



Implementation of a Long-term Vegetation Monitoring Program at Sleeping Bear Dunes National Lakeshore

Natural Resource Report NPS/GLKN/NRTR—2010/407



ON THE COVER

Clockwise from top left: determining whether a tree is within the belt transect; deer browse on striped maple (*Acer pensylvanicum*); getting a GPS reading. Photographs by: GLKN vegetation monitoring field crew

Implementation of a Long-term Vegetation Monitoring Program at Sleeping Bear Dunes National Lakeshore

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November 2010

U.S. Department of the Interior
National Park Service
Natural Resource Program Center
Fort Collins, Colorado

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Please cite this publication as:

Sanders, S. and J. Grochowski. 2010. Implementation of a long-term vegetation monitoring program at Sleeping Bear Dunes National Lakeshore. Natural Resource Technical Report NPS/GLKN/NRTR-2010/407. National Park Service, Fort Collins, Colorado.

Contents

	Page
Introduction	1
Methods	1
Results	7
Very Dry to Dry, Nutrient Poor Habitat	9
Dry to Dry Mesic, Poor to Medium Nutrient Habitat	12
Mesic, Medium to Very Rich Nutrient Habitat	16
Mesic to Wet Mesic, Poor Nutrient Habitat.....	20
Unclassified.....	20
Coarse Woody Material	20
Browse	21
Insects and Disease	22
Discussion	24
Ecology and Interpretation.....	24
Implementation: Problems, Logistics, and Future Plans	27
Literature Cited	29

Figures

	Page
Figure 1. Diagram of hybrid plot	2
Figure 2. Direct browse sampling circles.....	3
Figure 3. Long-term vegetation monitoring plots at Sleeping Bear Dunes National Lakeshore ..	8
Figure 4a. Density-diameter graph of hardwoods in very dry to dry, nutrient poor habitat	10
Figure 4b. Density-diameter graph of softwoods in very dry to dry, nutrient poor habitat	10
Figure 5a. Density-diameter graph of hardwoods in dry to dry mesic, poor to medium	13
Figure 5b. Density-diameter graph of softwoods in dry to dry mesic, poor to medium	13
Figure 6a. Density-diameter graph of hardwoods in mesic, medium to rich habitat	17
Figure 6b. Density-diameter graph of softwoods in mesic, medium to very rich habitat	17
Figure 7. Transect 2 in plot 8038 showing depauperate understory	25
Figure 8. Plot 8004 showing dense beech understory	26
Figure 9. Beech scale infestation on American beech tree.	27

Tables

	Page
Table 1. Targeted disease and damage agents.....	4
Table 2. Habitat and forest types at SLBE	7
Table 3. Basal area and density of trees in very dry to dry, nutrient poor habitat	9
Table 4. Seedling density in very dry to dry, nutrient poor habitat.....	11
Table 5. Shrub percent cover in very dry to dry, nutrient poor habitat.....	11
Table 6. Basal area and density of trees in dry to dry mesic, poor to medium nutrient habitat..	12
Table 7. Seedling density in dry to dry mesic, poor to medium habitat	14
Table 8. Shrub percent cover in dry to dry mesic, poor to medium habitat.....	15
Table 9. Basal area and density of trees in mesic, medium to very rich habitat	16
Table 10. Seedling density in mesic, medium to very rich habitat	18
Table 11. Shrub percent cover in mesic, medium to very rich habitat.....	19
Table 12. Coarse woody material volume and biomass in each habitat	20
Table 13. Coarse woody material density in four diameter classes	20
Table 14. Density of standing dead trees ≥ 30 cm DBH	21
Table 15. Direct browse in the 2 m ² circles	21
Table 16. Direct browse in the 4 m ² circles	22
Table 17. Summary of indirect browse for 2009	22
Table 18. Summary of targeted insect and disease damage for 2009	23
Table 19. White-tailed deer target and estimated population levels	26

Appendices

	Page
Appendix A: Field Site Maps	31
Appendix B: Complete List of Species Sampled.....	133
Appendix C: Individual Plot Data.....	139

Executive Summary

We initiated a long-term vegetation monitoring program at Sleeping Bear Dunes National Lakeshore (SLBE) in summer 2009. The goals of this monitoring program are to detect forest change and to draw inferences about forest health so that management recommendations can be provided to Network parks. In 2009, we established 50 plots at SLBE, distributed among five habitat types: 1) very dry to dry, nutrient poor, 2) dry to dry mesic, poor to medium nutrient availability, 3) mesic, medium to very rich nutrient availability, 4) mesic to wet mesic, nutrient poor, and 5) plantation. Data collected included tree species and diameter at breast height (DBH) for all individuals ≥ 2.6 cm DBH, sapling density, and coarse woody material. In the driest habitat, both jack pine and red pine are exhibiting signs of regeneration failure. In the absence of fire, these habitats are expected to follow a successional trajectory toward white pine, possibly with a red maple and mixed oak component. Indeed, in both forest types in sandy soils, these successional pathways appear to be occurring as white pine was the most abundant species in the very dry to dry, nutrient poor habitat and had the greatest seedling density. If park managers at SLBE wish to preserve historic forest types, burning may be necessary. Mesic forests were dominated by American beech, particularly at the smaller (sapling) size classes. Beech was considerably more abundant than sugar maple, due largely to the avoidance of beech as a browse species by white-tailed deer. White-tailed deer density is high. Beside the abundance of beech saplings, this may also be contributing to the depauperate understory at many plots. Although we encountered little evidence of beech bark disease at SLBE, and only in the form of the presence of beech scale, beech bark disease will become a pressing issue in the next 10-15 years. Efforts to reduce the dominance of beech and promote maple growth and reproduction will lessen the potentially devastating impacts of this disease. All management activities implemented by the park, in response to fire, disease, or otherwise, will be based upon NPS management policies, park enabling legislation, and relevant approved park planning documents (General Management Plan, Fire Management Plan).

Acknowledgments

We are grateful for the vegetation monitoring field crew of Joanna Bietka, Jon Bontrager, Katie Frerker, Cory Howes, and Jenna Scheub. Without their assistance, this project would in no way be possible. We are also indebted to Steve Yanco, Amanda Brushaber, and the rest of the staff at Sleeping Bear Dunes National Lakeshore for both planning and logistical assistance. We have also greatly appreciated the assistance of Rebecca Key of the Great Lakes I&M Network for assistance with database development and refinement.

Introduction

Long-term forest monitoring provides an assessment of forest health by showing the status of plant communities at the time of each sampling event and elucidating how these communities change over time. Despite this value, large-scale monitoring programs for forest health with regularly scheduled return intervals are not common (for an exception, see U. S. Department of Agriculture (2005).

In 2007, the Great Lakes Inventory & Monitoring Network of the National Park Service initiated a long-term forest vegetation monitoring program for nine national parks in the Great Lakes Region. The general goals of this program are to monitor forest vegetation to gain a better understanding of its dynamics, and to compare, ultimately, vegetation indices to baseline conditions. The summer of 2009 was the initiation of the program at Sleeping Bear Dunes National Lakeshore (SLBE) in the northern Lower Peninsula of Michigan. As this was the initial year of data collection at this park, no comparisons between time intervals can be made. Nonetheless, meaningful data were obtained to demonstrate the current status of SLBE forests.

The goals of the long-term vegetation monitoring effort during the first sampling year at a given park focus on obtaining baseline data on the status of park forests. Here, we report on this effort at SLBE. Specifically, we wanted to answer the following questions for key forest habitats: 1) What is the relationship between density and stem diameter for key tree species? 2) What is the basal area of both individual tree species and all species collectively? 3) What is the density of saplings? 4) What is the percentage of shrub cover?

Methods

Sampling was conducted at SLBE from May 27-June 30, 2009. Site locations were selected using a generalized random-tessellation stratified design (GRTS, Stevens and Olsen 2004), ensuring that sites are both randomly located, but also spatially balanced throughout the park. All potential sites were overlain on an aerial photography layer using GIS prior to visiting the site in the field. In this way, we were able to eliminate any potential sites that did not meet the minimum 10% forest cover requirement. Potential sites that were partially outside of the park boundary, or that did not meet the minimum 10% cover requirement, were moved the shortest distance possible, to a maximum of 100 m, so that they fell within the park boundary or within the desired amount of cover. If a potential site could not be moved ≤ 100 m to meet the criteria for acceptance, it was not sampled. Maps of individual sites are presented in Appendix A.

Sites were sampled using the hybrid plot (Figure 1), developed specifically for the Great Lakes Network long-term vegetation monitoring needs (Johnson et al. 2006, Johnson et al. 2008). This plot is composed of three parallel transects oriented east-west. Tree data were collected in a 6 m wide band along the length of each transect. Data collected included species, diameter at breast height (DBH), whether the tree was alive, and any evident damage or disease. Trees were defined as having a DBH of ≥ 2.6 cm (1 in). Groundlayer vegetation was collected in 1m^2 quadrats placed every 5 meters along each transect ($n = 30$ per plot). Within each quadrat, we recorded all herbaceous, vine, and shrub species present, as well as counted saplings of each tree species present. Saplings are defined as trees ≤ 2.5 cm DBH, but at least 15 cm (conifers) or 30

cm (hardwoods) in height and showing evidence of growth from the previous year. Shrub cover was assessed within each of six 2.82 m radius (25 m² area) shrub circles, located at the transect ends. Here, we visually estimated percent cover of each species present. We measured data on coarse woody materials (CWM) along each of the three transects using the planar intercept method (Brown 1974, Woodall and Williams 2005) and recorded the diameter at the point of intercept, the small end, and the large end, and recorded the length. We also noted the decay class and species. Because we defined CWM as having a diameter ≥ 7.6 cm (3 in), the length of a piece was recorded only along where the diameter exceeded this amount. Finally, we performed a half-hour time delimited search of the entire 50 m $\times$ 100 m plot area to locate any additional species not previously recorded in any of the sampling.

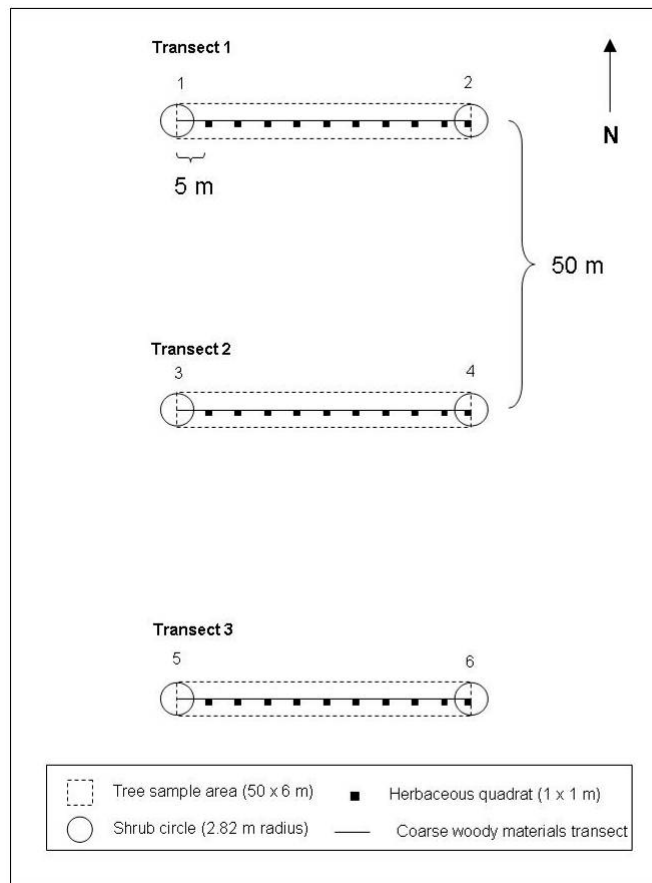


Figure 1. Diagram of hybrid plot.

We examined winter and summer browse pressure using both direct and indirect measures. Direct browse was measured along each of the three 50 meter transects, as well as along both of the 100 m transects running north-south at the plot (broken down into 50 meter segments for consistency). Direct browse measurements were done in both a 2 m² and 4 m² circular sampling area (Figure 2). These browse sampling circles were centered every 5 meters along each transect, for a total of 67 for the plot. This resulted in a total sampling area of 134 m² and 268 m², respectively. For each direct browse sampling circle, all woody species present in the browse zone, defined as between 0.20 m and 1.8 m in height were recorded. In addition to species presence, evidence of any ungulate browse on that species in the sampling circle was recorded.

Typically, winter browse surveys are conducted in the spring, prior to the new season's growth. Because we were not able to sample in the spring, we only considered a plant browsed when it was apparent that the browse occurred before the start of the current season's growth. This was evidenced by new growth arising from the bud immediately below the point of browse. Direct browse data was used to calculate a browse index based on all the woody species present and those with evident browse (Morellet et al. 2001, Morellet et al. 2003).

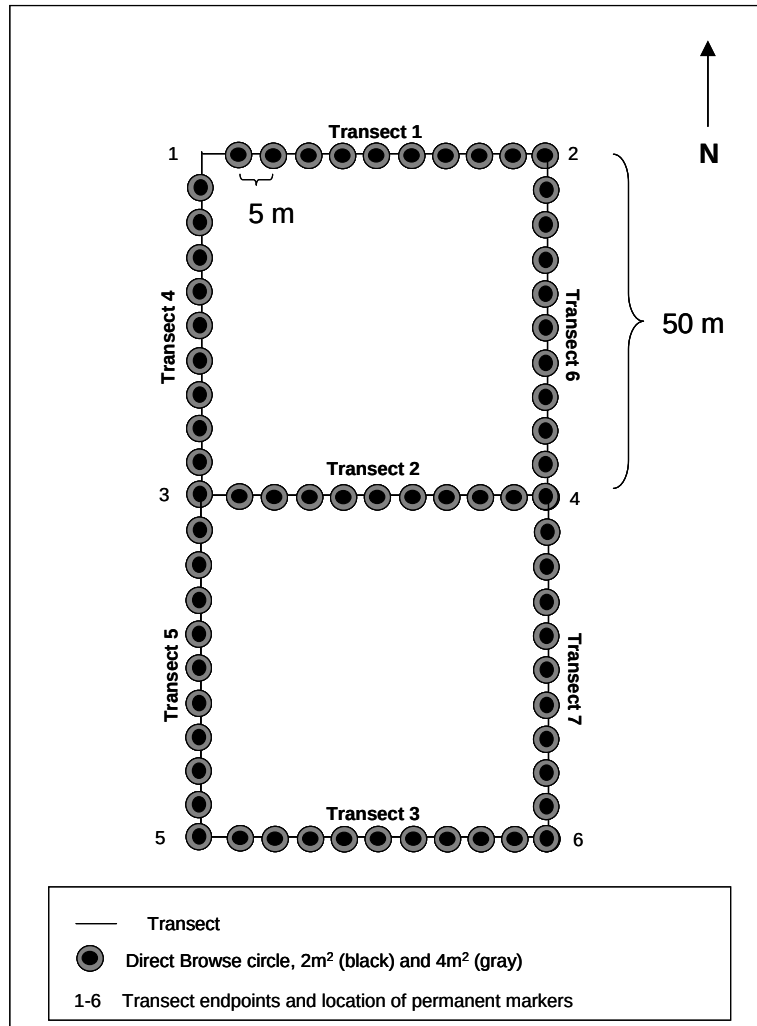


Figure 2. Direct browse sampling circles in plot.

To assess the indirect impacts of summer browse on understory species, we selected three target species, *Trillium grandiflorum* (large-flowered trillium), *Aralia nudicaulis* (wild sarsaparilla), and *Arisaema triphyllum* (jack-in-the-pulpit), that are known to be preferentially browsed by deer. In each 1m² herbaceous quadrat, for each species, we counted the number of individuals that were non-reproductive and not browsed, reproductive and not browsed, and browsed (regardless of reproductive state). We also measured the height of the tallest individual of each species.

To assess tree disease, we viewed the boles, leaves, and branches of all trees in the 6 × 50 m tree transects where DBH was measured. We looked for symptoms of target diseases, as well as

evidence of abiotic damage (Table 1) and, if found, the severity of damage and disease was recorded.

Table 1. Disease organisms and damage agents targeted in the vegetation monitoring protocol.

Bark beetles	Root/butt diseases
eastern larch beetle (<i>Dendroctonus simplex</i>)	armillaria root disease (<i>Armillaria</i> spp.)
red turpentine beetle (<i>Dendroctonus valens</i>)	Foliage disease
pine engraver (<i>Ips pini</i>)	siricoccus tip blight (<i>Sirococcus conigenus</i>)
Defoliators	diplopedia shoot blight (<i>Diplodia pinea</i>)
large aspen tortrix (<i>Choristoneura conflictana</i>)	Stem rust
spruce budworm (<i>Choristoneura fumiferana</i>)	white pine blister rust (<i>Cronartium ribicola</i>)
jackpine budworm (<i>Choristoneura pinus</i>)	Fire
larch casebearer (<i>Coleophora laricella</i>)	Wild animals
introduced pine sawfly (<i>Diprion similis</i>)	Abiotic damage
gypsy moth (<i>Lymantria dispar</i>)	Human activities
eastern tent caterpillar (<i>Malacosoma americanum</i>)	Unknown
forest tent caterpillar (<i>Malacosoma disstria</i>)	broken top
yellowheaded spruce sawfly (<i>Pikonema alaskensis</i>)	dead top
basswood thrips (<i>Thrips calcaratus</i>)	canker/gall
Sucking insects	open wound
pine spittlebug (<i>Aphrophora parabella</i>)	resinosis
Boring insects	damaged or discolored foliage
two-lined chestnut borer (<i>Agrilus bilineatus</i>)	
Zimmerman pine moth (<i>Dioryctria zimmermani</i>)	
Asian long-horned beetle (<i>Anoplophora glabripennis</i>)	
emerald ash borer (<i>Agrilus planipennis</i>)	
hemlock borer (<i>Melanophila fulvoguttata</i>)	
Sirex woodwasp (<i>Sirex noctilio</i>)	

Because we may want to stratify by forest or habitat type during later analyses (i.e., post stratification), we declared a forest type for all plots sampled while we were at the plot. We used the Kotar classification system (Kotar and Burger 2000). Under this system, the forest type of an area is based on the potential vegetation rather than the current vegetation. Potential vegetation is the expected climax forest in a stand and reflects both the moisture level, as well as the nutrient availability within the stand. The advantage of using Kotar classification rather than methods that describe the current forest type is that Kotar defined types are not expected to change over decadal time scales, as current types are. Thus, any post-sampling stratification that is performed should result in the same groupings of plots following any sampling event.

Finally, documenting visual assessment of site change will be as important as statistical documentation, and potentially more informative. Therefore, we took six photographs at each plot. The six photopoints were located at each of the six transect endpoints, with the camera facing into the plot (i.e., due east at points 1, 3, and 5 and due west at points 2, 4, and 6, Figure 1).

We attempted to identify all plants to the species level in the field. When this was not possible, we typically collected specimens for later identification. In some instances, it is not possible to distinguish between multiple species present in a park, unless they are flowering or fruiting, which often was not the case. In these instances, we made the decision to record to genus instead. Examples of this include *Amelanchier* (serviceberry) and *Salix* (willow). For *Amelanchier* sp., the genus was taken down to three groups of species complexes, with Group 1 containing *A. bartramiana*, Group 2 containing *A. arborea*, *A. laevis*, and *A. interior*, and Group 3 containing an uncertain number of species (Smith 2008). In other instances, we were not able to identify certain specimens due to lack of taxonomic expertise. For example, many grasses and sedges were not identified beyond the family or genus level.

Results

A total of 50 plots were completed at SLBE (Figure 3), representing six forest types (Table 2). These were then grouped into four habitat types, defined by broader grouping of soil moisture and soil nutrient regimes. Two plots, both conifer plantations, remained unclassified. Thirty-two tree species were recorded in the sampling plots (Appendix B), as were 40 shrub and woody vine species and 153 herbaceous species.

Table 2. Habitat and forest types at SLBE and the plots classified in each. Two plots, 8009 and 8010, were not classified as they were located in conifer plantations.

Habitat type <i>Forest type</i>	Plots in type
Very dry to dry, poor	
<i>Pinus strobus/Vaccinium spp.-Cladina spp.</i>	8003, 8021, 8040, 8051
<i>Pinus strobus-Acer rubrum/Vaccinium spp.-Hamamelis virginiana</i>	8002, 8023, 8067
Dry to dry mesic, poor to medium	
<i>Pinus strobus-Acer rubrum/Vaccinium-Viburnum acerifolium</i>	8012, 8013, 8022, 8029, 8030, 8036, 8037, 8038, 8045, 8049, 8053, 8066, 8073, 8079, 8089
Mesic, medium to very rich	
<i>Acer saccharum-Fagus grandifolia/Osmorhiza claytoni</i>	8004, 8005, 8006, 8008, 8028, 8034, 8047, 8059
<i>Acer saccharum-Fagus grandifolia/Osmorhiza claytoni-Caulophyllum thalictroides</i>	8015, 8019, 8020, 8024, 8026, 8027, 8033, 8035, 8041, 8044, 8048, 8057, 8062, 8064, 8069, 8071, 8072
Mesic to wet mesic, poor	
<i>Pinus strobus-Acer rubrum/Vaccinium-Cornus canadensis</i>	8060
Unclassified (Plantation)	8009, 8010

Sleeping Bear Dunes National Lakeshore Long-term Monitoring Sites (Established 2009)

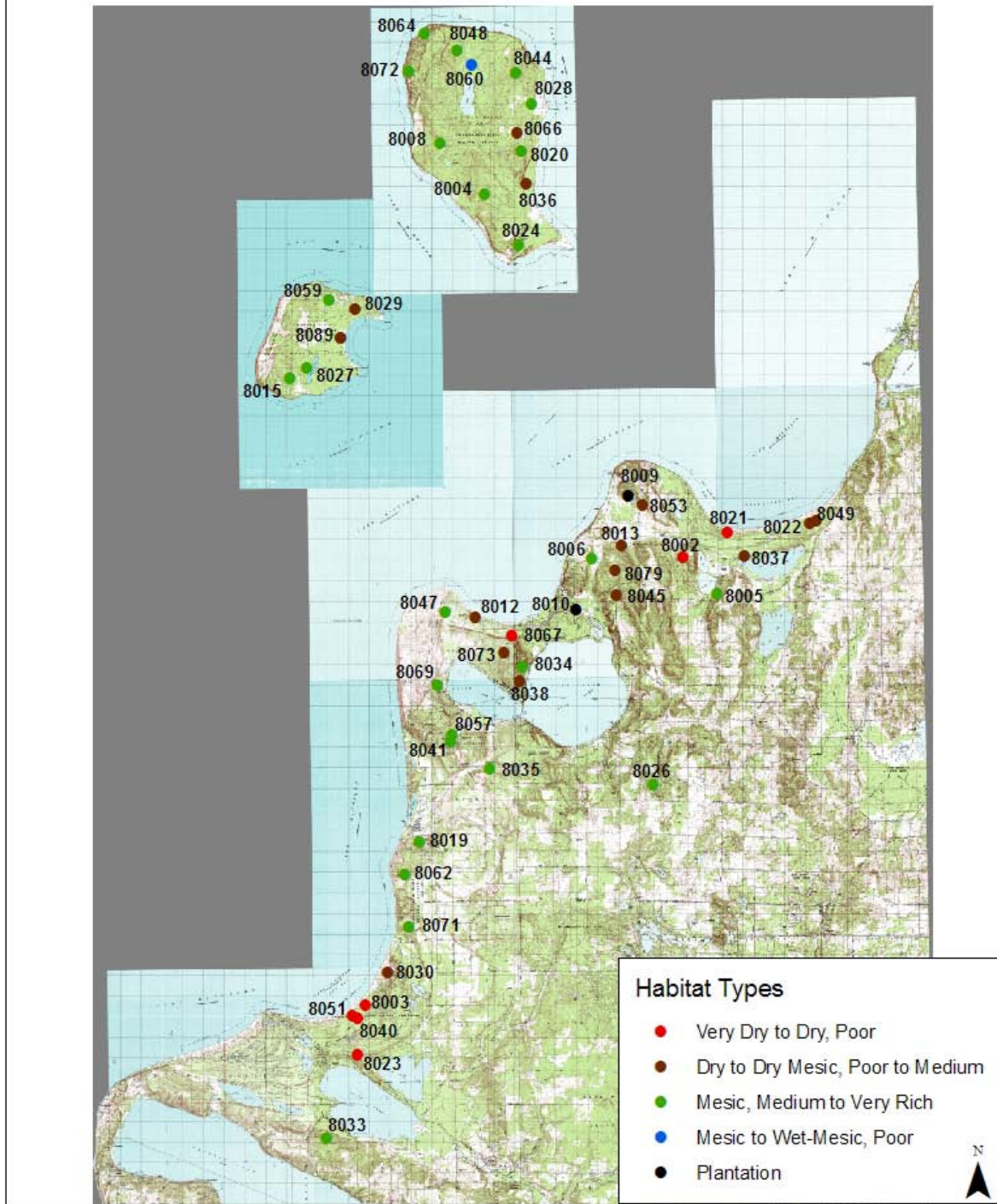


Figure 3. Long-term vegetation monitoring plots at Sleeping Bear Dunes National Lakeshore. Habitat types are defined by both soil moisture and soil nutrient regimes.

Very Dry to Dry, Nutrient Poor Habitat

Seven plots were in the very dry to dry, nutrient poor habitat at SLBE. Among the four habitat types at SLBE, this one had the lowest density of trees, at 926 trees/ha. Coniferous trees were more prevalent than hardwood trees, with the dominant coniferous trees being *Pinus strobus* (white pine) and *Pinus banksiana* (jack pine) (Figure 4a, Table 3). The dominant hardwood species were *Quercus rubra* (northern red oak) and *Acer rubrum* (red maple), as well as *Fagus grandifolia* (American beech) in the smaller size classes (<10 cm) (Figure 4b, Table 3).

