RELATIONSHIP OF UNDERSTORY VEGETATION, TREE REGENERATION, AND SOIL COMPOSITION TO STAND AGE IN BLACK ROCK FOREST

Senior Thesis

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Abstract

A forest's recovery from disturbance may be reflected in the structure of the plant community. Species abundance and distribution, as well as the trees' ability to regenerate may be altered for generations. Five stands in Black Rock Forest (Cornwall, New York) that were clearcut approximately 36 to 131 years ago were sampled, and the diversity and composition of understory vegetation, tree regeneration, ground cover and soil organic matter were compared. 22 species were recorded in the stands, and Jaccard's coefficient of similarity values showed decreasing similarity between the stands' understory composition as the age difference increased. Soil organic matter was consistently greater in the surface soil than the subsoil, but showed no consistent relationship with stand age. A significant nonlinear correlation was found between stand age and total regeneration as well as between stand age and *Quercus rubra* regeneration, *Betula lenta* regeneration, and *Acer rubrum* regeneration. Correlating stand mean LAI from a past study with the number of seedling and number of species revealed significant relationships. Regeneration was dominated by *Acer rubrum*, and the stand with the lowest LAI (stand B) had significantly more seedlings than the other stands.

Since some of the stands were thinned after the initial clearcut, their canopies may be less closed than they would otherwise be. Furthermore, the study was done using a limited amount of data and with pseudo replications only. Thus any conclusions drawn may be site specific only, and additional research is required before they can be further expanded.

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Introduction

Human activities have been the main cause of disturbance in northeastern United States forests since the European settlement (O'Keefe et al. 2005). Disturbance included clearcutting, burning, and grazing, for the purposes of producing wood products, farming, and urbanization. Unable to compete with more fertile areas to the west, many farmers abandoned their agricultural lands in the later 19th and early 20th centuries, leaving them to be reclaimed by the forest (Whitney and Foster 1988). Land-use history is embedded in the structure and function of all ecosystems (Foster et al. 2003). Indeed, the influence of disturbance is still apparent in ecosystems in the northeast, which exhibit differences in species abundance and distribution before and after the disturbance (Oliver 1981, O'Keefe et al. 2005).

Following a disturbance that removes all vegetation, such as a fire or windstorm, a forest often goes through predictable stages as different types of plants colonize the area. This pattern of ecosystem change over time is called forest succession. Bormann and Likens (1979) and Oliver (Oliver 1981) describe four stages in the development of a forest: stand initiation stage (reorganization), stem exclusion stage (aggradation), understory reinitiation stage (transition), and old-growth stage (steady-state). The *stand initiation stage* starts immediately after the disturbance. Since all vegetation was removed, resources such as water, light, and nutrients are abundant and new species of herbs, shrubs, and trees become established, taking advantage of the fertile and open site. These species are mostly shade intolerant, and ones that sprout from existing rootstocks.

New stems fill the site, until one or more of the resources become limiting (e.g., light after the canopy closes). The understory richness is expected to be high during this stage shortly after disturbance (Roberts and Gilliam 2003). The *stem exclusion stage begins* as intense competition for light, moisture, and nutrients causes some of the herbaceous plants to disappear, and the canopy is dominated by trees. During this stage shade tolerant species may become established. However, as the competition between overstory trees is at its maximum, Roberts and Gilliam predict that the understory richness would decrease to its minimum (2003). Overstory trees eventually start to die, and the gaps in the cover allow more light and moisture to reach the understory. That is when the *understory reinitiation stage* begins. Mid-canopy trees can grow and become dominant overstory species, or new species can establish, utilizing any resources that were previously used by the older trees. Herbaceous plants are expected to be greatly influenced by the forming gaps at this stage, since most species are light limited (Whigham 2004). This stage is similar to the stand initiation stage, only in a smaller scale, and as in the initiation stage understory richness is at an increase. This pattern of forming gaps that are utilized by new trees can theoretically continue indefinitely, and form a stable balance of plants of different ages, species, and sizes – the *old growth stage*. This stage is characterized by stable productivity and biomass levels, and changes in vegetation are generally gradual, until the next disturbance occurs, which would start the succession process again. It has not been determined whether at the old-growth stage the richness would decrease due to loss of early species, or increase to its maximum with colonization by slowly dispersing species (Roberts and Gilliam 2003). While Oliver generally agrees with Bormann and

Likens regarding the progression of these stages, he emphasizes the fact that species which appear in one stage are not necessarily replaced by species that invade the site later. Instead, he argues that prevalent species in the old forest are usually present from the beginning, but are overlooked because of their small size and numbers. Furthermore, Oliver opposes the idea of one dominant species or one group of species that is destined to dominate a site, which Bormann and Likens refer to as 'climax' vegetation (1979). Instead, Oliver stresses that actually several different communities can inhabit the same site, and the stages in his model seem to overlap more.

The timber industry is an important creator of disturbance in forests, and one of the primary practices of harvesting timber in the United States is clearcutting (Backiel and Gorte 1992). In this method all the trees in a site are cleared, and a new, even-aged stand is allowed to grow. Clearcutting is considered the most cost-effective method of harvesting timber, and it also leaves a site that is easier to prepare for artificial regeneration, since there is no need to avoid trees that are left behind. However, if all trees are cut, regardless of their merchantable value, then species that are ecologically important for conserving nutrients, minimizing erosion, and serving as a source of food for wildlife are removed as well (Bormann and Likens 1979). Furthermore, regeneration from seed is limited, since after the initial seed bank is exhausted there are no mature trees in the immediate vicinity to replenish it.

Special consideration should be given to the herbaceous understory plants, which are most sensitive to clearcutting (Duffy and Meier 1992, Gilliam 2002). This sensitivity may be related to their limited ability to disperse seeds over long distances, their short seed dormancy period, or low seedlings recruitment (Whigham 2004). Some studies suggest that the diversity of herbaceous plants is higher in younger stands and that clearcutting actually increases the diversity in the short term (Bormann and Likens 1979, Olivero and Hix 1998, Small and McCarthy 2005), yet several studies compared mature forests to younger ones following clearcuts and found no significant difference in the herbaceous layer richness (Yorks and Dabydeen 1999, Jenkins and Parker 2000, Gilliam 2002, Flinn and Vellend 2005). This lack of consistency suggests that the herb layer response to disturbance may be site specific and should be studied separately for different forests (Roberts and Gilliam 2003).

Soil composition can also be an important factor in the dynamics of the understory community (Small and McCarthy 2005). The availability of soil organic matter is expected to decrease after clearcutting due to accelerated decomposition and low amounts of leaf input, and increase thereafter as the forest recovers (Covington 1981). Covington (1981) found that the degrading period was 0-15 years after the disturbance, followed by a rapid aggrading of organic matter for 49 years, and by the 64th year the amount of organic matter was within 5% of its maximum. However, a more recent study found no significant difference in soil composition between younger (~20yo) and mature (older than 70yo) stands (Gilliam 2002). Yanai et al. (2000) revisited the sites used by Convigton, and found that his findings did not occur anymore (e.g., a forest that was supposed to be in the degradation phase according to Covington's findings had more organic matter content than Covington reported). They suggest that the differences found by Covington were due to differences in harvesting methods rather than the age of the forests (Yanai 2000).

Young trees are an important component of the understory layer. Tree regeneration can be influenced by the understory vegetation in a forest, which can shelter the seedlings from herbivory or act as a barrier to sunlight (George and Bazzaz 2003). Clearings are frequent grazing areas, and any young seedlings are in danger of being grazed. In a regenerating forest, therefore, an increase in the amount of seedlings would be expected as the cleared area proceeds through the various stages of succession. However, understory plants, which are expected to be more abundant during the earlier stages, may protect young tree seedlings from the herbivores (George and Bazzaz 2003). If sunlight is the dominant factor affecting the seedlings, then a decrease in regeneration would be expected with increasing canopy closure as trees age. Yet according to succession theory, the understory vegetation would be thicker in younger stands, and may block the sunlight from reaching the seedlings. As noted above, the amount of soil organic matter also varies after a disturbance. All of these factors act simultaneously, resulting in a complex pattern of tree regeneration.

