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GROWTH OF SOUTHERN ONTARIO HARDWOOD RESEARCH PLANTATIONS

Dan McKenney, Darren Allen, Saul Fraleigh, John Pedlar and Kathy Campbell

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Canada

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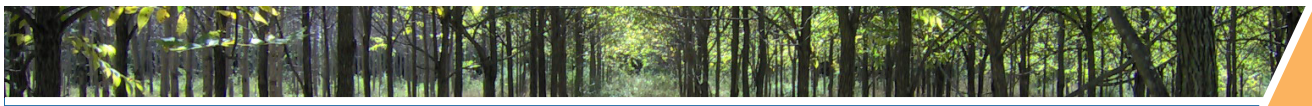

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1.0 INTRODUCTION

Throughout the 1970s and 1980s, Fred von Althen of the Canadian Forest Service studied the use of hardwood species for afforestation in southern Ontario. While that program has been since discontinued, his work left an impressive legacy of research plantings throughout the region and provided detailed silvicultural prescriptions for the establishment of new hardwood plantations on fallow agricultural land (summary in *Hardwood planting on abandoned farmland in Southern Ontario; Revised Guide*, von Althen 1990). Recent interest in afforestation as a method to reduce atmospheric carbon levels has brought about a renewed interest in this work. As part of the southern Ontario landscape, these plantations also provide valuable aesthetic and recreational opportunities, and help to maintain ecosystem function in this heavily developed area. Perhaps most importantly these plantations also offer the potential for ongoing research into the long-term effects of silvicultural treatments and the growth and yield of various combinations of hardwood species.

In spring 2003, CFS staff at the Great Lakes Forestry Centre (GLFC) were alerted to the fact that several of Fred's research plantings were slated to be cut by the Conservation Authority who managed the land on which the plantations were located. Recognizing that this could be the last chance to monitor some of these stands, researchers at the CFS organized resources to remeasure many of the plantations in southwestern Ontario. With the help of Garth Mitchell, Fred's long-time field assistant, the original research plots were located and remarked. During subsequent field work in the winter of 2004, remeasurements were taken on many of the original research plantations.

The objective of this report is simply to document and summarize the information gathered during this exercise. We provide this information for use in evaluating afforestation options and as guidance for future remeasurement efforts at these sites. This document is not intended to provide scientific interpretation of treatment or site effects, or specific recommendations for each of the plantations, although it is clear that some locations require stand management prescriptions and subsequent silivicultural interventions to enhance their future value.

2.0 STUDY SITES

A total of 480 remeasurement plots were established over the course of the study (Fig. 2.1); GPS coordinates for each plot are available in Appendix 2. The plots provided remeasurement data on more than 50 of the original experiments of Fred von Althen, covering subject areas such as: competition control, fertilization, irrigation, spacing, species mixtures, planting stock, and planting arrangement. Following is a list of the main study areas, directions on locating them and pertinent field notes.

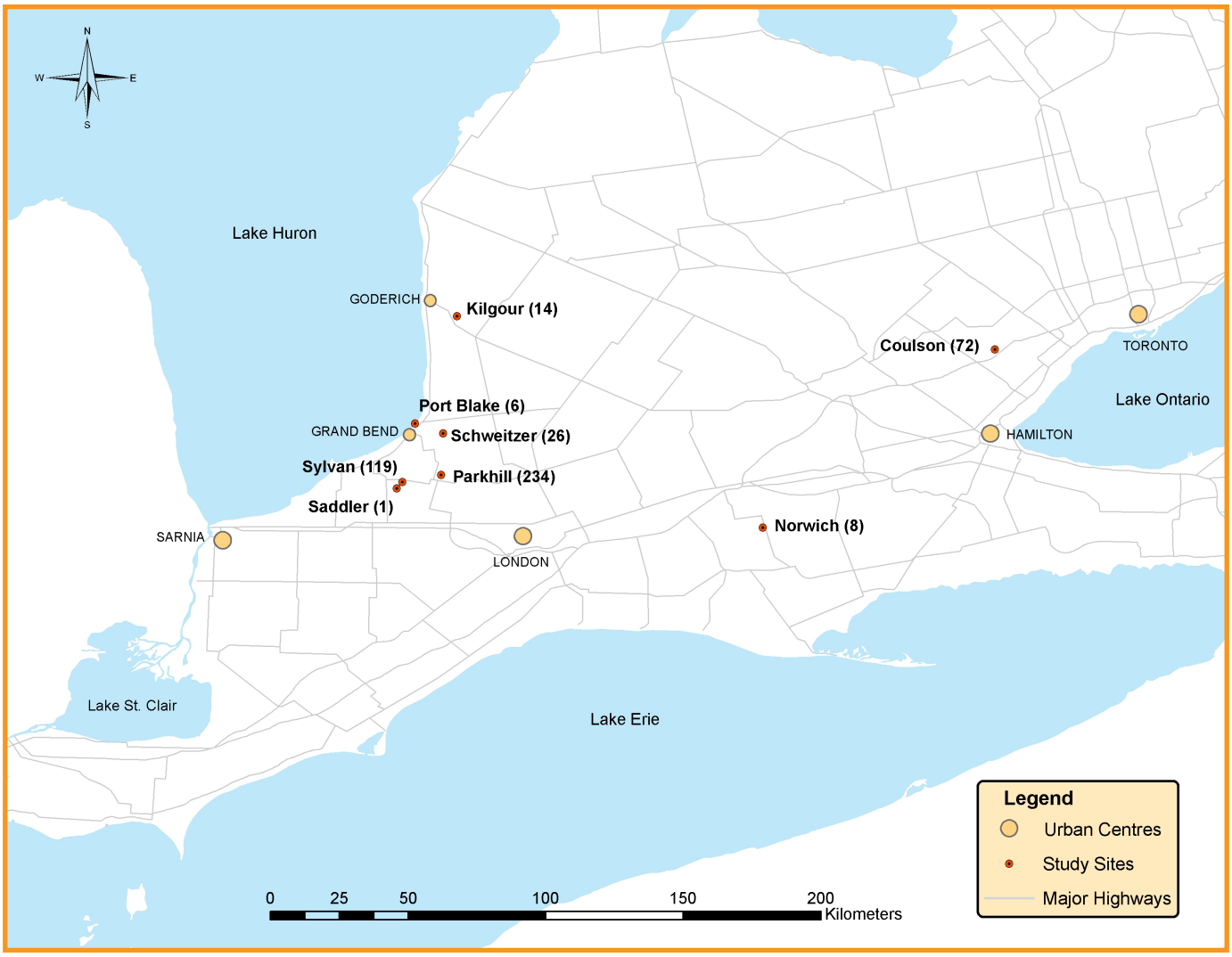


Figure 2.1 Location of hardwood plantations that were re-measured during the study; the number of plots at each location is shown in parentheses. Note that the site identified as Parkhill includes the sites of Campground, Vanderkant, Elson, Riley and Amos, which are mentioned in the following text.

2.1 PARKHILL

Under management of the Ausable Bayfield Conservation Authority.

2.1.1 CAMPGROUND

Located approximately two kilometers east of Parkhill, in the Parkhill Conservation Area. There is a large variety of species and growing conditions throughout. The area planted is approximately 38 hectares with minimal elevation change. Soils are predominately clay loam, but range from sandy loam to poorly drained clay loam. One hundred forty-six plots were established on this site (Figure 2.2).

2.1.2 ELSON

Located in the northern portion of the Parkhill Conservation Area. There are only two experiments located on this site involving black walnut inter-plantings. Growth is highly variable from poor to good on the four hectare plantation. Soils are a clay loam. Eight plots were established in this study. (Figure 2.2)

2.1.3 VANDERKANT

Located in the northern portion of the Parkhill Conservation Area. Growth was fair to poor throughout the site depending on species. This site is approximately two hectares and has clay loam soils. Thirty-six plots were established in this study (Figure 2.2).