The total seedling density was the lowest in the very dry to dry, nutrient poor habitat, with 3,933 seedlings/ha. One species, *Pinus strobus* (white pine) accounted for over 50% of the density. *Prunus virginiana* (chokecherry), *Pinus banksiana* (jack pine) and *Fagus grandifolia* (American beech) were also well represented in the seedling layer (Table 4).

Thirteen shrub species were identified, with most having an average cover less than 1%. The most common shrubs were all members of the heath family: *Vaccinium angustifolium* (lowbush blueberry) at 6.02%, *Gaylussacia baccata* (black huckleberry) at 1.48%, and *Vaccinium myrtilloides* (velvet-leaf blueberry) at 1.02% (Table 5).

Table 3. Basal area and density of live trees in very dry to dry, nutrient poor habitat.

Latin name	Common name	Basal area	Density
		m ² /ha	trees/ha
<i>Acer pensylvanicum</i>	striped maple	<0.00	4.76
<i>Acer rubrum</i>	red maple	1.92	88.89
<i>Acer saccharum</i>	sugar maple	0.61	23.81
<i>Betula papyrifera</i>	paper birch	0.15	3.17
<i>Fagus grandifolia</i>	American beech	1.08	57.14
<i>Populus grandidentata</i>	big tooth aspen	1.16	19.05
<i>Prunus virginiana</i>	chokecherry	0.03	20.63
<i>Quercus alba</i>	white oak	1.59	28.57
<i>Quercus rubra</i>	northern red oak	6.71	141.27
<i>Quercus velutina</i>	black oak	2.05	41.27
<i>Pinus banksiana</i>	jack pine	2.19	130.16
<i>Pinus resinosa</i>	red pine	0.21	7.94
<i>Pinus strobus</i>	white pine	3.53	276.19
<i>Tsuga canadensis</i>	eastern hemlock	1.61	84.13
Total		22.81	926.98

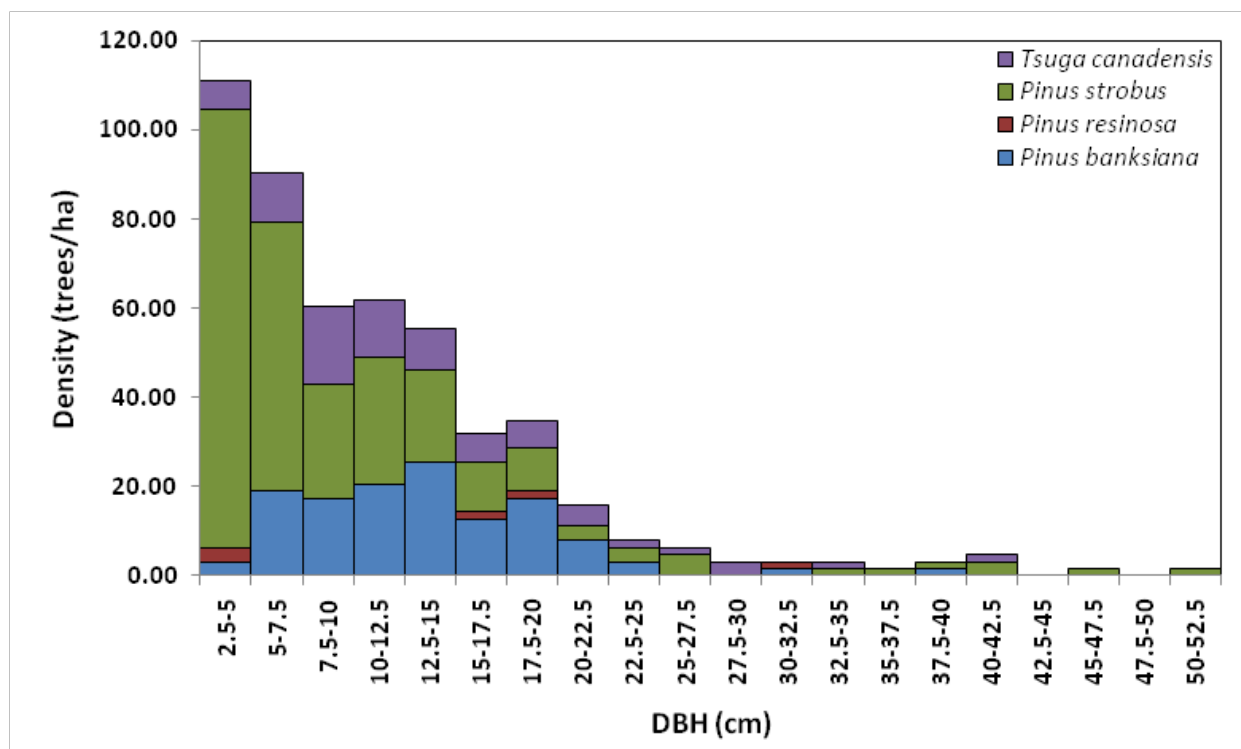


Figure 4a. Density-diameter graph of conifers in very dry to dry, nutrient poor habitat.

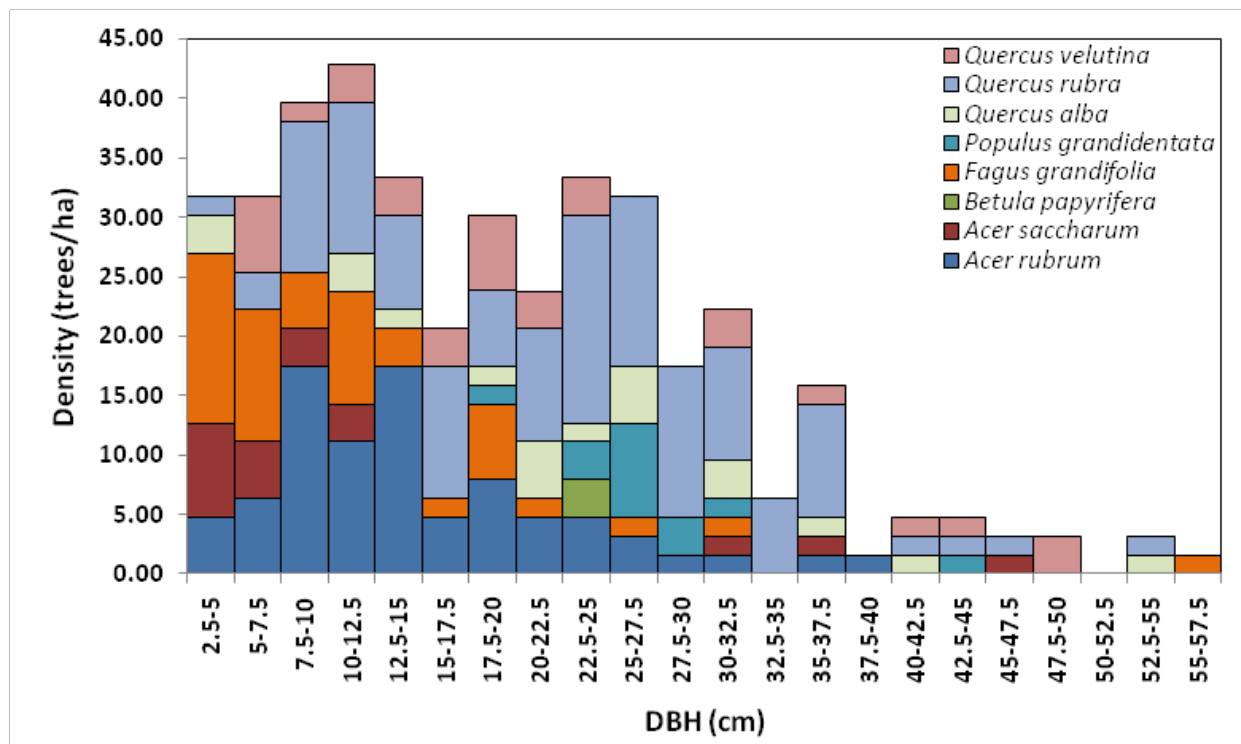


Figure 4b. Density-diameter graph of hardwoods in very dry to dry, nutrient poor habitat.

Table 4. Seedling density in very dry to dry, nutrient poor habitat.

Latin name	Common name	Density seedlings/ha
<i>Acer pensylvanicum</i>	striped maple	171.43
<i>Fagus grandifolia</i>	American beech	276.19
<i>Populus grandidentata</i>	big tooth aspen	142.86
<i>Prunus virginiana</i>	Chokecherry	609.52
<i>Quercus velutina</i>	black oak	47.62
<i>Pinus banksiana</i>	jack pine	285.72
<i>Pinus resinosa</i>	red pine	123.81
<i>Pinus strobus</i>	white pine	2,228.60
<i>Tsuga canadensis</i>	eastern hemlock	47.62
Total		3,933.37

Table 5. Shrub percent cover in very dry to dry, nutrient poor habitat.

Family	Latin name	Common name	Cover %
Anacardiaceae	<i>Toxicodendron rydbergii</i>	western poison ivy	0.07
Caprifoliaceae	<i>Lonicera oblongifolia</i>	swamp fly honeysuckle	0.14
	<i>Symphoricarpos albus</i>	snowberry	0.10
Cupressaceae	<i>Juniperus communis</i>	common juniper	0.10
	<i>Juniperus horizontalis</i>	creeping juniper	1.21
Elaeagnaceae	<i>Shepherdia canadensis</i>	buffalo berry	0.02
Ericaceae	<i>Gaylussacia baccata</i>	black huckleberry	1.48
	<i>Vaccinium angustifolium</i>	low sweet blueberry	6.02
	<i>Vaccinium myrtilloides</i>	velvet-leaf blueberry	1.02
Hamamelidaceae	<i>Hamamelis virginiana</i>	witch-hazel	0.43
Rosaceae	<i>Amelanchier</i> sp. Group 2	serviceberry	0.07
	<i>Amelanchier</i> sp. Group 3	serviceberry	0.14
	<i>Rosa blanda</i>	smooth rose	0.02
	<i>Rosa eglanteria</i>	sweetbriar rose	0.02

Dry to Dry Mesic, Poor to Medium Nutrient Habitat

Fifteen plots were classified as dry to dry mesic, poor to medium nutrient habitat at SLBE. This habitat type had the highest total tree density of the four habitats at SLBE, at 1,268 trees/ha, with a diverse mix of species. The dominant hardwood species was *Fagus grandifolia* (American beech), while *Acer saccharum* (sugar maple) and *Acer rubrum* (red maple) were also common (Figure 5a, Table 6). Coniferous trees were represented by a mix of species at similar densities, with *Pinus strobus* (white pine) having the highest density. *Tsuga canadensis* (eastern hemlock) and *Thuja occidentalis* (northern white cedar) were present in most of the DBH size classes. *Pinus resinosa* (red pine) and *Pinus banksiana* (jack pine) were present in the larger DBH size classes, but absent or poorly represented in the smaller DBH size classes (Figure 5b, Table 6).

Table 6. Basal area and density of live trees in dry to dry mesic, poor to medium nutrient habitat.

Latin name	Common name	Basal area	Density
		m ² /ha	trees/ha
<i>Acer pensylvanicum</i>	striped maple	0.01	10.37
<i>Acer rubrum</i>	red maple	3.95	147.41
<i>Acer saccharum</i>	sugar maple	4.55	152.59
<i>Betula papyrifera</i>	paper birch	0.99	21.48
<i>Fagus grandifolia</i>	American beech	3.20	284.44
<i>Fraxinus americana</i>	white ash	0.38	5.19
<i>Fraxinus pennsylvanica</i>	green ash	0.22	16.30
<i>Ostrya virginiana</i>	hop-hornbeam	0.15	62.96
<i>Populus grandidentata</i>	big tooth aspen	1.19	15.56
<i>Populus tremuloides</i>	trembling aspen	0.02	4.44
<i>Prunus serotina</i>	black cherry	0.11	3.70
<i>Prunus sp.</i>	Cherry	<0.01	0.74
<i>Prunus virginiana</i>	Chokecherry	0.02	16.30
<i>Quercus alba</i>	white oak	0.01	0.74
<i>Quercus rubra</i>	northern red oak	4.17	85.93
<i>Tilia americana</i>	Basswood	0.78	9.63
<i>Abies balsamea</i>	balsam fir	0.50	86.67
<i>Pinus banksiana</i>	jack pine	1.05	27.41
<i>Pinus resinosa</i>	red pine	2.21	30.37
<i>Pinus strobus</i>	white pine	4.47	108.15
<i>Thuja occidentalis</i>	northern white cedar	2.30	90.37
<i>Tsuga canadensis</i>	eastern hemlock	3.73	88.15
Total		34.02	1,268.90

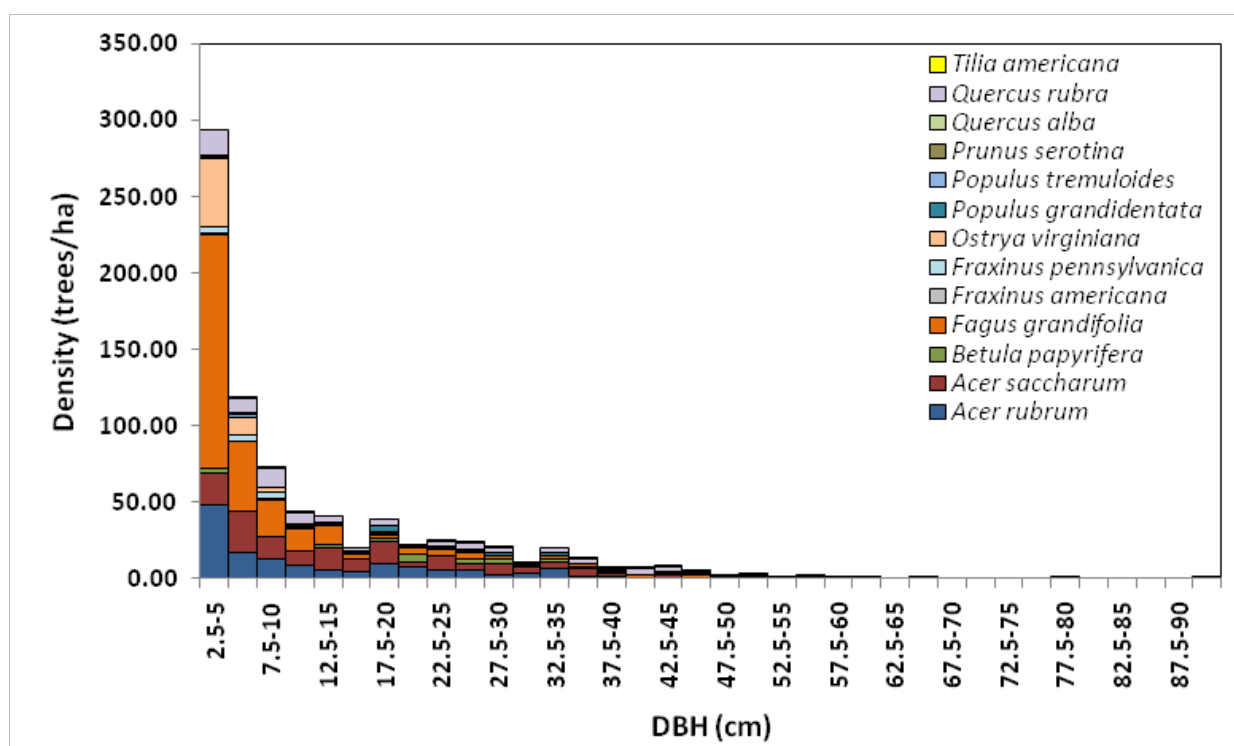


Figure 5a. Density-diameter graph of hardwoods in dry to dry mesic, poor to medium habitat.

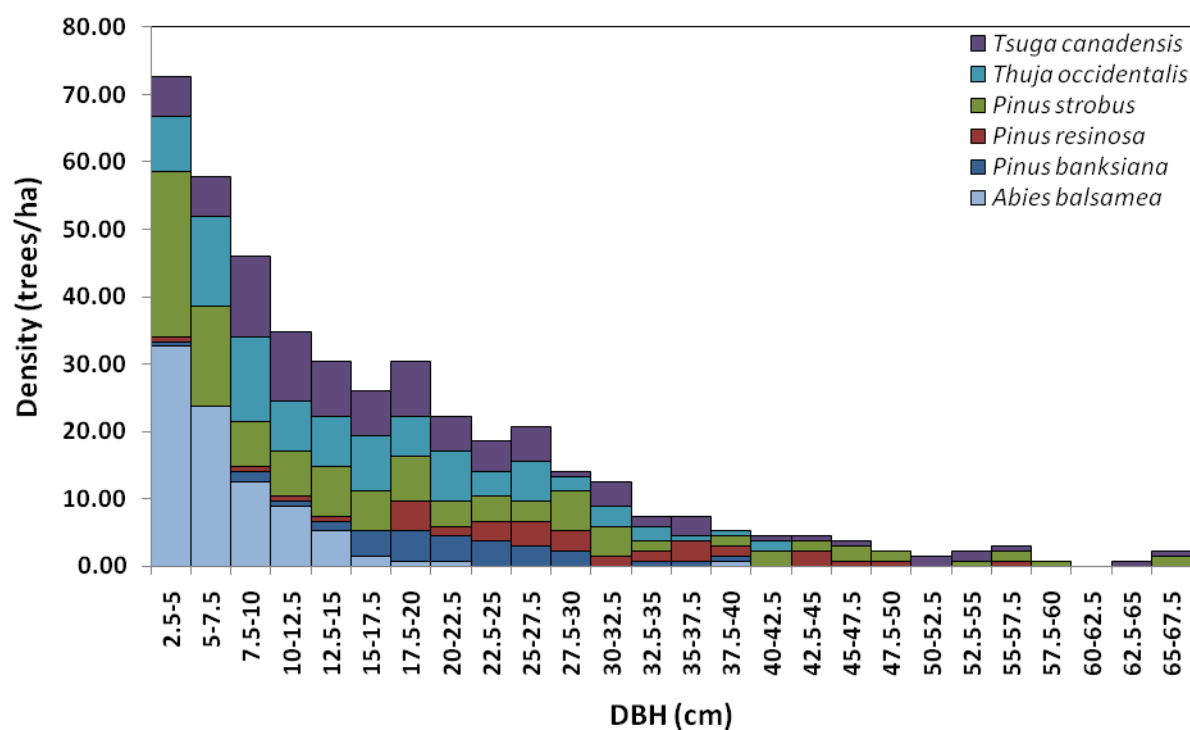


Figure 5b. Density-diameter graph of conifers in dry to dry mesic, poor to medium habitat.

The dominant species in the seedling layer was *Fagus grandifolia* (American beech), comprising about 45% of the total seedling density. Other common species in the seedling layer were *Acer saccharum* (sugar maple), *Acer pensylvanicum* (striped maple), *Fraxinus pennsylvanica* (green ash) and *Pinus strobus* (white pine, Table 7).

Table 7. Seedling density in dry to dry mesic, poor to medium nutrient habitat.

Latin name	Common name	Density seedlings/ha
<i>Acer pensylvanicum</i>	striped maple	666.66
<i>Acer rubrum</i>	red maple	373.33
<i>Acer saccharum</i>	sugar maple	742.22
<i>Betula papyrifera</i>	paper birch	8.89
<i>Fagus grandifolia</i>	American beech	4,088.89
<i>Fraxinus americana</i>	white ash	8.89
<i>Fraxinus pennsylvanica</i>	green ash	591.11
<i>Ostrya virginiana</i>	hop-hornbeam	533.33
<i>Populus grandidentata</i>	big tooth aspen	191.11
<i>Populus tremuloides</i>	trembling aspen	48.89
<i>Prunus serotina</i>	black cherry	57.78
<i>Prunus virginiana</i>	chokecherry	511.11
<i>Quercus rubra</i>	northern red oak	48.89
<i>Abies balsamea</i>	balsam fir	444.44
<i>Pinus strobus</i>	white pine	582.23
<i>Thuja occidentalis</i>	northern white cedar	71.11
<i>Tsuga canadensis</i>	eastern hemlock	8.89
Total		8,977.77

The dry to dry mesic, poor to medium nutrient habitat had the richest shrub community of the four habitat types at SLBE, with twenty four species. Most of these species had an average cover of less than 1%, except for *Juniperus communis* (common juniper), at 1.91%, *Symphoricarpos albus* (snowberry) at 1.36%, and *Taxus canadensis* (Canada yew) at 1.13% (Table 8).

Table 8. Shrub percent cover in dry to dry mesic, poor to medium nutrient habitat.

Family	Latin name	Common name	Cover %
Anacardiaceae	<i>Toxicodendron rydbergii</i>	western poison ivy	0.31
Berberidaceae	<i>Berberis vulgaris</i>	common barberry	0.07
Caprifoliaceae	<i>Diervilla lonicera</i>	bush honeysuckle	0.02
	<i>Lonicera canadensis</i>	fly honeysuckle	0.09
	<i>Lonicera hirsuta</i>	hairy honeysuckle	0.01
	<i>Lonicera oblongifolia</i>	swamp fly honeysuckle	0.28
	<i>Lonicera</i> sp.	honeysuckle	0.13
	<i>Symphoricarpos albus</i>	snowberry	1.36
	<i>Viburnum acerifolium</i>	maple-leaved viburnum	0.23
Cornaceae	<i>Cornus rugosa</i>	round-leaved dogwood	1.03
	<i>Cornus sericea</i> ssp. <i>sericea</i>	red osier dogwood	0.01
Cupressaceae	<i>Juniperus communis</i>	common juniper	1.91
	<i>Juniperus horizontalis</i>	creeping juniper	0.72
Elaeagnaceae	<i>Elaeagnus angustifolia</i>	Russian olive	0.02
	<i>Shepherdia canadensis</i>	buffalo berry	0.20
Ericaceae	<i>Vaccinium angustifolium</i>	low sweet blueberry	0.02
	<i>Vaccinium myrtilloides</i>	velvet-leaf blueberry	0.44
Hamamelidaceae	<i>Hamamelis virginiana</i>	witch-hazel	0.03
Rosaceae	<i>Amelanchier</i> sp. Group 2	serviceberry	0.23
	<i>Amelanchier</i> sp. Group 3	serviceberry	0.04
	<i>Rosa acicularis</i>	prickly rose	0.04
	<i>Rosa blanda</i>	smooth rose	0.04
	<i>Rosa eglanteria</i>	sweetbriar rose	0.01
	<i>Rubus allegheniensis</i>	common blackberry	0.01
Taxaceae	<i>Taxus canadensis</i>	Canada yew	1.13
Vitaceae	<i>Vitis riparia</i>	riverbank grape	0.02

Mesic, Medium to Very Rich Nutrient Habitat

The mesic, medium to very rich habitat contained more plots (25) than any other habitat type at SLBE (Figure 3). Twenty-two tree species were recorded in this habitat type, which was the richest of all the habitats at SLBE. The dominant hardwood trees were *Fagus grandifolia* (American beech) and *Acer saccharum* (sugar maple, Figure 6a, Table 9). The coniferous tree species were present at low densities, with *Abies balsamea* (balsam fir) common in the smaller DBH size classes (<7.5 cm), and *Tsuga canadensis* (eastern hemlock) and *Thuja occidentalis* (northern white cedar) present in most of the size classes (Figure 6b, Table 9).

Table 9. Basal area and density of live trees in mesic, medium to very rich nutrient habitat.

Latin name	Common name	Basal area	Density
		m ² /ha	trees/ha
<i>Acer pensylvanicum</i>	striped maple	0.06	6.22
<i>Acer rubrum</i>	red maple	0.22	6.67
<i>Acer saccharum</i>	sugar maple	13.37	299.11
<i>Acer spicatum</i>	mountain maple	<0.01	0.44
<i>Betula alleghaniensis</i>	yellow birch	0.20	2.67
<i>Betula papyrifera</i>	paper birch	1.66	20.00
<i>Fagus grandifolia</i>	American beech	8.62	450.67
<i>Fraxinus americana</i>	white ash	0.91	8.89
<i>Fraxinus pennsylvanica</i>	green ash	0.84	22.67
<i>Ostrya virginiana</i>	hop-hornbeam	0.50	94.22
<i>Populus grandidentata</i>	big tooth aspen	0.73	6.67
<i>Prunus serotina</i>	black cherry	0.88	7.11
<i>Prunus virginiana</i>	chokecherry	0.01	3.11
<i>Quercus rubra</i>	northern red oak	1.84	17.78
<i>Tilia americana</i>	basswood	0.98	9.33
<i>Ulmus americana</i>	American elm	0.04	0.89
<i>Abies balsamea</i>	balsam fir	0.14	28.00
<i>Picea glauca</i>	white spruce	<0.01	0.44
<i>Pinus resinosa</i>	red pine	<0.01	0.89
<i>Pinus strobus</i>	white pine	<0.01	0.44
<i>Thuja occidentalis</i>	northern white cedar	1.03	20.89
<i>Tsuga canadensis</i>	eastern hemlock	0.84	45.78
Total		32.86	1,052.89

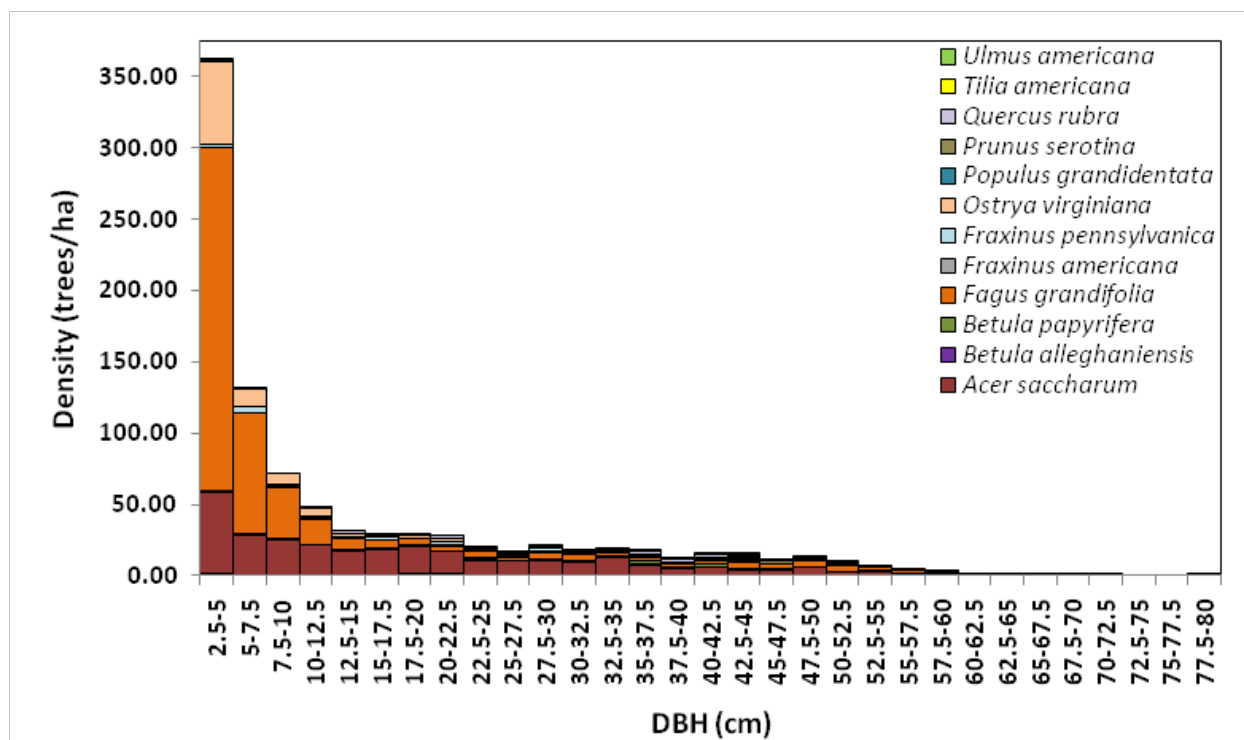


Figure 6a. Density-diameter graph of hardwoods in mesic, medium to very rich habitat.