The goal of this study is to examine changes in the understory vegetation as a forest matures. Black Rock Forest (BRF) was established in 1928 as an experimental forest to illustrate efficient means of timber production (Maher 1996), and was therefore relatively undisturbed since that time. Furthermore, it was never extensively cultivated, and only about 7.5% of the forest was ever cleared by farmers (Tryon 1930). BRF therefore provides an opportunity to examine development of natural vegetation following clearcutting in the Northeastern United States, an area which was mainly a vast deciduous forest before European arrival. Another advantage of BRF is that while most of the previous studies compared abandoned agricultural land (stands that were clearcut and then farmed) to mature natural forests (Roberts and Gilliam 2003), the sites used in this study all have similar land-use history that includes clearcutting and thinning. Five stands of varying ages in the forest were compared in order to assess changes in understory vegetation and soil organic matter content during different stages of succession following clearcutting.

Methods

The Black Rock Forest (BRF) is located in the Hudson Highlands, 85km north of New York City, in Cornwall, New York. It is a 1530 ha preserve that is dedicated to scientific research, education, and the conservation of the natural habitat that once covered the region (Bowman et al. 2005).

Sampling Design

This study was conducted on five neighboring stands in BRF near the intersection of Bog Meadow and Carpenter Roads (Figure 1). In each of these stands the date of the last clearcutting is known, and canopy trees are all approximately the same age, with averages of 36 years (stand A), 71 years (stand B), 92 years (stand C), 92 years (stand D), and 131 years (stand E) in 2005. The age of the trees was determined by data obtained from the forest's historic records, and was verified by coring sample trees and counting the annual rings (Carson 2004). In each of these stands, 6 plots were sampled, where each plot was $40.47m^2$ (a circle with a radius of 3.59m). During July 2005, the following data were recorded in each of the plots: species and diameter of trees at 130cm (breast height - DBH), tree regeneration – number of individuals shorter than 50cm by species (one sapling above this height was recorded, and was excluded from the data analysis), and vegetative cover in each of three strata. The cover was estimated and graded by a Braun-Blanquet Scale (Mueller-Dombois and Ellenberg 1974), for overall vegetation, trees alone (over all species and by individual species), shrubs (overall and by species), forbs (overall and by species), fern, grass, bare rock, and moss, in three different strata: below 1m, 1– 2m, and above 2m.

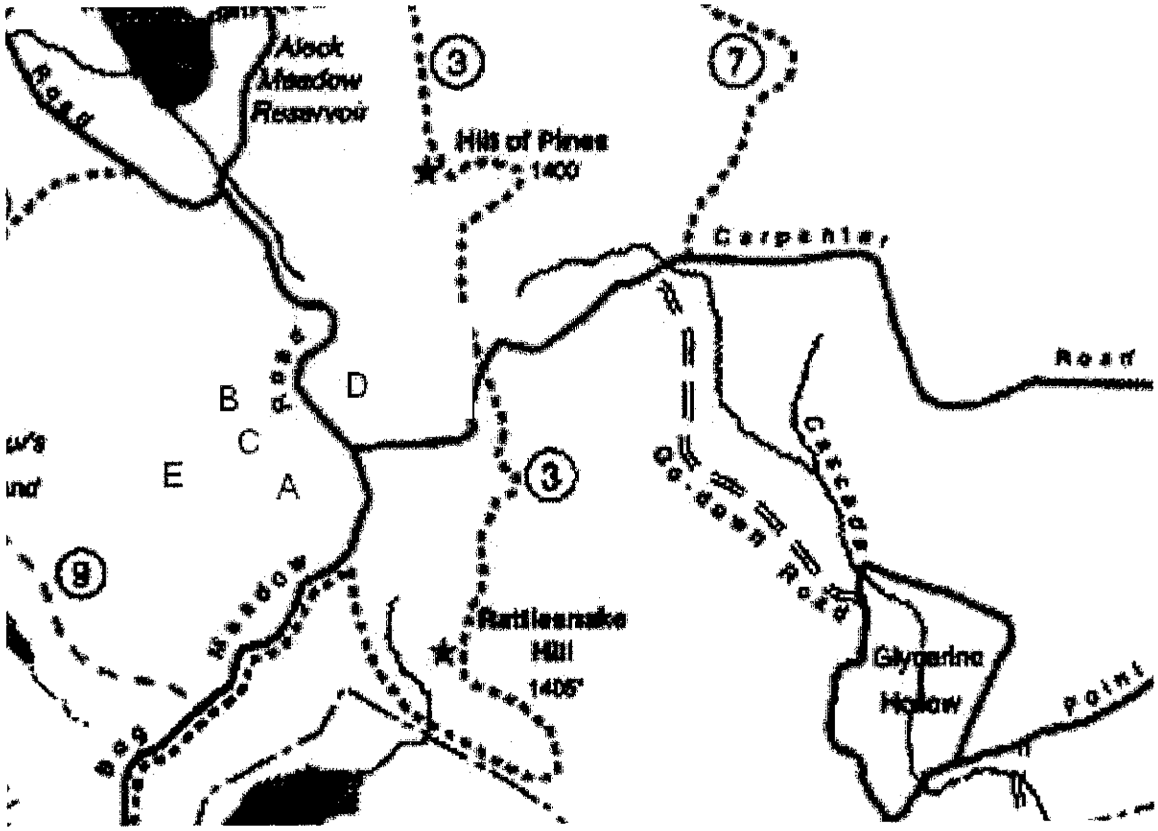

Figure 1: Location of the stands at Black Rock Forest

A single soil sample was collected from the margin of each of the six plots within each stand, and divided into topsoil and subsoil layers, which were distinguished visually by differences in color and texture. The samples were collected using a small shovel, and the cores were approximately 12 inches deep. Leaves and litter were removed from the area of sampling before the soil was collected. For each stand the six subsamples were mixed to create composite soil samples of both topsoil and subsoil. The amount of organic matter in the soil was estimated using the loss on ignition (LOI) method by drying the soil at room temperature for 48 hours, then heating at 100°C for 24 hours, weighing the sample then heating at 600°C for one hour, followed by a final weighing (Heiri et al. 2001).

The percent of organic matter in the soil was estimated using the following formula:

$$LOI = ((DW_{100}-DW_{600})/DW_{100})*100$$

where: DW_{100} = dry weight after 100°C for 24 hours

DW_{600} = weight after 600°C for 1 hour

Data Analysis

Linear and nonlinear regression analysis were used to examine the relationships between the age of the trees in a stand and the diversity of understory vegetation, composition of understory vegetation, amount of regeneration, and organic matter in the soil. The stands were also compared to one another using an ANOVA, to test for between-stand differences that may not be correlated with age. Correlations were also calculated between previously obtained measurements for leaf area index (LAI- a measure of light levels, Carson 2004) and levels of richness and numbers of seedlings per plot. The species composition of stands was compared using Jaccard Coefficient of Community Similarity (Lee 1999), which was calculated for each pair of stands as the number of shared species divided by the total number of species.

The analyses were performed using Microsoft Excel 2002 and JMP IN 5.1.

Results

A total of 22 species was recorded in the five stands. These included seven herbaceous species, seven shrub species, and eight tree species (Table 1). *Streptopus lanceolatus* (Twisted Stalk) occurred in 87% of the plots and *Maianthemum canadense* (Canada Mayflower) occurred in 67%. *Vaccinium angustifolium* (Lowbush Blackberry) was recorded in 97% of the plots, and *Amelanchier sp.* (Shadbush) in 80%. *Quercus rubra* (Red Oak) was found in 97% and *Acer rubrum* (Red Maple) was recorded in 100% of the plots.

Table 1: Species distribution and abundance. Numbers represent the number of plots in which the species was recorded.

