	Raster data from National Elevation Dataset (1999) published by US Geological Survey available at http://gisdata.usgs.net/ne Gesch et al. (2009) http://pubs.usgs.gov/fs/2009/3053/
Slope (°)	8 (0-33)	Slope of each site determined from a digital elevation model (DEM)	Calculated Using Elevation Data in ESRI ArcGIS Software 380 New York Street, Redlands, CA 92373-8100 USA. (This Study)
Aspect	categorical	Exposure (e.g. N, S, E, W) determined from a DEM	Calculated Using Elevation Data in ESRI ArcGIS Software 380 New York Street, Redlands, CA 92373-8100 USA. (This Study)

Table 1.1: Summary of predictor variables used in Multivariate Regression Tree (MRT) analysis, in this study.

for. One of the reasons for this is that the variables driving the variation at the cold end of the curve (e.g. drainage class and rock volume) are different from those driving the variability at the warm end of the curve (e.g. time since agricultural abandonment), as indicated in the MRT analyses. Windthrow (for example) has probably added to the variability in measured C content within the set of montane soils because most of those sites are older (> a century) and the landscape is steeper on average than the warmer agricultural regions.

The substantial amount of unresolved variation in the temperature v. SOC relationship also makes it difficult to project how much SOC might be lost in response to the warming. As calculated in this study, each degree increase (in ^{o}C) translates into 183 growing season degree-days (Table 4.1), and given the range and variability of values across the northern hardwood region, the average change might be 1.6- 2.2 kg-C m^{-2} lost from the soils. Using current methods and technology, there is little chance that changes in this range could be detected; larger changes in SOM caused by changes of 3-4 ^{o}C during the growing season would be required.

Secondary and tertiary splits in the SOC MRT data are consistent with the findings of Kulmatiski et al. (2004), Bedison and Johnson (2009), Johnson et al. (2009) and Clark and Johnson (2010). Within the set of sites with less C (Fig. 4.3), the lowest SOC amounts (mean = 6.0 kg-C m^{-2}) were associated with the warmest, longest growing seasons, modern agricultural practices and younger forests. All sites contained within the first two (least SOC) terminal nodes in figure 4.3 were from the western New England

and southern Wisconsin regions, the warmest regions. Six of the nine modern agricultural fields contained in this tree were grouped in the least SOC node. The remaining modern agricultural fields possessing greater amounts of SOC were cooler sites from northern Wisconsin and a higher elevation pasture in western New England. The terminal node, with the grouping of sites with the most SOC (mean = 16.2 kg-C m^{-2}), was comprised of older stands with the shortest, coolest growing seasons. Sites from the Adirondacks, Vermont, northern Wisconsin and the coldest areas of western New England are included in the nodes with the highest amounts of soil carbon.

When the sites with higher C content (Fig. 4.4) are analyzed, the greatest amounts of SOC (mean = 26.7 kg-C m^{-2}) were found at the sites with coldest, shortest growing season, on moderate slopes, in well-drained soils, with fewer rocks. The terminal nodes with the highest levels of SOC in figure 4.4 include sites from the Adirondacks and one Green Mtn. locale. The soils of the Adirondack northern hardwood forest that were sampled are slightly cooler and are on flatter slopes on average than the Green Mtn. stands (2366 v. 2424 GSDD), (5° v. 14.5° slopes). The terminal node in this group with the least SOC (mean = 12.2 kg-C m^{-2}), includes one modern agricultural site and one 100 year-old abandoned farm, both in the Berkshires, along with older stands from the Green mountains. The plowed agricultural field in this data set is at a high enough elevation (612 m) to be cold enough to be included with sites further to the north, but only contains 8.6 kg-C m^{-2}; less than half of the mean of all other sites in figure 4.4.

Agricultural uses are known to diminish soil C amounts in northern hardwood forests (Hamburg, 1984a; Gaudinski et al., 2000; Hooker and Compton, 2003; Johnson et al., 2009; Clark and Johnson, 2010), while logging seems to have little influence on SOC amounts (Johnson et al., 2009). It is noteworthy that sites within abandoned farms in the Berkshire-Taconic region that had been used as woodlots had the same amount of SOC as the oldest forested sites (> 250 years-old), and showed no tendency to accumulate C after abandonment (Clark and Johnson, 2010). The observed differences between regions where agricultural uses are common and regions where farming practices are limited agree with the results from those studies. The amount of organic carbon lost when forest to agricultural conversions occur is difficult to determine in these heterogeneous landscapes (see Clark and Johnson 2010). Our analysis does not allow us to know whether the warmer, longer growing season soils inherently have less C than the sites where farms were abandoned, or if they have less C because they were continuously in agricultural use for more than a century. In either case, the soils from agricultural regions are unlikely to achieve the amounts of SOC found in the cooler regions, as stands >250 y old in WNE have less than half (8.7 kg-C m^{-2}) of the average SOC content of the sites in the Green Mt. and ADK regions (19.1 kg-C m^{-2}).

Using the chronosequence data from Clark and Johnson (2010) and the time series data of Bedison and Johnson (2009), we have plotted our best estimate of the course of SOC recovery after agriculture or fire in the Adirondack and Green mountain northern hardwood sites, and after use for pasture, hay, or cultivation in the Berkshire – Taconic region (Fig. 4.7). In the montane forest sites, soils that had evidence of fire or plowing appear to have initially lost approximately 20% of their SOC and show recovery of SOC to steady-state levels after 75 yrs. In western New England, land cleared for plowing, pasture and hay fields appears to have lost 35-40% of the SOC, and after abandonment SOC recovers to levels found in modern-day old forest soils in approximately 100 yrs.

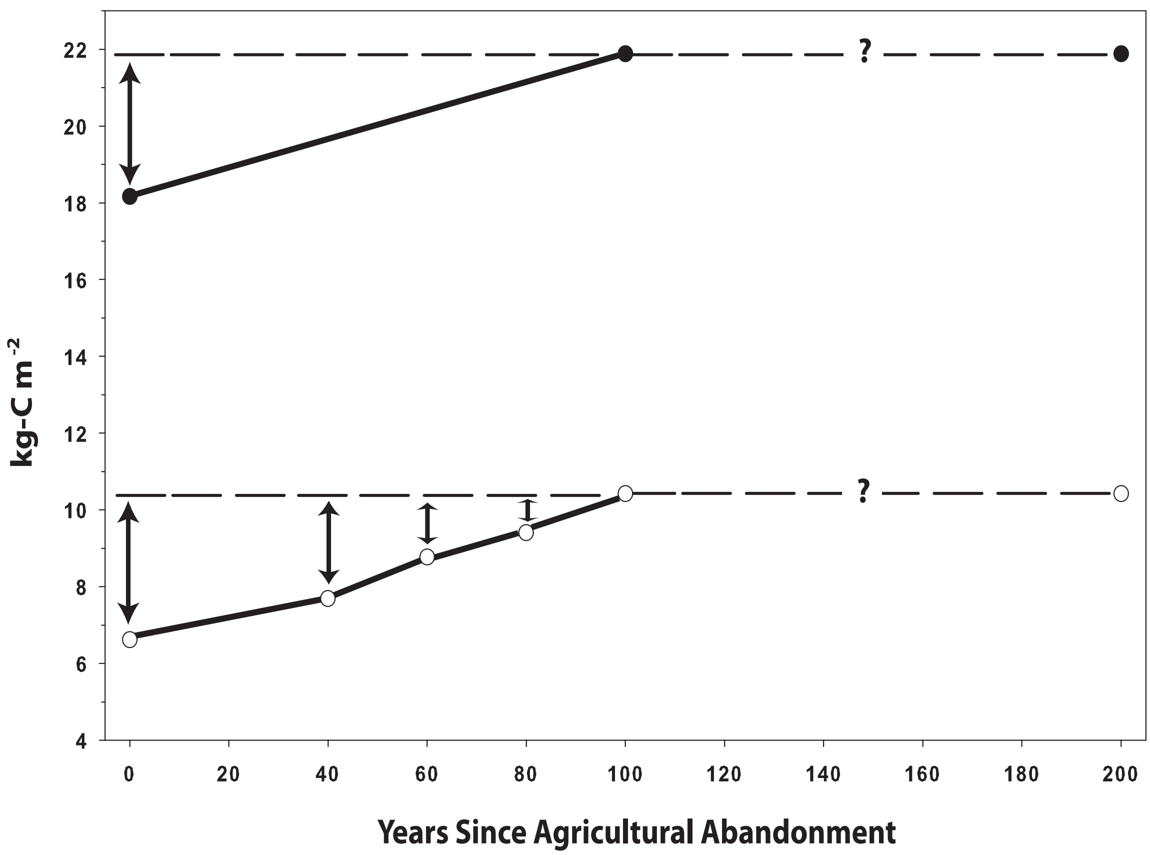


Figure 4.7: The pattern of SOC accumulation after post-disturbance in the montane northern hardwood forest regions (closed circles) and western New England (open circles). Arrows represent the remaining steady-state C deficit at a given time after disturbance.

Conclusions

Pooling the sites from the five regions shows the strong dominance of growing season length and temperature in determining SOC stocks in the northern hardwood forest. GSDD explains far more of the variation in SOC pools than any other single variable. Total SOC pools (Oe horizon to the bottom of the B horizon) show an unexpectedly wide range, with the warmest sites having less than ¼ the SOC as the coldest sites. Given that there are different factors influencing SOC pool size in the different regions, it may be important to treat sub-regions within the northern hardwood zone separately in modeling exercises designed to project future soil carbon stocks. One additional implication of this study is that it will be difficult to find a set of site management practices that can be effective at maximizing SOC stocks in the future, since the important variables are growing season temperature, a history of agricultural use, rock volume, slope and precipitation and these are not amenable to management. With regard to decreases in SOC that may occur due to future warming, it will be difficult to detect such an effect over the next several decades because, as expected, SOC stocks vary substantially even within the same growing season temperature regime.

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Chapter Five

Concluding Remarks

The primary objective of these investigations was to quantify current soil organic carbon stocks throughout the heterogeneous forested landscape of western New England in a way that allowed the determination of the influence of 19th and 20th century agricultural practices on current soil carbon amounts. We set out with the idea of quantifying a steady-state, maximum amount of carbon storage, using old-growth stands, successional forests on abandoned farmland, and an expected minimum amount of C using modern agricultural fields. An important finding in Chapter 2 was that there are fundamental differences between currently used farmland and the land that was used for agricultural practices but abandoned. The land that remains in agriculture is on the best soils (highest base status, level), and was used the longest.

After making corrections for lime additions in agricultural soils, we found that C-accumulated at a rate of 0.33 Mg ha^{-1} y^{-1} for the first century after agricultural abandonment and that the patterns of C-recovery were different for cultivated land and pastured or hayed land. Given the large variation in soil properties in western New England, we needed to examine individual soil horizons (e.g. forest floor, the top 20 cm of mineral soil) to find significant trends of C accumulation. These results generally agreed with the predicted patterns of C accumulation from other analyses in New England (Hamburg, 1984; Compton and Boone, 2000; Gaudinski et al., 2000). The lack of definitive endpoints in this study complicated efforts to fully quantify C-loss from the presettlement forest soils, and the potential maximum C stock. From our analyses it appears that 35-40% of SOC was lost due to land clearing and agricultural disturbances and that it takes about a century to recover that amount.

The accumulation of C in the deep mineral soil of formerly plowed land is of particular interest because SOC residence times increase with soil depth, as there is more opportunity for chemical bonding of organic matter with mineral surfaces (von Lützow et al., 2006). We suspect that the recovery of C in this zone is due to long term post-agricultural tree root inputs. The organic matter gained in this zone may be protected by soil minerals better than the C gained in upper soil horizons; especially the C in the organic horizons that make up the forest floor.

We knew from the literature that SOC pools become smaller when forests are converted to agricultural use (Six et al., 2000; Haynes, 2005), and that carbon quality assessments due to land conversions are important because the chemical forms of C may be altered independently of changes in SOC amounts (DeGryze et al., 2004). In Chapter 3, we showed that the most stable C pool we evaluated increased as time since abandonment increased, but that modern agricultural fields had as much C in this fraction as the oldest forests. This result signaled that there probably were important inherent differences in soil properties between the land that remains in agriculture in western New England and the farmland that was abandoned. Alternatively, modern agricultural practices may be more effective at retaining SOC than those in use in the 18th and 19th centuries. Our laboratory measurements of respired C showed that agricultural fields possessed more labile carbon than forested land. While there is as much C in agricultural soils as some of the oldest forests (per Chapter 2), a greater proportion of the SOC in forest soils is stored in more recalcitrant pools.

We explored the relationships between soil organic carbon and variables that have been known to influence soil carbon amounts and quality in Chapters 2, 3, and 4, using multivariate regression trees. This technique had been used previously by others (Kulmatiski et al., 2004; Bedison and Johnson, 2009; Johnson et al., 2009) for ecological interpretations, however our analyses are new contributions to the literature because they include stand age and variables related to agricultural use, in conjunction with environmental and site-level data. Further, our Chapter 4 synthesis of northern hardwood forests explores a wide range of areas, allowing for an expanded understanding of important predictor variables across different landscapes within the northern hardwood forest. Stand age and agricultural use were notable contributors to variability in the western New England SOC dataset. Soil texture and climate explained the most sums of squares in the POM data, and growing season length and temperature were the strongest determinants of SOC amounts when the whole sample of 94 sites was examined.

The relationships among temperature, latitude and elevation and their effects on SOC pools are well established in montane forests (Bedison and Johnson, 2009). In our analysis of the variables that influence soil carbon amounts across a range of northern hardwood forests, climatic variables were the largest contributors to variation within the data. Figure 5.1 shows the relationship between the mean growing season temperature (GSTemp) and the elevation at each site (n = 94). As expected, this relationship is significant ($r^2 = 0.84$, P = < 0.0001) within the range of sites we examined. Not surprisingly, there is also a significant relationship between GSTemp and SOC amounts ($r^2 = 0.52$, P = <0.0001) in our study (Fig 5.2).

Using the slopes of these relationships and the mean amount of SOC in undisturbed or recovered forests (stands > 100 years old), we estimate that if climate warming continues, for every degree (C) increase in temperature 1.6 – 2.2 kg-C m^{-2} would be lost from these soils, with greater losses occurring in the montane regions (Adirondack and Green mountains, Fig. 5.3). Figure 5.3 suggests that a 4°C increase in the mean growing season temperature would result in a loss of approximately ½ the SOC stock in the montane region and decrease the lower elevation, western New England SOC pool, by about 2/3. There are a number of factors not accounted for in this estimate (e.g. increases in forest productivity potentially resulting in more litter and larger forest floors, tree species shift) that might partially offset the effect of warmer air temperatures on decomposition, however we would still expect measurable changes to occur if growing season temperatures rise 3 – 4°C.

The impact of agricultural disturbances on SOC amounts in rocky, till-derived soils is shown in figure 5.4. In the Berkshire-Taconic landscape of western New England, there is about a 3.8 kg-C m^{-2} difference between the average SOC amount in agricultural fields (plowing plus pasture) and the average amount in forests older than a century. A similar

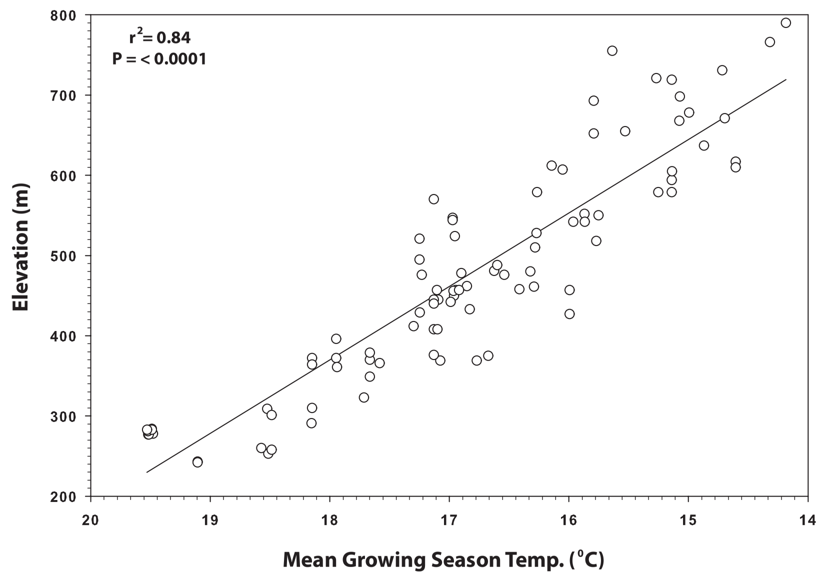


Figure 5.1: The relationship between mean growing season temperature (April – September, 1980-2003) and elevation among the northern hardwood stands analyzed in Chapter 4 (n = 94). The significant linear regression line is shown ($P \leq 0.05$).

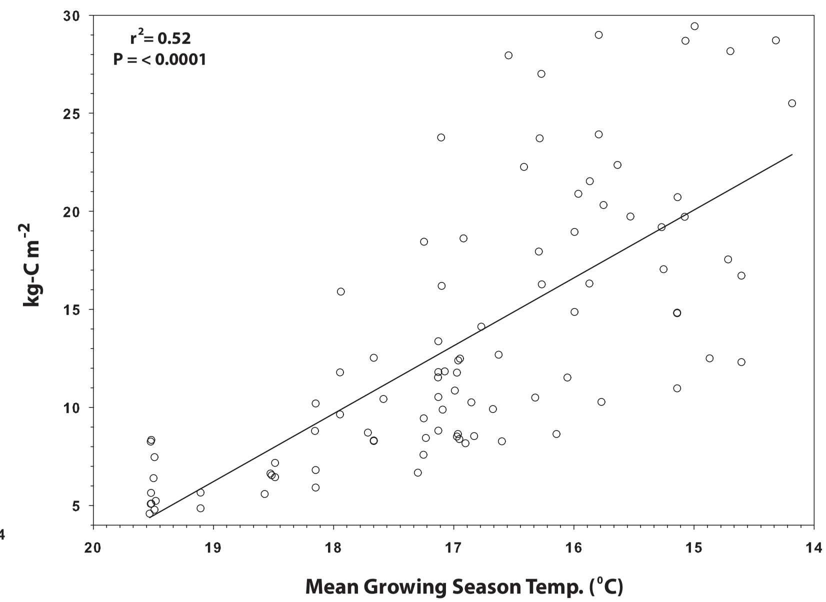
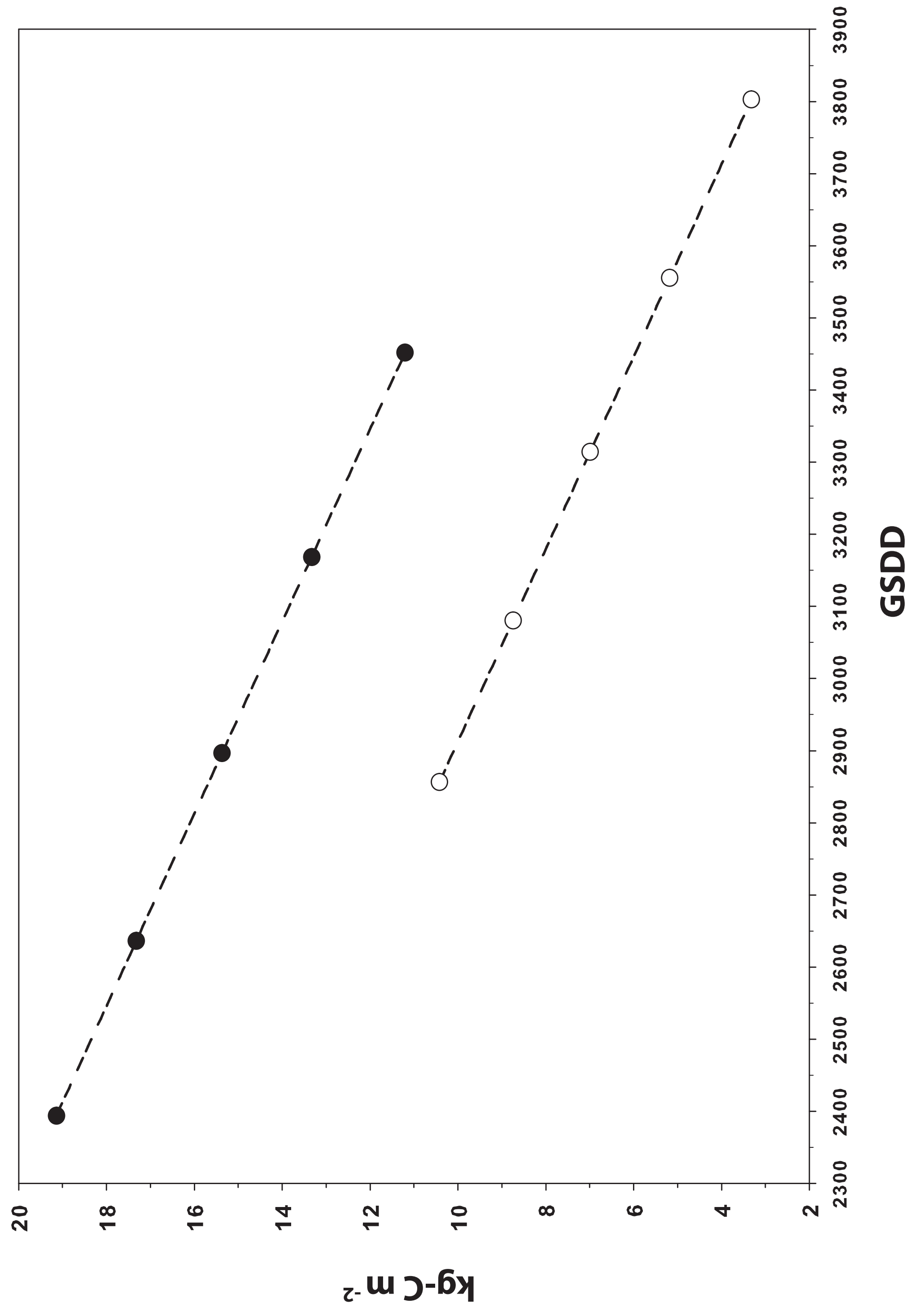


Figure 5.2: The relationship between mean growing season temperature (April – September, 1980-2003) and SOC content (kg m^{-2}) to the bottom of the rooting zone, for each locale (n = 94). The significant linear regression line is shown ($P \leq 0.05$).

Figure 5.3: The change in SOC content (kg m^{-2}) for each 1 °C increase in average growing season temperature (April – September, 1980-2003). The X-axis is the change in growing season degree-days (GSDD) with warming. Filled circles = montane region SOC, open circles = western New England SOC.



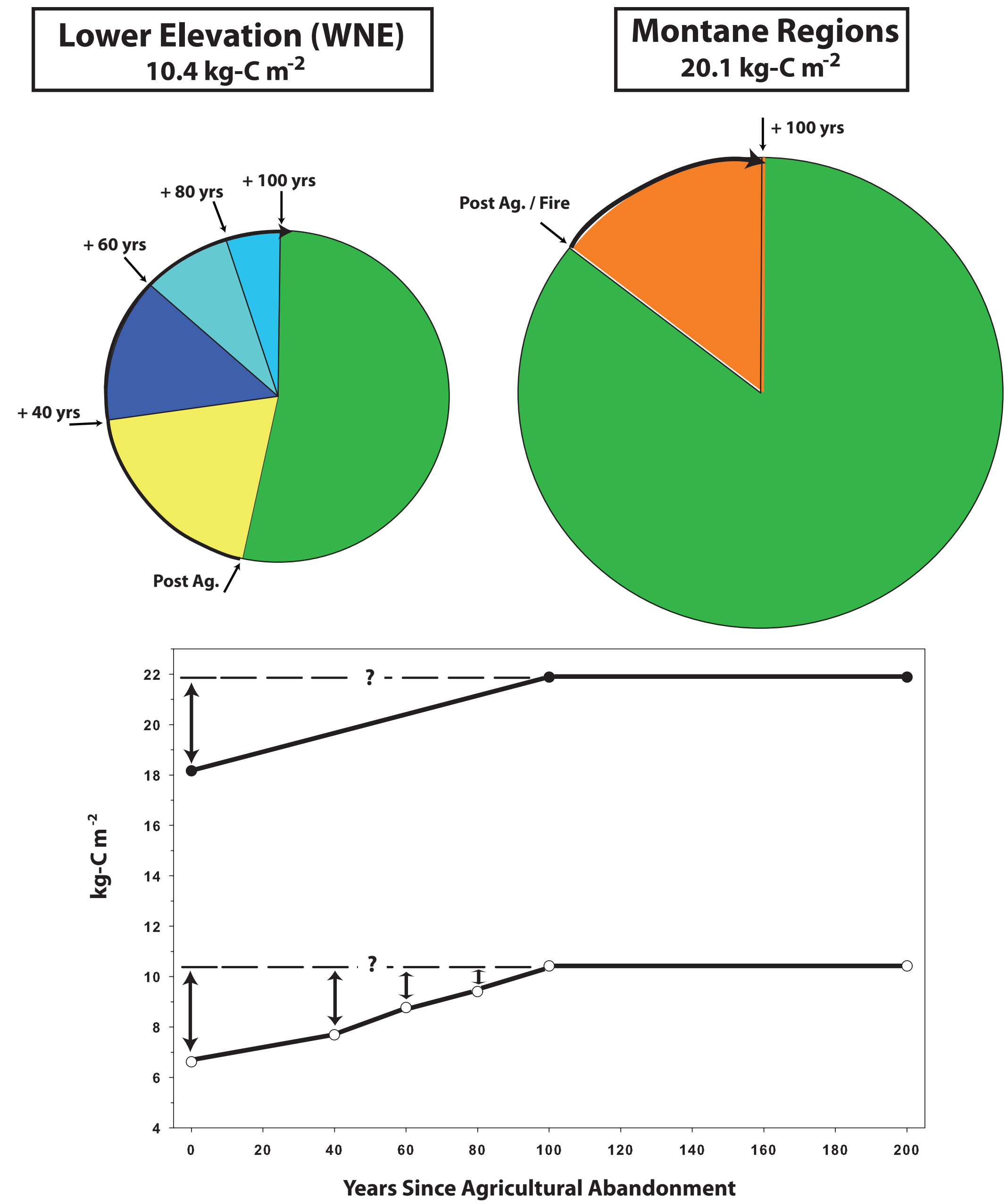


Figure 5.4: Comparison of SOC accumulation in disturbed montane region soils and lower elevation soils used for agriculture (western New England). Montane regions = filled circles, western New England = open circles. Circles are the mean SOC measured at different years since agricultural abandonment. Montane region data is from Bedison et al. (2010).

difference is shown for the montane regions (3.7 kg-C m^{-2}) per (Bedison et al., 2010). About 1 to 1.5 kg-C m^{-2} is gained every 20 or so years and much of that is in the organic horizons (Clark and Johnson, 2010).

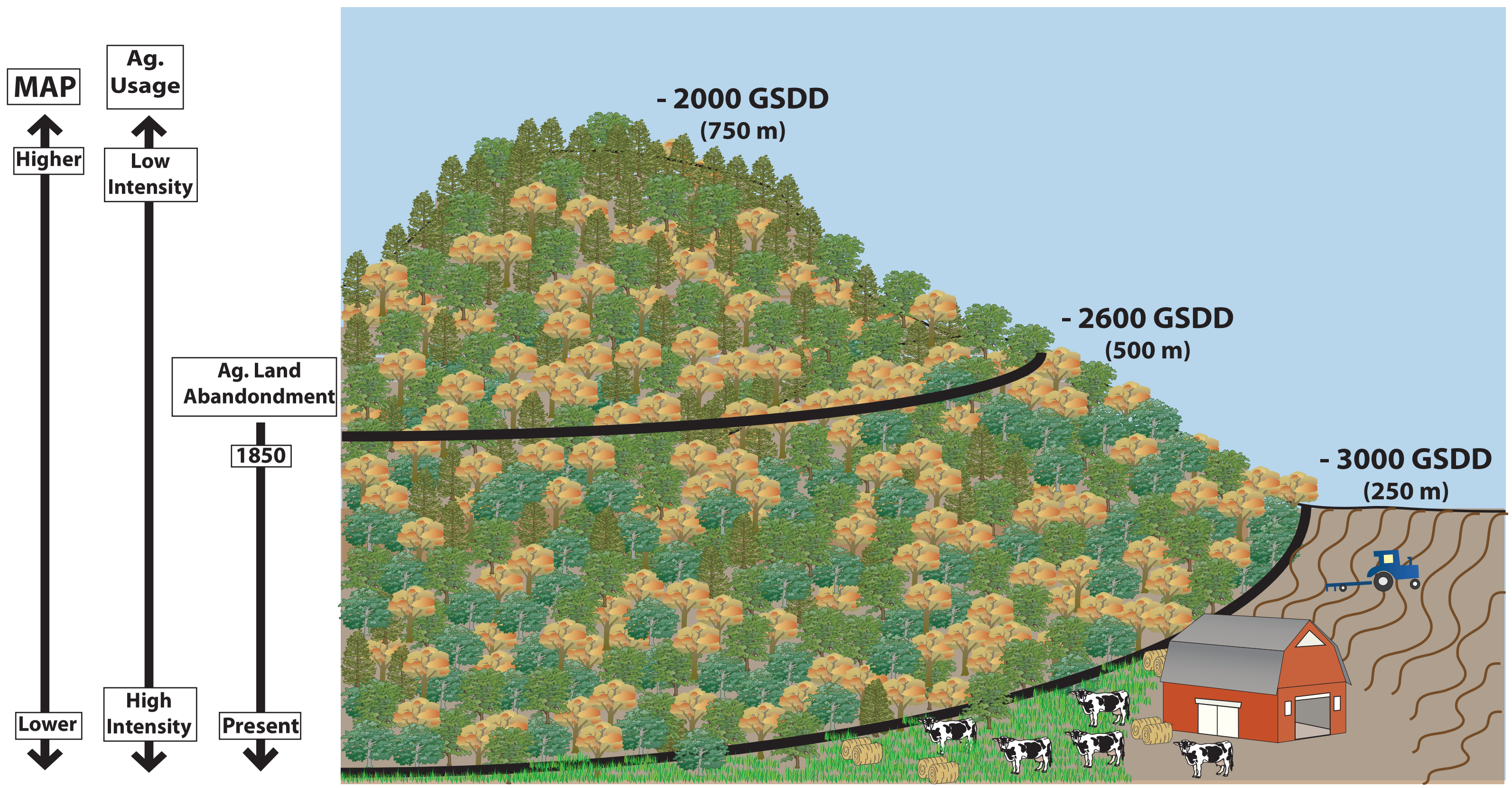
Lal et al. (2003) specify the need to quantify SOC changes in skeletal / rocky soils because of the difficulty in measuring accurate bulk densities when soils contain a significant coarse fragment fraction. Lal and others (2003) also propose a framework of data needed for understanding (measuring) carbon dynamics in soil which consists of: (1) historic C losses (deforestation and afforestation), (2) ecoregional factors (precipitation, temperature, soil properties), (3) management effects on soil C dynamics (fire, species composition, fertility management, etc.), (4) C sequestration economics (the cost of measurements and management, total v. achievable storage potential). This thesis addresses the first two needs and possibly the third, if natural succession is counted as a management strategy. The fourth need (storage potential) is estimated in our studies.

Meta-analysis studies have shown varied impacts of forest harvesting and forest to agriculture land conversions on SOC and N stocks (Post and Kwon, 2000; Johnson and Curtis, 2001; Guo and Gifford, 2002; Nave et al., 2009; Laganiere et al., 2010). The loss of C in soils converted to cropland ranges from about 20 – 50% in those studies, and our analysis in western New England falls within this range (35 - 40%). Studies from the New England states measuring carbon accumulation after agricultural abandonment indicate that it takes about a century to return to the pre-European settlement soil carbon condition (Compton and Boone, 2000; Gaudinski et al., 2000; Hooker and Compton, 2003; Clark and Johnson, 2010). Land used for pasture or hay comprised the majority of the New England landscape at the peak of agriculture. We observed some significant trends in C accumulation in land formerly used as pasture, and the rate of C accumulation in those soils was equivalent to that in formerly plowed soils (0.33 Mg ha^{-1} yr^{-1}). Both pasture and hayed and cultivated soils accumulated about 2 kg-C m^{-2} in the organic horizons over the first century of forest regrowth. Similar accumulation rates were observed for the mineral horizons of the soil profile. In our analysis, we did not observe an impact of the selective logging practices (farm woodlots) on SOC amounts, and this is consistent with the data from a 33-yr comparison of logged and unlogged plots in Vermont (A. Johnson, unpublished data). Forests used only as woodlot in western New England may be more representative of pre-colonial soil conditions as they tend to occupy land that is more level than the remaining old-growth stands in the region because they were not located far from the homestead. Agricultural land use conversions matter, in terms of SOC loss and SOC storage potential, in New England northern hardwood forests, but logging probably does not.

This study was not designed to examine how vegetation changes with time since abandonment. We therefore did not quantitatively measure vegetation at our study locales. The litter of conifers is more difficult to decompose than the litter of most deciduous trees (Melillo et al., 1982), and we observed, in at least one instance, the influence of hemlock litter on forest floor organic carbon totals (sites 112 – 114). Accordingly, there is likely some additional variance in our SOC data that could be explained with appropriate data on the tree species in each stand.

The use of chronosequences assumes that the rate and magnitude of the changes we observed remained constant throughout the time sequence sampled. Given the episodic nature of major disturbances, this may not be strictly true in this study. Because soil C changes on a centennial time scale, chronosequences, despite their inherent limitations, are the best choice available. We hope that these analyses will assist carbon modelers make predictions of future changes to soil organic matter and that the data we have provided will act as a guide for future research on soil carbon in northern hardwood forest ecosystems.

Figure 5.5: Summary of present and former land use by growing season degree-days in northern hardwood forests. Above 3000 GSDD = present-day agricultural land, 3000-2600 GSDD = abandoned agricultural land, Below 2600 GSDD = montane northern hardwood forests



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Appendix A

QUANTITATIVE SOIL PIT DATA

Table A1

Site Name	Plot #	Date Sampled:	Forest Age (yr)	Last Use
HMF - Moon Farm	0821B	7/21/06	40	Cultivation

Horizon	**Oi**	**Oe**	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)			1.0699	1.1577	1.5509
Air Dry sub (kg)			0.7434	0.8807	1.2310
Field Moist Total (kg)	0.1922	1.1917	32.8950	29.0160	106.7270
Air Dry Total (kg)	0.0877	0.6749	22.8574	22.0745	84.7138
Sieved sub (kg)	—		0.4778	0.5953	0.9176
Sieved Total (kg)	—	0.6045	14.6895	14.9203	63.1424
Sieved Oven Dry (kg)	—	0.5780	14.4619	14.7489	62.5432
Rocks wt (kg)	0.0000	0.0000	6.3290	6.3290	19.8870
Roots weight (kg)	0.0000	0.0000	0.2233	0.1086	0.0849
Rock Vol (m3)	0.0000	0.0000	0.0024	0.0024	0.0075
Root Vol (m3)	0.0000	0.0000	0.0005	0.0002	0.0002
Total Horizon Vol (m3)	0.0003	0.0012	0.0284	0.0215	0.0655
Soil Vol (m3)	0.0003	0.0012	0.0255	0.0189	0.0578
Horizon Bulk Density (kg/m3)	280.7680	575.9061	895.8220	1169.5405	1465.8627
<2mm BD (kg/m3)		493.2548	566.7867	781.4168	1082.2285
Horizon Depth (m)	0.0013	0.0047	0.1134	0.0859	0.2619
<2mm (kg/m2)		2.3121	64.2949	67.1530	283.4086
C%		9.5658	3.6730	1.9142	0.7412
C (kg/m2)		0.2212	2.3616	1.2854	2.1007
N%		0.5541	0.2978	0.1727	0.0950
N (kg/m2)		0.0128	0.1915	0.1159	0.2692

Table A2

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
HMF - Moon Farm	0822B	7/20/06	40	Cultivation

Horizon	**Oi**	**Oe**	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)			1.3112	1.2905	1.6915
Air Dry sub (kg)			1.0287	1.0821	1.5325
Field Moist Total (kg)	0.1814	0.8899	31.0160	33.7160	110.6190
Air Dry Total (kg)	0.1314	0.4705	24.3345	28.2704	100.2207
Sieved sub (kg)	—		0.7676	0.7066	0.9611
Sieved Total (kg)	—	0.3155	18.1571	18.4590	62.8542
Sieved Oven Dry (kg)	—	1.1806	17.9843	18.2558	62.4135
Rocks wt (kg)	0.0000	0.0000	7.4290	10.6290	51.1160
Roots weight (kg)	0.0000	0.0000	0.1784	0.0674	0.0241
Rock Vol (m3)	0.0000	0.0000	0.0028	0.0040	0.0193
Root Vol (m3)	0.0000	0.0000	0.0004	0.0001	0.0000
Total Horizon Vol (m3)	0.0006	0.0053	0.0261	0.0263	0.0783
Soil Vol (m3)	0.0006	0.0053	0.0229	0.0222	0.0590
Horizon Bulk Density (kg/m3)	215.5651	89.6267	1061.4191	1274.6037	1698.9447
<2mm BD (kg/m3)		224.8672	784.4382	823.0847	1058.0361
Horizon Depth (m)	0.0024	0.0210	0.1044	0.1053	0.3133
<2mm (kg/m2)		4.7222	81.8757	86.6811	331.4959
C%		12.7303	3.1020	2.3885	1.2980
C (kg/m2)		0.6012	2.5398	2.0704	4.3028
N%		0.8942	0.2320	0.1700	0.0950
N (kg/m2)		0.0422	0.1900	0.1474	0.3149

Table A3

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
HMF - Moon Farm	0923B	7/19/06	40	Cultivation

Horizon	**Oi**	**Oe**	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)			1.3911	1.9909	1.9914
Air Dry sub (kg)			0.9541	1.5564	1.6634
Field Moist Total (kg)	0.0913	0.6910	40.9450	50.5450	45.5450
Air Dry Total (kg)	0.0256	0.3895	28.0832	39.5134	38.0419
Sieved sub (kg)	—		0.5786	0.9440	1.1807
Sieved Total (kg)	—	0.0777	17.0301	23.9660	27.0026
Sieved Oven Dry (kg)	—	0.0751	16.6367	23.6317	26.7465
Rocks wt (kg)	0.0000	0.0000	6.8290	15.3580	7.3290
Roots weight (kg)	0.0000	0.0000	0.2659	0.3960	0.0126
Rock Vol (m3)	0.0000	0.0000	0.0026	0.0058	0.0028
Root Vol (m3)	0.0000	0.0000	0.0005	0.0008	0.0000
Total Horizon Vol (m3)	0.0011	0.0016	0.0304	0.0309	0.0236
Soil Vol (m3)	0.0011	0.0016	0.0273	0.0243	0.0208
Horizon Bulk Density (kg/m3)	23.4149	249.2992	1029.7762	1629.0122	1828.7336
<2mm BD (kg/m3)		48.0697	610.0453	974.2592	1285.7440
Horizon Depth (m)	0.0044	0.0063	0.1216	0.1234	0.0944
<2mm (kg/m2)		0.3004	74.1586	120.2601	121.3421
C%		8.0186	4.3110	2.0241	0.5696
C (kg/m2)		0.0241	3.1970	2.4342	0.6912
N%		0.5846	0.3770	0.1894	0.0775
N (kg/m2)		0.0018	0.2796	0.2278	0.0940

Table A4

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
HMF-Moon Farm Furrows	0923E	10/18/06	40	Cultivation

Horizon	**Oi**	**Oe**	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)			1.0675	1.2476	2.0064
Air Dry sub (kg)			0.7842	0.9996	1.7074
Field Moist Total (kg)	0.5173	2.0276	28.4160	31.8950	112.9480
Air Dry Total (kg)	0.1876	0.7315	20.8750	25.5560	96.1144
Sieved sub (kg)	—		0.6683	0.8195	1.2768
Sieved Total (kg)	—	0.6098	17.7888	20.9516	71.8735
Sieved Oven Dry (kg)	—	0.5699	17.3975	20.6785	71.3722
Rocks wt (kg)	0.0000	0.0000	0.9690	3.0790	18.7580
Roots weight (kg)	0.0000	0.0000	0.2443	0.1025	0.0748
Rock Vol (m3)	0.0000	0.0000	0.0004	0.0012	0.0071
Root Vol (m3)	0.0000	0.0000	0.0005	0.0002	0.0002
Total Horizon Vol (m3)	0.0073	0.0042	0.0245	0.0227	0.0680
Soil Vol (m3)	0.0073	0.0042	0.0236	0.0213	0.0607
Horizon Bulk Density (kg/m3)	25.8147	173.3831	884.9456	1200.6354	1582.4498
<2mm BD (kg/m3)		135.0947	737.5220	971.4906	1175.0887
Horizon Depth (m)	0.0291	0.0169	0.0978	0.0906	0.2719
<2mm (kg/m2)		2.2797	72.1389	88.0413	319.4772
C%		36.4349	3.8693	2.0814	1.2962
C (kg/m2)		0.8306	2.7912	1.8325	4.1411
N%		1.7089	0.2246	0.1411	0.0923
N (kg/m2)		0.0390	0.1620	0.1242	0.2948

Table A5

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
HMF - 80 year plowed	0620B	7/21/06	80	Cultivation

Horizon	**Oi**	**Oe**	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)			1.5420	2.3930	1.1930
Air Dry sub (kg)			1.1935	1.8471	1.1258
Field Moist Total (kg)	0.2931	2.4931	33.6160	50.1450	39.3160
Air Dry Total (kg)	0.2341	1.5590	26.0193	38.7058	37.1029
Sieved sub (kg)	—		0.9921	1.5618	0.7446
Sieved Total (kg)	—	1.4323	21.6288	32.7260	24.5394
Sieved Oven Dry (kg)	—	1.4206	21.5870	32.5749	24.4944
Rocks wt (kg)	0.0000	0.0000	6.1290	11.6290	36.6580
Roots weight (kg)	0.0000	0.0000	0.3066	0.0923	0.0196
Rock Vol (m3)	0.0000	0.0000	0.0023	0.0044	0.0138
Root Vol (m3)	0.0000	0.0000	0.0006	0.0002	0.0000
Total Horizon Vol (m3)	0.0036	0.0036	0.0294	0.0370	0.0295
Soil Vol (m3)	0.0036	0.0036	0.0264	0.0324	0.0156
Horizon Bulk Density (kg/m3)	65.1270	433.8031	984.2048	1195.4929	2381.4439
<2mm BD (kg/m3)		395.2835	816.5485	1006.1276	1572.1654
Horizon Depth (m)	0.0144	0.0144	0.1175	0.1478	0.1178
<2mm (kg/m2)		5.6822	95.9444	148.7182	185.2207
C%		7.8010	3.0698	1.5724	1.0031
C (kg/m2)		0.4433	2.9453	2.3385	1.8580
N%		0.6440	0.2653	0.1515	0.1229
N (kg/m2)		0.0366	0.2546	0.2253	0.2276

Table A6

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
HMF - 80 year plowed	0621C	7/21/06	80	Cultivation

Horizon	Oi	Oe	Oa	0-10 cm	10-20 cm	20+ cm
Field moist sub (kg)			0.8921	1.3929	1.1952	2.1930
Air Dry sub (kg)			0.3758	0.9323	0.8647	1.6688
Field Moist Total (kg)	0.2934	1.6926	2.8290	24.7870	39.3450	145.8350
Air Dry Total (kg)	0.2129	0.6151	1.1917	16.5905	28.4656	110.9738
Sieved sub (kg)	—		0.3658	0.8424	0.7321	1.3758
Sieved Total (kg)	—	0.5819	1.1598	14.9902	24.0999	91.4889
Sieved Oven Dry (kg)	—	0.5345	1.0954	14.7707	23.8350	90.3425
Rocks wt (kg)	0.0000	0.0000	0.0000	2.9290	3.0290	56.6160
Roots weight (kg)	0.0000	0.0000	0.1367	0.5263	0.1312	0.1583
Rock Vol (m3)	0.0000	0.0000	0.0000	0.0011	0.0011	0.0214
Root Vol (m3)	0.0000	0.0000	0.0003	0.0011	0.0003	0.0003
Total Horizon Vol (m3)	0.0034	0.0047	0.0049	0.0242	0.0302	0.1005
Soil Vol (m3)	0.0034	0.0047	0.0046	0.0220	0.0287	0.0789
Horizon Bulk Density (kg/m3)	61.9200	131.2171	256.6520	752.7459	990.2589	1407.2365
<2mm BD (kg/m3)		114.0352	235.9170	670.1792	829.1677	1145.6150
Horizon Depth (m)	0.0138	0.0188	0.0197	0.0969	0.1206	0.4022
<2mm (kg/m2)		2.1382	4.6446	64.9236	100.0184	460.7520
C%		45.6491	24.3699	4.6842	2.9051	1.5015
C (kg/m2)		0.9761	1.1319	3.0411	2.9056	6.9181
N%		2.0633	1.2776	0.3139	0.1903	0.1047
N (kg/m2)		0.0441	0.0593	0.2038	0.1903	0.4824

Table A7

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
HMF - 80 year plowed	0720A	7/21/06	80	Cultivation