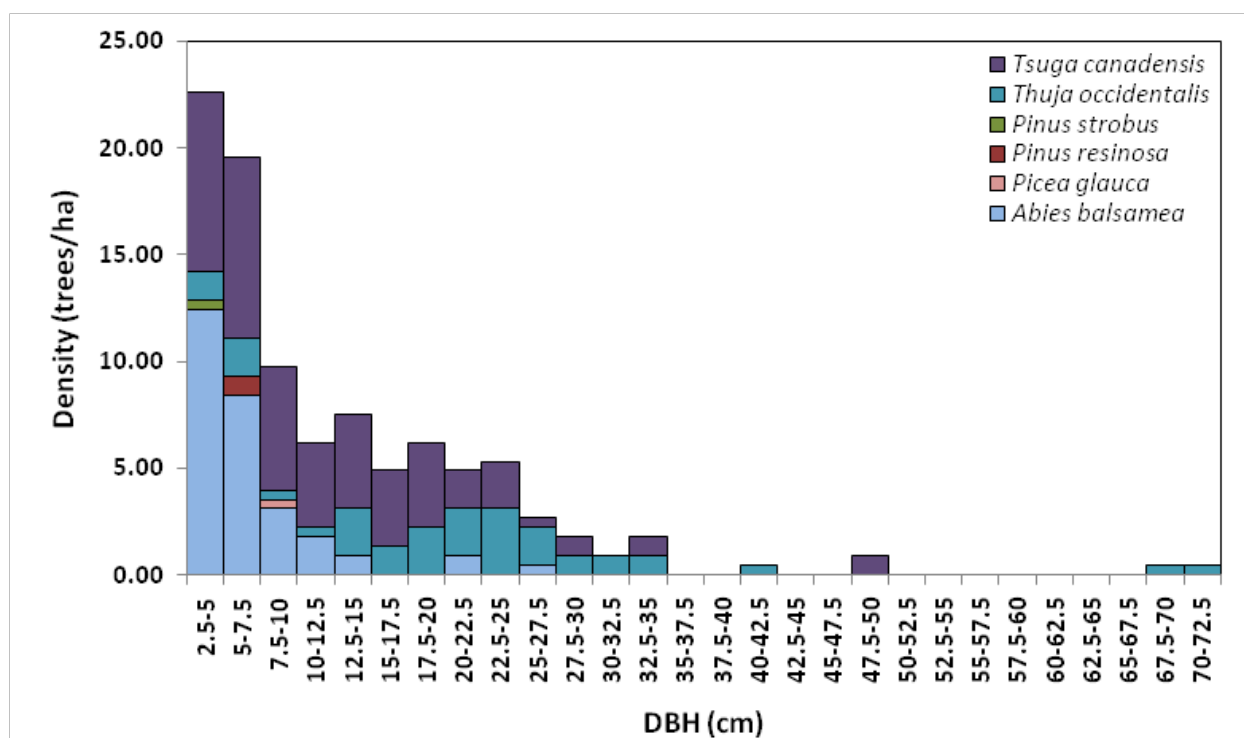


Figure 6b. Density-diameter graph of conifers in mesic, medium to very rich habitat.

The highest density of seedlings at SLBE was present in the mesic, medium to very rich habitat, with 15,154 seedlings/ha. Species with the greatest seedling density were *Fagus grandifolia* (American beech) and *Acer saccharum* (sugar maple). Coniferous species had lower densities than hardwood species, with *Thuja occidentalis* (northern white cedar) being the most common (Table 10).

Table 10. Seedling density in mesic, medium to very rich habitat.

Latin name	Common name	Density seedlings/ha
<i>Acer pensylvanicum</i>	striped maple	248.00
<i>Acer rubrum</i>	red maple	13.33
<i>Acer saccharum</i>	sugar maple	3,378.66
<i>Acer spicatum</i>	mountain maple	90.67
<i>Betula papyrifera</i>	paper birch	72.00
<i>Fagus grandifolia</i>	American beech	5,954.67
<i>Fraxinus americana</i>	white ash	760.00
<i>Fraxinus pennsylvanica</i>	green ash	1,250.66
<i>Ostrya virginiana</i>	hop-hornbeam	1,301.33
<i>Populus grandidentata</i>	big tooth aspen	98.67
<i>Populus tremuloides</i>	trembling aspen	2.67
<i>Prunus serotina</i>	black cherry	285.33
<i>Prunus virginiana</i>	chokecherry	725.33
<i>Quercus rubra</i>	northern red oak	8.00
<i>Sorbus americana</i>	mountain-ash	2.67
<i>Sorbus decora</i>	showy mountain-ash	32.00
<i>Tilia americana</i>	basswood	58.67
<i>Abies balsamea</i>	balsam fir	264.00
<i>Pinus strobus</i>	white pine	2.67
<i>Thuja occidentalis</i>	northern white cedar	586.67
<i>Tsuga canadensis</i>	eastern hemlock	18.66
Total		15,154.66

There were twenty two shrub species present, with all species having an average cover of less than 1% except *Sambucus racemosa* (red elderberry), at 1.56% (Table 11).

Table 11. Shrub percent cover in mesic, medium to very rich habitat.

Family	Latin name	Common name	Cover %
Anacardiaceae	<i>Toxicodendron rydbergii</i>	western poison ivy	0.35
Caprifoliaceae	<i>Diervilla lonicera</i>	bush honeysuckle	0.11
	<i>Lonicera canadensis</i>	fly honeysuckle	0.01
	<i>Lonicera oblongifolia</i>	swamp fly honeysuckle	0.07
	<i>Lonicera</i> sp.	honeysuckle	0.13
	<i>Sambucus racemosa</i>	red elderberry	1.56
	<i>Symphoricarpos albus</i>	snowberry	0.18
	<i>Viburnum acerifolium</i>	maple-leaved viburnum	0.05
	<i>Viburnum lentago</i>	nannyberry	0.05
Cornaceae	<i>Cornus alternifolia</i>	alternate-leaf dogwood	0.01
	<i>Cornus rugosa</i>	round-leaved dogwood	0.31
Cupressaceae	<i>Juniperus communis</i>	common juniper	0.25
Elaeagnaceae	<i>Shepherdia canadensis</i>	buffalo berry	0.01
Ericaceae	<i>Gaylussacia baccata</i>	black huckleberry	0.01
Grossulariaceae	<i>Ribes cynosbati</i>	eastern prickly gooseberry	0.01
	<i>Ribes</i> sp.	gooseberry	0.11
Rosaceae	<i>Amelanchier</i> sp. Group 2	serviceberry	0.14
	<i>Amelanchier</i> sp. Group 3	serviceberry	0.05
	<i>Rosa eglanteria</i>	sweetbriar rose	0.02
	<i>Rubus allegheniensis</i>	common blackberry	0.02
	<i>Rubus canadensis</i>	smooth blackberry	0.08
	<i>Rubus idaeus</i> ssp. <i>strigosus</i>	common red raspberry	0.33
Taxaceae	<i>Taxus canadensis</i>	Canada yew	0.30
Thymelaeaceae	<i>Dirca palustris</i>	eastern leatherwood	0.04
Vitaceae	<i>Vitis riparia</i>	riverbank grape	0.05

Mesic to Wet Mesic, Poor Nutrient Habitat

Only one plot was classified as mesic to wet mesic, poor nutrient habitat. The dominant trees were *Acer rubrum* (red maple) and *Tsuga canadensis* (eastern hemlock).

Unclassified

Two plots were located in pine plantations, and were not classifiable to habitat type. The data for these plots can be viewed in Appendix C, plots 8009 and 8010.

Coarse Woody Material

Coarse woody material (CWM) varied greatly between habitats, with very dry to dry, poor nutrient habitat having the lowest volume (14.11 m³/ha) and biomass (3,938.29 kg/ha). Mesic, medium to very rich habitat had the greatest CWM volume (54.75 m³/ha) and biomass (15,902.10 kg/ha, Table 12). The total pieces of CWM per habitat type followed a similar trend, with very dry to dry, poor nutrient having the least (201.10 pieces/ha, Table 13), and the mesic, medium to very rich habitat having the most (408 pieces/ha). The density of large (≥ 30 cm DBH) standing dead trees also varied between habitat types, ranging from 4.77 trees/ha in the very dry to dry, poor nutrient, to 22.22 trees/ha in the mesic to wet mesic, poor nutrient habitat (Table 14).

Table 12. Coarse woody material volume and biomass for each habitat.

Habitat*	Number of plots in habitat	Volume	Biomass	
		m ³ /ha	kg/ha	tons/ac
Very Dry to Dry, Poor	7	14.11	3,938.29	1.76
Dry to Dry Mesic, Poor to Medium	15	24.06	6,639.87	2.96
Mesic, Medium to Very Rich	25	54.75	15,902.10	7.09
Mesic to Wet-Mesic, Poor	1	40.31	9,313.18	4.15

*Habitat is based on Kotar classification and defined by both the moisture and nutrient availability.

Table 13. Coarse woody material density in four diameter classes.

Habitat*	Density (pieces/ha) in diameter classes (cm)				Total
	8.0-19.9	20.0-32.9	33.0-45.9	46.0-60.0	pieces/ha
Very Dry to Dry, Poor	170.74	30.36	0	0	201.10
Dry to Dry Mesic, Poor to Medium	209.55	42.10	5.58	0	257.23
Mesic, Medium to Very Rich	328.65	66.62	11.97	0.84	408.08
Mesic to Wet-Mesic, Poor	176.28	146.77	22.77	0	345.82

*Habitat is based on Kotar classification and defined by both the moisture and nutrient availability.

Table 14. Density of standing dead trees ≥ 30 cm DBH.

Habitat*	Density (trees/ha)
Very Dry to Dry, Poor	4.77
Dry to Dry Mesic, Poor to Medium	5.18
Mesic, Medium to Very Rich	10.17
Mesic to Wet-Mesic, Poor	22.22

*Habitat is based on Kotar classification and defined by both the moisture and nutrient availability.

Browse

All habitat types showed evidence of ungulate browse with mesic, medium to very rich, the habitat with the most plots, having the greatest degree of browse. There was not a large difference in browse index between browse circles with an area of 2 m² versus those with an area of 4 m². The browse index, which is a comparison of the number of browse circles with evident browse to the number of browse circles with species present, was 0.32 for the 2 m² area and 0.36 for the 4 m² area (Tables 15 and 16).

The indirect browse assessment of the three target herbaceous species showed there is some evidence of browse on *Aralia nudicaulis* (wild sarsaparilla), *Arisaema triphyllum* (jack in the pulpit), and *Trillium grandiflorum* (big white trillium). Evidence of browse on the three of these species was small in relation to their abundance, with *Aralia nudicaulis* being the most impacted with 10% of the individuals counted showing browse (Table 17).

Table 15. Direct browse at the 2 m² browse circles, by habitat and for the whole park.

Habitat	Number of Plots	Browse circles with species present	Browse circles with evident browse	Browse Index
Very Dry to Dry, Poor	7	253	60	0.24
Dry to Dry Mesic, Poor to Medium	15	699	155	0.22
Mesic, Medium to Very Rich	25	1238	482	0.39
Mesic to Wet-Mesic, Poor	1	40	4	0.12
Whole Park	50	2261	716	0.32

Table 16. Direct browse at the 4 m² browse circles, by habitat and for the whole park.

Habitat	Number of Plots	Browse circles with species present	Browse circles with evident browse	Browse Index
Very Dry to Dry, Poor	7	295	85	0.29
Dry to Dry Mesic, Poor to Medium	15	820	221	0.27
Mesic, Medium to Very Rich	25	1,400	606	0.43
Mesic to Wet-Mesic, Poor	1	48	10	0.22
Whole Park	50	2,613	948	0.36

Table 17. Summary of indirect browse for 2009.

Species	Number of quadrats where present	Mean maximum height per quadrat	Abundance	Number of unbrowsed and non-reproductive individuals	Number of browsed individuals
<i>Aralia nudicaulis</i>	49	23.77	298	2	30
<i>Arisaema triphyllum</i>	221	11.05	1,756	72	13
<i>Trillium grandiflorum</i>	106	18.05	429	18	24

Insects and Disease

Evidence of beech scale (*Cryptococcus fagisuga*) was detected on only two trees and only in the mesic, medium to very rich habitat. The amount of damage per tree averaged 1%. Evidence of the eastern tent caterpillar (*Malacosoma americanum*) and the forest tent caterpillar (*Malacosoma disstria*) were also detected in the park (Table 18).

Table 18. Summary of targeted insect and disease damage for 2009.

Habitat	Species	Disease agent	Number of infested trees	Mean damage severity/tree	Percent of the species that shows damage or disease
				%	%
Very Dry to Dry, Poor	<i>Prunus virginiana</i>	eastern tent caterpillar	1	20.00	7.69
	<i>Prunus virginiana</i>	defoliators (unidentified, but likely same as above)	5	52.00	38.46
Mesic, Medium to Very Rich	<i>Acer saccharum</i>	forest tent caterpillar	33	4.70	4.90
	<i>Fagus grandifolia</i>	beech scale ^a	2	1.00	0.20

^anon-native organism

Discussion

Ecology and Interpretation

This initial round of monitoring revealed several potential concerns about Sleeping Bear Dunes National Lakeshore forests. In dry, sandy forests, neither red pine nor jack pine are regenerating. In the driest sites (see Table 2, *Pinus strobus/Vaccinium* spp.-*Cladina* spp.), in the absence of fire, these habitats are expected to follow a successional trajectory toward white pine (Eyre and LeBarron 1944, Burger and Kotar 2003). Sites with slightly more moisture holding capacity and nutrients (Table 2, *Pinus strobus-Acer rubrum/Vaccinium* spp.-*Hamamelis virginiana*), in the absence of fire, are expected to move toward white pine and red maple, with a significant mixed oak component (Abrams and Scott 1989, Burger and Kotar 2003). Indeed, in both forest types in sandy soils, these successional pathways appear to be occurring as white pine was the most abundant species in the very dry to dry, poor nutrient habitat and had the greatest seedling density.

Historically, Great Lakes pine forests dominated areas of coarse textured soils throughout the northern lower peninsula of Michigan (Whitney 1986). These soils occur as sandy, outwash plains which resulted from retreating ice lobes during the Wisconsin glaciations. General Land Office (GLO) survey records from 1849-1859 were used to reconstruct pre-settlement forest types in this area and to infer disturbance history. In Roscommon and Crawford Counties, pine comprised >57% of the bearing trees recorded across all habitat types. Specifically on level plains, 30.9% of the bearing trees were jack pine, 20.4% were red pine, and 12.6% were white pine, with another 10.4% simply being identified as “pine”. Fire return intervals in the outwash plains were found to be 83 years in forests dominated by jack pine, and 130 years in mixed jack, red, and white pine forests (Whitney 1986).

If park managers at SLBE wish to preserve historic forest types, burning may be necessary. Whitney (1986) found that fires were referenced in 7.3% of presettlement northern Michigan forests studied, but were referenced in 18.0% of the jack pine forests and 11.6% of the mixed pine forests. Where fire cannot be used as a management tool, stocking and/or seeding, along with mechanical seedbed preparation may facilitate attaining desired densities (Burger and Kotar 2003).

In mesic habitats, forests are dominated by American beech with sugar maple comprising a lesser component. Beech - maple is the expected climax community in these habitats, which typically exhibit only a poorly developed understory layer due to the high degree of shading from the dense overstory canopy. While we did observe several plots with well developed herbaceous layers, more often, in mesic forests, we observed very depauperate herb layers (Figure 7) with minimal shrubs and few saplings. Where saplings were in abundance, these were typically almost exclusively beech.

Two important conifer species in this habitat may be experiencing early signs of regeneration failure. Hemlock appears to be successfully regenerating with a greater density of trees in successively smaller size classes (Figure 6b), although there were only 18 seedlings/hectare. In contrast, density of eastern white cedar trees is decreased in successively smaller size classes (Figure 6b), although there were 586 seedlings/hectare. Hemlock and cedar are both preferred

browse species by deer. Continued high deer density will undoubtedly threaten the persistence of these species at SLBE.

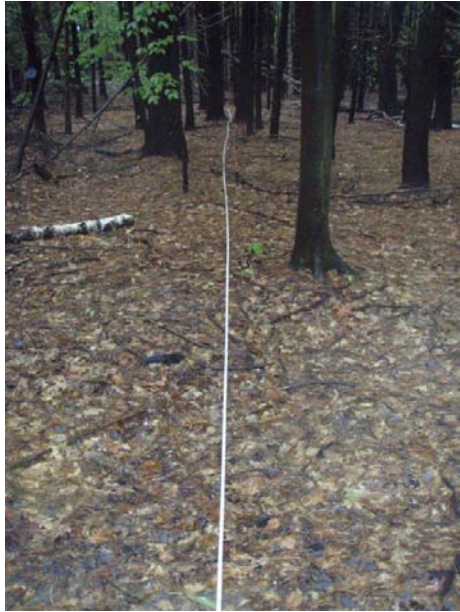


Figure 7. Transect 2 in plot 8038 showing depauperate herb, seedling, sapling, and shrub layers.

Beech is not a preferred browse species for white-tailed deer and high deer densities in the area may promote beech growth by reducing interspecific competition. Indeed, many of our plots were dominated with beech in the sapling layer and very little else (Figure 8). Michigan DNR target deer densities for Leelanau County are 7.7-9.7 deer/km², while the estimated 2009 population was 8.5 deer/km² (Table 19). Target densities for Benzie County are even higher at 9.3-10.8 deer/km², with the estimated 2009 population at 11.2 deer/km² (Rich Earl, Michigan DNR Wildlife Biologist, personal communication). These densities are well above historic level of <4 deer/km² reported in northern hardwood forests (Alverson et al. 1988) and what is considered the threshold for healthy regeneration of forest species.

Management measures to reduce the density of deer within the park would be beneficial. This would increase the density of other tree species and allow growth of herbs and shrubs that are now limited. Altering deer densities may be out of control of park managers, however. Erecting a limited number of deer exclosures would serve a couple of purposes. First, this could serve as a demonstration to both the public and to policy makers the impacts of herbivores in the forest. Second, they could serve as a research vehicle to test the length of time for forest recovery. Exclosures placed varying distances from seed sources would provide an estimate of recovery time for various areas within the park, should deer management policies change. Finally, exclosures placed at a given site would preserve the genetic diversity of, and the local adaptation to, that site.



Figure 8. Plot 8004 showing dense beech understory.

Table 19. White-tailed deer target and estimated population levels for SLBE for 2009.

Deer Management Unit	Target Population		Estimated 2009 Population	
	deer/mile ²	deer/km ²	deer/mile ²	deer/km ²
Leelanau Co. (mainland) ^{1,2}	20-25	7.7-9.7	22	8.5
North Manitou Island ³	undefined	undefined	2-3	0.77-1.2
Benzie Co. ¹	24-28	9.3-10.8	29	11.2

¹Estimates for Leelanau Co. (mainland) and Benzie Co. are made using the sex-age-kill model populated by harvest data from the 2009 season. In counties where relatively few tags are issued, the variance, and hence the actual estimate, may be high.

²Leelanau Co. is a Quality Deer Management Unit. As such, the target population density is set below the carrying capacity.

³Anecdotal estimate from North Manitou Island was made by Rich Earl, Wildlife Biologist for the Michigan DNR who spent four days on North Manitou Island during the summer of 2009.

Concern over the reproduction of species other than beech has special relevance as beech bark disease is emerging at SLBE. While we only detected very low levels of beech scale

(*Cryptococcus fagisuga*) presence in only a small number of plots, this disease will become a problem over the next 20 years.

Beech bark disease is a complex caused by the non-native beech scale insect and one or both of the both fungi, *Neonectria ditissima* and *N. faginata*. While the former species of *Neonectria* is native, the nativity of *N. faginata* is unclear but is generally believed to be non-native (Rossman and Samuels 1999). Beech scales feed on tree sap by inserting a 2 mm long stylet into the bark parenchyma cells. Later-staged nymphs and adults secrete a white, wool-like wax that is very evident on affected trees (Figure 9). Tree mortality occurs not by direct damage from the scale, but by the subsequent infection now afforded to the fungi, which opportunistically invade areas attacked by the scale.

The presence of beech bark disease in an area is classified into three temporally distinct phases (Shigo 1972, Houston 1994). The “advancing front” occurs where the scale has arrived and is present in sparse numbers on larger trees. The “killing front” occurs once both scale and *Neonectria* populations have built up and tree mortality is high. The “aftermath zone” follows the killing front and is evidenced by only a few large trees along with many saplings of both seedling and root sprout origin. Sleeping Bear Dunes National Lakeshore is currently (2009) located within the advancing front of this disease.



Figure 9. Beech scale infestation on American beech tree.

Implementation: Problems, Logistics, and Future Plans

Sampling during the 2009 field season went very smoothly, in large part because of the road and trail system at SLBE. Unfortunately all QA/QC plots in 2009 were at Pictured Rocks National

Lakeshore, which was sampled during the second half of the summer. A target for the next visit to SLBE, in 2015, is to revisit all 50 plots, and include five QA/QC resamples from these.

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Appendix A

Field Sites Maps

Maps have been omitted from this electronic version due to the large files size and to protect sensitive information.
Anyone wishing to obtain copies should contact the Great Lakes Network office.

Appendix B

Complete List of Species Sampled

Species Encountered during Site Visits - by Park

Park: SLBE Year: 2009

This report reflects data from Original Plots only.

Species

HERBACEOUS

Apiaceae

Heracleum maximum
Osmorhiza claytonii
Osmorhiza longistylis
Osmorhiza sp.

Apocynaceae

Apocynum androsaemifolium
Vinca minor

Araceae

Arisaema triphyllum

Araliaceae

Aralia nudicaulis
Aralia racemosa
Panax quinquefolius

Aristolochiaceae

Asarum canadense

Asteraceae

Achillea millefolium
Antennaria sp.
Arctium minus
Asteraceae fam.
Eurybia macrophylla
Hieracium piloselloides
Hieracium sp.
Hieracium venosum
Lactuca sp.
Packera sp.
Prenanthes alba
Prenanthes sp.
Solidago flexicaulis
Solidago sp.
Symphyotrichum laeve
Symphyotrichum puniceum var. puniceum
Symphyotrichum sp.
Taraxacum officinale

Berberidaceae

Caulophyllum thalictroides

Boraginaceae

Cynoglossum officinale
Lithospermum canescens

Brassicaceae

Alliaria petiolata
Arabis lyrata
Brassicaceae fam.
Cardamine concatenata
Cardamine diphylla

Campanulaceae

Campanula rotundifolia

Caprifoliaceae

Linnaea borealis

HERBACEOUS

Caryophyllaceae

Cerastium sp.
Minuartia michauxii

Clusiaceae

Hypericum sp.

Cornaceae

Cornus canadensis

Cyperaceae

Carex albursina
Carex arctata
Carex brunnescens
Carex communis
Carex deweyana
Carex eburnea
Carex intumescens
Carex laxiflora
Carex leptoneura
Carex pedunculata
Carex pensylvanica
Carex plantaginea
Carex rosea
Carex sp.
Carex tosa var. rugosperma

Dennstaedtiaceae

Pteridium aquilinum

Dryopteridaceae

Athyrium filix-femina
Dryopteris carthusiana
Dryopteris cristata
Dryopteris intermedia
Dryopteris marginalis
Gymnocarpium dryopteris
Onoclea sensibilis
Polystichum lonchitis

Equisetaceae

Equisetum arvense
Equisetum laevigatum

Ericaceae

Epigaea repens
Gaultheria procumbens

Fabaceae

Melilotus sp.
Trifolium sp.