Stand	A	B	C	D	E
Forbs					
Streptopus lanceolatus	5	6	6	6	3
Maianthemum canadense	5	4	4	6	1
Medeola virginiana		3	4	1	2
Lysimachia quadrifolia		1			2
Composite		1			
Unknown 1		1			
Unknown 2		1			
Shrubs					
Kalmia latifolia	5		5	3	
Amelanchier sp.	2	6	6	5	5
Vaccinium angustifolium	5	6	6	6	6
Vaccinium corymbosum	1		4		1
Hamamelis virginiana	5	6	4	6	6
Rubus sp.		3			
Sassafras albidum			1		1
Seedlings:					
Quercus rubra	5	6	6	6	6

Quercus prinus	3	3	3		
Quercus alba	1			1	
Acer rubrum	6	6	6	6	6
Acer saccharum	2	4			
Acer pensylvanicum	1	4			
Liriodendron tulipifera	1	6	1	4	
Betula sp.	6	5	1	2	5
total species	15	18	14	12	12

The Jaccard Coefficient of Community Similarity indicated that stands C and D were most similar, and stands A and E were the least similar (Table 2). Except for the similarity between stands A and C, there is a trend of decreasing similarity as the age difference between stands increases.

Table 2: Jaccard coefficient of similarity values for the various pairs of stands.

	A	B	C	D	E
A	1.00	0.57	0.67	0.50	0.42
B		1.00	0.52	0.50	0.43
C			1.00	0.73	0.53
D				1.00	0.71
E					1.00

Soil organic matter was consistently greater in the surface soil than the subsoil (surface soil mean % organic matter 63.5+-14.1, subsoil 15.1+-3.9, ANOVA: f=54.7, df=1, $p<0.0001$). However, soil organic matter showed no consistent relationship with stand age ($R^2<0.10$, $p>0.05$). No non-linear relationship was found between stand age and soil organic matter either.

Table 3: Soil organic matter estimated percentage for the various stands.

Stand	% organic matter in topsoil	% organic matter in subsoil
A	52.63	15.25
B	72.22	18.84
C	78.95	8.86
D	45.16	14.55
E	68.42	18.03

There was no significant relationship between stand age and total cover for any of the height categories recorded (Table 4, linear regressions: <1m: R^2=0.04, p>0.05; 1-2m: R^2=0.02, p>0.05; >2m: R^2=0.02, p>0.05). No non-linear relationship was found between these variables either. Carson (2004) reported leaf area index results that did correlate with stand age (R^2=0.77, p not reported).

Table 4: Stand age, mean cover values, and LAI (as reported by Carson, 2004)

Stand	A	B	C	D	E
Age	36	71	92	92	131
cover <1m	3.17	1.67	2.67	3.50	2.00
cover 1m-2m	1.33	0.67	1.00	0.83	1.00
cover >2m	4.33	4.00	3.67	3.83	4.00
LAI	1.75	1.67	1.85	1.85	1.98

There was also no significant relationship either between stand age and the species richness of understory vegetation (measured by the number of species per plot for all vegetation; R^2=0.002, p>0.05), or between stand age and tree regeneration (measured by counting the number of seedlings below 50cm; R^2=0.03, p>0.05). However, there was a significant nonlinear correlation between stand age and total regeneration as well as between stand age and Red Oak (*Quercus rubra*) regeneration, Black Birch (*Betula lenta*) regeneration, and Red Maple (*Acer rubrum*) regeneration (Figure 2).

Total regeneration and Red Maple regeneration were significantly higher in stand B, and did not vary among the other stands. Black Birch regeneration was highest in stand A, lowest in stands C and D, and intermediate in stands B and E, while Red Oak regeneration was highest in Stand C, lowest in stand A, and intermediate in the other stands (Figure 3).

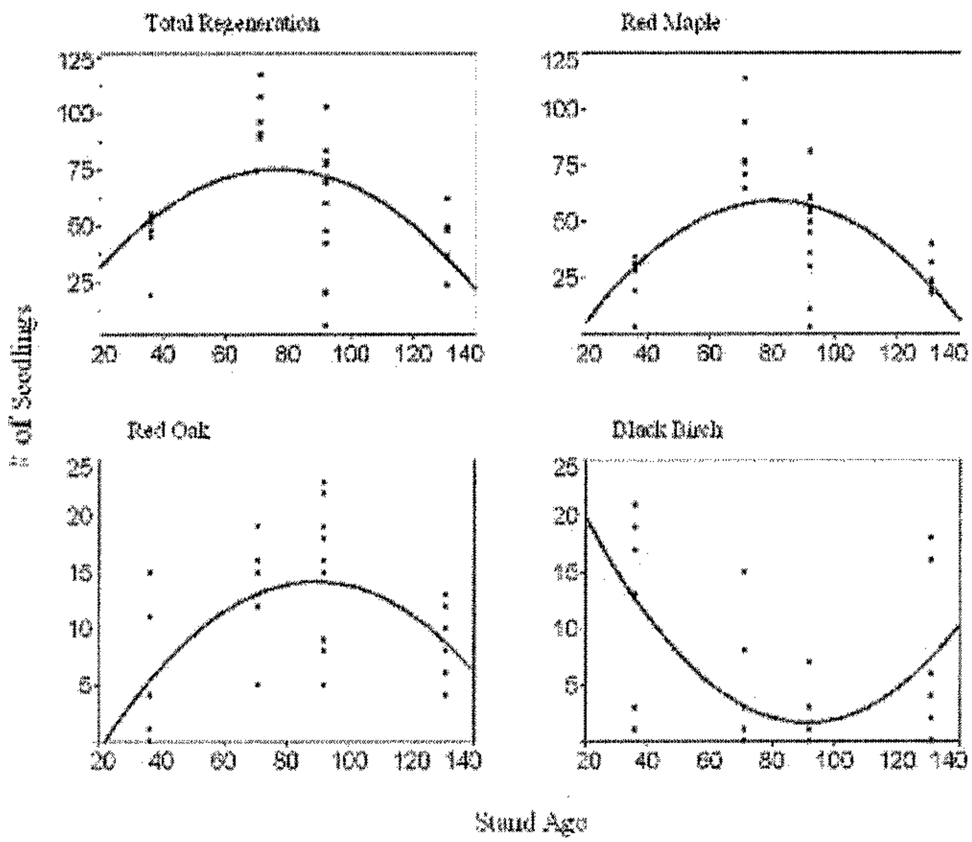

Figure 2: Nonlinear regression between regeneration and stand age. Total (R^2=0.22, p<0.05), Red Maple (R^2=0.36, p<0.05), Red Oak (R^2=0.32, p=0.05), Black Birch (R^2=0.38, p<0.05).

