draft Spring 2001

Establishment of Long-term Soil Monitoring Plots at Mount Mansfield and Lye Brook

Progress Report
Last updated: April 10, 2001

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Introduction

The impacts of air pollution on forest soil quality are a concern to land managers and the general public. Potential concerns include the fate of heavy metals (e.g. mercury and lead) deposited from the atmosphere, loss of available nutrients (especially calcium and magnesium) from acid anion-induced leaching, and changes in carbon and nitrogen status due to nitrogen saturation and the effects of climate change. Potential implications of such changes include loss of biodiversity and forest productivity (growth and mortality rates) and degradation of water quality (increases in heavy metal, aluminum and nitrate concentrations; decreases in pH, base cations and alkalinity). Despite these concerns, documentation of temporal patterns in forest soil quality is rare and difficult to obtain due to confounding effects of spatial variability and the slow rate of change compared to the time span of typical scientific studies. To address this need, a committee of scientists associated with the Vermont Monitoring Cooperative (VMC) has proposed establishment of a long-term forest soil monitoring study.

Study Design

The design of a long-term soil monitoring study has been discussed at several meetings of interested VMC scientists, beginning with a workshop held at the Proctor Maple Research Center on April 29,1998. From this initial discussion, a working group was formed, including Sandy Wilmot (VT-ANR), Deane Wang (UVM), Thom Villars (NRCS), Tim Scherbatskoy (UVM), Don Ross (UVM), Nancy Burt (USFS-GMNF), and Scott Bailey (USFS-NERS). Discussions have resulted in a general, conceptual study design, including the following:

1. Sampling will be over a 200-year period, with possible sampling dates at years 0, 5, 10, 20, 50, 100, 150, and 200.

2. Sites will be located at VMC areas on Mount Mansfield and Lye Brook to facilitate interactions with other types of forest monitoring and to provide for long-term protection from other land uses.
3. Five sites will be chosen to represent a range of forest cover types and elevation, including 3 at Mt. Mansfield (subalpine; conifer/hardwood transition, and northern hardwood) and 2 at Lye Brook (coniferous and northern hardwood).
4. Potential sites should be as internally uniform as possible in order to minimize the possibility that spatial variability will compromise detection of temporal trends. Additionally, relatively stone-free sites will be chosen, to minimize logistical difficulties. Other than a lack of stones, soils should be chosen to be representative of large forested areas of the Green Mountains.
5. To the extent possible, chosen sites will have relatively mature trees of species that are considered climax species for the site. Sites with recent logging activity or other types of alteration were avoided to the extent possible.
6. While initial discussions focused on a 10x10m plot design, sizes up to a 100x100m plot were considered. The larger size would minimize the chance that a change in canopy from dynamics of one or a few trees might cause changes in soil properties, confounding our ability to detect temporal trends and would give more leeway for preventing disturbance to adjacent sample nodes during sample collection. On the other hand, a smaller size increases the chances of finding a contiguous area with relatively uniform soil and landscape features. A 50x50m plot size was thought to be the best compromise.
7. All samples will be split in a non-biased manner (e.g. riffle sampler) with a suitable split reserved for long-term archiving.
8. If possible, monitoring plots will be collocated with long-term climate monitoring equipment (NRCS-SCAN program) and at Lye Brook, preference would be given to subwatersheds identified for nutrient cycle modeling (J. Campbell and C. Eagar, FS-NERS).

Reconnaissance soil mapping was conducted during the 1999 field season by Thomas Villars, NRCS. Based on this work 10 candidate areas were chosen for further investigation. Further reconnaissance by Villars and Bailey narrowed the choice to five sites. At each candidate site, physiographic position, slope and aspect, species composition and representative measurements of tree species were noted. Test holes were hand-dug, chosen to represent the variety of conditions present within a 50x50M area. Plot corners and proposed characterization sites were located with survey-grade gps. At each test hole, abbreviated profile descriptions were written, identifying the major horizons and their thickness. The purpose of this progress report is to document the selection of long-term monitoring sites, including data collected to document background conditions.

Candidate Monitoring Sites

Much of the Lye Brook Wilderness was deemed inappropriate because of extremely stony soils, including the subwatersheds where nutrient cycle modeling studies are underway.

Table 1. summarizes the characteristics of the five sites chosen for establishment of permanent monitoring plots.

SCAN climate monitoring instrumentation was installed in the fall of 2000 at the Lye Brook – Kelley Stand plot and Mount Mansfield – Underhill plot. Hourly data are generally available on the Internet within hours of collection at: http://www.wcc.nrcs.usda.gov/scan/Vermont/vermont.html. Soil characterization and sampling was conducted by the NRCS during the summer of 2000 and will be reported when the laboratory analyses are complete.

Attachments

1. Soil monitoring site review – Lye Brook Wilderness, October 13, 1999
2. Soil monitoring site review – Mt. Mansfield, October 8, 1999
3. Plot georeference data
4. Plant species composition table
5. Plot descriptions, including
    a. location map
    b. tree composition tables and graphs
    c. reconnaissance soil pedon descriptions
    d. reconnaissance soil quality data

Table 1. Summary of Plot Characteristics

name	elevation (m)	soil series	classification	vegetation type	general comments
Kelley Stand	739	Mundal	coarse-loamy, mixed, frigid, Aquic Haplorthod	beech-sugar maple-yellow birch	collocated with SCAN site
Branch Pond	808	Peru	coarse-loamy, mixed, frigid, Aquic Haplorthod	red maple-paper birch	
Ranch Brook	590	Peru variant	coarse-loamy, mixed, frigid, Aquic Dystrodept	sugar maple-beech	floral community suggests moderate nutrient enrichment - cause unknown but typical inclusion in Vermont hardwood forests
Underhill	695	Peru	coarse-loamy, mixed, frigid, Aquic Haplorthod	yellow birch-balsam fir	collocated with SCAN site
The Forehead	1140	Londonderry	coarse-loamy Lithic Cryorthent	balsam fir-red spruce	subalpine zone; collocated with bird monitoring plot

Fall '98
Rich Apple

USDA United States Department Agriculture

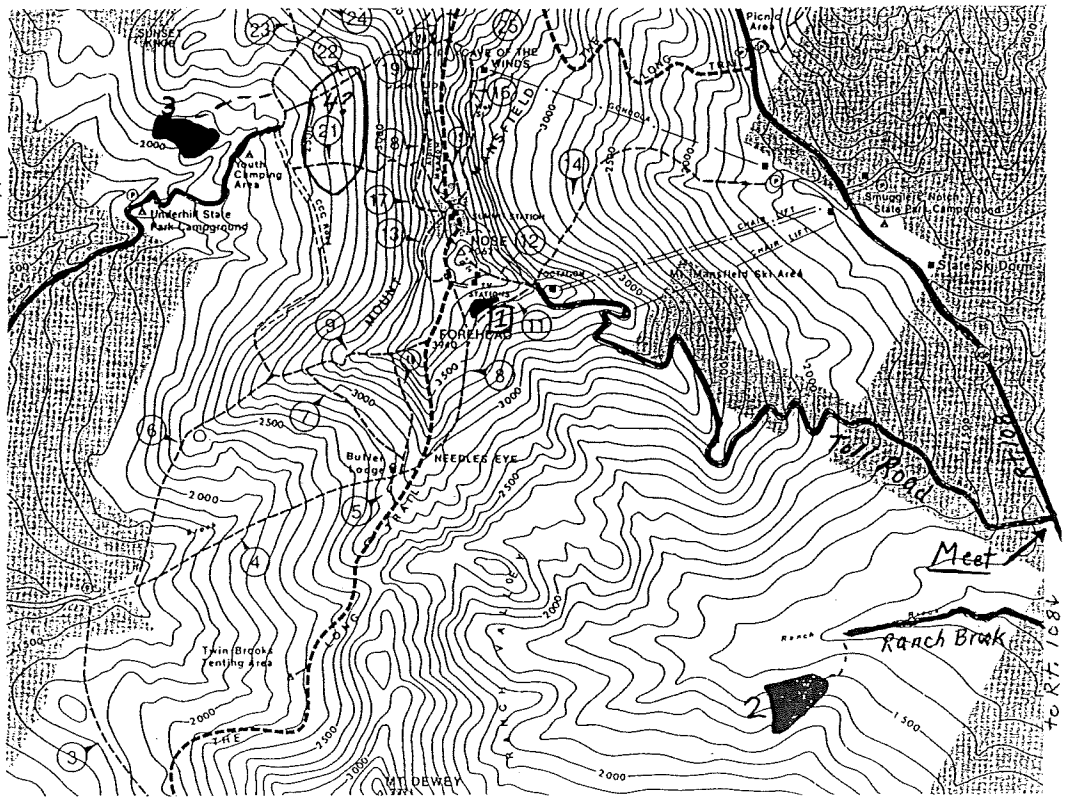
VForEm

Soil Monitoring

Site Review

Mt. Mansfield

October 8, 1999



Site 1. High elevation (3600 ft) "cryic" soils. Mapped as LoE, Londonderry-Stratton complex, 25-60% slopes, Lamoille County SS. Spruce-fir. Park near Octagon. Hike in on South Link Trail. Site is basically around the whole trail corridor.

Site 2. Low elevation (1500 ft) basal till soils. Mapped as MrD, Marlow, 15-25% slopes, Lamoille County SS. (looks wetter than Marlow, which would be the Peru soil series.) Hardwoods: beech, maple, yellow birch, w/hobblebush and striped maple. Drive in Ranch Brook access road off Rt. 108 to Bruce Trail trailhead. Hike up Dewey Trail to the southwest, maybe 10-15 minutes.

Site 3. Low elevation (2200-2300 ft) basal till soils. Mapped as PsC, Peru, 0-20% slopes, Chittenden County SS. Hardwoods: birch, w/ small spruce. Hike in the Sunset Ridge Trail. Turn left (west) on to the Polka Dot Trail at junction. Area is about 5 minutes walk from the trail junction.

Site 4? Time allowing. Mid-elevation area along Laura Cowles and/or Halfway House Trails. I think these areas are too bouldery to be used, but I'm open to your comments.

Summary: I am suggesting VForEM install 2 soil monitoring sites on Mt. Mansfield: one in low elevation hardwoods and a second in high elevation spruce-fir. Due to access and a lot of boulders on the surface, I have some reservations about installing a third site at mid-elevation. I think Lye Brook Wilderness offers more possibilities and could accommodate 3 sites on different forest/soil communities, though within a narrower elevational range.

USDA United States Department of Agriculture
Natural Resources Conservation Service
28 Farmvu Drive
White River Junction, VT 05001
Soils Phone: 802-295-1662 x.24
Fax: 802-296-3654

VForEm Soil Monitoring Site Review

Lye Brook Wilderness

October 13, 1999

Summary: I suggest we look for sites in the following areas.
1. near the Castnet site south of FR 6.
2. along FR 70 to east (out of LBW) or west (in LBW).
3. along Branch Pond Trail between the parking area at the end of FR70 and Bourn Pond, and also south on trail back to FR 6.

Site 1. Near Castnet site, off FR 85. "Pan" soils (Mundal or related soil). Slope is to east and to north. This looks like an enriched northern hardwood site to me. Spodic color is browner than "supposed to be" and no E horizon, but a good hardwood stand. Access Castnet site from gated landing on FR 6 or off FR 85? Out of LBW. Elevation: 2200 ft.

Site 2. Well drained knoll west of FR 70, a few tenths of a mile north of intersection with FR 6. Knoll is directly west of road. Looks like Berkshire soils (or "superspodic" version – Houghtonville). Northern hardwoods. On LBW bdry. Elevation: 2420 ft.

Site 3. At top of hill to east of FR 70, out of LBWilderness. Access by hiking south back towards FR 6 on Branch Pond trail from Branch Pond parking area. Hike for about 45 minutes to highest point on trail, then bushwack west to summit. Highest point in area. Mix of yellow birch, beech, striped maple, spruce. Soils are rocky, Rawsonville or Hogback. Broad ridgetop. Elevation about 3060 ft.

Site 4. North of Branch Pond, to west of Branch Pond Trail a few hundred yards. Mix of birch, red maple, spruce, fir. Mundal soils on relatively flat slope, with some wetter soils in small depressions. Near N site. Elevation: 2650 ft.

Site 5. Continuing north on Branch Pond Trail about .5 mile. Well drained knoll of Houghtonville soils. Mix of trees. Near N site. Elevation: about 2600 ft.

LYE BROOK BRIEF PEDON DESCRIPTIONS, June 20-21, 2000
T. Villars and S. Bailey

Branch Pond Plot
Slope is about 4-6%.