2.1.4 AMOS

Located in the northeastern portion of the Parkhill Conservation Area. This poorly drained site demonstrated poor growth. Soils are clay and the site is approximately 2.5 hectares. Seventeen plots were established at this location (Figure 2.2).

2.1.5 RILEY

Located approximately one kilometer east of the entrance to the Campground site, this site can be accessed via an old railway line. Fair to poor growth was observed on the two black walnut experiments. Twenty-seven plots were established (Figure 2.2) on this flat, sandy loam site.

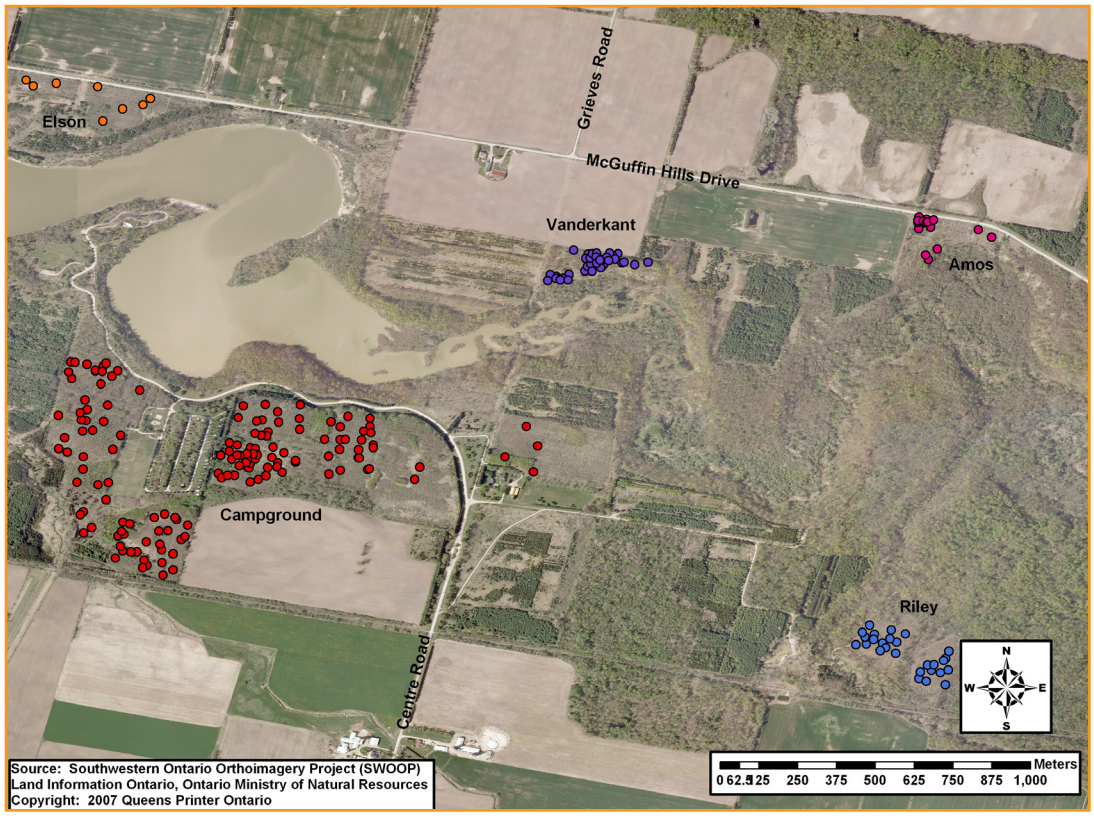


Figure 2.2. Study sites, plot locations and arrangement at Parkhill.

2.2 PORT BLAKE

This site is located approximately two kilometers north of Grand Bend on Highway 21 (Bluewater Highway). This study site contains three oak species (white, bur, European) and basswood. Growth differs greatly between species; white oak plantings were a complete failure. Soil is poorly drained clay. Six plots were established on this site (Figure 2.3).

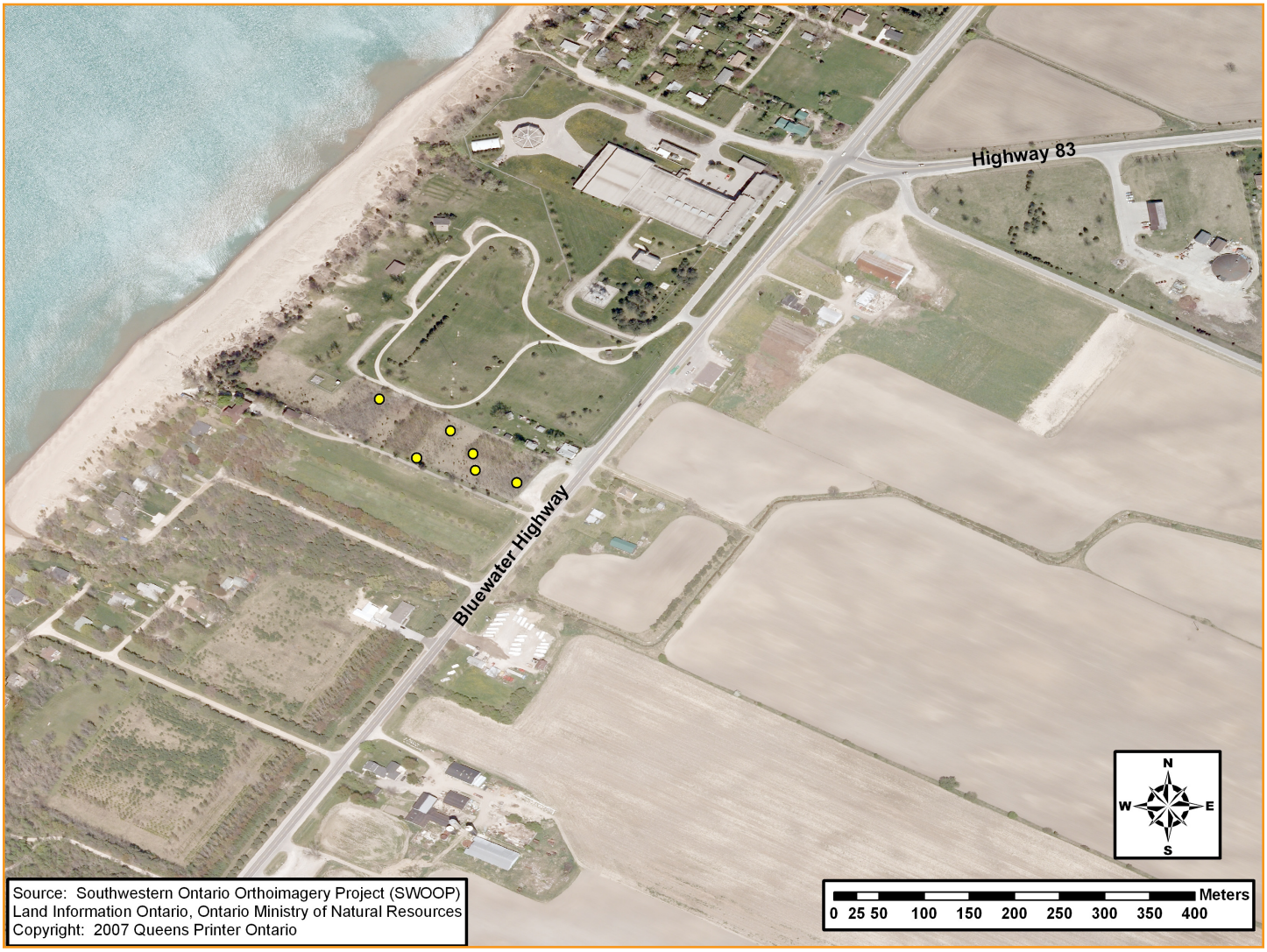


Figure 2.3. Plot locations and arrangement at the Port Blake study site.