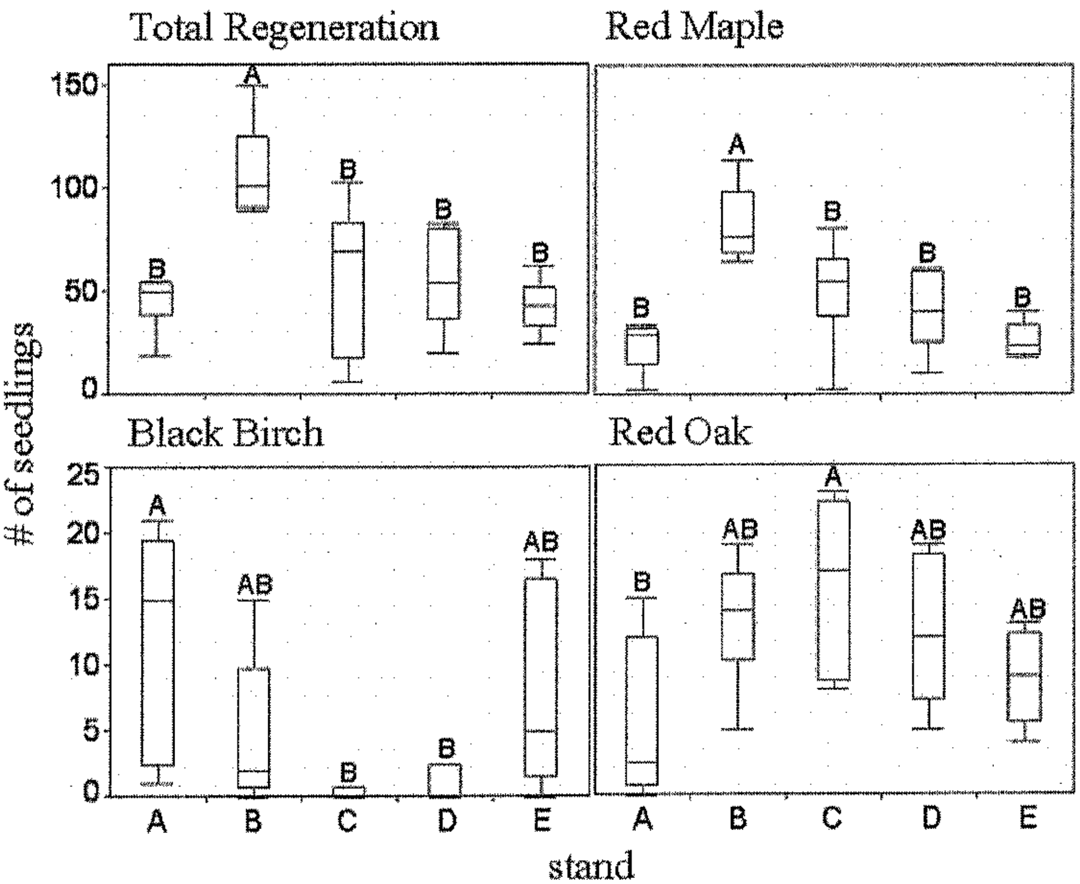

Figure 3: Regeneration varied between stands. Total: f=7.7 df=4,25 p<0.001; Red Maple: f=10.9 df=4,25 p<0.0001; Black Birch: f=4.1 df=4,25 p=0.01; Red Oak: f=3.5 df=4,25 p=0.02.

No significant relationship was found between richness and tree regeneration (R^2=0.12, p>0.05), although a previous study found richness to be inversely correlated with the number of seedlings (Scheller and Mlandenoff 2002). The number of seedlings was not significantly correlated with the total cover either (<1m: R^2=0.12, p>0.05; 1-2m: R^2=0.01, p>0.05; >2m: R^2=0.01, p>0.05). Correlating Carson's stand mean LAI values (Carson 2004) with the number of seedling and number of species reveals significant relationships (Figure 4). Stand B, which had the lowest LAI, had significantly more seedlings than any of the other stands (Table 4, ANOVA: f=7.7, df=4,25, p<0.001).

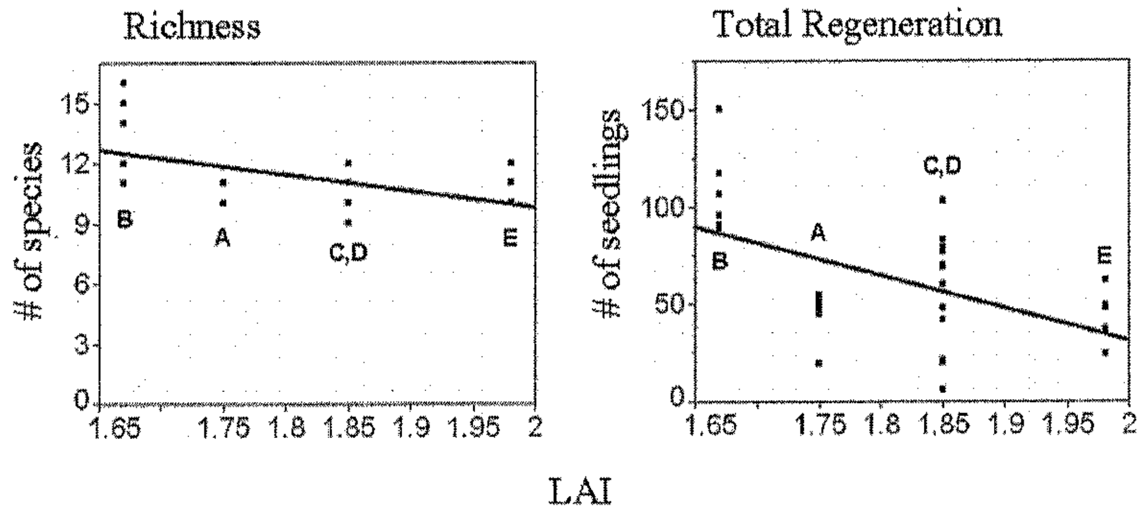

Figure 4: There is a correlation between Carson's LAI and richness (R2=0.28, p<0.01) and total regeneration (R2=0.30, p<0.01). Letters indicate stands.

Total cover below 1m varied between stands: stand D had the highest cover, B the lowest, and stands A, C, and E had intermediate values (Figure 4). There was no variation between the stands for cover above 1m.

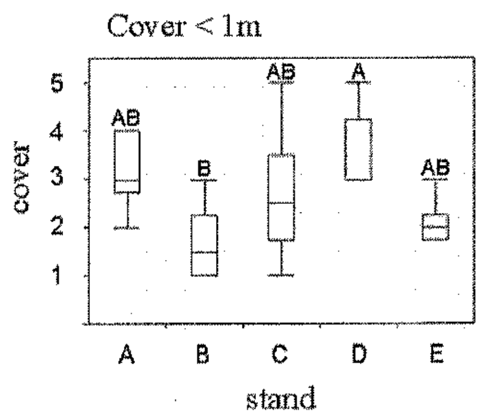

Figure 5: Variation of total cover below 1m between stands (f=4.2 df=4,25, p=0.01)

Discussion

Overall, the results suggest the five stands are similar with respect to soil organic matter and species richness. The variation between the stands of tree regeneration and cover below 1m seems to be driven by factors other than stand age, light probably being an important one.

Jaccard's coefficient of similarity between stands fits the expected results, in that similarity decreases when the difference in age increases (except for the comparison between stands A and C). The highest similarity index was found between stands C and D, as expected since they are of similar age. The dissimilarity may be attributed to the fact that younger stands had more species of seedlings (i.e., Sugar Maple and Striped Maple in Stands A and B) and older stands had more species of forbs and shrubs (i.e., Indian Cucumber in stands B-E and Sassafras in stands C and E).

There was no correlation between the age of the stand and organic matter in the soil, which suggests that either clearcutting had no effect on the organic matter, or the organic matter already recovered. Covington found that within 64 yrs the organic matter reaches almost its maximum, so 4 out of the 5 stands in this study would already be at that stage.

Although forest succession models predict increasing canopy cover with increasing stand age, this study found no significant relationship between stand age and cover at any height. It should be noted that Carson (2004) did find an increase in LAI with increasing age. This may be partly due to the small number of samples collected from each stand, lack of replication sites, or poor resolution. However, it could also indicate that these stands do not follow the classical models.

Moreover, the oldest stands were thinned after the initial clearcutting (Bowman et al. 2005). E.g., in Stand E (oldest stand) all Chestnut Oak, Birch, and poorly formed trees were removed in 1934-5. These secondary treatments affected the formation of canopy, and the results obtained here are therefore not representative of natural forest succession. Since Carson's measurements of LAI did correlate with stand age (2004), it could also be the case that the estimates used here were just not accurate enough. It should also be noted that the stands went through several cycles of cutting prior to the last clearcuttings that were used to estimate their age, with unknown consequences. Additionally, while the aboveground portions of the trees in each stand are of known age, their roots, the soils, and possibly some of the understory vegetation are all much older.

The lack of correlation between stand age and richness and between stand age and tree regeneration may be explained by the relatively narrow range of ages represented by the stands. Other studies consider young stands to be those younger than 20 years, and models indicate that full recovery may take several centuries (Flinn and Vellend 2005). So the stands used in this study may represent the stem exclusion and understory reinitiation stages, but not the stand initiation and old-growth stages. These results are consistent with studies that did not find a significant difference in the herbaceous layer richness between young and mature forests following clearcuts (Yorks and Dabydeen 1999, Jenkins and Parker 2000, Gilliam 2002, Flinn and Vellend 2005).