Pit 1. 13 m. west of NE corner of plot.

Horizon	Depth	Matrix Color	Redox and Other Colors	Texture	pH
Oi	0-1				
Oe	1-3				
Oa	3-6				
Bhs	6-9	7.5YR 3/3	black/light tan org stains	fsl	
Bs1	9-12	7.5YR 4/4		fsl	
Bs2	12-18	10YR 4/4-4/6	darker, lighter org stains	fsl	
BC	18-26	2.5Y 5/4		fsl	
Cd1	26-30+	2.5Y 5/4	faint red and grey redox	fsl-sl	5.2 @ 30"

Pit 2. 3 m. north of NW corner.

Horizon	Depth	Matrix Color	Redox Colors	Texture	pH
Oi	0-1				
Oa	1-3				
E	3-4	10YR 4/2		fsl	
Bhs1	4-5	5YR 2.5/1		fsl	
Bhs2	5-7	5YR 3/3		fsl	
Bs1	7-14	7.5YR 3/4	black and brown org stains	fsl	
Bs2	14-21	10YR 4/4	brown org stains	fsl	
BC	21-25+	2.5Y 5/4	dist. grey and reddish brown redox	fsl-sl	5.4 @ 22"

Pit 3. 6.2 m. southwest of NW corner. Slightly hummocky surface. This is SAMPLING PIT LOCATION.

Horizon	Depth	Matrix Color	Redox Colors	Texture	pH
Oi	0-1				
Oe	1-2				
Oa	2-4				
E	4-5	7.5YR 4/2		fsl	
Bhs1	5-6	N 2/		fsl	
Bhs2	6-10	7.5YR 2.5/3		fsl	
Bs1	10-21	7.5YR 3/4	dark and light brown org stains	fsl	
Bs2	21-28	10YR 4/4	dark and light brown org stains	fsl	
BC	28-34	2.5Y 5/4	dark/light brown org stains, grey redox	fsl	5.2 @ 30"
Cd	34+				

Pit 4. 12 m south of NW corner.

Horizon	Depth	Matrix Color	Redox Colors	Texture	pH
Oi	0-1				
Oe	1-2				
Oa	2-5				
E	5-8				
Bhs1, etc.	8-37				
Cd	37+	2.5Y 5/4	grey and reddish redox	fsl	5.2 @ 37"

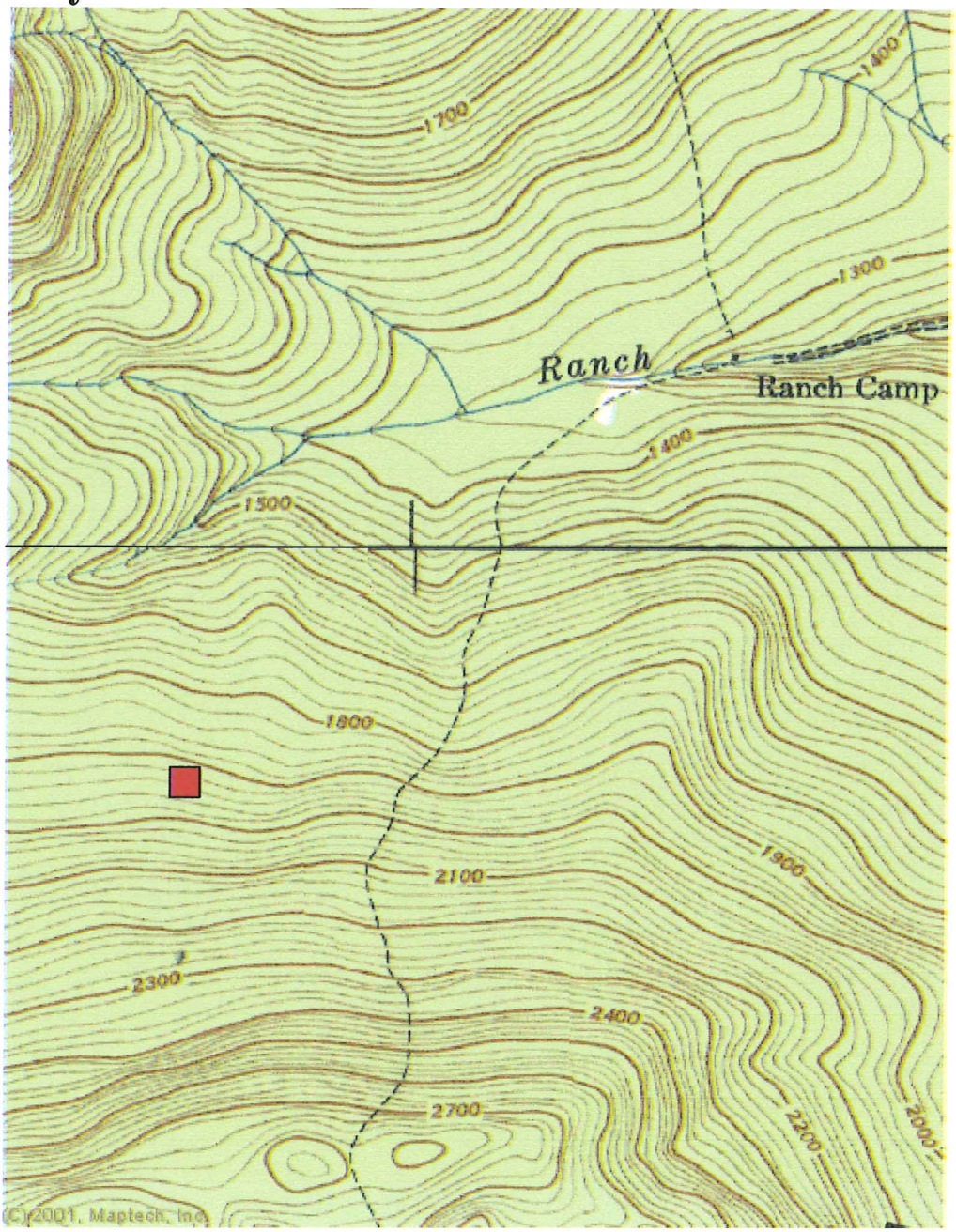
Mount Mansfield – Ranch Brook

Elevation: 1940' (590m)

Cover Type: Sugar Maple – American Beech (somewhat enriched)

Soil Type: Peru variant Aquic Dystrodept (Inceptisol)

moderately well drained

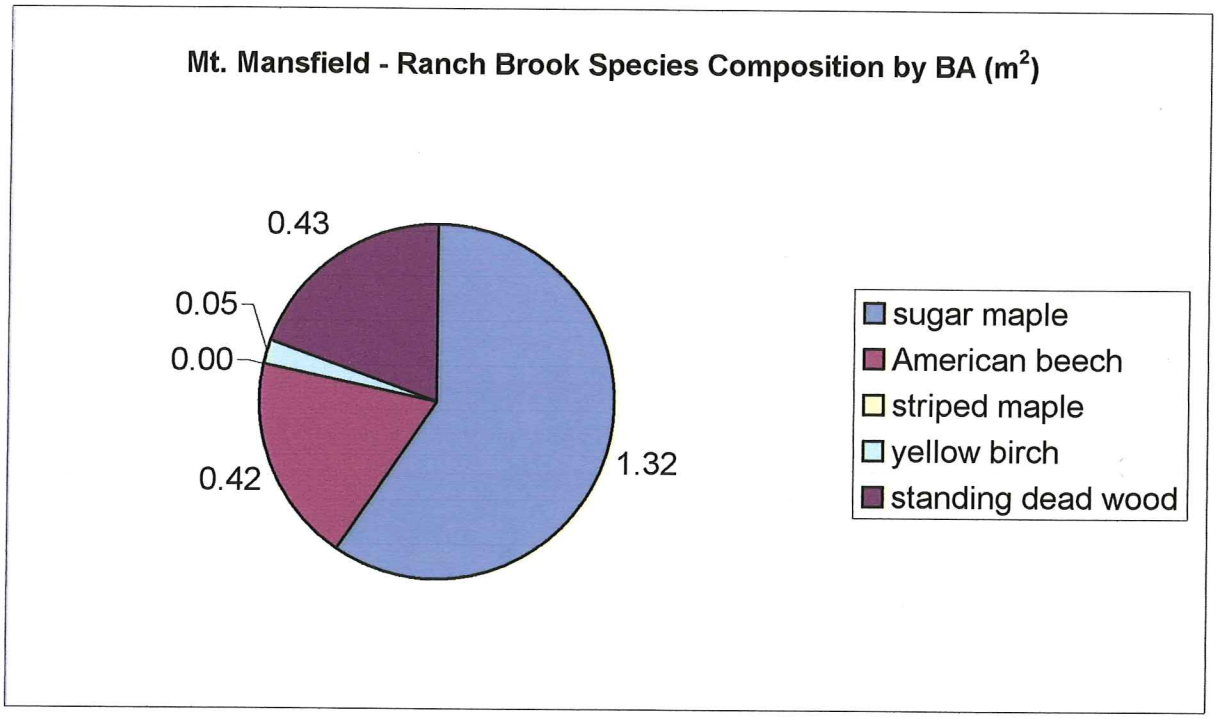


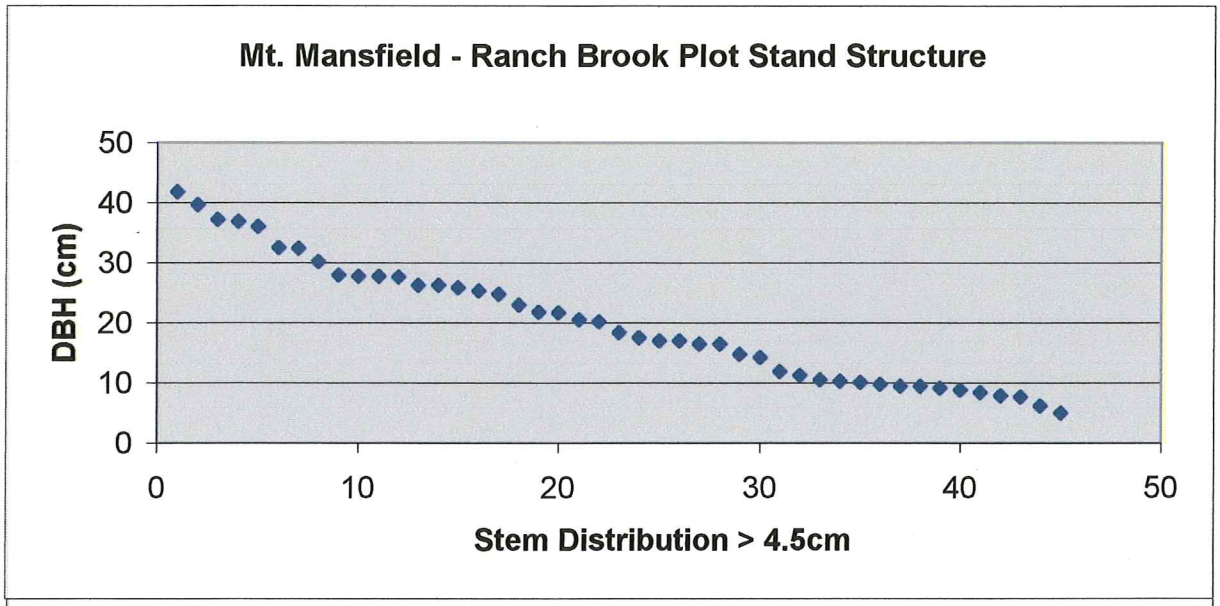
Mt. Mansfield - Ranch Brook (basal area(BA)based on measurements in a 25x25m area)