Source: South western Ontario,Orthoimagery Project (SWOOP), Land information Ontario, OMNR copyright 2007, Queen's Printer Ontario

2.3 KILGOUR

Under management of private ownership.

North Site: Located approximately eight kilometers southeast of Goderich. Fair growth is demonstrated in the two small plots measured here (Figure 2.4A). Soils between well-drained sand and gravelly loam.

South Site: Located approximately ten kilometers southeast of Goderich on the east side of the Maitland River. Good growth observed on this small site containing silt loam soils, characterized by rolling topography over the twelve plots measured (Figure 2.4B).

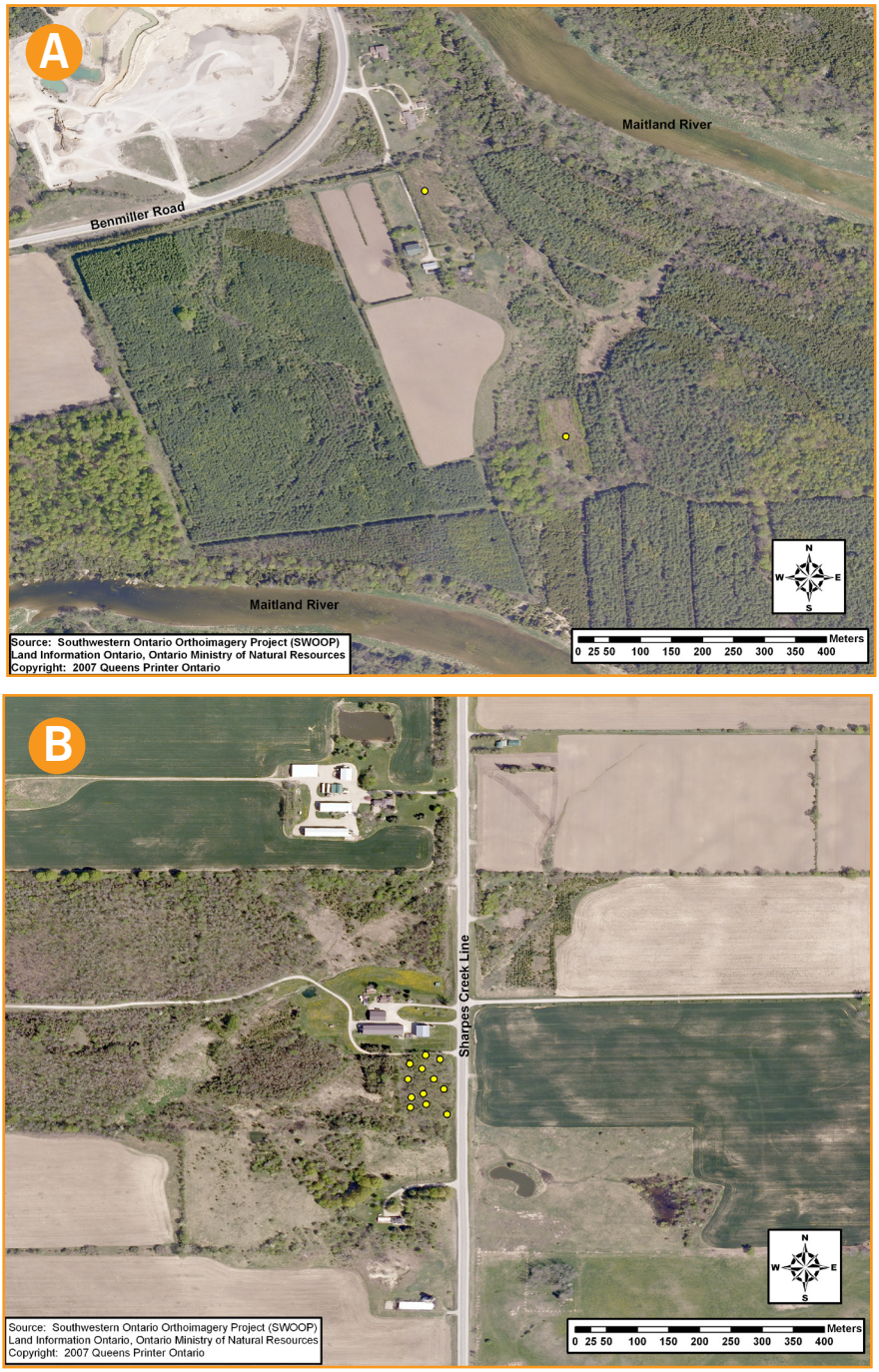


Figure 2.4. Plot locations and arrangement at (A) Kilgour north study site and, (B) Kilgour south study site.

2.4 NORWICH

Under management of Long Point Conservation Authority and located in the Norwich Conservation Area, one kilometer northwest of the town of Norwich. This walnut spacing trial exhibited fair to poor growth. The entire site slopes downwards, from east to west and the soils are clay loam. Eight plots were established at this site (Figure 2.5).

Figure 2.5. Plot locations and arrangement at Norwich study site.

2.5 SCHWEITZER

Management of this site has been turned over to the Ausable Bayfield Conservation Authority. The site is located approximately ten kilometers east of Grand Bend. Growth is fair to poor throughout the site. Soil is imperfectly drained clay loam. Twenty-six plots were established on this site (Figure 2.6), which is approximately seven hectares.