The nonlinear relationships between stand age and tree regeneration imply that a combination of factors affect the seedlings, although light probably has a large influence, as is suggested by the strong correlation between LAI and regeneration. Total regeneration, Red Oak, and Red Maple show a similar trend of increasing first, peaking around 80 years, and then decreasing. This could be explained by the increased amount of light and moisture available at the first stages of succession, which become limiting at the stage of stem exclusion. Deer herbivory would be expected to affect the seedlings in the opposite way, which would create a curve resembling the Black Birch curve.

The variation of regeneration, both total and by species is also curious, since each species has a higher number of seedlings in a different stand. This may mean that there are factors that are exclusive for each of the stands, such as moisture levels due to a near-by stream, varying light levels due to slope differences, etc. These unknown factors may also explain the variation of total cover below 1m.

The relationship that was found between Carson's LAI values and richness and between LAI and regeneration was expected according to succession models – as the LAI increases less light and moisture can reach the understory, which would decrease the ability of plants on the forest floor to develop.

Conclusions

Although it was initially assumed that the stands represent varying stages in forest succession, it seems that they are too close in age to be representative of that. The secondary thinning in some of the stands also makes them problematic for examining the subject of maturing forests, since not all stands were allowed to mature naturally. The small sample size and lack of real replication sites also reduce the ability of the data to document significant differences that may have been more apparent with more samples and replicates. This limits the conclusions that can be drawn from this study regarding the question of succession of the understory community.

The understory vegetation in the five stands differs in some aspects, but the differences are far from being a linear function of the age of the stands. Other data should be collected for each of stands, including the slope, exact measurements of light, soil nutrients, etc. These may shed more light on the reason to the variation between the stands.

Recommendations

Inferring vegetation changes from any chronosequence is problematic, since it is not obvious that the stands do not differ from each other in aspects other than age. Since data is accumulating in recent years, it might be possible to compare records of the same forest over the years, and examine the changes in vegetation directly.

Even if composition is similar, it might be that the individuals in younger stands perform differently than those in older stands. Individuals of the same species can be compared in relation to their size, their flowering pattern, etc. to examine whether stand age may be correlated with fitness.

Since herbaceous plants are susceptible to herbivory, and growing forests provide ideal habitat for white-tailed deer, it would be interesting to test deer browsing influence on the diversity and composition of understory vegetation in younger versus older forests.

It is also recommended to sample the same forests repeatedly for a number of years, since many of the understory vegetation are perennials (Whigham 2004).

Lastly, it is desirable to have a sample of the largest size possible, and have replication sites included in the design.

Specifically for BRF, if another study of this kind is to be done, many more sampling plots should be included, and perhaps even whole stands, since the area is not very big. Sampling should also take place during both the summer and the spring, since some species may not be visible in all seasons, and data should be recorded in a finer resolution.

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Appendix A: Data

Stand	A	Plot	1	Date	7/5/2005	Investigators	HR & MR

Tree	Spec.	DBH (INCH)
1	BB	1.8
2	CO	4.6
3	CO	4.2
4	CO	4.9
5	CO	2.5
6	CO	6.1
7	RO	5.94488189
8		
9		
10		
Total		na
Average basal area (ft^2/acre)		3.004488189
(ft^2/hectare)		

Tree #	Regeneration Species	# <BH	#>BH
1	RO	15	
2	RM	3	
3	BB	1	
4			
5			
6			
total		19	

Plant Cover	<1 m	1m - 2m	>2m
Overall	4	1	4
Tree	1	1	4
BB	1	1	1
CO	1	1	2
RO	1	0	1
Shrub	3	1	1
ML	1	1	1
LOWBUSH	2	0	0
WITCH	1	0	0
SB	1	0	0
forb	1		
TS	1		
fern	0		
grass	1		
bare rock	1		
moss	1		

Braun-Blanquet Scale:

1:	0-5%
2:	5-25%
3:	25-50%
4:	50-75%
5:	75-100%

Stand A Plot 2 Date 7/5/2005 Investigators HR & MR

Tree	Spec.	DBH (INCH)
1	RM	2.1
2	RM	1.3
3	RO	7.3
4	RO	7
5	RO	7
6	RO	6.4
7	RO	6.5
8	RM	2.2
9	RM	3.6
10	RM	3.4
11	RM	2.6
12	RO	1.1
Total		na
Average basal area (m^2/acre)		4.68
(m^2/hectare)		

Plant Cover	<1 m	1m - 2m	>2m
Overall	2	2	5
Tree	1	1	5
RM	1	1	2
RO	1	1	2
CO	1	0	1
SM	1	0	0
Shrub	2	2	2
WITCH	1	1	2
LOWBUSH	2	0	0
ML	1	1	1
SB	1	0	0
forb	1		
CM	1		
fern	0		
grass	1		
bare rock	1		

Braun-Blanquet Scale:

Regeneration

Tree #	Species	# <BH	#>BH

1	RM	28
2	RO	4
3	BB	21
4	SM	1
5		
6		
total		54

1:	0-5%	moss	1
2:	5-25%		
3:	25-50%		
4:	50-75%		
5:	75-100%		

Stand A Plot 3 Date 6/29/2005 Investigators HR & MR & PD

Tree	Spec.	DBH (INCH)
1	RO	6.2
2	RM	1.8
3	RM	2
4	CO	4.4
5	RM	3.5
6	RM	2.3
7		
8		
9		
10		
Total		na
Average basal area (m^2/acre)		2.02
(m^2/hectare)		

Plant Cover	<1 m	1m - 2m	>2m
Overall	3	2	4
Tree	1	0	4
RO	1	0	2
RM	1	1	2
CO	1	0	1
BIRCH	1	1	0
Shrub	3	2	1
LBBlue	2	0	0
ML	2	1	0
WITCH	1	2	1
forb	1		
TS	1		
CM	1		

				fern	0

Regeneration

Tree #	Species	# <BH	#>BH
1	RM	30	
2	RO	11	
3	CO	4	
4	BIRCH	3	1
5			
6			
total		48	

Braun-Blanquet Scale:

1:	0-5%	grass	1
2:	5-25%	bare rock	1
3:	25-50%	moss	1
4:	50-75%		
5:	75-100%		

Stand A Plot 4 Date 6/29/2005 Investigators HR & MR & PD

Tree	Spec.	DBH (INCH)
1	RO	6.2
2	RM	3.9
3	RM	4.2
4	RM	3.5
5	RM	1.4
6	RO	1.4
7	RO	2.6
8	CO	3.7
9		
10		
Total		na

Plant Cover	<1 m	1m - 2m	>2m
Overall	3	1	4
Tree	1	0	4
RO	1	0	2
RM	1	0	2
CO	0	0	1
Shrub	2	1	0
HIGHBLUE	1	1	0
LOWBLUE	1	0	0
WITCH	1	0	0
ML	1	1	0

Average basal area (m^2/acre)		2.69			forb	1
(m^2/hectare)					CM	1
					TS	1

	Regeneration			Braun-Blanquet Scale:			
Tree #	Species	# <BH	#>BH				
1	RM	32		1:	0-5%	fern	1
2	SM	1		2:	5-25%		
3	BB	17		3:	25-50%		
4	RO	1		4:	50-75%		
5				5:	75-100%	grass	1
6						bare rock	0
total		51				moss	2

Stand A Plot 5 Date 6/28/2005 Investigators HR & MR

Tree	Spec.
1	RM
2	RM
3	RM
4	CO
5	RM
6	RM
7	RM
8	RM
9	CO
10	BB

Plant Cover	<1 m	1m - 2m	>2m
Overall	3	1	4
Tree	1	1	4
RM	1	1	2
CO	1	0	2
BB	1	0	2
WO	1	0	0
Shrub	3	0	0
WITCH	1	0	0
LBBlue	3	0	0

Total

Average basal area (m^2/acre)

(m^2/hectare)

Tree #	Regeneration Species	# <BH	#>BH
1	RM	19	
2	CO	4	
3	BIRCH	19	
4	SM	1	
5	WO	2	
6			
total		45	