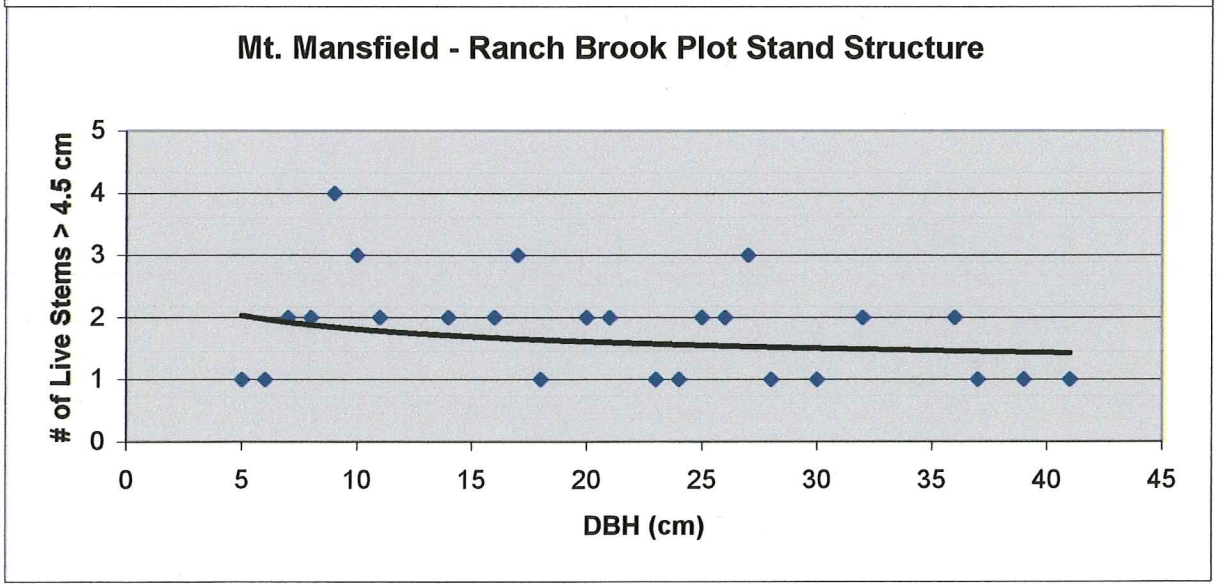
	BA 4.5 to 9.5 cm	% BA	BA >9.5 cm	% BA	Combined
sugar maple	0.04	53	1.28	60	1.32
American beech	0.03	40	0.39	18	0.42
striped maple	0.00	0	0.00	0	0.00
yellow birch	0.00	0	0.05	2	0.05
standing dead wood*	0.00	7	0.43	20	0.43
Totals	0.07	100	2.15	100	2.22

35.60 m^2/Ha

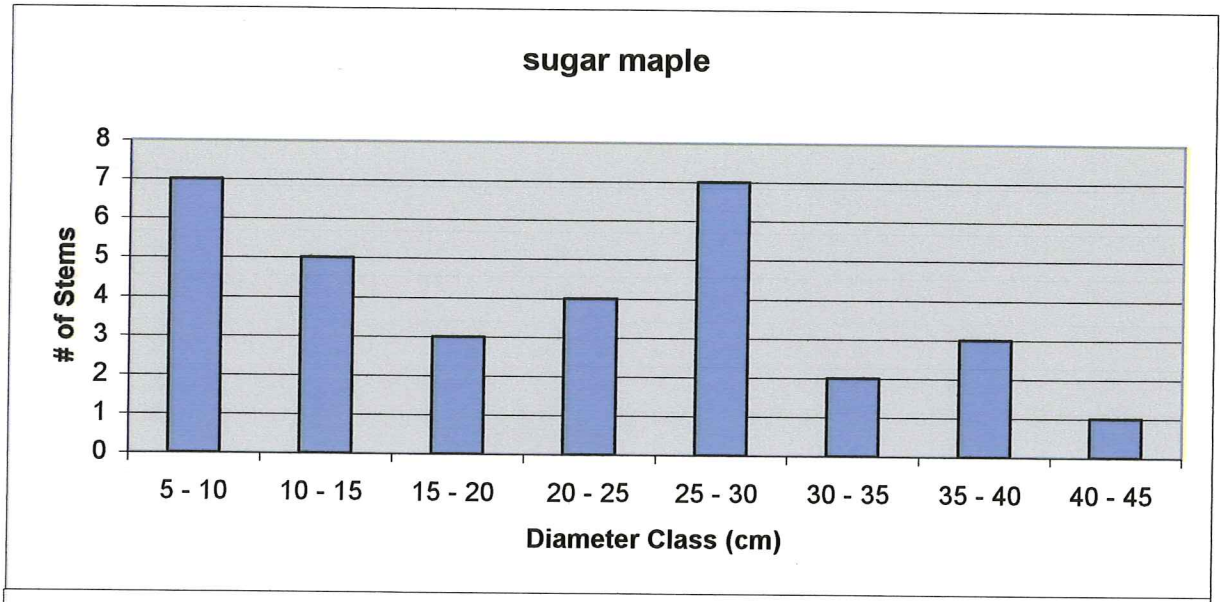
*Mostly pole size sugar maple with one large yellow birch and one large beech.

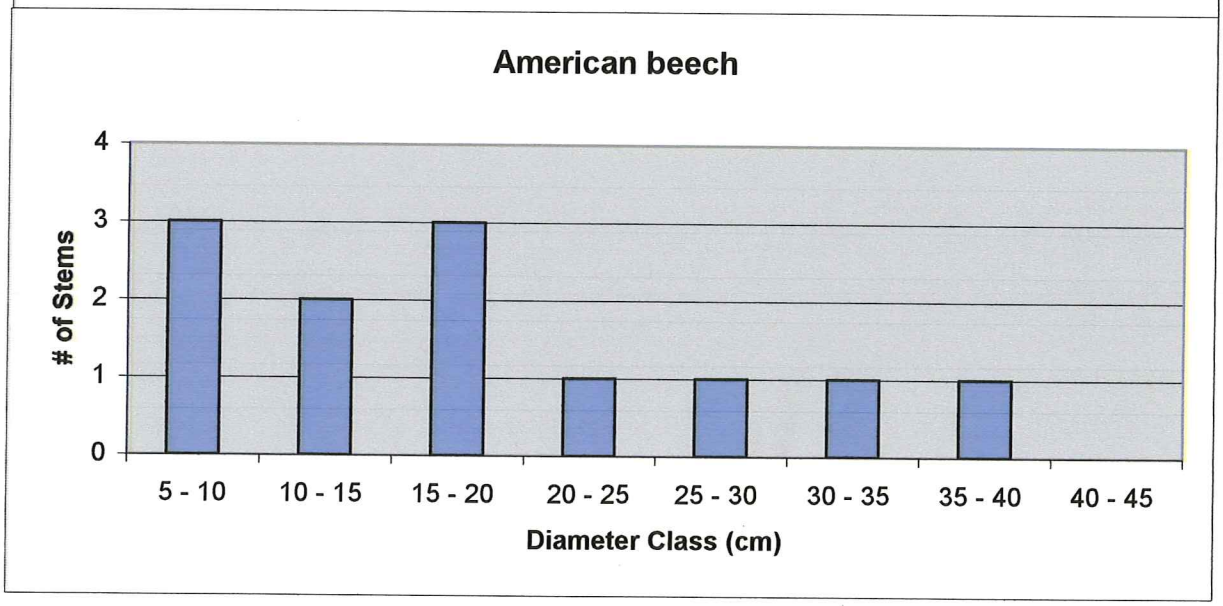



Mt. Mansfield - Ranch Brook Plot Stand Structure
DBH (cm)
0
10
20
30
40
50
0
10
20
30
40
50
Stem Distribution > 4.5cm


Mt. Mansfield - Ranch Brook Plot Stand Structure
# of Live Stems > 4.5 cm
0
1
2
3
4
5
0
5
10
15
20
25
30
35
40
45
DBH (cm)

Ranch Brook


sugar maple
# of Stems
8
7
6
5
4
3
2
1
0
5 - 10
10 - 15
15 - 20
20 - 25
25 - 30
30 - 35
35 - 40
40 - 45
Diameter Class (cm)


American beech
# of Stems
4
3
2
1
0
5 - 10
10 - 15
15 - 20
20 - 25
25 - 30
30 - 35
35 - 40
40 - 45
Diameter Class (cm)

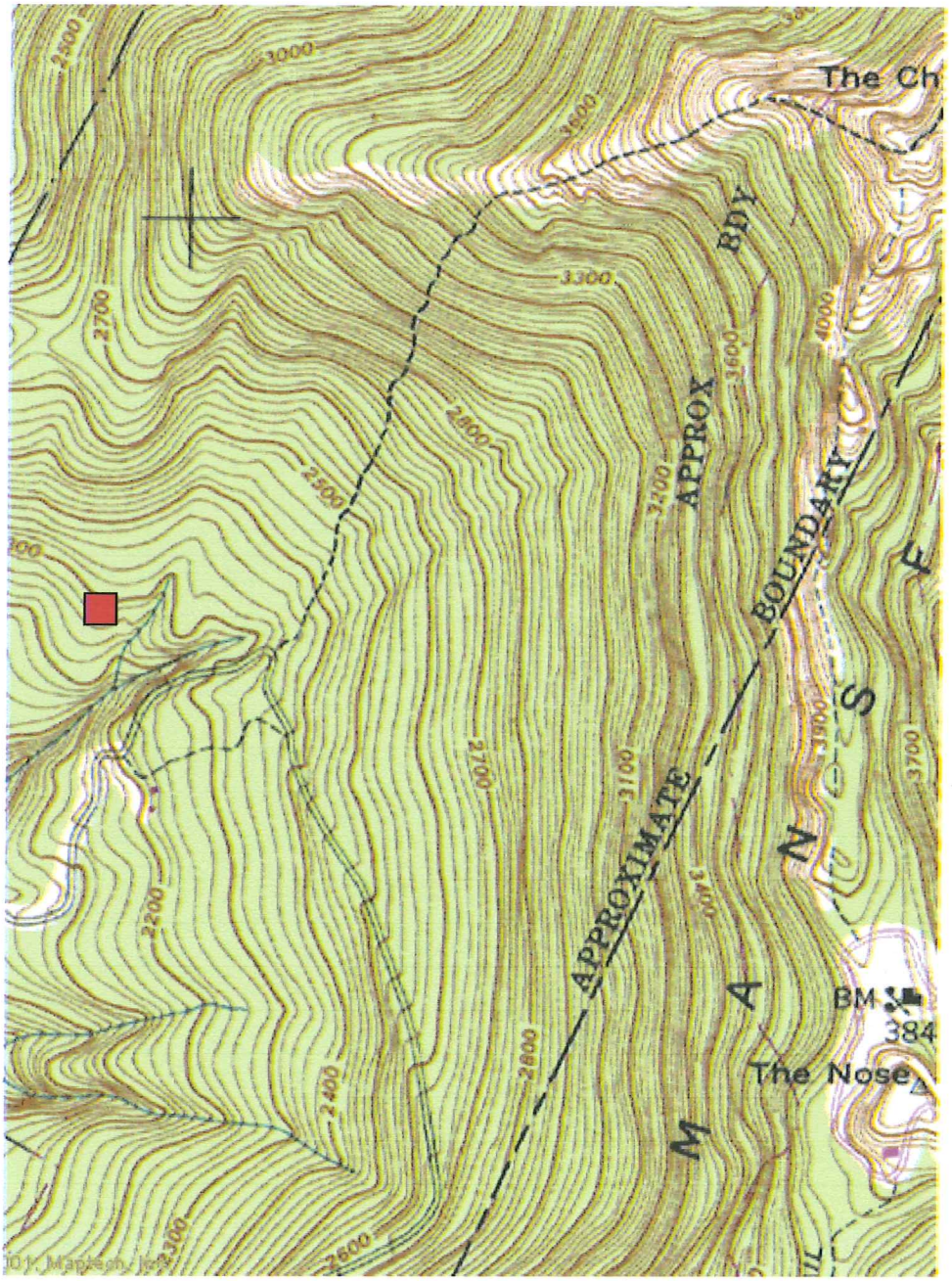
Mount Mansfield – Underhill

Elevation: 2280' (695m)

Cover Type: Yellow Birch – Balsam Fir

Soil Type: Peru Series Aquic Haplorthod (Spodosol)