Horizon	Oi	Oe	Oa	0-10 cm	10-20 cm	20+ cm
Field moist sub (kg)			1.1426	1.1848	1.2182	1.6867
Air Dry sub (kg)			0.4822	0.9317	1.0195	1.4800
Field Moist Total (kg)	0.2514	1.8910	3.0226	22.4870	30.9160	66.7030
Air Dry Total (kg)	0.1878	0.6886	1.2756	17.6832	25.8728	58.5264
Sieved sub (kg)	—		0.3193	0.6696	0.6936	1.0997
Sieved Total (kg)	—	0.5839	0.8446	12.7086	17.6036	43.4906
Sieved Oven Dry (kg)	—	0.5444	0.8268	12.5946	17.4803	43.1445
Rocks wt (kg)	0.0000	0.0000	0.0000	11.7290	17.5580	51.1160
Roots weight (kg)	0.0000	0.0000	0.0000	0.1550	0.0643	1.9143
Rock Vol (m3)	0.0000	0.0000	0.0000	0.0044	0.0066	0.0193
Root Vol (m3)	0.0000	0.0000	0.0000	0.0003	0.0001	0.0039
Total Horizon Vol (m3)	0.0029	0.0046	0.0045	0.0222	0.0279	0.0570
Soil Vol (m3)	0.0029	0.0046	0.0045	0.0174	0.0211	0.0338
Horizon Bulk Density (kg/m3)	64.9652	149.3999	281.5081	1013.6365	1224.2310	1733.6383
<2mm BD (kg/m3)		118.1171	182.4624	721.9484	827.1243	1278.0042
Horizon Depth (m)	0.0116	0.0184	0.0181	0.0888	0.1116	0.2278
<2mm (kg/m2)		2.1778	3.3071	64.0729	92.2761	291.1453
C%		46.5062	16.7409	4.5630	2.3082	0.7936
C (kg/m2)		1.0128	0.5536	2.9237	2.1299	2.3106
N%		2.1157	0.8849	0.2788	0.1661	0.0585
N (kg/m2)		0.0461	0.0293	0.1787	0.1533	0.1704

Table A8

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
HMF - Rye Field	1235A	7/18/06	80	Cultivation

Horizon	Oi	Oe	0-10 cm	10-20 cm	20+ cm
Field moist sub (kg)			1.7894	2.3894	2.2912
Air Dry sub (kg)			1.3742	1.9447	1.9122
Field Moist Total (kg)	0.3907	0.5898	34.1450	24.5870	197.6670
Air Dry Total (kg)	0.2255	0.3592	26.2218	20.0103	164.9746
Sieved sub (kg)	—		1.1386	1.5948	1.5861
Sieved Total (kg)	—	0.2436	21.7262	16.4098	136.8408
Sieved Oven Dry (kg)	—	1.0120	21.3909	16.2292	134.6535
Rocks wt (kg)	0.0000	0.0000	3.0290	3.2290	50.5580
Roots weight (kg)	0.0000	0.0000	0.2417	0.0440	0.4919
Rock Vol (m3)	0.0000	0.0000	0.0011	0.0012	0.0191
Root Vol (m3)	0.0000	0.0000	0.0005	0.0001	0.0010
Total Horizon Vol (m3)	0.0023	0.0053	0.0292	0.0196	0.1334
Soil Vol (m3)	0.0023	0.0053	0.0276	0.0183	0.1133
Horizon Bulk Density (kg/m3)	96.2219	67.6141	950.6585	1093.3927	1456.3760
<2mm BD (kg/m3)		190.4997	775.5184	886.7909	1188.7056
Horizon Depth (m)	0.0094	0.0213	0.1169	0.0784	0.5334
<2mm (kg/m2)		4.0481	90.6387	69.5577	634.1002
C%		11.5476	3.1769	1.7954	0.7207
C (kg/m2)		0.4675	2.8795	1.2489	4.5697
N%		0.8046	0.2274	0.1377	0.0739
N (kg/m2)		0.0326	0.2061	0.0958	0.4689

Table A9

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
HMF - Rye Feld	1235B	7/18/06	80	Cultivation

Horizon	**Oi**	**Oe**	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)			3.1913	3.9913	4.1909
Air Dry sub (kg)			2.4513	3.2127	3.5281
Field Moist Total (kg)	0.5405	0.8910	33.9160	36.1160	106.9480
Air Dry Total (kg)	0.2457	0.5203	26.0520	29.0709	90.0338
Sieved sub (kg)	—		2.2072	2.7465	2.8439
Sieved Total (kg)	—	0.4011	23.4575	24.8522	72.5721
Sieved Oven Dry (kg)	—	0.3885	23.0943	24.5541	71.9205
Rocks wt (kg)	0.0000	0.0000	5.1990	6.7290	17.6580
Roots weight (kg)	0.0000	0.0000	0.2631	0.2221	0.0968
Rock Vol (m3)	0.0000	0.0000	0.0020	0.0025	0.0067
Root Vol (m3)	0.0000	0.0000	0.0005	0.0005	0.0002
Total Horizon Vol (m3)	0.0022	0.0016	0.0288	0.0277	0.0613
Soil Vol (m3)	0.0022	0.0016	0.0263	0.0247	0.0545
Horizon Bulk Density (kg/m3)	112.3246	317.1352	989.4597	1174.9601	1652.9885
<2mm BD (kg/m3)		236.7898	877.1263	992.4035	1320.4348
Horizon Depth (m)	0.0088	0.0066	0.1153	0.1109	0.2453
<2mm (kg/m2)		1.5539	101.1436	110.0948	323.9192
C%		13.4836	2.8669	1.1002	0.3683
C (kg/m2)		0.2095	2.8997	1.2113	1.1930
N%		0.8384	0.2153	0.0933	0.0427
N (kg/m2)		0.0130	0.2178	0.1027	0.1382

Table A10

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
HMF- Rye Field	1236B	7/19/06	80	Cultivation

Horizon	**Oi**	**Oe**	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)			3.1918	2.6925	5.5911
Air Dry sub (kg)			2.4058	2.6034	4.5768
Field Moist Total (kg)	1.3903	1.8399	41.0450	43.9450	88.8610
Air Dry Total (kg)	0.1997	0.9319	30.9379	42.4908	72.7400
Sieved sub (kg)	—		2.1820	1.9170	4.0694
Sieved Total (kg)	—	0.8151	28.0604	31.2872	64.6754
Sieved Oven Dry (kg)	—	0.7833	27.7104	30.9265	64.3192
Rocks wt (kg)	0.0000	0.0000	9.5290	15.2580	24.3580
Roots weight (kg)	0.0000	0.0000	0.1360	0.1158	0.1727
Rock Vol (m3)	0.0000	0.0000	0.0036	0.0058	0.0092
Root Vol (m3)	0.0000	0.0000	0.0003	0.0002	0.0004
Total Horizon Vol (m3)	0.0023	0.0028	0.0343	0.0283	0.0438
Soil Vol (m3)	0.0023	0.0028	0.0305	0.0223	0.0342
Horizon Bulk Density (kg/m3)	88.1567	331.3529	1015.1632	1904.2782	2126.5192
<2mm BD (kg/m3)		278.5038	909.2580	1386.0106	1880.3408
Horizon Depth (m)	0.0091	0.0113	0.1374	0.1132	0.1750
<2mm (kg/m2)		3.1332	124.9283	156.9368	329.0596
C%		16.5062	2.6413	0.9888	0.5588
C (kg/m2)		0.5172	3.2997	1.5518	1.8388
N%		1.0479	0.1862	0.0861	0.0637
N (kg/m2)		0.0328	0.2326	0.1351	0.2095

Table A11

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
HMF - 100 yr plowed	1225A	7/29/06	100	Cultivation

Horizon	**Oi**	**Oe**	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)			1.1204	1.2215	2.9213
Air Dry sub (kg)			0.9431	0.9908	2.4482
Field Moist Total (kg)	0.5504	1.6205	27.7160	30.7160	118.8190
Air Dry Total (kg)	0.2386	0.9182	23.3311	24.9152	99.5766
Sieved sub (kg)	—		0.7525	0.7514	1.9188
Sieved Total (kg)	—	0.6337	18.6145	18.8948	78.0432
Sieved Oven Dry (kg)	—	0.6175	18.4146	18.7428	77.7467
Rocks wt (kg)	0.0000	0.0000	8.8290	8.5290	49.9450
Roots weight (kg)	0.0000	0.0000	0.1574	0.2650	0.4457
Rock Vol (m3)	0.0000	0.0000	0.0033	0.0032	0.0188
Root Vol (m3)	0.0000	0.0000	0.0003	0.0005	0.0009
Total Horizon Vol (m3)	0.0050	0.0030	0.0304	0.0261	0.1805
Soil Vol (m3)	0.0050	0.0030	0.0267	0.0223	0.1607
Horizon Bulk Density (kg/m3)	47.7100	306.0767	873.6067	1115.5397	619.5954
<2mm BD (kg/m3)		205.8360	689.5131	839.1806	483.7628
Horizon Depth (m)	0.0200	0.0120	0.1214	0.1044	0.7219
<2mm (kg/m2)		2.4700	83.7327	87.5895	349.2163
C%		13.6266	3.1208	1.3930	0.8942
C (kg/m2)		0.3366	2.6131	1.2201	3.1226
N%		0.9854	0.2426	0.1340	0.0756
N (kg/m2)		0.0243	0.2031	0.1173	0.2640

Table A12

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
HMF - 100 yr plowed	1225B	8/2/06	100	Cultivation

Horizon	**Oi**	**Oe**	**Oa**	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)			1.7074	1.8076	2.1078	2.2080
Air Dry sub (kg)			0.4957	1.2627	1.7754	2.0608
Field Moist Total (kg)	0.4314	1.0485	1.7074	40.9450	49.8450	116.0190
Air Dry Total (kg)	0.1512	0.3596	0.4957	28.6004	41.9837	108.2834
Sieved sub (kg)	—		0.2440	0.9867	1.4006	1.3700
Sieved Total (kg)	—	0.2782	0.2440	22.3496	33.1222	71.9845
Sieved Oven Dry (kg)	—	0.2598	0.2365	22.1127	32.9106	71.7937
Rocks wt (kg)	0.0000	0.0000	0.0000	5.1290	3.7290	18.7450
Roots weight (kg)	0.0000	0.0000	0.0000	0.6297	0.1000	1.2754
Rock Vol (m3)	0.0000	0.0000	0.0000	0.0019	0.0014	0.0071
Root Vol (m3)	0.0000	0.0000	0.0000	0.0013	0.0002	0.0026
Total Horizon Vol (m3)	0.0048	0.0033	0.0025	0.0329	0.0291	0.0629
Soil Vol (m3)	0.0048	0.0033	0.0025	0.0297	0.0275	0.0532
Horizon Bulk Density (kg/m3)	31.2155	109.5802	198.2680	963.9298	1525.0491	2034.8090
<2mm BD (kg/m3)		79.1817	94.6146	745.2724	1195.4688	1349.1117
Horizon Depth (m)	0.0194	0.0131	0.0100	0.1316	0.1166	0.2516
<2mm (kg/m2)		1.0393	0.9461	98.0499	139.3468	339.3859
C%		38.0023	19.2280	3.4077	0.9194	0.5115
C (kg/m2)		0.3949	0.1819	3.3413	1.2812	1.7358
N%		2.2481	1.2340	0.2645	0.1002	0.0826
N (kg/m2)		0.0234	0.0117	0.2594	0.1396	0.2802

Table A13

Site Name	Plot #	DateSampled	Forest Age (yr)	Last Use
HMF - 100 yr plowed	1225C	8/7/06	100	Cultivation

Horizon	**Oi**	**Oe**	**Oa**	**0-10 cm**	**10-20 cm**
Field moist sub (kg)			1.7215	1.7084	2.4582
Air Dry sub (kg)			1.0464	1.3540	2.1577
Field Moist Total (kg)	0.4239	0.3583	1.7215	39.9950	32.4870
Air Dry Total (kg)	0.2174	0.1799	1.0464	31.6968	28.5156
Sieved sub (kg)	—		0.7412	0.9099	1.2399
Sieved Total (kg)	—	0.1128	0.7412	21.3010	16.3863
Sieved Oven Dry (kg)	—	0.1072	0.7001	21.0169	16.2526
Rocks wt (kg)	0.0000	0.0000	0.0000	17.0870	19.7580
Roots weight (kg)	0.0000	0.0000	0.0000	0.2430	0.0924
Rock Vol (m3)	0.0000	0.0000	0.0000	0.0064	0.0075
Root Vol (m3)	0.0000	0.0000	0.0000	0.0005	0.0002
Total Horizon Vol (m3)	0.0041	0.0016	0.0020	0.0355	0.0208
Soil Vol (m3)	0.0041	0.0016	0.0020	0.0285	0.0131
Horizon Bulk Density (kg/m3)	52.4993	115.1104	535.7670	1111.1837	2170.6274
<2mm BD (kg/m3)		68.6028	358.4389	736.7823	1237.1593
Horizon Depth (m)	0.0166	0.0063	0.0078	0.1419	0.0831
<2mm (kg/m2)		0.4288	2.8003	104.5310	102.8389
C%		34.3698	17.4530	4.2778	1.9342
C (kg/m2)		0.1474	0.4887	4.4717	1.9891
N%		2.0061	1.0418	0.2774	0.1679
N (kg/m2)		0.0086	0.0292	0.2899	0.1727

Table A14

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
HMF - 110 yr plowed	0618C	7/22/06	110	Cultivation

Horizon	**Oi**	**Oe**	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)			1.2911	1.5932	1.5920
Air Dry sub (kg)			0.9355	1.2267	1.1011
Field Moist Total (kg)	0.2931	1.5911	36.5160	50.2160	82.6740
Air Dry Total (kg)	0.1353	0.5407	26.4595	38.6649	57.1801
Sieved sub (kg)	—		0.6411	0.8489	0.7523
Sieved Total (kg)	—	0.4863	18.1306	26.7555	39.0692
Sieved Oven Dry (kg)	—	0.4652	17.9768	26.5001	38.7888
Rocks wt (kg)	0.0000	0.0000	10.4290	20.2580	38.2160
Roots weight (kg)	0.0000	0.0000	0.3897	0.4498	0.3289
Rock Vol (m3)	0.0000	0.0000	0.0039	0.0076	0.0144
Root Vol (m3)	0.0000	0.0000	0.0008	0.0009	0.0007
Total Horizon Vol (m3)	0.0034	0.0029	0.0298	0.0339	0.0494
Soil Vol (m3)	0.0034	0.0029	0.0250	0.0253	0.0343
Horizon Bulk Density (kg/m3)	39.3600	187.0426	1056.8939	1525.3129	1668.1110
<2mm BD (kg/m3)		160.9293	718.0612	1045.4162	1131.5837
Horizon Depth (m)	0.0138	0.0116	0.1191	0.1356	0.1975
<2mm (kg/m2)		1.8607	85.4942	141.8042	223.4666
C%		30.3088	4.1522	1.8054	1.3362
C (kg/m2)		0.5640	3.5498	2.5601	2.9860
N%		1.4308	0.2924	0.1452	0.1150
N (kg/m2)		0.0266	0.2500	0.2060	0.2570

Table A15

Site Name	Plot #	Date sampled	Forest Age (yr)	Last Use
HMF - 110 yr plowed	0717A	7/25/06	110	Cultivation

Horizon	**Oi**	**Oe**	**Oa**	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)			1.2915	1.5914	2.2899	2.1913
Air Dry sub (kg)			0.3607	0.9160	1.7130	1.7987
Field Moist Total (kg)	1.1900	6.0800	4.1290	25.8870	40.6870	22.4580
Air Dry Total (kg)	0.3195	1.3251	1.1531	14.8999	30.4364	18.4347
Sieved sub (kg)	—		0.2885	0.7255	1.3084	1.4073
Sieved Total (kg)	—	0.9237	0.9222	11.8019	23.2480	14.4230
Sieved Oven Dry (kg)	—	0.8369	0.8621	11.6238	23.0973	14.3799
Rocks wt (kg)	0.0000	0.0000	0.0000	6.7290	8.8290	5.8290
Roots weight (kg)	0.0000	0.0000	0.0469	0.3382	0.1110	0.0049
Rock Vol (m3)	0.0000	0.0000	0.0000	0.0025	0.0033	0.0022
Root Vol (m3)	0.0000	0.0000	0.0001	0.0007	0.0002	0.0000
Total Horizon Vol (m3)	0.0060	0.0105	0.0059	0.0256	0.0259	0.0120
Soil Vol (m3)	0.0060	0.0105	0.0058	0.0224	0.0223	0.0098
Horizon Bulk Density (kg/m3)	53.1150	125.6363	200.0600	665.2938	1364.7849	1876.9461
<2mm BD (kg/m3)		79.3476	149.5683	519.0141	1035.6960	1464.1042
Horizon Depth (m)	0.0241	0.0422	0.0234	0.1025	0.1034	0.0481
<2mm (kg/m2)		3.3475	3.5055	53.1989	107.1298	70.4600
C%		44.8647	25.4653	5.6030	0.9788	0.8257
C (kg/m2)		1.5018	0.8927	2.9807	1.0485	0.5818
N%		2.4289	1.4967	0.4460	0.0960	0.0283
N (kg/m2)		0.0813	0.0525	0.2373	0.1029	0.0199

Table A16

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
HMF - 110 yr plowed	0718A	7/24/06	110	Cultivation

Horizon	**Oi**	**Oe**	**Oa**	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)			1.0812	1.5017	2.0406	3.1897
Air Dry sub (kg)			0.4010	0.9383	1.3539	2.2354
Field Moist Total (kg)	0.4958	3.9453	3.5290	22.9870	30.4160	103.9900
Air Dry Total (kg)	0.1804	1.0391	1.3087	14.3632	20.1807	72.8768
Sieved sub (kg)	—		0.3538	0.7388	1.0267	1.6513
Sieved Total (kg)	—	0.7167	1.1547	11.3093	15.3032	53.8344
Sieved Oven Dry (kg)	—	0.6666	1.1056	11.1114	15.1115	53.3513
Rocks wt (kg)	0.0000	0.0000	0.0000	7.4290	9.0290	28.2870
Roots weight (kg)	0.0000	0.0000	0.0584	0.3986	0.3868	0.9453
Rock Vol (m3)	0.0000	0.0000	0.0000	0.0028	0.0034	0.0107
Root Vol (m3)	0.0000	0.0000	0.0001	0.0008	0.0008	0.0019
Total Horizon Vol (m3)	0.0046	0.0113	0.0067	0.0234	0.0264	0.0809
Soil Vol (m3)	0.0046	0.0113	0.0066	0.0198	0.0222	0.0683
Horizon Bulk Density (kg/m3)	39.1420	91.7283	198.3082	724.6451	908.6264	1066.4643
<2mm BD (kg/m3)		58.8421	167.5294	560.5855	680.3870	780.7327
Horizon Depth (m)	0.0184	0.0453	0.0269	0.0938	0.1056	0.3238
<2mm (kg/m2)		2.6663	4.5024	52.5549	71.8659	252.7622
C%		46.4717	23.1314	6.0927	3.6078	2.3314
C (kg/m2)		1.2391	1.0415	3.2020	2.5928	5.8928
N%		2.0791	1.1180	0.3558	0.2116	0.1599
N (kg/m2)		0.0554	0.0503	0.1870	0.1521	0.4041

Table A18

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
HMF - 180 yr plowed	0610B	7/25/06	180	Cultivation

Horizon	**Oi**	**Oe**	**Oa**	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)			3.2911	1.1928	1.0929	1.6905
Air Dry sub (kg)			1.3887	0.7988	0.8082	1.3453
Field Moist Total (kg)	0.5915	4.7822	3.2911	28.3160	47.0450	101.3900
Air Dry Total (kg)	0.2064	1.4247	1.3887	18.9626	34.7910	80.6900
Sieved sub (kg)	—		0.9618	0.5754	0.5740	0.8894
Sieved Total (kg)	—	1.1276	0.9618	13.6604	24.7082	53.3415
Sieved Oven Dry (kg)	—	1.0526	0.9240	13.4710	24.6111	53.0351
Rocks wt (kg)	0.0000	0.0000	0.0000	17.9580	18.2580	80.0610
Roots weight (kg)	0.0000	0.0000	0.0000	0.2764	0.6206	0.5123
Rock Vol (m3)	0.0000	0.0000	0.0000	0.0068	0.0069	0.0302
Root Vol (m3)	0.0000	0.0000	0.0000	0.0006	0.0013	0.0010
Total Horizon Vol (m3)	0.0023	0.0096	0.0034	0.0300	0.0300	0.0684
Soil Vol (m3)	0.0023	0.0096	0.0034	0.0227	0.0218	0.0372
Horizon Bulk Density (kg/m3)	91.1183	148.2583	403.9884	836.8463	1592.6879	2170.2098
<2mm BD (kg/m3)		109.5388	268.7994	594.4938	1126.6664	1426.4139
Horizon Depth (m)	0.0091	0.0384	0.0138	0.1200	0.1200	0.2738
<2mm (kg/m2)		4.2104	3.6960	71.3393	135.2000	390.4808
C%		49.3296	32.8294	5.7543	2.8495	1.5558
C (kg/m2)		2.0770	1.2134	4.1051	3.8525	6.0750
N%		2.0173	1.1180	0.2593	0.1555	0.1360
N (kg/m2)		0.0849	0.0413	0.1850	0.2103	0.5311

Table A19

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
HMF - 180 yr plowed	0610C	7/26/06	180	Cultivation

Horizon	**Oi**	**Oe**	**Oa**	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)			3.4953	1.0915	0.9892	1.5932
Air Dry sub (kg)			1.6489	0.8696	0.8285	1.3651
Field Moist Total (kg)	0.3916	2.2917	3.4953	34.3160	36.8160	103.6900
Air Dry Total (kg)	0.2021	0.7934	1.6489	27.3403	30.8367	88.8456
Sieved sub (kg)	—		1.1122	0.6019	0.5779	0.9978
Sieved Total (kg)	—	0.6685	1.1122	18.9240	21.5076	64.9428
Sieved Oven Dry (kg)	—	0.6243	1.0776	18.6834	21.3420	64.6329
Rocks wt (kg)	0.0000	0.0000	0.0000	13.9580	9.0290	20.9580
Roots weight (kg)	0.0000	0.0000	0.0000	0.3124	0.0807	0.1351
Rock Vol (m3)	0.0000	0.0000	0.0000	0.0053	0.0034	0.0079
Root Vol (m3)	0.0000	0.0000	0.0000	0.0006	0.0002	0.0003
Total Horizon Vol (m3)	0.0027	0.0044	0.0048	0.0316	0.0279	0.0573
Soil Vol (m3)	0.0027	0.0044	0.0048	0.0257	0.0243	0.0492
Horizon Bulk Density (kg/m3)	73.8999	181.3417	340.4181	1065.5654	1268.0208	1807.2942
<2mm BD (kg/m3)		142.7044	222.4823	728.1713	877.5932	1314.7601
Horizon Depth (m)	0.0109	0.0175	0.0194	0.1263	0.1116	0.2294
<2mm (kg/m2)		2.4973	4.3106	91.9316	97.9065	301.5731
C%		49.9852	31.0815	5.2706	2.3302	1.1079
C (kg/m2)		1.2483	1.3398	4.8454	2.2815	3.3412
N%		2.1594	1.0858	0.2346	0.1180	0.0838
N (kg/m2)		0.0539	0.0468	0.2157	0.1155	0.2528

Table A20

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
HMF - 40 yr pasture	0940A	8/17/06	40	Pasture

Horizon	**Oi**	**Oe**	**Oa**	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)			3.5253	1.4764	1.5764	2.1362
Air Dry sub (kg)			2.2101	1.2212	1.3242	1.8895
Field Moist Total (kg)	0.2681	0.4883	3.5253	28.3960	28.5760	199.0800
Air Dry Total (kg)	0.1965	0.2572	2.2101	23.4885	24.0051	176.0909
Sieved sub (kg)	—		1.9710	0.9459	1.0684	1.5289
Sieved Total (kg)	—	0.2438	1.9710	18.1925	19.3673	142.4861
Sieved Oven Dry (kg)	—	0.2321	1.8790	17.5937	19.1839	141.6329
Rocks wt (kg)	0.0000	0.0000	0.0000	4.5790	7.2090	24.2380
Roots weight (kg)	0.0000	0.0000	0.0000	0.2095	0.0914	0.1229
Rock Vol (m3)	0.0000	0.0000	0.0000	0.0017	0.0027	0.0091
Root Vol (m3)	0.0000	0.0000	0.0000	0.0004	0.0002	0.0003
Total Horizon Vol (m3)	0.0046	0.0022	0.0035	0.0246	0.0245	0.1081
Soil Vol (m3)	0.0046	0.0022	0.0035	0.0225	0.0216	0.0987
Horizon Bulk Density (kg/m3)	42.6197	117.5817	628.6564	1044.8566	1111.4277	1783.5996
<2mm BD (kg/m3)		106.1171	534.4787	782.6321	888.2061	1434.5793
Horizon Depth (m)	0.0184	0.0088	0.0141	0.0985	0.0980	0.4325
<2mm (kg/m2)		0.9285	7.5161	77.1219	87.0627	620.4555
C%		26.3995	12.0897	3.0337	1.4734	0.4906
C (kg/m2)		0.2451	0.9087	2.3396	1.2828	3.0441
N%		1.5856	0.8428	0.2622	0.1345	0.0631
N (kg/m2)		0.0147	0.0633	0.2022	0.1171	0.3913

Table A21

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
HMF - 40 yr pasture	0940B	8/17/06	40	Pasture

Horizon	**Oi**	**Oe**	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)			1.3162	1.7163	2.3266
Air Dry sub (kg)			1.0094	1.4350	2.0623
Field Moist Total (kg)	0.3577	0.5691	27.9060	43.9750	196.1110
Air Dry Total (kg)	0.2124	0.3466	21.4019	36.7675	173.8351
Sieved sub (kg)	—		0.9066	1.1854	1.5562
Sieved Total (kg)	—	0.2142	19.2213	30.3723	131.1748
Sieved Oven Dry (kg)	—	0.2056	18.9614	30.0693	130.7163
Rocks wt (kg)	0.0000	0.0000	1.5790	5.0290	32.9270
Roots weight (kg)	0.0000	0.0000	0.1814	0.1486	0.1447
Rock Vol (m3)	0.0000	0.0000	0.0006	0.0019	0.0124
Root Vol (m3)	0.0000	0.0000	0.0004	0.0003	0.0003
Total Horizon Vol (m3)	0.0061	0.0024	0.0244	0.0282	0.1240
Soil Vol (m3)	0.0061	0.0024	0.0234	0.0260	0.1113
Horizon Bulk Density (kg/m3)	34.8570	143.0999	914.2596	1413.8471	1562.4114
<2mm BD (kg/m3)		84.9012	810.0030	1156.2762	1174.8647
Horizon Depth (m)	0.0244	0.0097	0.0975	0.1128	0.4959
<2mm (kg/m2)		0.8225	78.9753	130.4569	582.6448
C%		12.3983	3.2611	1.6097	0.4521
C (kg/m2)		0.1020	2.5754	2.1000	2.6341
N%		0.8408	0.2734	0.1535	0.0419
N (kg/m2)		0.0069	0.2159	0.2003	0.2440

Table A22

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
HMF - 40 yr pasture	0941A	8/15/06	40	Pasture

Horizon	Oi	Oe	Oa	0-10 cm	10-20 cm	20+ cm
Field moist sub (kg)			1.6222	1.5765	1.5962	2.3169
Air Dry sub (kg)			1.0786	1.2928	1.3384	1.9558
Field Moist Total (kg)	0.2488	0.4577	1.6222	28.8860	33.9160	130.4060
Air Dry Total (kg)	0.1776	0.2555	1.0786	23.6883	28.4387	110.0799
Sieved sub (kg)	—		0.9601	1.0993	1.1460	1.6267
Sieved Total (kg)	—	0.2084	0.9601	20.1430	24.3500	91.5589
Sieved Oven Dry (kg)	—	0.1985	0.9365	19.8922	24.0566	90.9631
Rocks wt (kg)	0.0000	0.0000	0.0000	4.1290	5.1690	12.4780
Roots weight (kg)	0.0000	0.0000	0.0000	0.2969	1.1827	0.2120
Rock Vol (m3)	0.0000	0.0000	0.0000	0.0016	0.0020	0.0047
Root Vol (m3)	0.0000	0.0000	0.0000	0.0006	0.0024	0.0004
Total Horizon Vol (m3)	0.0030	0.0016	0.0030	0.0254	0.0244	0.0802
Soil Vol (m3)	0.0030	0.0016	0.0030	0.0232	0.0200	0.0751
Horizon Bulk Density (kg/m3)	58.2991	163.5264	363.3280	1019.8618	1421.0877	1465.9103
<2mm BD (kg/m3)		127.0401	315.4681	856.4270	1202.1138	1211.3364
Horizon Depth (m)	0.0122	0.0063	0.0119	0.1016	0.0975	0.3209
<2mm (kg/m2)		0.7940	3.7462	86.9809	117.2061	388.7633
C%		23.9252	11.6268	2.6185	1.5411	0.7210
C (kg/m2)		0.1900	0.4356	2.2776	1.8063	2.8030
N%		1.4426	0.7912	0.2226	0.1308	0.0639
N (kg/m2)		0.0115	0.0296	0.1936	0.1533	0.2486

Table A23

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
HMF - 80 yr pasture	1233B	8/9/06	80	Pasture

Horizon	**Oi**	**Oe**	**Oa**	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)			2.2075	1.0461	1.5165	1.9160
Air Dry sub (kg)			1.0507	0.8235	1.2366	1.5596
Field Moist Total (kg)	0.6178	2.0077	2.2075	40.1950	39.2450	85.1820
Air Dry Total (kg)	0.1991	0.5603	1.0507	31.6402	32.0011	69.3370
Sieved sub (kg)	—		0.9391	0.6590	0.9497	1.1732
Sieved Total (kg)	—	0.5221	0.9391	25.3186	24.5766	52.1578
Sieved Oven Dry (kg)	—	0.4858	0.9053	24.9020	24.3068	51.7401
Rocks wt (kg)	0.0000	0.0000	0.0000	5.1290	5.8290	12.7580
Roots weight (kg)	0.0000	0.0000	0.0000	0.2516	0.0675	0.0285
Rock Vol (m3)	0.0000	0.0000	0.0000	0.0019	0.0022	0.0048
Root Vol (m3)	0.0000	0.0000	0.0000	0.0005	0.0001	0.0001
Total Horizon Vol (m3)	0.0046	0.0042	0.0027	0.0295	0.0250	0.0386
Soil Vol (m3)	0.0046	0.0042	0.0027	0.0271	0.0227	0.0337
Horizon Bulk Density (kg/m3)	43.1967	132.8095	384.2377	1168.2902	1412.0603	2056.1737
<2mm BD (kg/m3)		115.1539	331.0960	919.4885	1072.5453	1534.3419
Horizon Depth (m)	0.0184	0.0169	0.0109	0.1181	0.1000	0.1544
<2mm (kg/m2)		1.9432	3.6214	108.6146	107.2545	236.8640
C%		45.4050	14.0505	4.1604	1.6946	0.7008
C (kg/m2)		0.8823	0.5088	4.5188	1.8176	1.6599
N%		2.1720	0.8110	0.2517	0.1232	0.0874
N (kg/m2)		0.0422	0.0294	0.2734	0.1322	0.2071

Table A24

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
HMF - 80 yr pasture	1234B	8/5/06	80	Pasture

Horizon	Oi	Oe	Oa	0-10 cm	10-20 cm	20+ cm
Field moist sub (kg)			2.0577	1.4564	1.5166	2.1290
Air Dry sub (kg)			0.8404	1.1510	1.2382	1.7083
Field Moist Total (kg)	0.6167	1.0469	2.0577	35.2160	55.0740	266.3250
Air Dry Total (kg)	0.2032	0.3089	0.8404	27.8311	44.9634	213.7017
Sieved sub (kg)	—		0.7744	0.9266	1.0141	1.3665
Sieved Total (kg)	—	0.2836	0.7744	22.4064	36.8243	170.9384
Sieved Oven Dry (kg)	—	0.2633	0.7434	22.1380	36.4025	169.1408
Rocks wt (kg)	0.0000	0.0000	0.0000	4.6290	6.8290	40.9160
Roots weight (kg)	0.0000	0.0000	0.0000	0.5119	0.1661	0.3101
Rock Vol (m3)	0.0000	0.0000	0.0000	0.0017	0.0026	0.0154
Root Vol (m3)	0.0000	0.0000	0.0000	0.0010	0.0003	0.0006
Total Horizon Vol (m3)	0.0029	0.0027	0.0031	0.0292	0.0333	0.1209
Soil Vol (m3)	0.0029	0.0027	0.0031	0.0264	0.0304	0.1048
Horizon Bulk Density (kg/m3)	70.2962	116.2880	268.9280	1053.1015	1480.7387	2039.3947
<2mm BD (kg/m3)		99.1217	237.8853	837.6801	1198.8112	1614.1417
Horizon Depth (m)	0.0116	0.0106	0.0125	0.1169	0.1331	0.4834
<2mm (kg/m2)		1.0532	2.9736	97.9039	159.5917	780.3366
C%		43.0137	26.1935	3.7024	2.2412	0.7704
C (kg/m2)		0.4530	0.7789	3.6248	3.5768	6.0117
N%		1.9225	1.1995	0.2321	0.1474	0.0812
N (kg/m2)		0.0202	0.0357	0.2272	0.2353	0.6339

Table A25

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
HMF - 80 yr pasture	1234 C	8/3/06	80	Pasture

Horizon	**Oi**	**Oe**	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)			1.2659	1.4763	1.8160
Air Dry sub (kg)			0.9577	1.2380	1.3453
Field Moist Total (kg)	0.4314	1.2213	36.2450	43.3450	55.1450
Air Dry Total (kg)	0.2249	0.4765	27.4209	36.3485	40.8529
Sieved sub (kg)	—		0.8096	0.9594	1.0276
Sieved Total (kg)	—	0.4585	23.1816	28.1687	31.2051
Sieved Oven Dry (kg)	—	0.4245	22.7412	27.8602	30.9552
Rocks wt (kg)	0.0000	0.0000	5.2290	17.8580	41.7290
Roots weight (kg)	0.0000	0.0000	0.3175	0.0439	0.0362
Rock Vol (m3)	0.0000	0.0000	0.0020	0.0067	0.0157
Root Vol (m3)	0.0000	0.0000	0.0006	0.0001	0.0001
Total Horizon Vol (m3)	0.0071	0.0037	0.0305	0.0306	0.0365
Soil Vol (m3)	0.0071	0.0037	0.0278	0.0238	0.0207
Horizon Bulk Density (kg/m3)	31.6329	129.7593	984.6630	1527.4625	1977.0418
<2mm BD (kg/m3)		115.6055	816.6183	1170.7631	1498.0515
Horizon Depth (m)	0.0284	0.0147	0.1219	0.1225	0.1459
<2mm (kg/m2)		1.6980	99.5254	143.4185	218.6219
C%		34.9783	5.5260	1.8020	0.6880
C (kg/m2)		0.5939	5.4998	2.5843	1.5041
N%		1.7941	0.3748	0.1597	0.0711
N (kg/m2)		0.0305	0.3730	0.2291	0.1554

Table A26

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
HMF - 110 yr pasture	0619A	7/24/06	110	Pasture

Horizon	Oi	Oe	Oa	0-10 cm	10-20 cm	20+ cm
Field moist sub (kg)			1.4432	0.9930	1.4929	1.3926
Air Dry sub (kg)			0.6237	0.6806	1.1783	1.0986
Field Moist Total (kg)	0.4926	3.9855	1.4432	33.1160	39.7160	62.7740
Air Dry Total (kg)	0.1466	1.2280	0.6237	22.6984	31.3487	49.5228
Sieved sub (kg)	—		0.5634	0.5050	0.8403	0.8365
Sieved Total (kg)	—	0.9230	0.5634	16.8433	22.3557	37.7068
Sieved Oven Dry (kg)	—	0.8755	0.5538	16.6624	22.2035	37.5290
Rocks wt (kg)	0.0000	0.0000	0.0000	13.2290	11.6290	16.2580
Roots weight (kg)	0.0000	0.0000	0.0000	0.2581	0.1623	0.2588
Rock Vol (m3)	0.0000	0.0000	0.0000	0.0050	0.0044	0.0061
Root Vol (m3)	0.0000	0.0000	0.0000	0.0005	0.0003	0.0005
Total Horizon Vol (m3)	0.0011	0.0110	0.0020	0.0251	0.0280	0.0325
Soil Vol (m3)	0.0011	0.0110	0.0020	0.0196	0.0233	0.0258
Horizon Bulk Density (kg/m3)	134.0526	111.4744	307.0572	1160.4764	1343.8501	1916.7337
<2mm BD (kg/m3)		79.4789	272.6293	851.8809	951.8135	1452.5258
Horizon Depth (m)	0.0044	0.0441	0.0081	0.1003	0.1122	0.1300
<2mm (kg/m2)		3.5020	2.2151	85.4543	106.7816	188.8284
C%		48.4107	24.7039	3.4526	1.0090	0.7170
C (kg/m2)		1.6954	0.5472	2.9504	1.0774	1.3539
N%		1.7887	0.8588	0.1640	0.0701	0.0626
N (kg/m2)		0.0626	0.0190	0.1401	0.0749	0.1182

Table A27

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
HMF - 110 yr pasture	0619B	8/20/06	110	Pasture

Horizon	**Oi**	**Oe**	**Oa**	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)			7.5260	1.3780	1.2545	1.5764
Air Dry sub (kg)			2.6804	1.0606	0.9923	1.3347
Field Moist Total (kg)	0.2486	2.0683	7.5260	18.6370	33.1850	65.0430
Air Dry Total (kg)	0.1585	0.5601	2.6804	14.3440	26.2490	55.0719
Sieved sub (kg)	—		2.0588	0.6815	0.7189	0.9411
Sieved Total (kg)	—	0.3269	2.0588	9.2163	19.0151	38.8287
Sieved Oven Dry (kg)	—	0.3015	1.9378	9.0616	18.6618	38.7831
Rocks wt (kg)	0.0000	0.0000	0.0000	9.3290	14.0290	27.4580
Roots weight (kg)	0.0000	0.0000	0.0000	0.5269	0.1737	0.1087
Rock Vol (m3)	0.0000	0.0000	0.0000	0.0035	0.0053	0.0104
Root Vol (m3)	0.0000	0.0000	0.0000	0.0011	0.0004	0.0002
Total Horizon Vol (m3)	0.0050	0.0067	0.0143	0.0222	0.0285	0.0602
Soil Vol (m3)	0.0050	0.0067	0.0143	0.0176	0.0229	0.0496
Horizon Bulk Density (kg/m3)	31.7080	83.3637	187.4843	815.3525	1147.8818	1110.9231
<2mm BD (kg/m3)		44.8692	135.5386	515.0906	816.0921	782.3418
Horizon Depth (m)	0.0200	0.0269	0.0572	0.0888	0.1141	0.2406
<2mm (kg/m2)		1.2059	7.7511	45.7143	93.0855	188.2510
C%		49.1062	38.3148	8.8189	3.6905	1.6800
C (kg/m2)		0.5922	2.9698	4.0315	3.4354	3.1627
N%		2.0504	1.4951	0.3697	0.1541	0.0774
N (kg/m2)		0.0247	0.1159	0.1690	0.1434	0.1457

Table A28

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
HMF - 110 yr pasture	0619C	8/20/06	110	Pasture

Horizon	**Oi**	**Oe**	**Oa**	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)			2.3417	1.1542	1.4965	1.4759
Air Dry sub (kg)			1.1434	0.9989	1.3556	1.3255
Field Moist Total (kg)	0.1688	1.7776	2.3417	21.8370	13.6880	4.9190
Air Dry Total (kg)	0.1387	0.7790	1.1434	18.9000	12.3990	4.4178
Sieved sub (kg)	—		0.9894	0.7146	0.9120	0.9013
Sieved Total (kg)	—	0.7297	0.9894	13.5195	8.3421	3.0039
Sieved Oven Dry (kg)	—	0.7095	0.9699	13.4747	8.3275	2.9856
Rocks wt (kg)	0.0000	0.0000	0.0000	37.3870	14.8290	2.8590
Roots weight (kg)	0.0000	0.0000	0.0000	0.1722	0.1183	0.0798
Rock Vol (m3)	0.0000	0.0000	0.0000	0.0141	0.0056	0.0011
Root Vol (m3)	0.0000	0.0000	0.0000	0.0004	0.0002	0.0002
Total Horizon Vol (m3)	0.0042	0.0064	0.0060	0.0334	0.0226	0.0066
Soil Vol (m3)	0.0042	0.0064	0.0060	0.0190	0.0167	0.0053
Horizon Bulk Density (kg/m3)	33.3786	121.8895	190.0634	995.8960	740.6394	830.2808
<2mm BD (kg/m3)		111.0200	161.2276	710.0209	497.4313	561.1064
Horizon Depth (m)	0.0166	0.0256	0.0241	0.1338	0.0903	0.0263
<2mm (kg/m2)		2.8379	3.8795	94.9653	44.9243	14.7290
C%		49.0993	43.1431	5.5620	3.4465	3.1713
C (kg/m2)		1.3934	1.6738	5.2819	1.5483	0.4671
N%		1.9790	1.6408	0.2464	0.1826	0.1745
N (kg/m2)		0.0562	0.0637	0.2340	0.0820	0.0257

Table A29

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
HMF - 120 yr pasture	0514A	7/26/06	120	Pasture

Horizon	**Oi**	**Oe**	**Oa**	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)			2.8907	1.2905	1.5914	1.8895
Air Dry sub (kg)			1.3667	0.8471	1.0371	1.4195
Field Moist Total (kg)	0.4209	3.1814	2.8907	24.8160	27.1160	80.2320
Air Dry Total (kg)	0.2023	0.9027	1.3667	16.2884	17.6714	60.2755
Sieved sub (kg)	—		0.9796	0.7668	0.9737	1.2744
Sieved Total (kg)	—	0.7229	0.9796	14.7443	16.5908	54.1122
Sieved Oven Dry (kg)	—	0.6928	0.9543	14.5222	16.2989	53.8798
Rocks wt (kg)	0.0000	0.0000	0.0000	12.0580	3.0290	5.9290
Roots weight (kg)	0.0000	0.0000	0.0000	0.5555	0.2733	0.1666
Rock Vol (m3)	0.0000	0.0000	0.0000	0.0046	0.0011	0.0022
Root Vol (m3)	0.0000	0.0000	0.0000	0.0011	0.0006	0.0003
Total Horizon Vol (m3)	0.0055	0.0084	0.0027	0.0280	0.0252	0.0517
Soil Vol (m3)	0.0055	0.0084	0.0027	0.0224	0.0235	0.0491
Horizon Bulk Density (kg/m3)	36.4656	107.9877	499.8363	728.3439	753.3940	1226.5664
<2mm BD (kg/m3)		82.8822	348.9859	649.3644	694.8770	1096.4194
Horizon Depth (m)	0.0222	0.0334	0.0109	0.1122	0.1006	0.2069
<2mm (kg/m2)		2.7714	3.8170	72.8506	69.9220	226.8218
C%		45.7039	16.9178	4.1870	2.2841	0.9206
C (kg/m2)		1.2666	0.6458	3.0502	1.5971	2.0882
N%		2.0164	0.6899	0.1901	0.1258	0.0830
N (kg/m2)		0.0559	0.0263	0.1385	0.0880	0.1883

Table A30

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
HMF - 120 yr pasture	0515A	7/27/06	120	Pasture

Horizon	**Oi**	**Oe**	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)			1.2161	1.3163	2.0162
Air Dry sub (kg)			0.8803	0.9948	1.5859
Field Moist Total (kg)	2.3470	9.5408	23.1870	27.3870	147.1060
Air Dry Total (kg)	0.1826	3.1850	16.7845	20.6968	115.7073
Sieved sub (kg)	—		0.6673	0.7974	1.2278
Sieved Total (kg)	—	2.6143	12.7228	16.5912	89.5843
Sieved Oven Dry (kg)	—	2.4661	12.5893	16.4531	89.0610
Rocks wt (kg)	0.0000	0.0000	6.5290	6.1290	46.2160
Roots weight (kg)	0.0000	0.0000	0.4839	0.2148	0.2001
Rock Vol (m3)	0.0000	0.0000	0.0025	0.0023	0.0174
Root Vol (m3)	0.0000	0.0000	0.0010	0.0004	0.0004
Total Horizon Vol (m3)	0.0066	0.0215	0.0231	0.0236	0.1044
Soil Vol (m3)	0.0066	0.0215	0.0197	0.0208	0.0865
Horizon Bulk Density (kg/m3)	27.8232	148.2473	853.1230	992.9937	1337.2418
<2mm BD (kg/m3)		114.7853	639.8889	789.3890	1029.2883
Horizon Depth (m)	0.0263	0.0859	0.0925	0.0944	0.4175
<2mm (kg/m2)		9.8644	59.1897	74.4986	429.7279
C%		40.4142	5.6726	1.8160	0.7889
C (kg/m2)		3.9866	3.3576	1.3529	3.3899
N%		1.8762	0.3265	0.1240	0.0830
N (kg/m2)		0.1851	0.1933	0.0924	0.3567

Table A31

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
HMF - 120 yr pasture	0516C	7/28/06	120	Pasture