Braun-Blanquet Scale:

1:	0-5%
2:	5-25%
3:	25-50%
4:	50-75%
5:	75-100%

forb	1
TS	1
CM	1
fern	0
grass	1
bare rock	2
moss	1

Stand 1 Plot 6 Date 6/28/2005 Investigators HR & MR

Tree	Spec.	DBH (INCH)
1	BB	1.4
2	BB	5.8
3	CO	7
4	RO	5.5
5	RM	1.9
6	RO	4.8
7	RO	1.8
8		
9		

Plant Cover	<1 m	1m - 2m	>2m
Overall	4	1	5
Tree	1	1	5
BB	1	1	2
RM	1	0	1
RO	1	0	4
CO	1	0	1
Shrub	3	1	0
ML	2	0	0
HBBlue	1	1	0

10			LBBlue	2	0	0
Total	na					
Average basal area (m^2/acre)		2.82				
(m^2/hectare)			forb	1	0	0
			TS	1	0	0
			CM	1	0	0

Tree #	Regeneration Species	# <BH	#>BH
1	CO	6	
2	RM	34	
3	BIRCH	13	
4	TP	1	
5	RO	1	
6			
total		55	

Braun-Blanquet Scale:

1:	0-5%
2:	5-25%
3:	25-50%
4:	50-75%
5:	75-100%

fern	0
grass	1
bare rock	2
moss	2

Stand B Plot 1 Date 7/12/2005 Investigators HR & MR

Tree	Spec.	DBH (INCH)
1	RO	10.7
2	SM	1.6
3	SM	2.9
4		
5		
6		
7		
8		

Plant Cover	<1 m	1m - 2m	>2m
Overall	1	1	4
Tree	1	2	1
RM	1	1	0
STRM	1	0	3
RO	1	0	0
CO	1	0	0
TP	1	0	0
SM	0	2	2
ASH?	0	0	1

9		
10		
Total	na	
Average basal area (m^2/acre)		1.52
(m^2/hectare)		

Shrub	1	0	0
RASP	1		
WITCH	1		
LBUSH	1		
SB	1		
forb	1		
CM	1		
TS	1		
fern	0		
grass	1		
bare rock	1		
moss	1		

Tree #	Regeneration Species	# <BH	#>BH
1	RM	71	
2	STRM	1	
3	RO	12	
4	CO	2	
5	TP	3	
6			
total		89	

Braun-Blanquet Scale:

1:	0-5%
2:	5-25%
3:	25-50%
4:	50-75%
5:	75-100%

Stand B Plot 2 Date 7/12/2005 Investigators HR & MR

Tree	Spec.	DBH (INCH)
1	RM	2.6
2		
3		
4		

Plant Cover	<1 m	1m - 2m	>2m
Overall	3	0	4
Tree	1	0	4
RO	1	0	4
RM	1	0	2

5			
6			
7			
8			
9			
10			
Total		na	
Average basal area (m^2/acre)			0.26
(m^2/hectare)			

Shrub	3	
SB	1	
WITCH	1	
LBBLUE	3	
forb	1	
CM	1	
TS	1	
fern	0	
grass	2	
bare rock	2	
moss	1	
FUNGI	1	

Tree #	Regeneration Species	# <BH	#>BH
1	RM	77	
2	STRM	5	
3	BIRCH	3	
4	RO	19	
5	TP	2	
6	CO	1	
total		107	

Stand B Plot 3 Date 7/12/2005 Investigators HR & MR

Tree	Spec.	DBH (INCH)
1	CO	11.1
2	RO	14.3
3	RM	5.7
4		

Plant Cover	<1 m	1m - 2m	>2m
Overall	1	2	4
Tree	1	0	4
TP	1	0	0
RM	1	0	2
RO	1	0	3

5		
6		
7		
8		
9		
10		
Total	na	
Average basal area (m^2/acre)		3.11
(m^2/hectare)		

Tree #	Regeneration Species	# <BH	#>BH
1	TP	6	
2	RM	76	
3	RO	5	
4	BB	8	
5	SM	1	
6			
total		96	

BB	1	0	0
SM	1	0	0
CO	0	0	1
Shrub	1	2	
SB	1	0	
WITCH	1	2	
LBBLUE	1	0	
forb	1		
IC	1		
TS	1		
COMPOSITE	1		
fern	0		
grass	1		
bare rock	0		
moss	1		

Stand B Plot 4 Date 7/12/2005 Investigators HR & MR

Tree	Spec.	DBH (INCH)
1	RO	11.8

Plant Cover	<1 m	1m - 2m	>2m
Overall	1	1	5
Tree	1	1	5

2	RM	7.2
3	RM	4.4
4		
5		
6		
7		
8		
9		
10		
Total		na
Average basal area (m^2/acre)		2.34
(m^2/hectare)		

Tree #	Regeneration Species	# <BH	#>BH
1	RO	13	
2	BB	15	
3	RM	114	
4	SM	6	
5	TP	2	
6			
total		150	

Braun-Blanquet Scale:

1:	0-5%
2:	5-25%
3:	25-50%
4:	50-75%
5:	75-100%

	<1 m	1m - 2m	>2m
RO	1	0	2
BB	1	0	0
RM	1	1	5
SM	1	0	0
TP	1	0	0
Shrub	1	0	0
SB	1	0	0
RASP	1	0	0
LBLUE	1	0	0
WITCH	1	0	0
forb	1		
TS	1		
CM	1		
fern	0		
grass	0		
bare rock	1		
moss	1		

Stand B Plot 5 Date 7/12/2005 Investigators HR & MR

Tree	Spec.	DBH (INCH)
1	RO	14.7

Plant Cover	<1 m	1m - 2m	>2m
Overall	2	0	3
Tree	1	0	3

Tree	Spec.	DBH (INCH)
2	RO	10.7
3	RO	6.9
4	RM	4.7
5		
6		
7		
8		
9		
10		
Total	na	
Average basal area (m^2/acre)		3.7
(m^2/hectare)		

	Plant Cover	<1 m	1m - 2m	>2m
	STRM	1	0	0
	RO	1	0	2
	TP	1	0	0
	RM	1	0	3
	BB	1	0	0
	SM	1	0	0
	CO	1	0	0
	Shrub	1	0	0
	WITCH	1		
	SB	1		
	LBBLUE	1		
	forb	1		
	TS	1		
	IC	1		
	fern	0		
	grass	1		
	bare rock	1		
	moss	1		

Tree #	Regeneration Species	# <BH	#>BH
1	STRM	1	
2	RO	16	
3	TP	2	
4	RM	65	
5	BB	1	
6	SM	4	
7	CO	2	
total		91	

Stand B Plot 6 Date 7/12/2005 Investigators HR & MR

Tree	Spec.	DBH (INCH)
1	RO	8.5

Plant Cover	<1 m	1m - 2m	>2m
Overall	2	0	4
Tree	1	0	4

2			
3			
4			
5			
6			
7			
8			
9			
10			
Total	na		
Average basal area (m^2/acre)		0.85	
(m^2/hectare)			

Tree #	Regeneration Species	# <BH	#>BH
1	RM	94	
2	TP	1	
3	BIRCH	1	
4	SM	3	
5	RO	15	
6	STRM	3	
total		117	

RO	1	0	4
RM	1	0	1
YB	1	0	1
Shrub	2	0	0
RASP	1	0	0
SB	1	0	0
WITCH	1	0	0
LBBLUE	2	0	0
forb	1		
IC	1		
LMQUAD	1		
CM	1		
UNKNOWN1	1		
UNKNOWN2	1		
TS	1		
fern	0		
grass	1		
bare rock	1		
moss	1		
FUNGI	1		