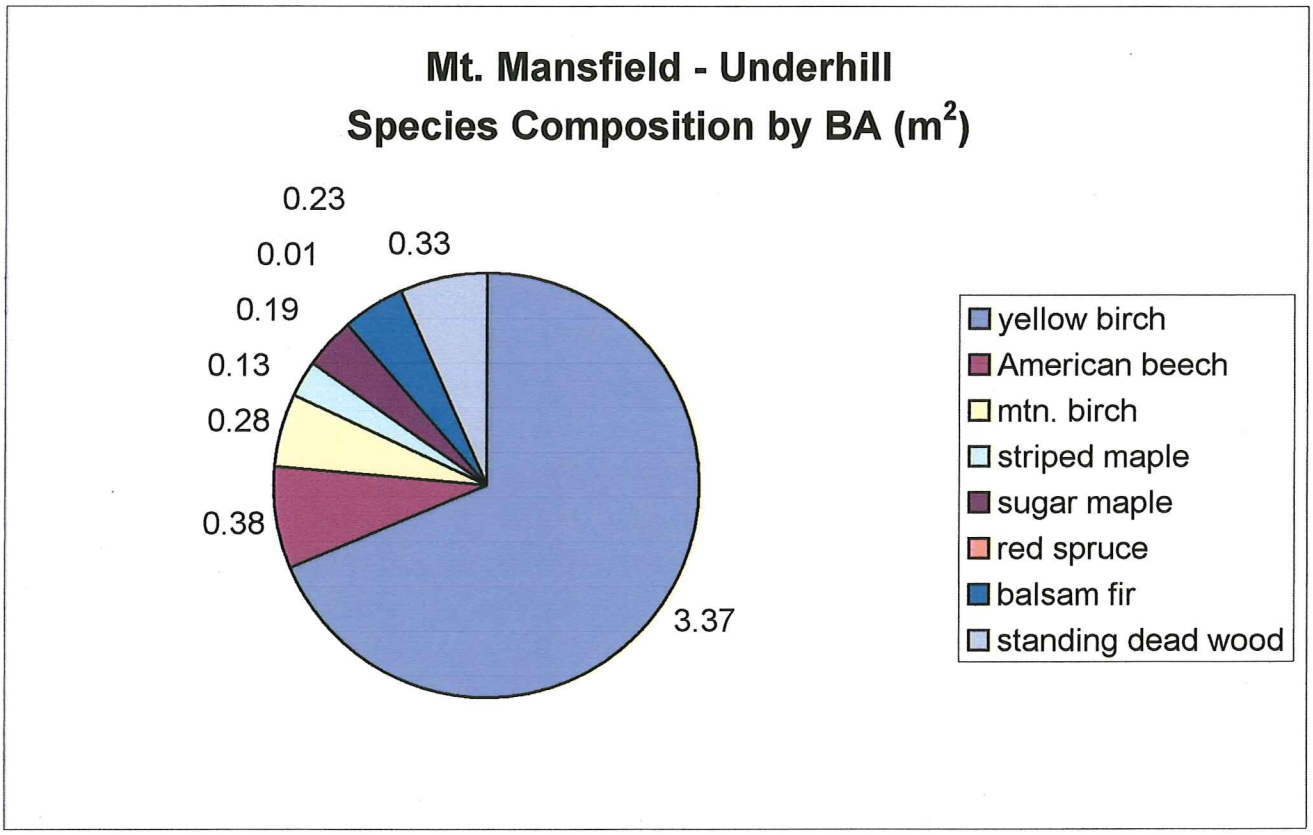
moderately well drained

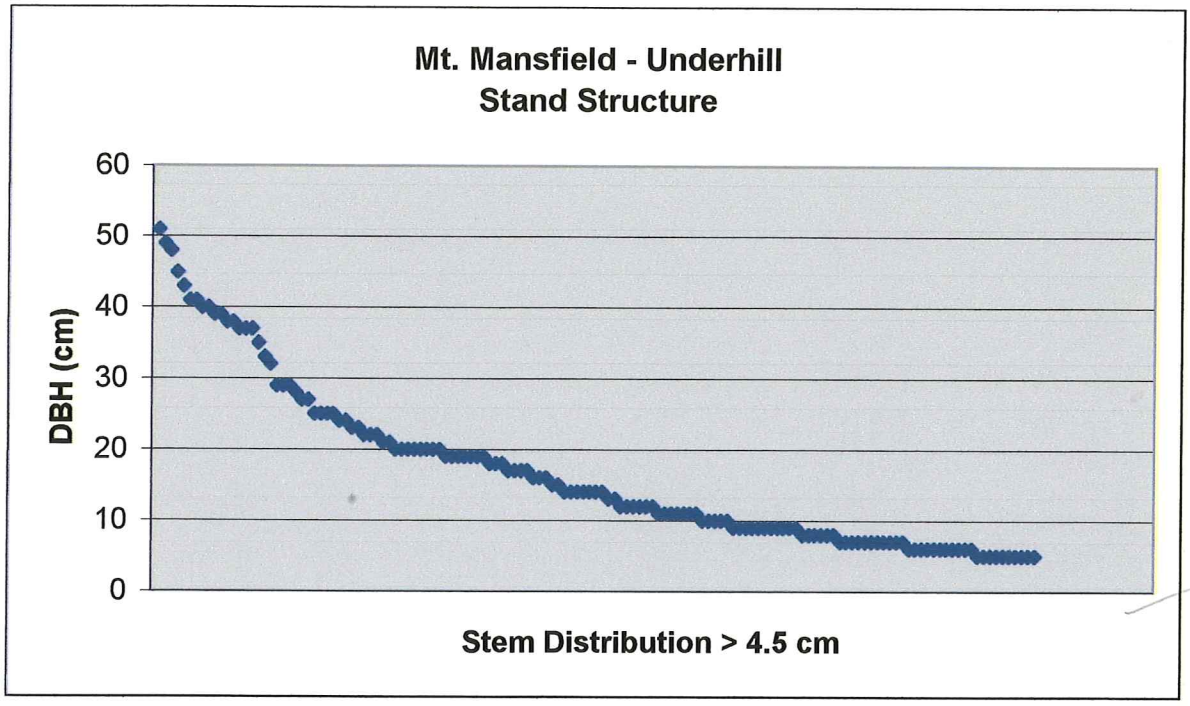


Mt. Mansfield - Underhill (Basal area (BA) based on measurements in a 40x40m area)

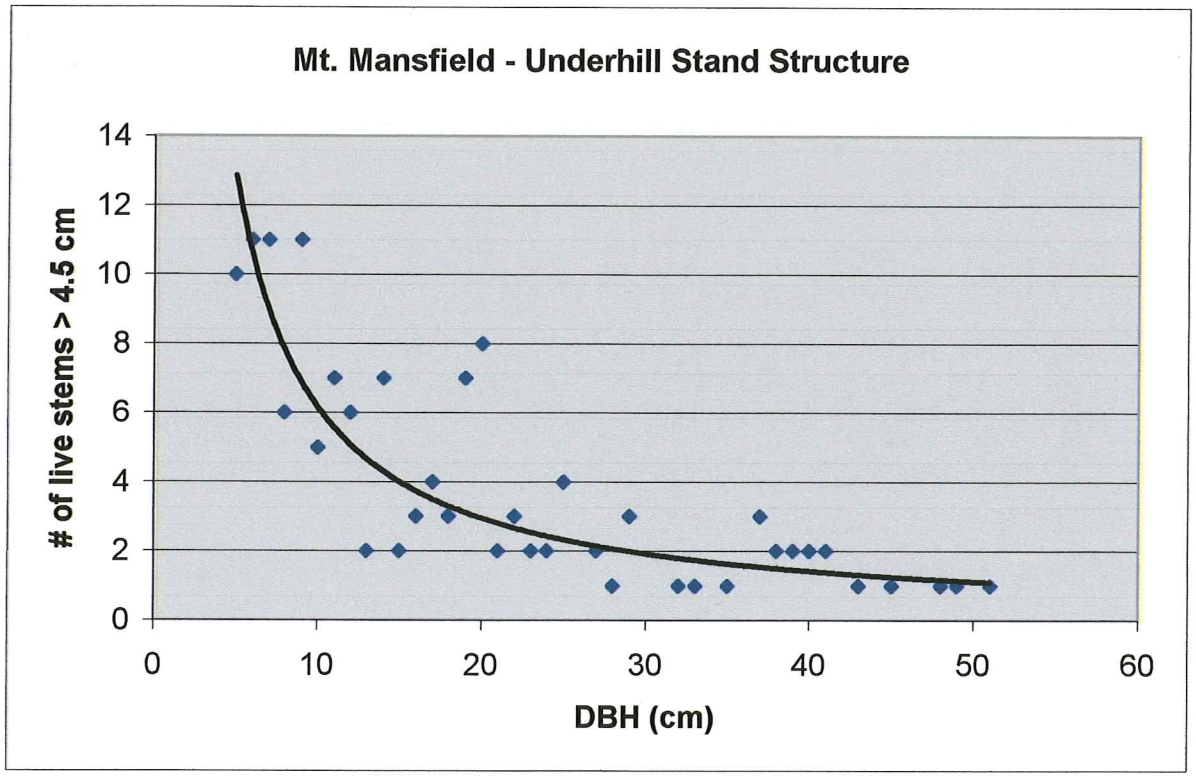
	BA 4.5 to 9.5 cm	% BA	BA >9.5 cm	% BA	Combined
yellow birch	0.08	34	3.30	70	3.37
American beech	0.00	0	0.38	8	0.38
mtn. birch	0.01	2	0.27	6	0.28
striped maple	0.05	20	0.08	2	0.13
sugar maple	0.01	3	0.18	4	0.19
red spruce	0.01	3	0.00	0	0.01
balsam fir	0.09	37	0.14	3	0.23
standing dead wood*	0.00	0	0.33	7	0.33
Totals	0.23	100	4.68	100	4.91
					30.68 m^2/Ha

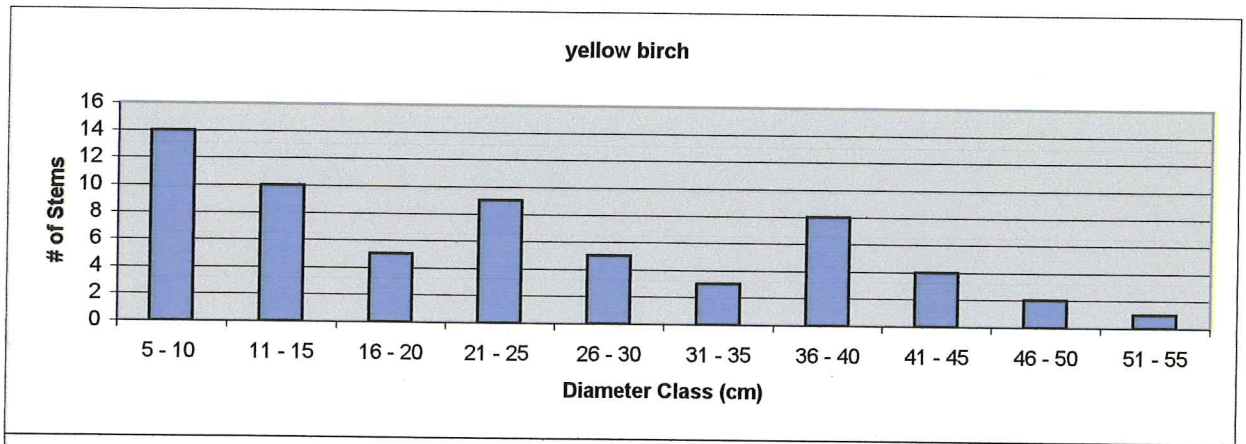
*** Mostly yellow birch and sugar maple.**