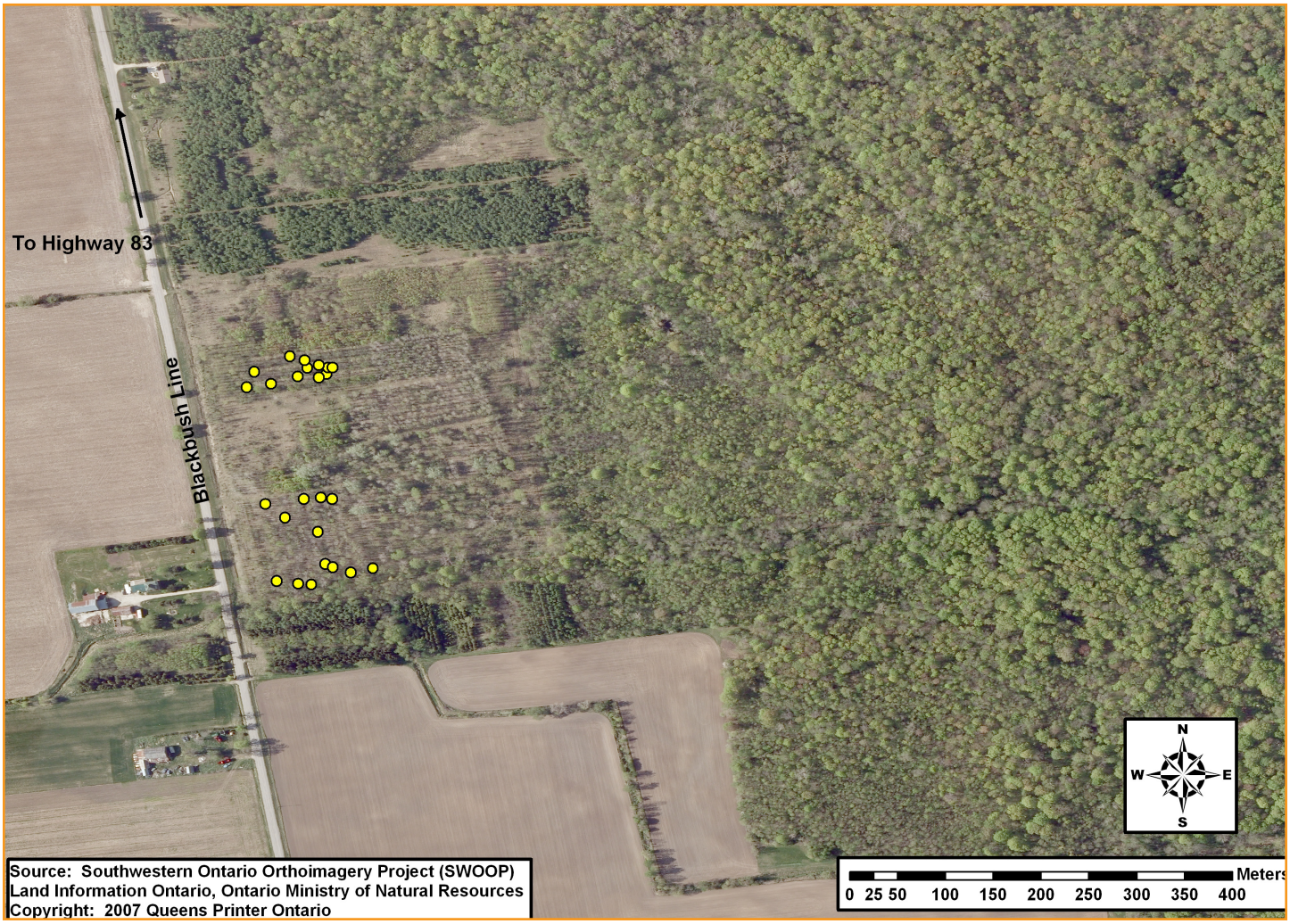


Figure 2.6. Plot locations and arrangement at the Schweitzer study site.

2.6 SADDLER

Under management of Ausable Bayfield Conservation Authority and located approximately ten kilometers southwest of Parkhill, south of the Ausable River. Excellent growth was observed on this site for black walnut and white ash. The soil is silty loam and is seasonally flooded. One plot was established on this site (Figure 2.7).

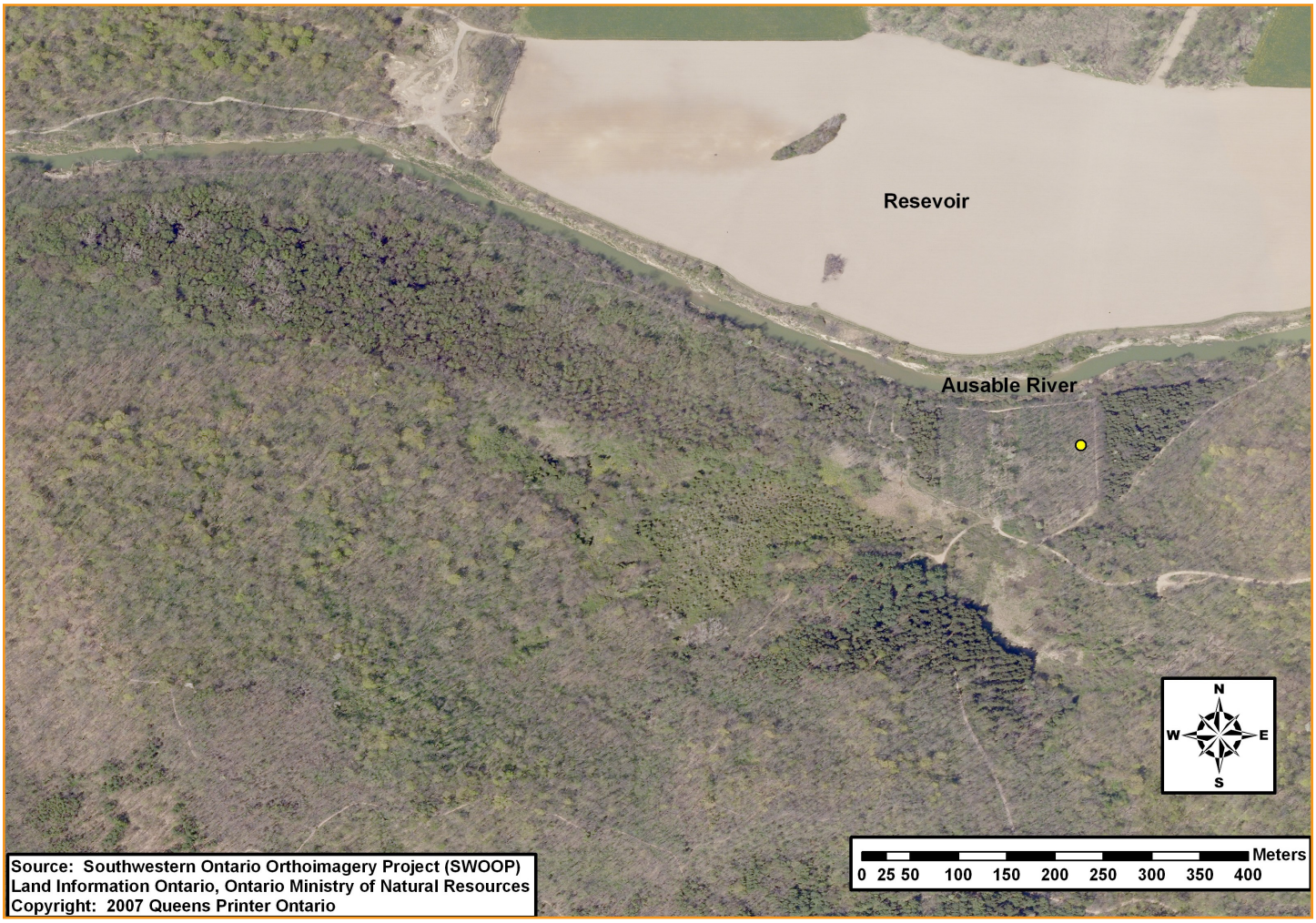


Figure 2.7. Plot location and arrangement at Saddler study site.

2.7 SYLVAN

This site is under the management and ownership of the Boy Scouts of Canada and is located approximately 8.5 kilometers southwest of Parkhill. Good growth was observed for most species throughout the site. Soil is sandy and drainage is good. Red oak and basswood have performed well on this site. One hundred nineteen plots were established at this site (Figure 2.8).