Horizon	**Oi**	**Oe**	**Oa**	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)			0.7426	1.2814	1.0214	1.1213
Air Dry sub (kg)			0.3834	0.9407	0.7802	0.9493
Field Moist Total (kg)	0.3130	4.1854	2.1226	26.5660	28.7160	46.2450
Air Dry Total (kg)	0.2126	1.4761	1.0957	19.5023	21.9338	39.1511
Sieved sub (kg)	—		0.3415	0.7003	0.5962	0.6406
Sieved Total (kg)	—	1.0159	0.9762	14.5189	16.7615	26.4195
Sieved Oven Dry (kg)	—	0.9516	0.9519	14.3376	16.5835	26.0696
Rocks wt (kg)	0.0000	0.0000	0.0000	8.2290	12.4290	34.1160
Roots weight (kg)	0.0000	0.0000	0.1023	0.2817	0.1723	0.1072
Rock Vol (m3)	0.0000	0.0000	0.0000	0.0031	0.0047	0.0129
Root Vol (m3)	0.0000	0.0000	0.0002	0.0006	0.0004	0.0002
Total Horizon Vol (m3)	0.0056	0.0125	0.0042	0.0266	0.0248	0.0483
Soil Vol (m3)	0.0056	0.0125	0.0040	0.0229	0.0197	0.0352
Horizon Bulk Density (kg/m3)	37.7920	117.7927	275.3964	852.2768	1112.0351	1112.6061
<2mm BD (kg/m3)		75.9407	239.2467	626.5691	840.7735	740.8519
Horizon Depth (m)	0.0225	0.0501	0.0168	0.1063	0.0991	0.1931
<2mm (kg/m2)		3.8065	4.0074	66.5730	83.2891	143.0770
C%		47.7952	21.0377	4.9397	3.4998	2.7393
C (kg/m2)		1.8193	0.8431	3.2885	2.9149	3.9193
N%		2.1492	0.8805	0.2330	0.1682	0.1534
N (kg/m2)		0.0818	0.0353	0.1551	0.1401	0.2195

Table A32

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
HMF - 170 yr pasture	0715B	5/23/07	170	Pasture

Horizon	**Oi**	**Oe**	**Oa**	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)			1.2378	1.6578	1.8074	2.4066
Air Dry sub (kg)			0.4953	1.1848	1.2405	1.8658
Field Moist Total (kg)	0.6077	1.0177	4.1290	27.1160	19.6870	99.4030
Air Dry Total (kg)	0.1981	0.2568	1.6524	19.3798	13.5119	77.0630
Sieved sub (kg)	—		0.4077	0.8794	1.0908	1.6862
Sieved Total (kg)	—	0.2234	1.3599	14.3844	11.8820	69.6481
Sieved Oven Dry (kg)	—	0.7557	1.3240	14.1981	11.7750	69.3343
Rocks wt (kg)	0.0000	0.0000	0.0000	5.9290	5.7290	21.8580
Roots weight (kg)	0.0000	0.0000	0.0000	0.3660	0.1339	0.4977
Rock Vol (m3)	0.0000	0.0000	0.0000	0.0022	0.0022	0.0082
Root Vol (m3)	0.0000	0.0000	0.0000	0.0007	0.0003	0.0010
Total Horizon Vol (m3)	0.0059	0.0072	0.0073	0.0285	0.0220	0.1013
Soil Vol (m3)	0.0059	0.0072	0.0073	0.0255	0.0195	0.0920
Horizon Bulk Density (kg/m3)	33.8142	35.7287	227.4208	759.0490	692.2754	837.7645
<2mm BD (kg/m3)		105.1444	182.2242	556.0978	603.2840	753.7440
Horizon Depth (m)	0.0234	0.0288	0.0291	0.1141	0.0878	0.4050
<2mm (kg/m2)		3.0229	5.2959	63.4299	52.9759	305.2663
C%		43.8258	29.3869	4.4587	2.8042	0.8919
C (kg/m2)		1.3248	1.5563	2.8281	1.4855	2.7226
N%		2.0110	1.0486	0.1797	0.1289	0.0602
N (kg/m2)		0.0608	0.0555	0.1140	0.0683	0.1837

Table A33

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
HMF - 170 yr pasture	0715C	5/23/07	170	Pasture

Horizon	**Oi**	**Oe**	**Oa**	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)			1.3576	1.3475	1.4073	3.1557
Air Dry sub (kg)			0.6386	1.0674	1.1058	2.5817
Field Moist Total (kg)	0.4079	1.4075	1.3576	34.2450	30.5160	160.1640
Air Dry Total (kg)	0.1603	0.3041	0.6386	27.1254	23.9777	131.0341
Sieved sub (kg)	—		0.4949	0.8898	0.7492	1.8855
Sieved Total (kg)	—	0.2653	0.4949	22.6135	16.2468	95.6991
Sieved Oven Dry (kg)	—	0.0045	0.4819	22.4214	16.1330	95.1748
Rocks wt (kg)	0.0000	0.0000	0.0000	13.0790	14.5580	84.5630
Roots weight (kg)	0.0000	0.0000	0.0000	0.3355	0.1960	0.4794
Rock Vol (m3)	0.0000	0.0000	0.0000	0.0049	0.0055	0.0319
Root Vol (m3)	0.0000	0.0000	0.0000	0.0007	0.0004	0.0010
Total Horizon Vol (m3)	0.0039	0.0035	0.0021	0.0314	0.0258	0.1294
Soil Vol (m3)	0.0039	0.0035	0.0021	0.0258	0.0199	0.0965
Horizon Bulk Density (kg/m3)	41.0445	86.4967	302.7532	1051.9225	1205.6402	1358.0550
<2mm BD (kg/m3)		1.2868	228.4407	869.5000	811.1955	986.4043
Horizon Depth (m)	0.0156	0.0141	0.0084	0.1256	0.1031	0.5175
<2mm (kg/m2)		0.0181	1.9275	109.2309	83.6545	510.4642
C%		43.8258	29.3869	2.8839	1.4886	0.7499
C (kg/m2)		0.0079	0.5664	3.1501	1.2453	3.8280
N%		2.0110	1.0486	0.0990	0.0854	0.0657
N (kg/m2)		0.0004	0.0202	0.1081	0.0715	0.3356

Table A34

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
HMF - 170 yr pasture	0716B	5/22/07	170	Pasture

Horizon	Oi	Oe	Oa	0-10 cm	10-20 cm	20+ cm
Field moist sub (kg)			4.0070	1.6576	1.4074	1.8567
Air Dry sub (kg)			2.6965	1.1877	1.0112	1.3837
Field Moist Total (kg)	0.7076	1.0077	4.0070	27.4160	30.9290	51.2160
Air Dry Total (kg)	0.2329	0.4388	2.6965	19.6433	22.2216	38.1686
Sieved sub (kg)	—		1.9669	0.9031	0.9234	1.0366
Sieved Total (kg)	—	0.3817	1.9669	14.9366	20.2932	28.5938
Sieved Oven Dry (kg)	—	0.3572	1.9433	14.7801	20.1206	28.2086
Rocks wt (kg)	0.0000	0.0000	0.0000	4.8290	9.1290	7.1290
Roots weight (kg)	0.0000	0.0000	0.0000	0.3036	0.6366	0.6365
Rock Vol (m3)	0.0000	0.0000	0.0000	0.0018	0.0034	0.0027
Root Vol (m3)	0.0000	0.0000	0.0000	0.0006	0.0013	0.0013
Total Horizon Vol (m3)	0.0061	0.0027	0.0043	0.0253	0.0266	0.0416
Soil Vol (m3)	0.0061	0.0027	0.0043	0.0229	0.0218	0.0376
Horizon Bulk Density (kg/m3)	38.2178	160.4681	627.5375	858.8769	1018.4550	1014.1363
<2mm BD (kg/m3)		130.6340	452.2522	646.2415	922.1615	749.4996
Horizon Depth (m)	0.0244	0.0109	0.0172	0.1013	0.1063	0.1665
<2mm (kg/m2)		1.4288	7.7731	65.4320	97.9797	124.7917
C%		42.8758	8.7868	3.4637	2.8529	2.1036
C (kg/m2)		0.6126	0.6830	2.2664	2.7952	2.6251
N%		1.9424	0.4913	0.2052	0.1791	0.1362
N (kg/m2)		0.0278	0.0382	0.1343	0.1755	0.1699

Table A35

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
HMF - Moon Woodlot	0921B	10/19/06	40	Woodlot

Horizon	Oi	Oe	0-10 cm	10-20 cm	20+ cm
Field moist sub (kg)			0.7450	1.2758	1.2776
Air Dry sub (kg)			0.5327	0.9865	1.0261
Field Moist Total (kg)	0.4478	1.0174	28.5660	35.4160	31.6870
Air Dry Total (kg)	0.1415	0.3281	20.4235	27.3837	25.4477
Sieved sub (kg)	—		0.4359	0.7165	0.7745
Sieved Total (kg)	—	0.2727	16.7118	19.8888	19.2076
Sieved Oven Dry (kg)	—	2.1987	16.3288	19.5912	19.0062
Rocks wt (kg)	0.0000	0.0000	5.8290	5.6290	5.4790
Roots weight (kg)	0.0000	0.0000	0.1328	0.0948	0.0124
Rock Vol (m3)	0.0000	0.0000	0.0022	0.0021	0.0021
Root Vol (m3)	0.0000	0.0000	0.0003	0.0002	0.0000
Total Horizon Vol (m3)	0.0064	0.0177	0.0263	0.0257	0.0213
Soil Vol (m3)	0.0064	0.0177	0.0239	0.0234	0.0192
Horizon Bulk Density (kg/m3)	22.0894	18.5832	856.0533	1170.9670	1328.3661
<2mm BD (kg/m3)		124.5300	684.4254	837.7496	992.1226
Horizon Depth (m)	0.0256	0.0706	0.1053	0.1028	0.0850
<2mm (kg/m2)		8.7949	72.0786	86.1311	84.3304
C%		31.5588	4.7393	1.9150	0.9917
C (kg/m2)		2.7756	3.4160	1.6494	0.8363
N%		1.1983	0.2032	0.1108	0.0693
N (kg/m2)		0.1054	0.1465	0.0955	0.0585

Table A36

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
HMF - Moon Woodlot	0921C	10/20/06	40	Woodlot

Horizon	**Oi**	**Oe**	**Oa**	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)			5.4662	3.1085	3.0586	2.7075
Air Dry sub (kg)			1.8503	2.0878	2.3073	2.1843
Field Moist Total (kg)	0.4675	4.2154	5.4662	32.7160	46.1450	30.6870
Air Dry Total (kg)	0.1335	1.0086	1.8503	21.9732	34.8100	24.7569
Sieved sub (kg)	—		1.6071	1.6474	1.7281	1.7359
Sieved Total (kg)	—	0.8396	1.6071	17.3388	26.0726	19.6756
Sieved Oven Dry (kg)	—	0.7712	1.5119	16.9828	25.9176	19.5385
Rocks wt (kg)	0.0000	0.0000	0.0000	10.0290	6.8290	7.3290
Roots weight (kg)	0.0000	0.0000	0.0000	0.5015	0.2780	0.0520
Rock Vol (m3)	0.0000	0.0000	0.0000	0.0038	0.0026	0.0028
Root Vol (m3)	0.0000	0.0000	0.0000	0.0010	0.0006	0.0001
Total Horizon Vol (m3)	0.0031	0.0097	0.0070	0.0290	0.0297	0.0227
Soil Vol (m3)	0.0031	0.0097	0.0070	0.0242	0.0265	0.0199
Horizon Bulk Density (kg/m3)	42.7104	104.1156	266.1106	908.8553	1311.4347	1246.4066
<2mm BD (kg/m3)		79.6108	217.4473	702.4435	976.4212	983.6828
Horizon Depth (m)	0.0125	0.0388	0.0278	0.1159	0.1188	0.0909
<2mm (kg/m2)		3.0849	6.0478	81.4395	115.9500	89.4537
C%		47.5561	28.8656	5.1387	1.5236	0.7839
C (kg/m2)		1.4671	1.7457	4.1849	1.7666	0.7013
N%		1.9301	1.1635	0.2660	0.0890	0.0735
N (kg/m2)		0.0595	0.0704	0.2167	0.1032	0.0658

Table A37

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
HMF - Moon Woodlot	0922C	10/18/06	40	Woodlot

Horizon	**Oi**	**Oe**	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)			1.1856	2.0068	2.1560
Air Dry sub (kg)			0.9533	1.6116	1.8524
Field Moist Total (kg)	0.3974	2.8822	27.2160	31.1160	118.1770
Air Dry Total (kg)	0.1411	1.6486	21.8843	24.9885	101.5365
Sieved sub (kg)	—		0.6950	1.1218	1.2900
Sieved Total (kg)	—	0.9687	15.9532	17.3936	70.7057
Sieved Oven Dry (kg)	—	0.9324	15.7305	17.2200	70.0671
Rocks wt (kg)	0.0000	0.0000	6.0290	8.2290	28.5870
Roots weight (kg)	0.0000	0.0000	0.1340	0.1546	0.0861
Rock Vol (m3)	0.0000	0.0000	0.0023	0.0031	0.0108
Root Vol (m3)	0.0000	0.0000	0.0003	0.0003	0.0002
Total Horizon Vol (m3)	0.0050	0.0042	0.0234	0.0243	0.0765
Soil Vol (m3)	0.0050	0.0042	0.0209	0.0209	0.0655
Horizon Bulk Density (kg/m3)	28.2120	390.7887	1047.6434	1196.9808	1549.6745
<2mm BD (kg/m3)		221.0051	753.0498	824.8580	1069.3808
Horizon Depth (m)	0.0200	0.0169	0.0938	0.0972	0.3059
<2mm (kg/m2)		3.7295	70.5984	80.1659	327.1637
C%		18.9958	3.1951	1.5174	0.5107
C (kg/m2)		0.7084	2.2557	1.2164	1.6708
N%		0.9651	0.2056	0.0941	0.0594
N (kg/m2)		0.0360	0.1452	0.0755	0.1943

Table A38

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
Hopkins Woodlot	1013C	10/21/06	80	Woodlot

Horizon	**Oi**	**Oe**	**Oa**	**0-10 cm**	**10-20 cm**
Field moist sub (kg)			4.6166	2.7080	2.7579
Air Dry sub (kg)			2.0532	1.8282	1.8496
Field Moist Total (kg)	0.4493	0.5289	4.6166	32.2450	31.0870
Air Dry Total (kg)	0.1453	0.1538	2.0532	21.7693	20.8490
Sieved sub (kg)	—		1.4597	1.3634	1.4998
Sieved Total (kg)	—	0.0858	1.4597	16.2340	16.9059
Sieved Oven Dry (kg)	—	0.0799	1.3997	15.9407	16.6114
Rocks wt (kg)	0.0000	0.0000	0.0000	9.2290	6.2290
Roots weight (kg)	0.0000	0.0000	0.0000	0.4411	0.1492
Rock Vol (m3)	0.0000	0.0000	0.0000	0.0035	0.0024
Root Vol (m3)	0.0000	0.0000	0.0000	0.0009	0.0003
Total Horizon Vol (m3)	0.0074	0.0034	0.0052	0.0294	0.0261
Soil Vol (m3)	0.0074	0.0034	0.0052	0.0250	0.0234
Horizon Bulk Density (kg/m3)	19.5813	44.7505	392.2531	871.0251	889.5072
<2mm BD (kg/m3)		23.2394	267.4098	637.8150	708.7112
Horizon Depth (m)	0.0297	0.0138	0.0209	0.1175	0.1044
<2mm (kg/m2)		0.3195	5.5989	74.9433	73.9717
C%		43.0546	18.2623	3.8366	2.1469
C (kg/m2)		0.1376	1.0225	2.8752	1.5881
N%		1.9755	0.8128	0.2365	0.1482
N (kg/m2)		0.0063	0.0455	0.1773	0.1096

Table A39

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
Hopkins Woodlot	1014C	10/22/06	80	Woodlot

Horizon	**Oi**	**Oe**	**Oa**	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)			5.3147	3.1079	2.9079	3.0934
Air Dry sub (kg)			1.9053	1.8422	2.0065	2.1531
Field Moist Total (kg)	0.5287	2.0076	5.3147	38.6450	24.9870	60.6450
Air Dry Total (kg)	0.1748	0.5168	1.9053	22.9070	17.2413	42.2102
Sieved sub (kg)	—		0.9638	1.3570	1.5863	1.5136
Sieved Total (kg)	—	0.3410	0.9638	16.8734	13.6308	29.6742
Sieved Oven Dry (kg)	—	0.3106	0.9128	16.5517	13.3853	29.0535
Rocks wt (kg)	0.0000	0.0000	0.0000	11.6290	6.2290	24.8870
Roots weight (kg)	0.0000	0.0000	0.0000	0.2700	0.1284	0.2785
Rock Vol (m3)	0.0000	0.0000	0.0000	0.0044	0.0024	0.0094
Root Vol (m3)	0.0000	0.0000	0.0000	0.0006	0.0003	0.0006
Total Horizon Vol (m3)	0.0073	0.0052	0.0067	0.0347	0.0216	0.0498
Soil Vol (m3)	0.0073	0.0052	0.0067	0.0297	0.0189	0.0399
Horizon Bulk Density (kg/m3)	24.0557	98.7281	283.5840	770.0209	909.8332	1058.3155
<2mm BD (kg/m3)		59.3459	135.8551	556.3881	706.3497	728.4446
Horizon Depth (m)	0.0291	0.0209	0.0269	0.1388	0.0863	0.1994
<2mm (kg/m2)		1.2426	3.6511	77.1988	60.9227	145.2336
C%		45.9994	28.3761	5.2906	3.5954	2.8688
C (kg/m2)		0.5716	1.0360	4.0843	2.1904	4.1664
N%		1.8983	1.1213	0.2642	0.1840	0.1681
N (kg/m2)		0.0236	0.0409	0.2040	0.1121	0.2441

Table A40

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
Hopkins Woodlot	1015B	10/23/06	80	Woodlot

Horizon	**Oi**	**Oe**	**Oa**	**0-10 cm**	**10-20 cm**
Field moist sub (kg)			5.3661	2.1074	2.8086
Air Dry sub (kg)			1.8542	1.3252	1.9659
Field Moist Total (kg)	0.6281	3.7410	5.3661	25.4870	39.1160
Air Dry Total (kg)	0.1881	0.8267	1.8542	16.0272	27.3790
Sieved sub (kg)	—		1.0802	0.9472	1.4857
Sieved Total (kg)	—	0.6616	1.0802	11.4558	20.6911
Sieved Oven Dry (kg)	—	0.6104	1.0397	11.3027	20.5162
Rocks wt (kg)	0.0000	0.0000	0.0000	8.6290	10.4290
Roots weight (kg)	0.0000	0.0000	0.0000	0.9064	0.2268
Rock Vol (m3)	0.0000	0.0000	0.0000	0.0033	0.0039
Root Vol (m3)	0.0000	0.0000	0.0000	0.0018	0.0005
Total Horizon Vol (m3)	0.0059	0.0091	0.0083	0.0248	0.0305
Soil Vol (m3)	0.0059	0.0091	0.0083	0.0197	0.0261
Horizon Bulk Density (kg/m3)	32.1092	91.2166	223.8974	815.1933	1047.0438
<2mm BD (kg/m3)		67.3508	125.5547	574.8918	784.5941
Horizon Depth (m)	0.0234	0.0363	0.0331	0.0991	0.1222
<2mm (kg/m2)		2.4415	4.1590	56.9502	95.8676
C%		46.5277	24.6695	4.7815	3.2572
C (kg/m2)		1.1360	1.0260	2.7231	3.1226
N%		1.9393	1.0313	0.2813	0.1855
N (kg/m2)		0.0473	0.0429	0.1602	0.1778

Table A41

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
HMF - Red Oak Wdlt.	RO1	8/17/06	130	Woodlot

Horizon	**Oi**	**Oe**	**Oa**	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)			4.5576	1.2468	1.4368	1.8565
Air Dry sub (kg)			1.8722	0.9305	1.1344	1.5757
Field Moist Total (kg)	0.2888	1.9086	4.5576	34.0150	33.4460	82.9700
Air Dry Total (kg)	0.1745	0.6890	1.8722	25.3852	26.4063	70.4189
Sieved sub (kg)	—		1.4211	0.7018	0.9907	1.2183
Sieved Total (kg)	—	0.5439	1.4211	19.1476	23.0617	54.4463
Sieved Oven Dry (kg)	—	0.5064	1.3506	18.8506	22.8310	54.1466
Rocks wt (kg)	0.0000	0.0000	0.0000	3.1590	1.1890	13.9580
Roots weight (kg)	0.0000	0.0000	0.0000	0.0960	0.1130	0.3208
Rock Vol (m3)	0.0000	0.0000	0.0000	0.0012	0.0004	0.0053
Root Vol (m3)	0.0000	0.0000	0.0000	0.0002	0.0002	0.0007
Total Horizon Vol (m3)	0.0067	0.0078	0.0084	0.0290	0.0223	0.0424
Soil Vol (m3)	0.0067	0.0078	0.0084	0.0276	0.0216	0.0365
Horizon Bulk Density (kg/m3)	25.9766	88.1869	223.9581	919.8712	1223.2783	1929.2644
<2mm BD (kg/m3)		64.8191	161.5714	683.0807	1057.6511	1483.4510
Horizon Depth (m)	0.0269	0.0313	0.0334	0.1159	0.0891	0.1697
<2mm (kg/m2)		2.0256	5.4025	79.1947	94.1971	251.7231
C%		38.2822	32.1445	4.4142	1.3943	0.4493
C (kg/m2)		0.7754	1.7366	3.4958	1.3134	1.1311
N%		1.7098	1.3107	0.2254	0.1035	0.0620
N (kg/m2)		0.0346	0.0708	0.1785	0.0975	0.1561

Table A42

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
HMF - Red Oak Wdlt.	RO2	8/18/06	130	Woodlot

Horizon	**Oi**	**Oe**	**Oa**	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)			3.1571	1.7461	1.4164	1.6664
Air Dry sub (kg)			1.3366	1.4086	1.1281	1.3512
Field Moist Total (kg)	0.3302	2.2085	3.1571	30.9250	31.1160	105.7580
Air Dry Total (kg)	0.1698	0.8252	1.3366	24.9479	24.7820	85.7590
Sieved sub (kg)	—		1.2423	1.1159	0.9282	1.0610
Sieved Total (kg)	—	0.6544	1.2423	19.7639	20.3909	67.3379
Sieved Oven Dry (kg)	—	0.6088	1.1771	19.5079	20.1454	66.6642
Rocks wt (kg)	0.0000	0.0000	0.0000	2.7290	6.3290	24.9580
Roots weight (kg)	0.0000	0.0000	0.0000	0.0913	0.5590	0.2981
Rock Vol (m3)	0.0000	0.0000	0.0000	0.0010	0.0024	0.0094
Root Vol (m3)	0.0000	0.0000	0.0000	0.0002	0.0011	0.0006
Total Horizon Vol (m3)	0.0050	0.0078	0.0074	0.0273	0.0279	0.0752
Soil Vol (m3)	0.0050	0.0078	0.0074	0.0260	0.0244	0.0652
Horizon Bulk Density (kg/m3)	33.9540	105.6294	180.0879	957.7102	1017.2357	1315.1571
<2mm BD (kg/m3)		77.9224	158.5964	748.8769	826.9124	1022.3289
Horizon Depth (m)	0.0200	0.0313	0.0297	0.1091	0.1116	0.3009
<2mm (kg/m2)		2.4351	4.7083	81.6744	92.2524	307.6571
C%		45.0803	37.8133	3.2585	2.3668	0.8504
C (kg/m2)		1.0977	1.7804	2.6614	2.1835	2.6164
N%		1.6822	1.3941	0.1278	0.1132	0.0592
N (kg/m2)		0.0410	0.0656	0.1044	0.1044	0.1821

Table A43

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
HMF - Red Oak Wdlt.	RO3	8/20/06	130	Woodlot

Horizon	**Oi**	**Oe**	**Oa**	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)			3.0087	1.0570	1.5865	2.2382
Air Dry sub (kg)			1.4278	0.6691	1.0692	1.7496
Field Moist Total (kg)	0.5086	1.4788	3.0087	29.7660	26.0070	54.8740
Air Dry Total (kg)	0.1605	0.4914	1.4278	18.8428	17.5274	42.8947
Sieved sub (kg)	—		1.1315	0.5940	0.9406	1.5407
Sieved Total (kg)	—	0.4115	1.1315	16.7277	15.4181	37.7723
Sieved Oven Dry (kg)	—	0.3887	1.1050	16.4603	15.1939	37.4896
Rocks wt (kg)	0.0000	0.0000	0.0000	2.4790	4.1790	3.9790
Roots weight (kg)	0.0000	0.0000	0.0000	0.0870	0.1196	0.0637
Rock Vol (m3)	0.0000	0.0000	0.0000	0.0009	0.0016	0.0015
Root Vol (m3)	0.0000	0.0000	0.0000	0.0002	0.0002	0.0001
Total Horizon Vol (m3)	0.0038	0.0042	0.0044	0.0252	0.0232	0.0373
Soil Vol (m3)	0.0038	0.0042	0.0044	0.0241	0.0214	0.0357
Horizon Bulk Density (kg/m3)	42.7867	116.4681	321.7510	783.1919	819.7172	1201.1151
<2mm BD (kg/m3)		92.1322	249.0176	684.1638	710.5853	1049.7645
Horizon Depth (m)	0.0150	0.0169	0.0178	0.1007	0.0928	0.1494
<2mm (kg/m2)		1.5547	4.4201	68.8867	65.9512	156.8086
C%		29.4116	13.1035	4.4383	2.0354	0.7750
C (kg/m2)		0.4573	0.5792	3.0574	1.3424	1.2153
N%		1.3732	0.6199	0.2131	0.1321	0.0648
N (kg/m2)		0.0214	0.0274	0.1468	0.0871	0.1017

Table A44

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
HMF - 150 yr woodlot	1226A	8/13/06	150	Woodlot

Horizon	**Oi**	**Oe**	**Oa**	**0-10 cm**	**10-20 cm**
Field moist sub (kg)			4.8468	1.5766	1.7164
Air Dry sub (kg)			2.9731	1.2217	1.4381
Field Moist Total (kg)	0.3689	0.9294	4.8468	32.2160	27.9870
Air Dry Total (kg)	0.1787	0.3561	2.9731	24.9644	23.4490
Sieved sub (kg)	—		2.2273	0.8707	0.9601
Sieved Total (kg)	—	0.3122	2.2273	17.7923	15.6546
Sieved Oven Dry (kg)	—	0.2888	2.1312	17.4196	15.3652
Rocks wt (kg)	0.0000	0.0000	0.0000	7.7290	10.6980
Roots weight (kg)	0.0000	0.0000	0.0000	0.1685	0.0503
Rock Vol (m3)	0.0000	0.0000	0.0000	0.0029	0.0040
Root Vol (m3)	0.0000	0.0000	0.0000	0.0003	0.0001
Total Horizon Vol (m3)	0.0045	0.0040	0.0071	0.0295	0.0240
Soil Vol (m3)	0.0045	0.0040	0.0071	0.0263	0.0198
Horizon Bulk Density (kg/m3)	40.1359	89.3616	418.1901	950.2680	1181.6126
<2mm BD (kg/m3)		72.4922	299.7736	663.0747	774.2645
Horizon Depth (m)	0.0178	0.0159	0.0284	0.1181	0.0959
<2mm (kg/m2)		1.1553	8.5248	78.3257	74.2810
C%		36.8279	17.1474	1.7006	2.2911
C (kg/m2)		0.4255	1.4618	1.3320	1.7019
N%		2.4139	1.1215	0.1652	0.1925
N (kg/m2)		0.0279	0.0956	0.1294	0.1430

Table A45

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
HMF - 150 yr woodlot	1226B	8/12/06	150	Woodlot

Horizon	Oi	Oe	Oa	0-10 cm	10-20 cm	20+ cm
Field moist sub (kg)			2.6678	1.4363	1.5265	1.7964
Air Dry sub (kg)			1.7278	1.1642	1.2426	1.5258
Field Moist Total (kg)	0.6381	1.2478	2.6678	47.9340	29.2270	63.5730
Air Dry Total (kg)	0.2738	0.6523	1.7278	38.8535	23.7913	53.9993
Sieved sub (kg)	—		1.4223	0.8786	0.9314	1.0899
Sieved Total (kg)	—	0.5485	1.4223	29.3215	17.8332	38.5707
Sieved Oven Dry (kg)	—	0.5184	1.3605	28.6611	17.4952	37.9545
Rocks wt (kg)	0.0000	0.0000	0.0000	8.0290	4.1290	21.3680
Roots weight (kg)	0.0000	0.0000	0.0000	0.3913	0.0891	0.0660
Rock Vol (m3)	0.0000	0.0000	0.0000	0.0030	0.0016	0.0081
Root Vol (m3)	0.0000	0.0000	0.0000	0.0008	0.0002	0.0001
Total Horizon Vol (m3)	0.0066	0.0028	0.0036	0.0364	0.0248	0.0490
Soil Vol (m3)	0.0066	0.0028	0.0036	0.0326	0.0231	0.0408
Horizon Bulk Density (kg/m3)	41.7219	230.6298	482.8674	1192.6218	1029.7496	1323.9525
<2mm BD (kg/m3)		183.3069	380.2155	879.7629	757.2399	930.5672
Horizon Depth (m)	0.0263	0.0113	0.0143	0.1456	0.0994	0.1959
<2mm (kg/m2)		2.0737	5.4418	128.1155	75.2507	182.3330
C%		23.3854	16.2035	2.4812	1.3832	1.0680
C (kg/m2)		0.4849	0.8818	3.1788	1.0409	1.9473
N%		1.6744	1.1389	0.2203	0.1348	0.1287
N (kg/m2)		0.0347	0.0620	0.2823	0.1015	0.2346

Table A46

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
HMF - 150 yr woodlot	1226C	8/12/06	150	Woodlot

Horizon	**Oi**	**Oe**	**Oa**	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)			3.4378	1.2664	2.4363	1.8461
Air Dry sub (kg)			2.1453	1.0120	1.1916	1.5541
Field Moist Total (kg)	0.2883	0.7381	3.4378	32.1960	38.4950	155.1640
Air Dry Total (kg)	0.1341	0.3173	2.1453	25.7284	18.8272	130.6200
Sieved sub (kg)	—		1.5836	0.1136	0.8216	1.0811
Sieved Total (kg)	—	0.2423	1.5836	2.8875	12.9809	90.8655
Sieved Oven Dry (kg)	—	0.2241	1.5234	2.8256	12.7412	89.9115
Rocks wt (kg)	0.0000	0.0000	0.0000	7.1290	6.5790	32.4870
Roots weight (kg)	0.0000	0.0000	0.0000	0.2385	0.0595	0.1194
Rock Vol (m3)	0.0000	0.0000	0.0000	0.0027	0.0025	0.0123
Root Vol (m3)	0.0000	0.0000	0.0000	0.0005	0.0001	0.0002
Total Horizon Vol (m3)	0.0034	0.0027	0.0057	0.0271	0.0295	0.0938
Soil Vol (m3)	0.0034	0.0027	0.0057	0.0239	0.0269	0.0812
Horizon Bulk Density (kg/m3)	39.0022	119.4353	376.1657	1075.0263	699.1877	1607.6841
<2mm BD (kg/m3)		84.3602	267.1208	118.0623	473.1714	1106.6396
Horizon Depth (m)	0.0138	0.0106	0.0228	0.1084	0.1181	0.3750
<2mm (kg/m2)		0.8963	6.0937	12.8024	55.8934	414.9899
C%		35.7793	11.1465	3.8450	2.4015	1.4535
C (kg/m2)		0.3207	0.6792	0.4923	1.3423	6.0318
N%		2.2951	0.8306	0.3004	0.1873	0.1173
N (kg/m2)		0.0206	0.0506	0.0385	0.1047	0.4869

Table A47

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
HMF - Bienecke Stand	1226C	8/9/06	250	Native Forest

Horizon	**Oi**	**Oe**	**Oa**	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)			2.0058	1.4142	1.3447	2.3160
Air Dry sub (kg)			1.1832	1.1331	1.0486	1.9569
Field Moist Total (kg)	0.3579	0.4544	2.0058	32.4160	31.3160	146.9350
Air Dry Total (kg)	0.1961	0.2468	1.1832	25.9717	24.4198	124.1544
Sieved sub (kg)	—		0.9253	0.9441	0.8311	1.5624
Sieved Total (kg)	—	0.1672	0.9253	21.6401	19.3560	99.1253
Sieved Oven Dry (kg)	—	0.1593	0.9030	21.2718	19.1623	98.3811
Rocks wt (kg)	0.0000	0.0000	0.0000	16.5290	14.7580	22.5580
Roots weight (kg)	0.0000	0.0000	0.0000	0.2862	0.1019	1.2405
Rock Vol (m3)	0.0000	0.0000	0.0000	0.0062	0.0056	0.0085
Root Vol (m3)	0.0000	0.0000	0.0000	0.0006	0.0002	0.0025
Total Horizon Vol (m3)	0.0032	0.0008	0.0024	0.0299	0.0275	0.0802
Soil Vol (m3)	0.0032	0.0008	0.0024	0.0231	0.0217	0.0691
Horizon Bulk Density (kg/m3)	61.2277	315.9168	488.5636	1124.2770	1124.1361	1796.3855
<2mm BD (kg/m3)		203.8655	372.8698	920.8259	882.1136	1423.4731
Horizon Depth (m)	0.0128	0.0031	0.0097	0.1197	0.1100	0.3206
<2mm (kg/m2)		0.6371	3.6122	110.2113	97.0325	456.4011
C%		20.4535	8.8368	3.1542	1.4858	0.5997
C (kg/m2)		0.1303	0.3192	3.4763	1.4417	2.7371
N%		1.2679	0.6185	0.2102	0.0943	0.0603
N (kg/m2)		0.0081	0.0223	0.2317	0.0915	0.2750

Table A48

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
HMF - Bienecke Stand	0942C	8/11/06	250	Native Forest

Horizon	**Oi**	**Oe**	**Oa**	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)			2.8565	1.4861	1.7162	2.0158
Air Dry sub (kg)			1.9919	1.1557	1.3730	1.6483
Field Moist Total (kg)	0.4073	0.7269	2.8565	34.5660	30.8660	222.3090
Air Dry Total (kg)	0.2794	0.4855	1.9919	26.8809	24.6936	181.7846
Sieved sub (kg)	—		1.1960	0.7477	0.8592	1.0416
Sieved Total (kg)	—	0.2467	1.1960	17.3912	15.4532	114.8722
Sieved Oven Dry (kg)	—	0.2377	1.1655	17.1043	15.2908	113.9569
Rocks wt (kg)	0.0000	0.0000	0.0000	11.8290	15.3290	68.4030
Roots weight (kg)	0.0000	0.0000	0.0000	0.1614	0.0847	0.2179
Rock Vol (m3)	0.0000	0.0000	0.0000	0.0045	0.0058	0.0258
Root Vol (m3)	0.0000	0.0000	0.0000	0.0003	0.0002	0.0004
Total Horizon Vol (m3)	0.0045	0.0010	0.0045	0.0275	0.0254	0.1303
Soil Vol (m3)	0.0045	0.0010	0.0045	0.0227	0.0194	0.1041
Horizon Bulk Density (kg/m3)	62.7335	478.0012	447.3016	1183.8198	1270.6762	1746.9938
<2mm BD (kg/m3)		234.0790	261.7214	753.2646	786.8305	1095.1533
Horizon Depth (m)	0.0178	0.0041	0.0178	0.1100	0.1016	0.5213
<2mm (kg/m2)		0.9509	4.6619	82.8591	79.9125	570.8486
C%		15.7430	6.9844	2.9493	1.2433	0.7260
C (kg/m2)		0.1497	0.3256	2.4437	0.9936	4.1444
N%		1.0842	0.5651	0.2420	0.0894	0.0570
N (kg/m2)		0.0103	0.0263	0.2005	0.0715	0.3254

Table A49

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
HMF - Bienecke Stand	1042B	8/10/06	250	Native Forest

Horizon	Oi	Oe	Oa	0-10 cm	10-20 cm	20+ cm
Field moist sub (kg)			1.5572	1.2361	1.6361	2.4660
Air Dry sub (kg)			1.0842	1.0676	1.3470	2.0796
Field Moist Total (kg)	0.3629	0.6074	1.5572	40.3450	50.6740	162.7930
Air Dry Total (kg)	0.2403	0.3942	1.0842	34.8455	41.7179	137.2885
Sieved sub (kg)	—		0.8774	0.8577	1.0912	1.6131
Sieved Total (kg)	—	0.3457	0.8774	27.9919	33.7972	106.4894
Sieved Oven Dry (kg)	—	0.3348	0.8630	27.7848	33.6689	106.0160
Rocks wt (kg)	0.0000	0.0000	0.0000	1.8290	2.5290	10.0290
Roots weight (kg)	0.0000	0.0000	0.0000	0.3312	0.1028	0.5707
Rock Vol (m3)	0.0000	0.0000	0.0000	0.0007	0.0010	0.0038
Root Vol (m3)	0.0000	0.0000	0.0000	0.0007	0.0002	0.0012
Total Horizon Vol (m3)	0.0019	0.0022	0.0016	0.0301	0.0340	0.0883
Soil Vol (m3)	0.0019	0.0022	0.0016	0.0287	0.0328	0.0833
Horizon Bulk Density (kg/m3)	128.1813	180.1920	660.8335	1213.6066	1271.0956	1647.4753
<2mm BD (kg/m3)		153.0730	526.0094	967.6941	1025.8516	1272.2025
Horizon Depth (m)	0.0075	0.0088	0.0066	0.1203	0.1359	0.3531
<2mm (kg/m2)		1.3394	3.4519	116.4257	139.4517	449.2465
C%		17.2860	7.9892	1.7050	0.7408	0.5175
C (kg/m2)		0.2315	0.2758	1.9850	1.0330	2.3250
N%		1.1881	0.6225	0.1353	0.0697	0.0538
N (kg/m2)		0.0159	0.0215	0.1576	0.0972	0.2416

Table A50

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
HMF - Diana's Bath	1118A	7/28/06	250	Native Forest

Horizon	**Oi**	**Oe**	**Oa**	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)			2.2441	1.0158	0.7161	2.2205
Air Dry sub (kg)			1.1464	0.7613	0.5047	1.7879
Field Moist Total (kg)	0.6213	0.8209	2.2441	23.7870	24.2870	256.9250
Air Dry Total (kg)	0.2489	0.3665	1.1464	17.8275	17.1175	206.8690
Sieved sub (kg)	—		0.9499	0.5748	0.3884	1.2791
Sieved Total (kg)	—	0.3070	0.9499	13.4617	13.1709	148.0008
Sieved Oven Dry (kg)	—	0.2856	0.9126	13.2867	13.0121	146.5927
Rocks wt (kg)	0.0000	0.0000	0.0000	19.7580	44.9370	132.1480
Roots weight (kg)	0.0000	0.0000	0.0000	0.1942	0.0567	0.0305
Rock Vol (m3)	0.0000	0.0000	0.0000	0.0075	0.0170	0.0499
Root Vol (m3)	0.0000	0.0000	0.0000	0.0004	0.0001	0.0001
Total Horizon Vol (m3)	0.0032	0.0016	0.0043	0.0314	0.0334	0.1388
Soil Vol (m3)	0.0032	0.0016	0.0043	0.0236	0.0163	0.0889
Horizon Bulk Density (kg/m3)	77.7116	234.5728	266.7985	756.8712	1051.0402	2327.0208
<2mm BD (kg/m3)		182.7667	212.3900	564.0887	798.9602	1648.9863
Horizon Depth (m)	0.0128	0.0063	0.0172	0.1256	0.1334	0.5553
<2mm (kg/m2)		1.1423	3.6505	70.8636	106.6112	915.7027
C%		45.2551	27.5676	6.1193	2.5877	1.6970
C (kg/m2)		0.5169	1.0063	4.3363	2.7588	15.5396
N%		1.7743	0.9346	0.2426	0.1252	0.1071
N (kg/m2)		0.0203	0.0341	0.1719	0.1335	0.9807

Table A51

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
HMF - Diana's Bath	1118B	7/27/06	250	Native Forest

Horizon	Oi	Oe	Oa	0-10 cm	10-20 cm	20+ cm
Field moist sub (kg)			1.6213	0.9168	1.0168	1.0161
Air Dry sub (kg)			0.8053	0.6100	0.6944	0.7696
Field Moist Total (kg)	0.3214	1.9429	1.6213	44.7740	38.3160	119.9480
Air Dry Total (kg)	0.1590	0.8511	0.8053	29.7914	26.1673	90.8419
Sieved sub (kg)	—		0.5478	0.4817	0.5214	0.5079
Sieved Total (kg)	—	0.5993	0.5478	23.5266	19.6477	59.9522
Sieved Oven Dry (kg)	—	0.5586	0.5240	23.1610	19.4420	59.3214
Rocks wt (kg)	0.0000	0.0000	0.0000	9.6290	8.6290	62.6450
Roots weight (kg)	0.0000	0.0000	0.0000	0.2609	0.2221	0.3101
Rock Vol (m3)	0.0000	0.0000	0.0000	0.0036	0.0033	0.0236
Root Vol (m3)	0.0000	0.0000	0.0000	0.0005	0.0005	0.0006
Total Horizon Vol (m3)	0.0059	0.0073	0.0012	0.0376	0.0242	0.0725
Soil Vol (m3)	0.0059	0.0073	0.0012	0.0334	0.0205	0.0482
Horizon Bulk Density (kg/m3)	26.7823	115.8890	687.1637	891.6295	1275.8604	1883.5970
<2mm BD (kg/m3)		76.0586	447.1704	693.1890	947.9506	1230.0228
Horizon Depth (m)	0.0238	0.0294	0.0047	0.1503	0.0969	0.2900
<2mm (kg/m2)		2.2342	2.0961	104.1950	91.8327	356.7066
C%		34.2551	17.4384	3.4304	1.8499	1.2988
C (kg/m2)		0.7653	0.3655	3.5743	1.6988	4.6329
N%		1.6070	0.9493	0.2013	0.1190	0.1046
N (kg/m2)		0.0359	0.0199	0.2098	0.1092	0.3730

Table A52

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
HMF - Diana's Bath	1118C	7/27/06	250	Native Forest

Horizon	Oi	Oe	Oa	0-10 cm	10-20 cm	20+ cm
Field moist sub (kg)			0.8212	0.8163	1.0163	1.1164
Air Dry sub (kg)			0.3079	0.4652	0.5897	0.7601
Field Moist Total (kg)	0.4214	2.5927	0.8212	28.6160	32.4870	45.3160
Air Dry Total (kg)	0.1992	0.7214	0.3079	16.3080	18.8497	30.8544
Sieved sub (kg)	—		0.1061	0.3156	0.4116	0.5075
Sieved Total (kg)	—	0.5030	0.1061	11.0642	13.1562	20.6013
Sieved Oven Dry (kg)	—	0.4690	0.1022	10.8153	12.8989	20.3444
Rocks wt (kg)	0.0000	0.0000	0.0000	12.0290	31.0870	17.7580
Roots weight (kg)	0.0000	0.0000	0.0000	-0.0080	0.2790	0.2218
Rock Vol (m3)	0.0000	0.0000	0.0000	0.0045	0.0117	0.0067
Root Vol (m3)	0.0000	0.0000	0.0000	0.0000	0.0006	0.0005
Total Horizon Vol (m3)	0.0029	0.0078	0.0006	0.0297	0.0305	0.0340
Soil Vol (m3)	0.0029	0.0078	0.0006	0.0252	0.0182	0.0268
Horizon Bulk Density (kg/m3)	68.9124	92.3418	492.6080	648.0546	1033.0383	1149.9601
<2mm BD (kg/m3)		60.0334	163.5915	429.7821	706.9120	758.2463
Horizon Depth (m)	0.0116	0.0313	0.0025	0.1188	0.1222	0.1359
<2mm (kg/m2)		1.8760	0.4090	51.0366	86.3758	103.0741
C%		38.3392	25.3220	6.8741	4.5298	1.8567
C (kg/m2)		0.7193	0.1036	3.5083	3.9126	1.9138
N%		1.5941	0.8230	0.2950	0.2074	0.1093
N (kg/m2)		0.0299	0.0034	0.1506	0.1792	0.1127

Table A53

Site Name	Plot #	Date Sampled	Age (yr)	Use
Win's Farm	100	5/23/07	0	Plowed Field

Horizon	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)	0.4070	0.4568	3.9070
Air Dry sub (kg)	0.2714	0.3557	3.2345
Field Moist Total (kg)	22.6160	23.8290	164.7590
Air Dry Total (kg)	15.0840	18.5551	136.3985
Sieved sub (kg)	0.2340	0.3126	2.9168
Sieved Total (kg)	13.0039	16.3068	123.0035
Sieved Oven Dry (kg)	12.8187	16.0976	122.0469
Rocks wt (kg)	2.6290	3.2290	10.2290
Roots weight (kg)	0.0000	0.0000	0.0000
Rock Vol (m3)	0.0010	0.0012	0.0039
Root Vol (m3)	0.0000	0.0000	0.0000
Total Horizon Vol (m3)	0.0294	0.0231	0.1252
Soil Vol (m3)	0.0284	0.0219	0.1214
Horizon Bulk Density (kg/m3)	531.4464	847.0136	1123.7837
<2mm BD (kg/m3)	451.6349	734.8332	1005.5411
Horizon Depth (m)	0.1175	0.0925	0.5009
<2mm (kg/m2)	53.0671	67.9721	503.7132
C%	3.3358	3.5858	0.8975
C (kg/m2)	1.7702	2.4374	4.5207
N%	0.3317	0.3232	0.0963
N (kg/m2)	0.1760	0.2197	0.4851