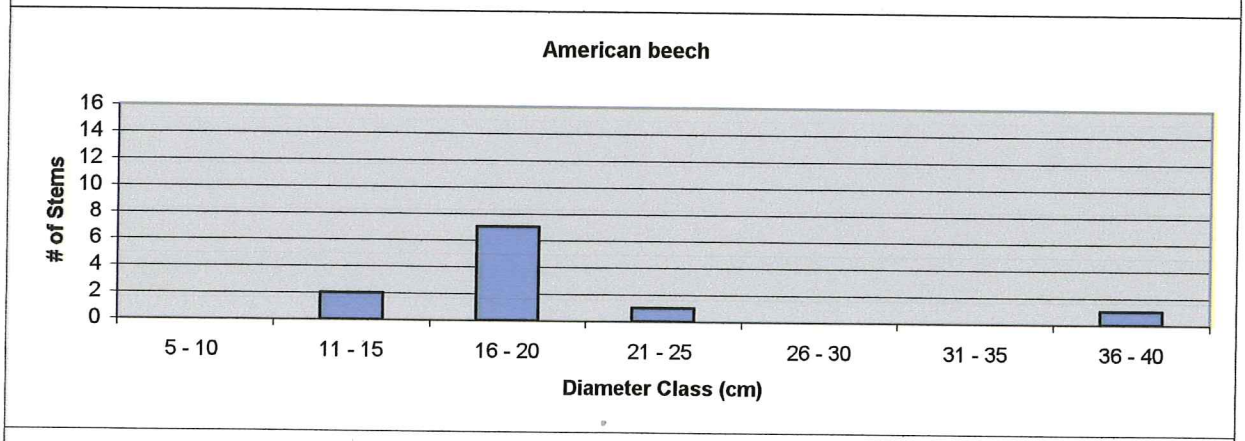


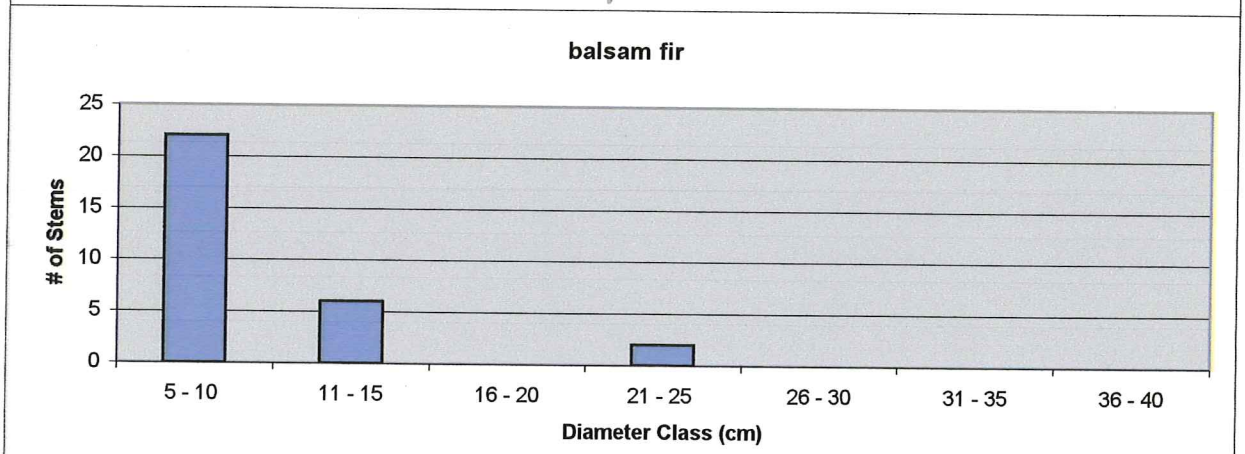

Mt. Mansfield - Underhill
Stand Structure
60
50
40
30
20
10
0
DBH (cm)
Stem Distribution > 4.5 cm

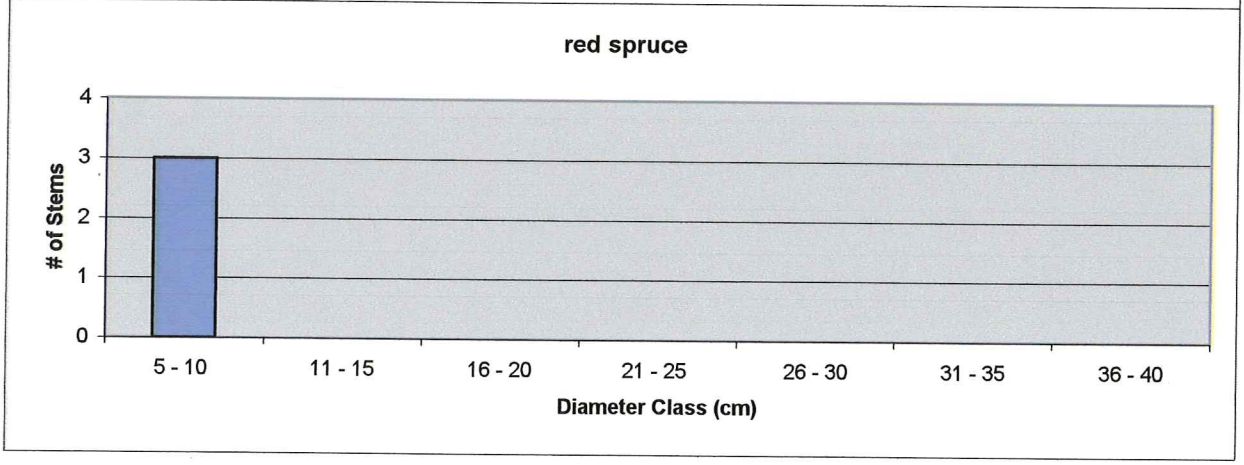
needs axis #


Mt. Mansfield - Underhill Stand Structure
14
12
10
8
6
4
2
0
# of live stems > 4.5 cm
0
10
20
30
40
50
60
DBH (cm)


yellow birch
# of Stems
16
14
12
10
8
6
4
2
0
5 - 10
11 - 15
16 - 20
21 - 25
26 - 30
31 - 35
36 - 40
41 - 45
46 - 50
51 - 55
Diameter Class (cm)


American beech
# of Stems
16
14
12
10
8
6
4
2
0
5 - 10
11 - 15
16 - 20
21 - 25
26 - 30
31 - 35
36 - 40
Diameter Class (cm)


balsam fir
# of Stems
25
20
15
10
5
0
5 - 10
11 - 15
16 - 20
21 - 25
26 - 30
31 - 35
36 - 40
Diameter Class (cm)


red spruce
# of Stems
4
3
2
1
0
5 - 10
11 - 15
16 - 20
21 - 25
26 - 30
31 - 35
36 - 40
Diameter Class (cm)

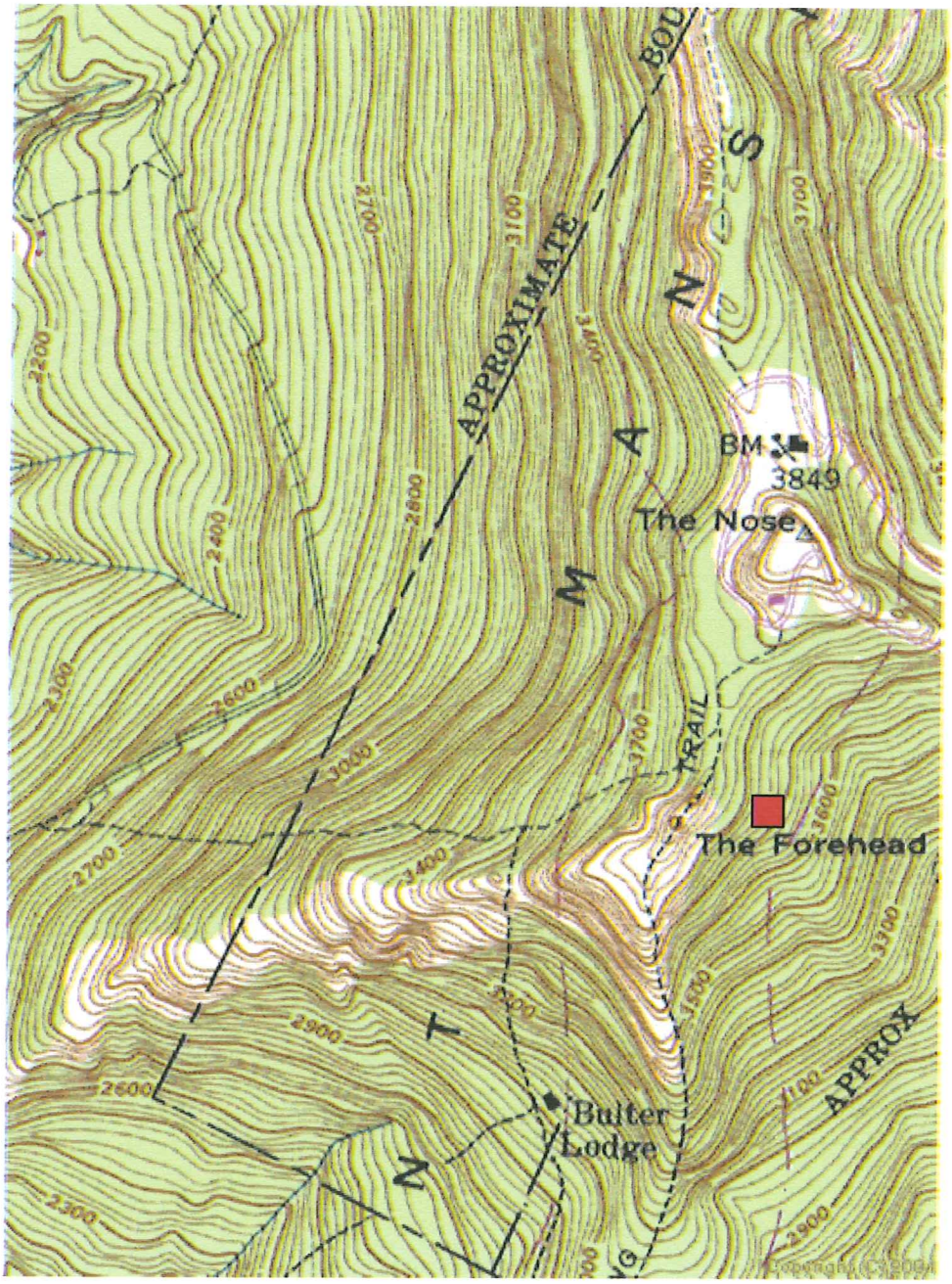
Recon. soil samples, Underhill																
29-Oct-99			Depth										Exch.			
Sample ID	Pedon	Horizon	Top	Bottom	$CaCl_2$ pH	L.O.I.	cmol(+)/kg					pH	Acidity	Exch. H		Base Sat
			cm	cm	(2 min)	(%)	Ca	Mg	Na	K	Al	1 M KCl	cmol(+)/kg	cmol(+)/kg	eCEC	%
MM01VT008010	4.1	A	8	10	3.56	33.26	0.47	0.31		0.39	14.03	3.93	12.317	-1.711	13.49	8.7
MM01VT010015	4.1	Bs	10	15	3.81	7.40	0.14	0.07		0.19	7.65	4.45	7.197	-0.458	7.60	5.3
MM01VT048052	4.1	Bs	48	52	3.97	6.58	0.10	0.04		0.16	4.82	4.58	5.032	0.217	5.33	5.5
MM02VT004007	4.2	A	4	7	3.93	58.09	0.54	0.39		0.62	17.69	4.34	14.193	-3.500	15.74	9.8
MM02VT007012	4.2	Bw	7	12	4.00	13.53	0.23	0.12	0.04	0.28	11.12	4.46	8.581	-2.540	9.25	7.3
MM03VT004006	4.3	A	4	6	3.66	37.64	0.45	0.42	0.05	0.62	16.71	3.8	13.215	-3.494	14.76	10.4
MM03VT009014	4.3	Bw	9	14	4.00	12.05	0.27	0.13	0.03	0.27	8.30	4.32	6.766	-1.530	7.47	9.5
MM04VT010016	4.4	Oa	10	16	4.03	57.38	0.65	0.55	0.08	0.85	17.25	4.06	12.808	-4.445	14.94	14.2
MM04VT016021	4.4	Bw	16	21	4.06	22.46	0.44	0.24	0.04	0.40	11.56	4.46	7.881	-3.677	9.01	12.5
MM05VT003005	4.5	A	3	5	3.05	37.23	2.52	0.72	0.04	0.78	7.67	2.96	9.794	2.125	13.86	29.3
MM05VT011016	4.5	Bs	11	16	3.57	11.46	0.25	0.13	0.04	0.27	14.77	3.8	12.756	-2.011	13.45	5.2
MM05VT040045	4.5	B	40	45	3.99	8.06	0.16	0.05	0.04	0.21	8.76	4.23	6.753	-2.009	7.22	6.5

Mount Mansfield – The Forehead

Elevation: 3750' (1140m)