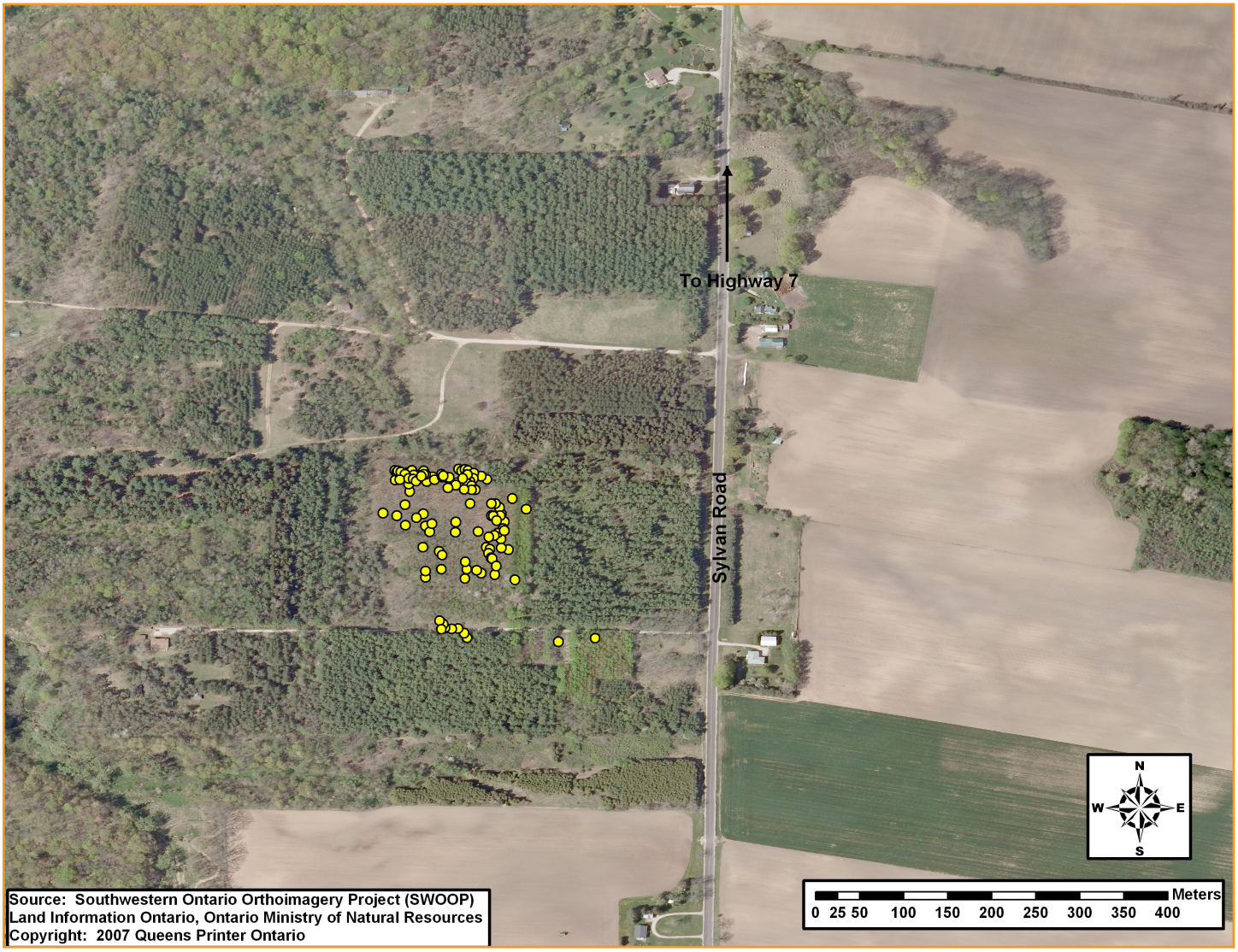


Figure 2.8. Plot locations and arrangement at Sylvan study site.

2.8 COULSON

This tract is owned by the Regional Municipality of Halton, located approximately 3 kilometers west of Hornby. Variable growth was observed among different species on this site. Of special note is the exceptional growth of walnut along the creek (Figure 2.9).

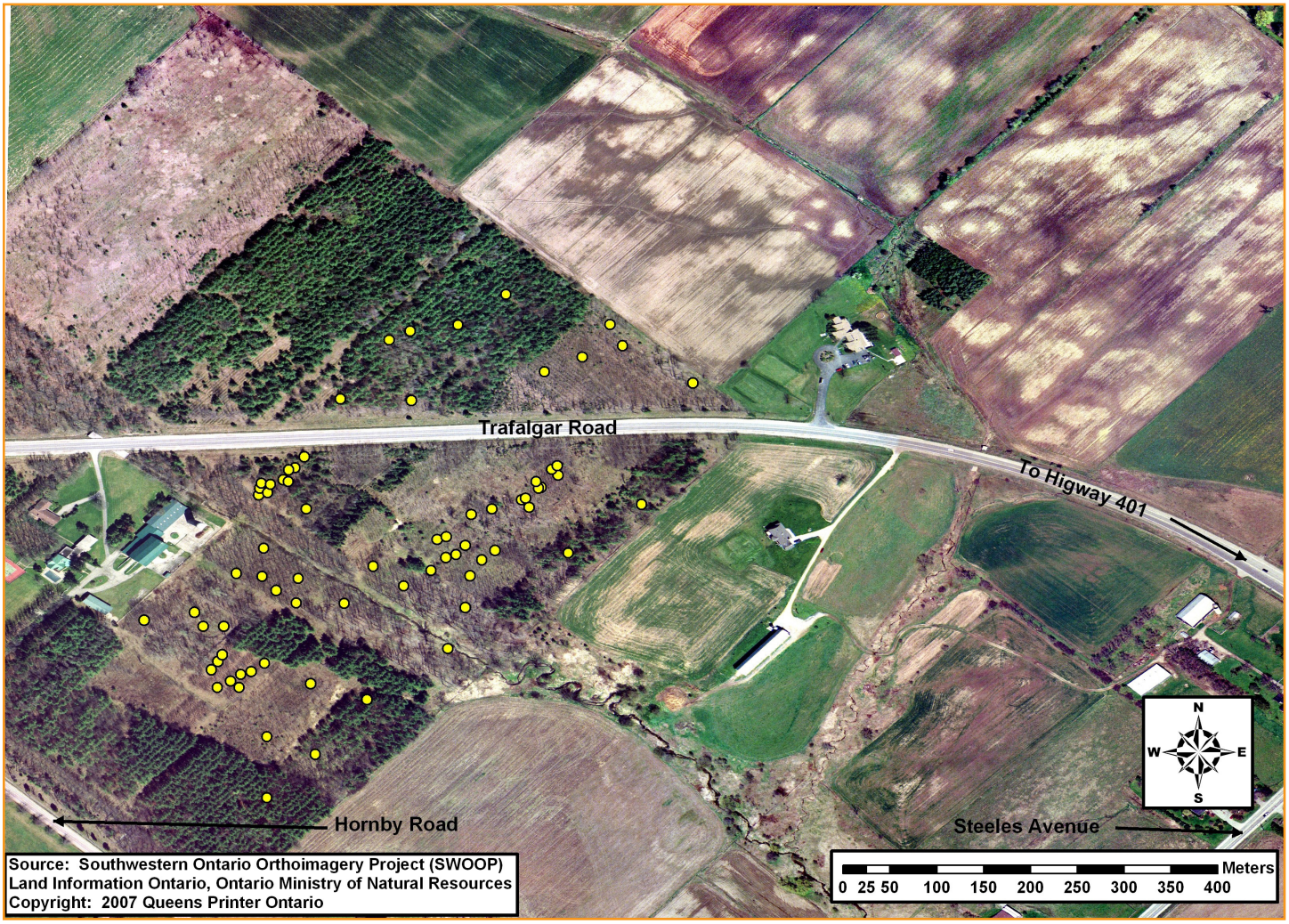
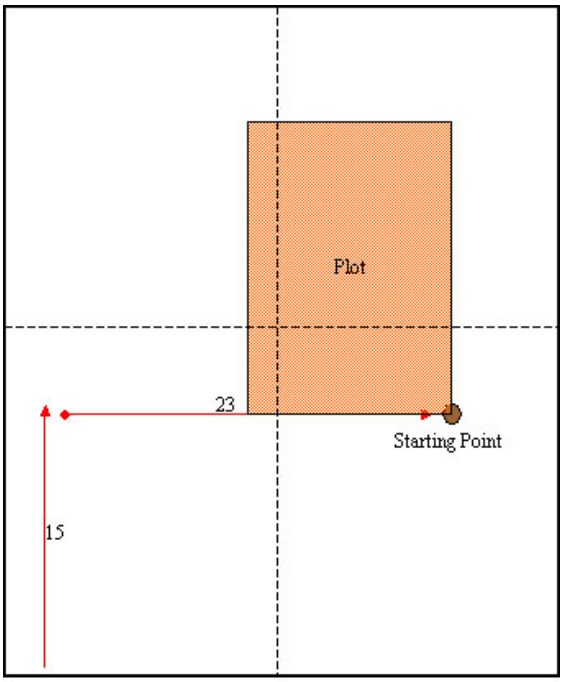


Figure 2.9. Plot locations and arrangement at Coulson study site.

3.0 METHODS



Random Numbers: 15, 23

Figure 3.1 Example of a plot set-up scenario.

Measurements on selected plantations were carried out from January to May, 2004.

3.1 PLOT ESTABLISHMENT

At each experiment site, a quick reconnaissance was undertaken to assess the treatments and feasibility of measuring the trees in each treatment. Where possible, each of the original treatment plots were measured separately. Beginning in any corner of the treatment plot, two random numbers were produced from a random number table (Steel and Torrie 1980) and used as X and Y distances (in metres) to locate the starting point (Figure 3.1). Plots were located leaving at least 1 row (3m in most instances) and most often 2-3 rows (6-9m) from the outside row of trees, in order to minimize the edge effect.