Table A54

Site Name	Plot #	Date Sampled	Age (yr)	Use
Win's Farm	101	5/23/07	0	Plowed Field

Horizon	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)	0.8074	1.1070	2.3070
Air Dry sub (kg)	0.5996	0.8223	1.8392
Field Moist Total (kg)	29.0160	29.3160	198.7460
Air Dry Total (kg)	21.5457	21.7759	158.4463
Sieved sub (kg)	0.5434	0.7931	1.2516
Sieved Total (kg)	19.5272	21.0026	107.8242
Sieved Oven Dry (kg)	19.2930	20.7641	107.1288
Rocks wt (kg)	2.2090	1.8290	6.6290
Roots weight (kg)	0.0000	0.0000	0.0000
Rock Vol (m3)	0.0008	0.0007	0.0025
Root Vol (m3)	0.0000	0.0000	0.0000
Total Horizon Vol (m3)	0.0270	0.0249	0.1068
Soil Vol (m3)	0.0261	0.0242	0.1043
Horizon Bulk Density (kg/m3)	824.8869	898.6554	1519.2076
<2mm BD (kg/m3)	738.6435	856.8970	1027.1674
Horizon Depth (m)	0.1078	0.0997	0.4272
<2mm (kg/m2)	79.6350	85.4219	438.7931
C%	2.4572	2.2425	0.7065
C (kg/m2)	1.9568	1.9156	3.1001
N%	0.2397	0.2251	0.0818
N (kg/m2)	0.1909	0.1923	0.3590

Table A55

Site Name	Plot #	Date Sampled	Age (yr)	Use
Win's Farm	102	5/24/07	0	Plowed Field

Horizon	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)	0.8079	1.4982	3.3781
Air Dry sub (kg)	0.5917	1.1855	2.7562
Field Moist Total (kg)	30.4160	32.0450	117.0350
Air Dry Total (kg)	22.2757	25.3561	95.4911
Sieved sub (kg)	0.5440	1.0630	2.7052
Sieved Total (kg)	20.4806	22.7359	93.7235
Sieved Oven Dry (kg)	20.2727	22.5049	93.0569
Rocks wt (kg)	6.1290	1.0290	3.8790
Roots weight (kg)	0.0000	0.0000	0.0000
Rock Vol (m3)	0.0023	0.0004	0.0015
Root Vol (m3)	0.0000	0.0000	0.0000
Total Horizon Vol (m3)	0.0261	0.0234	0.0811
Soil Vol (m3)	0.0238	0.0230	0.0796
Horizon Bulk Density (kg/m3)	936.7048	1100.0844	1199.1852
<2mm BD (kg/m3)	852.4757	976.3862	1168.6165
Horizon Depth (m)	0.1044	0.0938	0.3244
<2mm (kg/m2)	88.9771	91.5362	379.0700
C%	1.9786	1.9317	0.2723
C (kg/m2)	1.7605	1.7682	1.0322
N%	0.2075	0.1942	0.0460
N (kg/m2)	0.1846	0.1777	0.1743

Table A56

Site Name	Plot #	Date Sampled	Age (yr)	Use
Lasso	119	6/5/07	0	Plowed Field

Horizon	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)	1.7082	2.1092	3.4071
Air Dry sub (kg)	1.1986	1.5870	2.8688
Field Moist Total (kg)	34.3160	46.8740	258.8330
Air Dry Total (kg)	24.0787	35.2677	217.9342
Sieved sub (kg)	1.1370	1.4617	2.7596
Sieved Total (kg)	22.8400	32.4833	209.6438
Sieved Oven Dry (kg)	22.6645	32.2789	209.2054
Rocks wt (kg)	1.2290	1.7290	15.0580
Roots weight (kg)	0.0920	0.0090	0.0000
Rock Vol (m3)	0.0005	0.0007	0.0057
Root Vol (m3)	0.0002	0.0000	0.0000
Total Horizon Vol (m3)	0.0242	0.0223	0.1198
Soil Vol (m3)	0.0236	0.0216	0.1142
Horizon Bulk Density (kg/m3)	1021.6988	1633.1470	1908.9994
<2mm BD (kg/m3)	961.6898	1494.7475	1832.5392
Horizon Depth (m)	0.0969	0.0891	0.4794
<2mm (kg/m2)	93.1637	133.1259	878.4735
C%	1.7500	1.1948	0.1942
C (kg/m2)	1.6304	1.5906	1.7060
N%	0.1782	0.1251	0.0281
N (kg/m2)	0.1660	0.1666	0.2467

Table A57

Site Name	Plot #	Date Sampled	Age (yr)	Use
Lasso	120	6/5/07	0	Plowed Field

Horizon	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)	1.7097	1.5184	2.7082
Air Dry sub (kg)	1.2088	1.1667	2.2646
Field Moist Total (kg)	33.9660	40.1160	224.0880
Air Dry Total (kg)	24.0152	30.8241	187.3858
Sieved sub (kg)	1.1384	1.1312	2.2015
Sieved Total (kg)	22.6165	29.8861	182.1580
Sieved Oven Dry (kg)	22.4568	29.6581	182.1316
Rocks wt (kg)	0.8290	1.7290	12.1580
Roots weight (kg)	0.0485	0.0024	0.0000
Rock Vol (m3)	0.0003	0.0007	0.0046
Root Vol (m3)	0.0001	0.0000	0.0000
Total Horizon Vol (m3)	0.0249	0.0255	0.1302
Soil Vol (m3)	0.0245	0.0249	0.1256
Horizon Bulk Density (kg/m3)	979.8030	1238.4307	1492.3017
<2mm BD (kg/m3)	916.2245	1191.5855	1450.4578
Horizon Depth (m)	0.0997	0.1022	0.5206
<2mm (kg/m2)	91.3361	121.7651	755.1446
C%	1.9772	1.3723	0.4114
C (kg/m2)	1.8059	1.6710	3.1066
N%	0.2000	0.1363	0.0441
N (kg/m2)	0.1827	0.1660	0.3332

Table A58

Site Name	Plot #	Date Sampled	Age (yr)	Use
Lasso	121	6/5/07	0	Plowed Field

Horizon	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)	1.2259	1.8075	3.4077
Air Dry sub (kg)	0.9044	1.3761	2.8822
Field Moist Total (kg)	33.6160	39.2450	173.5640
Air Dry Total (kg)	24.7997	29.8778	146.8024
Sieved sub (kg)	0.8766	1.3355	2.7925
Sieved Total (kg)	24.0382	28.9978	142.2322
Sieved Oven Dry (kg)	23.8299	28.7974	141.7875
Rocks wt (kg)	0.9490	2.0290	13.7290
Roots weight (kg)	0.2686	0.0039	0.0000
Rock Vol (m3)	0.0004	0.0008	0.0052
Root Vol (m3)	0.0005	0.0000	0.0000
Total Horizon Vol (m3)	0.0242	0.0255	0.1059
Soil Vol (m3)	0.0233	0.0247	0.1007
Horizon Bulk Density (kg/m3)	1063.7793	1209.8627	1458.1293
<2mm BD (kg/m3)	1022.1803	1166.1137	1408.3180
Horizon Depth (m)	0.0969	0.1019	0.4234
<2mm (kg/m2)	99.0237	118.7978	596.3347
C%	1.9969	1.5158	0.1090
C (kg/m2)	1.9774	1.8007	0.6503
N%	0.1829	0.1493	0.0223
N (kg/m2)	0.1811	0.1774	0.1331

Table A59

Site Name	Plot #	Date Sampled	Age (yr)	Use
Olsen's Turnip Farm	140	6/13/07	0	Plowed Field

Horizon	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)	1.3081	1.6585	2.7067
Air Dry sub (kg)	0.8555	1.1664	1.8765
Field Moist Total (kg)	31.9250	34.2660	105.9900
Air Dry Total (kg)	20.8802	24.0980	73.4787
Sieved sub (kg)	0.7641	1.0507	1.5052
Sieved Total (kg)	18.6488	21.7082	58.9394
Sieved Oven Dry (kg)	18.5310	21.5806	58.6164
Rocks wt (kg)	1.8290	4.5290	20.6160
Roots weight (kg)	0.0000	0.0052	0.0000
Rock Vol (m3)	0.0007	0.0017	0.0078
Root Vol (m3)	0.0000	0.0000	0.0000
Total Horizon Vol (m3)	0.0259	0.0235	0.0820
Soil Vol (m3)	0.0252	0.0218	0.0742
Horizon Bulk Density (kg/m3)	829.5947	1105.6134	990.6330
<2mm BD (kg/m3)	736.2586	990.1172	790.2607
Horizon Depth (m)	0.1034	0.0941	0.3278
<2mm (kg/m2)	76.1567	93.1329	259.0573
C%	3.5509	2.6774	1.2389
C (kg/m2)	2.7042	2.4935	3.2095
N%	0.2321	0.1890	0.0738
N (kg/m2)	0.1768	0.1760	0.1911

Table A60

Site Name	Plot #	Date Sampled	Age (yr)	Use
Olsen's Turnip Farm	141	6/13/07	0	Plowed Field

Horizon	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)	2.2081	2.2086	2.4090
Air Dry sub (kg)	1.5008	1.4910	1.8960
Field Moist Total (kg)	41.0450	33.5450	132.6770
Air Dry Total (kg)	27.8960	22.6458	104.4210
Sieved sub (kg)	1.3582	1.2663	1.5891
Sieved Total (kg)	25.2470	19.2326	87.5222
Sieved Oven Dry (kg)	24.9957	19.1584	86.7572
Rocks wt (kg)	4.1290	3.4290	8.7290
Roots weight (kg)	0.2404	0.0000	0.0000
Rock Vol (m3)	0.0016	0.0013	0.0033
Root Vol (m3)	0.0005	0.0000	0.0000
Total Horizon Vol (m3)	0.0315	0.0238	0.0745
Soil Vol (m3)	0.0294	0.0225	0.0712
Horizon Bulk Density (kg/m3)	947.6856	1004.9536	1465.8200
<2mm BD (kg/m3)	849.1568	850.1957	1217.8616
Horizon Depth (m)	0.1259	0.0953	0.2981
<2mm (kg/m2)	106.9407	81.0343	363.0750
C%	3.2048	1.7971	0.6340
C (kg/m2)	3.4272	1.4563	2.3021
N%	0.1808	0.1065	0.0357
N (kg/m2)	0.1933	0.0863	0.1295

Table A61

Site Name	Plot #	Date Sampled	Age (yr)	Use
Olsen's Turnip Farm	142	6/13/07	0	Plowed Field

Horizon	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)	1.7087	1.8081	2.8074
Air Dry sub (kg)	0.9249	1.3211	1.5882
Field Moist Total (kg)	31.9160	43.9450	141.6350
Air Dry Total (kg)	17.2754	32.1082	80.1247
Sieved sub (kg)	0.8578	1.2341	1.5667
Sieved Total (kg)	16.0217	29.9935	79.0415
Sieved Oven Dry (kg)	15.7160	29.3309	77.7376
Rocks wt (kg)	2.0290	1.8290	11.8290
Roots weight (kg)	0.0658	0.0000	0.0449
Rock Vol (m3)	0.0008	0.0007	0.0045
Root Vol (m3)	0.0001	0.0000	0.0001
Total Horizon Vol (m3)	0.0241	0.0266	0.0856
Soil Vol (m3)	0.0232	0.0260	0.0811
Horizon Bulk Density (kg/m3)	745.8276	1237.2881	988.3448
<2mm BD (kg/m3)	678.5066	1130.2676	958.9003
Horizon Depth (m)	0.0963	0.1066	0.3425
<2mm (kg/m2)	65.3063	120.4441	328.4234
C%	3.4578	2.7597	1.4627
C (kg/m2)	2.2582	3.3239	4.8039
N%	0.1978	0.1903	0.0810
N (kg/m2)	0.1292	0.2292	0.2661

Table A62

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
Mt. Everett Access	131	6/9/07	40	Cultivation

Horizon	**Oi**	**Oe**	**Oa**	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)			2.5077	1.7066	2.9049	4.5072
Air Dry sub (kg)			1.0334	1.2600	1.2622	3.7742
Field Moist Total (kg)	0.3079	2.6158	2.5077	25.5870	37.3160	164.9350
Air Dry Total (kg)	0.1742	0.8127	1.0334	18.8909	16.2145	138.1117
Sieved sub (kg)	—		0.7134	0.8514	0.9840	2.9509
Sieved Total (kg)	—	0.6534	0.7134	12.7658	12.6409	107.9815
Sieved Oven Dry (kg)	—	0.6251	0.6930	12.7658	12.6095	107.8918
Rocks wt (kg)	0.0000	0.0000	0.0000	5.7290	8.8290	24.6580
Roots weight (kg)	0.0000	0.0000	0.0000	0.1510	0.1267	0.1750
Rock Vol (m3)	0.0000	0.0000	0.0000	0.0022	0.0033	0.0093
Root Vol (m3)	0.0000	0.0000	0.0000	0.0003	0.0003	0.0004
Total Horizon Vol (m3)	0.0050	0.0059	0.0050	0.0231	0.0263	0.0937
Soil Vol (m3)	0.0050	0.0059	0.0050	0.0207	0.0227	0.0840
Horizon Bulk Density (kg/m3)	34.8460	138.6940	206.6700	914.5853	715.5590	1643.9897
<2mm BD (kg/m3)		106.6831	138.6028	618.0447	556.4666	1284.2723
Horizon Depth (m)	0.0200	0.0234	0.0200	0.0925	0.1050	0.4797
<2mm (kg/m2)		2.5004	2.7721	57.1691	58.4290	616.0494
C%		45.3069	37.9996	4.6661	2.2099	0.5397
C (kg/m2)		1.1328	1.0534	2.6676	1.2912	3.3251
N%		2.1097	1.9215	0.3158	0.1826	0.0603
N (kg/m2)		0.0528	0.0533	0.1805	0.1067	0.3714

Table A63

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
Mt. Everett Access	132	6/9/07	40	Cultivation

Horizon	**Oi**	**Oe**	**Oa**	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)			1.3072	1.6073	1.6575	3.5076
Air Dry sub (kg)			0.6605	1.1960	1.3214	2.7584
Field Moist Total (kg)	0.3074	0.5166	1.3072	27.7660	31.4160	99.3900
Air Dry Total (kg)	0.1781	0.1972	0.6605	20.6603	25.0457	78.1611
Sieved sub (kg)	—		0.4584	0.9208	0.9931	1.8450
Sieved Total (kg)	—	0.1758	0.4584	15.9065	18.8231	52.2781
Sieved Oven Dry (kg)	—	0.1679	0.4519	15.8433	18.7755	52.2616
Rocks wt (kg)	0.0000	0.0000	0.0000	7.0290	5.7790	13.9580
Roots weight (kg)	0.0000	0.0000	0.0000	0.3895	0.0935	0.0209
Rock Vol (m3)	0.0000	0.0000	0.0000	0.0027	0.0022	0.0053
Root Vol (m3)	0.0000	0.0000	0.0000	0.0008	0.0002	0.0000
Total Horizon Vol (m3)	0.0055	0.0038	0.0023	0.0263	0.0244	0.0565
Soil Vol (m3)	0.0055	0.0038	0.0023	0.0229	0.0220	0.0512
Horizon Bulk Density (kg/m3)	32.0992	52.5813	291.5222	902.9405	1138.2577	1527.3403
<2mm BD (kg/m3)		44.7797	199.4742	692.4193	853.2930	1021.2407
Horizon Depth (m)	0.0222	0.0150	0.0091	0.1053	0.0975	0.2259
<2mm (kg/m2)		0.6717	1.8077	72.9204	83.1961	230.7366
C%		45.9381	27.5408	3.2720	1.9481	0.4213
C (kg/m2)		0.3086	0.4979	2.3860	1.6207	0.9721
N%		2.3205	1.5576	0.2407	0.1424	0.0581
N (kg/m2)		0.0156	0.0282	0.1755	0.1185	0.1340

Table A64

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
Mt. Everett Access	133	6/9/07	40	Cultivation

Horizon	**Oi**	**Oe**	**Oa**	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)			2.0577	1.2477	2.3575	3.7079
Air Dry sub (kg)			1.2611	0.9294	1.8787	3.1588
Field Moist Total (kg)	0.3283	1.0523	2.0577	31.3160	40.6245	184.8715
Air Dry Total (kg)	0.1925	0.4183	1.2611	23.3270	32.3738	157.4930
Sieved sub (kg)	—		0.7635	0.7344	1.3303	2.8873
Sieved Total (kg)	—	0.3225	0.7635	18.4337	22.9240	143.9567
Sieved Oven Dry (kg)	—	0.1922	0.7556	18.3350	22.8593	143.9228
Rocks wt (kg)	0.0000	0.0000	0.0000	4.4790	5.1428	18.3942
Roots weight (kg)	0.0000	0.0000	0.0000	0.2613	0.0641	0.0371
Rock Vol (m3)	0.0000	0.0000	0.0000	0.0017	0.0019	0.0069
Root Vol (m3)	0.0000	0.0000	0.0000	0.0005	0.0001	0.0001
Total Horizon Vol (m3)	0.0056	0.0024	0.0030	0.0243	0.0336	0.1062
Soil Vol (m3)	0.0056	0.0024	0.0030	0.0221	0.0315	0.0992
Horizon Bulk Density (kg/m3)	34.2133	172.7215	413.8929	1056.7768	1027.0082	1588.3514
<2mm BD (kg/m3)		79.3687	248.0013	830.6249	725.1763	1451.4935
Horizon Depth (m)	0.0225	0.0097	0.0122	0.0972	0.1344	0.4247
<2mm (kg/m2)		0.7689	3.0225	80.7264	97.4456	616.4312
C%		34.2066	18.0077	4.5036	2.2694	0.3530
C (kg/m2)		0.2630	0.5443	3.6356	2.2114	2.1761
N%		1.9789	1.0656	0.3067	0.1601	0.0557
N (kg/m2)		0.0152	0.0322	0.2476	0.1561	0.3431

Table A65

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
Cheshire Harbor Trail	109	5/28/07	60	Cultivation

Horizon	**Oi**	**Oe**	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)			1.1070	1.0275	3.0575
Air Dry sub (kg)			0.8959	0.7910	2.3762
Field Moist Total (kg)	0.3578	1.6572	20.6160	34.2240	149.5510
Air Dry Total (kg)	0.1974	0.8513	16.6849	26.3477	116.2287
Sieved sub (kg)	—		0.8483	0.7448	2.3235
Sieved Total (kg)	—	0.8102	15.7977	24.8092	113.6514
Sieved Oven Dry (kg)	—	0.7780	15.6046	24.6533	112.6033
Rocks wt (kg)	0.0000	0.0000	4.1290	0.9290	31.2870
Roots weight (kg)	0.0000	0.0000	0.1878	0.2476	0.5106
Rock Vol (m3)	0.0000	0.0000	0.0016	0.0004	0.0118
Root Vol (m3)	0.0000	0.0000	0.0004	0.0005	0.0010
Total Horizon Vol (m3)	0.0055	0.0042	0.0242	0.0284	0.1451
Soil Vol (m3)	0.0055	0.0042	0.0223	0.0276	0.1322
Horizon Bulk Density (kg/m3)	35.5840	201.7944	748.9572	955.2545	878.9873
<2mm BD (kg/m3)		184.4039	700.4628	893.8250	851.5701
Horizon Depth (m)	0.0222	0.0169	0.0969	0.1138	0.5803
<2mm (kg/m2)		3.1118	67.8573	101.6726	494.1768
C%		18.1447	4.4569	2.5938	0.7197
C (kg/m2)		0.5646	3.0243	2.6372	3.5565
N%		1.2516	0.3880	0.2510	0.0759
N (kg/m2)		0.0389	0.2633	0.2552	0.3751

Table A66

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
Cheshire Harbor Trail	110	5/29/07	60	Cultivation

Horizon	**Oi**	**Oe**	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)			0.9071	1.5073	2.6073
Air Dry sub (kg)			0.6556	1.1516	2.0642
Field Moist Total (kg)	0.3671	1.4273	25.4160	37.6450	135.3350
Air Dry Total (kg)	0.1904	0.6637	18.3698	28.7612	107.1451
Sieved sub (kg)	—		0.5707	1.0003	1.7604
Sieved Total (kg)	—	0.6045	15.9914	24.9827	91.3725
Sieved Oven Dry (kg)	—	0.5650	15.7084	24.6853	90.8647
Rocks wt (kg)	0.0000	0.0000	1.1290	1.8290	4.1290
Roots weight (kg)	0.0000	0.0000	0.0766	0.2445	0.3189
Rock Vol (m3)	0.0000	0.0000	0.0004	0.0007	0.0016
Root Vol (m3)	0.0000	0.0000	0.0002	0.0005	0.0007
Total Horizon Vol (m3)	0.0048	0.0034	0.0240	0.0289	0.0968
Soil Vol (m3)	0.0048	0.0034	0.0234	0.0277	0.0946
Horizon Bulk Density (kg/m3)	39.3084	197.5695	784.9612	1037.6562	1132.7516
<2mm BD (kg/m3)		168.1798	671.2369	890.6043	960.6336
Horizon Depth (m)	0.0194	0.0134	0.0959	0.1156	0.3872
<2mm (kg/m2)		2.2599	64.3968	102.9761	371.9453
C%		23.8055	3.5715	2.5460	0.7021
C (kg/m2)		0.5380	2.3000	2.6218	2.6113
N%		1.4122	0.2919	0.2243	0.0641
N (kg/m2)		0.0319	0.1880	0.2310	0.2383

Table A67

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
Cheshire Harbor Trail	111	5/30/07	60	Cultivation

Horizon	**Oi**	**Oe**	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)			1.1075	1.4077	3.0076
Air Dry sub (kg)			0.7595	1.0814	2.3707
Field Moist Total (kg)	0.3076	1.7070	18.1160	32.9950	182.6170
Air Dry Total (kg)	0.2066	0.9625	12.4230	25.3469	143.9485
Sieved sub (kg)	—		0.6819	0.9579	2.2177
Sieved Total (kg)	—	0.8852	11.1541	22.4530	134.6548
Sieved Oven Dry (kg)	—	0.8353	10.9076	22.0329	132.8390
Rocks wt (kg)	0.0000	0.0000	0.5290	1.8290	2.9290
Roots weight (kg)	0.0000	0.0000	0.2309	0.1457	0.3632
Rock Vol (m3)	0.0000	0.0000	0.0002	0.0007	0.0011
Root Vol (m3)	0.0000	0.0000	0.0005	0.0003	0.0007
Total Horizon Vol (m3)	0.0040	0.0059	0.0228	0.0258	0.1305
Soil Vol (m3)	0.0040	0.0059	0.0221	0.0248	0.1286
Horizon Bulk Density (kg/m3)	51.8425	164.2615	561.0640	1022.3052	1119.1544
<2mm BD (kg/m3)		142.5527	492.6236	888.6454	1032.7815
Horizon Depth (m)	0.0159	0.0234	0.0913	0.1031	0.5219
<2mm (kg/m2)		3.3411	44.9519	91.6416	538.9828
C%		14.8554	6.0028	2.3133	0.9107
C (kg/m2)		0.4963	2.6984	2.1199	4.9088
N%		0.9743	0.4751	0.2274	0.1000
N (kg/m2)		0.0326	0.2136	0.2084	0.5388

Table A68

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
Raycroft	149	6/16/07	100	Cultivation

Horizon	**Oi**	**Oe**	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)			1.4067	1.6583	2.8070
Air Dry sub (kg)			0.9431	1.3379	2.2628
Field Moist Total (kg)	0.4026	1.1583	26.1160	36.3660	166.2930
Air Dry Total (kg)	0.1946	0.5377	17.5097	29.3403	134.0485
Sieved sub (kg)	—		0.8691	0.9887	1.6873
Sieved Total (kg)	—	0.4309	16.1355	21.6811	99.9598
Sieved Oven Dry (kg)	—	0.4028	15.7571	21.4323	99.0763
Rocks wt (kg)	0.0000	0.0000	2.7790	9.2790	64.5820
Roots weight (kg)	0.0000	0.0000	0.1304	0.0380	0.1394
Rock Vol (m3)	0.0000	0.0000	0.0010	0.0035	0.0244
Root Vol (m3)	0.0000	0.0000	0.0003	0.0001	0.0003
Total Horizon Vol (m3)	0.0049	0.0030	0.0252	0.0259	0.1294
Soil Vol (m3)	0.0049	0.0030	0.0238	0.0224	0.1047
Horizon Bulk Density (kg/m3)	39.5459	181.1133	734.4207	1312.2633	1280.0636
<2mm BD (kg/m3)		135.6821	660.9080	958.5698	946.1052
Horizon Depth (m)	0.0197	0.0119	0.1006	0.1038	0.5175
<2mm (kg/m2)		1.6112	66.5039	99.4516	489.6095
C%		18.4285	3.8877	2.8346	0.9423
C (kg/m2)		0.2969	2.5854	2.8190	4.6134
N%		1.2065	0.2811	0.2126	0.0711
N (kg/m2)		0.0194	0.1870	0.2114	0.3482

Table A69

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
Raycroft	150	6/16/07	100	Cultivation

Horizon	**Oi**	**Oe**	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)			1.2093	1.2577	3.0089
Air Dry sub (kg)			0.7174	0.9367	2.5330
Field Moist Total (kg)	1.5078	2.3177	12.7870	22.6870	90.1610
Air Dry Total (kg)	0.2176	1.1258	7.5860	16.8977	75.9014
Sieved sub (kg)	—		0.6905	0.7646	1.8378
Sieved Total (kg)	—	0.9752	7.3013	13.7930	55.0708
Sieved Oven Dry (kg)	—	0.9108	7.0717	13.5763	54.5707
Rocks wt (kg)	0.0000	0.0000	2.1290	7.2290	36.0870
Roots weight (kg)	0.0000	0.0000	0.0647	0.0654	0.0533
Rock Vol (m3)	0.0000	0.0000	0.0008	0.0027	0.0136
Root Vol (m3)	0.0000	0.0000	0.0001	0.0001	0.0001
Total Horizon Vol (m3)	0.0070	0.0052	0.0209	0.0278	0.0802
Soil Vol (m3)	0.0070	0.0052	0.0199	0.0250	0.0664
Horizon Bulk Density (kg/m3)	31.2996	215.0687	380.7474	677.2312	1142.5819
<2mm BD (kg/m3)		174.0112	354.9334	544.1146	821.4805
Horizon Depth (m)	0.0278	0.0209	0.0834	0.1113	0.3206
<2mm (kg/m2)		3.6434	29.6148	60.5327	263.3872
C%		22.4066	8.8762	4.2470	1.9201
C (kg/m2)		0.8164	2.6287	2.5708	5.0572
N%		1.5580	0.7662	0.3733	0.1725
N (kg/m2)		0.0568	0.2269	0.2260	0.4543

Table A70

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
Raycroft	151	6/16/07	100	Cultivation

Horizon	Oi	Oe	Oa	0-10 cm	10-20 cm	20+ cm
Field moist sub (kg)			4.1618	0.9154	0.9073	2.6065
Air Dry sub (kg)			2.6382	0.6540	0.6825	2.0909
Field Moist Total (kg)	0.3077	0.3663	4.1618	26.1660	26.8660	157.7640
Air Dry Total (kg)	0.1441	0.1473	2.6382	18.6932	20.2071	126.5580
Sieved sub (kg)	—		2.1041	0.5399	0.5355	1.6570
Sieved Total (kg)	—	0.1077	2.1041	15.4321	15.8545	100.2930
Sieved Oven Dry (kg)	—	0.1007	2.0300	15.0611	15.5485	99.5842
Rocks wt (kg)	0.0000	0.0000	0.0000	7.6290	6.2790	31.1870
Roots weight (kg)	0.0000	0.0000	0.0000	0.1582	0.0448	0.1050
Rock Vol (m3)	0.0000	0.0000	0.0000	0.0029	0.0024	0.0118
Root Vol (m3)	0.0000	0.0000	0.0000	0.0003	0.0001	0.0002
Total Horizon Vol (m3)	0.0063	0.0018	0.0086	0.0216	0.0247	0.1099
Soil Vol (m3)	0.0063	0.0018	0.0086	0.0184	0.0222	0.0979
Horizon Bulk Density (kg/m3)	23.0592	81.9701	306.9871	1018.0912	909.1325	1292.2134
<2mm BD (kg/m3)		56.0375	236.2143	820.2772	699.5374	1016.7987
Horizon Depth (m)	0.0250	0.0072	0.0344	0.0863	0.0988	0.4397
<2mm (kg/m2)		0.4028	8.1199	70.7489	69.0793	447.0737
C%		29.2524	13.9943	5.9878	4.5362	1.3867
C (kg/m2)		0.1178	1.1363	4.2363	3.1336	6.1994
N%		1.8327	1.0012	0.4784	0.2903	0.1124
N (kg/m2)		0.0074	0.0813	0.3385	0.2005	0.5025

Table A71

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
Moore Farm	134	6/10/07	125	Cultivation

Horizon	**Oi**	**Oe**	**Oa**	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)			3.1068	1.9052	2.2073	4.4080
Air Dry sub (kg)			1.8565	1.5381	1.5073	3.4351
Field Moist Total (kg)	0.3081	1.8457	3.1068	30.7160	31.2870	108.8900
Air Dry Total (kg)	0.2021	0.7001	1.8565	24.7971	21.3650	84.8569
Sieved sub (kg)	—		1.2860	1.0694	1.0132	2.0237
Sieved Total (kg)	—	0.6122	1.2860	17.2410	14.3614	49.9915
Sieved Oven Dry (kg)	—	0.5880	1.2728	17.1677	14.3152	49.9289
Rocks wt (kg)	0.0000	0.0000	0.0000	6.0290	8.7290	26.4580
Roots weight (kg)	0.0000	0.0000	0.0000	0.2865	0.0787	0.1211
Rock Vol (m3)	0.0000	0.0000	0.0000	0.0023	0.0033	0.0100
Root Vol (m3)	0.0000	0.0000	0.0000	0.0006	0.0002	0.0002
Total Horizon Vol (m3)	0.0077	0.0030	0.0038	0.0284	0.0231	0.0734
Soil Vol (m3)	0.0077	0.0030	0.0038	0.0256	0.0197	0.0632
Horizon Bulk Density (kg/m3)	26.1340	235.8299	495.0560	969.4697	1086.1444	1342.5386
<2mm BD (kg/m3)		198.0550	339.4175	671.1908	727.7529	789.9351
Horizon Depth (m)	0.0309	0.0119	0.0150	0.1138	0.0925	0.2938
<2mm (kg/m2)		2.3519	5.0913	76.3480	67.3171	232.0434
C%		45.9111	14.7144	3.6477	1.6759	0.9456
C (kg/m2)		1.0798	0.7491	2.7850	1.1281	2.1941
N%		2.2666	0.8773	0.2301	0.1251	0.1029
N (kg/m2)		0.0533	0.0447	0.1757	0.0842	0.2389

Table A72

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
Moore Farm	135	6/10/07	125	Cultivation

Horizon	**Oi**	**Oe**	**Oa**	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)			3.6154	1.1072	1.3066	2.4079
Air Dry sub (kg)			2.0820	0.8681	1.1095	2.0253
Field Moist Total (kg)	0.3284	2.1156	3.6154	32.0660	40.9950	89.6610
Air Dry Total (kg)	0.2042	0.8339	2.0820	25.1392	34.8111	75.4136
Sieved sub (kg)	—		1.6749	0.7752	0.6214	1.2261
Sieved Total (kg)	—	0.7416	1.6749	22.4511	19.4963	45.6560
Sieved Oven Dry (kg)	—	0.7104	1.6535	22.3657	19.4659	45.4640
Rocks wt (kg)	0.0000	0.0000	0.0000	15.7580	10.0290	23.5580
Roots weight (kg)	0.0000	0.0000	0.0000	0.2552	0.0355	0.0335
Rock Vol (m3)	0.0000	0.0000	0.0000	0.0059	0.0038	0.0089
Root Vol (m3)	0.0000	0.0000	0.0000	0.0005	0.0001	0.0001
Total Horizon Vol (m3)	0.0066	0.0059	0.0049	0.0329	0.0268	0.0682
Soil Vol (m3)	0.0066	0.0059	0.0049	0.0264	0.0229	0.0592
Horizon Bulk Density (kg/m3)	31.1131	140.4463	423.0156	951.3886	1517.4951	1272.9083
<2mm BD (kg/m3)		119.6428	335.9564	846.4249	848.5637	767.3882
Horizon Depth (m)	0.0263	0.0238	0.0197	0.1316	0.1072	0.2728
<2mm (kg/m2)		2.8415	6.6141	111.3578	90.9554	209.3531
C%		42.0234	21.9767	4.0048	1.2945	0.8079
C (kg/m2)		1.1941	1.4536	4.4596	1.1774	1.6913
N%		1.9236	1.1019	0.2673	0.0898	0.0874
N (kg/m2)		0.0547	0.0729	0.2977	0.0817	0.1831

Table A73

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
Moore Farm	136	6/10/07	125	Cultivation

Horizon	**Oi**	**Oe**	**Oa**	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)			4.5180	1.4574	2.0075	1.8093
Air Dry sub (kg)			2.6591	1.1083	1.6024	1.3706
Field Moist Total (kg)	0.3377	2.3175	4.5180	26.4870	36.9160	128.3770
Air Dry Total (kg)	0.1851	0.8539	2.6591	20.1426	29.4662	97.2495
Sieved sub (kg)	—		2.1907	0.9716	1.1577	0.9342
Sieved Total (kg)	—	0.7805	2.1907	17.6573	21.2886	66.2845
Sieved Oven Dry (kg)	—	0.7198	2.1292	17.5179	21.1523	65.8503
Rocks wt (kg)	0.0000	0.0000	0.0000	4.1290	6.7290	25.8580
Roots weight (kg)	0.0000	0.0000	0.0000	0.2345	0.1369	0.2176
Rock Vol (m3)	0.0000	0.0000	0.0000	0.0016	0.0025	0.0098
Root Vol (m3)	0.0000	0.0000	0.0000	0.0005	0.0003	0.0004
Total Horizon Vol (m3)	0.0063	0.0065	0.0064	0.0243	0.0273	0.1035
Soil Vol (m3)	0.0063	0.0065	0.0064	0.0223	0.0245	0.0933
Horizon Bulk Density (kg/m3)	29.6155	131.6827	415.0821	904.8646	1201.4605	1042.1745
<2mm BD (kg/m3)		110.9988	332.3636	786.9530	862.4665	705.6846
Horizon Depth (m)	0.0250	0.0259	0.0256	0.0972	0.1094	0.4141
<2mm (kg/m2)		2.8790	8.5168	76.4820	94.3323	292.1975
C%		48.1335	18.2450	3.9173	1.7158	1.4473
C (kg/m2)		1.3858	1.5539	2.9960	1.6185	4.2290
N%		2.1535	0.9613	0.2545	0.1124	0.1132
N (kg/m2)		0.0620	0.0819	0.1946	0.1060	0.3307

Table A74

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
Moore Farm	146	6/15/07	125	Cultivation

Horizon	Oi	Oe	Oa	0-10 cm	10-20 cm	20+ cm
Field moist sub (kg)			1.6068	1.4023	1.6072	2.7070
Air Dry sub (kg)			0.7267	1.1468	1.4150	2.4647
Field Moist Total (kg)	0.3075	1.6132	1.6068	18.8870	26.1870	115.8190
Air Dry Total (kg)	0.2448	0.7008	0.7267	15.4461	23.0549	105.4511
Sieved sub (kg)	—		0.5691	0.8843	1.0601	1.7340
Sieved Total (kg)	—	0.4930	0.5691	11.9107	17.2731	74.1898
Sieved Oven Dry (kg)	—	0.4442	0.5184	11.6082	17.0876	73.8250
Rocks wt (kg)	0.0000	0.0000	0.0000	3.1290	4.7290	21.4580
Roots weight (kg)	0.0000	0.0000	0.0000	0.0683	0.0543	0.1004
Rock Vol (m3)	0.0000	0.0000	0.0000	0.0012	0.0018	0.0081
Root Vol (m3)	0.0000	0.0000	0.0000	0.0001	0.0001	0.0002
Total Horizon Vol (m3)	0.0029	0.0043	0.0036	0.0224	0.0262	0.0933
Soil Vol (m3)	0.0029	0.0043	0.0036	0.0211	0.0243	0.0850
Horizon Bulk Density (kg/m3)	84.6772	163.1023	202.2233	731.9802	949.6784	1240.9063
<2mm BD (kg/m3)		103.3850	144.2467	550.1077	703.8744	868.7431
Horizon Depth (m)	0.0116	0.0172	0.0144	0.0897	0.1047	0.3731
<2mm (kg/m2)		1.7769	2.0735	49.3378	73.6869	324.1498
C%		49.0757	36.7174	5.5425	1.7175	0.5331
C (kg/m2)		0.8720	0.7614	2.7346	1.2656	1.7280
N%		2.4166	1.9463	0.3319	0.1185	0.0575
N (kg/m2)		0.0429	0.0404	0.1637	0.0873	0.1864

Table A75

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
Moore Farm	147	6/15/07	125	Cultivation

Horizon	**Oi**	**Oe**	**Oa**	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)			3.1075	2.1074	2.0574	2.5085
Air Dry sub (kg)			1.7770	1.6655	1.7268	2.1915
Field Moist Total (kg)	0.1677	0.5876	3.1075	36.0160	33.2660	111.7690
Air Dry Total (kg)	0.1021	0.2843	1.7770	28.4639	27.9216	97.6436
Sieved sub (kg)	—		1.4525	1.1774	1.2389	1.5865
Sieved Total (kg)	—	0.2418	1.4525	20.1220	20.0325	70.6889
Sieved Oven Dry (kg)	—	0.2224	1.3928	19.8460	19.8641	70.3770
Rocks wt (kg)	0.0000	0.0000	0.0000	5.4290	6.8290	20.5180
Roots weight (kg)	0.0000	0.0000	0.0000	0.0648	0.0416	0.0551
Rock Vol (m3)	0.0000	0.0000	0.0000	0.0020	0.0026	0.0077
Root Vol (m3)	0.0000	0.0000	0.0000	0.0001	0.0001	0.0001
Total Horizon Vol (m3)	0.0023	0.0015	0.0031	0.0266	0.0233	0.0639
Soil Vol (m3)	0.0023	0.0015	0.0031	0.0244	0.0206	0.0561
Horizon Bulk Density (kg/m3)	45.0604	191.5015	568.6240	1167.4309	1354.1360	1742.0401
<2mm BD (kg/m3)		149.8329	445.6946	813.9745	963.3672	1255.5819
Horizon Depth (m)	0.0091	0.0059	0.0125	0.1063	0.0931	0.2556
<2mm (kg/m2)		0.8896	5.5712	86.4848	89.7136	320.9581
C%		37.8199	17.7999	2.9461	1.3681	0.5053
C (kg/m2)		0.3365	0.9917	2.5480	1.2274	1.6219
N%		2.1301	1.0409	0.2097	0.0986	0.0575
N (kg/m2)		0.0189	0.0580	0.1813	0.0884	0.1846

Table A76

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
Moore Farm	148	6/15/07	125	Cultivation

Horizon	**Oi**	**Oe**	**Oa**	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)			2.4056	1.6064	1.8564	1.9574
Air Dry sub (kg)			1.1186	1.2300	1.5848	1.7070
Field Moist Total (kg)	0.4478	1.8571	2.4056	31.0660	38.0160	251.1380
Air Dry Total (kg)	0.2631	0.8300	1.1186	23.7861	32.4528	219.0123
Sieved sub (kg)	—		0.9351	0.9602	0.9786	1.1708
Sieved Total (kg)	—	0.4806	0.9351	18.5695	20.0395	150.2127
Sieved Oven Dry (kg)	—	0.4341	0.8695	18.2993	19.8902	149.3299
Rocks wt (kg)	0.0000	0.0000	0.0000	8.7580	8.2290	66.8740
Roots weight (kg)	0.0000	0.0000	0.0000	0.0868	0.1589	0.1807
Rock Vol (m3)	0.0000	0.0000	0.0000	0.0033	0.0031	0.0252
Root Vol (m3)	0.0000	0.0000				
Total Horizon Vol (m3)	0.0071	0.0045	0.0036	0.0263	0.0257	0.1494
Soil Vol (m3)	0.0071	0.0045	0.0036	0.0230	0.0226	0.1241
Horizon Bulk Density (kg/m3)	37.0004	186.3815	311.2570	1033.1333	1436.1003	1764.2434
<2mm BD (kg/m3)		97.4831	241.9589	794.8194	880.1792	1202.9198
Horizon Depth (m)	0.0284	0.0178	0.0144	0.1053	0.1028	0.5975
<2mm (kg/m2)		1.7364	3.4782	83.7044	90.4934	718.7446
C%		45.2830	35.7878	3.5509	1.4002	0.5392
C (kg/m2)		0.7863	1.2448	2.9723	1.2671	3.8753
N%		2.3289	1.7659	0.2321	0.1155	0.0612
N (kg/m2)		0.0404	0.0614	0.1943	0.1046	0.4399

Table A77

Site Name	Plot #	Date Sampled	Age (yr)	Use
Win's Pasture	103	5/25/07	0	Pasture

Horizon	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)	1.1074	0.5077	3.2374
Air Dry sub (kg)	0.8331	0.3689	2.7709
Field Moist Total (kg)	44.4740	26.0870	163.1380
Air Dry Total (kg)	33.4583	18.9550	139.6326
Sieved sub (kg)	0.7852	0.3465	2.4865
Sieved Total (kg)	31.5353	17.8035	125.3011
Sieved Oven Dry (kg)	31.1617	17.5749	124.3995
Rocks wt (kg)	1.1290	1.5290	14.0290
Roots weight (kg)	0.2166	0.0021	0.0000
Rock Vol (m3)	0.0004	0.0006	0.0053
Root Vol (m3)	0.0004	0.0000	0.0000
Total Horizon Vol (m3)	0.0324	0.0211	0.1140
Soil Vol (m3)	0.0316	0.0205	0.1087
Horizon Bulk Density (kg/m3)	1060.3486	924.0729	1284.6817
<2mm BD (kg/m3)	987.5662	856.7906	1144.5301
Horizon Depth (m)	0.1297	0.0844	0.4559
<2mm (kg/m2)	128.0750	72.2917	521.8342
C%	2.1312	1.1815	0.5132
C (kg/m2)	2.7296	0.8541	2.6780
N%	0.2242	0.1193	0.0617
N (kg/m2)	0.2872	0.0863	0.3220

Table A78

Site Name	Plot #	Date Sampled	Age (yr)	Use
Win's Pasture	104	5/24/07	0	Pasture

Horizon	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)	1.8070	1.0077	1.9070
Air Dry sub (kg)	1.1728	0.7623	1.5956
Field Moist Total (kg)	30.2160	35.8450	150.6640
Air Dry Total (kg)	19.6117	27.1166	126.0605
Sieved sub (kg)	1.1524	0.5138	1.5587
Sieved Total (kg)	19.2696	18.2768	123.1429
Sieved Oven Dry (kg)	19.0205	18.1010	122.4323
Rocks wt (kg)	0.0390	1.7290	9.8290
Roots weight (kg)	0.0000	0.0000	0.0000
Rock Vol (m3)	0.0000	0.0007	0.0037
Root Vol (m3)	0.0000	0.0000	0.0000
Total Horizon Vol (m3)	0.0213	0.0209	0.0970
Soil Vol (m3)	0.0212	0.0203	0.0933
Horizon Bulk Density (kg/m3)	923.5450	1336.7759	1350.8099
<2mm BD (kg/m3)	895.7047	892.3299	1311.9318
Horizon Depth (m)	0.0850	0.0838	0.3881
<2mm (kg/m2)	76.1349	74.7326	509.1935
C%	4.1546	1.7077	0.3742
C (kg/m2)	3.1631	1.2762	1.9056
N%	0.4418	0.1862	0.0653
N (kg/m2)	0.3363	0.1392	0.3327

Table A79

Site Name	Plot #	Date Sampled	Age (yr)	Use
Win's Pasture	105	5/24/07	0	Pasture

Horizon	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)	1.4082	0.8079	1.9582
Air Dry sub (kg)	1.1397	0.6164	1.6039
Field Moist Total (kg)	42.7030	38.3240	95.8480
Air Dry Total (kg)	34.5624	29.2420	78.5064
Sieved sub (kg)	1.0828	0.5764	1.4537
Sieved Total (kg)	32.8350	27.3412	71.1503
Sieved Oven Dry (kg)	32.5402	27.1462	70.7654
Rocks wt (kg)	2.1290	1.8290	36.1870
Roots weight (kg)	0.2347	0.0035	0.0000
Rock Vol (m3)	0.0008	0.0007	0.0137
Root Vol (m3)	0.0005	0.0000	0.0000
Total Horizon Vol (m3)	0.0275	0.0278	0.0882
Soil Vol (m3)	0.0262	0.0271	0.0745
Horizon Bulk Density (kg/m3)	1318.2749	1078.4344	1053.1040
<2mm BD (kg/m3)	1241.1453	1001.1395	949.2645
Horizon Depth (m)	0.1100	0.1113	0.3528
<2mm (kg/m2)	136.5260	111.3768	334.9124
C%	1.5926	1.0329	0.5287
C (kg/m2)	2.1744	1.1504	1.7707
N%	0.1823	0.1180	0.0604
N (kg/m2)	0.2489	0.1314	0.2024