Cover Type: Balsam Fir – Red Spruce

Soil Type:Londonderry Series Lithic Cryorthent (Entisol) well drained



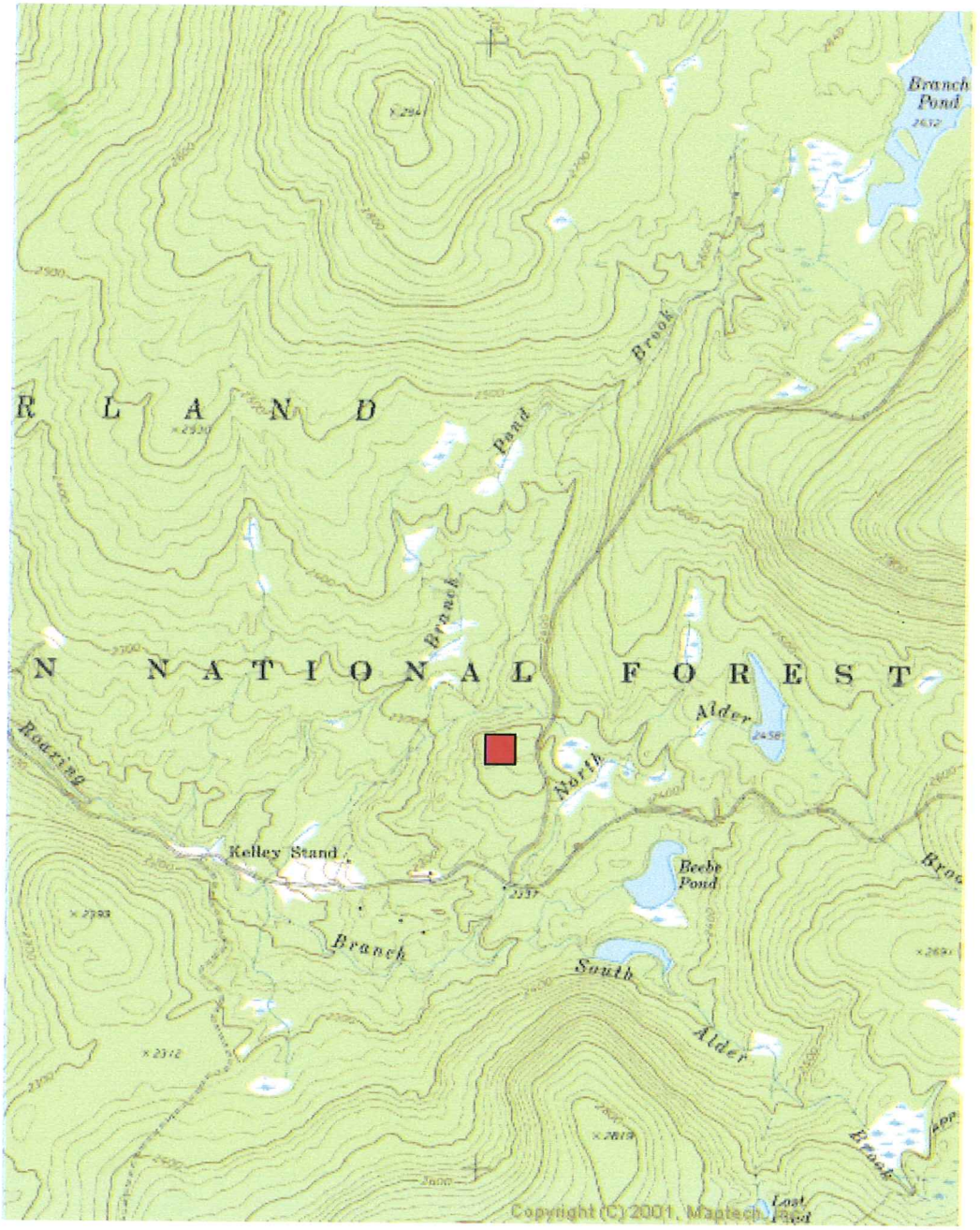
Lye Brook – Kelley Stand

Elevation: 2425' (739m)

Cover Type: American Beech – Sugar Maple -Yellow Birch

Soil Type: Mundal Series Aquic Haplorthod (Spodosol)

moderately well drained

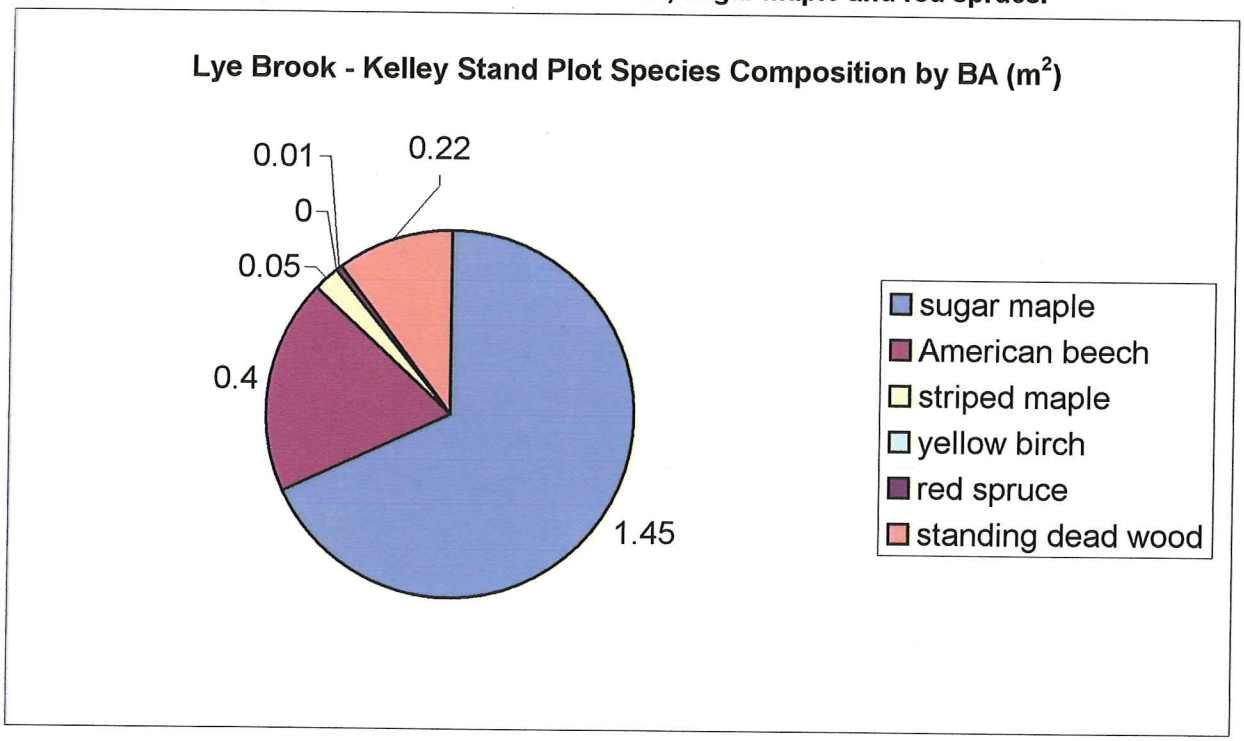


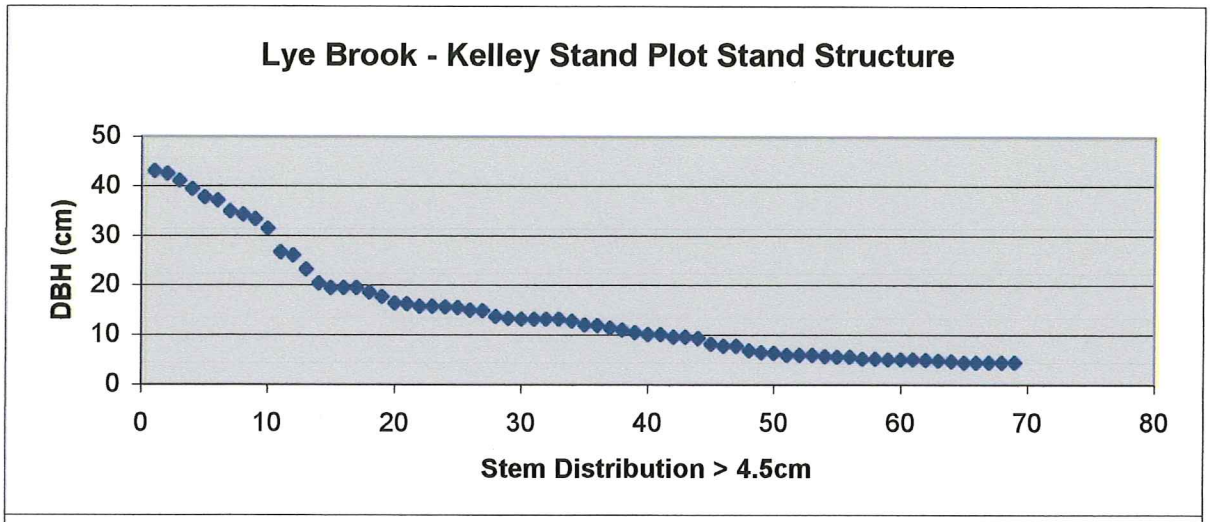
Lye Brook - Kelley Stand Plot (basal area(BA) based on measurements in a 25x25m area)

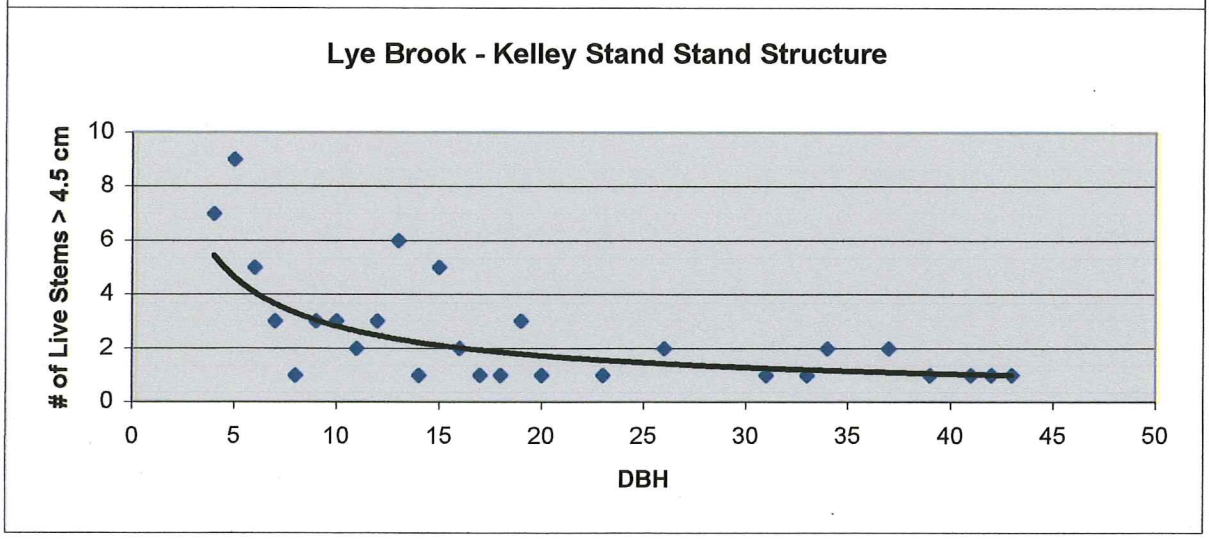
	BA 4.5 to 9.5 cm	% BA	BA >9.5 cm	% BA	Combined
sugar maple	0.08	47	1.37	70	1.45
American beech	0.06	35	0.34	17	0.40
striped maple	0.00	0	0.05	3	0.05
yellow birch	0.00	0	0.00	0	0.00
red spruce	0.00	0	0.01	1	0.01
standing dead wood*	0.03	18	0.19	10	0.22
Totals	0.17	100	1.96	100	2.13

34.08 m^2/Ha

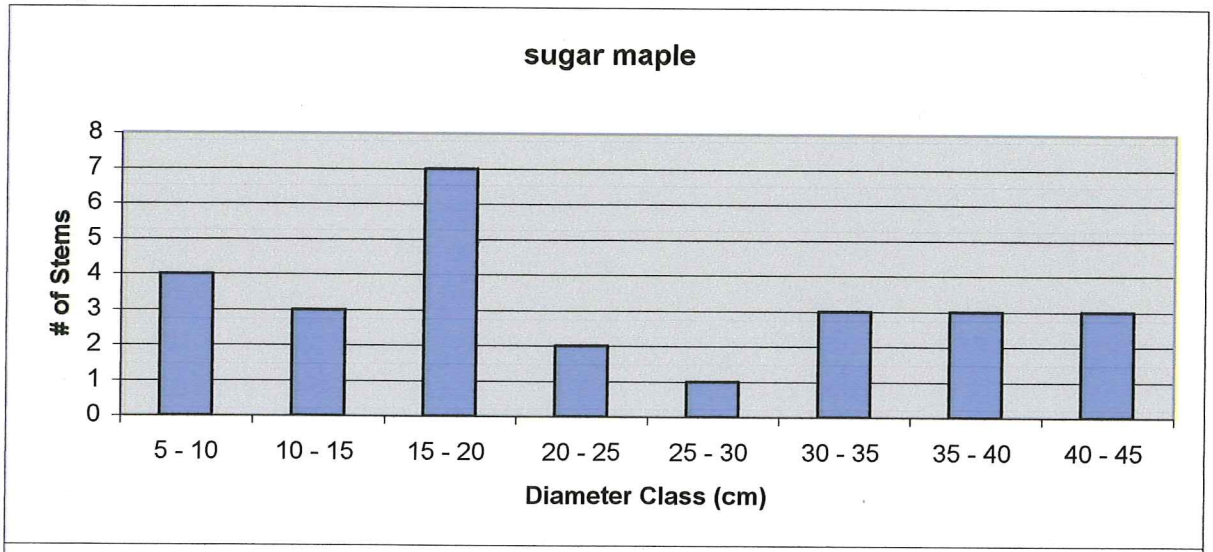
*Mostly striped maple with even amounts of beech, sugar maple and red spruce.