Stand C Plot 1 Date 7/11/2005 Investigators HR & MR

Tree	Spec.	DBH (INCH)
1	BB	4.2
2	RM	8

Plant Cover	<1 m	1m - 2m	>2m
Overall	1	1	4
Tree	1	0	4
RM	1	0	4

3	CO	14.3
4		
5		
6		
7		
8		
9		
10		
Total	na	
Average basal area (m^2/acre)		2.65
(m^2/hectare)		

RO	1	0	2
BB	0	0	1
CO	0	0	1
Shrub	1	1	0
ML	1	1	0
LBBLUE	1	0	0
SB	1	0	0
forb	1		
TS	1		
CM	1		
fern	0		

Tree #	Regeneration Species	# <BH	#>BH
1	RM	61	
2	RO	8	
3			

Stand C Plot 2 Date 7/11/2005 Investigators HR & MR

Tree	Spec.	DBH (INCH)
1	CO	11.3
2		
3		
4		
5		
6		
7		

Plant Cover	<1 m	1m - 2m	>2m
Overall	5	1	3
Tree	1	0	3
RO	1	0	2
RM	1	0	2
BB	0	0	2
CO	0	0	1
Shrub	5	1	

8		
9		
10		
Total	na	
Average basal area (m^2/acre)		1.13
(m^2/hectare)		

Tree #	Regeneration Species	# <BH	#>BH
1	RO	18	
2	RM	3	

ML	1	0
SB	1	0
LBBLUE	5	0
HBBLUE	1	1
forb	1	
IC	1	
CM	1	
TS	1	
fern	0	

Stand C Plot 3 Date 7/11/2005 Investigators HR & MR

Tree	Spec.	DBH (INCH)
1	CO	11
2	RO	13.1
3	CO	12.4
4		
5		
6		
7		
8		
9		
10		
Total	na	
Average		3.65

Plant Cover	<1 m	1m - 2m	>2m
Overall	2	2	4
Tree	1	1	4
WO	0	1	2
CO	1	0	1
RO	1	0	2
RM	1	1	1
Shrub	2	2	1
WITHC	1	1	1
ML	1	2	1
LBBLUE	2	0	0
SB	1	0	0
SAS	1	0	0

basal area (m^2/acre)

(m^2/hectare)

Tree #	Regeneration Species	# <BH	#>BH
1	RM	81	
2	RO	23	
3	TP	1	

forb	1
IC	1
TS	1
fern	0

Stand C Plot 4 Date 7/11/2005 Investigators HR & MR

Tree	Spec.	DBH (INCH)
1	RO	13.5
2	RM	4.7
3	RM	5.4
4	RM	1.8
5		
6		
7		
8		
9		
10		
Total		na
Average basal area (m^2/acre)		2.54
(m^2/hectare)		

Plant Cover	<1 m	1m - 2m	>2m
Overall	2	0	5
Tree	1	0	5
RM	1	0	4
RO	1	0	2
CO	1	0	1
Shrub	2	0	
WITCH	1	0	
LBBLUE	2	0	
SB	1	0	
forb	1		
TS	1		
IC	1		
CM	1		
fern	0		

Tree #	Regeneration Species	# <BH	#>BH

1	RM	50
2	RO	16
3	CO	2

Stand	C	Plot	5	Date
Tree	Spec.	DBH (INCH)		
1	RM	3.6		
2				
3				
4				
5				
6				
7				
8				
9				
10				
Total		na		
Average basal area (m^2/acre)		0.36		
(m^2/hectare)				

Investigators HR & MR

Plant Cover	<1 m	1m - 2m	>2m
Overall	3	1	3
Tree	1	0	2
RM	1	0	2
RO	1	0	1
CO	1	0	1
BB	1	0	1
Shrub	3	1	0
WITCH	1	1	0
SB	1	0	0
ML	1	0	0
LBBLUE	3	0	0
HBBLUE	1	1	0
forb	1		
IC	1		
TS	1		
fern	0		
grass	0		
bare rock	1		
moss	1		

Tree #	Regeneration Species	# <BH	#>BH
1	RM	56	
2	RO	9	
3	CO	2	
4	BB	3	
5			

	6		
total			70

Stand	C	Plot	6	Date	7/11/2005	Investigators	HR & MR

Tree	Spec.	DBH (cm)
1	RO	19.1
2		
3		
4		
5		
6		
7		
8		
9		
10		
Total		na
Average basal area (m^2/acre)		1.91
(m^2/hectare)		

Tree #	Regeneration Species	# <BH	#>BH
1	RM	54	
2	RO	22	
3	CO	1	

Plant Cover	<1 m	1m - 2m	>2m
Overall	3	1	3
Tree	1	0	3
RM	1	0	1
RO	1	0	2
CO	1	0	1
Shrub	1	1	1
ML	1	1	1
HBBLUE	1	1	1
LBBLUE	1	0	0
WITCH	1	1	1
SB	1	1	0
forb	1		
CM	1		
TS	1		
fern	0		
grass	0		
bare rock	1		
moss	1		

Stand	D	Plot	1	Date	7/11/2005	Investigators	HR+MR	<1 m	1m - 2m	>2m

Tree	Spec.	DBH (inches)
1	RO	5.9
2	RO	13.1
3		
4		
5		
6		
7		
8		
9		
10		
Total		na
Average basal area (m^2/acre)		1.9
(m^2/hectare)		

Tree #	Regeneration Species	# <BH	#>BH
1	RM	36	
2	RO	5	
3	TP	1	

Plant Cover			
Overall	3	1	4
Tree	1	0	4
RM	1	0	1
RO	1	0	4
Shrub	3	1	3
SHAD	1	0	0
WITCH	1	1	3
LBBLUE	3	0	0
forb	1		
CM	1		
TS	1		
fern	0		
grass	1		
bare rock	1		
moss	1		

Stand D Plot 2 Date 7/11/2005 Investigators HR+MR

Tree	Spec.	DBH (INCH)
1	RM	1.8
2	RM	4.8
3	RM	4.6
4		

Plant Cover	<1 m	1m - 2m	>2m
Overall	3	1	4
Tree	1	0	4
RM	1	0	3
RO	1	0	3

5			
6			
7			
8			
9			
10			
Total		na	
Average basal area (m^2/acre)		1.12	
(m^2/hectare)			

Shrub	3	1	1
WITCH	1	1	1
ML	1	1	1
SHAD	1	0	0
LOWBB	3	0	0
forb	1		
IC	1		
TS	1		
CM	1		
fern	0		
grass	0		
bare rock	1		
moss	1		

Tree #	Regeneration Species	# <BH	#>BH
1	WO	1	
2	RM	61	
3	RO	19	
4	TP	2	

Stand D Plot 3 Date 7/11/2005 Investigators HR+MR

Tree	Spec.	DBH (INCH)
1	RM	2.5
2		
3		
4		
5		
6		
7		
8		

Plant Cover	<1 m	1m - 2m	>2m
Overall	3	1	4
Tree	1	0	4
RO	1	0	4
RM	1	0	2
TP	1	0	0
BB	1	0	0
Shrub	3	1	1
SHAD	1	0	0

9			
10			
Total		na	
Average basal area (m^2/acre)			0.25
(m^2/hectare)			

Tree #	Regeneration Species	# <BH	#>BH
1	TP	2	
2	RM	30	
3	RO	9	
4	BB	7	

	<1 m	1m - 2m	>2m
LB	3	0	0
WITCH	1	1	1
forb	1		
CM	1		
TS	1		
fern	0		
grass	1		
bare rock	1		
moss	1		

Stand D Plot 4 Date 7/11/2005 Investigators MR+HR

Tree	Spec.	DBH (cm)
1	RO	3.1
2	RM	3.2
3	RO	14.7
4	RO	2.4
5		
6		
7		
8		
9		
10		
Total		na

Plant Cover	<1 m	1m - 2m	>2m
Overall	3	0	5
Tree	1	0	5
RO	1	0	4
RM	1	0	3
BB	1	0	0
Shrub	3	1	3
WITCH	1	1	2
ML	1	1	1
LOWBBLUE	2	0	0
forb	1		
TS	1		

Average basal area (m^2/acre)		2.34	
(m^2/hectare)			