Fumariaceae

Dicentra canadensis
Dicentra cucullaria
Dicentra sp.

Geraniaceae

Geranium maculatum
Geranium robertianum

Hydrophyllaceae

Hydrophyllum virginianum

Lamiaceae

Clinopodium vulgare

Species Encountered during Site Visits - by Park

HERBACEOUS

Lamiaceae

Glechoma hederacea
Lamiaceae fam.
Lycopus uniflorus
Mentha arvensis

Liliaceae

Allium tricoccum
Clintonia borealis
Erythronium americanum
Lilium philadelphicum
Maianthemum canadense
Maianthemum racemosum ssp. racemosum
Maianthemum stellatum
Medeola virginiana
Polygonatum biflorum
Polygonatum pubescens
Streptopus amplexifolius
Streptopus lanceolatus var. roseus
Trillium grandiflorum
Uvularia grandiflora

Lycopodiaceae

Huperzia lucidula
Lycopodium annotinum
Lycopodium clavatum
Lycopodium dendroideum
Lycopodium digitatum
Lycopodium obscurum

Menyanthaceae

Menyanthes trifoliata

Monotropaceae

Monotropa uniflora

Onagraceae

Chamerion angustifolium
Circaea alpina
Circaea lutetiana
Circaea sp.

Ophioglossaceae

Botrychium virginianum

Orchidaceae

Cypripedium acaule
Cypripedium sp.
Epipactis helleborine
Goodyera oblongifolia

Orobanchaceae

Conopholis americana

Osmundaceae

Osmunda cinnamomea
Osmunda claytoniana

Oxalidaceae

Oxalis sp.

Papaveraceae

Sanguinaria canadensis

Poaceae

Dactylis glomerata

HERBACEOUS

Poaceae

Danthonia spicata
Deschampsia flexuosa
Elymus repens
Festuca occidentalis
Festuca subverticillata
Melica smithii
Miliium effusum
Oryzopsis asperifolia
Phalaris arundinacea
Piptatherum pungens
Poa sp.
Poaceae fam.
Schizachne purpurascens

Polemoniaceae

Phlox divaricata

Polygalaceae

Polygala paucifolia

Polygonaceae

Polygonella articulata
Rumex acetosella

Portulacaceae

Claytonia caroliniana

Primulaceae

Lysimachia thyrsiflora
Trientalis borealis

Pteridaceae

Adiantum pedatum

Pyrolaceae

Chimaphila umbellata
Pyrola asarifolia
Pyrola elliptica
Pyrola sp.

Ranunculaceae

Actaea pachypoda
Actaea rubra
Actaea sp.
Aquilegia canadensis
Coptis trifolia
Hepatica nobilis var. acuta
Hepatica nobilis var. obtusa
Ranunculus abortivus
Ranunculus recurvatus
Thalictrum dioicum

Rosaceae

Agrimonia sp.
Fragaria vesca
Fragaria virginiana
Potentilla sp.

Rubiaceae

Galium lanceolatum
Galium sp.
Galium triflorum
Houstonia longifolia
Mitchella repens

Species Encountered during Site Visits - by Park

HERBACEOUS

Rubiaceae

Santalaceae

Comandra umbellata

Saxifragaceae

Mitella diphylla

Mitella nuda

Scrophulariaceae

Melampyrum lineare

Pedicularis canadensis

Verbascum thapsus

Veronica americana

Veronica officinalis

Veronica serpyllifolia

Thelypteridaceae

Phegopteris connectilis

Thelypteris palustris

Typhaceae

Typha latifolia

Urticaceae

Urtica dioica ssp. gracilis

Violaceae

Viola canadensis

Viola sp.

SHRUB

Anacardiaceae

Rhus hirta

Toxicodendron rydbergii

Berberidaceae

Berberis vulgaris

Caprifoliaceae

Diervilla lonicera

Lonicera canadensis

Lonicera hirsuta

Lonicera oblongifolia

Lonicera sp.

Lonicera sp. - Exotic

Lonicera tatarica

Sambucus racemosa

Sambucus racemosa var. racemosa

Symphoricarpos albus

Viburnum acerifolium

Viburnum lentago

Cornaceae

Cornus alternifolia

Cornus rugosa

Cornus sericea ssp. sericea

Cupressaceae

Juniperus communis

Juniperus horizontalis

Elaeagnaceae

Elaeagnus angustifolia

Elaeagnus umbellata

Shepherdia canadensis

SHRUB

Ericaceae

Arctostaphylos uva-ursi

Gaylussacia baccata

Vaccinium angustifolium

Vaccinium myrtilloides

Grossulariaceae

Ribes cynosbati

Ribes sp.

Hamamelidaceae

Hamamelis virginiana

Rosaceae

Amelanchier sp.

Amelanchier sp. Group 2

Amelanchier sp. Group 3

Malus pumila

Rosa acicularis

Rosa blanda

Rosa eglanteria

Rosa multiflora

Rosa sp.

Rubus allegheniensis

Rubus canadensis

Rubus flagellaris

Rubus idaeus ssp. strigosus

Rubus pubescens

Rubus sp.

Taxaceae

Taxus canadensis

Thymelaeaceae

Dirca palustris

Vitaceae

Vitis riparia

TREE

Aceraceae

Acer pensylvanicum

Acer rubrum

Acer saccharinum

Acer saccharum

Acer sp.

Acer spicatum

Betulaceae

Betula alleghaniensis

Betula papyrifera

Ostrya virginiana

Cupressaceae

Thuja occidentalis

Fagaceae

Fagus grandifolia

Quercus alba

Quercus rubra

Quercus velutina

Oleaceae

Fraxinus americana

Fraxinus pennsylvanica

Species Encountered during Site Visits - by Park

TREE

Oleaceae

Fraxinus sp.

Pinaceae

Abies balsamea

Picea abies

Picea glauca

Picea pungens

Pinus banksiana

Pinus resinosa

Pinus sp.

Pinus strobus

Pinus sylvestris

Tsuga canadensis

Rosaceae

Crataegus sp.

Prunus serotina

Prunus sp.

Prunus virginiana

Sorbus americana

Sorbus decora

Sorbus sp.

Salicaceae

Populus alba

Populus grandidentata

Populus tremuloides

Tiliaceae

Tilia americana

Ulmaceae

Ulmus americana

Ulmus sp.

Appendix C

Individual Plot Data

Density and Basal Area of Tree Species (Live trees)

Plot: 8002	Density (individuals / ha)	Basal Area (m ² / ha)
Species		
hardwood		
<i>Acer pensylvanicum</i>	33.3	0.0
<i>Acer rubrum</i>	244.4	3.5
<i>Acer saccharum</i>	144.4	1.4
<i>Fagus grandifolia</i>	22.2	0.0
<i>Populus grandidentata</i>	111.1	7.3
<i>Quercus rubra</i>	422.2	22.5
softwood		
<i>Pinus strobus</i>	111.1	4.7
<i>Tsuga canadensis</i>	455.6	5.5
TOTAL	1,544.4	44.9

Plot: 8003	Density (individuals / ha)	Basal Area (m ² / ha)
Species		
hardwood		
<i>Prunus virginiana</i>	11.1	0.0
<i>Quercus alba</i>	44.4	2.2
<i>Quercus velutina</i>	55.6	3.7
softwood		
<i>Pinus banksiana</i>	366.7	4.3
<i>Pinus resinosa</i>	22.2	0.2
<i>Pinus strobus</i>	133.3	1.0
TOTAL	633.3	11.5

Plot: 8004	Density (individuals / ha)	Basal Area (m ² / ha)
Species		
hardwood		
<i>Acer saccharum</i>	211.1	20.3
<i>Betula alleghaniensis</i>	44.4	2.6
<i>Fagus grandifolia</i>	666.7	24.2
<i>Populus grandidentata</i>	11.1	1.6
softwood		
<i>Tsuga canadensis</i>	33.3	3.8
TOTAL	966.7	52.5

Plot: 8005	Density (individuals / ha)	Basal Area (m ² / ha)
Species		
hardwood		
<i>Acer rubrum</i>	55.6	1.0
<i>Acer saccharum</i>	233.3	10.8
<i>Fagus grandifolia</i>	477.8	9.5
<i>Fraxinus americana</i>	33.3	3.4
<i>Populus grandidentata</i>	44.4	6.2
<i>Quercus rubra</i>	22.2	2.8
TOTAL	866.7	33.6

Plot: 8006	Density (individuals / ha)	Basal Area (m ² / ha)
Species		
hardwood		
<i>Acer rubrum</i>	22.2	0.6
<i>Acer saccharum</i>	222.2	8.0
<i>Fagus grandifolia</i>	300.0	4.1
<i>Ostrya virginiana</i>	355.6	1.0
<i>Populus grandidentata</i>	33.3	3.8
<i>Quercus rubra</i>	100.0	13.7
softwood		
<i>Pinus resinosa</i>	22.2	0.1
<i>Pinus strobus</i>	11.1	0.0
<i>Tsuga canadensis</i>	11.1	0.3
TOTAL	1,077.8	31.6

Plot: 8008	Density (individuals / ha)	Basal Area (m ² / ha)
Species		
hardwood		
<i>Acer pensylvanicum</i>	22.2	1.1
<i>Acer saccharum</i>	244.4	17.4
<i>Betula alleghaniensis</i>	11.1	0.9
<i>Fagus grandifolia</i>	488.9	12.3
<i>Prunus serotina</i>	11.1	1.8
softwood		
<i>Tsuga canadensis</i>	55.6	1.1
TOTAL	833.3	34.5

Plot: 8009	Density (individuals / ha)	Basal Area (m ² / ha)
Species		
hardwood		
<i>Fagus grandifolia</i>	11.1	0.0
<i>Fraxinus americana</i>	100.0	0.8
softwood		
<i>Pinus resinosa</i>	1688.9	67.3
TOTAL	1,800.0	68.1

Plot: 8010	Density (individuals / ha)	Basal Area (m ² / ha)
Species		
hardwood		
<i>Betula papyrifera</i>	44.4	3.8
<i>Populus tremuloides</i>	22.2	1.3
<i>Prunus serotina</i>	11.1	0.1
softwood		
<i>Abies balsamea</i>	22.2	0.0
<i>Picea abies</i>	177.8	7.1
<i>Picea glauca</i>	55.6	2.2
<i>Picea pungens</i>	22.2	1.9
<i>Pinus sylvestris</i>	211.1	8.1
<i>Thuja occidentalis</i>	577.8	11.9
<i>Tsuga canadensis</i>	22.2	1.2
TOTAL	1,166.7	37.7

Plot: 8012	Density (individuals / ha)	Basal Area (m ² / ha)
Species		
hardwood		
<i>Acer saccharum</i>	55.6	0.5
<i>Betula papyrifera</i>	44.4	1.0
<i>Fraxinus pennsylvanica</i>	66.7	0.5
<i>Populus grandidentata</i>	55.6	2.0
<i>Prunus serotina</i>	11.1	0.5
<i>Prunus virginiana</i>	88.9	0.1
<i>Quercus rubra</i>	33.3	0.3
softwood		
<i>Abies balsamea</i>	422.2	2.6
<i>Pinus banksiana</i>	133.3	6.4
<i>Pinus resinosa</i>	122.2	7.3
<i>Pinus strobus</i>	44.4	0.6
<i>Thuja occidentalis</i>	133.3	1.1
TOTAL	1,211.1	22.9

Plot: 8013	Density (individuals / ha)	Basal Area (m ² / ha)
Species		
hardwood		
<i>Acer pensylvanicum</i>	33.3	0.0
<i>Acer saccharum</i>	188.9	11.9
<i>Fagus grandifolia</i>	433.3	7.0
<i>Fraxinus americana</i>	22.2	4.5
<i>Ostrya virginiana</i>	11.1	0.1
softwood		
<i>Tsuga canadensis</i>	44.4	10.0
TOTAL	733.3	33.4

Plot: 8015	Density (individuals / ha)	Basal Area (m ² / ha)
Species		
hardwood		
<i>Acer saccharum</i>	500.0	14.7
<i>Fagus grandifolia</i>	133.3	1.9
<i>Fraxinus pennsylvanica</i>	11.1	0.0
<i>Prunus virginiana</i>	22.2	0.0
TOTAL	666.7	16.6

Plot: 8019	Density (individuals / ha)	Basal Area (m ² / ha)
Species		
hardwood		
<i>Acer saccharum</i>	488.9	16.3
<i>Fagus grandifolia</i>	122.2	2.1
<i>Fraxinus pennsylvanica</i>	22.2	2.0
<i>Ostrya virginiana</i>	22.2	0.5
<i>Populus grandidentata</i>	11.1	0.8
<i>Prunus serotina</i>	66.7	6.8
TOTAL	733.3	28.5

Plot: 8020	Density (individuals / ha)	Basal Area (m ² / ha)
Species		
hardwood		
<i>Acer saccharum</i>	166.7	20.2
<i>Fagus grandifolia</i>	1577.8	24.3
TOTAL	1,744.4	44.5

Plot: 8021	Density (individuals / ha)	Basal Area (m ² / ha)
Species		
hardwood		
<i>Acer rubrum</i>	66.7	0.7
<i>Prunus virginiana</i>	77.8	0.1
<i>Quercus rubra</i>	311.1	10.7
softwood		
<i>Pinus banksiana</i>	255.6	6.1
<i>Pinus resinosa</i>	22.2	0.3
<i>Pinus strobus</i>	588.9	3.8
TOTAL	1,322.2	21.8

Plot: 8022	Density (individuals / ha)	Basal Area (m ² / ha)
Species		
hardwood		
<i>Acer rubrum</i>	355.6	4.9
<i>Betula papyrifera</i>	11.1	0.4
<i>Fagus grandifolia</i>	77.8	0.5
<i>Fraxinus pennsylvanica</i>	11.1	0.2
<i>Populus grandidentata</i>	33.3	2.3
<i>Prunus virginiana</i>	33.3	0.0
<i>Quercus alba</i>	11.1	0.1
<i>Quercus rubra</i>	311.1	2.8
softwood		
<i>Pinus strobus</i>	544.4	16.7
<i>Thuja occidentalis</i>	55.6	1.4
TOTAL	1,444.4	29.4

Plot: 8023	Density (individuals / ha)	Basal Area (m ² / ha)
Species		
hardwood		
<i>Acer rubrum</i>	55.6	0.7
<i>Populus grandidentata</i>	22.2	0.8
<i>Quercus alba</i>	77.8	4.3
<i>Quercus rubra</i>	222.2	8.6
softwood		
<i>Pinus banksiana</i>	22.2	0.1
<i>Pinus resinosa</i>	11.1	0.8
<i>Pinus strobus</i>	555.6	5.6
TOTAL	966.7	20.9

Plot: 8024	Density (individuals / ha)	Basal Area (m ² / ha)
Species		
hardwood		
<i>Acer pensylvanicum</i>	33.3	0.0
<i>Acer saccharum</i>	411.1	17.8
<i>Fagus grandifolia</i>	700.0	8.3
<i>Fraxinus americana</i>	11.1	2.2
<i>Fraxinus pennsylvanica</i>	11.1	0.7
<i>Ostrya virginiana</i>	66.7	1.5
<i>Prunus serotina</i>	22.2	3.8
<i>Tilia americana</i>	33.3	5.9
TOTAL	1,288.9	40.2

Plot: 8026	Density (individuals / ha)	Basal Area (m ² / ha)
Species		
hardwood		
<i>Acer saccharum</i>	522.2	21.8
<i>Fagus grandifolia</i>	11.1	1.1
<i>Fraxinus americana</i>	11.1	1.5
<i>Ostrya virginiana</i>	88.9	0.5
<i>Tilia americana</i>	33.3	3.2
<i>Ulmus americana</i>	22.2	1.0
TOTAL	688.9	29.1

Plot: 8027	Density (individuals / ha)	Basal Area (m ² / ha)
Species		
hardwood		
<i>Acer saccharum</i>	377.8	11.0
<i>Betula papyrifera</i>	33.3	2.2
<i>Fagus grandifolia</i>	177.8	0.6
<i>Fraxinus pennsylvanica</i>	11.1	0.9
<i>Ostrya virginiana</i>	22.2	0.0
softwood		
<i>Tsuga canadensis</i>	33.3	0.7
TOTAL	655.6	15.5

Plot: 8028	Density (individuals / ha)	Basal Area (m ² / ha)
Species		
hardwood		
<i>Acer saccharum</i>	77.8	10.1
<i>Betula papyrifera</i>	11.1	1.7
<i>Fagus grandifolia</i>	1788.9	21.3
<i>Prunus serotina</i>	11.1	2.1
TOTAL	1,888.9	35.3

Plot: 8029	Density (individuals / ha)	Basal Area (m ² / ha)
Species		
hardwood		
<i>Acer rubrum</i>	255.6	1.0
<i>Acer saccharum</i>	211.1	3.9
<i>Betula papyrifera</i>	22.2	0.4
<i>Fagus grandifolia</i>	122.2	2.1
<i>Ostrya virginiana</i>	111.1	0.6
<i>Prunus sp.</i>	11.1	0.0
<i>Prunus virginiana</i>	88.9	0.1
<i>Quercus rubra</i>	88.9	3.8
softwood		
<i>Pinus banksiana</i>	266.7	9.4
TOTAL	1,177.8	21.3

Plot: 8030	Density (individuals / ha)	Basal Area (m ² / ha)
Species		
hardwood		
<i>Acer saccharum</i>	77.8	4.5
<i>Betula papyrifera</i>	11.1	0.6
<i>Fraxinus pennsylvanica</i>	144.4	2.6
<i>Ostrya virginiana</i>	11.1	0.0
<i>Quercus rubra</i>	33.3	2.2
<i>Tilia americana</i>	144.4	11.7
softwood		
<i>Abies balsamea</i>	77.8	1.1
<i>Thuja occidentalis</i>	233.3	13.3
TOTAL	733.3	36.0

Plot: 8033	Density (individuals / ha)	Basal Area (m ² / ha)
Species		
hardwood		
<i>Acer saccharum</i>	400.0	7.4
<i>Fagus grandifolia</i>	411.1	23.8
<i>Fraxinus pennsylvanica</i>	22.2	0.5
<i>Ostrya virginiana</i>	44.4	0.5
<i>Prunus serotina</i>	22.2	3.8
<i>Tilia americana</i>	44.4	3.8
TOTAL	944.4	39.7

Plot: 8034	Density (individuals / ha)	Basal Area (m ² / ha)
Species		
hardwood		
<i>Acer pensylvanicum</i>	33.3	0.0
<i>Acer rubrum</i>	33.3	1.5
<i>Acer saccharum</i>	33.3	1.8
<i>Betula papyrifera</i>	22.2	2.0
<i>Fagus grandifolia</i>	411.1	8.5
<i>Quercus rubra</i>	122.2	15.3
softwood		
<i>Tsuga canadensis</i>	644.4	10.0
TOTAL	1,300.0	39.2

Plot: 8035	Density (individuals / ha)	Basal Area (m ² / ha)
Species		
hardwood		
<i>Acer saccharum</i>	411.1	23.5
<i>Fagus grandifolia</i>	100.0	2.4
<i>Fraxinus americana</i>	66.7	8.0
<i>Tilia americana</i>	11.1	1.5
TOTAL	588.9	35.4

Plot: 8036	Density (individuals / ha)	Basal Area (m ² / ha)
Species		
hardwood		
<i>Acer rubrum</i>	388.9	18.2
<i>Acer saccharum</i>	55.6	0.6
<i>Betula papyrifera</i>	33.3	1.7
<i>Fagus grandifolia</i>	388.9	8.8
<i>Quercus rubra</i>	33.3	4.6
softwood		
<i>Pinus strobus</i>	11.1	2.9
<i>Tsuga canadensis</i>	111.1	7.9
TOTAL	1,022.2	44.7

Plot: 8037	Density (individuals / ha)	Basal Area (m ² / ha)
Species		
hardwood		
<i>Acer rubrum</i>	166.7	9.4
<i>Acer saccharum</i>	333.3	12.2
<i>Betula papyrifera</i>	11.1	1.2
<i>Fagus grandifolia</i>	888.9	7.6
<i>Ostrya virginiana</i>	22.2	0.2
<i>Populus grandidentata</i>	11.1	1.2
softwood		
<i>Pinus strobus</i>	22.2	1.5
<i>Tsuga canadensis</i>	77.8	0.4
TOTAL	1,533.3	33.6

Plot: 8038	Density (individuals / ha)	Basal Area (m ² / ha)
Species		
hardwood		
<i>Acer rubrum</i>	155.6	7.2
<i>Betula papyrifera</i>	66.7	2.9
<i>Fagus grandifolia</i>	211.1	1.9
<i>Quercus rubra</i>	133.3	7.2
softwood		
<i>Pinus resinosa</i>	55.6	2.1
<i>Pinus strobus</i>	100.0	7.4
<i>Tsuga canadensis</i>	588.9	21.1
TOTAL	1,311.1	49.7

Plot: 8040	Density (individuals / ha)	Basal Area (m ² / ha)
Species		
hardwood		
<i>Quercus alba</i>	77.8	4.6
<i>Quercus velutina</i>	200.0	8.2
softwood		
<i>Pinus banksiana</i>	88.9	1.4
<i>Pinus strobus</i>	533.3	8.3
TOTAL	900.0	22.5

Plot: 8041	Density (individuals / ha)	Basal Area (m ² / ha)
Species		
hardwood		
<i>Acer saccharum</i>	355.6	16.9
<i>Fagus grandifolia</i>	166.7	5.1
<i>Fraxinus americana</i>	44.4	2.8
<i>Fraxinus pennsylvanica</i>	100.0	3.6
<i>Ostrya virginiana</i>	33.3	0.3
<i>Tilia americana</i>	11.1	0.6
TOTAL	711.1	29.3

Plot: 8044	Density (individuals / ha)	Basal Area (m ² / ha)
Species		
hardwood		
<i>Acer saccharum</i>	144.4	18.1
<i>Fagus grandifolia</i>	1777.8	11.0
<i>Prunus serotina</i>	33.3	3.6
TOTAL	1,955.6	32.7

Plot: 8045	Density (individuals / ha)	Basal Area (m ² / ha)
Species		
hardwood		
<i>Acer pensylvanicum</i>	111.1	0.2
<i>Acer rubrum</i>	100.0	1.6
<i>Acer saccharum</i>	400.0	6.5
<i>Fagus grandifolia</i>	555.6	2.0
<i>Ostrya virginiana</i>	122.2	0.1
<i>Populus grandidentata</i>	22.2	1.3
<i>Quercus rubra</i>	155.6	12.0
softwood		
<i>Pinus strobus</i>	44.4	3.9
<i>Tsuga canadensis</i>	11.1	0.1
TOTAL	1,522.2	27.6

Plot: 8047	Density (individuals / ha)	Basal Area (m ² / ha)
Species		
hardwood		
<i>Acer saccharum</i>	66.7	1.4
<i>Betula papyrifera</i>	22.2	1.6
<i>Fagus grandifolia</i>	11.1	1.5
<i>Fraxinus pennsylvanica</i>	211.1	1.9
<i>Ostrya virginiana</i>	88.9	1.8
<i>Populus grandidentata</i>	66.7	5.8
softwood		
<i>Abies balsamea</i>	644.4	3.5
<i>Thuja occidentalis</i>	488.9	16.3
TOTAL	1,600.0	33.7

Plot: 8048	Density (individuals / ha)	Basal Area (m ² / ha)
Species		
hardwood		
<i>Acer saccharum</i>	244.4	19.6
<i>Betula alleghaniensis</i>	11.1	1.5
<i>Fagus grandifolia</i>	744.4	18.1
TOTAL	1,000.0	39.2

Plot: 8049	Density (individuals / ha)	Basal Area (m ² / ha)
Species		
hardwood		
<i>Acer rubrum</i>	333.3	5.4
<i>Populus grandidentata</i>	44.4	3.4
<i>Prunus virginiana</i>	22.2	0.0
<i>Quercus rubra</i>	300.0	2.3
softwood		
<i>Pinus resinosa</i>	22.2	0.5
<i>Pinus strobus</i>	655.6	22.8
<i>Thuja occidentalis</i>	111.1	2.0
TOTAL	1,488.9	36.4

Plot: 8051	Density (individuals / ha)	Basal Area (m ² / ha)
Species		
hardwood		
<i>Prunus virginiana</i>	55.6	0.1
<i>Quercus velutina</i>	33.3	2.5
softwood		
<i>Pinus banksiana</i>	177.8	3.4
TOTAL	266.7	6.0

Plot: 8053	Density (individuals / ha)	Basal Area (m ² / ha)
Species		
hardwood		
<i>Acer saccharum</i>	88.9	2.2
<i>Betula papyrifera</i>	44.4	2.2
<i>Fagus grandifolia</i>	100.0	2.4
<i>Fraxinus pennsylvanica</i>	22.2	0.0
<i>Ostrya virginiana</i>	33.3	0.0
<i>Populus grandidentata</i>	11.1	1.5
<i>Quercus rubra</i>	122.2	11.1
softwood		
<i>Pinus resinosa</i>	88.9	7.4
<i>Pinus strobus</i>	133.3	5.6
TOTAL	644.4	32.6

Plot: 8057	Density (individuals / ha)	Basal Area (m ² / ha)
Species		
hardwood		
<i>Acer saccharum</i>	722.2	8.9
<i>Betula papyrifera</i>	122.2	3.7
<i>Fagus grandifolia</i>	111.1	2.2
<i>Fraxinus pennsylvanica</i>	55.6	5.2
<i>Ostrya virginiana</i>	44.4	0.1
<i>Prunus serotina</i>	11.1	0.0
<i>Quercus rubra</i>	77.8	6.9
<i>Tilia americana</i>	11.1	1.0
TOTAL	1,155.6	28.0