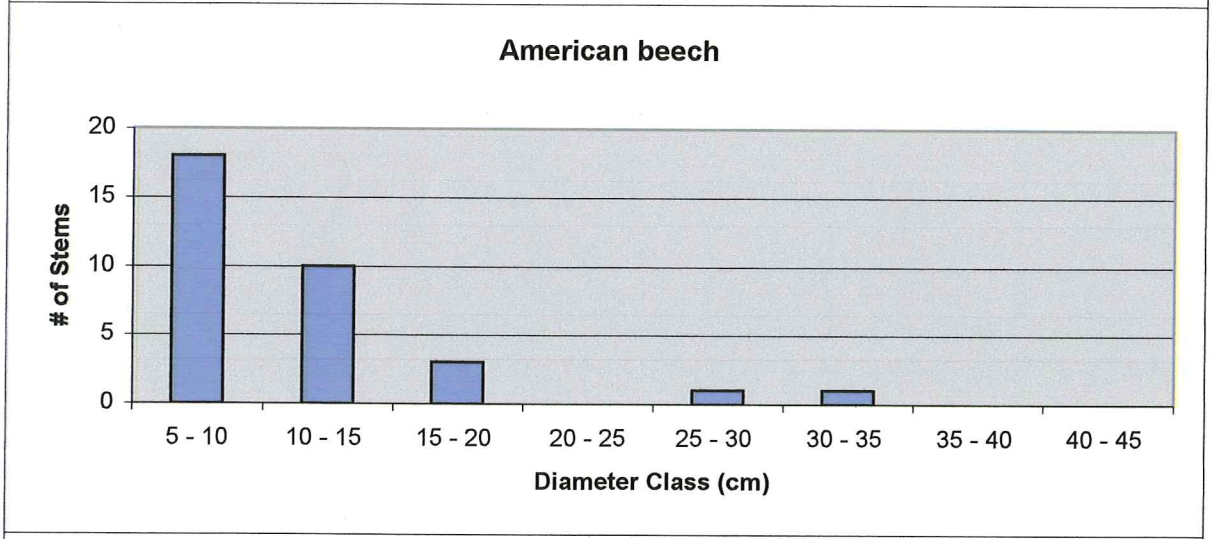


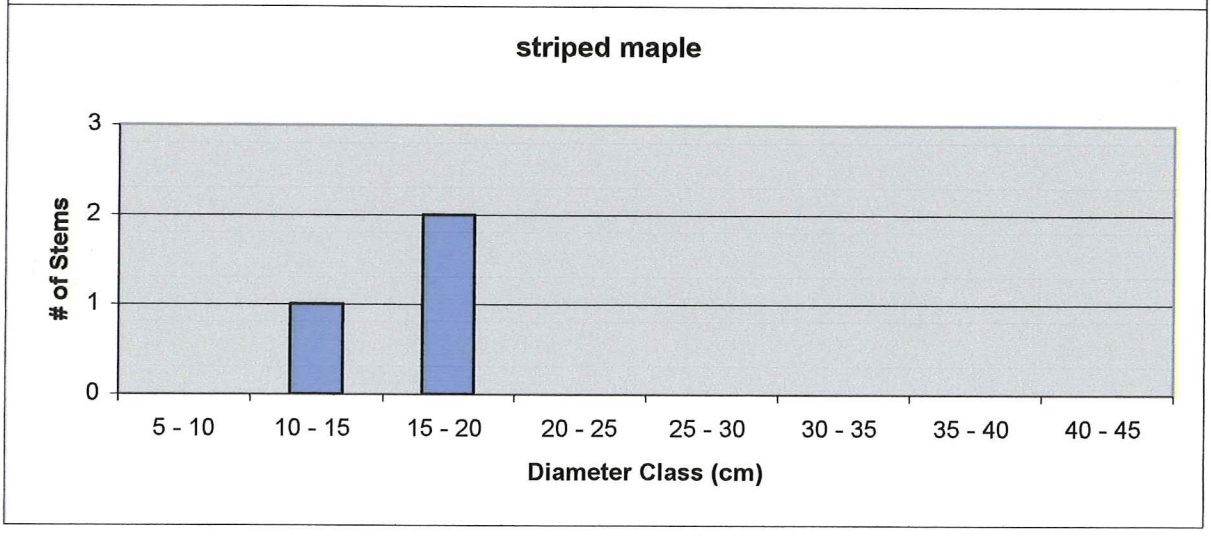

Lye Brook - Kelley Stand Plot Stand Structure
DBH (cm)
50
40
30
20
10
0
0
10
20
30
40
50
60
70
80
Stem Distribution > 4.5cm


Lye Brook - Kelley Stand Stand Structure
# of Live Stems > 4.5 cm
10
8
6
4
2
0
0
5
10
15
20
25
30
35
40
45
50
DBH

Kelley Stand





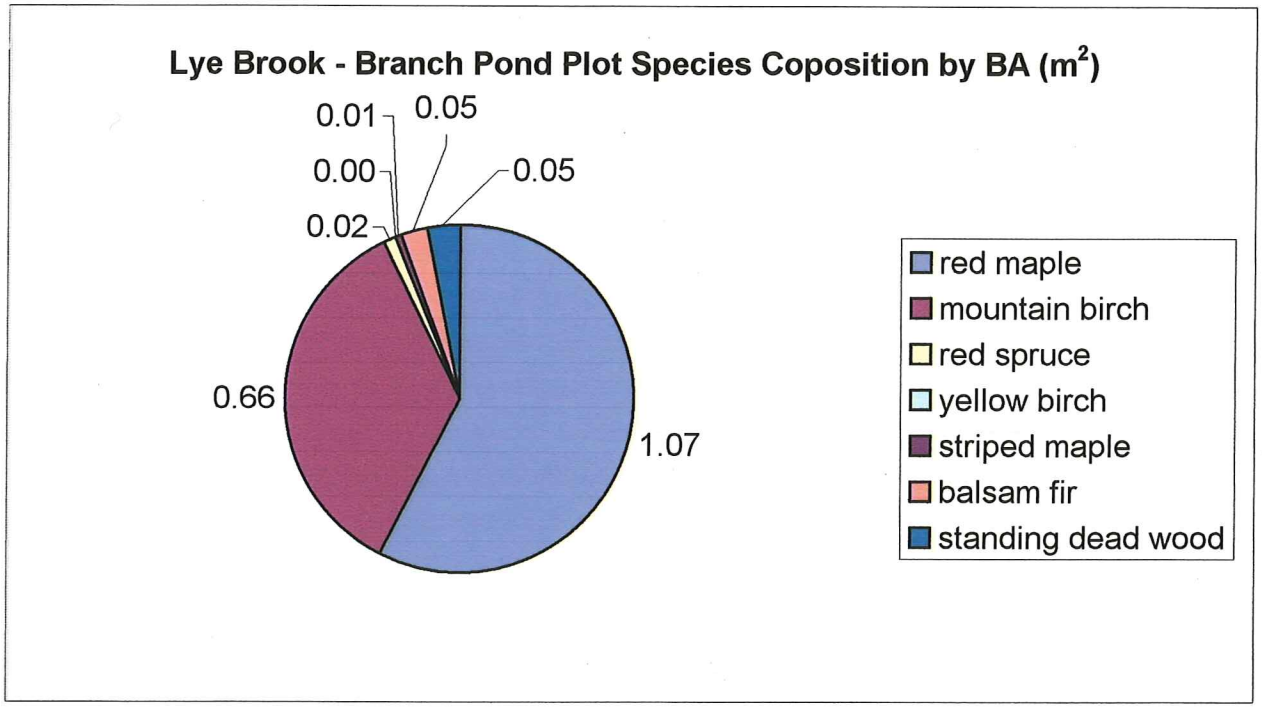


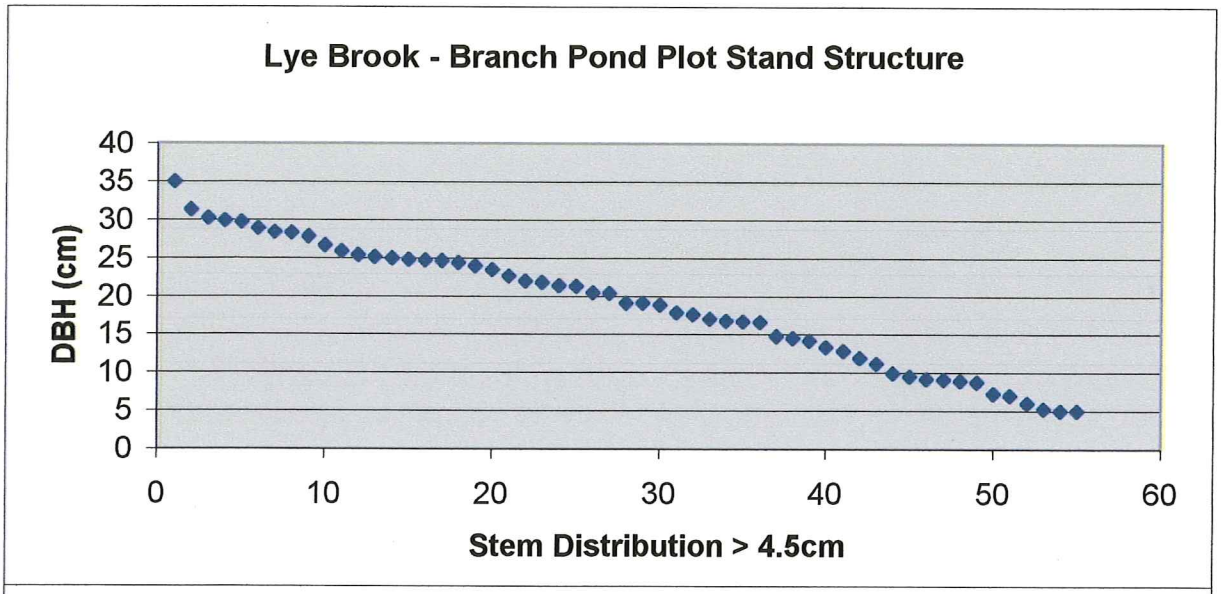
Lye Brook - Branch Pond Plot (basal area (BA) based on measurements in a 25x25m area)

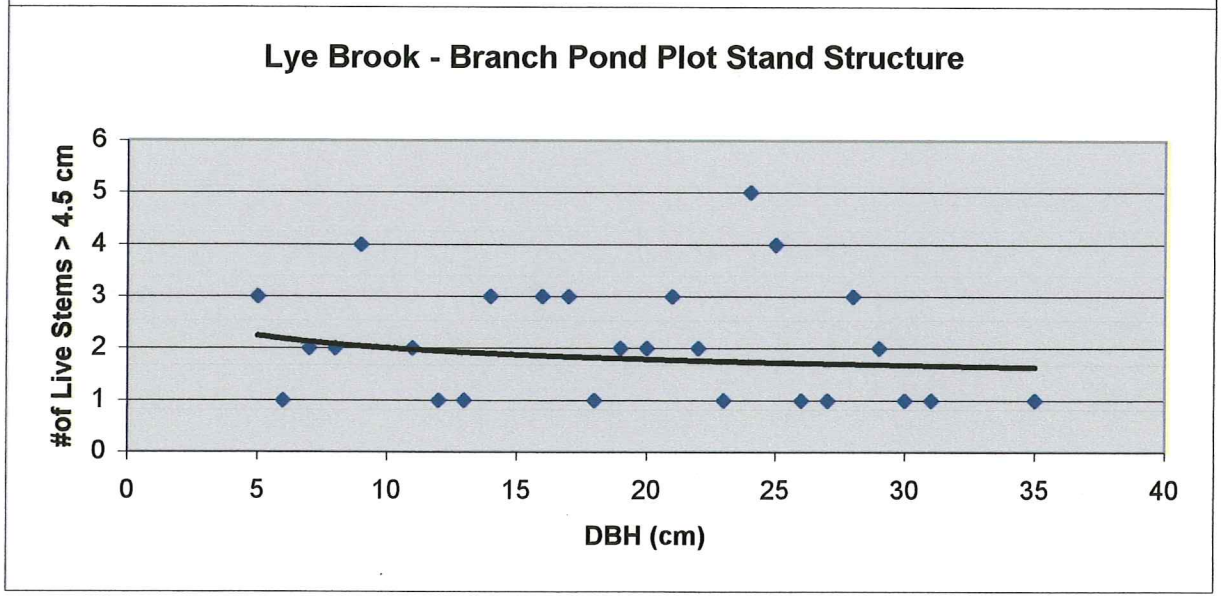
	BA 4.5 to 9.5 cm	% BA	BA >9.5 cm	% BA	Combined
red maple	0.01	15	1.06	59	1.07
mountain birch	0.00	0	0.66	37	0.66
red spruce	0.01	15	0.01	1	0.02
yellow birch	0.00	0	0.00	0	0.00
striped maple	0.01	15	0.00	0	0.01
balsam fir	0.03	46	0.02	1	0.05
standing dead wood*	0.00	8	0.05	3	0.05
Totals	0.06	100	1.80	100	1.86