Table A80

Site Name	Plot #	Date Sampled	Age (yr)	Use
Lasso	122	6/6/07	0	Hay

Horizon	**Oi**	**Oe**	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)			2.1072	2.4078	2.6079
Air Dry sub (kg)			1.5414	2.0538	2.1329
Field Moist Total (kg)	0.0680	1.8073	35.7450	40.5450	177.1220
Air Dry Total (kg)	0.0474	0.9209	26.1481	34.5836	144.8609
Sieved sub (kg)	—		1.4701	1.9503	1.6806
Sieved Total (kg)	—	0.7175	24.9383	32.8414	114.1450
Sieved Oven Dry (kg)	—	0.7045	24.7214	32.7427	113.8727
Rocks wt (kg)	0.0000	0.0000	1.4290	1.2290	6.0290
Roots weight (kg)	0.0000	0.0000	0.4070	0.0053	0.0261
Rock Vol (m3)	0.0000	0.0000	0.0005	0.0005	0.0023
Root Vol (m3)	0.0000	0.0000	0.0008	0.0000	0.0001
Total Horizon Vol (m3)	0.0009	0.0038	0.0234	0.0215	0.0921
Soil Vol (m3)	0.0009	0.0038	0.0220	0.0210	0.0898
Horizon Bulk Density (kg/m3)	50.5067	240.5721	1189.0909	1646.0733	1613.4904
<2mm BD (kg/m3)		184.0429	1124.2114	1558.4552	1268.3371
Horizon Depth (m)	0.0038	0.0153	0.0934	0.0859	0.3684
<2mm (kg/m2)		2.8182	105.0435	133.9297	467.3030
C%		8.6832	2.0694	0.4555	0.1864
C (kg/m2)		0.2447	2.1738	0.6100	0.8712
N%		0.6472	0.1828	0.0419	0.0301
N (kg/m2)		0.0182	0.1920	0.0561	0.1406

Table A81

Site Name	Plot #	Date Sampled	Age (yr)	Use
Lasso	123	6/6/07	0	Hay

Horizon	**Oi**	**Oe**	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)			1.1557	1.7077	2.6065
Air Dry sub (kg)			0.7994	1.3198	2.1845
Field Moist Total (kg)	0.4680	1.7081	20.7870	44.1950	220.7380
Air Dry Total (kg)	0.1152	0.7556	14.3788	34.1567	184.9986
Sieved sub (kg)	—		0.7843	1.2803	2.0996
Sieved Total (kg)	—	0.6467	14.1067	33.1345	177.8104
Sieved Oven Dry (kg)	—	0.6304	13.9948	33.0193	177.5423
Rocks wt (kg)	0.0000	0.0000	0.1290	2.5790	9.1290
Roots weight (kg)	0.0000	0.0000	0.2142	0.1013	0.1517
Rock Vol (m3)	0.0000	0.0000	0.0000	0.0010	0.0034
Root Vol (m3)	0.0000	0.0000	0.0004	0.0002	0.0003
Total Horizon Vol (m3)	0.0085	0.0019	0.0189	0.0293	0.1472
Soil Vol (m3)	0.0085	0.0019	0.0184	0.0281	0.1434
Horizon Bulk Density (kg/m3)	13.5292	402.9760	780.5849	1214.8047	1289.7889
<2mm BD (kg/m3)		336.2291	759.7390	1174.3522	1237.8046
Horizon Depth (m)	0.0341	0.0075	0.0756	0.1172	0.5888
<2mm (kg/m2)		2.5217	57.4553	137.6194	728.7575
C%		24.0357	2.3087	1.3062	0.2553
C (kg/m2)		0.6061	1.3265	1.7975	1.8608
N%		1.6455	0.2320	0.1398	0.0336
N (kg/m2)		0.0415	0.1333	0.1924	0.2451

Table A82

Site Name	Plot #	Date Sampled	Age (yr)	Use
Lasso	124	6/6/07	0	Hay

Horizon	**Oi**	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)		1.1080	3.1586	3.3079
Air Dry sub (kg)		0.7398	2.6604	1.6074
Field Moist Total (kg)	0.2279	26.4160	38.1450	160.7430
Air Dry Total (kg)	0.0998	17.6364	32.1286	78.1066
Sieved sub (kg)	—	0.7256	2.5666	1.4485
Sieved Total (kg)	—	17.2976	30.9950	70.3894
Sieved Oven Dry (kg)	—	17.1476	30.9289	70.0706
Rocks wt (kg)	0.0000	0.5790	1.3290	11.6580
Roots weight (kg)	0.0000	0.6127	0.0522	0.1051
Rock Vol (m3)	0.0000	0.0002	0.0005	0.0044
Root Vol (m3)	0.0000	0.0012	0.0001	0.0002
Total Horizon Vol (m3)	0.0064	0.0222	0.0297	0.1030
Soil Vol (m3)	0.0064	0.0207	0.0291	0.0984
Horizon Bulk Density (kg/m3)	15.5739	851.2067	1104.8520	794.1286
<2mm BD (kg/m3)		827.6124	1063.5972	712.4250
Horizon Depth (m)	0.0256	0.0888	0.1188	0.4119
<2mm (kg/m2)		73.4506	126.3022	293.4301
C%		3.7238	0.5012	1.7615
C (kg/m2)		2.7351	0.6330	5.1687
N%		0.3430	0.0599	0.1728
N (kg/m2)		0.2519	0.0756	0.5070

Table A83

Site Name	Plot #	Date Sampled	Age (yr)	Use
Brown's Pature	143	6/14/07	0	Pasture

Horizon	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)	1.2066	1.4581	2.6066
Air Dry sub (kg)	0.8866	1.0155	2.0125
Field Moist Total (kg)	28.8660	35.0160	107.0900
Air Dry Total (kg)	21.2104	24.3861	82.6818
Sieved sub (kg)	0.7826	0.8951	1.5262
Sieved Total (kg)	18.7242	21.4959	62.7013
Sieved Oven Dry (kg)	18.2946	21.1446	62.2553
Rocks wt (kg)	0.7890	1.9290	8.1290
Roots weight (kg)	1.2083	0.0056	0.0000
Rock Vol (m3)	0.0003	0.0007	0.0031
Root Vol (m3)	0.0025	0.0000	0.0000
Total Horizon Vol (m3)	0.0252	0.0252	0.0686
Soil Vol (m3)	0.0225	0.0244	0.0655
Horizon Bulk Density (kg/m3)	943.8647	998.7352	1261.8128
<2mm BD (kg/m3)	814.1108	865.9797	950.0823
Horizon Depth (m)	0.1009	0.1006	0.2744
<2mm (kg/m2)	82.1743	87.1392	260.6788
C%	2.7073	2.8720	1.0205
C (kg/m2)	2.2247	2.5026	2.6602
N%	0.2141	0.2555	0.0907
N (kg/m2)	0.1759	0.2226	0.2365

Table A84

Site Name	Plot #	Date Sampled	Age (yr)	Use
Brown's Pature	144	6/14/07	0	Pasture

Horizon	**Oi**	**Oe**	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)			1.3078	2.0543	1.4065
Air Dry sub (kg)			1.1604	1.4845	1.0440
Field Moist Total (kg)	0.2670	1.7079	28.0450	35.3450	140.4930
Air Dry Total (kg)	0.0679	0.7508	24.8848	25.5409	104.2825
Sieved sub (kg)	—		1.0755	1.3405	0.8344
Sieved Total (kg)	—	0.6635	23.0646	23.0629	83.3475
Sieved Oven Dry (kg)	—	0.6255	22.6100	22.6907	82.3489
Rocks wt (kg)	0.0000	0.0000	2.8790	1.3290	14.7580
Roots weight (kg)	0.0000	0.0000	0.0842	0.0025	0.0119
Rock Vol (m3)	0.0000	0.0000	0.0011	0.0005	0.0056
Root Vol (m3)	0.0000	0.0000	0.0002	0.0000	0.0000
Total Horizon Vol (m3)	0.0052	0.0051	0.0230	0.0262	0.0868
Soil Vol (m3)	0.0052	0.0051	0.0217	0.0257	0.0812
Horizon Bulk Density (kg/m3)	13.1665	147.8538	1146.2086	995.1552	1284.2115
<2mm BD (kg/m3)		123.1745	1041.4296	884.1024	1014.1054
Horizon Depth (m)	0.0206	0.0203	0.0919	0.1047	0.3472
<2mm (kg/m2)		2.5020	95.6813	92.5545	352.0847
C%		20.0232	2.8637	2.0007	1.1743
C (kg/m2)		0.5010	2.7400	1.8517	4.1345
N%		1.2277	0.2146	0.1556	0.0697
N (kg/m2)		0.0307	0.2054	0.1440	0.2455

Table A85

Site Name	Plot #	Date Sampled	Age (yr)	Use
Brown's Pature	145	6/14/07	0	Pasture

Horizon	**Oi**	**Oe**	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)			1.2080	1.6079	2.6067
Air Dry sub (kg)			0.9158	1.2127	1.9882
Field Moist Total (kg)	0.2076	1.0068	32.5450	39.8450	85.4900
Air Dry Total (kg)	0.0889	0.4175	24.6738	30.0528	65.2045
Sieved sub (kg)	—		0.8620	1.0736	1.5924
Sieved Total (kg)	—	0.2981	23.2225	26.6052	52.2234
Sieved Oven Dry (kg)	—	0.2754	22.7683	26.2028	51.5792
Rocks wt (kg)	0.0000	0.0000	0.9290	2.8290	15.4290
Roots weight (kg)	0.0000	0.0000	0.2784	0.2770	0.0159
Rock Vol (m3)	0.0000	0.0000	0.0004	0.0011	0.0058
Root Vol (m3)	0.0000	0.0000	0.0006	0.0006	0.0000
Total Horizon Vol (m3)	0.0016	0.0029	0.0263	0.0259	0.0554
Soil Vol (m3)	0.0016	0.0029	0.0254	0.0242	0.0495
Horizon Bulk Density (kg/m3)	56.9024	144.4428	971.0369	1240.4776	1316.3095
<2mm BD (kg/m3)		95.2900	896.0472	1081.5635	1041.2495
Horizon Depth (m)	0.0063	0.0116	0.1053	0.1034	0.2216
<2mm (kg/m2)		1.1018	94.3650	111.8742	230.7018
C%		29.0393	3.3626	1.7428	0.8815
C (kg/m2)		0.3200	3.1731	1.9498	2.0337
N%		1.5163	0.2141	0.1107	0.0510
N (kg/m2)		0.0167	0.2020	0.1239	0.1177

Table A86

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
Gould Road	115	6/1/07	25	Pasture

Horizon	**Oi**	**Oe**	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)			1.4079	1.5077	3.1082
Air Dry sub (kg)			1.0865	1.2184	2.6709
Field Moist Total (kg)	0.3081	0.8578	30.0950	24.8660	198.3250
Air Dry Total (kg)	0.1324	0.3894	23.2253	20.0952	170.4222
Sieved sub (kg)	—		1.0158	1.1040	2.3662
Sieved Total (kg)	—	0.3524	21.7128	18.2088	150.9827
Sieved Oven Dry (kg)	—	0.3344	21.4372	17.9713	149.6337
Rocks wt (kg)	0.0000	0.0000	1.4290	2.4290	30.4580
Roots weight (kg)	0.0000	0.0000	0.2469	0.2102	0.4897
Rock Vol (m3)	0.0000	0.0000	0.0005	0.0009	0.0115
Root Vol (m3)	0.0000	0.0000	0.0005	0.0004	0.0010
Total Horizon Vol (m3)	0.0077	0.0016	0.0269	0.0252	0.1617
Soil Vol (m3)	0.0077	0.0016	0.0258	0.0239	0.1492
Horizon Bulk Density (kg/m3)	17.1184	249.1840	899.0891	841.1906	1142.0392
<2mm BD (kg/m3)		214.0377	829.8668	752.2809	1002.7306
Horizon Depth (m)	0.0309	0.0063	0.1075	0.1009	0.6469
<2mm (kg/m2)		1.3377	89.2107	75.9334	648.6414
C%		18.2639	3.2317	1.2172	0.8705
C (kg/m2)		0.2443	2.8830	0.9243	5.6465
N%		1.0271	0.2291	0.1095	0.0885
N (kg/m2)		0.0137	0.2043	0.0832	0.5744

Table A87

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
Gould Road	116	6/1/07	25	Pasture

Horizon	**Oi**	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)		1.0378	2.1591	2.3583
Air Dry sub (kg)		0.8741	1.7907	1.9249
Field Moist Total (kg)	0.2680	28.3160	32.9160	217.3960
Air Dry Total (kg)	0.1262	23.8475	27.2992	177.4387
Sieved sub (kg)	—	0.7744	1.5471	1.6604
Sieved Total (kg)	—	21.1283	23.5849	153.0547
Sieved Oven Dry (kg)	—	20.8948	23.3876	151.9116
Rocks wt (kg)	0.0000	2.4290	3.5790	33.3160
Roots weight (kg)	0.0000	0.1707	0.0460	0.2529
Rock Vol (m3)	0.0000	0.0009	0.0014	0.0126
Root Vol (m3)	0.0000	0.0003	0.0001	0.0005
Total Horizon Vol (m3)	0.0041	0.0265	0.0252	0.1689
Soil Vol (m3)	0.0041	0.0252	0.0238	0.1558
Horizon Bulk Density (kg/m3)	31.0646	945.5960	1147.5115	1138.7546
<2mm BD (kg/m3)		828.5192	983.0877	974.9282
Horizon Depth (m)	0.0163	0.1059	0.1009	0.6756
<2mm (kg/m2)		87.7712	99.2304	658.6858
C%		3.2317	1.1832	0.8705
C (kg/m2)		2.8365	1.1741	5.7339
N%		0.2291	0.1095	0.0885
N (kg/m2)		0.2011	0.1087	0.5833

Table A88

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
Gould Road	117	6/1/07	25	Pasture

Horizon	**Oi**	**Oe**	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)			1.6097	1.5097	2.7588
Air Dry sub (kg)			1.3739	1.2943	2.3875
Field Moist Total (kg)	0.3580	1.7099	26.2160	34.5950	188.0170
Air Dry Total (kg)	0.2160	1.0752	22.3748	29.6588	162.7160
Sieved sub (kg)	—		1.2499	1.1011	2.2754
Sieved Total (kg)	—	0.8418	20.3558	25.2321	155.0720
Sieved Oven Dry (kg)	—	0.8014	20.2010	25.0825	154.5453
Rocks wt (kg)	0.0000	0.0000	1.6090	5.6290	40.5450
Roots weight (kg)	0.0000	0.0000	0.5331	0.0576	0.1680
Rock Vol (m3)	0.0000	0.0000	0.0006	0.0021	0.0153
Root Vol (m3)	0.0000	0.0000	0.0011	0.0001	0.0003
Total Horizon Vol (m3)	0.0028	0.0030	0.0234	0.0227	0.1484
Soil Vol (m3)	0.0028	0.0030	0.0217	0.0205	0.1327
Horizon Bulk Density (kg/m3)	76.7822	352.8796	1032.7758	1447.2921	1226.0409
<2mm BD (kg/m3)		263.0367	932.4371	1223.9768	1164.4760
Horizon Depth (m)	0.0113	0.0122	0.0934	0.0909	0.5934
<2mm (kg/m2)		3.2058	87.1246	111.3054	691.0437
C%		20.2416	2.0767	1.1999	0.5539
C (kg/m2)		0.6489	1.8093	1.3356	3.8279
N%		0.9395	0.1562	0.0964	0.0535
N (kg/m2)		0.0301	0.1361	0.1073	0.3700

Table A89

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
Win's Abandoned Pasture	106	5/26/07	50	Pasture

Horizon	**Oi**	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)		1.1066	1.3572	3.2577
Air Dry sub (kg)		0.7765	1.0639	2.5865
Field Moist Total (kg)	1.2075	24.4160	38.2740	135.2640
Air Dry Total (kg)	0.1278	17.1322	30.0025	107.3949
Sieved sub (kg)	—	0.6959	0.9141	2.5015
Sieved Total (kg)	—	15.3536	25.7775	103.8655
Sieved Oven Dry (kg)	—	15.1102	25.5548	103.2311
Rocks wt (kg)	0.0000	0.6290	1.8790	54.3160
Roots weight (kg)	0.0000	0.1764	0.0623	0.0883
Rock Vol (m3)	0.0000	0.0002	0.0007	0.0205
Root Vol (m3)	0.0000	0.0004	0.0001	0.0002
Total Horizon Vol (m3)	0.0022	0.0216	0.0246	0.1027
Soil Vol (m3)	0.0022	0.0210	0.0238	0.0820
Horizon Bulk Density (kg/m3)	58.4046	814.1310	1262.0256	1310.0213
<2mm BD (kg/m3)		718.0444	1074.9376	1259.2310
Horizon Depth (m)	0.0088	0.0866	0.0984	0.4106
<2mm (kg/m2)		62.1557	105.8142	517.0717
C%		4.0280	1.5256	1.8115
C (kg/m2)		2.5036	1.6143	9.3669
N%		0.3547	0.1478	0.0845
N (kg/m2)		0.2205	0.1563	0.4367

Table A90

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
Win's Abandoned Pasture	107	5/28/07	50	Pasture

Horizon	**Oi**	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)		1.1080	1.1084	3.8084
Air Dry sub (kg)		0.7125	0.8605	3.0738
Field Moist Total (kg)	0.4077	31.3338	39.6740	279.9020
Air Dry Total (kg)	0.2062	20.1485	30.7993	225.9150
Sieved sub (kg)	—	0.6958	0.8431	2.9892
Sieved Total (kg)	—	19.6776	30.1793	219.6935
Sieved Oven Dry (kg)	—	19.4972	29.9990	219.0342
Rocks wt (kg)	0.0000	0.9290	0.1290	16.0290
Roots weight (kg)	0.0000	0.0842	0.0832	0.0157
Rock Vol (m3)	0.0000	0.0004	0.0000	0.0060
Root Vol (m3)	0.0000	0.0002	0.0002	0.0000
Total Horizon Vol (m3)	0.0027	0.0256	0.0229	0.1706
Soil Vol (m3)	0.0027	0.0251	0.0227	0.1645
Horizon Bulk Density (kg/m3)	77.6207	802.6430	1358.4594	1372.9738
<2mm BD (kg/m3)		776.6986	1323.1633	1331.1564
Horizon Depth (m)	0.0106	0.1025	0.0916	0.6825
<2mm (kg/m2)		79.6116	121.1521	908.5142
C%		2.8775	0.9678	0.5184
C (kg/m2)		2.2908	1.1725	4.7100
N%		0.2705	0.1091	0.0728
N (kg/m2)		0.2153	0.1322	0.6618

Table A91

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
Win's Abandoned Pasture	108	5/28/07	50	Pasture

Horizon	**Oi**	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)		1.7074	1.7072	3.7072
Air Dry sub (kg)		1.1333	1.1602	3.1171
Field Moist Total (kg)	0.5071	24.1870	33.0160	252.9460
Air Dry Total (kg)	0.1931	16.0532	22.4374	212.6809
Sieved sub (kg)	—	1.0835	1.1256	2.2713
Sieved Total (kg)	—	15.3485	21.7692	154.9734
Sieved Oven Dry (kg)	—	15.2194	21.5619	154.5101
Rocks wt (kg)	0.0000	0.1290	1.2290	19.0580
Roots weight (kg)	0.0000	0.1832	0.2078	0.2872
Rock Vol (m3)	0.0000	0.0000	0.0005	0.0072
Root Vol (m3)	0.0000	0.0004	0.0004	0.0006
Total Horizon Vol (m3)	0.0032	0.0248	0.0230	0.1667
Soil Vol (m3)	0.0032	0.0244	0.0221	0.1589
Horizon Bulk Density (kg/m3)	60.2724	657.3421	1016.1359	1338.1100
<2mm BD (kg/m3)		623.1977	976.4885	972.1205
Horizon Depth (m)	0.0128	0.0919	0.0919	0.6669
<2mm (kg/m2)		57.2563	89.7149	648.2829
C%		3.1816	2.0822	1.1067
C (kg/m2)		1.8217	1.8681	7.1749
N%		0.2677	0.2037	0.0504
N (kg/m2)		0.1533	0.1828	0.3267

Table A92

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
Vandersmissen	137	6/11/07	80	Pasture

Horizon	**Oi**	**Oe**	**Oa**	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)			2.5083	1.7599	1.4681	2.5087
Air Dry sub (kg)			1.3464	1.1691	1.0779	2.0719
Field Moist Total (kg)	0.3687	1.7086	2.5083	30.5160	25.8870	120.7190
Air Dry Total (kg)	0.2135	0.5651	1.3464	20.2723	19.0059	99.7016
Sieved sub (kg)	—		0.8852	0.8844	0.8289	1.4678
Sieved Total (kg)	—	0.4998	0.8852	15.3358	14.6156	70.6305
Sieved Oven Dry (kg)	—	0.4695	0.8580	15.1333	14.4293	70.1984
Rocks wt (kg)	0.0000	0.0000	0.0000	11.1290	12.0290	58.5450
Roots weight (kg)	0.0000	0.0000	0.0000	0.0984	0.0473	0.0379
Rock Vol (m3)	0.0000	0.0000	0.0000	0.0042	0.0045	0.0221
Root Vol (m3)	0.0000	0.0000	0.0000	0.0002	0.0001	0.0001
Total Horizon Vol (m3)	0.0088	0.0009	0.0036	0.0283	0.0220	0.0930
Soil Vol (m3)	0.0088	0.0009	0.0036	0.0239	0.0173	0.0708
Horizon Bulk Density (kg/m3)	24.1818	602.8160	374.6560	848.8899	1097.5034	1408.2367
<2mm BD (kg/m3)		500.7842	238.7578	633.6950	833.2271	991.5180
Horizon Depth (m)	0.0353	0.0038	0.0144	0.1131	0.0878	0.3719
<2mm (kg/m2)		1.8779	3.4321	71.6867	73.1678	368.7208
C%		43.8034	15.9354	3.8333	1.2466	0.8228
C (kg/m2)		0.8226	0.5469	2.7480	0.9121	3.0340
N%		1.9502	0.9456	0.2917	0.0999	0.0903
N (kg/m2)		0.0366	0.0325	0.2091	0.0731	0.3331

Table A93

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
Vandersmissen	138	6/11/07	80	Pasture

Horizon	**Oi**	**Oe**	**Oa**	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)			2.2085	1.5085	1.1081	1.4884
Air Dry sub (kg)			1.0785	1.0751	0.8117	1.2908
Field Moist Total (kg)	0.2585	1.4082	2.2085	24.8160	22.1370	72.6320
Air Dry Total (kg)	0.1568	0.5307	1.0785	17.6867	16.2151	62.9867
Sieved sub (kg)	—		0.7266	0.7709	0.5594	0.9690
Sieved Total (kg)	—	0.4449	0.7266	12.6816	11.1754	47.2832
Sieved Oven Dry (kg)	—	0.4210	0.6971	12.5156	10.8336	47.0550
Rocks wt (kg)	0.0000	0.0000	0.0000	15.0580	17.0080	112.5900
Roots weight (kg)	0.0000	0.0000	0.0000	0.2261	0.0826	0.0492
Rock Vol (m3)	0.0000	0.0000	0.0000	0.0057	0.0064	0.0425
Root Vol (m3)	0.0000	0.0000	0.0000	0.0005	0.0002	0.0001
Total Horizon Vol (m3)	0.0066	0.0016	0.0016	0.0300	0.0210	0.0929
Soil Vol (m3)	0.0066	0.0016	0.0016	0.0239	0.0144	0.0503
Horizon Bulk Density (kg/m3)	23.8949	323.4987	657.3410	741.3807	1123.7781	1252.1338
<2mm BD (kg/m3)		256.5913	424.8771	524.6218	750.8138	935.4215
Horizon Depth (m)	0.0263	0.0066	0.0066	0.1200	0.0841	0.3716
<2mm (kg/m2)		1.6839	2.7883	62.9546	63.1153	347.5675
C%		40.7247	22.7842	5.3730	3.4312	1.4413
C (kg/m2)		0.6858	0.6353	3.3826	2.1656	5.0095
N%		1.9714	1.1560	0.3653	0.2500	0.1509
N (kg/m2)		0.0332	0.0322	0.2300	0.1578	0.5244

Table A94

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
Vandersmissen	139	6/11/07	80	Pasture

Horizon	Oi	Oe	Oa	0-10 cm	10-20 cm	20+ cm
Field moist sub (kg)			2.2079	1.0084	1.4088	2.6086
Air Dry sub (kg)			1.0751	0.7342	1.1151	2.2630
Field Moist Total (kg)	0.3083	1.4080	2.2079	20.9870	30.2870	197.3220
Air Dry Total (kg)	0.1893	0.5042	1.0751	15.2799	23.9732	171.1803
Sieved sub (kg)	—		0.7611	0.5500	0.7539	1.4714
Sieved Total (kg)	—	0.3635	0.7611	11.4469	16.2078	111.2992
Sieved Oven Dry (kg)	—	0.3428	0.7322	11.3000	16.0294	111.0451
Rocks wt (kg)	0.0000	0.0000	0.0000	5.0290	9.8290	63.8740
Roots weight (kg)	0.0000	0.0000	0.0000	0.2071	0.4246	0.0974
Rock Vol (m3)	0.0000	0.0000	0.0000	0.0019	0.0037	0.0241
Root Vol (m3)	0.0000	0.0000	0.0000	0.0004	0.0009	0.0002
Total Horizon Vol (m3)	0.0066	0.0037	0.0031	0.0205	0.0253	0.0999
Soil Vol (m3)	0.0066	0.0037	0.0031	0.0182	0.0207	0.0756
Horizon Bulk Density (kg/m3)	28.8411	137.3113	344.0384	838.3266	1156.0386	2263.6990
<2mm BD (kg/m3)		93.3568	234.2984	619.9686	772.9694	1468.4674
Horizon Depth (m)	0.0263	0.0147	0.0125	0.0822	0.1013	0.3997
<2mm (kg/m2)		1.3712	2.9287	50.9537	78.2632	586.9281
C%		46.8754	27.6008	5.1104	2.7698	0.5081
C (kg/m2)		0.6427	0.8084	2.6039	2.1678	2.9824
N%		2.2505	1.4997	0.3705	0.2141	0.0806
N (kg/m2)		0.0309	0.0439	0.1888	0.1676	0.4732

Table A95

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
Garrett	128	6/8/07	80	Pasture

Horizon	**Oi**	**Oe**	**Oa**	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)			3.4082	1.8072	2.5078	3.1074
Air Dry sub (kg)			1.5058	1.1922	1.7234	2.3106
Field Moist Total (kg)	0.4283	1.0079	3.4082	24.8870	29.8870	69.5740
Air Dry Total (kg)	0.2058	0.4175	1.5058	16.4180	20.5390	51.7345
Sieved sub (kg)	—		1.0009	0.8555	1.1434	1.4956
Sieved Total (kg)	—	0.1627	1.0009	11.7815	13.6264	33.4862
Sieved Oven Dry (kg)	—	0.1567	0.9860	11.7330	13.6037	33.4594
Rocks wt (kg)	0.0000	0.0000	0.0000	6.1290	4.4290	8.4290
Roots weight (kg)	0.0000	0.0000	0.0000	0.4331	0.1886	0.3526
Rock Vol (m3)	0.0000	0.0000	0.0000	0.0023	0.0017	0.0032
Root Vol (m3)	0.0000	0.0000	0.0000	0.0009	0.0004	0.0007
Total Horizon Vol (m3)	0.0079	0.0013	0.0023	0.0233	0.0241	0.0494
Soil Vol (m3)	0.0079	0.0013	0.0023	0.0201	0.0220	0.0455
Horizon Bulk Density (kg/m3)	26.0790	334.0320	664.6201	817.4320	933.3193	1137.6490
<2mm BD (kg/m3)		125.3447	435.2053	584.1710	618.1702	735.7776
Horizon Depth (m)	0.0316	0.0050	0.0091	0.0931	0.0963	0.1975
<2mm (kg/m2)		0.6267	3.9440	54.4009	59.4989	145.3161
C%		40.0449	18.1468	4.5225	2.6955	1.3263
C (kg/m2)		0.2510	0.7157	2.4603	1.6038	1.9273
N%		2.1801	1.1894	0.3718	0.2319	0.1171
N (kg/m2)		0.0137	0.0469	0.2022	0.1380	0.1701

Table A96

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
Garrett	129	6/8/07	80	Pasture

Horizon	**Oi**	**Oe**	**Oa**	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)			2.5576	1.6568	1.7571	2.3072
Air Dry sub (kg)			0.9031	1.0884	1.2742	1.8777
Field Moist Total (kg)	0.1080	0.8076	2.5576	34.1160	25.7870	54.0160
Air Dry Total (kg)	0.0449	0.2318	0.9031	22.4121	18.6993	43.9611
Sieved sub (kg)	—		0.6470	0.9484	0.6451	1.2149
Sieved Total (kg)	—	0.1757	0.6470	19.5287	9.4669	28.4440
Sieved Oven Dry (kg)	—	0.1681	0.6196	19.4972	9.4499	28.4344
Rocks wt (kg)	0.0000	0.0000	0.0000	15.8580	11.8290	11.3290
Roots weight (kg)	0.0000	0.0000	0.0000	0.2802	0.1857	0.1474
Rock Vol (m3)	0.0000	0.0000	0.0000	0.0060	0.0045	0.0043
Root Vol (m3)	0.0000	0.0000	0.0000	0.0006	0.0004	0.0003
Total Horizon Vol (m3)	0.0005	0.0015	0.0045	0.0330	0.0283	0.0356
Soil Vol (m3)	0.0005	0.0015	0.0045	0.0265	0.0234	0.0310
Horizon Bulk Density (kg/m3)	95.7013	156.1667	202.7947	846.0168	797.7941	1415.8501
<2mm BD (kg/m3)		113.2700	139.1372	735.9877	403.1723	915.7831
Horizon Depth (m)	0.0019	0.0059	0.0178	0.1322	0.1131	0.1425
<2mm (kg/m2)		0.6725	2.4784	97.2884	45.6089	130.4991
C%		42.5163	34.8861	4.6568	2.6269	0.6594
C (kg/m2)		0.2859	0.8646	4.5306	1.1981	0.8604
N%		2.4812	2.1047	0.3484	0.2397	0.0711
N (kg/m2)		0.0167	0.0522	0.3390	0.1093	0.0928

Table A97

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
Garrett	130	6/8/07	80	Pasture

Horizon	**Oi**	**Oe**	**Oa**	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)			2.8573	1.3324	1.6578	2.7571
Air Dry sub (kg)			1.2046	0.9560	1.2396	2.2212
Field Moist Total (kg)	0.2879	0.8279	2.8573	27.2660	28.8160	64.1530
Air Dry Total (kg)	0.1381	0.2991	1.2046	19.5638	21.5461	51.6842
Sieved sub (kg)	—		1.0185	0.6083	0.8497	1.6395
Sieved Total (kg)	—	0.1321	1.0185	12.4478	14.7695	38.1493
Sieved Oven Dry (kg)	—	0.1263	0.9961	12.4309	14.7345	38.0793
Rocks wt (kg)	0.0000	0.0000	0.0000	11.3580	5.7790	8.7790
Roots weight (kg)	0.0000	0.0000	0.0000	0.1294	0.1454	0.3193
Rock Vol (m3)	0.0000	0.0000	0.0000	0.0043	0.0022	0.0033
Root Vol (m3)	0.0000	0.0000	0.0000	0.0003	0.0003	0.0007
Total Horizon Vol (m3)	0.0034	0.0022	0.0031	0.0242	0.0238	0.0408
Soil Vol (m3)	0.0034	0.0022	0.0031	0.0197	0.0214	0.0368
Horizon Bulk Density (kg/m3)	41.1178	136.7497	385.4560	994.6662	1009.1473	1403.8125
<2mm BD (kg/m3)		57.7575	318.7661	632.0172	690.1141	1034.2837
Horizon Depth (m)	0.0134	0.0088	0.0125	0.0969	0.0953	0.1631
<2mm (kg/m2)		0.5054	3.9846	61.2267	65.7765	168.7175
C%		39.3427	26.1851	5.0926	2.6973	1.4644
C (kg/m2)		0.1988	1.0434	3.1180	1.7742	2.4707
N%		2.3843	1.7518	0.3579	0.2307	0.1373
N (kg/m2)		0.0120	0.0698	0.2191	0.1517	0.2316

Table A98

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
West Mtn. Rd. Pasture	112	5/30/07	100	Pasture

Horizon	**Oi**	**Oe**	**Oa**	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)			0.9074	1.6074	1.3676	3.0074
Air Dry sub (kg)			0.3975	1.2502	1.1134	2.6060
Field Moist Total (kg)	0.7276	1.5873	13.3450	21.5160	24.2450	132.7010
Air Dry Total (kg)	0.3412	0.5827	5.8453	16.7340	19.7390	114.9907
Sieved sub (kg)	—		0.3859	1.2011	1.0189	2.3110
Sieved Total (kg)	—	0.5375	5.6745	16.0770	18.0640	101.9739
Sieved Oven Dry (kg)	—	0.4926	5.2716	15.8045	17.6649	100.7488
Rocks wt (kg)	0.0000	0.0000	0.0000	0.6690	4.1290	31.8580
Roots weight (kg)	0.0000	0.0000	0.1460	0.2592	0.1048	0.2064
Rock Vol (m3)	0.0000	0.0000	0.0000	0.0003	0.0016	0.0120
Root Vol (m3)	0.0000	0.0000	0.0003	0.0005	0.0002	0.0004
Total Horizon Vol (m3)	0.0052	0.0045	0.0213	0.0257	0.0277	0.1126
Soil Vol (m3)	0.0052	0.0045	0.0210	0.0249	0.0260	0.1001
Horizon Bulk Density (kg/m3)	66.1624	128.6047	278.9814	671.4533	760.2882	1148.3538
<2mm BD (kg/m3)		108.7111	251.6024	634.1584	680.3998	1006.1271
Horizon Depth (m)	0.0206	0.0181	0.0850	0.1028	0.1109	0.4503
<2mm (kg/m2)		1.9704	21.3862	65.1994	75.4819	453.0716
C%		38.9839	32.5377	4.7396	3.0409	1.2202
C (kg/m2)		0.7681	6.9586	3.0902	2.2953	5.5286
N%		1.7885	1.1619	0.1932	0.1356	0.0674
N (kg/m2)		0.0352	0.2485	0.1260	0.1024	0.3053

Table A99

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
West Mtn. Rd. Pasture	113	5/31/07	100	Pasture

Horizon	Oi	Oe	Oa	0-10 cm	10-20 cm	20+ cm
Field moist sub (kg)			0.7576	1.2073	1.3079	2.4075
Air Dry sub (kg)			0.2787	0.8877	1.0576	2.0669
Field Moist Total (kg)	0.5079	0.8082	11.2660	24.2160	27.2450	80.6490
Air Dry Total (kg)	0.2941	0.2660	4.1444	17.8047	22.0309	69.2410
Sieved sub (kg)	—		0.2687	0.7937	0.9175	1.8641
Sieved Total (kg)	—	0.2159	3.9958	15.9206	19.1135	62.4463
Sieved Oven Dry (kg)	—	0.1968	3.7380	15.6359	18.6956	61.9913
Rocks wt (kg)	0.0000	0.0000	0.0000	6.3580	9.8290	8.5290
Roots weight (kg)	0.0000	0.0000	0.1823	0.6728	0.2755	0.0780
Rock Vol (m3)	0.0000	0.0000	0.0000	0.0024	0.0037	0.0032
Root Vol (m3)	0.0000	0.0000	0.0004	0.0014	0.0006	0.0002
Total Horizon Vol (m3)	0.0076	0.0031	0.0205	0.0334	0.0308	0.0649
Soil Vol (m3)	0.0076	0.0031	0.0201	0.0297	0.0265	0.0615
Horizon Bulk Density (kg/m3)	38.8117	85.1040	206.2187	600.1737	831.0327	1125.0609
<2mm BD (kg/m3)		62.9718	185.9990	527.0655	705.2203	1007.2635
Horizon Depth (m)	0.0303	0.0125	0.0819	0.1338	0.1231	0.2597
<2mm (kg/m2)		0.7871	15.2287	70.4950	86.8303	261.5737
C%		42.1932	28.3070	3.9798	2.6061	1.0361
C (kg/m2)		0.3321	4.3108	2.8056	2.2629	2.7102
N%		2.0262	1.1801	0.1958	0.1530	0.0735
N (kg/m2)		0.0159	0.1797	0.1380	0.1328	0.1921

Table A100

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
West Mtn. Rd. Pasture	114	5/31/07	100	Pasture

Horizon	**Oi**	**Oe**	**Oa**	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)			1.5679	1.4576	1.8067	2.7579
Air Dry sub (kg)			0.6392	1.1827	1.3974	2.2393
Field Moist Total (kg)	0.6086	1.6570	14.5660	23.9160	24.6160	64.3320
Air Dry Total (kg)	0.3559	0.5997	5.9382	19.4060	19.0398	52.2330
Sieved sub (kg)	—		0.5955	1.0733	1.2378	2.1038
Sieved Total (kg)	—	0.5780	5.5328	17.6102	16.8647	49.0739
Sieved Oven Dry (kg)	—	0.5232	5.1800	17.2514	16.5807	48.6944
Rocks wt (kg)	0.0000	0.0000	0.0000	1.9290	2.8290	7.3290
Roots weight (kg)	0.0000	0.0000	0.1992	0.1414	0.0305	0.0313
Rock Vol (m3)	0.0000	0.0000	0.0000	0.0007	0.0011	0.0028
Root Vol (m3)	0.0000	0.0000	0.0004	0.0003	0.0001	0.0001
Total Horizon Vol (m3)	0.0075	0.0038	0.0284	0.0196	0.0224	0.0548
Soil Vol (m3)	0.0075	0.0038	0.0280	0.0186	0.0213	0.0519
Horizon Bulk Density (kg/m3)	47.4467	156.6563	211.8413	1043.7222	894.2170	1005.7156
<2mm BD (kg/m3)		136.6766	184.7938	927.8432	778.7244	937.5821
Horizon Depth (m)	0.0300	0.0153	0.1138	0.0784	0.0897	0.2191
<2mm (kg/m2)		2.0929	21.0203	72.7777	69.8418	205.3891
C%		46.2595	32.8144	2.6041	3.3353	2.0770
C (kg/m2)		0.9681	6.8977	1.8952	2.3294	4.2660
N%		2.0242	1.1720	0.0989	0.1497	0.1058
N (kg/m2)		0.0424	0.2464	0.0720	0.1045	0.2174

Table A101

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
Moore Farm Pasture	125	6/7/07	125	Pasture

Horizon	**Oi**	**Oe**	**Oa**	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)			2.5576	1.0774	1.8576	3.7578
Air Dry sub (kg)			1.2052	0.8131	1.3838	3.0120
Field Moist Total (kg)	0.2478	0.8978	2.5576	37.2450	31.6160	173.3060
Air Dry Total (kg)	0.1339	0.3269	1.2052	28.1087	23.5527	138.9119
Sieved sub (kg)	—		1.0921	0.7548	1.0206	2.2616
Sieved Total (kg)	—	0.2991	1.0921	26.0909	17.3699	104.3052
Sieved Oven Dry (kg)	—	0.2830	1.0599	26.0282	17.3425	104.2054
Rocks wt (kg)	0.0000	0.0000	0.0000	4.5290	4.0790	10.9290
Roots weight (kg)	0.0000	0.0000	0.0000	0.2489	0.1130	0.0820
Rock Vol (m3)	0.0000	0.0000	0.0000	0.0017	0.0015	0.0041
Root Vol (m3)	0.0000	0.0000	0.0000	0.0005	0.0002	0.0002
Total Horizon Vol (m3)	0.0008	0.0013	0.0047	0.0288	0.0233	0.0830
Soil Vol (m3)	0.0008	0.0013	0.0047	0.0266	0.0215	0.0788
Horizon Bulk Density (kg/m3)	171.4048	261.4880	257.1072	1056.2626	1094.8830	1763.8387
<2mm BD (kg/m3)		226.3864	226.1108	978.0836	806.1916	1323.1520
Horizon Depth (m)	0.0031	0.0050	0.0188	0.1153	0.0931	0.3322
<2mm (kg/m2)		1.1319	4.2396	112.7853	75.0766	439.5346
C%		33.4565	22.1707	3.0691	1.6019	1.6144
C (kg/m2)		0.3787	0.9399	3.4615	1.2027	7.0958
N%		1.9924	1.5789	0.2843	0.1494	0.1272
N (kg/m2)		0.0226	0.0669	0.3207	0.1122	0.5592

Table A102

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
Moore Farm Pasture	126	6/7/07	125	Pasture

Horizon	**Oi**	**Oe**	**Oa**	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)			3.5155	1.2075	1.4069	3.8075
Air Dry sub (kg)			1.5170	0.8367	1.0005	3.1229
Field Moist Total (kg)	0.9077	2.1066	3.5155	25.9660	28.7870	87.4610
Air Dry Total (kg)	0.2771	0.7002	1.5170	17.9917	20.4718	71.7348
Sieved sub (kg)	—		1.2556	0.7712	0.7694	2.0217
Sieved Total (kg)	—	0.5303	1.2556	16.5836	15.7436	46.4397
Sieved Oven Dry (kg)	—	0.0342	1.2225	16.5130	15.6873	46.3652
Rocks wt (kg)	0.0000	0.0000	0.0000	5.7290	6.1290	15.0580
Roots weight (kg)	0.0000	0.0000	0.0000	0.1644	0.0738	0.0770
Rock Vol (m3)	0.0000	0.0000	0.0000	0.0022	0.0023	0.0057
Root Vol (m3)	0.0000	0.0000	0.0000	0.0003	0.0002	0.0002
Total Horizon Vol (m3)	0.0056	0.0075	0.0047	0.0235	0.0241	0.0703
Soil Vol (m3)	0.0056	0.0075	0.0047	0.0210	0.0217	0.0645
Horizon Bulk Density (kg/m3)	49.2622	93.3560	323.6160	855.9986	944.3877	1112.6312
<2mm BD (kg/m3)		4.5551	260.7926	785.6443	723.6757	719.1409
Horizon Depth (m)	0.0225	0.0300	0.0188	0.0941	0.0966	0.2813
<2mm (kg/m2)		0.1367	4.8899	73.8997	69.8799	202.2584
C%		42.5851	27.8244	3.7133	2.8583	1.2238
C (kg/m2)		0.0582	1.3606	2.7441	2.5949	5.7812
N%		2.5162	1.8022	0.3236	0.2336	0.1151
N (kg/m2)		0.0034	0.0881	0.2391	0.1632	0.2328

Table A103

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
Moore Farm Pasture	127	6/7/07	125	Pasture

Horizon	**Oi**	**Oe**	**Oa**	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)			2.9082	1.6076	1.4070	3.3079
Air Dry sub (kg)			1.0516	1.0809	1.0290	2.7329
Field Moist Total (kg)	0.3979	1.0272	2.9082	25.5870	32.4870	86.4320
Air Dry Total (kg)	0.1506	0.3062	1.0516	17.2041	23.7595	71.4080
Sieved sub (kg)	—		0.9474	0.8246	0.7939	1.8471
Sieved Total (kg)	—	0.2603	0.9474	13.1247	18.3305	48.2623
Sieved Oven Dry (kg)	—	0.2466	0.9131	13.0792	18.2839	48.2301
Rocks wt (kg)	0.0000	0.0000	0.0000	5.8290	7.2290	8.0290
Roots weight (kg)	0.0000	0.0000	0.0000	0.1235	0.1389	0.0760
Rock Vol (m3)	0.0000	0.0000	0.0000	0.0022	0.0027	0.0030
Root Vol (m3)	0.0000	0.0000	0.0000	0.0003	0.0003	0.0002
Total Horizon Vol (m3)	0.0056	0.0021	0.0053	0.0216	0.0259	0.0580
Soil Vol (m3)	0.0056	0.0021	0.0053	0.0192	0.0228	0.0548
Horizon Bulk Density (kg/m3)	26.7787	145.1710	197.9539	896.5535	1039.8938	1303.4501
<2mm BD (kg/m3)		116.8961	171.8712	681.5944	800.2397	880.3701
Horizon Depth (m)	0.0225	0.0084	0.0213	0.0866	0.1034	0.2319
<2mm (kg/m2)		0.9863	3.6523	59.0005	82.7748	204.1358
C%		44.7536	31.6784	4.4096	2.2715	0.7172
C (kg/m2)		0.4414	1.1570	2.6017	1.8803	1.4641
N%		2.5393	2.0595	0.3412	0.1699	0.0788
N (kg/m2)		0.0250	0.0752	0.2013	0.1406	0.1609

Table A104

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
Brown's Forest	152	6/17/07	250	Native Forest

Horizon	**Oi**	**Oe**	**Oa**	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)			0.8056	1.0691	0.7458	1.5256
Air Dry sub (kg)			0.4680	0.8242	0.5306	1.1454
Field Moist Total (kg)	0.4476	0.9701	0.8056	26.7660	26.8950	163.8800
Air Dry Total (kg)	0.1842	0.3017	0.4680	20.6348	19.1326	123.0437
Sieved sub (kg)	—		0.3530	0.5970	0.4898	0.8022
Sieved Total (kg)	—	0.2024	0.3530	14.9470	17.6632	86.1746
Sieved Oven Dry (kg)	—	0.1878	0.3429	14.7462	17.4746	84.8737
Rocks wt (kg)	0.0000	0.0000	0.0000	1.4490	1.5290	54.3950
Roots weight (kg)	0.0000	0.0000	0.0000	0.1562	0.1051	0.1031
Rock Vol (m3)	0.0000	0.0000	0.0000	0.0005	0.0006	0.0205
Root Vol (m3)	0.0000	0.0000	0.0000	0.0003	0.0002	0.0002
Total Horizon Vol (m3)	0.0068	0.0036	0.0011	0.0237	0.0243	0.1466
Soil Vol (m3)	0.0068	0.0036	0.0011	0.0228	0.0235	0.1259
Horizon Bulk Density (kg/m3)	27.1022	83.9541	427.8491	904.7754	813.9610	977.2825
<2mm BD (kg/m3)		52.2548	313.4630	646.5763	743.4244	674.1144
Horizon Depth (m)	0.0272	0.0144	0.0044	0.0947	0.0972	0.5866
<2mm (kg/m2)		0.7512	1.3714	61.2227	72.2516	395.4102
C%		30.3906	15.4887	3.7453	3.2199	2.1556
C (kg/m2)		0.2283	0.2124	2.2930	2.3264	8.5233
N%		1.7790	0.5566	0.2494	0.1574	0.1197
N (kg/m2)		0.0134	0.0076	0.1527	0.1137	0.4735