Plot: 8059	Density (individuals / ha)	Basal Area (m ² / ha)
Species		
hardwood		
<i>Acer saccharum</i>	633.3	11.8
<i>Betula papyrifera</i>	166.7	19.6
<i>Fagus grandifolia</i>	66.7	4.3
<i>Fraxinus pennsylvanica</i>	44.4	0.1
<i>Ostrya virginiana</i>	233.3	1.0
<i>Prunus virginiana</i>	11.1	0.0
<i>Quercus rubra</i>	44.4	2.0
TOTAL	1,200.0	38.8

Plot: 8060	Density (individuals / ha)	Basal Area (m ² / ha)
Species		
hardwood		
<i>Acer rubrum</i>	266.7	30.5
<i>Acer saccharum</i>	66.7	3.4
<i>Betula papyrifera</i>	66.7	2.9
<i>Prunus serotina</i>	11.1	0.3
softwood		
<i>Pinus strobus</i>	33.3	5.1
<i>Tsuga canadensis</i>	211.1	13.2
TOTAL	655.6	55.4

Plot: 8062	Density (individuals / ha)	Basal Area (m ² / ha)
Species		
hardwood		
<i>Acer saccharum</i>	211.1	23.6
<i>Fagus grandifolia</i>	266.7	11.3
<i>Fraxinus pennsylvanica</i>	33.3	1.7
<i>Ostrya virginiana</i>	44.4	0.1
softwood		
<i>Picea glauca</i>	11.1	0.1
TOTAL	566.7	36.7

Plot: 8064	Density (individuals / ha)	Basal Area (m ² / ha)
Species		
hardwood		
<i>Acer saccharum</i>	266.7	8.4
<i>Betula papyrifera</i>	66.7	6.9
<i>Fagus grandifolia</i>	11.1	0.8
<i>Fraxinus americana</i>	44.4	2.9
<i>Fraxinus pennsylvanica</i>	11.1	1.6
<i>Ostrya virginiana</i>	600.0	3.4
<i>Tilia americana</i>	11.1	1.0
TOTAL	1,011.1	24.9

Plot: 8066	Density (individuals / ha)	Basal Area (m ² / ha)
Species		
hardwood		
<i>Acer rubrum</i>	11.1	0.1
<i>Acer saccharum</i>	355.6	12.8
<i>Betula papyrifera</i>	66.7	3.9
<i>Fagus grandifolia</i>	933.3	8.2
<i>Ostrya virginiana</i>	500.0	1.0
<i>Populus grandidentata</i>	22.2	3.1
<i>Populus tremuloides</i>	22.2	0.0
<i>Prunus serotina</i>	44.4	1.1
softwood		
<i>Tsuga canadensis</i>	44.4	2.1
TOTAL	2,000.0	32.4

Plot: 8067	Density (individuals / ha)	Basal Area (m ² / ha)
Species		
hardwood		
<i>Acer rubrum</i>	255.6	8.5
<i>Acer saccharum</i>	22.2	2.9
<i>Betula papyrifera</i>	22.2	1.0
<i>Fagus grandifolia</i>	377.8	7.5
<i>Quercus rubra</i>	33.3	5.1
softwood		
<i>Pinus strobus</i>	11.1	1.3
<i>Tsuga canadensis</i>	133.3	5.8
TOTAL	855.6	32.2

Plot: 8069	Density (individuals / ha)	Basal Area (m ² / ha)
Species		
hardwood		
<i>Acer saccharum</i>	166.7	9.0
<i>Fagus grandifolia</i>	244.4	6.7
<i>Fraxinus americana</i>	11.1	2.0
<i>Ostrya virginiana</i>	100.0	0.6
<i>Tilia americana</i>	11.1	3.7
TOTAL	533.3	22.0

Plot: 8071	Density (individuals / ha)	Basal Area (m ² / ha)
Species		
hardwood		
<i>Acer rubrum</i>	55.6	2.5
<i>Acer saccharum</i>	233.3	5.7
<i>Betula papyrifera</i>	22.2	0.5
<i>Fagus grandifolia</i>	477.8	10.4
<i>Quercus rubra</i>	77.8	5.3
softwood		
<i>Tsuga canadensis</i>	366.7	5.1
TOTAL	1,233.3	29.5

Plot: 8072	Density (individuals / ha)	Basal Area (m ² / ha)
Species		
hardwood		
<i>Acer pensylvanicum</i>	66.7	0.2
<i>Acer saccharum</i>	133.3	9.5
<i>Acer spicatum</i>	11.1	0.0
<i>Betula papyrifera</i>	33.3	3.3
<i>Fagus grandifolia</i>	22.2	0.0
<i>Fraxinus pennsylvanica</i>	33.3	2.8
<i>Ostrya virginiana</i>	611.1	1.2
<i>Prunus virginiana</i>	44.4	0.1
<i>Tilia americana</i>	66.7	4.0
softwood		
<i>Abies balsamea</i>	55.6	0.1
<i>Thuja occidentalis</i>	33.3	9.4
TOTAL	1,111.1	30.6

Plot: 8073	Density (individuals / ha)	Basal Area (m ² / ha)
Species		
hardwood		
<i>Acer rubrum</i>	100.0	3.7
<i>Acer saccharum</i>	188.9	9.4
<i>Betula papyrifera</i>	11.1	0.7
<i>Fagus grandifolia</i>	266.7	4.8
<i>Fraxinus americana</i>	11.1	0.6
<i>Populus grandidentata</i>	11.1	0.6
softwood		
<i>Pinus resinosa</i>	44.4	2.5
<i>Tsuga canadensis</i>	444.4	14.3
TOTAL	1,077.8	36.7

Plot: 8079		
Species	Density (individuals / ha)	Basal Area (m ² / ha)
hardwood		
<i>Acer pensylvanicum</i>	11.1	0.0
<i>Acer rubrum</i>	344.4	7.9
<i>Acer saccharum</i>	333.3	3.7
<i>Fagus grandifolia</i>	288.9	2.8
<i>Fraxinus americana</i>	44.4	0.7
<i>Ostrya virginiana</i>	133.3	0.4
<i>Populus grandidentata</i>	22.2	2.5
<i>Quercus rubra</i>	77.8	16.1
TOTAL	1,255.6	34.1

Plot: 8089		
Species	Density (individuals / ha)	Basal Area (m ² / ha)
hardwood		
<i>Populus tremuloides</i>	44.4	0.2
<i>Prunus virginiana</i>	11.1	0.0
softwood		
<i>Abies balsamea</i>	800.0	3.8
<i>Pinus banksiana</i>	11.1	0.0
<i>Pinus resinosa</i>	122.2	13.3
<i>Pinus strobus</i>	66.7	5.6
<i>Thuja occidentalis</i>	822.2	16.6
TOTAL	1,877.8	39.5

Density and Basal Area of Tree Species (Dead trees)

Plot: 8002	Density (individuals / ha)	Basal Area (m ² / ha)
Species		
hardwood		
<i>Acer rubrum</i>	22.2	0.1
<i>Acer saccharum</i>	11.1	0.0
<i>Betula papyrifera</i>	11.1	0.1
<i>Quercus rubra</i>	33.3	0.7
unknown dead tree - hardwood	44.4	0.2
softwood		
<i>Pinus strobus</i>	33.3	0.3
<i>Tsuga canadensis</i>	77.8	0.7
TOTAL	233.3	2.2

Plot: 8003	Density (individuals / ha)	Basal Area (m ² / ha)
Species		
hardwood		
<i>Quercus alba</i>	11.1	0.6
softwood		
<i>Pinus banksiana</i>	22.2	0.3
TOTAL	33.3	0.8

Plot: 8004	Density (individuals / ha)	Basal Area (m ² / ha)
Species		
hardwood		
<i>Acer saccharum</i>	11.1	0.2
<i>Betula alleghaniensis</i>	11.1	2.1
<i>Fagus grandifolia</i>	11.1	0.1
TOTAL	33.3	2.4

Plot: 8005	Density (individuals / ha)	Basal Area (m ² / ha)
Species		
hardwood		
<i>Acer saccharum</i>	22.2	0.1
<i>Fagus grandifolia</i>	44.4	0.1
softwood		
unknown dead tree - softwood	11.1	0.0
TOTAL	77.8	0.2

Plot: 8006	Density (individuals / ha)	Basal Area (m ² / ha)
Species		
hardwood		
<i>Betula papyrifera</i>	44.4	3.3
<i>Fagus grandifolia</i>	44.4	0.1
<i>Ostrya virginiana</i>	44.4	0.1
TOTAL	133.3	3.5

Plot: 8008	Density (individuals / ha)	Basal Area (m ² / ha)
Species		
hardwood		
<i>Acer saccharum</i>	11.1	0.0
<i>Betula alleghaniensis</i>	11.1	3.4
<i>Fagus grandifolia</i>	11.1	0.0
softwood		
<i>Tsuga canadensis</i>	11.1	0.1
TOTAL	44.4	3.6

Plot: 8009	Density (individuals / ha)	Basal Area (m ² / ha)
Species		
hardwood		
<i>Fagus grandifolia</i>	11.1	0.1
<i>Fraxinus americana</i>	100.0	0.3
softwood		
<i>Pinus resinosa</i>	133.3	1.0
TOTAL	244.4	1.4

Plot: 8010	Density (individuals / ha)	Basal Area (m ² / ha)
Species		
hardwood		
<i>Tilia americana</i>	11.1	0.3
softwood		
<i>Picea abies</i>	22.2	0.1
<i>Pinus sylvestris</i>	44.4	0.3
<i>Thuja occidentalis</i>	88.9	0.4
TOTAL	166.7	1.1

Plot: 8012	Density (individuals / ha)	Basal Area (m ² / ha)
Species		
hardwood		
<i>Betula papyrifera</i>	11.1	0.2
softwood		
<i>Abies balsamea</i>	55.6	0.1
<i>Pinus banksiana</i>	33.3	0.7
TOTAL	100.0	1.0

Plot: 8013	Density (individuals / ha)	Basal Area (m ² / ha)
Species		
hardwood		
<i>Acer saccharum</i>	11.1	0.4
<i>Fagus grandifolia</i>	11.1	0.0
<i>Ostrya virginiana</i>	22.2	0.0
TOTAL	44.4	0.4

Plot: 8015	Density (individuals / ha)	Basal Area (m ² / ha)
Species		
hardwood		
<i>Acer saccharum</i>	11.1	0.2
<i>Betula papyrifera</i>	11.1	0.8
TOTAL	22.2	1.0

Plot: 8019	Density (individuals / ha)	Basal Area (m ² / ha)
Species		
hardwood		
<i>Acer saccharum</i>	133.3	0.6
<i>Ostrya virginiana</i>	33.3	0.3
<i>Prunus serotina</i>	22.2	0.3
TOTAL	188.9	1.2

Plot: 8020	Density (individuals / ha)	Basal Area (m ² / ha)
Species		
hardwood		
<i>Fagus grandifolia</i>	377.8	0.8
TOTAL	377.8	0.8

Plot: 8021	Density (individuals / ha)	Basal Area (m ² / ha)
Species		
softwood		
<i>Pinus banksiana</i>	44.4	0.3
<i>Pinus strobus</i>	11.1	0.1
softwood / hardwood		
<i>unknown dead tree</i>	11.1	0.0
TOTAL	66.7	0.3

Plot: 8022	Density (individuals / ha)	Basal Area (m ² / ha)
Species		
hardwood		
<i>Acer rubrum</i>	22.2	0.0
<i>Betula papyrifera</i>	44.4	0.9
<i>Populus grandidentata</i>	11.1	0.2
<i>unknown dead tree - hardwood</i>	11.1	0.1
softwood		
<i>Pinus strobus</i>	133.3	5.7
<i>unknown dead tree - softwood</i>	11.1	0.1
TOTAL	233.3	6.9

Plot: 8023	Density (individuals / ha)	Basal Area (m ² / ha)
Species		
hardwood		
<i>Acer rubrum</i>	11.1	0.0
<i>Prunus serotina</i>	11.1	0.1
<i>Quercus rubra</i>	11.1	0.0
softwood		
<i>Pinus banksiana</i>	22.2	0.1
<i>Pinus resinosa</i>	11.1	0.0
TOTAL	66.7	0.3

Plot: 8024	Density (individuals / ha)	Basal Area (m ² / ha)
Species		
hardwood		
<i>Acer pensylvanicum</i>	11.1	0.1
<i>Acer saccharum</i>	100.0	1.3
<i>Ostrya virginiana</i>	11.1	0.4
TOTAL	122.2	1.8

Plot: 8026	Density (individuals / ha)	Basal Area (m ² / ha)
Species		
hardwood		
<i>Acer saccharum</i>	111.1	0.8
softwood / hardwood		
<i>unknown dead tree</i>	11.1	0.3
TOTAL	122.2	1.1

Plot: 8027	Density (individuals / ha)	Basal Area (m ² / ha)
Species		
hardwood		
<i>Acer saccharum</i>	88.9	0.6
TOTAL	88.9	0.6

Plot: 8028	Density (individuals / ha)	Basal Area (m ² / ha)
Species		
hardwood		
<i>Acer saccharum</i>	11.1	0.4
<i>Fagus grandifolia</i>	66.7	0.1
<i>Prunus serotina</i>	22.2	2.2
TOTAL	100.0	2.7

Plot: 8029	Density (individuals / ha)	Basal Area (m ² / ha)
Species		
hardwood		
<i>Acer rubrum</i>	44.4	0.1
<i>Acer saccharum</i>	33.3	0.2
<i>Acer sp.</i>	33.3	0.3
<i>Prunus sp.</i>	11.1	0.0
softwood		
<i>Pinus banksiana</i>	22.2	0.2
TOTAL	144.4	0.8

Plot: 8030	Density (individuals / ha)	Basal Area (m ² / ha)
Species		
hardwood		
<i>Acer saccharum</i>	11.1	0.4
<i>Tilia americana</i>	11.1	0.0
softwood		
<i>Abies balsamea</i>	33.3	0.1
<i>Thuja occidentalis</i>	44.4	0.4
TOTAL	100.0	0.9

Plot: 8033	Density (individuals / ha)	Basal Area (m ² / ha)
Species		
hardwood		
<i>Acer saccharum</i>	11.1	0.0
<i>Fagus grandifolia</i>	22.2	1.4
TOTAL	33.3	1.4

Plot: 8034	Density (individuals / ha)	Basal Area (m ² / ha)
Species		
hardwood		
<i>Fagus grandifolia</i>	44.4	2.9
<i>Quercus rubra</i>	22.2	0.9
softwood		
<i>Tsuga canadensis</i>	22.2	0.5
TOTAL	88.9	4.3

Plot: 8035	Density (individuals / ha)	Basal Area (m ² / ha)
Species		
hardwood		
<i>Acer saccharum</i>	44.4	0.3
<i>Fraxinus americana</i>	11.1	0.9
TOTAL	55.6	1.2

Plot: 8036	Density (individuals / ha)	Basal Area (m ² / ha)
Species		
hardwood		
<i>Acer rubrum</i>	88.9	0.9
<i>Fagus grandifolia</i>	44.4	0.1
softwood		
<i>Tsuga canadensis</i>	11.1	0.1
softwood / hardwood		
<i>unknown dead tree</i>	11.1	0.1
TOTAL	155.6	1.2

Plot: 8037	Density (individuals / ha)	Basal Area (m ² / ha)
Species		
hardwood		
<i>Acer rubrum</i>	11.1	0.2
<i>Acer saccharum</i>	55.6	0.5
<i>Fagus grandifolia</i>	11.1	0.0
<i>Populus grandidentata</i>	11.1	0.8
softwood		
<i>Pinus strobus</i>	22.2	0.1
<i>Tsuga canadensis</i>	11.1	0.0
TOTAL	122.2	1.7

Plot: 8038	Density (individuals / ha)	Basal Area (m ² / ha)
Species		
hardwood		
<i>Fagus grandifolia</i>	11.1	0.3
softwood		
<i>Pinus strobus</i>	44.4	0.7
<i>Tsuga canadensis</i>	33.3	0.3
TOTAL	88.9	1.2

Plot: 8040	Density (individuals / ha)	Basal Area (m ² / ha)
Species		
hardwood		
<i>Quercus velutina</i>	33.3	0.2
softwood		
<i>Pinus banksiana</i>	100.0	1.8
<i>Pinus sp.</i>	33.3	0.6
<i>Pinus strobus</i>	33.3	0.9
TOTAL	200.0	3.5

Plot: 8041	Density (individuals / ha)	Basal Area (m ² / ha)
Species		
hardwood		
<i>Acer saccharum</i>	55.6	0.4
<i>Fagus grandifolia</i>	22.2	0.0
TOTAL	77.8	0.4

Plot: 8044	Density (individuals / ha)	Basal Area (m ² / ha)
Species		
hardwood		
<i>Fagus grandifolia</i>	277.8	0.4
<i>Prunus serotina</i>	11.1	0.6
TOTAL	288.9	0.9

Plot: 8045	Density (individuals / ha)	Basal Area (m ² / ha)
Species		
hardwood		
<i>Acer rubrum</i>	22.2	0.1
<i>Acer saccharum</i>	33.3	0.2
<i>Fagus grandifolia</i>	11.1	0.0
<i>Populus grandidentata</i>	11.1	0.2
softwood		
<i>Pinus strobus</i>	33.3	0.0
TOTAL	111.1	0.5

Plot: 8047	Density (individuals / ha)	Basal Area (m ² / ha)
Species		
hardwood		
<i>Betula papyrifera</i>	44.4	4.3
unknown dead tree - hardwood	22.2	0.8
softwood		
<i>Abies balsamea</i>	11.1	0.5
<i>Thuja occidentalis</i>	33.3	0.1
unknown dead tree - softwood	11.1	0.0
TOTAL	122.2	5.8

Plot: 8048	Density (individuals / ha)	Basal Area (m ² / ha)
Species		
hardwood		
<i>Acer pensylvanicum</i>	11.1	0.0
<i>Acer saccharum</i>	11.1	0.8
<i>Fagus grandifolia</i>	22.2	0.0
TOTAL	44.4	0.8

Plot: 8049	Density (individuals / ha)	Basal Area (m ² / ha)
Species		
hardwood		
<i>Betula papyrifera</i>	33.3	0.9
<i>Populus grandidentata</i>	11.1	3.1
unknown dead tree - hardwood	33.3	0.7
softwood		
<i>Pinus strobus</i>	122.2	2.5
<i>Thuja occidentalis</i>	11.1	0.1
softwood / hardwood		
unknown dead tree	11.1	0.0
TOTAL	222.2	7.3

Plot: 8051	Density (individuals / ha)	Basal Area (m ² / ha)
Species		
hardwood		
<i>Prunus virginiana</i>	11.1	0.0
<i>Quercus velutina</i>	11.1	0.2
softwood		
<i>Pinus banksiana</i>	22.2	1.0
TOTAL	44.4	1.2

Plot: 8053	Density (individuals / ha)	Basal Area (m ² / ha)
Species		
hardwood		
<i>Acer saccharum</i>	11.1	0.1
<i>Betula papyrifera</i>	44.4	1.4
<i>Fagus grandifolia</i>	22.2	0.0
<i>Populus grandidentata</i>	11.1	0.3
<i>Quercus rubra</i>	11.1	0.1
softwood		
<i>Pinus strobus</i>	33.3	0.7
TOTAL	133.3	2.6

Plot: 8057	Density (individuals / ha)	Basal Area (m ² / ha)
Species		
hardwood		
<i>Acer saccharum</i>	66.7	0.3
<i>Betula papyrifera</i>	11.1	0.0
<i>Fagus grandifolia</i>	11.1	0.0
<i>Quercus alba</i>	11.1	0.5
TOTAL	100.0	0.8

Plot: 8059	Density (individuals / ha)	Basal Area (m ² / ha)
Species		
hardwood		
<i>Acer saccharum</i>	22.2	0.4
<i>Betula papyrifera</i>	44.4	3.3
<i>Fagus grandifolia</i>	11.1	0.0
<i>Ostrya virginiana</i>	22.2	0.0
TOTAL	100.0	3.8

Plot: 8060	Density (individuals / ha)	Basal Area (m ² / ha)
Species		
hardwood		
<i>Acer rubrum</i>	11.1	1.1
<i>Acer saccharum</i>	11.1	1.3
<i>Betula papyrifera</i>	11.1	0.0
softwood		
<i>Tsuga canadensis</i>	22.2	0.0
softwood / hardwood		
unknown living Tree species	11.1	0.1
TOTAL	66.7	2.6

Plot: 8062	Density (individuals / ha)	Basal Area (m ² / ha)
Species		
hardwood		
<i>Acer saccharum</i>	22.2	0.4
<i>Fagus grandifolia</i>	22.2	1.3
TOTAL	44.4	1.7

Plot: 8064	Density (individuals / ha)	Basal Area (m ² / ha)
Species		
hardwood		
<i>Acer saccharum</i>	22.2	0.6
<i>Betula papyrifera</i>	11.1	0.6
<i>Fraxinus americana</i>	11.1	0.2
<i>Ostrya virginiana</i>	22.2	0.0
<i>Tilia americana</i>	11.1	1.4
unknown dead tree - hardwood	11.1	1.4
TOTAL	88.9	4.3

Plot: 8066	Density (individuals / ha)	Basal Area (m ² / ha)
Species		
hardwood		
<i>Acer saccharum</i>	11.1	0.0
<i>Fagus grandifolia</i>	22.2	0.0
<i>Prunus serotina</i>	11.1	2.4
TOTAL	44.4	2.5

Plot: 8067	Density (individuals / ha)	Basal Area (m ² / ha)
Species		
hardwood		
<i>Acer rubrum</i>	100.0	0.6
<i>Betula papyrifera</i>	11.1	0.3
<i>Fagus grandifolia</i>	22.2	0.0
softwood		
<i>Tsuga canadensis</i>	66.7	2.5
TOTAL	200.0	3.5

Plot: 8069	Density (individuals / ha)	Basal Area (m ² / ha)
Species		
hardwood		
<i>Acer saccharum</i>	33.3	2.1
<i>Ostrya virginiana</i>	22.2	0.1
TOTAL	55.6	2.3

Plot: 8071	Density (individuals / ha)	Basal Area (m ² / ha)
Species		
hardwood		
<i>Acer saccharum</i>	11.1	0.4
<i>Fagus grandifolia</i>	22.2	0.0
<i>Quercus rubra</i>	55.6	0.3
softwood		
<i>Tsuga canadensis</i>	22.2	0.0
TOTAL	111.1	0.8

Plot: 8072	Density (individuals / ha)	Basal Area (m ² / ha)
Species		
hardwood		
<i>Acer saccharum</i>	33.3	0.0
<i>Ostrya virginiana</i>	33.3	0.0
<i>Prunus virginiana</i>	11.1	0.2
<i>Tilia americana</i>	22.2	1.8
TOTAL	100.0	2.1

Plot: 8073	Density (individuals / ha)	Basal Area (m ² / ha)
Species		
hardwood		
<i>Betula papyrifera</i>	55.6	2.8
<i>Fagus grandifolia</i>	33.3	0.2
<i>Populus grandidentata</i>	11.1	0.3
softwood		
<i>Pinus resinosa</i>	33.3	0.2
<i>Tsuga canadensis</i>	66.7	0.5
<i>unknown dead tree - softwood</i>	11.1	0.2
TOTAL	211.1	4.2

Plot: 8079	Density (individuals / ha)	Basal Area (m ² / ha)
Species		
hardwood		
<i>Acer pensylvanicum</i>	11.1	0.0
<i>Acer rubrum</i>	33.3	0.0
<i>Acer saccharum</i>	11.1	0.0
<i>unknown dead tree - hardwood</i>	22.2	0.0
TOTAL	77.8	0.1

Plot: 8089	Density (individuals / ha)	Basal Area (m ² / ha)
Species		
hardwood		
<i>Populus tremuloides</i>	22.2	0.0
softwood		
<i>Abies balsamea</i>	33.3	0.2
<i>Thuja occidentalis</i>	11.1	0.2
TOTAL	66.7	0.4

Percent Cover of Shrub Species

Plot: 8002

Species	Percent cover in shrub circles						mean percent cover
	1	2	3	4	5	6	
Amelanchier sp. Group 2					1		0.17
Amelanchier sp. Group 3				1		1	0.33
Hamamelis virginiana						18	3.00

Number of Shrub Circles Not Sampled in Plot 8002: 0

Plot: 8003

Species	Percent cover in shrub circles						mean percent cover
	1	2	3	4	5	6	
Amelanchier sp. Group 3				1	1		0.33
Gaylussacia baccata						3	0.50
Toxicodendron rydbergii					1		0.17
Vaccinium angustifolium		2		15	3	2	3.67
Vaccinium myrtilloides					1		0.17

Number of Shrub Circles Not Sampled in Plot 8003: 0

Plot: 8005

Species	Percent cover in shrub circles						mean percent cover
	1	2	3	4	5	6	
Lonicera canadensis						1	0.17

Number of Shrub Circles Not Sampled in Plot 8005: 0

Plot: 8006

Species	Percent cover in shrub circles						mean percent cover
	1	2	3	4	5	6	
Amelanchier sp. Group 2		1				3	0.67
Rubus allegheniensis						1	0.17
Viburnum acerifolium	2			1			0.50

Number of Shrub Circles Not Sampled in Plot 8006: 0

Plot: 8008

Species	Percent cover in shrub circles						mean percent cover
	1	2	3	4	5	6	
Gaylussacia baccata			1				0.17
Rubus canadensis		4					0.67

Number of Shrub Circles Not Sampled in Plot 8008: 0

Plot: 8010

Species	Percent cover in shrub circles						mean percent cover
	1	2	3	4	5	6	
Amelanchier sp. Group 2			1		1		0.33
Vitis riparia			1				0.17