Rectangular plots were used in situations where the original plantation rows were easily identifiable (about 80% of the time). In setting up a rectangular plot, the starting point was moved to the midpoint between rows in order to best estimate growing space within the plot. From there, the plot was laid out so that its length ran toward the end of the treatment plot that was furthest from the starting point, and its width toward the side that was furthest from the starting point (Fig. 3.1). As with the starting point, all corner posts were located at the midpoint between rows. In other situations, circular plots were employed. In this case, the same process was used to locate a starting point, but this point then became the middle of the circle plot. Regardless of the type of plot used, plots were sized to sample a minimum of 10% of the trees in the original treatment plot.

3.2 TREE MEASUREMENTS

Diameter at breast height and total tree height were measured on every tree in the plot. Diameters were measured with a DBH tape and heights were obtained with a Suunto clinometer which was replaced by a digital Haglof Hypsometer halfway through the study. Other data recorded included tree number, species, block, plot width, plot length, and general comments.

3.3 DATA SUMMARIES AND CALCULATIONS

Outlined below are the main calculations and summaries that were carried out on the data.

3.3.1 GROSS TREE VOLUME (M^3)

Gross Volume was calculated for each tree using one of the species-specific equations listed below:

(1) Black Walnut (Ferrel and Lundgren 1976):

Volume = $b_1 H(1.0\text{-}e^{b_2 D})^{b_3}$

where, D = diameter breast height (cm), H = height of tree (m), and b1 = 192.3086

b_2 = -0.003543, and b_3 = 1.9939

(2) Basswood, Maples, Oaks, Birch, Cherry, White Pine (Honer et al. 1983):

Species	b_2	c_1	c_2
Basswood	0.145	0.948	401.456
Maples	0.145	1.046	383.972
Oaks	0.145	1.512	336.509
Birch	0.176	2.222	300.373
Black Cherry	0.145	0.033	393.336
White Pine	0.184	0.691	363.676
Spruce	0.176	1.44	342.175

Volume = $0.0043891D^2(1-0.04365b_2)^2/(c_1+(0.3048c_2/H))$ where, D = diameter breast height (cm), H = height of tree (m), and coefficients vary with species:

(3) In the case that a species-specific formula could not be found, the equation for volume of a cone was used (Titus and Morgan 1988):

Volume = $(H/3)\ \pi\ ((D)/200)^2$ - where, D = diameter breast height (cm), H = height of tree (m).

3.3.2 QUADRATIC MEAN DIAMETER (DQ; CM)

$$Dq = \sqrt{\frac{\sum D^2}{n}}$$ where, D = diameter breast height (cm), n = number of samples.

3.3.3 BASAL AREA (BA; M^2 ;M^2/HA)

BA/tree = $0.00007854D^2$

BA/ha = (Sum of Plot Basal Area) (1/Plot Area)

where, D = diameter breast height (cm), Plot Area = sample area (ha).

3.3.4 TOTAL YIELD (M^3/HA)

Calculated by summing the individual tree volumes (see 3.3.1) on a plot and dividing by plot area in hectares.

3.3.5 MEAN ANNUAL INCREMENT (MAI; M^3/HA/YR)

Calculated as the total yield (see 3.3.4) divided by the age of the plantation in years from planting.

3.3.6 SITE INDEX (SI; M)

Site index was calculated for white ash, red oak and sugar maple from tables in "A Silvicultural Guide to Managing Southern Ontario Forests", Version 1.1, OMNR (2000). Black walnut site index was determined using the graph provided by Schlesinger and Funk (1977). In order to predict site index for these plots, non-linear 3 parameter logistic regression equations were matched to three of Schlesinger's curves representing high, medium and low productivity. This method was validated against interpretations of site index from the site index graph and show an average site index difference for 20 randomly selected plots to be 0.19m, with a maximum difference of 0.92m.

3.3.7 STOCKING

Stocking for all plots was calculated using an equation from Gingrich (1967). This equation was originally derived for upland hardwoods of the eastern United States.

Stocking (%) = $-0.0507N + 0.1698\Sigma D + 0.0317\Sigma D^2$

Where N = 1 (acres) and D= diameter (inches).

4.0

RESULTS AND DISCUSSION

Of the 480 plots established in this study, 314 were located in single-species plantations which contained 12 different tree species (Table 4.1). The number of trees sampled per plot range from 1-121 having a mean of 19 trees measured per plot. Plot areas range from 18-720 m^2 having a mean of 104 m^2. Within row spacing range from 0.6-4.5m having a mean of 1.5m while between row spacing range from 0.9-4.5m having a mean of 2.2m. Densities range from 188-6723 stems/ha having a mean of 1648 stems/ha.

Species that exhibited the highest MAI values (m^3/ha/yr) include tulip poplar (19.87), basswood (5.09) and red oak (6.76). Poor MAI values were recorded for white oak (0.43), shagbark hickory (1.39) and black walnut (1.96). All other species ranged from 2-5 m^3/ha/yr. We note that small sample sizes for several of these plots make these findings relatively uncertain in nature. This is particularly true for the very high tulip poplar growth rate, which is based on a single small plot. The unusually high yields and volume for red oak, as it appears in the table 4.1 may be attributed to small sample plots for some experiments (Sylvain, P3 – sample area of 21m^2), as this may tend to skew the results by having 1 or 2 large trees, making the extrapolated volumes for this species appear more productive, in-general, than what may occur on a larger area-based estimate. It is also important to note that the general growth rates presented here are an average across various experiments (geographic locations) and site conditions. Individual site/experiment results for any given species are provided in the Plot Summary (Appendix 2).

Though black walnut was often a focal species for Fred von Althen, it generally performed poorly across the study area. Field observations indicated that walnut productivity was closely related to site conditions; with poor growth being expressed on pure clay soils and good growth on loamy and silty soils. Walnut plantations appeared to fail entirely when planted in areas where red osier dogwood (*Cornus stolonifera*) was abundant in the understory. This may be an indication of sites being too wet for black walnut to survive and flourish. Evidence that walnut can be successfully grown as a plantation species was observed at several sites with good quality soils, including Coulson M2 (MAI of 15.14 m^3/ha/yr) and Saddler K2 (MAI of 8.95 m^3/ha/yr for a walnut-ash mixture).

A total of 31 different species mixtures were measured at 166 study plots (Table 4.1). Many of these mixtures represent unusual species combinations, including a variety of Carolinian species for which the study sites are located at or beyond the northern limit of their published ranges. Species mixtures with noteworthy growth rates included basswood/white pine (13.02 m^3/ha/yr), tulip poplar/white oak (7.19 m^3/ha/yr) and butternut/shagbark hickory/bitternut hickory/cottonwood/white oak/soft maple/thornless locust (9.23 m^3/ha/yr). The lowest volume recorded for mixed planting was black walnut/white birch at 1.15 m^3/ha/yr. Although the low number of replicates for most species combinations limits the strength of the results, several patterns do emerge: 1) species mixtures generally performed better than monocultures, 2) Carolinian species tended to perform well as part of a species mixture, and 3) mixtures of hardwood and conifer species also performed well.

Two scientific papers have arisen from the remeasurement work and can be summarized as follows:

1) Planting black walnut in southern Ontario: midrotation assessment of growth, yield, and silvicultural treatments (Pedlar et al. 2006).