Table A105

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
Brown's Forest	153	6/17/07	250	Native Forest

Horizon	**Oi**	**Oe**	**Oa**	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)			1.5557	1.9056	1.8073	2.9062
Air Dry sub (kg)			0.6514	1.2948	1.3022	2.3794
Field Moist Total (kg)	0.3570	1.1068	1.5557	27.4160	25.2870	195.8800
Air Dry Total (kg)	0.1849	0.3585	0.6514	18.6284	18.2205	160.3705
Sieved sub (kg)	—		0.4811	1.1612	1.0705	1.7602
Sieved Total (kg)	—	0.1944	0.4811	16.7055	14.9778	118.6412
Sieved Oven Dry (kg)	—	0.1772	0.4518	16.3224	14.6833	117.2619
Rocks wt (kg)	0.0000	0.0000	0.0000	0.9290	1.7290	43.7450
Roots weight (kg)	0.0000	0.0000	0.0000	0.1014	0.1079	0.1214
Rock Vol (m3)	0.0000	0.0000	0.0000	0.0004	0.0007	0.0165
Root Vol (m3)	0.0000	0.0000	0.0000	0.0002	0.0002	0.0002
Total Horizon Vol (m3)	0.0038	0.0017	0.0028	0.0254	0.0232	0.1133
Soil Vol (m3)	0.0038	0.0017	0.0028	0.0248	0.0223	0.0965
Horizon Bulk Density (kg/m3)	48.3056	208.5702	231.6089	750.1435	815.9467	1661.4207
<2mm BD (kg/m3)		103.1047	160.6419	657.2842	657.5452	1214.8203
Horizon Depth (m)	0.0153	0.0069	0.0113	0.1016	0.0928	0.4531
<2mm (kg/m2)		0.7088	1.8072	66.7554	61.0284	550.4654
C%		43.6133	22.7961	5.7581	3.5936	1.2860
C (kg/m2)		0.3092	0.4120	3.8438	2.1931	7.0787
N%		2.2177	1.1075	0.3476	0.2217	0.0800
N (kg/m2)		0.0157	0.0200	0.2321	0.1353	0.4402

Table A106

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
Brown's Forest	154	6/17/07	250	Native Forest

Horizon	**Oi**	**Oe**	**Oa**	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)			6.0129	1.4071	1.2079	2.5064
Air Dry sub (kg)			3.5744	0.9828	0.8653	1.8484
Field Moist Total (kg)	0.5369	0.7473	5.2709	33.4450	30.2160	209.5370
Air Dry Total (kg)	0.2197	0.2393	3.1333	23.3586	21.6454	154.5324
Sieved sub (kg)	—		3.3339	0.8290	0.8000	1.5944
Sieved Total (kg)	—	0.1752	2.9224	19.7046	20.0128	133.2949
Sieved Oven Dry (kg)	—	0.1603	2.8448	19.3537	19.6800	131.0844
Rocks wt (kg)	0.0000	0.0000	0.0000	4.9290	1.1290	23.4580
Roots weight (kg)	0.0000	0.0000	0.0000	0.1430	0.1098	0.5312
Rock Vol (m3)	0.0000	0.0000	0.0000	0.0019	0.0004	0.0089
Root Vol (m3)	0.0000	0.0000	0.0000	0.0003	0.0002	0.0011
Total Horizon Vol (m3)	0.0071	0.0025	0.0066	0.0259	0.0274	0.1516
Soil Vol (m3)	0.0071	0.0025	0.0066	0.0238	0.0268	0.1416
Horizon Bulk Density (kg/m3)	30.9015	95.7360	471.8410	982.0390	808.5084	1091.1238
<2mm BD (kg/m3)		64.1133	428.3924	813.6670	735.0956	925.5618
Horizon Depth (m)	0.0284	0.0100	0.0266	0.1038	0.1097	0.6063
<2mm (kg/m2)		0.6411	11.3792	84.4179	80.6308	561.1219
C%		37.0711	8.0524	3.7191	2.4717	2.1133
C (kg/m2)		0.2377	0.9163	3.1396	1.9929	11.8582
N%		1.9457	0.5332	0.2344	0.1445	0.1316
N (kg/m2)		0.0125	0.0607	0.1979	0.1165	0.7387

Table A107

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
Gifford Woods	155	6/18/07	250	Native Forest

Horizon	**Oi**	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)		1.2075	1.6561	2.3566
Air Dry sub (kg)		0.7852	1.2215	1.9784
Field Moist Total (kg)	0.3182	17.1870	25.3160	137.0850
Air Dry Total (kg)	0.1366	11.1762	18.6724	115.0861
Sieved sub (kg)	—	0.7183	0.9938	1.8811
Sieved Total (kg)	—	10.2235	15.1914	109.4260
Sieved Oven Dry (kg)	—	9.9970	14.8571	107.6387
Rocks wt (kg)	0.0000	25.0870	3.2790	103.3450
Roots weight (kg)	0.0000	0.1754	0.0956	0.5760
Rock Vol (m3)	0.0000	0.0095	0.0012	0.0390
Root Vol (m3)	0.0000	0.0006	0.0003	0.0020
Total Horizon Vol (m3)	0.0067	0.0251	0.0245	0.1541
Soil Vol (m3)	0.0067	0.0150	0.0230	0.1132
Horizon Bulk Density (kg/m3)	20.3327	744.7304	813.0936	1017.0387
<2mm BD (kg/m3)		666.1551	646.9558	951.2241
Horizon Depth (m)	0.0269	0.1003	0.0981	0.6166
<2mm (kg/m2)		66.8237	63.4825	586.4891
C%		5.8834	3.0508	1.7944
C (kg/m2)		3.9315	1.9367	10.5242
N%		0.4275	0.2269	0.1163
N (kg/m2)		0.2857	0.1441	0.6821

Table A108

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
Gifford Woods	156	6/18/07	250	Native Forest

Horizon	**Oi**	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)		1.7570	1.5074	2.7070
Air Dry sub (kg)		0.8736	0.9768	1.9128
Field Moist Total (kg)	0.7074	22.6870	25.7160	68.0320
Air Dry Total (kg)	0.1269	11.2798	16.6635	48.0720
Sieved sub (kg)	—	0.8289	0.8732	1.8172
Sieved Total (kg)	—	10.7033	14.8966	45.6703
Sieved Oven Dry (kg)	—	10.4202	14.4114	44.8383
Rocks wt (kg)	0.0000	1.2290	2.7290	90.1870
Roots weight (kg)	0.0000	0.1940	0.2244	0.2749
Rock Vol (m3)	0.0000	0.0005	0.0010	0.0340
Root Vol (m3)	0.0000	0.0004	0.0005	0.0006
Total Horizon Vol (m3)	0.0030	0.0241	0.0266	0.1125
Soil Vol (m3)	0.0030	0.0232	0.0251	0.0779
Horizon Bulk Density (kg/m3)	42.7318	486.1360	664.5484	617.0473
<2mm BD (kg/m3)		449.0864	574.7351	575.5402
Horizon Depth (m)	0.0119	0.0963	0.1063	0.4500
<2mm (kg/m2)		43.2246	61.0656	258.9931
C%		7.1076	3.6930	1.8942
C (kg/m2)		3.0722	2.2552	4.9060
N%		0.4852	0.2888	0.1252
N (kg/m2)		0.2097	0.1764	0.3241

Table A109

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
Gifford Woods	157	6/18/07	250	Native Forest

Horizon	**Oi**	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)		1.2061	1.0461	1.2063
Air Dry sub (kg)		0.8537	0.9830	0.8220
Field Moist Total (kg)	0.1576	24.7660	26.5160	17.2870
Air Dry Total (kg)	0.0745	17.5291	24.9166	11.7802
Sieved sub (kg)	—	0.7532	0.9213	0.7733
Sieved Total (kg)	—	15.4667	23.3525	11.0816
Sieved Oven Dry (kg)	—	15.2764	23.0737	10.9670
Rocks wt (kg)	0.0000	2.5290	4.9790	37.0790
Roots weight (kg)	0.0000	0.1628	0.2425	0.1184
Rock Vol (m3)	0.0000	0.0010	0.0019	0.0140
Root Vol (m3)	0.0000	0.0003	0.0005	0.0002
Total Horizon Vol (m3)	0.0045	0.0254	0.0239	0.0398
Soil Vol (m3)	0.0045	0.0241	0.0215	0.0256
Horizon Bulk Density (kg/m3)	16.4370	727.2201	1157.1477	459.9834
<2mm BD (kg/m3)		633.7641	1071.5612	428.2272
Horizon Depth (m)	0.0181	0.1016	0.0956	0.1594
<2mm (kg/m2)		64.3667	102.4680	68.2487
C%		4.0844	1.9373	1.1997
C (kg/m2)		2.6290	1.9851	0.8188
N%		0.3132	0.1626	0.0975
N (kg/m2)		0.2016	0.1666	0.0665

Table A110

Site Name	Plot #	Date Sampled	Age (yr)	Use
Eleva Corn	203	7/11/07	0	Plowed

Horizon	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)	1.6087	1.6079	2.7085
Air Dry sub (kg)	1.5544	1.5146	2.5408
Field Moist Total (kg)	35.1160	47.5450	207.4380
Air Dry Total (kg)	33.9309	44.7852	194.5911
Sieved sub (kg)	1.5476	1.5091	2.5269
Sieved Total (kg)	33.7838	44.6253	193.5334
Sieved Oven Dry (kg)	33.5620	44.3348	191.3259
Rocks wt (kg)	0.3290	0.3290	28.4580
Roots weight (kg)	0.0170	0.0000	0.0000
Rock Vol (m3)	0.0001	0.0001	0.0107
Root Vol (m3)	0.0000	0.0000	0.0000
Total Horizon Vol (m3)	0.0225	0.0277	0.1455
Soil Vol (m3)	0.0223	0.0276	0.1347
Horizon Bulk Density (kg/m3)	1518.7551	1622.0525	1444.3056
<2mm BD (kg/m3)	1502.2423	1605.7382	1420.0703
Horizon Depth (m)	0.0900	0.1109	0.5819
<2mm (kg/m2)	135.2018	178.1366	826.3034
C%	1.2134	0.9666	0.3445
C (kg/m2)	1.6406	1.7219	2.8463
N%	0.1330	0.1358	0.0526
N (kg/m2)	0.1799	0.2420	0.4343

Table A111

Site Name	Plot #	Date Sampled	Age (yr)	Use
Eleva Corn	204	7/11/07	0	Plowed

Horizon	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)	1.7086	2.9087	2.1088
Air Dry sub (kg)	1.5599	2.6855	1.8118
Field Moist Total (kg)	37.8450	47.7450	215.6800
Air Dry Total (kg)	34.5505	44.0821	185.3051
Sieved sub (kg)	1.5547	2.6822	1.7845
Sieved Total (kg)	34.4349	44.0274	182.5069
Sieved Oven Dry (kg)	34.1753	43.7433	181.1916
Rocks wt (kg)	0.0290	0.0290	14.6080
Roots weight (kg)	0.1551	0.0034	0.0025
Rock Vol (m3)	0.0000	0.0000	0.0055
Root Vol (m3)	0.0003	0.0000	0.0000
Total Horizon Vol (m3)	0.0260	0.0250	0.1110
Soil Vol (m3)	0.0257	0.0250	0.1055
Horizon Bulk Density (kg/m3)	1344.9939	1764.5408	1756.4776
<2mm BD (kg/m3)	1330.3860	1750.9788	1717.4858
Horizon Depth (m)	0.1041	0.1000	0.4441
<2mm (kg/m2)	138.4433	175.0979	762.6710
C%	1.9983	1.0658	0.4795
C (kg/m2)	2.7666	1.8662	3.6570
N%	0.2137	0.1311	0.0485
N (kg/m2)	0.2959	0.2295	0.3697

Table A112

Site Name	Plot #	Date Sampled	Age (yr)	Use
Eleva Corn	205	7/11/07	0	Plowed

Horizon	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)	2.0060	2.2064	2.4088
Air Dry sub (kg)	1.8195	2.0295	2.2150
Field Moist Total (kg)	40.1450	46.8450	237.8960
Air Dry Total (kg)	36.4125	43.0895	218.7552
Sieved sub (kg)	1.8164	2.0261	2.1633
Sieved Total (kg)	36.3498	43.0178	213.6453
Sieved Oven Dry (kg)	36.1433	42.7140	211.6452
Rocks wt (kg)	0.0290	0.0000	15.2580
Roots weight (kg)	0.0445	0.0000	0.0023
Rock Vol (m3)	0.0000	0.0000	0.0058
Root Vol (m3)	0.0001	0.0000	0.0000
Total Horizon Vol (m3)	0.0247	0.0259	0.1124
Soil Vol (m3)	0.0246	0.0259	0.1067
Horizon Bulk Density (kg/m3)	1481.0420	1661.2827	2050.9697
<2mm BD (kg/m3)	1470.0926	1646.8046	1984.3092
Horizon Depth (m)	0.0988	0.1038	0.4497
<2mm (kg/m2)	145.1716	170.8560	892.3190
C%	1.3933	0.5308	0.1881
C (kg/m2)	2.0226	0.9068	1.6789
N%	0.1592	0.0680	0.0358
N (kg/m2)	0.2311	0.1162	0.3195

Table A113

Site Name	Plot #	Date Sampled	Age (yr)	Use
Gale Corn	209	7/13/07	0	Plowed

Horizon	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)	1.9082	2.0084	2.5083
Air Dry sub (kg)	1.6177	1.6952	2.1130
Field Moist Total (kg)	42.9450	31.9160	272.0990
Air Dry Total (kg)	36.4079	26.9389	229.2135
Sieved sub (kg)	1.6140	1.6905	2.1014
Sieved Total (kg)	36.3237	26.8644	227.9584
Sieved Oven Dry (kg)	35.9350	26.5970	224.7808
Rocks wt (kg)	0.0000	0.0000	3.4290
Roots weight (kg)	0.0080	0.0000	0.0000
Rock Vol (m3)	0.0000	0.0000	0.0013
Root Vol (m3)	0.0000	0.0000	0.0000
Total Horizon Vol (m3)	0.0314	0.0193	0.1442
Soil Vol (m3)	0.0314	0.0193	0.1429
Horizon Bulk Density (kg/m3)	1159.8570	1396.0231	1603.7350
<2mm BD (kg/m3)	1144.7932	1378.3061	1572.7210
Horizon Depth (m)	0.1256	0.0772	0.5769
<2mm (kg/m2)	143.8146	106.3880	907.2634
C%	1.4987	1.0900	0.3866
C (kg/m2)	2.1554	1.1596	3.5076
N%	0.1626	0.1263	0.0521
N (kg/m2)	0.2339	0.1343	0.4729

Table A114

Site Name	Plot #	Date Sampled	Age (yr)	Use
Gale Corn	210	7/13/07	0	Plowed

Horizon	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)	1.0767	2.0083	2.7086
Air Dry sub (kg)	1.0097	1.8160	2.4342
Field Moist Total (kg)	39.2160	46.1450	162.5010
Air Dry Total (kg)	36.7743	41.7261	146.0419
Sieved sub (kg)	1.0063	1.8069	2.3983
Sieved Total (kg)	36.6519	41.5160	143.8874
Sieved Oven Dry (kg)	36.3069	41.1259	141.9003
Rocks wt (kg)	0.0290	0.0290	13.8580
Roots weight (kg)	0.0573	0.0026	0.0054
Rock Vol (m3)	0.0000	0.0000	0.0052
Root Vol (m3)	0.0001	0.0000	0.0000
Total Horizon Vol (m3)	0.0266	0.0252	0.0850
Soil Vol (m3)	0.0265	0.0251	0.0798
Horizon Bulk Density (kg/m3)	1387.0339	1659.7516	1831.0249
<2mm BD (kg/m3)	1369.4045	1635.8786	1779.0989
Horizon Depth (m)	0.1066	0.1006	0.3400
<2mm (kg/m2)	145.9272	164.6103	604.8936
C%	1.2355	0.7296	0.2369
C (kg/m2)	1.8029	1.2010	1.4330
N%	0.1308	0.1033	0.0474
N (kg/m2)	0.1908	0.1700	0.2868

Table A115

Site Name	Plot #	Date Sampled	Age (yr)	Use
Gale Corn	211	7/13/07	0	Plowed

Horizon	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)	1.3061	1.9062	2.6067
Air Dry sub (kg)	1.1373	1.7133	2.3226
Field Moist Total (kg)	43.4450	45.9450	187.7510
Air Dry Total (kg)	37.8300	41.2958	167.2923
Sieved sub (kg)	1.1340	1.7119	2.3029
Sieved Total (kg)	37.7189	41.2613	165.8691
Sieved Oven Dry (kg)	37.3629	40.8766	163.7277
Rocks wt (kg)	-0.0010	0.0000	1.1690
Roots weight (kg)	0.0437	0.0061	0.0075
Rock Vol (m3)	0.0000	0.0000	0.0004
Root Vol (m3)	0.0001	0.0000	0.0000
Total Horizon Vol (m3)	0.0330	0.0267	0.1066
Soil Vol (m3)	0.0329	0.0267	0.1062
Horizon Bulk Density (kg/m3)	1150.5492	1546.2946	1575.4915
<2mm BD (kg/m3)	1136.3438	1530.5968	1541.9212
Horizon Depth (m)	0.1319	0.1069	0.4266
<2mm (kg/m2)	149.8553	163.5825	657.7258
C%	1.3351	0.8559	0.2526
C (kg/m2)	2.0007	1.4002	1.6612
N%	0.1607	0.0943	0.0427
N (kg/m2)	0.2408	0.1542	0.2808

Table A116

Site Name	Plot #	Date Sampled	Age (yr)	Use
Ocker's Acres	242	7/27/07	0	Plowed

Horizon	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)	0.8085	0.7085	1.4086
Air Dry sub (kg)	0.7064	0.6708	1.1320
Field Moist Total (kg)	44.3450	48.5450	395.4150
Air Dry Total (kg)	38.7479	45.9632	317.7665
Sieved sub (kg)	0.6951	0.6621	1.0602
Sieved Total (kg)	38.1248	45.3691	297.6189
Sieved Oven Dry (kg)	37.8982	45.1474	296.8751
Rocks wt (kg)	0.2490	0.0000	10.8580
Roots weight (kg)	0.0520	0.0015	0.0000
Rock Vol (m3)	0.0001	0.0000	0.0041
Root Vol (m3)	0.0001	0.0000	0.0000
Total Horizon Vol (m3)	0.0249	0.0292	0.1979
Soil Vol (m3)	0.0247	0.0292	0.1938
Horizon Bulk Density (kg/m3)	1567.3516	1573.2326	1639.7190
<2mm BD (kg/m3)	1532.9818	1545.3100	1531.9163
Horizon Depth (m)	0.0997	0.1169	0.7916
<2mm (kg/m2)	152.8191	180.6081	1212.6075
C%	2.0676	0.6003	0.9222
C (kg/m2)	3.1597	1.0842	11.1831
N%	0.1722	0.0520	0.0655
N (kg/m2)	0.2631	0.0939	0.7938

Table A117

Site Name	Plot #	Date Sampled	Age (yr)	Use
Ocker's Acres	243	7/27/07	0	Plowed

Horizon	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)	0.9287	1.0687	1.3529
Air Dry sub (kg)	0.7981	0.9426	1.2509
Field Moist Total (kg)	48.9450	51.9450	251.3380
Air Dry Total (kg)	42.0631	45.8153	232.3850
Sieved sub (kg)	0.7838	0.9319	1.2016
Sieved Total (kg)	41.3073	45.2947	223.2299
Sieved Oven Dry (kg)	40.8273	44.8219	221.5917
Rocks wt (kg)	0.1490	0.1290	9.0290
Roots weight (kg)	0.0219	0.0009	0.0010
Rock Vol (m3)	0.0001	0.0000	0.0034
Root Vol (m3)	0.0000	0.0000	0.0000
Total Horizon Vol (m3)	0.0262	0.0259	0.1345
Soil Vol (m3)	0.0261	0.0258	0.1311
Horizon Bulk Density (kg/m3)	1613.4090	1775.1802	1772.2800
<2mm BD (kg/m3)	1566.0069	1736.6897	1689.9651
Horizon Depth (m)	0.1047	0.1034	0.5381
<2mm (kg/m2)	163.9413	179.6388	909.4125
C%	0.8938	1.0574	0.4644
C (kg/m2)	1.4653	1.8996	4.2234
N%	0.0846	0.0911	0.0447
N (kg/m2)	0.1386	0.1636	0.4068

Table A118

Site Name	Plot #	Date Sampled	Age (yr)	Use
Ocker's Acres	244	7/27/07	0	Plowed

Horizon	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)	1.4082	0.9488	1.1087
Air Dry sub (kg)	1.2512	0.8787	1.0193
Field Moist Total (kg)	47.1450	53.4740	482.8500
Air Dry Total (kg)	41.8894	49.5275	443.9245
Sieved sub (kg)	1.2425	0.8709	0.9969
Sieved Total (kg)	41.5971	49.0834	434.1473
Sieved Oven Dry (kg)	41.1825	48.6349	430.9166
Rocks wt (kg)	0.0190	0.0590	2.2790
Roots weight (kg)	0.0352	0.0028	0.0416
Rock Vol (m3)	0.0000	0.0000	0.0009
Root Vol (m3)	0.0001	0.0000	0.0001
Total Horizon Vol (m3)	0.0268	0.0282	0.2100
Soil Vol (m3)	0.0267	0.0282	0.2091
Horizon Bulk Density (kg/m3)	1567.8413	1757.8393	2123.4808
<2mm BD (kg/m3)	1541.3850	1726.1598	2061.2589
Horizon Depth (m)	0.1072	0.1128	0.8400
<2mm (kg/m2)	165.2172	194.7324	1731.4574
C%	2.1716	0.7591	0.7552
C (kg/m2)	3.5879	1.4781	13.0754
N%	0.1649	0.0586	0.0607
N (kg/m2)	0.2725	0.1141	1.0507

Table A119

Site Name	Plot #	Date Sampled	Age (yr)	Use
Welch's Farm	254	8/1/07	0	Plowed

Horizon	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)	0.7674	0.8470	0.7876
Air Dry sub (kg)	0.6158	0.7028	0.7081
Field Moist Total (kg)	39.4450	39.1450	242.9250
Air Dry Total (kg)	31.6525	32.4820	218.4043
Sieved sub (kg)	0.6025	0.6867	0.7027
Sieved Total (kg)	30.9704	31.7351	216.7325
Sieved Oven Dry (kg)	30.3763	31.2274	215.0021
Rocks wt (kg)	0.4290	0.4290	0.3890
Roots weight (kg)	0.0135	0.0023	0.0146
Rock Vol (m3)	0.0002	0.0002	0.0001
Root Vol (m3)	0.0000	0.0000	0.0000
Total Horizon Vol (m3)	0.0259	0.0241	0.1363
Soil Vol (m3)	0.0257	0.0239	0.1362
Horizon Bulk Density (kg/m3)	1229.3174	1359.3141	1604.1256
<2mm BD (kg/m3)	1179.7523	1306.8138	1579.1378
Horizon Depth (m)	0.1038	0.0963	0.5453
<2mm (kg/m2)	122.3993	125.7808	861.1236
C%	2.9832	2.6573	0.6264
C (kg/m2)	3.6515	3.3423	5.3938
N%	0.2418	0.1872	0.0487
N (kg/m2)	0.2959	0.2354	0.4197

Table A120

Site Name	Plot #	Date Sampled	Age (yr)	Use
Welch's Farm	255	8/1/07	0	Plowed

Horizon	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)	1.1171	1.5076	1.2609
Air Dry sub (kg)	0.8612	1.0233	1.2362
Field Moist Total (kg)	40.3950	41.0160	235.1960
Air Dry Total (kg)	31.1418	27.8392	230.5758
Sieved sub (kg)	0.8363	1.0187	1.2123
Sieved Total (kg)	30.2396	27.7144	226.1291
Sieved Oven Dry (kg)	29.8025	27.5270	222.8844
Rocks wt (kg)	0.6190	0.3090	0.2790
Roots weight (kg)	-0.0214	0.0006	0.0009
Rock Vol (m3)	0.0002	0.0001	0.0001
Root Vol (m3)	0.0000	0.0000	0.0000
Total Horizon Vol (m3)	0.0305	0.0242	0.1363
Soil Vol (m3)	0.0303	0.0240	0.1361
Horizon Bulk Density (kg/m3)	1026.3783	1158.1189	1693.6314
<2mm BD (kg/m3)	982.2372	1145.1280	1637.1361
Horizon Depth (m)	0.1221	0.0966	0.5450
<2mm (kg/m2)	119.9557	110.6480	892.2392
C%	3.3312	1.2163	0.7905
C (kg/m2)	3.9960	1.3458	7.0534
N%	0.2652	0.0712	0.0587
N (kg/m2)	0.3181	0.0788	0.5238

Table A121

Site Name	Plot #	Date Sampled	Age (yr)	Use
Welch's Farm	256	8/1/07	0	Plowed

Horizon	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)	0.8083	0.7287	1.5284
Air Dry sub (kg)	0.5889	0.5939	1.4118
Field Moist Total (kg)	23.4160	42.7450	304.8410
Air Dry Total (kg)	17.0609	34.8368	281.5922
Sieved sub (kg)	0.5754	0.5825	1.4052
Sieved Total (kg)	16.6692	34.1698	280.2818
Sieved Oven Dry (kg)	16.2830	33.3071	278.2220
Rocks wt (kg)	0.4190	0.3790	0.4890
Roots weight (kg)	0.0120	0.0006	0.0005
Rock Vol (m3)	0.0002	0.0001	0.0002
Root Vol (m3)	0.0000	0.0000	0.0000
Total Horizon Vol (m3)	0.0254	0.0295	0.1490
Soil Vol (m3)	0.0252	0.0294	0.1488
Horizon Bulk Density (kg/m3)	676.8028	1185.4506	1892.4360
<2mm BD (kg/m3)	645.9456	1133.3956	1869.7865
Horizon Depth (m)	0.1016	0.1181	0.5959
<2mm (kg/m2)	65.6038	133.8824	1114.2759
C%	3.3140	2.9317	0.9547
C (kg/m2)	2.1741	3.9250	10.6379
N%	0.2511	0.2238	0.0687
N (kg/m2)	0.1647	0.2996	0.7652

Table A122

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
Mindock Red Pines	239	7/25/07	20	Cultivation

Horizon	**Oi**	**Oe**	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)			0.7282	0.9282	1.2782
Air Dry sub (kg)			0.6736	0.8420	1.2055
Field Moist Total (kg)	1.6676	1.0605	30.9660	34.0790	181.2440
Air Dry Total (kg)	0.6596	0.4561	28.6462	30.9135	170.9370
Sieved sub (kg)	—		0.6472	0.8042	1.1496
Sieved Total (kg)	—	0.4246	27.5240	29.5249	163.0121
Sieved Oven Dry (kg)	—	0.4082	27.2243	29.1867	161.8652
Rocks wt (kg)	0.0000	0.0000	3.0790	4.0290	9.4290
Roots weight (kg)	0.0000	0.0000	0.1704	0.0856	0.1045
Rock Vol (m3)	0.0000	0.0000	0.0012	0.0015	0.0036
Root Vol (m3)	0.0000	0.0000	0.0003	0.0002	0.0002
Total Horizon Vol (m3)	0.0118	0.0020	0.0266	0.0227	0.1020
Soil Vol (m3)	0.0118	0.0020	0.0251	0.0210	0.0983
Horizon Bulk Density (kg/m3)	55.9148	224.5218	1143.4244	1469.3105	1739.6412
<2mm BD (kg/m3)		200.9660	1086.6699	1387.2381	1647.3166
Horizon Depth (m)	0.0472	0.0081	0.1063	0.0909	0.4081
<2mm (kg/m2)		1.6328	115.4587	126.1520	672.3111
C%		19.2161	3.2954	2.0729	0.6676
C (kg/m2)		0.3138	3.8048	2.6150	4.4881
N%		0.6813	0.2888	0.1862	0.0595
N (kg/m2)		0.0111	0.3335	0.2349	0.4003

Table A123

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
Mindock Red Pines	240	7/25/07	20	Cultivation

Horizon	**Oi**	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)		0.8288	0.9084	1.1085
Air Dry sub (kg)		0.7204	0.8488	1.0417
Field Moist Total (kg)	1.3575	25.8870	38.7160	193.9510
Air Dry Total (kg)	0.7783	22.5033	36.1775	182.2584
Sieved sub (kg)	—	0.6492	0.7328	0.9679
Sieved Total (kg)	—	20.2768	31.2305	169.3393
Sieved Oven Dry (kg)	—	20.0501	30.9614	168.1854
Rocks wt (kg)	0.0000	5.8290	7.6290	9.0290
Roots weight (kg)	0.0000	0.0850	0.0503	0.1741
Rock Vol (m3)	0.0000	0.0022	0.0029	0.0034
Root Vol (m3)	0.0000	0.0002	0.0001	0.0004
Total Horizon Vol (m3)	0.0133	0.0226	0.0297	0.1339
Soil Vol (m3)	0.0133	0.0202	0.0267	0.1301
Horizon Bulk Density (kg/m3)	58.6022	1113.7352	1354.6514	1400.4362
<2mm BD (kg/m3)		992.3235	1159.3380	1292.3020
Horizon Depth (m)	0.0531	0.0903	0.1188	0.5356
<2mm (kg/m2)		89.6192	137.6714	692.1893
C%		3.4398	2.4397	0.5373
C (kg/m2)		3.0827	3.3588	3.7189
N%		0.2737	0.2075	0.0595
N (kg/m2)		0.2453	0.2856	0.4122

Table A124

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
Mindock Red Pines	241	7/25/07	20	Cultivation

Horizon	**Oi**	**Oe**	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)			0.8789	1.1483	1.5882
Air Dry sub (kg)			0.7976	1.0666	1.5172
Field Moist Total (kg)	0.2188	0.2285	31.5160	38.0450	219.5800
Air Dry Total (kg)	0.1786	0.1934	28.6006	35.3387	209.7706
Sieved sub (kg)	—		0.7640	1.0302	1.4644
Sieved Total (kg)	—	0.1617	27.3957	34.1343	202.4650
Sieved Oven Dry (kg)	—	0.1531	27.1301	33.8804	201.3876
Rocks wt (kg)	0.0000	0.0000	2.3790	0.3290	14.4290
Roots weight (kg)	0.0000	0.0000	0.0560	0.1181	0.0856
Rock Vol (m3)	0.0000	0.0000	0.0009	0.0001	0.0054
Root Vol (m3)	0.0000	0.0000	0.0001	0.0002	0.0002
Total Horizon Vol (m3)	0.0050	0.0013	0.0259	0.0277	0.2231
Soil Vol (m3)	0.0050	0.0013	0.0249	0.0274	0.2175
Horizon Bulk Density (kg/m3)	35.3962	154.7200	1147.4371	1291.1800	964.4379
<2mm BD (kg/m3)		122.4768	1088.4437	1237.8980	925.8965
Horizon Depth (m)	0.0202	0.0050	0.1038	0.1109	0.8925
<2mm (kg/m2)		0.6124	112.9260	137.3293	826.3626
C%		15.4001	3.2212	3.7493	0.4070
C (kg/m2)		0.0943	3.6376	5.1489	3.3631
N%		0.6941	0.2801	0.2285	0.0595
N (kg/m2)		0.0043	0.3163	0.3137	0.4921

Table A125

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
Henderson Red Pines	233	7/23/07	30	Cultivation

Horizon	**Oi**	**Oe**	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)			1.2565	0.8664	2.3063
Air Dry sub (kg)			0.6930	0.8093	0.9357
Field Moist Total (kg)	0.6839	0.5669	30.3660	41.4160	518.7210
Air Dry Total (kg)	0.5556	0.4648	16.7477	38.6828	210.4510
Sieved sub (kg)	—		0.6898	0.8041	0.9277
Sieved Total (kg)	—	0.4489	16.6709	38.4342	208.6652
Sieved Oven Dry (kg)	—	0.4285	16.5736	38.2887	208.4007
Rocks wt (kg)	0.0000	0.0000	0.0290	1.7790	0.0000
Roots weight (kg)	0.0000	0.0000	0.0910	0.7135	0.1628
Rock Vol (m3)	0.0000	0.0000	0.0000	0.0007	0.0000
Root Vol (m3)	0.0000	0.0000	0.0002	0.0015	0.0003
Total Horizon Vol (m3)	0.0080	0.0020	0.0248	0.0283	0.2209
Soil Vol (m3)	0.0080	0.0020	0.0246	0.0262	0.2206
Horizon Bulk Density (kg/m3)	69.0417	237.9878	679.4963	1479.0124	953.9699
<2mm BD (kg/m3)		219.4047	672.4313	1463.9437	944.6758
Horizon Depth (m)	0.0322	0.0078	0.0994	0.1131	0.8838
<2mm (kg/m2)		1.7141	66.8229	165.6086	834.8573
C%		34.9434	2.3201	2.3976	0.2178
C (kg/m2)		0.5990	1.5504	3.9706	1.8179
N%		1.1139	0.1610	0.1369	0.0194
N (kg/m2)		0.0191	0.1076	0.2267	0.1620

Table A126

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
Henderson Red Pines	234	7/23/07	30	Cultivation

Horizon	**Oi**	**Oe**	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)			0.8587	1.3886	1.2286
Air Dry sub (kg)			0.8064	1.3114	1.1958
Field Moist Total (kg)	0.2986	0.2666	34.0160	38.4160	268.4960
Air Dry Total (kg)	0.2680	0.2381	31.9437	36.2813	261.3302
Sieved sub (kg)	—		0.8033	1.3079	1.1935
Sieved Total (kg)	—	0.2275	31.8225	36.1847	260.8276
Sieved Oven Dry (kg)	—	0.2105	31.6190	35.9862	258.9525
Rocks wt (kg)	0.0000	0.0000	0.0000	0.0000	0.5590
Roots weight (kg)	0.0000	0.0000	0.0269	0.1726	0.0565
Rock Vol (m3)	0.0000	0.0000	0.0000	0.0000	0.0002
Root Vol (m3)	0.0000	0.0000	0.0001	0.0004	0.0001
Total Horizon Vol (m3)	0.0045	0.0028	0.0259	0.0275	0.1563
Soil Vol (m3)	0.0045	0.0028	0.0259	0.0271	0.1560
Horizon Bulk Density (kg/m3)	59.1360	84.6542	1234.1802	1336.4290	1675.1736
<2mm BD (kg/m3)		74.8271	1221.6344	1325.5600	1659.9318
Horizon Depth (m)	0.0181	0.0113	0.1038	0.1100	0.6253
<2mm (kg/m2)		0.8418	126.7446	145.8116	1037.9761
C%		25.3827	2.6412	1.6234	0.5344
C (kg/m2)		0.2137	3.3476	2.3671	5.5470
N%		1.0812	0.1893	0.1135	0.0485
N (kg/m2)		0.0091	0.2399	0.1655	0.5032

Table A127

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
Henderson Red Pines	235	7/23/07	30	Cultivation

Horizon	**Oi**	**Oe**	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)			0.8481	1.0085	1.4086
Air Dry sub (kg)			0.6927	0.9209	1.2785
Field Moist Total (kg)	0.3282	0.9085	24.1870	37.4160	203.3800
Air Dry Total (kg)	0.2622	0.7025	19.7553	34.1680	184.5965
Sieved sub (kg)	—		0.6903	0.9186	1.2749
Sieved Total (kg)	—	0.6501	19.6863	34.0809	184.0767
Sieved Oven Dry (kg)	—	0.6238	19.5391	33.8314	183.3931
Rocks wt (kg)	0.0000	0.0000	0.0000	0.0000	0.0000
Roots weight (kg)	0.0000	0.0000	0.0704	0.0421	0.0247
Rock Vol (m3)	0.0000	0.0000	0.0000	0.0000	0.0000
Root Vol (m3)	0.0000	0.0000	0.0001	0.0001	0.0001
Total Horizon Vol (m3)	0.0060	0.0034	0.0212	0.0257	0.1303
Soil Vol (m3)	0.0060	0.0034	0.0210	0.0256	0.1303
Horizon Bulk Density (kg/m3)	43.5848	209.1222	939.4671	1333.7950	1417.1155
<2mm BD (kg/m3)		185.6817	929.1820	1320.6515	1407.8776
Horizon Depth (m)	0.0241	0.0134	0.0847	0.1028	0.5213
<2mm (kg/m2)		2.4951	78.6901	135.7795	733.8562
C%		31.8331	3.4071	1.5307	0.4642
C (kg/m2)		0.7943	2.6811	2.0783	3.4068
N%		1.3164	0.2264	0.0991	0.0368
N (kg/m2)		0.0328	0.1782	0.1345	0.2702

Table A128

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
Norway Plantation	200	7/10/07	40	Cultivation

Horizon	**Oi**	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)		3.1290	1.6067	1.9067
Air Dry sub (kg)		2.6175	1.4670	1.7873
Field Moist Total (kg)	0.3565	36.0450	39.0450	127.7350
Air Dry Total (kg)	0.2400	30.1525	35.6515	119.7381
Sieved sub (kg)	—	2.5839	1.4623	1.7778
Sieved Total (kg)	—	29.7655	35.5373	119.1017
Sieved Oven Dry (kg)	—	29.3067	35.1672	117.6090
Rocks wt (kg)	0.0000	0.0190	0.2890	6.1290
Roots weight (kg)	0.0000	0.0925	0.0563	0.0780
Rock Vol (m3)	0.0000	0.0000	0.0001	0.0023
Root Vol (m3)	0.0000	0.0002	0.0001	0.0002
Total Horizon Vol (m3)	0.0015	0.0263	0.0250	0.0662
Soil Vol (m3)	0.0015	0.0261	0.0248	0.0637
Horizon Bulk Density (kg/m3)	161.6573	1153.8357	1438.9513	1879.7182
<2mm BD (kg/m3)		1121.4727	1419.4024	1846.2943
Horizon Depth (m)	0.0059	0.1053	0.1000	0.2647
<2mm (kg/m2)		118.1051	141.9402	488.6910
C%		2.3112	1.1243	0.4596
C (kg/m2)		2.7296	1.5959	2.2459
N%		0.2214	0.1168	0.0845
N (kg/m2)		0.2615	0.1658	0.4127

Table A129

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
Norway Plantation	201	7/10/07	40	Cultivation

Horizon	**Oi**	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)		1.7081	2.3084	2.8077
Air Dry sub (kg)		1.4870	2.0897	2.5949
Field Moist Total (kg)	1.2078	26.7160	41.5450	163.5800
Air Dry Total (kg)	0.4781	23.2567	37.6095	151.1826
Sieved sub (kg)	—	1.4809	2.0824	2.5891
Sieved Total (kg)	—	23.1611	37.4770	150.8418
Sieved Oven Dry (kg)	—	22.8297	37.0607	149.2227
Rocks wt (kg)	0.0000	0.0000	0.0690	4.2290
Roots weight (kg)	0.0000	0.0399	0.0732	0.4038
Rock Vol (m3)	0.0000	0.0000	0.0000	0.0016
Root Vol (m3)	0.0000	0.0001	0.0001	0.0008
Total Horizon Vol (m3)	0.0071	0.0252	0.0288	0.1061
Soil Vol (m3)	0.0071	0.0252	0.0286	0.1037
Horizon Bulk Density (kg/m3)	67.2422	924.6081	1316.1818	1458.2472
<2mm BD (kg/m3)		907.6331	1296.9760	1439.3425
Horizon Depth (m)	0.0284	0.1009	0.1150	0.4244
<2mm (kg/m2)		91.6142	149.1522	610.8210
C%		4.3928	1.3605	0.6265
C (kg/m2)		4.0244	2.0292	3.8266
N%		0.3392	0.1614	0.0619
N (kg/m2)		0.3108	0.2408	0.3782

Table A130

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
Norway Plantation	202	7/10/07	40	Cultivation

Horizon	**Oi**	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)		1.3292	2.2594	1.7093
Air Dry sub (kg)		1.1936	2.1173	1.5595
Field Moist Total (kg)	0.3268	31.5160	42.0950	176.2930
Air Dry Total (kg)	0.1914	28.3015	39.4481	160.8351
Sieved sub (kg)	—	1.1898	2.1066	1.5392
Sieved Total (kg)	—	28.2100	39.2476	158.7435
Sieved Oven Dry (kg)	—	27.9016	38.9279	156.7952
Rocks wt (kg)	0.0000	0.0090	0.0690	12.4580
Roots weight (kg)	0.0000	0.1024	0.1842	0.2526
Rock Vol (m3)	0.0000	0.0000	0.0000	0.0047
Root Vol (m3)	0.0000	0.0002	0.0004	0.0005
Total Horizon Vol (m3)	0.0040	0.0263	0.0288	0.1108
Soil Vol (m3)	0.0040	0.0261	0.0284	0.1056
Horizon Bulk Density (kg/m3)	48.0301	1083.6930	1387.7271	1523.5679
<2mm BD (kg/m3)		1068.3796	1369.4281	1485.2988
Horizon Depth (m)	0.0159	0.1053	0.1153	0.4431
<2mm (kg/m2)		112.5137	157.9122	658.1730
C%		2.8826	0.9036	0.4178
C (kg/m2)		3.2433	1.4268	2.7500
N%		0.2370	0.0954	0.0572
N (kg/m2)		0.2666	0.1506	0.3767

Table A131

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
Gale Red Pine	206	7/12/07	40	Cultivation

Horizon	**Oi**	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)		1.0059	1.2567	2.9065
Air Dry sub (kg)		0.8911	1.1770	2.6995
Field Moist Total (kg)	1.2629	35.0160	29.5660	190.9960
Air Dry Total (kg)	0.7551	31.0175	27.6916	177.3970
Sieved sub (kg)	—	0.8870	1.1703	2.6872
Sieved Total (kg)	—	30.8768	27.5347	176.5855
Sieved Oven Dry (kg)	—	30.6147	27.2631	174.2626
Rocks wt (kg)	0.0000	0.2790	0.1790	1.2190
Roots weight (kg)	0.0000	0.4675	0.1523	0.1061
Rock Vol (m3)	0.0000	0.0001	0.0001	0.0005
Root Vol (m3)	0.0000	0.0010	0.0003	0.0002
Total Horizon Vol (m3)	0.0051	0.0278	0.0220	0.1227
Soil Vol (m3)	0.0051	0.0268	0.0216	0.1220
Horizon Bulk Density (kg/m3)	148.7006	1159.3754	1283.5073	1454.3148
<2mm BD (kg/m3)		1144.3214	1263.6486	1428.6186
Horizon Depth (m)	0.0203	0.1113	0.0878	0.4906
<2mm (kg/m2)		127.3058	110.9641	700.9160
C%		1.5823	1.0938	0.4591
C (kg/m2)		2.0144	1.2137	3.2182
N%		0.1600	0.1128	0.0697
N (kg/m2)		0.2037	0.1252	0.4884

Table A132

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
Gale Red Pine	207	7/12/07	40	Cultivation

Horizon	**Oi**	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)		1.7081	1.9085	2.3087
Air Dry sub (kg)		1.6293	1.8144	2.0967
Field Moist Total (kg)	0.9371	27.9160	41.3450	213.4250
Air Dry Total (kg)	0.6929	26.6283	39.3058	193.8295
Sieved sub (kg)	—	1.6203	1.8085	2.0930
Sieved Total (kg)	—	26.4799	39.1793	193.4902
Sieved Oven Dry (kg)	—	26.1765	38.8498	190.3888
Rocks wt (kg)	0.0000	0.0000	0.0000	0.0000
Roots weight (kg)	0.0000	0.0471	0.2009	0.2425
Rock Vol (m3)	0.0000	0.0000	0.0000	0.0000
Root Vol (m3)	0.0000	0.0001	0.0004	0.0005
Total Horizon Vol (m3)	0.0090	0.0236	0.0296	0.1513
Soil Vol (m3)	0.0090	0.0235	0.0292	0.1508
Horizon Bulk Density (kg/m3)	77.1183	1133.2278	1346.1076	1285.0566
<2mm BD (kg/m3)		1113.9998	1330.4897	1262.2454
Horizon Depth (m)	0.0359	0.0944	0.1184	0.6053
<2mm (kg/m2)		105.1337	157.5799	764.0529
C%		1.8805	0.7183	0.4296
C (kg/m2)		1.9770	1.1319	3.2825
N%		0.1725	0.0876	0.0418
N (kg/m2)		0.1814	0.1380	0.3191

Table A133

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
Gale Red Pine	208	7/12/07	40	Cultivation