Number of Shrub Circles Not Sampled in Plot 8010: 0

Plot: 8012

Species	Percent cover in shrub circles						mean percent cover
	1	2	3	4	5	6	
Amelanchier sp. Group 2	1	1	2	1			0.83
Berberis vulgaris			5	1			1.00
Cornus rugosa	25		15	12		38	15.00
Elaeagnus angustifolia						2	0.33
Juniperus communis	1	5	2				1.33
Juniperus horizontalis	15						2.50
Lonicera hirsuta						1	0.17
Lonicera oblongifolia		1		1		17	3.17
Lonicera sp.			2	5		2	1.50
Rosa blanda		3	1				0.67
Shepherdia canadensis		12					2.00
Symphoricarpos albus	12	28		27	8	35	18.33
Toxicodendron rydbergii	1	2		2	1	3	1.50

Number of Shrub Circles Not Sampled in Plot 8012: 0

Plot: 8015

Species	Percent cover in shrub circles						mean percent cover
	1	2	3	4	5	6	
Ribes sp.	1	3				1	0.83
Rubus allegheniensis		1					0.17
Sambucus racemosa		55	3	1		3	10.33
Taxus canadensis					20		3.33

Number of Shrub Circles Not Sampled in Plot 8015: 0

Plot: 8021

Species	Percent cover in shrub circles						mean percent cover
	1	2	3	4	5	6	
Amelanchier sp. Group 2				1			0.17
Juniperus communis			4				0.67
Juniperus horizontalis	25	25		1			8.50
Rosa blanda		1					0.17
Shepherdia canadensis		1					0.17
Symphoricarpos albus				1			0.17
Toxicodendron rydbergii		1		1			0.33
Vaccinium angustifolium					1		0.17
Vaccinium myrtilloides						2	0.33

Number of Shrub Circles Not Sampled in Plot 8021: 0

Plot: 8022

Species	Percent cover in shrub circles						mean percent cover
	1	2	3	4	5	6	
Amelanchier sp. Group 2	1				1	1	0.50
Juniperus communis		1					0.17
Vaccinium angustifolium		1		1			0.33
Vaccinium myrtilloides	3	2	1				1.00

Number of Shrub Circles Not Sampled in Plot 8022: 0

Plot: 8023							
Species	Percent cover in shrub circles						mean percent cover
	1	2	3	4	5	6	
Amelanchier sp. Group 3	1				1		0.33
Gaylussacia baccata	8	10	10	15		15	9.67
Vaccinium angustifolium	5	1	5	3	2	4	3.33
Number of Shrub Circles Not Sampled in Plot 8023: 0							

Plot: 8024							
Species	Percent cover in shrub circles						mean percent cover
	1	2	3	4	5	6	
Amelanchier sp. Group 2		1					0.17
Cornus rugosa					1		0.17
Sambucus racemosa				1			0.17
Number of Shrub Circles Not Sampled in Plot 8024: 0							

Plot: 8026							
Species	Percent cover in shrub circles						mean percent cover
	1	2	3	4	5	6	
Amelanchier sp. Group 2	1	1	1		1	1	0.83
Dirca palustris	1	1	1	1	1	1	1.00
Sambucus racemosa			1				0.17
Number of Shrub Circles Not Sampled in Plot 8026: 0							

Plot: 8027							
Species	Percent cover in shrub circles						mean percent cover
	1	2	3	4	5	6	
Ribes sp.				1			0.17
Sambucus racemosa		3	4				1.17
Taxus canadensis		25					4.17
Number of Shrub Circles Not Sampled in Plot 8027: 0							

Plot: 8029							
Species	Percent cover in shrub circles						mean percent cover
	1	2	3	4	5	6	
Diervilla lonicera		1					0.17
Juniperus communis						70	11.67
Lonicera oblongifolia					3		0.50
Lonicera sp.				2	1		0.50
Toxicodendron rydbergii					1	1	0.33
Viburnum acerifolium		5		1			1.00
Number of Shrub Circles Not Sampled in Plot 8029: 0							

Plot: 8030							
	Percent cover in shrub circles						mean
Species	1	2	3	4	5	6	percent cover
Cornus rugosa	1	1			1		0.50
Lonicera canadensis	1				1		0.33
Rosa acicularis		1			1		0.33
Symphoricarpos albus					1	1	0.33
Toxicodendron rydbergii	1	3	1		4	1	1.67
Viburnum acerifolium			2			2	0.67
Vitis riparia		1			1		0.33
Number of Shrub Circles Not Sampled in Plot 8030: 0							

Plot: 8033							
	Percent cover in shrub circles						mean
Species	1	2	3	4	5	6	percent cover
Ribes sp.			1		1		0.33
Sambucus racemosa			1	1	1		0.50
Number of Shrub Circles Not Sampled in Plot 8033: 0							

Plot: 8035							
	Percent cover in shrub circles						mean
Species	1	2	3	4	5	6	percent cover
Cornus alternifolia		1					0.17
Lonicera canadensis	1						0.17
Ribes sp.	1			1			0.33
Sambucus racemosa			3		1	1	0.83
Number of Shrub Circles Not Sampled in Plot 8035: 0							

Plot: 8036							
	Percent cover in shrub circles						mean
Species	1	2	3	4	5	6	percent cover
Amelanchier sp. Group 2						1	0.17
Number of Shrub Circles Not Sampled in Plot 8036: 0							

Plot: 8040							
	Percent cover in shrub circles						mean
Species	1	2	3	4	5	6	percent cover
Amelanchier sp. Group 2						1	0.17
Gaylussacia baccata					1		0.17
Vaccinium angustifolium		60		80	5	40	30.83
Number of Shrub Circles Not Sampled in Plot 8040: 0							

Plot: 8041							
	Percent cover in shrub circles						mean
Species	1	2	3	4	5	6	percent cover
Sambucus racemosa		1		1	1		0.50
Number of Shrub Circles Not Sampled in Plot 8041: 0							

Plot: 8045							
Species	Percent cover in shrub circles						mean percent cover
	1	2	3	4	5	6	
Amelanchier sp. Group 2					1		0.17
Viburnum acerifolium		1			1		0.33
Number of Shrub Circles Not Sampled in Plot 8045: 0							

Plot: 8047							
Species	Percent cover in shrub circles						mean percent cover
	1	2	3	4	5	6	
Cornus rugosa					5		0.83
Juniperus communis				2			0.33
Lonicera sp.				4		1	0.83
Rosa eglanteria						3	0.50
Shepherdia canadensis				2			0.33
Symphoricarpos albus				2		1	0.50
Toxicodendron rydbergii				5		1	1.00
Vitis riparia				7			1.17
Number of Shrub Circles Not Sampled in Plot 8047: 0							

Plot: 8048							
Species	Percent cover in shrub circles						mean percent cover
	1	2	3	4	5	6	
Rubus canadensis	3						0.50
Sambucus racemosa	30				3	2	5.83
Number of Shrub Circles Not Sampled in Plot 8048: 0							

Plot: 8049							
Species	Percent cover in shrub circles						mean percent cover
	1	2	3	4	5	6	
Amelanchier sp. Group 2	1		1	1			0.50
Cornus sericea ssp. sericea		1					0.17
Juniperus communis	3						0.50
Lonicera canadensis			1	1			0.33
Vaccinium myrtilloides		32			2		5.67
Number of Shrub Circles Not Sampled in Plot 8049: 0							

Plot: 8051							
Species	Percent cover in shrub circles						mean percent cover
	1	2	3	4	5	6	
Lonicera oblongifolia				5	1		1.00
Rosa eglanteria	1						0.17
Symphoricarpos albus	3						0.50
Vaccinium angustifolium				20	5		4.17
Vaccinium myrtilloides				30	10		6.67
Number of Shrub Circles Not Sampled in Plot 8051: 0							

Plot: 8053							
Species	Percent cover in shrub circles						mean percent cover
	1	2	3	4	5	6	
Amelanchier sp. Group 2		1					0.17
Hamamelis virginiana	1					2	0.50
Viburnum acerifolium		1	2	3		3	1.50
Number of Shrub Circles Not Sampled in Plot 8053: 0							

Plot: 8057							
Species	Percent cover in shrub circles						mean percent cover
	1	2	3	4	5	6	
Rubus allegheniensis		1					0.17
Rubus idaeus ssp. strigosus		5					0.83
Number of Shrub Circles Not Sampled in Plot 8057: 0							

Plot: 8059							
Species	Percent cover in shrub circles						mean percent cover
	1	2	3	4	5	6	
Amelanchier sp. Group 3	2						0.33
Diervilla lonicera			1		15		2.67
Juniperus communis		35					5.83
Lonicera oblongifolia					10		1.67
Lonicera sp.						15	2.50
Toxicodendron rydbergii	40						6.67
Viburnum acerifolium				1	4		0.83
Number of Shrub Circles Not Sampled in Plot 8059: 0							

Plot: 8060							
Species	Percent cover in shrub circles						mean percent cover
	1	2	3	4	5	6	
Amelanchier sp. Group 2	2	1	10		4		2.83
Rubus allegheniensis			1				0.17
Rubus flagellaris			8				1.33
Number of Shrub Circles Not Sampled in Plot 8060: 0							

Plot: 8062							
Species	Percent cover in shrub circles						mean percent cover
	1	2	3	4	5	6	
Ribes sp.		5	1		1		1.17
Rubus idaeus ssp. strigosus		5	1				1.00
Number of Shrub Circles Not Sampled in Plot 8062: 0							

Plot: 8064							
Species	Percent cover in shrub circles						mean percent cover
	1	2	3	4	5	6	
Amelanchier sp. Group 3						3	0.50
Cornus rugosa	6						1.00
Ribes cynosbati						1	0.17
Rubus canadensis					5		0.83
Rubus idaeus ssp. strigosus	1	1		1	3	5	1.83
Sambucus racemosa	10	4	2	1	2		3.17
Viburnum lentago				4	4		1.33
Number of Shrub Circles Not Sampled in Plot 8064: 0							

Plot: 8066							
Species	Percent cover in shrub circles						mean percent cover
	1	2	3	4	5	6	
Amelanchier sp. Group 2			1	1	1	1	0.67
Amelanchier sp. Group 3			1	2		1	0.67
Diervilla lonicera					1		0.17
Rosa eglanteria						1	0.17
Rubus allegheniensis						1	0.17
Number of Shrub Circles Not Sampled in Plot 8066: 0							

Plot: 8069							
Species	Percent cover in shrub circles						mean percent cover
	1	2	3	4	5	6	
Ribes cynosbati						1	0.17
Sambucus racemosa				2	65		11.17
Number of Shrub Circles Not Sampled in Plot 8069: 0							

Plot: 8071							
Species	Percent cover in shrub circles						mean percent cover
	1	2	3	4	5	6	
Amelanchier sp. Group 2				1	1	1	0.50
Number of Shrub Circles Not Sampled in Plot 8071: 0							

Plot: 8072							
Species	Percent cover in shrub circles						mean percent cover
	1	2	3	4	5	6	
Amelanchier sp. Group 2	1	2		5			1.33
Amelanchier sp. Group 3						3	0.50
Cornus rugosa						35	5.83
Rubus idaeus ssp. strigosus		3		12	9	4	4.67
Sambucus racemosa	3	5	4	15	4		5.17
Symphoricarpos albus					18	6	4.00
Toxicodendron rydbergii						7	1.17
Number of Shrub Circles Not Sampled in Plot 8072: 0							

Plot: 8073							
	Percent cover in shrub circles						mean
Species	1	2	3	4	5	6	percent cover
Amelanchier sp. Group 2						1	0.17
Number of Shrub Circles Not Sampled in Plot 8073: 0							
Plot: 8079							
	Percent cover in shrub circles						mean
Species	1	2	3	4	5	6	percent cover
Amelanchier sp. Group 2			1				0.17
Number of Shrub Circles Not Sampled in Plot 8079: 0							
Plot: 8089							
	Percent cover in shrub circles						mean
Species	1	2	3	4	5	6	percent cover
Amelanchier sp. Group 2	1						0.17
Juniperus communis		40		20		30	15.00
Juniperus horizontalis				10		40	8.33
Lonicera canadensis	1	2				1	0.67
Lonicera oblongifolia				3			0.50
Rosa acicularis	2						0.33
Shepherdia canadensis		1				5	1.00
Symphoricarpos albus			10				1.67
Taxus canadensis	70	30	2				17.00
Toxicodendron rydbergii		2	5				1.17
Number of Shrub Circles Not Sampled in Plot 8089: 0							

Frequency of Species in Groundlayer Quadrats

Plot: 8002

Species	Quadrat Frequency			Mean Quadrat Frequency
	1	2	3	
Acer pensylvanicum	0.0	0.0	0.1	0.03
Amelanchier sp. Group 3	0.0	0.1	0.0	0.03
Aralia nudicaulis	0.0	0.1	0.1	0.07
Carex communis	0.0	0.0	0.1	0.03
Carex sp.	0.0	0.1	0.0	0.03
Fagus grandifolia	0.1	0.1	0.1	0.10
Gaultheria procumbens	0.0	0.0	0.1	0.03
Hamamelis virginiana	0.0	0.2	0.1	0.10
Maianthemum canadense	0.0	0.4	0.1	0.17
Mitchella repens	0.0	0.0	0.1	0.03
Polygonatum pubescens	0.1	0.0	0.1	0.07
Populus grandidentata	0.0	0.1	0.0	0.03
Pteridium aquilinum	0.0	0.1	0.2	0.10

Plot: 8003

Species	Quadrat Frequency			Mean Quadrat Frequency
	1	2	3	
Arctostaphylos uva-ursi	0.1	0.1	0.0	0.07
Carex pensylvanica	0.7	0.9	0.6	0.73
Comandra umbellata	0.1	0.0	0.0	0.03
Deschampsia flexuosa	0.7	0.4	0.7	0.60
Gaultheria procumbens	0.0	0.0	0.3	0.10
Maianthemum canadense	0.0	0.0	0.1	0.03
Melampyrum lineare	0.1	0.0	0.0	0.03
Pinus banksiana	0.0	0.1	0.0	0.03
Pinus strobus	0.0	0.0	0.1	0.03
Poaceae fam.	0.2	0.1	0.1	0.13
Polygonella articulata	0.2	0.0	0.0	0.07
Pteridium aquilinum	0.2	0.0	0.1	0.10
Vaccinium angustifolium	0.5	0.4	0.3	0.40

Plot: 8004

Species	Quadrat Frequency			Mean Quadrat Frequency
	1	2	3	
Acer pensylvanicum	0.0	0.0	0.1	0.03
Acer saccharum	0.0	0.3	0.0	0.10
Carex pedunculata	0.0	0.0	0.1	0.03
Dicentra canadensis	0.6	0.0	0.0	0.20
Dicentra cucullaria	0.3	0.0	0.0	0.10
Fagus grandifolia	0.6	0.9	0.9	0.80
Polygonatum pubescens	0.0	0.1	0.0	0.03

Plot: 8005

Species	Quadrat Frequency			Mean Quadrat Frequency
	1	2	3	
Carex communis	0.0	0.2	0.0	0.07
Fagus grandifolia	0.5	0.2	0.4	0.37
Lycopodium dendroideum	0.0	0.0	0.1	0.03
Maianthemum canadense	0.2	0.5	0.1	0.27
Osmorhiza sp.	0.1	0.0	0.0	0.03
Ostrya virginiana	0.0	0.0	0.2	0.07
Polygonatum pubescens	0.1	0.1	0.1	0.10
Trillium grandiflorum	0.1	0.0	0.0	0.03

Plot: 8006

Species	Quadrat Frequency			Mean Quadrat Frequency
	1	2	3	
Acer saccharum	0.4	0.1	0.2	0.23
Actaea sp.	0.0	0.1	0.0	0.03
Amelanchier sp. Group 2	0.1	0.0	0.2	0.10
Carex pedunculata	0.0	0.1	0.0	0.03
Conopholis americana	0.0	0.0	0.1	0.03
Epipactis helleborine	0.0	0.1	0.0	0.03
Fagus grandifolia	0.4	0.0	0.1	0.17
Fraxinus pennsylvanica	0.4	0.1	0.3	0.27
Maianthemum canadense	0.6	0.6	0.4	0.53
Ostrya virginiana	0.0	0.3	0.0	0.10
Populus grandidentata	0.1	0.0	0.0	0.03
Prunus serotina	0.0	0.1	0.3	0.13
Rubus allegheniensis	0.0	0.0	0.2	0.07
Solidago sp.	0.1	0.1	0.1	0.10
Trillium grandiflorum	0.1	0.0	0.0	0.03
Viburnum acerifolium	0.1	0.1	0.1	0.10
Vinca minor	0.0	0.0	0.1	0.03

Plot: 8008

Species	Quadrat Frequency			Mean Quadrat Frequency
	1	2	3	
Arisaema triphyllum	0.0	0.1	0.0	0.03
Carex communis	0.0	0.0	0.2	0.07
Fagus grandifolia	0.7	0.5	0.6	0.60
Maianthemum canadense	0.0	0.0	0.1	0.03
Polygonatum pubescens	0.0	0.0	0.2	0.07

Plot: 8009

Species	Quadrat Frequency			Mean Quadrat Frequency
	1	2	3	
Elymus repens	0.0	0.0	0.2	0.07
Monotropa uniflora	0.0	0.1	0.0	0.03
Poa sp.	0.0	0.0	0.1	0.03

Plot: 8010

Species	Quadrat Frequency			Mean Quadrat Frequency
	1	2	3	
Amelanchier sp. Group 2	0.0	0.2	0.0	0.07
Carex intumescens	0.0	0.1	0.0	0.03
Carex sp.	0.1	0.0	0.1	0.07
Hieracium sp.	0.1	0.0	0.0	0.03
Poaceae fam.	0.2	0.2	0.0	0.13
Pteridium aquilinum	0.5	0.6	0.4	0.50
unknown living Herbaceous species	0.2	0.0	0.0	0.07

Plot: 8012

Species	Quadrat Frequency			Mean Quadrat Frequency
	1	2	3	
Abies balsamea	0.2	0.1	0.0	0.10
Amelanchier sp. Group 2	0.1	0.0	0.0	0.03
Arabis lyrata	0.0	0.1	0.0	0.03
Asteraceae fam.	0.0	0.1	0.0	0.03
Berberis vulgaris	0.0	0.2	0.0	0.07
Comandra umbellata	0.0	0.0	0.1	0.03
Cornus rugosa	0.2	0.5	0.1	0.27
Elaeagnus umbellata	0.0	0.1	0.0	0.03
Eurybia macrophylla	0.0	0.0	0.4	0.13
Fragaria virginiana	0.5	0.0	0.0	0.17
Fraxinus pennsylvanica	0.0	0.3	0.1	0.13
Glechoma hederacea	0.0	0.1	0.0	0.03
Hypericum sp.	0.0	0.2	0.1	0.10
Juniperus communis	0.1	0.0	0.0	0.03
Linnaea borealis	1.0	0.0	0.0	0.33
Lonicera hirsuta	0.0	0.0	0.1	0.03
Lonicera oblongifolia	0.0	0.0	0.2	0.07
Lonicera sp.	0.0	0.2	0.2	0.13
Lonicera tatarica	0.1	0.0	0.0	0.03
Maianthemum canadense	0.4	0.3	0.6	0.43
Maianthemum stellatum	0.8	0.6	0.1	0.50
Oryzopsis asperifolia	0.6	0.3	0.1	0.33
Poaceae fam.	0.0	0.8	0.4	0.40
Polygonatum pubescens	0.0	0.0	0.1	0.03
Prunus virginiana	0.4	0.0	0.1	0.17
Pteridium aquilinum	0.7	0.3	0.7	0.57
Quercus rubra	0.1	0.0	0.0	0.03
Rosa eglanteria	0.1	0.0	0.0	0.03
Rubus idaeus ssp. strigosus	0.1	0.0	0.0	0.03
Schizachne purpurascens	0.3	0.0	0.0	0.10
Solidago sp.	0.1	0.8	0.6	0.50
Symphoricarpos albus	0.7	0.1	0.1	0.30
Taraxacum officinale	0.3	0.4	0.0	0.23
Toxicodendron rydbergii	0.3	0.4	0.2	0.30
Veronica officinalis	0.4	0.4	0.0	0.27

Plot: 8013

Species	Quadrat Frequency			Mean Quadrat Frequency
	1	2	3	
Acer pensylvanicum	0.0	0.0	0.1	0.03
Asteraceae fam.	0.2	0.0	0.0	0.07
Carex pedunculata	0.1	0.0	0.0	0.03
Fagus grandifolia	0.1	0.1	0.2	0.13
Maianthemum canadense	0.3	0.0	0.0	0.10
Maianthemum racemosum ssp. racemosum	0.0	0.0	0.2	0.07
Mitchella repens	0.1	0.1	0.0	0.07
Polygonatum pubescens	0.1	0.0	0.0	0.03
Streptopus lanceolatus var. roseus	0.1	0.0	0.0	0.03
Trientalis borealis	0.1	0.0	0.0	0.03
Trillium grandiflorum	0.0	0.1	0.0	0.03
Viola sp.	0.1	0.0	0.0	0.03

Plot: 8015

Species	Quadrat Frequency			Mean Quadrat Frequency
	1	2	3	
Acer saccharum	0.4	0.3	0.6	0.43
Actaea pachypoda	0.0	0.0	0.1	0.03
Allium tricoccum	0.7	1.0	0.5	0.73
Aralia nudicaulis	0.0	0.4	0.0	0.13
Arisaema triphyllum	0.8	0.9	1.0	0.90
Cardamine diphylla	0.1	0.0	0.1	0.07
Caulophyllum thalictroides	0.2	0.2	0.1	0.17
Dicentra sp.	0.0	0.2	0.1	0.10
Dryopteris carthusiana	0.0	0.2	0.0	0.07
Dryopteris intermedia	0.0	0.3	0.1	0.13
Fagus grandifolia	0.0	0.0	0.1	0.03
Fraxinus pennsylvanica	0.1	0.1	0.1	0.10
Galium triflorum	0.0	0.0	0.1	0.03
Geranium robertianum	0.4	0.2	0.3	0.30
Hepatica nobilis var. acuta	0.4	0.3	0.6	0.43
Heracleum maximum	0.0	0.2	0.0	0.07
Maianthemum racemosum ssp. racemosum	0.0	0.2	0.2	0.13
Mitella diphylla	0.0	0.1	0.1	0.07
Osmorhiza sp.	0.1	0.0	0.1	0.07
Polygonatum pubescens	0.5	0.2	0.4	0.37
Ribes sp.	0.0	0.0	0.1	0.03
Sambucus racemosa	0.0	0.0	0.1	0.03
Sanguinaria canadensis	0.2	0.1	0.0	0.10
Solidago flexicaulis	0.0	0.0	0.3	0.10
Trillium grandiflorum	0.3	0.5	0.5	0.43
Viola sp.	0.8	0.7	0.9	0.80

Plot: 8019

Species	Quadrat Frequency			Mean Quadrat Frequency
	1	2	3	
Actaea sp.	0.0	0.1	0.6	0.23
Allium tricoccum	0.5	0.8	0.9	0.73
Arisaema triphyllum	0.9	0.7	1.0	0.87
Cardamine diphylla	0.1	0.2	0.4	0.23
Carex communis	0.1	0.0	0.0	0.03
Dicentra canadensis	0.0	0.1	0.2	0.10
Dryopteris cristata	0.0	0.1	0.0	0.03
Dryopteris intermedia	0.0	0.0	0.3	0.10
Erythronium americanum	0.0	0.0	0.1	0.03
Maianthemum canadense	0.4	0.3	0.3	0.33
Polygonatum pubescens	0.1	0.1	0.2	0.13
Solidago sp.	0.1	0.0	0.0	0.03
Trillium grandiflorum	0.2	0.3	0.2	0.23
Uvularia grandiflora	0.1	0.0	0.1	0.07

Plot: 8020

Species	Quadrat Frequency			Mean Quadrat Frequency
	1	2	3	
Allium tricoccum	0.7	0.1	0.0	0.27
Arisaema triphyllum	0.4	0.0	0.2	0.20
Carex arctata	0.0	0.0	0.1	0.03
Carex communis	0.0	0.0	0.1	0.03
Carex pedunculata	0.2	0.0	0.1	0.10
Carex sp.	0.0	0.1	0.0	0.03
Dicentra canadensis	0.5	0.4	0.2	0.37
Dicentra cucullaria	0.0	0.5	0.7	0.40
Erythronium americanum	0.4	0.7	0.6	0.57
Fagus grandifolia	0.5	0.2	0.1	0.27
Ostrya virginiana	0.1	0.0	0.0	0.03
Polygonatum pubescens	0.1	0.0	0.1	0.07
Trillium grandiflorum	0.3	0.0	0.0	0.10
Viola canadensis	0.0	0.0	0.2	0.07

Plot: 8021

Species	Quadrat Frequency			Mean Quadrat Frequency
	1	2	3	
Arctostaphylos uva-ursi	0.9	0.2	0.0	0.37
Campanula rotundifolia	0.3	0.2	0.1	0.20
Chimaphila umbellata	0.0	0.2	0.0	0.07
Clinopodium vulgare	0.4	0.1	0.1	0.20
Comandra umbellata	0.2	0.1	0.0	0.10
Deschampsia flexuosa	0.5	0.9	0.7	0.70
Fragaria virginiana	0.7	0.2	0.0	0.30
Galium sp.	0.0	0.2	0.0	0.07
Gaultheria procumbens	0.0	0.0	0.1	0.03
Hieracium venosum	0.0	0.0	0.1	0.03
Juniperus communis	1.0	0.0	0.1	0.37
Juniperus horizontalis	0.0	0.6	0.1	0.23
Lithospermum canescens	0.3	0.0	0.0	0.10
Maianthemum canadense	0.0	0.4	0.1	0.17
Maianthemum stellatum	0.7	0.6	0.1	0.47
Melampyrum lineare	0.1	0.4	0.4	0.30
Oryzopsis asperifolia	0.3	0.4	0.0	0.23
Packera sp.	0.2	0.1	0.0	0.10
Pinus banksiana	0.1	0.0	0.0	0.03
Pinus strobus	0.5	0.5	0.2	0.40
Poa sp.	0.9	0.3	0.4	0.53
Prenanthes alba	0.1	0.1	0.0	0.07
Prunus virginiana	0.3	0.0	0.0	0.10
Pteridium aquilinum	0.0	0.5	1.0	0.50
Streptopus lanceolatus var. roseus	0.3	0.0	0.0	0.10
Symphoricarpos albus	0.2	0.2	0.0	0.13
Taraxacum officinale	0.0	0.2	0.0	0.07
Toxicodendron rydbergii	0.2	0.1	0.0	0.10
Uvularia grandiflora	0.0	0.1	0.0	0.03
Vaccinium angustifolium	0.0	0.1	0.0	0.03
Vaccinium myrtilloides	0.0	0.0	0.1	0.03