	Regeneration		
Tree #	Species	# <BH	#>BH
1	RM	11	
2	RO	8	
3	BB	1	

CM	1
fern	0
grass	1
bare rock	1
moss	1
FUNGI	1

Stand	D	Plot	5	Date	7/11/2005	Investigators	HR &MR
Tree	Spec.	DBH (INCH)					
1	RO	15.8					
2	RO	17.3					
3	RM	6.6					
4							
5							
6							
7							
8							
9							
10							
Total		na					
Average basal area (m^2/acre)		3.97					
(m^2/hectare)							
	Regeneration						

Plant Cover	<1 m	1m - 2m	>2m
Overall	5	1	5
Tree	1	0	5
RO	0	0	4
RM	0	0	2
Shrub	3	1	1
SB	1	0	0
WITCH	1	1	1
LBBLUE	3	0	0
forb	1		
CM	1		
TS	1		
fern	0		
grass	2		
bare rock	0		

Tree #	Species	# <BH	#>BH
1	RM	60	
2	RO	18	
3	TP	1	

moss	1

Stand	D	Plot	6	Date	7/11/2005	Investigators	HR & MR
Tree	Spec.	DBH (INCH)					
1	RO	6					
2							
3							
4							
5							
6							
7							
8							
9							
10							
Total		na		na			
Average basal area (m^2/acre)		0.6			0		
(m^2/hectare)							

Plant Cover	<1 m	1m - 2m	>2m
Overall	4	1	4
Tree	1	0	4
RM	1	0	3
RO	1	0	3
Shrub	3	1	1
SB	1	0	0
WITCH	1	0	1
LBBLUE	2	0	0
ML	1	0	0
forb	1		
CM	1		
TS	1		
fern	0		
grass	2		
bare rock	1		
moss	1		

Regeneration

Tree #	Species	# <BH	#>BH
1	RM	45	
2	RO	15	
3			

Stand	E	Plot	1	Date	7/12/2005	Investigators	HR & MR

Tree	Spec.	DBH (INCH)
1	RM	2.4
2	RM	3
3	BB	7.7
4		
5		
6		
7		
8		
9		
10		
Total		na
Average basal area (m^2/acre)		1.31
(m^2/hectare)		

Plant Cover	<1 m	1m - 2m	>2m
Overall	2	1	5
Tree	1	1	5
RM	1	1	2
BB	1	0	3
WO	0	0	2
RO	1	0	1
Shrub	1		
SAS	1		
LBLUE	1		
WITCH	1		
forb	0		
fern	0		
grass	1		
bare rock	2		
moss	2		
FUNGI	1		

Regeneration

Tree #	Species	# <BH	#>BH
1	RO	8	
2	BIRCH	18	
3	RM	23	

Stand	E	Plot	2	Date	7/12/2005	Investigators	HR & MR

Tree	Spec.	DBH (INCH)

Plant Cover	<1 m	1m - 2m	>2m
Overall	1	1	3

1	RM	3.3
2		
3		
4		
5		
6		
7		
8		
9		
10		
Total	na	
Average basal area (m^2/acre)		0.33
(m^2/hectare)		

Tree #	Regeneration Species	# <BH	#>BH
1	RO	12	
2	RM	24	

Tree	1	1	3
RM	1	1	1
BB	0	0	2
UNIDENT.	0	0	1
RO	1	0	2
CO	0	0	1
Shrub	1	1	
WITCH	1	1	
LBBLUE	1	0	
SB	1	0	
forb	0		
fern	0		
grass	0		
bare rock	1		
moss	1		
fungi	1		

Stand E Plot 3 Date 7/12/2005 Investigators HR & MR

Tree	Spec.	DBH (INCH)
1	RM	5.7
2		
3		
4		
5		
6		

Plant Cover	<1 m	1m - 2m	>2m
Overall	2	0	4
Tree	1	0	4
RM	1	0	3
RO	1	0	3
CO	1	0	1
Shrub	2	0	0

7			SB	1
8			WITCH	1
9			LBBLUE	2
10				
			forb	1
Total	na		TS	1
Average basal area (m^2/acre)		0.57	CM	1
(m^2/hectare)			fern	0
			grass	2
			bare rock	1
			moss	1

Tree #	Regeneration Species	# <BH	#>BH
1	RO	13	
2	RM	20	
3	BIRCH	4	

Stand E Plot 4 Date 7/12/2005 Investigators HR & MR

Tree	Spec.	DBH (INCH)
1	RM	3.5
2		
3		
4		
5		
6		
7		
8		
9		
10		

Plant Cover	<1 m	1m - 2m	>2m
Overall	2	2	3
Tree	1	0	3
RO	1	0	3
RM	1	0	1
WO	0	0	1
RO	1	0	1
Shrub	2	2	2
LBBLUE	2	0	0
SB	1	0	0
WITCH	1	2	2

Total		na	
Average basal area (m^2/acre)		0.35	
(m^2/hectare)			

forb	1	
TS	1	
fern	0	
grass	1	
bare rock	1	
moss	1	
FUNGI	1	

Tree #	Regeneration Species	# <BH	#>BH
1	RO	6	
2	RM	40	
3	BB	16	

Stand E Plot 5 Date 7/12/2005 Investigators HR & MR

Tree	Spec.	DBH (INCH)
1	RO	23.8
2	RM	2.1
3	RM	3.5
4	RM	4.2
5		
6		
7		
8		
9		
10		
Total		na
Average basal area (m^2/acre)		3.36
(m^2/hectare)		

Plant Cover	<1 m	1m - 2m	>2m
Overall	2	1	4
Tree	1	1	4
RO	1	0	4
RM	1	1	3
BB	1	0	0
Shrub	2	1	1
LBBLUE	2	0	0
SB	1	0	0
WITCH	1	1	1
forb	1		
IC	1		
LMQUAD	1		
fern	0		

Tree #	Regeneration Species	# <BH	#>BH
1	RO	10	
2	BB	6	
3	RM	32	
4			

grass	1
bare rock	1
moss	1
fungi	1

Stand	E	Plot	6	Date	7/12/2005	Investigators	HR & MR

Tree	Spec.	DBH (INCH)
1	RM	2.8
2	BB	1.6
3		
4		
5		
6		
7		
8		
9		
10		
Total		na
Average basal area (m^2/acre)		0.44
(m^2/hectare)		

Plant Cover	<1 m	1m - 2m	>2m
Overall	3	1	5
Tree	1	1	5
BB	1	1	5
RM	1	0	2
RO	1	0	1
Shrub	3	1	0
SB	1	0	
WITCH	1	0	
HBBLUE	1	1	
LBBLUE	3	0	
forb	1		
TS	1		
IC	1		
LMQUAD	1		
fern	0		
grass	0		

Tree #	Regeneration Species	# <BH	#>BH
1	RM	18	

2	RO	4	bare rock	1
3	BIRCH	2	moss	1
			FUNGI	1

Soil Data

Sample	CONTAINER	CONTAINER &SAMPLE	sample before ignition	AFTER IGNITION	DIFFERENCE	diff/total before	%organic matter
A-TOP	13	14.9	1.9	13.9	1	0.526315789	52.63
A-BOT	13.5	19.4	5.9	18.5	0.9	0.152542373	15.25
B-TOP	13	14.8	1.8	13.5	1.3	0.722222222	72.22
B-BOT	12.3	19.2	6.9	17.9	1.3	0.188405797	18.84
C-TOP	13	14.9	1.9	13.4	1.5	0.789473684	78.95
C-BOT	14.9	22.8	7.9	22.1	0.7	0.088607595	8.86
D-TOP	14.7	17.8	3.1	16.4	1.4	0.451612903	45.16
D-BOT	14.1	19.6	5.5	18.8	0.8	0.145454545	14.55
E-TOP	12.4	14.3	1.9	13	1.3	0.684210526	68.42
E-BOT	14.7	20.8	6.1	19.7	1.1	0.180327869	18.03

Stand	% organic matter in top	% organic matter in under
A	52.63157895	15.25423729
B	72.22222222	18.84057971
C	78.94736842	8.860759494
D	45.16129032	14.54545455
E	68.42105263	18.03278689