29.84 m^2/Ha

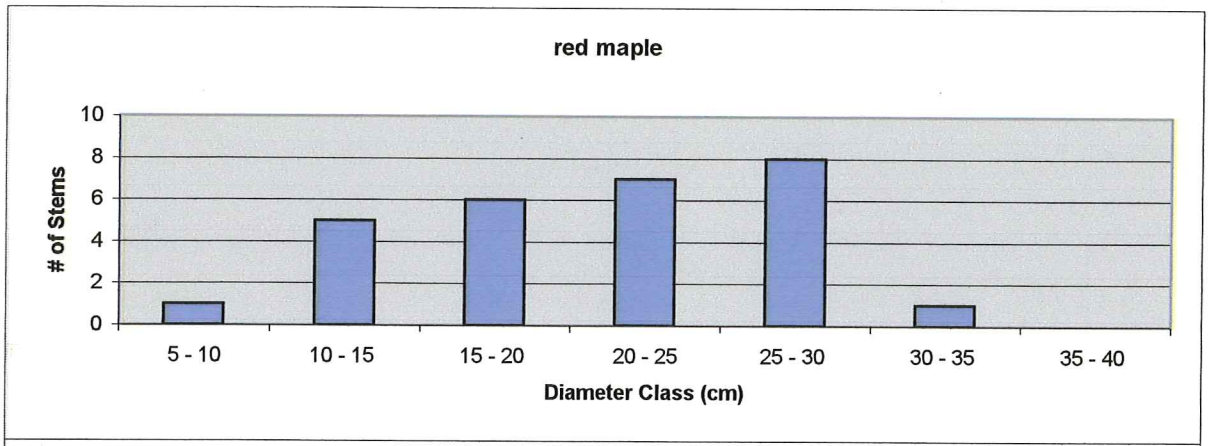
*All red maple except one mountain birch.

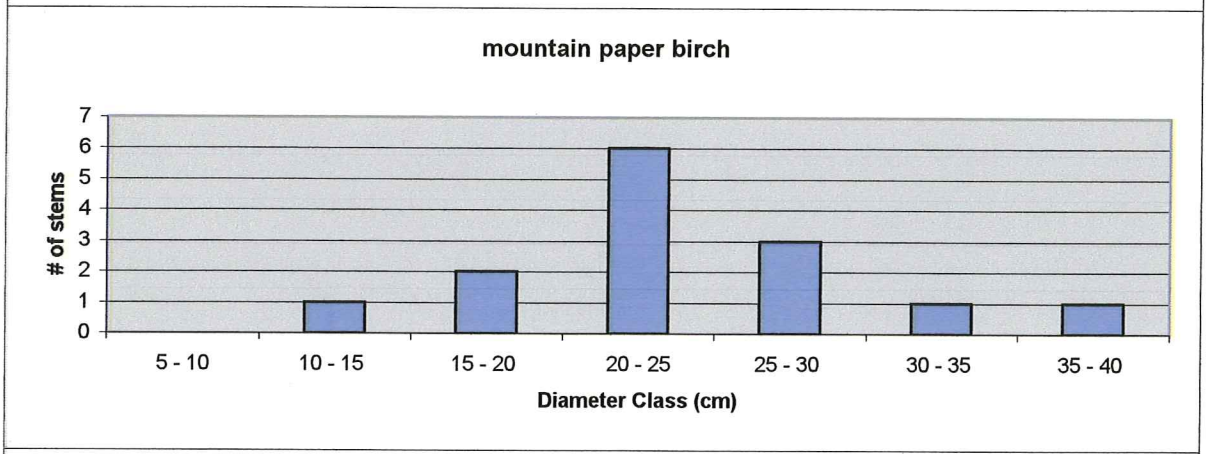


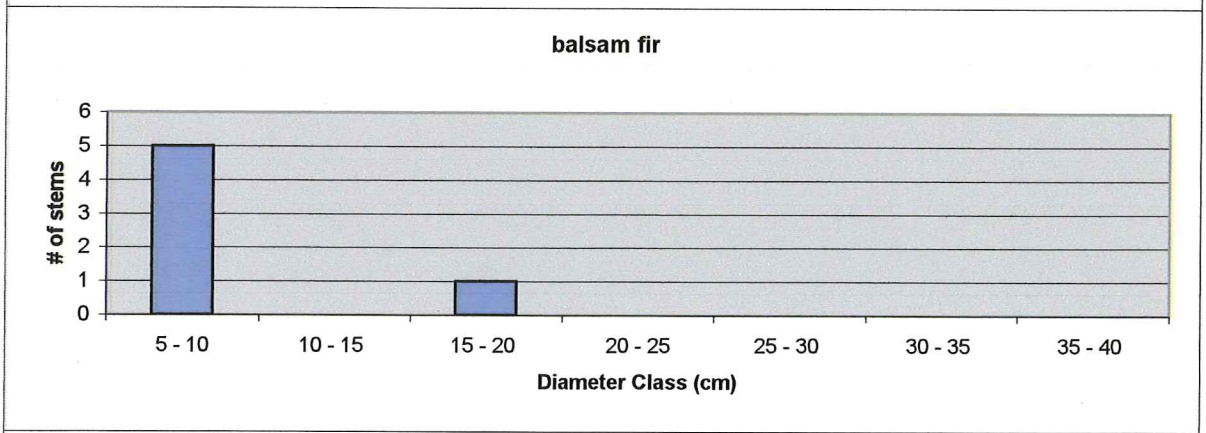

Lye Brook - Branch Pond Plot Stand Structure
DBH (cm)
40
35
30
25
20
15
10
5
0
0
10
20
30
40
50
60
Stem Distribution > 4.5cm

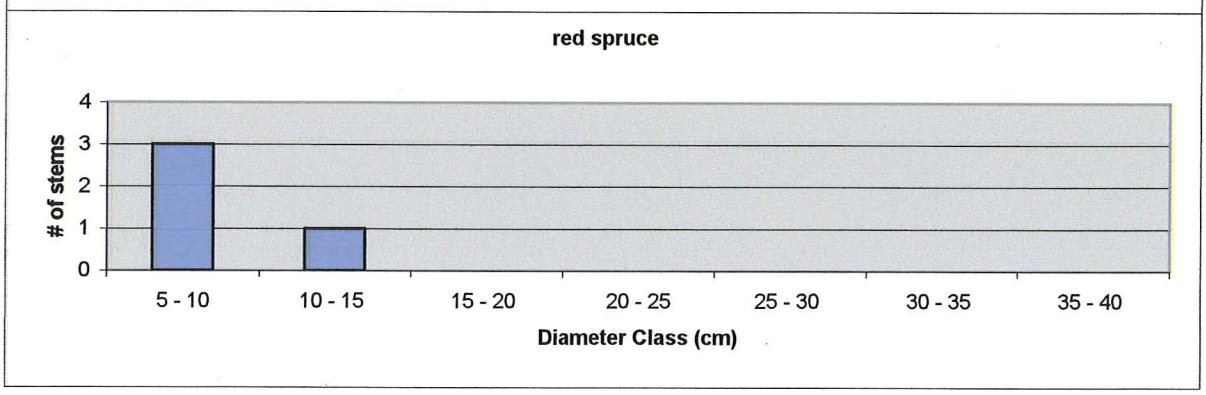

Lye Brook - Branch Pond Plot Stand Structure
#of Live Stems > 4.5 cm
6
5
4
3
2
1
0
0
5
10
15
20
25
30
35
40
DBH (cm)

Branch Pond


red maple
# of Stems
10
8
6
4
2
0
5 - 10
10 - 15
15 - 20
20 - 25
25 - 30
30 - 35
35 - 40
Diameter Class (cm)


mountain paper birch
# of stems
7
6
5
4
3
2
1
0
5 - 10
10 - 15
15 - 20
20 - 25
25 - 30
30 - 35
35 - 40
Diameter Class (cm)


balsam fir
# of stems
6
5
4
3
2
1
0
5 - 10
10 - 15
15 - 20
20 - 25
25 - 30
30 - 35
35 - 40
Diameter Class (cm)


red spruce
# of stems
4
3
2
1
0
5 - 10
10 - 15
15 - 20
20 - 25
25 - 30
30 - 35
35 - 40
Diameter Class (cm)

2002 inventory

Complete Species List for all Plots

		Kelley Stand	Branch Pond	Ranch Brook	Underhill
Abies balsamea	Balsam Fir		x		x
Acer pensylvanicum	Striped Maple	x	x	x	x
Acer rubrum	Red Maple		x		
Acer saccharum	Sugar Maple	x		x	x
Acer spicatum	Mountain Maple			x	x
Actea pachypoda	White Baneberry			x	
Aralia nudicaulis	Wild Sarsasparilla	x	x	x	x
Arisaema triphyllum	Jack in the Pulpit			x	
Aster acuminatus	Whorled Aster	x	x	x	x
Athyrium filix-femina	Lady Fern			x	x
Athyrium thelypterioides	Silvery Spleenwart			x	
Betula alleghaniensis	Yellow Birch	x	x	x	x
Betula cordifolia	Mountain Birch		x		x
Botrychium matrifolium	Daisy-leaved Grape Fern			x	
Botrychium virginianum/dissectum	Rattlesnake Fern			x	
Carex sp.	unidentified sedge	x	x	x	x
Carex intumescens	Inflated Sedge		x		x
Carex appalachica	a Sedge		x		
Carex arctata	a Sedge		x		
Cinna latifolia	Wood Reed			x	
Clintonia borealis	Bluebead Lily		x	x	x
Coptis groenlandica	Goldthread		x		
Cornus alternifolia	Bunchberry			x	
Dryopteris campyloptera	Mountain Wood Fern		x		x
Epipactis helleborine	Helleborine			x	
Fagus grandifolia	American Beech	x		x	x
Fraxinus americana	White Ash			x	
Galium triflorum	Sweet-scented Bedstraw			x	
Laportea canadensis	Wood Nettle			x	
Listera convallarioides	Broad-leaved Twayblade			x	
Lonicera canadensis	Fly Honeysuckle	x		x	
Lycopodium lucidulum	Shining Clubmoss	x	x	x	x
Lycopodium obscurum	Princess Pine		x		
Maianthemum canadense	Canada Mayflower	x	x	x	x
Medeola virginiana	Indian Cucumber-Root		x		
Osmunda claytoniana	Interupted Fern			x	x
Oxalis acetosella =(montana)	Northern Wood Sorrel	x	x	x	x
Picea rubens	Red Spruce	x	x	x	x
Phegopteris conectillis	Narrow Beech Fern			x	x
Polystichum acrostichoides	Christmas Fern			x	
Prenanthes altissima	Tall Wild Lettuce			x	
Rubus allegheniensis	Blackberry		x		x
Sambucus pubens	Red Elderberry			x	
Smilacina racemosa	False Solomon's Seal	x		x	x
Solidago flexicaulis	Zig-zag Goldenrod			x	
Solidago sp.	a Goldenrod				x
Sorbus americana	American Mountain Ash		x	x	
Streptopus roseus	Rosy Twisted-Stalk	x	x	x	
Thelypteris noveboracensis	New York Fern			x	x
Tiarella cordifolia	Foamflower			x	
Trientalis borealis	Starflower		x		
Trillium erectum	Painted Trillium	x		x	x
Trillium undulatum	Stinking Benjamin	x	x		
Uvularia sessilifolia	Wild Oats	x			x
Veratrum viride	False Hellebore				x
Viburnum alnifolium	Hobblebush	x	x	x	x
Viola canadensis	Tall White Violet			x	
Viola pubescens	Yellow Forest Violet			x	
Viola rotundifolia	Round-leaved Yellow Violet			x	
Viola slh		x		x	
	Total Species	**19**	**26**	**44**	**28**