Plot: 8022

Species	Quadrat Frequency			Mean Quadrat Frequency
	1	2	3	
Abies balsamea	0.1	0.0	0.0	0.03
Acer rubrum	0.1	0.1	0.2	0.13
Amelanchier sp. Group 2	0.1	0.0	0.1	0.07
Aralia nudicaulis	0.0	0.1	0.1	0.07
Carex sp.	0.0	0.1	0.0	0.03
Cypripedium sp.	0.1	0.0	0.0	0.03
Fraxinus pennsylvanica	0.0	0.0	0.1	0.03
Gaultheria procumbens	0.6	0.7	0.5	0.60
Lysimachia thyrsiflora	0.0	0.1	0.0	0.03
Maianthemum canadense	0.5	1.0	0.6	0.70
Mitchella repens	0.1	0.3	0.3	0.23
Oryzopsis asperifolia	0.4	0.2	0.1	0.23
Pinus strobus	0.2	0.3	0.0	0.17
Poaceae fam.	0.1	0.0	0.0	0.03
Polygala paucifolia	0.0	0.1	0.0	0.03
Pteridium aquilinum	0.9	1.0	0.7	0.87
Pyrola asarifolia	0.0	0.1	0.0	0.03
Streptopus lanceolatus var. roseus	0.0	0.0	0.1	0.03
Toxicodendron rydbergii	0.1	0.1	0.0	0.07
Trientalis borealis	0.3	0.5	0.2	0.33
Vaccinium myrtilloides	0.0	0.1	0.0	0.03

Plot: 8023

Species	Quadrat Frequency			Mean Quadrat Frequency
	1	2	3	
Amelanchier sp. Group 3	0.0	0.1	0.2	0.10
Apocynum androsaemifolium	0.0	0.0	0.1	0.03
Arabis lyrata	0.0	0.0	0.1	0.03
Carex pensylvanica	0.9	0.3	0.4	0.53
Comandra umbellata	0.0	0.0	0.2	0.07
Cypripedium acaule	0.1	0.0	0.0	0.03
Gaultheria procumbens	0.3	0.4	0.4	0.37
Gaylussacia baccata	0.6	0.8	0.2	0.53
Melampyrum lineare	0.1	0.1	0.1	0.10
Pinus banksiana	0.0	0.0	0.1	0.03
Pinus strobus	0.1	0.0	0.1	0.07
Piptatherum pungens	0.0	0.0	0.3	0.10
Pteridium aquilinum	0.8	0.6	0.8	0.73
Trientalis borealis	0.1	0.0	0.0	0.03
Vaccinium angustifolium	0.8	0.4	0.5	0.57
Vaccinium myrtilloides	0.0	0.0	0.1	0.03

Plot: 8024

Species	Quadrat Frequency			Mean Quadrat Frequency
	1	2	3	
Acer saccharum	0.3	0.4	0.0	0.23
Actaea sp.	0.0	0.1	0.0	0.03
Allium tricoccum	0.0	0.1	0.6	0.23
Amelanchier sp. Group 2	0.0	0.2	0.0	0.07
Arisaema triphyllum	0.0	0.0	0.3	0.10
Carex pedunculata	0.2	0.1	0.0	0.10
Carex sp.	0.1	0.0	0.1	0.07
Dicentra canadensis	0.3	0.1	0.5	0.30
Dicentra cucullaria	0.1	0.0	0.5	0.20
Erythronium americanum	0.0	0.0	0.3	0.10
Fagus grandifolia	0.5	0.2	0.3	0.33
Hepatica nobilis var. acuta	0.0	0.2	0.3	0.17
Maianthemum canadense	0.4	0.6	0.6	0.53
Maianthemum racemosum ssp. racemosum	0.1	0.2	0.3	0.20
Melica smithii	0.0	0.0	0.3	0.10
Osmorhiza claytonii	0.0	0.1	0.4	0.17
Osmorhiza longistylis	0.0	0.1	0.4	0.17
Ostrya virginiana	0.1	0.1	0.2	0.13
Polygonatum pubescens	0.3	0.4	0.2	0.30
Sanguinaria canadensis	0.0	0.0	0.1	0.03
Solidago flexicaulis	0.0	0.0	0.2	0.07
Streptopus lanceolatus var. roseus	0.6	0.4	0.4	0.47
Taraxacum officinale	0.0	0.0	0.1	0.03
Trientalis borealis	0.0	0.0	0.1	0.03

Plot: 8026

Species	Quadrat Frequency			Mean Quadrat Frequency
	1	2	3	
Allium tricoccum	1.0	1.0	1.0	1.00
Amelanchier sp. Group 2	0.0	0.1	0.0	0.03
Aralia nudicaulis	0.2	0.0	0.2	0.13
Carex sp.	0.1	0.0	0.0	0.03
Caulophyllum thalictroides	0.0	0.1	0.0	0.03
Claytonia caroliniana	0.7	0.6	0.4	0.57
Dicentra canadensis	0.4	0.3	0.5	0.40
Dicentra cucullaria	0.1	0.3	0.0	0.13
Dirca palustris	0.1	0.0	0.1	0.07
Dryopteris carthusiana	0.1	0.0	0.0	0.03
Erythronium americanum	0.9	0.5	0.4	0.60
Fagus grandifolia	0.0	0.2	0.0	0.07
Fraxinus americana	0.0	0.0	0.2	0.07
Fraxinus pennsylvanica	0.1	0.2	0.1	0.13
Galium triflorum	0.2	0.1	0.2	0.17
Hepatica nobilis var. acuta	0.2	0.0	0.0	0.07
Maianthemum canadense	0.1	0.0	0.0	0.03
Maianthemum racemosum ssp. racemosum	0.0	0.2	0.0	0.07
Mitella diphylla	0.3	0.0	0.0	0.10
Osmorhiza claytonii	1.0	1.0	1.0	1.00
Osmunda cinnamomea	0.2	0.0	0.0	0.07
Ostrya virginiana	0.1	0.1	0.0	0.07
Poaceae fam.	0.3	0.1	0.0	0.13
Polygonatum pubescens	0.6	0.7	0.2	0.50
Ribes sp.	0.1	0.0	0.0	0.03
Solidago flexicaulis	0.0	0.0	0.1	0.03
Solidago sp.	0.1	0.0	0.0	0.03
Streptopus amplexifolius	0.2	0.7	0.0	0.30
Streptopus lanceolatus var. roseus	0.1	0.2	0.0	0.10
Thalictrum dioicum	0.1	0.0	0.0	0.03
Trillium grandiflorum	0.8	0.8	0.5	0.70
Viola sp.	1.0	0.8	1.0	0.93

Plot: 8027

Species	Quadrat Frequency			Mean Quadrat Frequency
	1	2	3	
Acer saccharum	0.0	0.8	0.0	0.27
Allium tricoccum	0.6	0.2	0.0	0.27
Arisaema triphyllum	0.7	0.8	0.4	0.63
Cardamine concatenata	0.1	0.0	0.0	0.03
Cardamine diphylla	0.3	0.0	0.1	0.13
Carex deweyana	0.0	0.0	0.1	0.03
Carex leptoneuria	0.0	0.1	0.0	0.03
Carex pedunculata	0.0	0.0	0.2	0.07
Carex sp.	0.0	0.0	0.1	0.03
Caulophyllum thalictroides	0.5	0.0	0.0	0.17
Dicentra sp.	0.6	0.3	0.0	0.30
Dryopteris carthusiana	0.0	0.1	0.0	0.03
Dryopteris intermedia	0.2	0.0	0.1	0.10
Erythronium americanum	0.0	0.4	0.2	0.20
Fraxinus pennsylvanica	0.2	0.1	0.0	0.10
Galium triflorum	0.0	0.1	0.0	0.03
Hepatica nobilis var. acuta	0.9	0.2	0.0	0.37
Maianthemum canadense	0.3	0.3	0.6	0.40
Maianthemum racemosum ssp. racemosum	0.0	0.1	0.0	0.03
Mitchella repens	0.5	0.3	0.5	0.43
Polygonatum pubescens	0.1	0.2	0.2	0.17
Prunus virginiana	0.0	0.1	0.0	0.03
Rubus idaeus ssp. strigosus	0.0	0.1	0.0	0.03
Sambucus racemosa	0.0	0.1	0.0	0.03
Sanguinaria canadensis	0.1	0.0	0.0	0.03
Trillium grandiflorum	0.2	0.1	0.0	0.10
Viola sp.	0.4	0.6	0.0	0.33

Plot: 8028

Species	Quadrat Frequency			Mean Quadrat Frequency
	1	2	3	
Arisaema triphyllum	0.4	0.4	0.1	0.30
Carex communis	0.2	0.0	0.0	0.07
Dicentra canadensis	0.2	0.6	0.2	0.33
Dicentra cucullaria	0.2	0.0	0.0	0.07
Dicentra sp.	0.1	0.0	0.0	0.03
Erythronium americanum	0.3	0.1	0.1	0.17
Fagus grandifolia	0.3	0.4	0.2	0.30
Maianthemum canadense	0.0	0.1	0.0	0.03
Polygonatum pubescens	0.1	0.0	0.0	0.03
Streptopus lanceolatus var. roseus	0.0	0.1	0.1	0.07
Trillium grandiflorum	0.1	0.0	0.2	0.10

Plot: 8029

Species	Quadrat Frequency			Mean Quadrat Frequency
	1	2	3	
Acer rubrum	0.0	0.0	0.2	0.07
Acer saccharum	0.2	0.2	0.4	0.27
Aralia nudicaulis	0.1	0.0	0.0	0.03
Carex tonsa var. rugosperma	0.0	0.1	0.0	0.03
Cornus sericea ssp. sericea	0.0	0.0	0.1	0.03
Diervilla lonicera	0.0	0.3	0.0	0.10
Fragaria virginiana	0.0	0.0	0.1	0.03
Hepatica nobilis var. acuta	0.1	0.0	0.0	0.03
Hieracium sp.	0.0	0.0	0.1	0.03
Juniperus communis	0.0	0.0	0.1	0.03
Linnaea borealis	0.0	0.0	0.2	0.07
Lonicera canadensis	0.0	0.2	0.0	0.07
Lonicera oblongifolia	0.0	0.0	0.2	0.07
Lycopodium clavatum	0.0	0.0	0.1	0.03
Maianthemum canadense	0.5	0.4	0.8	0.57
Maianthemum racemosum ssp. racemosum	0.1	0.1	0.1	0.10
Melampyrum lineare	0.0	0.0	0.1	0.03
Poaceae fam.	0.0	0.1	0.3	0.13
Polygala paucifolia	0.0	0.5	0.6	0.37
Polygonatum pubescens	0.2	0.0	0.2	0.13
Populus tremuloides	0.1	0.0	0.0	0.03
Prunus virginiana	0.1	0.1	0.0	0.07
Pteridium aquilinum	0.2	0.4	0.6	0.40
Toxicodendron rydbergii	0.0	0.0	0.1	0.03
Trientalis borealis	0.3	0.2	0.8	0.43
Viburnum acerifolium	0.3	0.0	0.0	0.10

Plot: 8030

Species	Quadrat Frequency			Mean Quadrat Frequency
	1	2	3	
Abies balsamea	0.0	0.0	0.1	0.03
Actaea rubra	0.0	0.0	0.1	0.03
Actaea sp.	0.0	0.1	0.2	0.10
Aralia nudicaulis	0.1	0.7	0.8	0.53
Carex eburnea	0.0	0.0	0.1	0.03
Carex pedunculata	0.0	0.0	0.1	0.03
Carex sp.	0.1	0.0	0.0	0.03
Chamerion angustifolium	0.0	0.1	0.0	0.03
Cornus rugosa	0.1	0.0	0.0	0.03
Eurybia macrophylla	0.2	0.2	0.2	0.20
Fraxinus pennsylvanica	0.1	0.3	0.0	0.13
Lonicera hirsuta	0.0	0.0	0.1	0.03
Maianthemum canadense	0.5	0.8	0.8	0.70
Maianthemum stellatum	0.9	0.0	0.0	0.30
Oryzopsis asperifolia	0.2	0.3	0.1	0.20
Ostrya virginiana	0.0	0.1	0.0	0.03
Poaceae fam.	0.4	0.0	0.0	0.13
Polygonatum pubescens	0.0	0.0	0.1	0.03
Pteridium aquilinum	0.6	0.0	0.2	0.27
Rosa acicularis	0.2	0.0	0.0	0.07
Solidago sp.	0.6	0.0	0.3	0.30
Symphoricarpos albus	0.0	0.0	0.1	0.03
Toxicodendron rydbergii	0.4	0.2	0.0	0.20
Trillium grandiflorum	0.0	0.1	0.2	0.10
Viburnum acerifolium	0.0	0.1	0.1	0.07
Vitis riparia	0.3	0.0	0.0	0.10

Plot: 8033

Species	Quadrat Frequency			Mean Quadrat Frequency
	1	2	3	
Acer saccharum	0.0	0.0	0.3	0.10
Actaea sp.	0.0	0.1	0.0	0.03
Allium tricoccum	0.0	0.4	0.9	0.43
Arisaema triphyllum	0.0	0.1	0.4	0.17
Carex albursina	0.0	0.0	0.1	0.03
Caulophyllum thalictroides	0.0	0.0	0.3	0.10
Circaea sp.	0.0	0.1	0.0	0.03
Dicentra canadensis	1.0	1.0	0.7	0.90
Dicentra cucullaria	0.1	0.6	0.2	0.30
Dryopteris carthusiana	0.1	0.1	0.1	0.10
Erythronium americanum	0.5	0.6	0.9	0.67
Fagus grandifolia	0.1	0.4	0.4	0.30
Fraxinus pennsylvanica	0.0	0.1	0.0	0.03
Galium triflorum	0.0	0.1	0.3	0.13
Geranium robertianum	0.0	0.1	0.3	0.13
Osmorhiza claytonii	0.4	0.8	0.9	0.70
Poaceae fam.	0.0	0.0	0.2	0.07
Polygonatum pubescens	0.0	0.1	0.1	0.07
Ribes sp.	0.0	0.1	0.0	0.03
Viburnum acerifolium	0.0	0.0	0.1	0.03
Viola sp.	0.1	0.5	0.2	0.27

Plot: 8034

Species	Quadrat Frequency			Mean Quadrat Frequency
	1	2	3	
Acer pensylvanicum	0.3	0.1	0.0	0.13
Fagus grandifolia	0.3	0.0	0.2	0.17
Maianthemum canadense	0.0	0.0	0.1	0.03
Oryzopsis asperifolia	0.0	0.0	0.1	0.03

Plot: 8035

Species	Quadrat Frequency			Mean Quadrat Frequency
	1	2	3	
Actaea pachypoda	0.0	0.0	0.2	0.07
Allium tricoccum	0.7	0.9	1.0	0.87
Aralia nudicaulis	0.2	0.0	0.0	0.07
Arisaema triphyllum	0.0	0.0	0.3	0.10
Cardamine diphylla	0.0	0.1	0.5	0.20
Carex communis	0.0	0.1	0.0	0.03
Caulophyllum thalictroides	0.1	0.0	0.0	0.03
Claytonia caroliniana	0.4	0.0	0.1	0.17
Dicentra canadensis	0.2	0.2	0.6	0.33
Dryopteris intermedia	0.0	0.2	0.6	0.27
Erythronium americanum	0.5	0.6	0.7	0.60
Fagus grandifolia	0.4	0.4	0.2	0.33
Hydrophyllum virginianum	0.0	0.0	0.6	0.20
Maianthemum canadense	0.1	0.0	0.0	0.03
Melica smithii	0.0	0.0	0.6	0.20
Osmorhiza sp.	0.5	0.9	0.7	0.70
Panax quinquefolius	0.0	0.0	0.1	0.03
Polygonatum pubescens	0.1	0.2	0.1	0.13
Sambucus racemosa	0.0	0.0	0.1	0.03
Sambucus racemosa var. racemosa	0.0	0.2	0.0	0.07
Trillium grandiflorum	0.2	0.1	0.4	0.23
Viola sp.	0.3	0.3	0.6	0.40

Plot: 8036

Species	Quadrat Frequency			Mean Quadrat Frequency
	1	2	3	
Amelanchier sp. Group 2	0.1	0.0	0.0	0.03
Carex sp.	0.1	0.0	0.1	0.07
Fagus grandifolia	1.0	0.1	0.3	0.47
Maianthemum canadense	0.2	0.0	0.6	0.27
Oryzopsis asperifolia	0.1	0.0	0.0	0.03
Pinus strobus	0.0	0.0	0.1	0.03
Populus grandidentata	0.3	0.0	0.0	0.10
Trientalis borealis	0.2	0.3	0.7	0.40

Plot: 8037

Species	Quadrat Frequency			Mean Quadrat Frequency
	1	2	3	
Fagus grandifolia	0.5	0.2	0.3	0.33
Lycopodium obscurum	0.3	0.0	0.0	0.10
Maianthemum canadense	0.0	0.4	0.4	0.27
Mitchella repens	0.0	0.3	0.0	0.10
Polygonatum pubescens	0.0	0.2	0.3	0.17
Streptopus lanceolatus var. roseus	0.0	0.1	0.0	0.03

Plot: 8038

Species	Quadrat Frequency			Mean Quadrat Frequency
	1	2	3	
Pteridium aquilinum	0.6	0.0	0.0	0.20

Plot: 8040

Species	Quadrat Frequency			Mean Quadrat Frequency
	1	2	3	
Carex communis	1.0	0.7	0.6	0.77
Comandra umbellata	0.0	0.1	0.3	0.13
Gaultheria procumbens	0.0	0.3	0.0	0.10
Maianthemum canadense	0.0	0.3	0.3	0.20
Melampyrum lineare	0.0	0.1	0.3	0.13
Oryzopsis asperifolia	0.0	0.0	0.1	0.03
Pinus strobus	0.1	0.0	0.0	0.03
Poaceae fam.	1.0	0.4	1.0	0.80
Pteridium aquilinum	0.0	0.4	0.2	0.20
Vaccinium angustifolium	0.1	0.7	0.8	0.53

Plot: 8041

Species	Quadrat Frequency			Mean Quadrat Frequency
	1	2	3	
Actaea pachypoda	0.0	0.1	0.1	0.07
Allium tricoccum	0.9	0.4	0.6	0.63
Arisaema triphyllum	0.8	1.0	0.1	0.63
Cardamine diphylla	0.0	0.4	0.0	0.13
Carex sp.	0.0	0.0	0.2	0.07
Claytonia caroliniana	0.6	0.5	0.2	0.43
Dicentra canadensis	0.1	0.0	0.0	0.03
Dicentra sp.	1.0	1.0	1.0	1.00
Dryopteris carthusiana	0.1	0.2	0.0	0.10
Erythronium americanum	0.6	0.3	0.0	0.30
Fagus grandifolia	0.1	0.1	0.2	0.13
Galium sp.	0.0	0.0	0.1	0.03
Galium triflorum	0.3	0.3	0.4	0.33
Geranium robertianum	0.0	0.2	0.0	0.07
Hydrophyllum virginianum	0.8	0.8	1.0	0.87
Melica smithii	0.4	0.6	0.8	0.60
Osmorhiza claytonii	0.7	0.9	0.9	0.83
Ostrya virginiana	0.0	0.0	0.1	0.03
Ribes sp.	0.0	0.0	0.2	0.07
Sambucus racemosa	0.2	0.6	0.1	0.30
Viola sp.	0.3	0.6	0.5	0.47

Plot: 8044

Species	Quadrat Frequency			Mean Quadrat Frequency
	1	2	3	
Cardamine concatenata	0.0	0.1	0.0	0.03
Carex communis	0.1	0.2	0.0	0.10
Carex pedunculata	0.0	0.0	0.1	0.03
Dicentra canadensis	0.0	0.5	0.1	0.20
Dicentra cucullaria	0.0	0.0	0.5	0.17
Erythronium americanum	0.0	0.2	0.9	0.37
Fagus grandifolia	0.1	0.1	0.4	0.20
Trillium grandiflorum	0.0	0.1	0.0	0.03

Plot: 8045

Species	Quadrat Frequency			Mean Quadrat Frequency
	1	2	3	
Acer pensylvanicum	0.0	0.3	0.5	0.27
Aralia nudicaulis	0.0	0.4	0.1	0.17
Carex brunnescens	0.1	0.0	0.0	0.03
Carex communis	0.2	0.1	0.1	0.13
Conopholis americana	0.0	0.0	0.1	0.03
Fagus grandifolia	0.3	0.0	0.5	0.27
Lycopodium dendroideum	0.0	0.0	0.2	0.07
Maianthemum canadense	0.1	0.3	0.8	0.40
Ostrya virginiana	0.2	0.0	0.0	0.07
Pinus strobus	0.0	0.0	0.1	0.03
Polygala paucifolia	0.0	0.0	0.2	0.07
Polygonatum pubescens	0.0	0.1	0.1	0.07
Pteridium aquilinum	0.3	0.2	0.0	0.17
Solidago flexicaulis	0.0	0.0	0.1	0.03
Trientalis borealis	0.0	0.1	1.0	0.37
Trillium grandiflorum	0.0	0.0	0.1	0.03

Plot: 8047

Species	Quadrat Frequency			Mean Quadrat Frequency
	1	2	3	
Abies balsamea	0.3	0.1	0.1	0.17
Acer saccharum	0.0	0.1	0.0	0.03
Aralia nudicaulis	0.3	0.5	0.0	0.27
Arctostaphylos uva-ursi	0.0	0.1	0.0	0.03
Brassicaceae fam.	0.0	0.1	0.0	0.03
Carex eburnea	0.0	0.4	0.8	0.40
Carex pedunculata	0.0	0.0	0.5	0.17
Carex pensylvanica	0.0	0.0	0.1	0.03
Comandra umbellata	0.0	0.2	0.0	0.07
Cornus rugosa	0.0	0.1	0.4	0.17
Cynoglossum officinale	0.2	0.0	0.0	0.07
Fraxinus pennsylvanica	0.0	0.3	0.0	0.10
Galium triflorum	0.1	0.1	0.0	0.07
Hypericum sp.	0.0	0.0	0.1	0.03
Lamiaceae fam.	0.0	0.2	0.0	0.07
Maianthemum canadense	0.5	0.7	0.5	0.57
Osmorhiza claytonii	0.1	0.0	0.0	0.03
Ostrya virginiana	0.0	0.1	0.1	0.07
Poaceae fam.	0.0	0.3	0.4	0.23
Polygonatum pubescens	0.0	0.1	0.3	0.13
Pteridium aquilinum	0.0	0.6	0.0	0.20
Solidago sp.	0.0	0.2	0.3	0.17
Streptopus lanceolatus var. roseus	0.0	0.0	0.1	0.03
Symphoricarpos albus	0.0	0.1	0.0	0.03
Taraxacum officinale	0.0	0.0	0.1	0.03
Toxicodendron rydbergii	0.1	0.4	0.0	0.17
Trifolium sp.	0.0	0.1	0.0	0.03
Trillium grandiflorum	0.1	0.0	0.0	0.03
Veronica officinalis	0.1	0.0	0.0	0.03
Vitis riparia	0.0	0.1	0.0	0.03

Plot: 8048

Species	Quadrat Frequency			Mean Quadrat Frequency
	1	2	3	
Allium tricoccum	0.7	0.1	0.3	0.37
Arisaema triphyllum	0.6	0.1	0.3	0.33
Athyrium filix-femina	0.0	0.1	0.0	0.03
Carex pedunculata	0.0	0.0	0.1	0.03
Carex sp.	0.3	0.0	0.0	0.10
Claytonia caroliniana	0.5	0.1	0.2	0.27
Dicentra canadensis	0.5	0.6	0.6	0.57
Dicentra cucullaria	0.2	0.1	0.3	0.20
Erythronium americanum	0.8	0.8	0.9	0.83
Fagus grandifolia	0.3	0.1	0.7	0.37
Osmorhiza claytonii	0.3	0.0	0.0	0.10
Osmorhiza longistylis	0.6	0.0	0.0	0.20
Osmorhiza sp.	0.0	0.0	0.1	0.03
Poaceae fam.	0.1	0.0	0.0	0.03
Sambucus racemosa	0.3	0.0	0.0	0.10
Sanguinaria canadensis	0.0	0.0	0.1	0.03
Trillium grandiflorum	0.3	0.1	0.4	0.27
Viola sp.	0.2	0.0	0.0	0.07