Horizon	**Oi**	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)		1.7064	1.9566	2.1565
Air Dry sub (kg)		1.5887	1.8618	2.0152
Field Moist Total (kg)	0.7739	44.4240	39.1950	87.2610
Air Dry Total (kg)	0.6562	41.3578	37.2942	81.5446
Sieved sub (kg)	—	1.5859	1.8591	1.9809
Sieved Total (kg)	—	41.2857	37.2403	80.1566
Sieved Oven Dry (kg)	—	40.8803	36.8887	79.0539
Rocks wt (kg)	0.0000	0.1490	0.1590	4.6290
Roots weight (kg)	0.0000	0.0762	0.0463	0.0398
Rock Vol (m3)	0.0000	0.0001	0.0001	0.0017
Root Vol (m3)	0.0000	0.0002	0.0001	0.0001
Total Horizon Vol (m3)	0.0038	0.0325	0.0238	0.0472
Soil Vol (m3)	0.0038	0.0323	0.0236	0.0454
Horizon Bulk Density (kg/m3)	174.9920	1280.8910	1580.5624	1797.7355
<2mm BD (kg/m3)		1266.1022	1563.3755	1742.8258
Horizon Depth (m)	0.0150	0.1300	0.0950	0.1888
<2mm (kg/m2)		164.5933	148.5207	328.9584
C%		1.6372	0.6766	0.2945
C (kg/m2)		2.6948	1.0049	0.9689
N%		0.1184	0.0668	0.0355
N (kg/m2)		0.1948	0.0993	0.1168

Table A134

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
Lukatch Red Pines	230	7/22/07	50	Cultivation

Horizon	**Oi**	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)		1.3583	1.3586	2.3082
Air Dry sub (kg)		1.2283	1.2232	2.2584
Field Moist Total (kg)	1.4671	26.7870	37.4450	184.4640
Air Dry Total (kg)	0.8278	24.2218	33.7120	180.4826
Sieved sub (kg)	—	1.1727	1.1416	1.9689
Sieved Total (kg)	—	23.1251	31.4633	157.3507
Sieved Oven Dry (kg)	—	22.8939	31.2156	156.4391
Rocks wt (kg)	0.0000	3.0290	5.2290	61.9160
Roots weight (kg)	0.0000	0.0629	0.0456	0.0692
Rock Vol (m3)	0.0000	0.0011	0.0020	0.0234
Root Vol (m3)	0.0000	0.0001	0.0001	0.0001
Total Horizon Vol (m3)	0.0091	0.0214	0.0313	0.1481
Soil Vol (m3)	0.0091	0.0201	0.0293	0.1246
Horizon Bulk Density (kg/m3)	90.5616	1202.9766	1152.0759	1448.2700
<2mm BD (kg/m3)		1137.0274	1066.7638	1255.3348
Horizon Depth (m)	0.0366	0.0856	0.1253	0.5925
<2mm (kg/m2)		97.3580	133.6788	743.7859
C%		3.0780	1.4681	0.5445
C (kg/m2)		2.9967	1.9625	4.0498
N%		0.2282	0.1066	0.0406
N (kg/m2)		0.2222	0.1425	0.3023

Table A135

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
Lukatch Red Pines	231	7/22/07	50	Cultivation

Horizon	**Oi**	**Oe**	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)			1.1101	0.8600	1.7099
Air Dry sub (kg)			0.8579	0.7104	1.6615
Field Moist Total (kg)	0.3101	1.2596	37.4450	35.4950	177.3930
Air Dry Total (kg)	0.2430	0.9930	28.9387	29.3220	172.3666
Sieved sub (kg)	—		0.8366	0.6944	1.5370
Sieved Total (kg)	—	0.9091	28.2195	28.6616	159.4516
Sieved Oven Dry (kg)	—	0.8862	27.8992	28.4233	158.3173
Rocks wt (kg)	0.0000	0.0000	4.2290	3.6790	27.3870
Roots weight (kg)	0.0000	0.0000	0.0580	0.0905	0.1768
Rock Vol (m3)	0.0000	0.0000	0.0016	0.0014	0.0103
Root Vol (m3)	0.0000	0.0000	0.0001	0.0002	0.0004
Total Horizon Vol (m3)	0.0038	0.0009	0.0283	0.0244	0.0918
Soil Vol (m3)	0.0038	0.0009	0.0266	0.0228	0.0811
Horizon Bulk Density (kg/m3)	63.4645	1155.4444	1089.2719	1285.9292	2125.3184
<2mm BD (kg/m3)		1031.1785	1050.1442	1246.5197	1952.0867
Horizon Depth (m)	0.0153	0.0034	0.1131	0.0975	0.3672
<2mm (kg/m2)		3.5447	118.7976	121.5357	716.7818
C%		8.0306	2.5160	1.4722	0.6656
C (kg/m2)		0.2847	2.9889	1.7893	4.7708
N%		0.4037	0.1902	0.1250	0.0742
N (kg/m2)		0.0143	0.2260	0.1519	0.5322

Table A136

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
Lukatch Red Pines	232	7/22/07	50	Cultivation

Horizon	**Oi**	**Oe**	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)			1.3982	2.0084	1.5186
Air Dry sub (kg)			1.1859	1.4326	1.3965
Field Moist Total (kg)	0.6770	1.1082	42.4450	43.1450	283.4540
Air Dry Total (kg)	0.4932	0.7780	36.0013	30.7767	260.6597
Sieved sub (kg)	—		1.1097	1.3482	1.3182
Sieved Total (kg)	—	0.7369	33.6892	28.9636	246.0446
Sieved Oven Dry (kg)	—	0.7082	33.3993	28.7459	244.4690
Rocks wt (kg)	0.0000	0.0000	6.0790	4.4290	43.1870
Roots weight (kg)	0.0000	0.0000	0.0595	0.1499	0.1634
Rock Vol (m3)	0.0000	0.0000	0.0023	0.0017	0.0163
Root Vol (m3)	0.0000	0.0000	0.0001	0.0003	0.0003
Total Horizon Vol (m3)	0.0076	0.0023	0.0300	0.0255	0.1474
Soil Vol (m3)	0.0076	0.0023	0.0276	0.0236	0.1308
Horizon Bulk Density (kg/m3)	65.0860	343.3710	1305.1195	1305.7692	1992.9398
<2mm BD (kg/m3)		312.5754	1210.7917	1219.6090	1869.1499
Horizon Depth (m)	0.0303	0.0091	0.1200	0.1022	0.5897
<2mm (kg/m2)		2.8327	145.2950	124.6288	1102.2143
C%		13.2419	2.9700	1.5091	0.4954
C (kg/m2)		0.3751	4.3153	1.8808	5.4604
N%		0.5357	0.2147	0.1075	0.0440

Table A137

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
Milkhouse Red Pines	236	7/24/07	50	Cultivation

Horizon	**Oi**	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)		0.5783	0.6579	1.0985
Air Dry sub (kg)		0.4789	0.5443	1.0294
Field Moist Total (kg)	0.9668	27.7160	33.8950	278.3990
Air Dry Total (kg)	0.6915	22.9551	28.0406	260.8885
Sieved sub (kg)	—	0.4755	0.5426	1.0248
Sieved Total (kg)	—	22.7902	27.9510	259.7303
Sieved Oven Dry (kg)	—	22.4265	27.6308	257.9863
Rocks wt (kg)	0.0000	0.0290	0.0000	0.4690
Roots weight (kg)	0.0000	0.0783	0.1241	0.5026
Rock Vol (m3)	0.0000	0.0000	0.0000	0.0002
Root Vol (m3)	0.0000	0.0002	0.0003	0.0010
Total Horizon Vol (m3)	0.0084	0.0266	0.0262	0.1654
Soil Vol (m3)	0.0084	0.0264	0.0259	0.1642
Horizon Bulk Density (kg/m3)	82.7203	869.7808	1081.8663	1588.9573
<2mm BD (kg/m3)		849.7498	1066.0546	1571.2812
Horizon Depth (m)	0.0334	0.1063	0.1047	0.6616
<2mm (kg/m2)		90.2859	111.6026	1039.5007
C%		4.6820	2.1268	0.9351
C (kg/m2)		4.2272	2.3735	9.7207
N%		0.2917	0.2065	0.0774
N (kg/m2)		0.2634	0.2305	0.8045

Table A138

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
Milkhouse Red Pines	237	7/24/07	50	Cultivation

Horizon	**Oi**	**Oe**	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)			0.5089	0.6884	1.0890
Air Dry sub (kg)			0.4460	0.5965	0.9683
Field Moist Total (kg)	0.5083	0.5074	27.1160	36.6160	289.4410
Air Dry Total (kg)	0.3540	0.3327	23.7657	31.7297	257.3603
Sieved sub (kg)	—		0.4431	0.5940	0.9671
Sieved Total (kg)	—	0.3000	23.6079	31.5940	257.0494
Sieved Oven Dry (kg)	—	0.2834	23.1106	31.3215	255.4253
Rocks wt (kg)	0.0000	0.0000	0.0000	0.0000	0.0000
Roots weight (kg)	0.0000	0.0000	0.1682	0.0619	0.1532
Rock Vol (m3)	0.0000	0.0000	0.0000	0.0000	0.0000
Root Vol (m3)	0.0000	0.0000	0.0003	0.0001	0.0003
Total Horizon Vol (m3)	0.0095	0.0022	0.0240	0.0280	0.1735
Soil Vol (m3)	0.0095	0.0022	0.0236	0.0278	0.1732
Horizon Bulk Density (kg/m3)	37.3893	153.1810	1005.2605	1139.6147	1485.8865
<2mm BD (kg/m3)		130.4665	977.5531	1124.9546	1474.7147
Horizon Depth (m)	0.0379	0.0087	0.0959	0.1119	0.6941
<2mm (kg/m2)		1.1334	93.7840	125.8543	1023.5442
C%		22.0461	3.2900	1.8724	0.2982
C (kg/m2)		0.2499	3.0855	2.3565	3.0525
N%		0.8904	0.2252	0.1260	0.0311
N (kg/m2)		0.0101	0.2112	0.1585	0.3187

Table A139

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
Milkhouse Red Pines	238	7/24/07	50	Cultivation

Horizon	**Oi**	**Oe**	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)			0.8280	0.8286	1.0478
Air Dry sub (kg)			0.7040	0.7617	1.0136
Field Moist Total (kg)	0.4486	0.2281	30.6160	35.8160	188.6510
Air Dry Total (kg)	0.3630	0.1700	26.0300	32.9259	182.5040
Sieved sub (kg)	—		0.7016	0.7596	1.0125
Sieved Total (kg)	—	0.1529	25.9409	32.8338	182.3005
Sieved Oven Dry (kg)	—	0.1446	25.6035	32.6032	181.6002
Rocks wt (kg)	0.0000	0.0000	0.0000	0.0090	0.0000
Roots weight (kg)	0.0000	0.0000	0.0673	0.1013	0.3403
Rock Vol (m3)	0.0000	0.0000	0.0000	0.0000	0.0000
Root Vol (m3)	0.0000	0.0000	0.0001	0.0002	0.0007
Total Horizon Vol (m3)	0.0063	0.0015	0.0256	0.0251	0.1148
Soil Vol (m3)	0.0063	0.0015	0.0255	0.0249	0.1141
Horizon Bulk Density (kg/m3)	58.0864	114.5128	1021.2785	1324.0237	1599.9082
<2mm BD (kg/m3)		97.4110	1004.5445	1311.0460	1591.9850
Horizon Depth (m)	0.0250	0.0059	0.1025	0.1003	0.4591
<2mm (kg/m2)		0.5784	102.9658	131.5143	730.8206
C%		23.0222	4.4048	1.5994	0.5779
C (kg/m2)		0.1332	4.5355	2.1034	4.2235
N%		0.7120	0.2672	0.1273	0.0365
N (kg/m2)		0.0041	0.2751	0.1674	0.2667

Table A140

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
Behgin's Woodlot	212	7/14/07	60	Woodlot

Horizon	**Oi**	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)		1.8574	1.5072	3.2572
Air Dry sub (kg)		1.7544	1.4428	3.0976
Field Moist Total (kg)	0.8739	36.1740	33.6450	213.1750
Air Dry Total (kg)	0.5470	34.1682	32.2085	202.7238
Sieved sub (kg)	—	1.7469	1.4361	3.0720
Sieved Total (kg)	—	34.0222	32.0576	201.0517
Sieved Oven Dry (kg)	—	33.7278	31.8798	199.6127
Rocks wt (kg)	0.0000	0.0000	0.0000	18.1580
Roots weight (kg)	0.0000	0.1132	0.0749	0.1772
Rock Vol (m3)	0.0000	0.0000	0.0000	0.0069
Root Vol (m3)	0.0000	0.0002	0.0002	0.0004
Total Horizon Vol (m3)	0.0090	0.0275	0.0238	0.1202
Soil Vol (m3)	0.0090	0.0273	0.0237	0.1130
Horizon Bulk Density (kg/m3)	60.8835	1252.9997	1360.4194	1793.6839
<2mm BD (kg/m3)		1236.8490	1346.5336	1766.1570
Horizon Depth (m)	0.0359	0.1100	0.0953	0.4809
<2mm (kg/m2)		136.0534	128.3415	849.4111
C%		2.0280	0.5418	0.1998
C (kg/m2)		2.7592	0.6953	1.6969
N%		0.1575	0.0662	0.0297
N (kg/m2)		0.2143	0.0850	0.2520

Table A141

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
Behgin's Woodlot	213	7/14/07	60	Woodlot

Horizon	**Oi**	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)		1.6090	1.6087	3.0082
Air Dry sub (kg)		1.5022	1.5119	2.8484
Field Moist Total (kg)	0.3285	31.6160	39.0160	244.8380
Air Dry Total (kg)	0.2080	29.5180	36.6687	231.8326
Sieved sub (kg)	—	1.4958	1.5066	2.8328
Sieved Total (kg)	—	29.3919	36.5395	230.5613
Sieved Oven Dry (kg)	—	29.1120	36.3862	229.3386
Rocks wt (kg)	0.0000	0.0000	0.0000	14.3580
Roots weight (kg)	0.0000	0.1958	0.0332	0.1691
Rock Vol (m3)	0.0000	0.0000	0.0000	0.0054
Root Vol (m3)	0.0000	0.0004	0.0001	0.0003
Total Horizon Vol (m3)	0.0057	0.0279	0.0269	0.1133
Soil Vol (m3)	0.0057	0.0275	0.0268	0.1075
Horizon Bulk Density (kg/m3)	36.4782	1073.7233	1367.8635	2156.2170
<2mm BD (kg/m3)		1058.9533	1357.3248	2133.0215
Horizon Depth (m)	0.0228	0.1116	0.1075	0.4531
<2mm (kg/m2)		118.1395	145.9124	966.5254
C%		2.3491	0.6578	0.1043
C (kg/m2)		2.7752	0.9598	1.0077
N%		0.2111	0.0836	0.0632
N (kg/m2)		0.2494	0.1220	0.6107

Table A142

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
Behgin's Woodlot	214	7/14/07	60	Woodlot

Horizon	**Oi**	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)		1.7076	1.8583	2.5082
Air Dry sub (kg)		1.5681	1.7587	2.4036
Field Moist Total (kg)	0.9081	32.9160	31.9160	139.5850
Air Dry Total (kg)	0.4038	30.2265	30.2064	133.7595
Sieved sub (kg)	—	1.5604	1.7457	2.3943
Sieved Total (kg)	—	30.0773	29.9824	133.2436
Sieved Oven Dry (kg)	—	29.8982	29.8528	132.4122
Rocks wt (kg)	0.0000	0.3290	0.6290	6.6290
Roots weight (kg)	0.0000	0.0619	0.1060	0.0813
Rock Vol (m3)	0.0000	0.0001	0.0002	0.0025
Root Vol (m3)	0.0000	0.0001	0.0002	0.0002
Total Horizon Vol (m3)	0.0064	0.0250	0.0238	0.0973
Soil Vol (m3)	0.0064	0.0247	0.0234	0.0947
Horizon Bulk Density (kg/m3)	63.0260	1221.2886	1292.2729	1412.8068
<2mm BD (kg/m3)		1208.0272	1277.1447	1398.5763
Horizon Depth (m)	0.0256	0.1000	0.0953	0.3894
<2mm (kg/m2)		120.8027	121.7279	544.5706
C%		2.6166	0.6517	0.2683
C (kg/m2)		3.1609	0.7933	1.4611
N%		0.2031	0.0488	0.0388
N (kg/m2)		0.2454	0.0594	0.2115

Table A143

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
Blackhawk Garden	215	7/15/07	80	Cultivation

Horizon	**Oi**	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)		1.9567	1.5966	3.5069
Air Dry sub (kg)		1.8056	1.5162	3.2941
Field Moist Total (kg)	0.4535	29.9660	35.9160	266.0120
Air Dry Total (kg)	0.3653	27.6523	34.1080	249.8739
Sieved sub (kg)	—	1.8012	1.5122	3.2912
Sieved Total (kg)	—	27.5844	34.0191	249.6531
Sieved Oven Dry (kg)	—	27.3725	33.8654	248.1691
Rocks wt (kg)	0.0000	0.0000	0.0000	0.0000
Roots weight (kg)	0.0000	0.2281	0.3098	0.3784
Rock Vol (m3)	0.0000	0.0000	0.0000	0.0000
Root Vol (m3)	0.0000	0.0005	0.0006	0.0008
Total Horizon Vol (m3)	0.0048	0.0268	0.0238	0.1205
Soil Vol (m3)	0.0048	0.0263	0.0232	0.1198
Horizon Bulk Density (kg/m3)	76.6489	1050.1597	1470.4101	2086.1944
<2mm BD (kg/m3)		1039.5335	1459.9518	2071.9613
Horizon Depth (m)	0.0191	0.1072	0.0953	0.4822
<2mm (kg/m2)		111.4250	139.1517	999.0739
C%		2.6007	0.9517	0.2347
C (kg/m2)		2.8978	1.3244	2.3452
N%		0.2240	0.0854	0.0345
N (kg/m2)		0.2496	0.1189	0.3445

Table A144

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
Blackhawk Garden	216	7/15/07	80	Cultivation

Horizon	**Oi**	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)		1.8086	2.4581	3.4084
Air Dry sub (kg)		1.6896	2.3304	2.8613
Field Moist Total (kg)	0.2488	41.0450	38.1160	133.3150
Air Dry Total (kg)	0.1879	38.3428	36.1354	111.9184
Sieved sub (kg)	—	1.6848	2.3233	2.8585
Sieved Total (kg)	—	38.2355	36.0258	111.8081
Sieved Oven Dry (kg)	—	38.0380	35.6920	110.7453
Rocks wt (kg)	0.0000	0.0000	0.0000	0.0000
Roots weight (kg)	0.0000	0.4357	0.0591	0.1590
Rock Vol (m3)	0.0000	0.0000	0.0000	0.0000
Root Vol (m3)	0.0000	0.0009	0.0001	0.0003
Total Horizon Vol (m3)	0.0023	0.0323	0.0238	0.0995
Soil Vol (m3)	0.0023	0.0315	0.0236	0.0992
Horizon Bulk Density (kg/m3)	82.9263	1218.9713	1529.2555	1128.1299
<2mm BD (kg/m3)		1209.2798	1510.4928	1116.3053
Horizon Depth (m)	0.0091	0.1294	0.0950	0.3981
<2mm (kg/m2)		156.4506	143.4968	444.4290
C%		1.2038	0.6709	0.2545
C (kg/m2)		1.8834	0.9627	1.1312
N%		0.0958	0.0626	0.0395
N (kg/m2)		0.1498	0.0898	0.1756

Table A145

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
Blackhawk Garden	217	7/15/07	80	Cultivation

Horizon	**Oi**	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)		2.1086	1.8083	2.7085
Air Dry sub (kg)		1.7356	1.7796	2.6313
Field Moist Total (kg)	0.4087	30.5160	3.0160	176.9220
Air Dry Total (kg)	0.3083	25.1179	2.9680	171.8799
Sieved sub (kg)	—	1.7297	1.7762	2.6280
Sieved Total (kg)	—	25.0324	2.9623	171.6643
Sieved Oven Dry (kg)	—	24.6965	2.9398	170.6246
Rocks wt (kg)	0.0000	0.0000	0.0000	0.0000
Roots weight (kg)	0.0000	0.1069	0.0917	0.0327
Rock Vol (m3)	0.0000	0.0000	0.0000	0.0000
Root Vol (m3)	0.0000	0.0002	0.0002	0.0001
Total Horizon Vol (m3)	0.0066	0.0205	0.0277	0.1023
Soil Vol (m3)	0.0066	0.0203	0.0275	0.1022
Horizon Bulk Density (kg/m3)	46.9714	1235.5773	107.7413	1681.8180
<2mm BD (kg/m3)		1214.8489	106.7196	1669.5349
Horizon Depth (m)	0.0263	0.0822	0.1109	0.4091
<2mm (kg/m2)		99.8454	11.8392	682.9441
C%		2.6085	0.6665	0.2187
C (kg/m2)		2.6044	0.0789	1.4939
N%		0.2011	0.0722	0.0268
N (kg/m2)		0.2008	0.0085	0.1832

Table A146

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
Blackhawk Old Field	220	7/18/07	80	Cultivation

Horizon	**Oi**	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)		1.0702	1.5302	3.7601
Air Dry sub (kg)		0.9826	1.4528	3.5300
Field Moist Total (kg)	0.4989	31.6160	36.9750	241.0460
Air Dry Total (kg)	0.4193	29.0301	35.1052	226.2983
Sieved sub (kg)	—	0.9742	1.4480	3.2565
Sieved Total (kg)	—	28.7825	34.9897	208.7601
Sieved Oven Dry (kg)	—	28.4550	34.7368	206.1050
Rocks wt (kg)	0.0000	0.0000	0.0000	0.0000
Roots weight (kg)	0.0000	0.2131	0.3511	0.0685
Rock Vol (m3)	0.0000	0.0000	0.0000	0.0000
Root Vol (m3)	0.0000	0.0004	0.0007	0.0001
Total Horizon Vol (m3)	0.0056	0.0252	0.0248	0.1316
Soil Vol (m3)	0.0056	0.0248	0.0241	0.1315
Horizon Bulk Density (kg/m3)	74.5476	1170.5777	1454.9862	1720.8880
<2mm BD (kg/m3)		1147.3902	1439.7186	1567.3275
Horizon Depth (m)	0.0225	0.1009	0.0994	0.5266
<2mm (kg/m2)		115.8147	143.0720	825.2959
C%		1.9848	0.6167	0.1884
C (kg/m2)		2.2987	0.8823	1.5547
N%		0.1743	0.0710	0.0238
N (kg/m2)		0.2019	0.1016	0.1960

Table A147

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
Blackhawk Old Field	221	7/18/07	80	Cultivation

Horizon	**Oi**	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)		1.5084	1.8089	2.0086
Air Dry sub (kg)		1.3601	1.6972	1.9262
Field Moist Total (kg)	0.4075	28.3160	30.1160	168.9220
Air Dry Total (kg)	0.3174	25.5317	28.2571	161.9948
Sieved sub (kg)	—	1.3541	1.6922	1.9233
Sieved Total (kg)	—	25.4200	28.1737	161.7492
Sieved Oven Dry (kg)	—	25.1221	27.9549	159.9928
Rocks wt (kg)	0.0000	0.0000	0.0000	0.0000
Roots weight (kg)	0.0000	0.2049	1.6715	0.1534
Rock Vol (m3)	0.0000	0.0000	0.0000	0.0000
Root Vol (m3)	0.0000	0.0004	0.0034	0.0003
Total Horizon Vol (m3)	0.0074	0.0235	0.0241	0.1055
Soil Vol (m3)	0.0074	0.0231	0.0207	0.1052
Horizon Bulk Density (kg/m3)	42.7655	1105.3741	1368.1919	1539.3757
<2mm BD (kg/m3)		1087.6446	1353.5576	1520.3519
Horizon Depth (m)	0.0297	0.0941	0.0963	0.4222
<2mm (kg/m2)		102.3066	130.2799	641.8736
C%		2.6705	0.6928	0.1488
C (kg/m2)		2.7321	0.9026	0.9553
N%		0.2444	0.0825	0.0339
N (kg/m2)		0.2500	0.1075	0.2179

Table A148

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
Blackhawk Old Field	222	7/18/07	80	Cultivation

Horizon	**Oi**	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)		1.2486	1.4487	3.1585
Air Dry sub (kg)		1.1726	1.3286	2.8573
Field Moist Total (kg)	0.1087	37.4450	34.3160	198.9800
Air Dry Total (kg)	0.0583	35.1632	31.4712	180.0044
Sieved sub (kg)	—	1.1641	1.3245	2.8534
Sieved Total (kg)	—	34.9083	31.3743	179.7587
Sieved Oven Dry (kg)	—	34.5332	31.1660	178.1060
Rocks wt (kg)	0.0000	0.0000	0.0000	0.0000
Roots weight (kg)	0.0000	0.0805	0.1921	0.4228
Rock Vol (m3)	0.0000	0.0000	0.0000	0.0000
Root Vol (m3)	0.0000	0.0002	0.0004	0.0009
Total Horizon Vol (m3)	0.0036	0.0284	0.0235	0.1186
Soil Vol (m3)	0.0036	0.0283	0.0231	0.1177
Horizon Bulk Density (kg/m3)	16.2198	1243.6919	1360.9924	1528.9426
<2mm BD (kg/m3)		1221.4101	1347.7940	1512.8185
Horizon Depth (m)	0.0144	0.1138	0.0941	0.4744
<2mm (kg/m2)		138.9354	126.7769	717.6433
C%		2.3785	0.6032	0.1370
C (kg/m2)		3.3045	0.7647	0.9828
N%		0.2157	0.0791	0.0310
N (kg/m2)		0.2997	0.1002	0.2223

Table A149

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
Blackhawk Sandy Forest	218	7/17/07	130	Cultivation

Horizon	**Oi**	**Oe**	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)			2.1085	1.7085	3.0073
Air Dry sub (kg)			1.8635	1.6017	2.8787
Field Moist Total (kg)	0.2886	0.6477	39.0450	40.0160	203.3220
Air Dry Total (kg)	0.2226	0.5339	34.5076	37.5150	194.6288
Sieved sub (kg)	—		1.7721	1.5272	2.5772
Sieved Total (kg)	—	0.4649	32.8144	35.7694	174.2459
Sieved Oven Dry (kg)	—	0.4430	32.4975	35.4933	173.2588
Rocks wt (kg)	0.0000	0.0000	1.8290	0.4490	13.6580
Roots weight (kg)	0.0000	0.0000	0.1296	0.1124	0.1922
Rock Vol (m3)	0.0000	0.0000	0.0007	0.0002	0.0052
Root Vol (m3)	0.0000	0.0000	0.0003	0.0002	0.0004
Total Horizon Vol (m3)	0.0063	0.0005	0.0310	0.0252	0.1227
Soil Vol (m3)	0.0063	0.0005	0.0301	0.0248	0.1172
Horizon Bulk Density (kg/m3)	35.6112	1139.0080	1147.9132	1515.2916	1660.8209
<2mm BD (kg/m3)		945.1278	1081.0463	1433.6301	1478.4651
Horizon Depth (m)	0.0250	0.0019	0.1241	0.1006	0.4909
<2mm (kg/m2)		1.7721	134.1173	144.2590	725.8340
C%		24.6165	2.4168	0.8910	0.5418
C (kg/m2)		0.4362	3.2414	1.2854	3.9323
N%		1.3230	0.2112	0.1026	0.0843
N (kg/m2)		0.0234	0.2832	0.1480	0.6118

Table A150

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
Blackhawk Sandy Forest	219	7/17/07	130	Cultivation

Horizon	**Oi**	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)		1.4599	1.2299	2.8094
Air Dry sub (kg)		1.3429	1.1860	2.6540
Field Moist Total (kg)	0.3210	42.3950	43.7250	226.4960
Air Dry Total (kg)	0.2602	38.9957	42.1639	213.9684
Sieved sub (kg)	—	1.3307	1.1631	2.6321
Sieved Total (kg)	—	38.6432	41.3497	212.1972
Sieved Oven Dry (kg)	—	38.2761	41.1042	210.3856
Rocks wt (kg)	0.0000	0.0340	0.0290	2.5790
Roots weight (kg)	0.0000	0.0000	0.2055	0.2641
Rock Vol (m3)	0.0000	0.0000	0.0000	0.0010
Root Vol (m3)	0.0000	0.0000	0.0004	0.0005
Total Horizon Vol (m3)	0.0075	0.0305	0.0238	0.0898
Soil Vol (m3)	0.0075	0.0305	0.0233	0.0883
Horizon Bulk Density (kg/m3)	34.6880	1277.1216	1808.0685	2422.3249
<2mm BD (kg/m3)		1253.5535	1762.6284	2381.7643
Horizon Depth (m)	0.0300	0.1222	0.0950	0.3594
<2mm (kg/m2)		153.1686	167.4497	855.9465
C%		2.3297	0.5647	0.2386
C (kg/m2)		3.5683	0.9455	2.0423
N%		0.1436	0.0618	0.0444
N (kg/m2)		0.2199	0.1034	0.3801

Table A151

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
Blackhawk Sandy Forest	223	7/17/07	130	Cultivation

Horizon	**Oi**	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)		1.9083	1.8084	3.1084
Air Dry sub (kg)		1.8004	1.7427	2.8138
Field Moist Total (kg)	0.4085	37.1160	30.9160	121.5190
Air Dry Total (kg)	0.3145	35.0176	29.7935	110.0021
Sieved sub (kg)	—	1.7667	1.6562	2.4299
Sieved Total (kg)	—	34.3627	28.3150	94.9945
Sieved Oven Dry (kg)	—	34.1144	28.1631	94.7151
Rocks wt (kg)	0.0000	0.5290	0.7290	17.2580
Roots weight (kg)	0.0000	0.0175	0.0997	0.0905
Rock Vol (m3)	0.0000	0.0002	0.0003	0.0065
Root Vol (m3)	0.0000	0.0000	0.0002	0.0002
Total Horizon Vol (m3)	0.0085	0.0294	0.0232	0.0842
Soil Vol (m3)	0.0085	0.0291	0.0227	0.0775
Horizon Bulk Density (kg/m3)	36.9321	1201.7145	1311.0656	1418.9832
<2mm BD (kg/m3)		1170.7190	1239.3206	1221.7873
Horizon Depth (m)	0.0341	0.1175	0.0928	0.3369
<2mm (kg/m2)		137.5595	115.0244	411.5896
C%		2.8694	1.1778	0.9304
C (kg/m2)		3.9471	1.3548	3.8293
N%		0.2436	0.1144	0.0865
N (kg/m2)		0.3351	0.1316	0.3560

Table A152

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
Blackhawk Old Oaks	224	7/19/07	130	Cultivation

Horizon	**Oi**	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)		1.5084	1.6082	2.1086
Air Dry sub (kg)		1.4001	1.4971	1.8854
Field Moist Total (kg)	0.3688	25.7160	27.3160	189.0090
Air Dry Total (kg)	0.3053	23.8703	25.4286	169.0062
Sieved sub (kg)	—	1.3938	1.4942	1.8829
Sieved Total (kg)	—	23.7620	25.3791	168.7767
Sieved Oven Dry (kg)	—	23.5319	25.2190	167.0074
Rocks wt (kg)	0.0000	0.0000	0.0000	0.0000
Roots weight (kg)	0.0000	0.0604	0.1686	0.7435
Rock Vol (m3)	0.0000	0.0000	0.0000	0.0000
Root Vol (m3)	0.0000	0.0001	0.0003	0.0015
Total Horizon Vol (m3)	0.0055	0.0233	0.0266	0.1197
Soil Vol (m3)	0.0055	0.0232	0.0263	0.1182
Horizon Bulk Density (kg/m3)	55.0346	1030.7571	966.9866	1430.1838
<2mm BD (kg/m3)		1016.1447	959.0191	1413.2696
Horizon Depth (m)	0.0222	0.0931	0.1066	0.4788
<2mm (kg/m2)		94.6285	102.1955	676.6028
C%		2.6283	0.7237	0.6929
C (kg/m2)		2.4871	0.7396	4.6881
N%		0.2215	0.0736	0.0504
N (kg/m2)		0.2096	0.0752	0.3413

Table A153

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
Blackhawk Old Oaks	225	7/19/07	130	Cultivation

Horizon	**Oi**	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)		0.8593	1.1099	2.4601
Air Dry sub (kg)		0.7500	1.0459	2.3033
Field Moist Total (kg)	0.5547	29.5160	38.9160	233.2670
Air Dry Total (kg)	0.4232	25.7605	36.6744	218.3945
Sieved sub (kg)	—	0.7433	1.0403	2.2514
Sieved Total (kg)	—	25.5314	36.4766	213.4800
Sieved Oven Dry (kg)	—	25.1438	36.1914	211.2493
Rocks wt (kg)	0.0000	0.0000	0.1290	0.1190
Roots weight (kg)	0.0000	0.2835	0.3581	0.4637
Rock Vol (m3)	0.0000	0.0000	0.0000	0.0000
Root Vol (m3)	0.0000	0.0006	0.0007	0.0009
Total Horizon Vol (m3)	0.0070	0.0263	0.0264	0.1148
Soil Vol (m3)	0.0070	0.0257	0.0256	0.1139
Horizon Bulk Density (kg/m3)	60.1941	1003.4583	1431.0736	1918.2157
<2mm BD (kg/m3)		979.4354	1412.2274	1855.4570
Horizon Depth (m)	0.0281	0.1050	0.1056	0.4594
<2mm (kg/m2)		102.8407	149.1665	852.3506
C%		3.0458	0.9414	0.3236
C (kg/m2)		3.1324	1.4042	2.7578
N%		0.2441	0.1016	0.0431
N (kg/m2)		0.2511	0.1515	0.3676

Table A154

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
Blackhawk Old Oaks	226	7/19/07	130	Cultivation

Horizon	**Oi**	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)		1.4570	1.1261	1.8565
Air Dry sub (kg)		1.3179	1.0490	1.7072
Field Moist Total (kg)	0.6154	28.0160	45.4160	215.1670
Air Dry Total (kg)	0.4914	25.3426	42.3069	197.8612
Sieved sub (kg)	—	1.3088	1.0463	1.7041
Sieved Total (kg)	—	25.1674	42.2000	197.4950
Sieved Oven Dry (kg)	—	24.7201	41.7878	194.6166
Rocks wt (kg)	0.0000	0.0000	0.0000	0.0000
Roots weight (kg)	0.0000	0.2762	0.1253	0.1222
Rock Vol (m3)	0.0000	0.0000	0.0000	0.0000
Root Vol (m3)	0.0000	0.0006	0.0003	0.0002
Total Horizon Vol (m3)	0.0063	0.0266	0.0261	0.1205
Soil Vol (m3)	0.0063	0.0260	0.0258	0.1203
Horizon Bulk Density (kg/m3)	77.6470	974.7477	1637.3733	1644.7648
<2mm BD (kg/m3)		950.8066	1617.2826	1617.7935
Horizon Depth (m)	0.0253	0.1063	0.1044	0.4822
<2mm (kg/m2)		101.0232	168.8039	780.0798
C%		2.9795	1.0543	0.2854
C (kg/m2)		3.0100	1.7798	2.2261
N%		0.2216	0.0906	0.0411
N (kg/m2)		0.2239	0.1529	0.3203

Table A155

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
Blackhawk Maples	227	7/20/07	130	Cultivation

Horizon	**Oi**	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)		0.9297	1.0298	2.0098
Air Dry sub (kg)		0.8148	0.9363	1.8501
Field Moist Total (kg)	0.3191	33.5160	39.1250	254.0830
Air Dry Total (kg)	0.2659	29.3720	35.5722	233.8899
Sieved sub (kg)	—	0.8096	0.9195	1.8470
Sieved Total (kg)	—	29.1853	34.9373	233.5005
Sieved Oven Dry (kg)	—	28.7888	34.6372	230.1644
Rocks wt (kg)	0.0000	0.0000	0.0000	0.0000
Roots weight (kg)	0.0000	0.1332	0.1137	0.3784
Rock Vol (m3)	0.0000	0.0000	0.0000	0.0000
Root Vol (m3)	0.0000	0.0003	0.0002	0.0008
Total Horizon Vol (m3)	0.0046	0.0255	0.0243	0.1325
Soil Vol (m3)	0.0046	0.0252	0.0241	0.1318
Horizon Bulk Density (kg/m3)	57.6955	1165.6947	1478.1705	1775.1450
<2mm BD (kg/m3)		1142.5489	1439.3172	1746.8697
Horizon Depth (m)	0.0184	0.1019	0.0972	0.5301
<2mm (kg/m2)		116.3972	139.8836	926.0509
C%		1.8988	0.4158	0.1904
C (kg/m2)		2.2101	0.5816	1.7631
N%		0.1791	0.0599	0.0366
N (kg/m2)		0.2084	0.0837	0.3392

Table A156

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
Blackhawk Maples	228	7/20/07	130	Cultivation

Horizon	**Oi**	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)		0.9685	1.2085	2.0585
Air Dry sub (kg)		0.8378	1.1224	1.9024
Field Moist Total (kg)	0.1882	33.8160	29.6660	230.5250
Air Dry Total (kg)	0.1567	29.2527	27.5527	213.0428
Sieved sub (kg)	—	0.7856	1.1193	1.6191
Sieved Total (kg)	—	27.4304	27.4761	181.3126
Sieved Oven Dry (kg)	—	27.0517	27.2467	178.8348
Rocks wt (kg)	0.0000	0.0000	0.0000	0.0000
Roots weight (kg)	0.0000	0.1111	0.0653	0.0740
Rock Vol (m3)	0.0000	0.0000	0.0000	0.0000
Root Vol (m3)	0.0000	0.0002	0.0001	0.0002
Total Horizon Vol (m3)	0.0053	0.0278	0.0230	0.1248
Soil Vol (m3)	0.0053	0.0276	0.0229	0.1246
Horizon Bulk Density (kg/m3)	29.4984	1060.4226	1202.4574	1709.6125
<2mm BD (kg/m3)		980.6363	1189.1011	1435.1025
Horizon Depth (m)	0.0213	0.1113	0.0922	0.4991
<2mm (kg/m2)		109.0958	109.6203	716.2058
C%		2.5826	0.6465	0.1800
C (kg/m2)		2.8175	0.7087	1.2890
N%		0.2428	0.0673	0.0341
N (kg/m2)		0.2649	0.0737	0.2439

Table A157

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
Blackhawk Maples	229	7/20/07	130	Cultivation

Horizon	**Oi**	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)		1.2088	1.5082	2.2077
Air Dry sub (kg)		1.0846	1.4417	1.9743
Field Moist Total (kg)	0.3386	27.5160	31.4160	156.9930
Air Dry Total (kg)	0.2948	24.6897	30.0298	140.3964
Sieved sub (kg)	—	1.0730	1.4366	1.9733
Sieved Total (kg)	—	24.4256	29.9237	140.3196
Sieved Oven Dry (kg)	—	24.0881	29.6855	138.6643
Rocks wt (kg)	0.0000	0.0000	0.0000	0.0000
Roots weight (kg)	0.0000	0.2045	0.1098	0.5199
Rock Vol (m3)	0.0000	0.0000	0.0000	0.0000
Root Vol (m3)	0.0000	0.0004	0.0002	0.0011
Total Horizon Vol (m3)	0.0060	0.0249	0.0211	0.1084
Soil Vol (m3)	0.0060	0.0245	0.0209	0.1073
Horizon Bulk Density (kg/m3)	49.0090	1007.5463	1438.9064	1308.4614
<2mm BD (kg/m3)		982.9958	1422.4087	1292.3188
Horizon Depth (m)	0.0241	0.0997	0.0844	0.4334
<2mm (kg/m2)		97.9924	120.0157	560.1394
C%		2.4874	0.7459	0.1960
C (kg/m2)		2.4375	0.8952	1.0980
N%		0.2172	0.0813	0.0342
N (kg/m2)		0.2129	0.0976	0.1916

Table A158

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
Memorial Grove	245	7/28/07	130	Native Forest

Horizon	**Oi**	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)		0.6665	0.6271	0.8271
Air Dry sub (kg)		0.5472	0.5555	0.7548
Field Moist Total (kg)	0.1671	40.1450	31.3160	173.4930
Air Dry Total (kg)	0.1098	32.9543	27.7393	158.3245
Sieved sub (kg)	—	0.5357	0.5237	0.7219
Sieved Total (kg)	—	32.2646	26.1528	151.4230
Sieved Oven Dry (kg)	—	31.8238	25.9036	150.0762
Rocks wt (kg)	0.0000	0.0590	0.0490	0.8290
Roots weight (kg)	0.0000	0.1220	0.0163	0.0356
Rock Vol (m3)	0.0000	0.0000	0.0000	0.0003
Root Vol (m3)	0.0000	0.0002	0.0000	0.0001
Total Horizon Vol (m3)	0.0060	0.0274	0.0198	0.0993
Soil Vol (m3)	0.0060	0.0272	0.0198	0.0989
Horizon Bulk Density (kg/m3)	18.2442	1213.7479	1401.5380	1600.6699
<2mm BD (kg/m3)		1172.1108	1308.7850	1517.2795
Horizon Depth (m)	0.0241	0.1097	0.0794	0.3972
<2mm (kg/m2)		128.5659	103.8848	602.6444
C%		4.1762	1.2201	0.9522
C (kg/m2)		5.3692	1.2675	5.7383
N%		0.2750	0.1156	0.0764
N (kg/m2)		0.3535	0.1201	0.4604

Table A159

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
Memorial Grove	246	7/28/07	130	Native Forest

Horizon	**Oi**	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)		1.5586	0.6887	0.9585
Air Dry sub (kg)		0.6775	0.6121	0.8789
Field Moist Total (kg)	0.5487	38.0950	39.2950	253.3250
Air Dry Total (kg)	0.3092	16.5597	34.9206	232.2895
Sieved sub (kg)	—	0.6719	0.6039	0.8696
Sieved Total (kg)	—	16.4235	34.4551	229.8288
Sieved Oven Dry (kg)	—	16.2184	34.0072	228.3428
Rocks wt (kg)	0.0000	0.0490	0.0300	0.1390
Roots weight (kg)	0.0000	0.0882	0.1287	0.0550
Rock Vol (m3)	0.0000	0.0000	0.0000	0.0001
Root Vol (m3)	0.0000	0.0002	0.0003	0.0001
Total Horizon Vol (m3)	0.0059	0.0265	0.0271	0.1200
Soil Vol (m3)	0.0059	0.0263	0.0268	0.1198
Horizon Bulk Density (kg/m3)	52.0707	629.9805	1301.2802	1938.4035
<2mm BD (kg/m3)		616.9961	1267.2415	1905.4695
Horizon Depth (m)	0.0238	0.1059	0.1084	0.4800
<2mm (kg/m2)		65.3630	137.4165	914.6254
C%		2.0438	1.2598	0.7621
C (kg/m2)		1.3359	1.7312	6.9706
N%		0.1758	0.0784	0.0633
N (kg/m2)		0.1149	0.1077	0.5791

Table A160

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
Memorial Grove	247	7/28/07	130	Native Forest

Horizon	**Oi**	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)		1.1165	0.8270	1.0070
Air Dry sub (kg)		0.8986	0.7400	0.9166
Field Moist Total (kg)	0.0771	30.8160	28.9870	250.1960
Air Dry Total (kg)	0.0538	24.8012	25.9387	227.7339
Sieved sub (kg)	—	0.8602	0.6664	0.8413
Sieved Total (kg)	—	23.7416	23.3579	209.0283
Sieved Oven Dry (kg)	—	23.3444	22.9276	207.7760
Rocks wt (kg)	0.0000	4.8290	4.0790	8.2190
Roots weight (kg)	0.0000	0.1212	0.0778	0.2355
Rock Vol (m3)	0.0000	0.0018	0.0015	0.0031
Root Vol (m3)	0.0000	0.0002	0.0002	0.0005
Total Horizon Vol (m3)	0.0013	0.0266	0.0241	0.1441
Soil Vol (m3)	0.0013	0.0245	0.0224	0.1406
Horizon Bulk Density (kg/m3)	40.4706	1012.5779	1159.8158	1620.2041
<2mm BD (kg/m3)		953.1009	1025.1813	1478.2140
Horizon Depth (m)	0.0053	0.1063	0.0963	0.5766
<2mm (kg/m2)		101.2670	98.6737	852.2828
C%		6.7046	2.5748	0.7570
C (kg/m2)		6.7895	2.5406	6.4516
N%		0.3767	0.1748	0.0502
N (kg/m2)		0.3815	0.1725	0.4281

Table A161

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
Tucker Lake	248	7/30/07	130	Native Forest

Horizon	**Oi**	**Oe**	**Oa**	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)			1.2669	0.6069	0.6868	0.8670
Air Dry sub (kg)			0.8987	0.5457	0.6238	0.8154
Field Moist Total (kg)	0.1862	0.6509	1.2669	33.1160	35.3160	195.8930
Air Dry Total (kg)	0.1466	0.4235	0.8987	29.7775	32.0789	184.2366
Sieved sub (kg)	—		0.8775	0.5023	0.5356	0.6577
Sieved Total (kg)	—	0.2908	0.8775	27.4070	27.5440	148.6075
Sieved Oven Dry (kg)	—	0.2621	0.8296	27.0944	27.3074	147.8561
Rocks wt (kg)	0.0000	0.0000	0.0000	3.2290	8.2290	36.6870
Roots weight (kg)	0.0000	0.0000	0.0000	0.1189	0.0809	0.0776
Rock Vol (m3)	0.0000	0.0000	0.0000	0.0012	0.0031	0.0138
Root Vol (m3)	0.0000	0.0000	0.0000	0.0002	0.0002	0.0002
Total Horizon Vol (m3)	0.0037	0.0038	0.0024	0.0251	0.0249	0.3216
Soil Vol (m3)	0.0037	0.0038	0.0024	0.0236	0.0217	0.3076
Horizon Bulk Density (kg/m3)	39.9169	112.9413	371.0844	1260.8438	1481.6006	599.0262
<2mm BD (kg/m3)		69.8838	342.5575	1147.2348	1261.2236	480.7389
Horizon Depth (m)	0.0147	0.0247	0.0097	0.1003	0.0997	1.2863
<2mm (kg/m2)		1.7253	3.3185	115.0820	125.7282	618.3504
C%		38.2347	22.8132	2.2509	1.8415	0.2540
C (kg/m2)		0.6596	0.7571	2.5903	2.3153	1.5708
N%		1.8910	1.2888	0.1538	0.1417	0.0646
N (kg/m2)		0.0326	0.0428	0.1770	0.1781	0.3993