110 remeasurement plots were used to summarize the growth and yield of black walnut (*Juglans nigra* L.) plantations in southern Ontario. Overall, walnut growth averaged only 2.3 m^3/ha/yr, reflecting the less than optimal soil conditions at the majority of sites. However, good growth rates (i.e., >5 m^3/ha/yr) were recorded at sites with well-drained loamy soils, particularly when walnut was interplanted with other tree species. More detailed analyses of four of the original experiments were carried out to examine the long-term impacts of silvicultural treatments applied at an early stage in plantation development. Briefly, these analyses found (*i*) a significant long-term effect of controlling herbaceous competition at an early point in plantation development, although there is a suggestion that lower herbicide concentrations may be adequate in the long run, (*ii*) that fertilization effects, which were marginal at the time of application, were not apparent at age 32, (*iii*) generally better walnut growth when interplanted with other woody species, but autumn olive (*Elaeagnus umbellata* Thunb.), the species that stimulated the best walnut growth, grew invasively throughout the study area, thus ruling it out as a nurse species, and (*iv*) weak evidence that an initial spacing of 3 m × 3 m is optimal for walnut development in the absence of thinning up to age 30. This study provides rare insight into black walnut growth rates and best management practices in southern Ontario, although we recognize that the scope of these findings is limited by less than optimal soil conditions at many of the study sites.

2) Revisiting the work of Fred von Althen – an update on the growth and yield of a mixed hardwood plantation in southern Ontario (Pedlar et al. 2007).

In this work, an update on the growth and yield a particularly productive, and compositionally unique, mixed hardwood plantation is provided. At age 30, the plantation exhibited the following characteristics on average: 1) density of 790 stems/ha – reduced from 2222 stems/ha at time of planting through natural mortality; 2) height of 14.4 meters; 3) quadratic mean diameter of 20.1 cm; and 4) gross stand volume of 181 m^3/ha/yr. With a mean annual increment (MAI) of 6.1 m^3/ha/yr, this plantation exhibits one of the highest published growth rates for mixed hardwoods in temperate North America. There was considerable variation in growth and yield of the 10 hardwood species making up the stand – silver maple, white ash, and black walnut had the highest growth rates, and red and white oak the lowest. Several Carolinian species, such as catalpa and sycamore, showed good growth rates, despite the study site being located north of their published range limits. This data set provides rare information on the growth and yield of mixed hardwood plantations in Canada.

Table 4.1 Species summary table showing plot minimum, mean and maximum values for six attributes. Full species names are provided in Appendix 1.

Species	# of Plots	Age (yrs)			Density (stems/ha)			Average Height (m)			Quadratic DBH (cm)			Gross Total Volume (m^3/ha)			Mean Annual Increment (m^3/ha/yr)		
		Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max
PURE																			
Aw	32	19	31	36	354	1805	3571	5.65	11.69	21.98	6.63	11.88	23.50	15.30	96.07	185.76	0.43	3.12	5.99
Bd	33	25	35	36	455	2351	3892	6.22	10.44	14.94	7.05	11.85	18.03	41.62	178.28	463.36	1.19	5.09	13.24
Ck	1	24	24	24	-	-	-	12.13	12.13	12.13	14.79	14.79	14.79	-	-	-	-	-	-
Hs	2	23	23	23	4026	4156	4286	6.71	6.78	6.86	5.51	5.88	6.25	28.43	32.02	35.61	1.24	1.39	1.55
Mh	21	19	27	31	1158	2511	3944	7.84	10.75	13.67	6.97	9.31	12.97	29.15	94.10	173.04	1.17	3.58	7.52
Ms	9	22	28	30	495	1088	1852	7.95	9.05	11.76	8.15	10.18	13.17	21.19	70.00	153.48	0.71	2.56	5.58
Ob	2	25	25	25	2238	2934	3630	5.96	6.87	7.78	7.54	8.62	9.70	51.75	60.77	69.80	2.07	2.43	2.79
Oe	2	25	25	25	1923	2726	3529	7.06	8.94	10.82	8.88	10.91	12.95	92.33	122.03	151.74	3.69	4.88	6.07
Or	84	22	35	36	0	1347	2857	6.90	15.58	20.97	4.00	16.37	27.61	0.97	237.40	780.22	0.03	6.76	21.67
Ow	1	25	25	25	1000	1000	1000	4.75	4.75	4.75	7.00	7.00	7.00	10.81	10.81	10.81	0.43	0.43	0.43
Pt[1]	1	29	29	29	2222	2222	2222	14.33	14.33	14.33	23.94	23.94	23.94	576.37	576.37	576.37	19.87	19.87	19.87
Wb	126	19	28	36	0	1607	6723	2.27	7.93	22.02	3.54	10.38	25.41	0.48	57.66	514.93	0.02	1.97	15.14
MIXED																			
AwBd	1	24	24	24	1895	1895	1895	8.77	8.77	8.77	10.56	10.56	10.56	101.56	101.56	101.56	4.23	4.23	4.23
AwBdWb	10	33	33	33	1429	3476	5238	7.74	8.73	10.10	6.77	8.69	10.50	27.44	96.76	159.27	0.83	2.93	4.83
AwHs	1	24	24	24	3800	3800	3800	7.97	7.97	7.97	6.06	6.06	6.06	34.47	34.47	34.47	1.44	1.44	1.44
AwMs	2	22	22	22	1528	1711	1894	7.22	8.70	10.19	7.01	7.98	8.96	24.85	47.81	70.78	1.13	2.17	3.22
AwPw	2	31	32	32	616	648	681	11.56	12.91	14.26	15.03	18.69	22.35	80.43	139.91	199.39	2.51	4.47	6.43
AwPwSw	5	26	26	26	787	1138	1691	8.09	11.65	14.14	11.37	15.88	19.85	48.75	155.94	199.96	1.87	6.00	7.69
AwPwWb	1	33	33	33	1078	1078	1078	11.32	11.32	11.32	14.27	14.27	14.27	106.58	106.58	106.58	3.23	3.23	3.23
BdPw	1	31	31	31	1945	1945	1945	17.23	17.23	17.23	17.87	17.87	17.87	403.73	403.73	403.73	13.02	13.02	13.02
BnCkHbHopLtMmOeOw	3	26	26	26	1429	2010	2801	7.48	10.21	11.78	10.04	12.69	14.38	131.91	150.27	183.75	5.07	5.78	7.07
BnHbCotCbBwCa	14	28	28	28	577	1268	2857	8.40	12.27	16.14	10.84	14.79	18.65	47.98	146.81	404.11	1.71	5.24	14.43
BnHbHopMmMockObOeOw	3	26	26	26	1377	2085	2894	8.55	9.21	9.85	10.17	11.30	12.48	78.67	132.60	168.99	3.03	5.10	6.50
BnHbObOeOw	3	26	26	26	1794	2329	2787	9.64	10.67	11.88	13.68	14.27	14.68	203.05	246.66	275.49	7.81	9.49	10.60
BnHsHbCotOwMsLt	9	29	29	29	593	1183	1765	10.69	12.38	14.25	14.86	18.97	24.08	135.18	267.70	379.93	4.66	9.23	13.10
CkCa	8	30	30	30	1500	2163	2609	7.30	10.84	13.94	9.52	16.51	22.30	123.40	223.55	361.50	4.11	7.45	12.05
HbHs	3	22	22	22	547	1599	2346	8.32	9.91	10.85	8.81	9.11	9.32	11.22	39.01	60.67	0.51	1.77	2.76
MsCkHsMmLtMhHk	12	24	24	24	1667	2731	4667	4.54	6.09	7.61	3.53	5.94	8.08	6.34	31.10	63.83	0.26	1.30	2.66
OwBnOe	12	26	26	26	800	1204	1905	8.85	10.82	12.05	9.83	14.43	17.44	27.11	106.52	209.60	1.04	4.10	8.06
PtOw	1	35	35	35	3333	3333	3333	9.64	9.64	9.64	13.25	13.25	13.25	251.78	251.78	251.78	7.19	7.19	7.19
PwWb	2	31	32	32	1010	1106	1202	9.16	9.82	10.48	12.54	13.25	13.96	69.73	76.75	83.77	2.25	2.43	2.62
WbAw	5	19	23	35	750	1468	2130	9.55	13.26	22.66	10.07	13.76	23.63	39.03	124.00	313.26	2.05	4.75	8.95
WbAwBdBnMsHsHkOlive	12	23	23	23	253	897	1392	8.71	12.65	17.80	10.68	15.89	28.90	32.52	117.28	365.61	1.41	5.10	15.90
WbAwMs	1	19	19	19	1034	1034	1034	8.67	8.67	8.67	8.65	8.65	8.65	19.30	19.30	19.30	1.02	1.02	1.02
WbAwMsOrOwBdCaSyAmLb	6	30	30	30	487	788	1144	12.19	14.40	16.61	16.82	20.20	22.76	163.07	194.86	250.66	5.44	6.50	8.36
WbBdBwObOrMs	1	22	22	22	2006	2006	2006	8.68	8.68	8.68	9.28	9.28	9.28	75.22	75.22	75.22	3.42	3.42	3.42
WbBnCbAwOrOwMsMhMaPtAm	2	29	29	29	487	699	911	10.45	11.82	13.19	13.90	15.85	17.80	106.57	107.91	109.25	3.67	3.72	3.77
WbBw	1	25	25	25	1173	1173	1173	10.21	10.21	10.21	12.54	12.54	12.54	28.87	28.87	28.87	1.15	1.15	1.15
WbLb	5	22	23	24	469	1021	1410	7.18	8.47	10.04	9.86	11.30	12.36	12.34	47.68	64.84	0.56	2.04	2.95
WbMs	7	21	21	22	875	1144	1471	7.38	9.23	11.15	9.28	10.85	12.94	37.00	49.27	71.42	1.76	2.33	3.40
WbOb	2	24	24	24	1528	1807	2086	8.35	9.14	9.94	11.44	11.65	11.86	80.10	95.85	111.60	3.34	3.99	4.65
WbOlive	14	21	23	24	188	862	1391	4.11	8.22	11.65	6.14	11.38	16.30	1.07	48.05	99.51	0.05	2.15	4.15
WbPw	16	22	23	24	470	915	1528	5.11	9.29	14.39	8.45	13.82	20.76	28.67	62.90	123.81	1.30	2.67	5.16