Plot: 8049

Species	Quadrat Frequency			Mean Quadrat Frequency
	1	2	3	
Acer rubrum	0.1	0.0	0.0	0.03
Carex sp.	0.0	0.1	0.0	0.03
Chimaphila umbellata	0.0	0.0	0.1	0.03
Cornus sericea ssp. sericea	0.1	0.0	0.0	0.03
Fagus grandifolia	0.1	0.1	0.0	0.07
Gaultheria procumbens	1.0	0.6	0.1	0.57
Juniperus communis	0.1	0.0	0.0	0.03
Lonicera oblongifolia	0.0	0.0	0.1	0.03
Maianthemum canadense	0.8	0.8	1.0	0.87
Melampyrum lineare	0.0	0.1	0.1	0.07
Mitchella repens	0.3	0.6	0.8	0.57
Oryzopsis asperifolia	0.2	0.0	0.1	0.10
Pinus strobus	0.3	0.0	0.0	0.10
Poaceae fam.	0.1	0.0	0.0	0.03
Polygala paucifolia	0.0	0.1	0.2	0.10
Polygonatum biflorum	0.0	0.1	0.0	0.03
Populus grandidentata	0.1	0.0	0.0	0.03
Pteridium aquilinum	1.0	0.5	0.7	0.73
Trientalis borealis	0.6	0.4	0.8	0.60
Vaccinium myrtilloides	0.2	0.0	0.1	0.10

Plot: 8051

Species	Quadrat Frequency			Mean Quadrat Frequency
	1	2	3	
Amelanchier sp. Group 2	0.0	0.1	0.0	0.03
Aquilegia canadensis	0.0	0.1	0.0	0.03
Arabis lyrata	0.2	0.0	0.0	0.07
Arctostaphylos uva-ursi	0.1	0.2	0.1	0.13
Asteraceae fam.	0.0	0.0	0.2	0.07
Carex pensylvanica	0.7	0.9	0.9	0.83
Comandra umbellata	0.1	0.2	0.0	0.10
Hieracium sp.	0.0	0.4	0.0	0.13
Houstonia longifolia	0.0	0.0	0.1	0.03
Hypericum sp.	0.0	0.1	0.1	0.07
Lithospermum canescens	0.0	0.1	0.0	0.03
Lonicera oblongifolia	0.0	0.1	0.0	0.03
Pinus banksiana	0.0	0.0	0.1	0.03
Poaceae fam.	1.0	1.0	1.0	1.00
Prunus virginiana	0.1	0.0	0.1	0.07
Quercus velutina	0.0	0.0	0.1	0.03
Rosa eglanteria	0.2	0.0	0.0	0.07
Rumex acetosella	0.8	0.0	0.1	0.30
Taraxacum officinale	0.0	0.1	0.0	0.03
Vaccinium angustifolium	0.2	0.7	0.1	0.33
Vaccinium myrtilloides	0.0	0.4	0.0	0.13

Plot: 8053

Species	Quadrat Frequency			Mean Quadrat Frequency
	1	2	3	
Aquilegia canadensis	0.1	0.0	0.0	0.03
Asteraceae fam.	0.4	0.4	0.1	0.30
Carex communis	0.1	0.1	0.2	0.13
Carex pedunculata	0.1	0.0	0.0	0.03
Carex pensylvanica	0.6	0.4	0.1	0.37
Carex sp.	0.1	0.1	0.3	0.17
Dactylis glomerata	0.1	0.0	0.0	0.03
Eurybia macrophylla	0.7	0.5	0.5	0.57
Fagus grandifolia	0.1	0.0	0.1	0.07
Fraxinus pennsylvanica	0.2	0.0	0.1	0.10
Galium lanceolatum	0.0	0.0	0.1	0.03
Hamamelis virginiana	0.3	0.2	0.0	0.17
Lactuca sp.	0.0	0.1	0.0	0.03
Maianthemum canadense	0.6	0.4	0.0	0.33
Oryzopsis asperifolia	0.2	0.2	0.4	0.27
Osmorhiza claytonii	0.2	0.0	0.0	0.07
Ostrya virginiana	0.3	0.0	0.0	0.10
Poa sp.	0.0	0.2	0.2	0.13
Polygonatum pubescens	0.1	0.1	0.1	0.10
Prenanthes sp.	0.0	0.0	0.1	0.03
Pteridium aquilinum	0.5	0.5	0.8	0.60
Veronica americana	0.1	0.0	0.0	0.03
Viburnum acerifolium	0.1	0.4	0.3	0.27

Plot: 8057

Species	Quadrat Frequency			Mean Quadrat Frequency
	1	2	3	
Acer saccharum	0.4	0.0	0.0	0.13
Allium tricoccum	0.0	0.1	0.4	0.17
Arisaema triphyllum	0.0	0.1	0.0	0.03
Betula papyrifera	0.0	0.1	0.1	0.07
Cardamine concatenata	0.0	0.0	0.1	0.03
Carex pedunculata	0.2	0.0	0.0	0.07
Dicentra sp.	0.0	0.0	0.2	0.07
Erythronium americanum	0.0	0.9	1.0	0.63
Fagus grandifolia	0.2	0.6	0.0	0.27
Fragaria virginiana	0.2	0.0	0.0	0.07
Galium triflorum	0.1	0.0	0.0	0.03
Hepatica nobilis var. acuta	0.0	0.0	0.1	0.03
Maianthemum canadense	0.0	0.5	0.0	0.17
Ostrya virginiana	0.1	0.0	0.0	0.03
Oxalis sp.	0.1	0.0	0.0	0.03
Poaceae fam.	0.1	0.0	0.0	0.03
Polygonatum pubescens	0.0	0.0	0.2	0.07
Prunus serotina	0.2	0.0	0.0	0.07
Rubus allegheniensis	0.2	0.0	0.0	0.07
Rubus idaeus ssp. strigosus	0.1	0.0	0.0	0.03
Trillium grandiflorum	0.0	0.3	0.3	0.20
Viola sp.	0.1	0.0	0.0	0.03

Plot: 8059

Species	Quadrat Frequency			Mean Quadrat Frequency
	1	2	3	
Acer saccharum	0.1	0.5	0.5	0.37
Diervilla lonicera	0.0	0.2	0.2	0.13
Galium triflorum	0.0	0.0	0.2	0.07
Lycopodium annotinum	0.0	0.0	0.1	0.03
Lycopodium dendroideum	0.0	0.0	0.1	0.03
Maianthemum canadense	0.5	0.6	0.3	0.47
Maianthemum racemosum ssp. racemosum	0.0	0.2	0.4	0.20
Poaceae fam.	0.0	0.0	0.1	0.03
Polygonatum pubescens	0.1	0.1	0.3	0.17
Prunus serotina	0.0	0.1	0.0	0.03
Prunus virginiana	0.1	0.5	0.3	0.30
Rubus idaeus ssp. strigosus	0.0	0.0	0.1	0.03
Toxicodendron rydbergii	0.3	0.0	0.1	0.13
Trientalis borealis	0.0	0.4	0.3	0.23
Viburnum acerifolium	0.3	0.4	0.1	0.27

Plot: 8060

Species	Quadrat Frequency			Mean Quadrat Frequency
	1	2	3	
Acer pensylvanicum	0.3	0.0	0.0	0.10
Acer rubrum	0.4	0.0	0.1	0.17
Allium tricoccum	0.6	0.1	0.0	0.23
Amelanchier sp. Group 2	0.0	0.1	0.0	0.03
Betula papyrifera	0.0	0.0	0.1	0.03
Carex arctata	0.1	0.0	0.0	0.03
Carex communis	0.1	0.0	0.0	0.03
Carex sp.	0.2	0.0	0.0	0.07
Dryopteris intermedia	0.5	0.6	0.4	0.50
Maianthemum canadense	0.2	0.5	0.0	0.23
Maianthemum racemosum ssp. racemosum	0.1	0.0	0.0	0.03
Medeola virginiana	0.1	0.0	0.0	0.03
Poaceae fam.	0.1	0.0	0.0	0.03
Prunus serotina	0.2	0.0	0.0	0.07
Rubus allegheniensis	0.3	0.1	0.0	0.13
Rubus flagellaris	0.0	0.1	0.0	0.03
Trientalis borealis	0.9	0.7	0.4	0.67
Tsuga canadensis	0.3	0.0	0.1	0.13

Plot: 8062

Species	Quadrat Frequency			Mean Quadrat Frequency
	1	2	3	
Actaea pachypoda	0.0	0.2	0.1	0.10
Actaea sp.	0.0	0.1	0.0	0.03
Allium tricoccum	0.2	0.7	0.9	0.60
Arctium minus	0.1	0.0	0.0	0.03
Arisaema triphyllum	0.8	0.6	0.2	0.53
Cardamine concatenata	0.0	0.0	0.1	0.03
Cardamine diphylla	0.1	0.9	0.8	0.60
Carex pedunculata	0.0	0.1	0.0	0.03
Carex plantaginea	0.0	0.2	0.0	0.07
Carex sp.	0.3	0.3	0.5	0.37
Caulophyllum thalictroides	0.0	0.4	0.1	0.17
Chamerion angustifolium	0.0	0.0	0.1	0.03
Circaea alpina	0.4	0.6	0.0	0.33
Claytonia caroliniana	0.2	0.6	0.9	0.57
Dicentra canadensis	0.2	0.8	0.7	0.57
Dicentra cucullaria	0.2	0.8	0.2	0.40
Erythronium americanum	0.2	1.0	0.8	0.67
Fagus grandifolia	0.0	0.2	0.1	0.10
Fraxinus americana	0.1	0.0	0.0	0.03
Fraxinus pennsylvanica	0.1	0.1	0.0	0.07
Galium sp.	0.0	0.2	0.0	0.07
Galium triflorum	0.0	0.0	0.1	0.03
Geranium maculatum	0.1	0.0	0.0	0.03
Geranium robertianum	0.9	0.1	0.0	0.33
Hepatica nobilis var. acuta	0.0	0.5	0.3	0.27
Maianthemum canadense	0.1	0.4	0.6	0.37
Mitella diphylla	0.0	0.2	0.1	0.10
Osmorhiza claytonii	0.5	0.6	0.8	0.63
Ostrya virginiana	0.0	0.1	0.0	0.03
Polygonatum pubescens	0.2	0.2	0.4	0.27
Prunus serotina	0.1	0.0	0.0	0.03
Ribes sp.	0.1	0.2	0.1	0.13
Rubus idaeus ssp. strigosus	0.1	0.0	0.0	0.03
Sambucus racemosa	0.0	0.1	0.0	0.03
Sanguinaria canadensis	0.0	0.5	0.2	0.23
Solidago flexicaulis	0.9	0.8	0.1	0.60
Solidago sp.	0.2	0.0	0.3	0.17
Streptopus amplexifolius	0.0	0.2	0.1	0.10
Streptopus lanceolatus var. roseus	0.0	0.1	0.0	0.03
Trillium grandiflorum	0.0	0.8	0.7	0.50
Urtica dioica ssp. gracilis	0.1	0.0	0.0	0.03
Viola sp.	0.3	0.9	0.2	0.47

Plot: 8064

Species	Quadrat Frequency			Mean Quadrat Frequency
	1	2	3	
Allium tricoccum	1.0	0.4	0.1	0.50
Amelanchier sp. Group 2	0.0	0.1	0.0	0.03
Aquilegia canadensis	0.1	0.0	0.0	0.03
Arisaema triphyllum	0.8	0.7	0.6	0.70
Botrychium virginianum	0.2	0.1	0.0	0.10
Cardamine concatenata	0.4	0.0	0.0	0.13
Cardamine diphylla	0.3	0.0	0.0	0.10
Carex eburnea	0.1	0.6	0.9	0.53
Carex pedunculata	0.0	0.1	0.1	0.07
Carex sp.	0.0	0.0	0.1	0.03
Caulophyllum thalictroides	0.1	0.1	0.0	0.07
Cornus rugosa	0.0	0.0	0.1	0.03
Dicentra canadensis	0.1	0.0	0.0	0.03
Erythronium americanum	0.3	0.0	0.0	0.10
Eurybia macrophylla	0.0	0.0	0.1	0.03
Fragaria vesca	0.0	0.0	0.1	0.03
Fraxinus americana	0.0	0.1	0.4	0.17
Fraxinus pennsylvanica	0.3	0.2	0.0	0.17
Galium triflorum	0.5	0.3	0.0	0.27
Hepatica nobilis var. acuta	0.6	0.0	0.0	0.20
Maianthemum canadense	0.2	0.4	0.1	0.23
Maianthemum racemosum ssp. racemosum	0.0	0.3	0.0	0.10
Melica smithii	1.0	0.3	0.2	0.50
Osmorhiza claytonii	0.0	0.0	0.1	0.03
Osmorhiza longistylis	0.8	0.0	0.0	0.27
Osmorhiza sp.	0.0	0.2	0.1	0.10
Ostrya virginiana	0.3	0.6	0.5	0.47
Poa sp.	0.2	0.0	0.0	0.07
Poaceae fam.	0.0	0.0	0.1	0.03
Polygonatum pubescens	0.2	0.2	0.2	0.20
Prunus virginiana	0.1	0.0	0.0	0.03
Rubus idaeus ssp. strigosus	0.2	0.1	0.5	0.27
Sambucus racemosa	0.2	0.0	0.0	0.07
Solidago flexicaulis	0.4	0.6	0.4	0.47
Sorbus decora	0.0	0.0	0.1	0.03
Streptopus amplexifolius	0.1	0.0	0.0	0.03
Streptopus lanceolatus var. roseus	0.2	0.1	0.0	0.10
Symphoricarpos albus	0.0	0.2	0.0	0.07
Symphyotrichum sp.	0.5	0.7	0.8	0.67
Taraxacum officinale	0.2	0.7	0.5	0.47
Trillium grandiflorum	0.2	0.0	0.0	0.07
Viburnum lentago	0.0	0.1	0.0	0.03
Viola sp.	0.8	0.8	0.3	0.63

Plot: 8066

Species	Quadrat Frequency			Mean Quadrat Frequency
	1	2	3	
Acer rubrum	0.0	0.0	0.2	0.07
Acer saccharum	0.0	0.0	0.2	0.07
Allium tricoccum	0.4	0.1	0.1	0.20
Amelanchier sp. Group 2	0.0	0.2	0.5	0.23
Carex arctata	0.0	0.0	0.1	0.03
Carex communis	0.0	0.0	0.4	0.13
Carex laxiflora	0.0	0.0	0.1	0.03
Carex pedunculata	0.0	0.0	0.6	0.20
Carex sp.	0.0	0.0	0.2	0.07
Cypripedium sp.	0.0	0.0	0.1	0.03
Erythronium americanum	0.0	0.1	0.0	0.03
Eurybia macrophylla	0.0	0.0	0.3	0.10
Fagus grandifolia	0.7	0.0	0.2	0.30
Lonicera oblongifolia	0.0	0.0	0.1	0.03
Maianthemum canadense	0.0	0.5	0.9	0.47
Mitchella repens	0.0	0.0	0.1	0.03
Ostrya virginiana	0.0	0.0	0.3	0.10
Poaceae fam.	0.0	0.0	0.2	0.07
Polygonatum pubescens	0.0	0.1	0.0	0.03
Rosa eglanteria	0.0	0.0	0.3	0.10
Rubus flagellaris	0.0	0.0	0.3	0.10
Solidago sp.	0.0	0.0	0.2	0.07
Trientalis borealis	0.0	0.4	0.0	0.13
Viola sp.	0.0	0.2	0.1	0.10

Plot: 8067

Species	Quadrat Frequency			Mean Quadrat Frequency
	1	2	3	
Fagus grandifolia	0.0	0.1	0.0	0.03
Maianthemum canadense	0.3	0.1	0.0	0.13
Pinus strobus	0.1	0.1	0.0	0.07
Pteridium aquilinum	0.0	0.1	0.0	0.03
Trientalis borealis	0.1	0.0	0.0	0.03
Tsuga canadensis	0.0	0.1	0.0	0.03
Vaccinium angustifolium	0.1	0.0	0.0	0.03

Plot: 8069

Species	Quadrat Frequency			Mean Quadrat Frequency
	1	2	3	
Actaea pachypoda	0.0	0.4	0.0	0.13
Actaea sp.	0.4	0.3	0.5	0.40
Allium tricoccum	0.1	0.3	0.3	0.23
Aquilegia canadensis	0.0	0.1	0.0	0.03
Aralia nudicaulis	0.0	0.1	0.6	0.23
Arisaema triphyllum	0.9	1.0	0.6	0.83
Cardamine diphylla	0.5	0.1	0.4	0.33
Caulophyllum thalictroides	0.4	0.0	0.1	0.17
Circaea lutetiana	0.5	0.4	0.2	0.37
Dicentra cucullaria	0.1	0.0	0.0	0.03
Dryopteris marginalis	0.0	0.0	0.2	0.07
Fagus grandifolia	0.1	0.0	0.0	0.03
Fraxinus americana	0.2	0.0	0.0	0.07
Fraxinus pennsylvanica	0.4	0.1	0.0	0.17
Galium triflorum	0.3	0.1	0.2	0.20
Geranium robertianum	0.8	0.9	0.5	0.73
Hydrophyllum virginianum	0.0	0.4	0.9	0.43
Maianthemum canadense	0.3	0.0	0.0	0.10
Maianthemum racemosum ssp. racemosum	0.0	0.0	0.1	0.03
Melica smithii	0.1	0.0	0.2	0.10
Mitella diphylla	0.1	0.1	0.0	0.07
Osmorhiza claytonii	1.0	1.0	0.9	0.97
Ribes cynosbati	0.2	0.1	0.1	0.13
Rubus idaeus ssp. strigosus	0.1	0.0	0.0	0.03
Sanguinaria canadensis	0.2	0.0	0.0	0.07
Streptopus amplexifolius	0.1	0.0	0.0	0.03
Thalictrum dioicum	0.0	0.1	0.0	0.03
Tilia americana	0.0	0.0	0.1	0.03
Trillium grandiflorum	0.1	0.0	0.2	0.10
Uvularia grandiflora	0.3	0.0	0.0	0.10
Viola sp.	1.0	0.9	0.7	0.87

Plot: 8071

Species	Quadrat Frequency			Mean Quadrat Frequency
	1	2	3	
Arisaema triphyllum	0.0	0.1	0.0	0.03
Asteraceae fam.	0.0	0.4	0.2	0.20
Carex arctata	0.0	0.1	0.0	0.03
Carex communis	0.0	0.1	0.0	0.03
Carex pedunculata	0.0	0.4	0.2	0.20
Carex sp.	0.0	0.3	0.1	0.13
Epipactis helleborine	0.0	0.2	0.1	0.10
Eurybia macrophylla	0.0	0.1	0.0	0.03
Fagus grandifolia	0.0	0.1	0.3	0.13
Maianthemum canadense	0.2	0.5	0.1	0.27
Oryzopsis asperifolia	0.0	0.1	0.0	0.03
Ostrya virginiana	0.0	0.1	0.0	0.03
Polygonatum pubescens	0.2	0.1	0.1	0.13
Populus grandidentata	0.0	0.2	0.0	0.07
Solidago sp.	0.0	0.0	0.1	0.03
Trillium grandiflorum	0.0	0.2	0.0	0.07
Tsuga canadensis	0.1	0.0	0.0	0.03
Viola sp.	0.0	0.2	0.0	0.07

Plot: 8072

Species	Quadrat Frequency			Mean Quadrat Frequency
	1	2	3	
Acer spicatum	0.0	0.2	0.1	0.10
Actaea sp.	0.1	0.0	0.1	0.07
Allium tricoccum	0.2	0.2	0.1	0.17
Amelanchier sp. Group 2	0.2	0.1	0.6	0.30
Amelanchier sp. Group 3	0.1	0.0	0.0	0.03
Aralia nudicaulis	0.1	0.0	0.1	0.07
Aralia racemosa	0.1	0.0	0.0	0.03
Arisaema triphyllum	0.9	0.9	0.9	0.90
Asteraceae fam.	0.0	0.0	0.2	0.07
Botrychium virginianum	0.3	0.1	0.5	0.30
Carex eburnea	0.0	0.0	0.1	0.03
Carex pedunculata	0.0	0.0	0.1	0.03
Carex sp.	0.1	0.0	0.1	0.07
Caulophyllum thalictroides	0.1	0.0	0.0	0.03
Dicentra canadensis	0.4	0.5	0.0	0.30
Dicentra cucullaria	0.2	0.1	0.0	0.10
Dryopteris carthusiana	0.2	0.0	0.0	0.07
Erythronium americanum	0.1	0.2	0.4	0.23
Fagus grandifolia	0.0	0.2	0.0	0.07
Fragaria virginiana	0.1	0.0	0.2	0.10
Fraxinus americana	0.5	0.5	0.2	0.40
Galium triflorum	0.7	0.1	0.1	0.30
Geranium robertianum	0.0	0.1	0.1	0.07
Hepatica nobilis var. acuta	0.4	0.9	0.4	0.57
Maianthemum canadense	0.8	0.7	0.2	0.57
Maianthemum racemosum ssp. racemosum	0.1	0.2	0.0	0.10
Maianthemum stellatum	0.0	0.2	0.6	0.27
Melica smithii	0.3	0.5	0.2	0.33
Mitella diphylla	0.0	0.1	0.0	0.03
Mitella nuda	0.1	0.0	0.0	0.03
Oryzopsis asperifolia	0.2	0.0	0.0	0.07
Osmorhiza claytonii	0.3	0.4	0.5	0.40
Osmorhiza longistylis	0.9	0.9	0.9	0.90
Ostrya virginiana	0.0	0.2	0.0	0.07
Phegopteris connectilis	0.0	0.1	0.0	0.03
Polygonatum biflorum	0.1	0.0	0.0	0.03
Polygonatum pubescens	0.5	0.7	0.1	0.43
Prunus serotina	0.1	0.1	0.0	0.07
Rosa eglanteria	0.1	0.0	0.0	0.03
Rubus allegheniensis	0.3	0.0	0.0	0.10
Rubus idaeus ssp. strigosus	0.3	0.6	0.2	0.37
Rubus pubescens	0.0	0.0	0.1	0.03
Sambucus racemosa	0.0	0.1	0.0	0.03
Solidago flexicaulis	0.2	0.2	0.0	0.13
Sorbus decora	0.0	0.1	0.0	0.03
Streptopus lanceolatus var. roseus	0.1	0.0	0.0	0.03
Symphoricarpos albus	0.0	0.0	0.2	0.07
Symphyotrichum sp.	0.0	0.2	0.1	0.10
Taraxacum officinale	0.1	0.1	0.3	0.17
Toxicodendron rydbergii	0.0	0.0	0.1	0.03
Trillium grandiflorum	0.1	0.5	0.1	0.23
Viola sp.	0.4	0.4	0.3	0.37

Plot: 8073

Species	Quadrat Frequency			Mean Quadrat Frequency
	1	2	3	
Carex communis	0.0	0.0	0.1	0.03
Fagus grandifolia	0.1	0.0	0.0	0.03
Trientalis borealis	0.0	0.0	0.1	0.03

Plot: 8079

Species	Quadrat Frequency			Mean Quadrat Frequency
	1	2	3	
Acer rubrum	0.0	0.1	0.0	0.03
Acer saccharum	0.0	0.1	0.0	0.03
Amelanchier sp. Group 2	0.0	0.1	0.0	0.03
Amelanchier sp. Group 3	0.3	0.3	0.0	0.20
Arisaema triphyllum	0.0	0.0	0.1	0.03
Asteraceae fam.	0.1	0.0	0.1	0.07
Carex pensylvanica	0.0	0.1	0.0	0.03
Conopholis americana	0.2	0.1	0.0	0.10
Cornus canadensis	0.0	0.0	0.1	0.03
Danthonia spicata	0.1	0.0	0.0	0.03
Fagus grandifolia	0.6	0.7	0.4	0.57
Maianthemum canadense	0.6	0.6	0.5	0.57
Mitchella repens	0.1	0.1	0.0	0.07
Ostrya virginiana	0.0	0.1	0.1	0.07
Polygala paucifolia	0.0	0.1	0.0	0.03
Polygonatum pubescens	0.4	0.2	0.3	0.30
Pteridium aquilinum	0.6	0.9	0.1	0.53
Solidago flexicaulis	0.1	0.0	0.0	0.03
Trientalis borealis	0.9	0.9	0.9	0.90
Viburnum acerifolium	0.0	0.0	0.1	0.03

Plot: 8089

Species	Quadrat Frequency			Mean Quadrat Frequency
	1	2	3	
Abies balsamea	0.2	0.1	0.2	0.17
Arctostaphylos uva-ursi	0.2	0.2	0.3	0.23
Carex tonsa var. rugosperma	0.0	0.1	0.0	0.03
Chimaphila umbellata	0.1	0.0	0.2	0.10
Eurybia macrophylla	0.2	0.3	0.3	0.27
Goodyera oblongifolia	0.0	0.1	0.0	0.03
Hieracium piloselloides	0.3	0.1	0.0	0.13
Juniperus communis	0.0	0.0	0.1	0.03
Juniperus horizontalis	0.4	0.1	0.4	0.30
Linnaea borealis	0.0	0.1	0.3	0.13
Lithospermum canescens	0.0	0.1	0.0	0.03
Lonicera canadensis	0.2	0.0	0.0	0.07
Lonicera oblongifolia	0.1	0.0	0.0	0.03
Maianthemum canadense	0.9	0.9	0.6	0.80
Maianthemum stellatum	0.0	0.1	0.0	0.03
Melampyrum lineare	0.0	0.1	0.0	0.03
Mitchella repens	0.1	0.0	0.0	0.03
Oryzopsis asperifolia	0.1	0.2	0.3	0.20
Poaceae fam.	0.1	0.0	0.1	0.07
Polygala paucifolia	0.6	0.8	0.9	0.77
Polygonatum pubescens	0.1	0.1	0.0	0.07
Prunus virginiana	0.0	0.2	0.0	0.07
Pteridium aquilinum	0.0	0.0	0.1	0.03
Shepherdia canadensis	0.0	0.0	0.1	0.03
Symphoricarpos albus	0.0	0.2	0.0	0.07
Taraxacum officinale	0.1	0.0	0.0	0.03
Taxus canadensis	0.3	0.1	0.2	0.20
Thuja occidentalis	0.1	0.1	0.0	0.07
Toxicodendron rydbergii	0.3	0.0	0.0	0.10
Trientalis borealis	0.3	0.2	0.6	0.37

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NPS 634/106103, November 2010

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