Table A162

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
Tucker Lake	249	7/30/07	130	Native Forest

Horizon	**Oi**	**Oe**	**Oa**	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)			2.7074	0.8116	0.6666	0.8676
Air Dry sub (kg)			1.8535	0.6876	0.5831	0.7565
Field Moist Total (kg)	0.3966	1.7076	2.7074	40.0950	33.7660	79.6820
Air Dry Total (kg)	0.2238	0.9050	1.8535	33.9674	29.5370	69.4787
Sieved sub (kg)	—		1.7340	0.6243	0.5257	0.6819
Sieved Total (kg)	—	0.7375	1.7340	30.8383	26.6280	62.6285
Sieved Oven Dry (kg)	—	0.6817	1.6866	30.5055	26.3563	62.2786
Rocks wt (kg)	0.0000	0.0000	0.0000	2.5790	1.8790	4.4290
Roots weight (kg)	0.0000	0.0000	0.0000	0.0818	0.3370	0.0420
Rock Vol (m3)	0.0000	0.0000	0.0000	0.0010	0.0007	0.0017
Root Vol (m3)	0.0000	0.0000	0.0000	0.0002	0.0007	0.0001
Total Horizon Vol (m3)	0.0043	0.0048	0.0030	0.0271	0.0247	0.0428
Soil Vol (m3)	0.0043	0.0048	0.0030	0.0260	0.0233	0.0411
Horizon Bulk Density (kg/m3)	52.0937	186.8470	624.3368	1307.9816	1268.1764	1692.3153
<2mm BD (kg/m3)		140.7340	568.1148	1174.6748	1131.6132	1516.9390
Horizon Depth (m)	0.0172	0.0313	0.0119	0.1084	0.0988	0.1713
<2mm (kg/m2)		4.3979	6.7464	127.3788	111.7468	259.7758
C%		33.8510	11.5147	2.3805	1.3648	0.1367
C (kg/m2)		1.4887	0.7768	3.0323	1.5251	0.3550
N%		1.8171	0.6911	0.1733	0.1138	0.0331
N (kg/m2)		0.0799	0.0466	0.2207	0.1271	0.0859

Table A163

Site Name	Plot #	Date Sampled	Forest Age (yr)	Last Use
Tucker Lake	250	7/30/07	130	Native Forest

Horizon	**Oi**	**Oe**	**0-10 cm**	**10-20 cm**	**20+ cm**
Field moist sub (kg)			0.9585	0.8987	0.7086
Air Dry sub (kg)			0.8572	0.7947	0.8892
Field Moist Total (kg)	0.2975	1.4087	37.3450	29.9160	121.1480
Air Dry Total (kg)	0.1858	0.8893	33.4011	26.4525	152.0214
Sieved sub (kg)	—		0.8422	0.7556	0.8508
Sieved Total (kg)	—	0.8208	32.8154	25.1507	145.4597
Sieved Oven Dry (kg)	—	0.7808	32.5278	24.8786	144.4176
Rocks wt (kg)	0.0000	0.0000	1.3290	5.6290	7.1790
Roots weight (kg)	0.0000	0.0000	0.1038	0.0849	0.0467
Rock Vol (m3)	0.0000	0.0000	0.0005	0.0021	0.0027
Root Vol (m3)	0.0000	0.0000	0.0002	0.0002	0.0001
Total Horizon Vol (m3)	0.0060	0.0053	0.0295	0.0243	0.0672
Soil Vol (m3)	0.0060	0.0053	0.0288	0.0220	0.0644
Horizon Bulk Density (kg/m3)	30.9667	167.3882	1159.0339	1202.4105	2361.1946
<2mm BD (kg/m3)		146.9813	1128.7303	1130.8656	2243.0915
Horizon Depth (m)	0.0240	0.0213	0.1181	0.0972	0.2688
<2mm (kg/m2)		3.1234	133.3313	109.9060	602.8308
C%		22.1045	1.8815	1.3978	0.7120
C (kg/m2)		0.6904	2.5086	1.5362	4.2922
N%		1.2954	0.1705	0.1111	0.0553
N (kg/m2)		0.0405	0.2273	0.1221	0.3333

Appendix B

SITE SPECIFIC DATA

Table B1
Hopkins Memorial Forest

Site Name and #s	TSA	# QSP	Latitude	Longitude	Soil Series	Elevation (m)	Soil Texture	Drainage Class	Slope (°)
0821, 0822, 0923B,E	40	4	42.728961	-73.245803	Lanesboro	349	Silt-Loam	WD	8
0620, 0621, 0720, 0721	80	4	42.734617	-73.248408	Fullam	372	Coarse-Loam	MWD	5
1235, 1236	80	3	42.723514	-73.229847	Stockbridge	309	Coarse-Loam	WD	5
1225 A-C	100	3	42.723872	-73.230222	Lanesboro	372	Silt-Loam	WD	16
0618, 0717, 0718	110	3	42.735061	-73.250956	Lanesboro	408	Silt-Loam	WD	12
0610 A-C	180	3	42.734792	-73.260453	Lanesboro	570	Silt-Loam	WD	13
0940, 0941	40	3	42.729308	-73.223711	Farmington	301	Silt-Loam	SED	8
1233, 1234	80	3	42.724	-73.232203	Macomber	310	Silt-Loam	WD	9
0619 A-C	110	3	42.734925	-73.250144	Macomber	396	Silt-Loam	WD	11
0514-0516	120	3	42.736161	-73.25355	Lanesboro	445	Silt-Loam	WD	10
0715-0716	170	3	42.733186	-73.253717	Taconic	440	Silt-Loam	SED	15
0921, 0922	40	3	42.729917	-73.24715	Lanesboro	370	Silt-Loam	WD	12
1013-1015	80	3	42.727969	-73.2545	Fullam	433	Silt-Loam	MWD	11
RO1, RO2, RO3	130	3	42.728253	-73.230408	Nellis	291	Sandy-Loam	WD	7
1226 A-C	150	3	42.723283	-73.241914	Macomber	364	Silt-Loam	WD	16
Dianas Bath 1118 A-C	250	3	42.725831	-73.250722	Lanesboro	379	Silt-Loam	WD	11
Bienecke Stand 0942 A-B, 1042B	250	3	42.729375	-73.22155	Farmington	258	Silt-Loam	WD	23

Table B1 cont.
Hopkins Memorial Forest

Site Name and #s	Aspect	GSTemp	GSFrostdays	GS Frost-Free days	GSDD	GSDY	MAT (°C)	MAP (cm)
0821, 0822, 0923B,E	East	17.6655	18.8333	164.1667	2901.5452	116061.8088	9.6492	121.8875
0620, 0621, 0720, 0721	Southwest	17.9465	17.7917	165.2083	2966.2298	237298.3876	9.9000	119.5208
1235, 1236	Southeast	18.5253	16.5833	166.4167	3084.1207	246729.6530	10.4356	114.6917
1225 A-C	North	18.1487	17.2083	165.7917	3010.1893	301018.9335	10.0913	117.8625
0618, 0717, 0718	South	17.1295	20.4167	162.5833	2786.9367	306563.0423	9.1582	126.3583
0610 A-C	East	17.1295	20.4167	162.5833	2786.9367	501648.6148	9.1582	126.3583
0940, 0941	South	18.4877	16.7083	166.2917	3075.6163	123024.6534	10.3986	115.0292
1233, 1234	Southwest	18.1487	17.2083	165.7917	3010.1893	240815.1468	10.0913	117.8625
0619 A-C	Southeast	17.9465	17.7917	165.2083	2966.2298	326285.2830	9.9000	119.5208
0514-0516	Southeast	17.1295	20.4167	162.5833	2786.9367	334432.4098	9.1582	126.3583
0715-0716	East	17.1295	20.4167	162.5833	2786.9367	473779.2473	9.1582	126.3583
0921, 0922	Northeast	17.6655	18.8333	164.1667	2901.5452	116061.8088	9.6492	121.8875
1013-1015	East	16.8297	21.3333	161.6667	2722.7572	217820.5763	8.8892	128.8125
RO1, RO2, RO3	Northeast	18.1548	17.2500	165.7500	3010.4262	391355.4060	10.0933	117.8458
1226 A-C	Northeast	18.1487	17.2083	165.7917	3010.1893	451528.4003	10.0913	117.8625
Dianas Bath 1118 A-C	Southeast	17.6655	18.8333	164.1667	2901.5452	725386.3052	9.6492	121.8875
Bienecke Stand 0942 A-B, 1042B	East	18.4877	16.7083	166.2917	3075.6163	768904.0836	10.3986	115.0292

Table B2
Western New England Sites

Site Name and #s	Site Age	# QSP	Latitude	Longitude	Soil Series	Elevation (m)	Soil Texture	Drainage Class	Slope (°)
Win's Farm 100-102	0	3	42.688464	-73.178381	Amenia	253	Coarse-Loam	MWD	5
Lasso 119-121	0	3	42.061	-73.397531	Amenia	243	Coarse-Loam	MWD	1
Olsons Turnip 140-142	0	3	42.689822	-73.035364	Peru	612	Coarse-Loam	MWD	5
Mt. Evrtt. Acc. 131-133	40	3	42.103856	-73.451975	Macomber	521	Silt-Loam	WD	5
CHT 109-111	65	3	42.611275	-73.157317	Peru	478	Coarse-Loam	MWD	4
Raycroft Farm 149-151	100	3	42.710056	-72.992964	Peru	607	Coarse-Loam	MWD	12
Moore Farm 146-148	125	3	42.071183	-73.457806	Lanesboro	547	Coarse-Loam	WD	7
Moore Farm 134-136	125	3	42.071278	-73.458694	Fullam	535	Coarse-Loam	WD	10
Win's Pasture 103-105	0	3	42.687372	-73.182094	Amenia	260	Coarse-Loam	MWD	8
Lasso 122-124	0	3	42.061286	-73.397836	Amenia	242	Coarse-Loam	MWD	1
Brown's Past. 143-145	0	3	42.638764	-72.9962	Tunbridge	476	Coarse-Loam	WD	4
Gould Rd. 115-117	25	3	42.629642	-73.149361	Pittsfield	412	Coarse-Loam	WD	8
Win's Ab. Pasture 106-108	50	3	42.683847	-73.175678	Pittsfield	323	Coarse-Loam	WD	7
Van-d-missn. 137-139	60	3	42.126828	-73.472956	Fullam	495	Coarse-Loam	WD	8
Garrett 128-130	80	3	42.074572	-73.459494	Lanesboro	524	Coarse-Loam	WD	6
WMRP 112-114	100	3	42.622158	-73.459494	Berkshire	361	Coarse-Loam	WD	6
Moore Farm 125-127	125	3	42.07265	-73.458431	Fullam	544	Coarse-Loam	WD	8
Browns Forest 152-154	250	3	42.637197	-72.987356	Tunbridge	369	Coarse-Loam	WD	33
Gifford Wds 155-157	250	3	43.675272	-72.809542	Sunapee	480	Coarse-Loam	MWD	8

Table B2 Cont.
Western New England Sites

Site Name and #s	Aspect	GSTemp	GSFrostdays	GS Frost-Free days	GSDD	GSDY	MAT (°C)	MAP (cm)
Win's Farm 100-102	Northwest	18.5157	16.7917	166.2083	3078.6668	0.0000	10.4419	115.8292
Lasso 119-121	North	19.1073	15.7083	167.2917	3197.4860	0.0000	11.1924	117.3500
Olsons Turnip 140-142	Southwest	16.1452	25.2500	157.7500	2549.1488	0.0000	8.3166	139.7375
Mt. Evrtt. Acc. 131-133	Northwest	17.2510	20.3333	162.6667	2806.7623	112270.4927	9.4490	129.9167
CHT 109-111	Southeast	16.9016	21.8333	161.1667	2725.5639	177161.6543	9.0158	129.7875
Raycroft Farm 149-151	Northeast	16.0533	26.0000	157.0000	2522.6597	252265.9670	8.2294	141.3208
Moore Farm 146-148	Northwest	16.9733	21.1250	161.8750	2748.0261	343503.2619	9.1984	132.9750
Moore Farm 134-136	West	16.9733	21.1250	161.8750	2748.0261	343503.2619	9.1984	132.9750
Win's Pasture 103-105	North	18.5733	16.5833	166.4167	3092.1639	0.0000	10.4939	115.3958
Lasso 122-124	North	19.1073	15.7083	167.2917	3197.4860	0.0000	11.1924	117.3500
Brown's Past. 143-145	South	17.2324	21.6667	161.3333	2781.7261	0.0000	9.3240	130.5208
Gould Rd. 115-117	Southeast	17.2989	20.7083	162.2917	2809.1541	70228.8527	9.3718	126.7292
Win's Ab. Pasture 106-108	North	17.7143	19.1250	163.8750	2904.4147	145220.7367	9.7201	123.3542
Van-d-missn. 137-139	East	17.2501	20.7083	162.2917	2800.1294	168007.7658	9.4494	130.9500
Garrett 128-130	West	16.9540	21.5000	161.5000	2738.6382	219091.0532	9.1784	132.7667
WMRP 112-114	North	17.9398	18.2083	164.7917	2957.5610	295756.1031	9.9539	121.0833
Moore Farm 125-127	West	16.9733	21.1250	161.8750	2748.0261	343503.2619	9.1984	132.9750
Browns Forest 152-154	Southeast	17.0757	22.0833	160.9167	2749.4775	687369.3682	9.1813	132.2083
Gifford Wds 155-157	East	16.3228	31.2500	151.7500	2479.5808	619895.1913	8.1712	127.5375

Table B3
Wisconsin

Site Name and #s	TSA	# QSP	Latitude	Longitude	Soil Series	Elevation (m)	Soil Texture	Drainage Class	Slope (°)
Eleva Corn 203-205	0	3	43.660925	-89.794119	Eleva	280	Sandy-Loam	WD	0
Norway Plnt. 200-202	40	3	43.6598	-89.791803	Eleva	282	Sandy-Loam	WD	1
Behgins Wdlt. 212-214	60	3	43.660589	-89.789928	Eleva	277	Sandy-Loam	WD	6
Blackhawk Grdn 215-217	80	3	43.650456	-89.796242	Eleva	281	Sandy-Loam	WD	1
Blackhawk O.F. 223, 218,219	130	3	43.651536	-89.795983	Eleva	281	Sandy-Loam	WD	2
Gale Corn 209-211	0	3	43.665733	-89.793886	Gale	278	Silt-Loam	WD	1
Gale RP. 206-208	40	3	43.667469	-89.790069	Gale	277	Silt-Loam	WD	2
Blackhawk Ol' Field 220-222	80	3	43.649583	-89.792964	Gale	284	Silt-Loam	WD	0
Blackhawk Old Oaks 224-226	130	3	43.648911	-89.790383	Gale	283	Silt-Loam	WD	1
BlackHawk Maples 227-229	130	3	43.634486	-89.789144	Gale	283	Silt-Loam	WD	1
Ockers Acres 242-44	0	3	45.868711	-90.389311	Padus	462	Sandy-Loam	WD	0
Mindock RP. 239-41	20	3	45.737733	-90.389275	Padus	450	Sandy-Loam	WD	0
Lukatch RP. 230-232	50	3	45.685147	-90.464064	Pence	445	Sandy-Loam	MWD	1
Tucker Lake 248-250	250	3	45.940836	-90.058447	Padus	488	Sandy-Loam	WD	0
Welch's Farm 254-256	0	3	45.718164	-90.344453	Vilas	457	Loamy-Sand	ED	1
Henderson 233-35	30	3	45.711578	-90.3511	Vilas	456	Loamy-Sand	ED	1
Milk House RP. 236-38	50	3	45.708967	-90.382814	Croswell	442	Loamy-Sand	ED	1
Memorial Grve. 245-47	250	3	45.890936	-90.054136	Vilas	481	Loamy-Sand	ED	1

Table B3 Cont.
Wisconsin

Site Name and #s	Aspect	GSTemp	GSFrostdays	GS Frost-Free days	GSDD	GSDY	MAT (°C)	MAP (cm)
Eleva Corn 203-205	West	19.4978	16.0833	166.9167	3256.8814	0.0000	10.3524	90.8875
Norway Plnt. 200-202	Northeast	19.5158	16.0417	166.9583	3260.6677	130426.7085	10.3739	90.6625
Behgins Wdlt. 212-214	Northeast	19.5158	16.0417	166.9583	3260.6677	195640.0627	10.3739	90.6625
Blackhawk Grdn 215-217	Southwest	19.5217	16.0000	167.0000	3262.4809	260998.4734	10.3824	90.3417
Blackhawk O.F. 223, 218,219	Northwest	19.5217	16.0000	167.0000	3262.4809	424122.5193	10.3824	90.3417
Gale Corn 209-211	South	19.4797	16.0833	166.9167	3253.8468	0.0000	10.3314	91.3500
Gale RP. 206-208	Northeast	19.5192	16.0833	166.9167	3260.4746	130418.9821	10.3749	90.1917
Blackhawk Ol' Field 220-222	Southwest	19.4901	16.0417	166.9583	3256.3704	260509.6322	10.3479	90.9083
Blackhawk Old Oaks 224-226	East	19.4901	16.0417	166.9583	3256.3704	423328.1524	10.3479	90.9083
BlackHawk Maples 227-229	Southeast	19.5303	15.9167	167.0833	3265.4574	424509.4655	10.3965	90.3167
Ockers Acres 242-44	Northwest	16.8535	29.6250	153.3750	2588.6147	0.0000	7.3895	87.9917
Mindock RP. 239-41	South	16.9620	28.5833	154.4167	2622.9633	52459.2654	7.4795	85.3625
Lukatch RP. 230-232	North	17.0920	28.0000	155.0000	2653.0197	132650.9859	7.5994	84.1083
Tucker Lake 248-250	Southwest	16.5999	29.9167	153.0833	2544.3098	636077.4573	7.1715	87.6250
Welch's Farm 254-256	South	16.9479	28.3750	154.6250	2624.1502	0.0000	7.4679	85.3708
Henderson 233-35	Northwest	16.9653	28.3333	154.6667	2627.5357	78826.0695	7.4846	84.9667
Milk House RP. 236-38	South	16.9904	28.2500	154.7500	2632.8704	131643.5183	7.5072	84.8875
Memorial Grve. 245-47	Northwest	16.6257	29.6667	153.3333	2552.2797	638069.9266	7.1895	87.1542

Appendix C

PARTICULATE ORGANIC MATTER FRACTIONS

Table C1
Western New England POM Calculations

Sample	Layer	YSA	Wt_i (g)	CPOM mass (g)	FPOM mass (g)	MinOM mass (g)	Mass recovery (%)	WS-C (g/g soil)	CPOM-C (g/g frac)	FPOM-C (g/g frac)	MinOM-C (g/g frac)	C recovery (%)	CPOM-C (kg)	FPOM-C (kg)	MinOM-C (kg)	CPOM-C (kg m^{-2})	FPOM-C (kg m^{-2})	MinOM-C (kg m^{-2})	Total POM-C (kg m^{-2})	CPOM-C %	FPOM-C %	MinOM-C %
102	0-10	0	30.0837	3.1097	5.8083	20.7129	98.5	0.0226	0.0356	0.0188	0.0185	88.8	0.0001	0.0001	0.0004	0.3139	0.3098	1.0861	1.7097	0.1836	0.1812	0.6352
120	0-10	0	30.0504	4.1176	9.3458	15.7085	97.1	0.0198	0.0112	0.0107	0.0292	101.9	0.0000	0.0001	0.0005	0.1402	0.3051	1.4001	1.8454	0.0760	0.1653	0.7587
140	0-10	0	30.0260	9.4967	9.8268	10.4039	99.0	0.0581	0.0645	0.0376	0.0722	99.3	0.0006	0.0004	0.0008	1.5008	0.9064	1.8412	4.2484	0.3533	0.2134	0.4334
102-140	0-10	0	30.0534	5.5747	8.3270	15.6084	98.2	0.0335	0.0371	0.0224	0.0400	101.0	0.0002	0.0002	0.0006	0.6516	0.5071	1.4424	2.6012	0.2505	0.1950	0.5545
923E	0-10	40	30.1337	7.9541	6.4577	14.5673	96.2	0.0387	0.0242	0.0153	0.0449	81.1	0.0002	0.0001	0.0007	0.4718	0.2416	1.5992	2.3126	0.2040	0.1045	0.6915
131	0-10	40	30.0571	10.1536	3.4950	16.1066	99.0	0.0405	0.0183	0.0117	0.0476	81.6	0.0002	0.0000	0.0008	0.3803	0.0836	1.5679	2.0317	0.1872	0.0412	0.7717
923E - 131	0-10	40	30.0954	9.0539	4.9764	15.3370	97.6	0.0396	0.0213	0.0135	0.0462	81.3	0.0002	0.0001	0.0007	0.4260	0.1626	1.5835	2.1722	0.1961	0.0749	0.7290
110	0-10	60	30.5157	5.5743	11.8520	12.7104	98.8	0.0357	0.0606	0.0176	0.0418	98.9	0.0003	0.0002	0.0005	0.7420	0.4585	1.1675	2.3681	0.3133	0.1936	0.4930
1235A	0-10	80	30.5311	6.9751	6.5065	16.8033	99.2	0.0318	0.0192	0.0124	0.0449	99.8	0.0001	0.0001	0.0008	0.3410	0.2042	1.9143	2.4595	0.1386	0.0830	0.7783
720A	0-10	80	30.0346	10.0567	5.7865	13.8636	98.9	0.0408	0.0180	0.0073	0.0628	89.3	0.0002	0.0000	0.0009	0.4303	0.1009	2.0648	2.5961	0.1658	0.0389	0.7954
1235A-720A	0-10	80	30.2829	8.5159	6.1465	15.3335	99.1	0.0363	0.0186	0.0099	0.0538	95.0	0.0002	0.0001	0.0008	0.3857	0.1526	1.9896	2.5278	0.1526	0.0604	0.7871
1225B	0-10	100	30.5359	5.8917	2.7870	21.4128	98.5	0.0341	0.0205	0.0159	0.0386	95.2	0.0001	0.0000	0.0008	0.2944	0.1079	2.0150	2.4173	0.1218	0.0446	0.8336
150	0-10	100	30.0291	5.7636	9.8062	14.0074	98.5	0.0888	0.1423	0.0981	0.0819	109.9	0.0008	0.0010	0.0011	0.9425	1.1063	1.3186	3.3675	0.2799	0.3285	0.3916
1225B-150	0-10	100	30.2825	5.8277	6.2966	17.7101	98.5	0.0614	0.0814	0.0570	0.0602	102.1	0.0005	0.0004	0.0011	0.6185	0.6071	1.6668	2.8924	0.2138	0.2099	0.5763
618C	0-10	110	30.0313	11.5159	5.1395	13.3838	100.0	0.0399	0.0172	0.0167	0.0562	86.4	0.0002	0.0001	0.0008	0.4730	0.2049	1.7990	2.4769	0.1910	0.0827	0.7263
146	0-10	125	30.0238	7.7135	7.3042	14.6949	99.0	0.0554	0.0457	0.0401	0.0689	99.6	0.0004	0.0003	0.0010	0.6389	0.5304	1.8357	3.0050	0.2126	0.1765	0.6109
610B	0-10	180	30.1029	6.4526	6.5105	16.4828	97.8	0.0575	0.0443	0.0399	0.0536	82.5	0.0003	0.0003	0.0009	0.5640	0.5132	1.7453	2.8226	0.1998	0.1818	0.6183
103	0-10	0	30.0798	2.5447	5.4988	21.4257	98.0	0.0213	0.0224	0.0299	0.0169	91.2	0.0001	0.0002	0.0004	0.1873	0.5403	1.1923	1.9200	0.0976	0.2814	0.6210
122	0-10	0	30.0104	8.3459	7.2473	13.8939	98.3	0.0207	0.0173	0.0125	0.0233	89.8	0.0001	0.0001	0.0003	0.5390	0.3371	1.2051	2.0812	0.2590	0.1620	0.5790
145	0-10	0	30.0112	4.2015	12.9801	12.5699	99.1	0.0469	0.0498	0.0189	0.0647	90.0	0.0002	0.0002	0.0008	0.6245	0.7328	2.4274	3.7847	0.1650	0.1936	0.6414
103-145	0-10	0	30.0338	5.0307	8.5754	15.9632	98.5	0.0296	0.0298	0.0204	0.0350	99.2	0.0002	0.0002	0.0006	0.4503	0.5368	1.6083	2.5953	0.1735	0.2068	0.6197
116	0-10	25	30.1431	4.2072	10.2849	16.1690	101.7	0.0207	0.0470	0.0091	0.0183	94.1	0.0002	0.0001	0.0003	0.5433	0.2559	0.8133	1.6125	0.3369	0.1587	0.5044
941A	0-10	40	30.7577	4.7799	5.9207	18.7688	95.8	0.0269	0.0156	0.0118	0.0357	98.4	0.0001	0.0001	0.0007	0.2073	0.1946	1.8661	2.2680	0.0914	0.0858	0.8228
107	0-10	50	30.2640	1.5745	8.9183	19.2123	98.2	0.0288	0.0481	0.0158	0.0325	96.6	0.0001	0.0001	0.0006	0.1943	0.3605	1.6049	2.1597	0.0900	0.1669	0.7431
138	0-10	60	30.0083	6.6958	2.7941	19.7656	97.5	0.0482	0.0240	0.0232	0.0514	85.8	0.0002	0.0001	0.0010	0.2810	0.1134	1.7749	2.1692	0.1295	0.0523	0.8182
1234B	0-10	80	30.0443	4.3116	7.7570	18.7732	102.7	0.0370	0.0325	0.0108	0.0356	80.3	0.0001	0.0001	0.0007	0.3901	0.2346	1.8645	2.4892	0.1567	0.0942	0.7490
130	0-10	80	30.0139	8.6766	3.9929	16.8109	98.2	0.0421	0.0234	0.0315	0.0535	97.4	0.0002	0.0001	0.0009	0.4280	0.2646	1.8937	2.5863	0.1655	0.1023	0.7322
1234B-130	0-10	80	30.0291	6.4941	5.8750	17.7921	100.4	0.0395	0.0279	0.0212	0.0446	92.6	0.0002	0.0001	0.0008	0.4091	0.2496	1.8791	2.5377	0.1612	0.0983	0.7405
113	0-10	100	30.0076	4.4102	12.3145	12.8281	98.5	0.0398	0.0198	0.0232	0.0594	95.1	0.0001	0.0003	0.0008	0.1533	0.5021	1.3385	1.9938	0.0769	0.2518	0.6713
619B	0-10	110	30.1104	5.5919	6.1037	18.0316	98.7	0.0768	0.0681	0.0206	0.0798	84.1	0.0004	0.0001	0.0014	0.6429	0.2123	2.4301	3.2853	0.1957	0.0646	0.7397
126	0-10	125	30.2227	9.6296	5.2511	15.0292	99.0	0.0371	0.0150	0.0196	0.0570	98.4	0.0001	0.0001	0.0009	0.3753	0.2669	2.2195	2.8617	0.1311	0.0933	0.7756
716B	0-10	170	30.0302	6.3527	7.0434	16.0528	98.1	0.0346	0.0348	0.0138	0.0425	96.2	0.0002	0.0001	0.0007	0.4761	0.2099	1.4678	2.1537	0.2210	0.0974	0.6815
942B	0-10	250	30.0539	6.0779	7.5272	16.7149	100.9	0.0315	0.0152	0.0113	0.0401	89.3	0.0001	0.0001	0.0007	0.2823	0.2597	2.0511	2.5932	0.1089	0.1002	0.7910
942C	0-10	250	30.9474	6.2588	7.5900	18.2519	103.7	0.0241	0.0097	0.0074	0.0329	96.4	0.0001	0.0001	0.0006	0.1482	0.1363	1.4630	1.7475	0.0848	0.0780	0.8372
1042B	0-10	250	30.2258	6.3043	8.1118	15.0643	97.5	0.0175	0.0112	0.0175	0.0215	101.6	0.0001	0.0001	0.0003	0.5415	1.0902	2.4867	4.1184	0.1315	0.2647	0.6038
1118A	0-10	250	30.1669	9.8731	5.1239	16.5850	104.7	0.0445	0.0177	0.0166	0.0543	86.4	0.0002	0.0001	0.0009	0.3261	0.1589	1.6837	2.1687	0.1504	0.0733	0.7764
1118B	0-10	250	30.0193	5.2971	2.7806	22.6493	102.4	0.0343	0.0241	0.0201	0.0354	95.8	0.0001	0.0001	0.0008	0.2946	0.1292	1.8533	2.2770	0.1294	0.0567	0.8139
1118C	0-10	250	30.9873	9.5918	4.5530	16.5445	99.0	0.0687	0.0492	0.0247	0.0701	81.9	0.0005	0.0001	0.0012	0.6541	0.1562	1.6094	2.4197	0.2703	0.0646	0.6651
152	0-10	250	31.2160	8.0657	13.9992	8.8267	99.0	0.0375	0.0315	0.0165	0.0614	87.8	0.0003	0.0002	0.0005	0.5253	0.4758	1.1199	2.1210	0.2477	0.2243	0.5280
153	0-10	250	30.1380	3.5080	13.8129	12.7811	99.9	0.0576	0.0554	0.0106	0.0821	80.2	0.0002	0.0001	0.0010	0.4237	0.3207	2.2891	3.0335	0.1397	0.1057	0.7546
154	0-10	250	18.2490	1.2893	8.5728	8.9594	103.1	0.0372	0.0321	0.0149	0.0567	99.9	0.0000	0.0001	0.0005	0.1847	0.5714	2.2661	3.0222	0.0611	0.1891	0.7498
155	0-10	250	30.0061	3.4676	11.8306	14.8817	100.6	0.0588	0.0666	0.0237	0.0866	102.0	0.0002	0.0003	0.0013	0.5126	0.6215	2.8625	3.9966	0.1283	0.1555	0.7162
156	0-10	250	30.2016	8.6953	9.1211	11.7349	97.8	0.0711	0.0671	0.0443	0.0624	80.1	0.0006	0.0004	0.0007	0.8667	0.5993	1.0877	2.5538	0.3394	0.2347	0.4259
157	0-10	250	30.8418	2.6275	14.3466	15.2853	104.6	0.0450	0.1651	0.0087	0.0571	103.1	0.0004	0.0001	0.0009	0.8914	0.2567	1.7939	2.9420	0.3030	0.0873	0.6097
942B-157	0-10	250	29.5890	6.0651	8.6302	15.0138	100.4	0.0448	0.0427	0.0183	0.0562	95.2	0.0003	0.0002	0.0008	0.4709	0.3980	1.8805	2.7495	0.1713	0.1448	0.6840

Table C1

Western New England POM Calculations

Sample	Layer	YSA	Wt_i (g)	CPOM mass (g)	FPOM mass (g)	MinOM mass (g)	Mass recovery (%)	WS-C (g/g soil)	CPOM-C (g/g frac)	FPOM-C (g/g frac)	MinOM-C (g/g frac)	C recovery (%)	CPOM-C (kg)	FPOM-C (kg)	MinOM-C (kg)	CPOM-C (kg m^{-2})	FPOM-C (kg m^{-2})	MinOM-C (kg m^{-2})	Total POM-C (kg m^{-2})	CPOM-C %	FPOM-C %	MinOM-C %
102	10-20	0	30.0207	3.0748	6.6415	19.9048	98.7	0.0225	0.0233	0.0191	0.0226	95.8	0.0001	0.0001	0.0004	0.2322	0.4106	1.4569	2.0998	0.1106	0.1956	0.6939
120	10-20	0	30.5111	5.8580	9.1119	14.5136	96.6	0.0137	0.0041	0.0035	0.0219	89.3	0.0000	0.0000	0.0003	0.0932	0.1258	1.2410	1.4599	0.0638	0.0862	0.8500
140	10-20	0	30.0096	8.0548	10.5933	11.1191	99.2	0.0341	0.0144	0.0136	0.0683	99.7	0.0001	0.0001	0.0008	0.3823	0.4754	2.4985	3.3561	0.1139	0.1416	0.7444
102-140	10-20	0	30.1805	5.6625	8.7822	15.1792	98.2	0.0235	0.0139	0.0121	0.0376	106.8	0.0001	0.0001	0.0006	0.2359	0.3373	1.7321	2.3053	0.1023	0.1463	0.7514
923E	10-20	40	30.5536	7.5176	8.2137	14.3720	98.5	0.0208	0.0141	0.0204	0.0239	96.9	0.0001	0.0002	0.0003	0.3330	0.5275	1.0822	1.9427	0.1714	0.2716	0.5570
131	10-20	40	30.2927	11.8832	2.3922	15.5645	98.5	0.0208	0.0063	0.0135	0.0256	80.1	0.0001	0.0000	0.0004	0.1377	0.0593	0.7310	0.9280	0.1484	0.0639	0.7877
923E - 131	10-20	40	30.4232	9.7004	5.3030	14.9683	98.5	0.0208	0.0102	0.0169	0.0247	88.2	0.0001	0.0001	0.0004	0.2353	0.2934	0.9066	1.4353	0.1640	0.2044	0.6316
110	10-20	60	30.1946	6.9512	8.9640	13.8541	98.6	0.0215	0.0215	0.0072	0.0291	95.3	0.0001	0.0001	0.0004	0.4408	0.1897	1.1906	1.8211	0.2420	0.1042	0.6538
1235A	10-20	80	31.0273	7.2773	6.5078	16.9677	99.1	0.0180	0.0064	0.0064	0.0238	88.2	0.0000	0.0000	0.0004	0.1271	0.1141	1.0984	1.3396	0.0949	0.0852	0.8199
720A	10-20	80	30.4053	7.5129	6.3625	17.4633	103.1	0.0189	0.0089	0.0063	0.0220	85.3	0.0001	0.0000	0.0004	0.1812	0.1085	1.0436	1.3333	0.1359	0.0814	0.7827
1235A-720A	10-20	80	30.7163	7.3951	6.4352	17.2155	101.1	0.0184	0.0076	0.0064	0.0229	86.7	0.0001	0.0000	0.0004	0.1542	0.1113	1.0710	1.3365	0.1153	0.0833	0.8014
1225B	10-20	100	30.0196	7.1572	2.7834	19.5836	98.3	0.0075	0.0047	0.0047	0.0101	108.6	0.0000	0.0000	0.0002	0.1341	0.0525	0.7901	0.9767	0.1373	0.0538	0.8090
150	10-20	100	30.6141	6.8305	7.8751	15.5074	98.7	0.0409	0.0147	0.0172	0.0534	85.0	0.0001	0.0001	0.0008	0.1784	0.2401	1.4729	1.8914	0.0943	0.1270	0.7787
1225B-150	10-20	100	30.3169	6.9939	5.3293	17.5455	98.5	0.0242	0.0097	0.0109	0.0318	93.2	0.0001	0.0001	0.0006	0.1562	0.1463	1.1315	1.4341	0.1090	0.1020	0.7890
618C	10-20	110	30.3974	11.5045	5.3047	14.4180	102.7	0.0181	0.0046	0.0039	0.0269	84.2	0.0001	0.0000	0.0004	0.1838	0.0713	1.3339	1.5890	0.1156	0.0449	0.8395
146	10-20	125	31.2282	7.2856	7.6139	15.2928	96.7	0.0172	0.0098	0.0068	0.0251	94.4	0.0001	0.0001	0.0004	0.1605	0.1166	0.8640	1.1411	0.1406	0.1022	0.7572
610B	10-20	180	30.0276	6.7168	4.0101	20.4828	103.9	0.0266	0.0155	0.0161	0.0236	81.6	0.0001	0.0001	0.0005	0.3912	0.2419	1.8121	2.4452	0.1600	0.0989	0.7411
103	10-20	0	30.0000	2.1345	4.5576	21.9735	95.6	0.0118	0.0040	0.0048	0.0152	103.1	0.0000	0.0000	0.0003	0.0238	0.0614	0.9328	1.0180	0.0234	0.0603	0.9163
122	10-20	0	30.0225	4.8089	9.1982	15.6826	98.9	0.0079	0.0047	0.0044	0.0100	92.4	0.0000	0.0000	0.0002	0.1144	0.2054	0.8005	1.1204	0.1021	0.1834	0.7145
145	10-20	0	30.9459	3.1227	14.1750	13.5689	99.7	0.0174	0.0101	0.0048	0.0272	86.8	0.0000	0.0001	0.0004	0.1106	0.2366	1.2888	1.6360	0.0676	0.1446	0.7878
103-145	10-20	0	30.3228	3.3554	9.3103	17.0750	98.1	0.0124	0.0063	0.0047	0.0175	96.6	0.0000	0.0000	0.0003	0.0829	0.1678	1.0074	1.2581	0.0659	0.1334	0.8007
116	10-20	25	30.1189	3.0963	11.3425	16.3586	102.3	0.0088	0.0067	0.0046	0.0110	95.6	0.0000	0.0001	0.0002	0.0672	0.1703	0.5900	0.8276	0.0813	0.2058	0.7129
941A	10-20	40	30.3125	8.0163	7.3319	14.6413	98.9	0.0154	0.0067	0.0045	0.0219	87.2	0.0001	0.0000	0.0003	0.2142	0.1303	1.2702	1.6148	0.1327	0.0807	0.7866
107	10-20	50	30.1126	1.0722	10.4858	18.5516	100.0	0.0097	0.0113	0.0043	0.0114	92.4	0.0000	0.0000	0.0002	0.0527	0.1990	0.9232	1.1748	0.0448	0.1694	0.7858
138	10-20	60	30.0300	6.1764	1.6161	21.7901	98.5	0.0313	0.0086	0.0123	0.0353	89.6	0.0001	0.0000	0.0008	0.1297	0.0483	1.8765	2.0545	0.0631	0.0235	0.9134
1234B	10-20	80	30.2251	5.0885	8.0495	17.8572	102.5	0.0214	0.0098	0.0082	0.0239	83.5	0.0000	0.0001	0.0004	0.1970	0.2617	1.6892	2.1479	0.0917	0.1218	0.7865
130	10-20	80	30.1018	9.1017	4.8960	15.6880	98.6	0.0270	0.0162	0.0125	0.0325	88.5	0.0001	0.0001	0.0005	0.3370	0.1403	1.1663	1.6437	0.2051	0.0853	0.7096
1234B-130	10-20	80	30.1635	7.0951	6.4728	16.7726	100.6	0.0242	0.0130	0.0104	0.0282	86.5	0.0001	0.0001	0.0005	0.2670	0.2010	1.4278	1.8958	0.1408	0.1060	0.7531
113	10-20	100	30.0097	4.1543	12.2065	13.0862	98.1	0.0261	0.0269	0.0100	0.0344	87.6	0.0001	0.0001	0.0005	0.2630	0.2881	1.0589	1.6100	0.1633	0.1790	0.6577
619B	10-20	110	30.4987	4.8215	4.1801	22.4789	103.2	0.0339	0.0188	0.0063	0.0414	101.2	0.0001	0.0000	0.0009	0.2420	0.0700	2.4879	2.7998	0.0864	0.0250	0.8886
126	10-20	125	30.0586	7.6557	3.7992	18.2898	99.0	0.0286	0.0098	0.0091	0.0326	82.1	0.0001	0.0000	0.0006	0.1811	0.0831	1.4316	1.6959	0.1068	0.0490	0.8442
716B	10-20	170	30.1938	6.3470	6.8513	16.4732	98.3	0.0285	0.0337	0.0163	0.0249	85.4	0.0002	0.0001	0.0004	0.6527	0.3419	1.2519	2.2465	0.2906	0.1522	0.5573
942B	10-20	250	30.0432	6.1886	9.3647	14.1144	98.8	0.0122	0.0072	0.0166	0.0094	90.4	0.0000	0.0002	0.0001	0.1300	0.4560	0.3885	0.9745	0.1334	0.4679	0.3987
942C	10-20	250	30.0541	3.5053	7.2277	19.6093	101.0	0.0124	0.0040	0.0145	0.0096	82.0	0.0000	0.0001	0.0002	0.0367	0.2744	0.4907	0.8018	0.0458	0.3422	0.6120
1042B	10-20	250	30.4886	6.5467	9.2929	14.4789	99.4	0.0060	0.0059	0.0027	0.0084	101.5	0.0000	0.0000	0.0001	0.3510	0.2287	1.1031	1.6827	0.2086	0.1359	0.6555
1118A	10-20	250	30.8571	9.3773	6.6261	15.3898	101.7	0.0188	0.0176	0.0074	0.0215	94.0	0.0002	0.0000	0.0003	0.4267	0.1267	0.8564	1.4099	0.3027	0.0898	0.6075
1118B	10-20	250	30.1420	6.7322	3.8588	20.4352	102.9	0.0185	0.0097	0.0061	0.0190	85.7	0.0001	0.0000	0.0004	0.2049	0.0744	1.2222	1.5015	0.1365	0.0495	0.8140
1118C	10-20	250	30.9313	7.4706	4.6768	19.1592	101.2	0.0453	0.0276	0.0186	0.0460	83.8	0.0002	0.0001	0.0009	0.4718	0.1988	2.0130	2.6836	0.1758	0.0741	0.7501
152	10-20	250	30.4887	3.5083	16.1846	10.4267	98.8	0.0463	0.1136	0.0191	0.0751	105.7	0.0004	0.0003	0.0008	0.9708	0.7527	1.9086	3.6321	0.2673	0.2072	0.5255
153	10-20	250	30.1048	3.4227	13.8287	13.6292	102.6	0.0359	0.0249	0.0222	0.0591	110.7	0.0001	0.0003	0.0008	0.1854	0.6660	1.7516	2.6029	0.0712	0.2558	0.6729
154	10-20	250	30.2000	2.5992	16.1984	11.6540	100.8	0.0281	0.0217	0.0048	0.0587	96.4	0.0001	0.0001	0.0007	0.1373	0.1888	1.6649	1.9910	0.0690	0.0948	0.8362
155	10-20	250	30.0773	2.9368	11.1579	14.8118	96.1	0.0305	0.0208	0.0078	0.0451	88.9	0.0001	0.0001	0.0007	0.1311	0.1876	1.4352	1.7539	0.0748	0.1069	0.8183
156	10-20	250	30.7426	5.0700	12.9556	12.5766	99.5	0.0369	0.0213	0.0264	0.0613	107.6	0.0001	0.0003	0.0008	0.2018	0.6387	1.4423	2.2828	0.0884	0.2798	0.6318
157	10-20	250	30.6216	7.2607	15.1986	8.1590	100.0	0.0206	0.0114	0.0050	0.0445	82.9	0.0001	0.0001	0.0004	0.2888	0.2677	1.2673	1.8239	0.1584	0.1468	0.6949
942B-157	10-20	250	30.3445	5.4748	9.6005	15.2983	100.1	0.0268	0.0234	0.0121	0.0369	99.5	0.0001	0.0001	0.0006	0.2947	0.3384	1.2953	1.9284	0.1528	0.1755	0.6717

Appendix D

INCUBATION EXPERIMENT DATA

Table D1
Westrn New England

Forest Age	Agricultural Use	Layer	Cumulative Respiration after 62 days of incubation (µg CO2 - C g-1 Soil-C)	Standard Error
0	Modern Plowed	0-10 cm	51.8062	13.9440
40	Cultivated	0-10 cm	31.0190	1.3449
60	Cultivated	0-10 cm	40.7927	
80	Cultivated	0-10 cm	33.6920	2.4425
100	Cultivated	0-10 cm	40.4033	12.3315
110	Cultivated	0-10 cm	36.1814	
125	Cultivated	0-10 cm	28.8380	
180	Cultivated	0-10 cm	24.3826	
0	Modern Pasture / Hay	0-10 cm	70.4979	6.0767
25	Pasture	0-10 cm	39.4747	
40	Pasture	0-10 cm	39.2454	
50	Pasture	0-10 cm	55.9141	
60	Pasture	0-10 cm	25.2397	
80	Pasture	0-10 cm	31.0927	1.7335
100	Pasture	0-10 cm	31.9449	
110	Pasture	0-10 cm	17.5355	
125	Pasture	0-10 cm	26.7987	
170	Pasture	0-10 cm	36.0397	
250	Native Forest	0-10 cm	29.2606	2.6447
0	Modern Plowed	10-20 cm	37.2459	5.1306
40	Cultivated	10-20 cm	28.9846	1.0133
60	Cultivated	10-20 cm	26.7925	
80	Cultivated	10-20 cm	25.7496	1.7794
100	Cultivated	10-20 cm	29.1464	4.9561
110	Cultivated	10-20 cm	34.7958	
125	Cultivated	10-20 cm	30.9288	
180	Cultivated	10-20 cm	20.0427	
0	Modern Pasture / Hay	10-20 cm	53.9979	4.4931
25	Pasture	10-20 cm	31.0307	
40	Pasture	10-20 cm	33.0784	
50	Pasture	10-20 cm	59.8699	
60	Pasture	10-20 cm	22.4778	
80	Pasture	10-20 cm	33.8956	0.6145
100	Pasture	10-20 cm	26.2168	
110	Pasture	10-20 cm	21.8165	
125	Pasture	10-20 cm	23.6635	
170	Pasture	10-20 cm	28.6110	
250	Native Forest	10-20 cm	26.0132	2.6664

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