[1] Tulip Poplar measurements were calculated based on one plot containing a row of ten trees. This row was planted in experiment V2 and extracted to provide the lone tulip poplar values. The row was located within the stand, and, as a result edge effects were minimal to none.

5.0 CONCLUSIONS

Throughout the 1970s and 1980s Fred von Althen established hundreds of research plots to explore the potential of planting hardwood species on abandoned agricultural land in southern Ontario. Many of these plantations remain relatively undisturbed since the research program ended in the early 1990s and thus represent a valuable source of information on the growth and yield of hardwood species in this region. This report summarizes an effort to revisit and remeasure many of these research plantations.

Based on the 480 remeasurement plots established during this study, we make the following general conclusions with regard to hardwood afforestation efforts:

1) Tree species showing average-to-good growth rates include tulip poplar, red oak, basswood, white ash, sugar maple, and black walnut under proper site conditions;

2) Plantations with a mixture of hardwood species generally appear to outperform monocultures;

3) Carolinian species showed the potential for good growth rates, particularly when planted in species mixtures (including such species in current planting efforts in Ontario may provide some insurance against the predicted temperature increases associated with climate change); and

4) Hardwood species are sensitive to site conditions – well-drained, deep, fertile soil appears to produce the best growth.

Persons interested in conducting additional analysis in these research plantations may contact the Canadian Forest Service, Great Lakes Forestry Centre for information. As some of these plantations occur on private lands, approval must be obtained before entering these properties.

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APPENDIX I
SPECIES CODES, COMMON AND SCIENTIFIC NAMES

Code	Common Name	Scientific Name
Ab	Black Ash	*Fraxinus nigra*
Ae	European Alder	*Alnus glutinosa*
Am	Mountain Ash	*Sorbus americana*
Aw	White Ash	*Fraxinus americana*
Bd	Basswood	*Tilia americana*
Bn	Butternut	*Juglans cinerea*
Bw	White Birch	*Betula papyrifera*
Ca	Catalpa	*Catalpa bignonioides*
Cb	Black Cherry	*Prunus serotina*
Ck	Kentucky Coffeetree	*Gymnocladus dioicus*
Cot	Eastern Cottonwood	*Populus deltoides*
Cr	Eastern Red Cedar	*Juniperus virginiana*
Ew	White Elm	*Ulmus americana*
Hb	Bitternut Hickory	*Carya cordiformis*
Hk	Hackberry	*Celtis occidentalis*
Hs	Shagbark Hickory	*Carya ovata*
Id	Ironwood	*Ostrya virginiana*
Lb	Black Locust	*Robinia pseudoacacia*
Lt	Thornless Locust	*Gleditsia triacanthos*
Ma	Amur Maple	*Acer ginnala*
Mh	Hard Maple (Sugar Maple)	*Acer saccharum*
Mm	Manitoba Maple	*Acer negundo*
Ms	Soft Maple (Red/Silver Maple)	*Acer rubrum/Acer saccharinum*
Ob	Bur Oak	*Quercus macrocarpa*
Oe	European Oak	*Quercus robur*
Or	Red Oak	*Quercus rubra*
Ow	White Oak	*Quercus alba*
Pt	Tulip Poplar	*Liriodendron tulipifera*
Pw	White Pine	*Pinus strobus*
Sy	Sycamore	*Platanus occidentalis*
Wb	Black Walnut	*Juglans nigra*

APPENDIX 2
PLOT SUMMARY TABLE

Study Site	Experiment	Plot #	Latitude DD	Longitude DD	Species	Density (stems/ha)	Year Established	Stocking (%)	Site Index	Basal Area (m^2/ha)	Average Height (m)	Quadratic Mean DBH (cm)	Mean Annual Increment (m^3/ha/yr)
Amos	b12	1	43.170195	-81.643644	Wb	2130	1983	56	12.8	8.69	4.52	6.91	1.27
	b4	1	43.169981	-81.64326	Wb	2169	1980	109	15.0	19.79	8.46	10.79	3.44
	c6	1	43.169634	-81.644833	Wb Bw	1173	1980	74	N/A	15.26	10.21	12.54	1.15
		2	43.169344	-81.645091	Mh	2211	1980	17	20.0	26.95	11.55	11.17	5.50
		3	43.169462	-81.645179	Mh	1579	1980	50	16.0	7.65	7.87	7.85	1.17
	m18	1	43.170274	-81.645026	Ms Ck Hs Mm Lt Mh Hk	2439	1980	31	N/A	3.32	4.54	4.14	0.26
		2	43.170387	-81.645244	Ms Ck Hs Mm Lt Mh Hk	1667	1980	20	N/A	3.23	5.09	4.05	0.31
		3	43.170221	-81.645377	Ms Ck Hs Mm Lt Mh Hk	2500	1980	59	N/A	10.01	7.31	6.46	1.47
		4	43.170407	-81.645392	Ms Ck Hs Mm Lt Mh Hk	4444	1980	122	N/A	22.23	6.47	7.14	2.60
		5	43.170464	-81.645394	Ms Ck Hs Mm Lt Mh Hk	2500	1980	82	N/A	12.82	6.92	8.08	2.04
		6	43.170442	-81.645243	Ms Ck Hs Mm Lt Mh Hk	2222	1980	58	N/A	10.42	7.38	6.91	1.34
		7	43.170408	-81.645151	Ms Ck Hs Mm Lt Mh Hk	2222	1980	22	N/A	3.53	5.05	3.53	0.33
		8	43.170428	-81.645114	Ms Ck Hs Mm Lt Mh Hk	1667	1980	28	N/A	3.33	4.88	5.05	0.38
		9	43.170486	-81.644941	Ms Ck Hs Mm Lt Mh Hk	2333	1980	43	N/A	7.79	5.69	5.46	0.88
		10	43.1705	-81.645144	Ms Ck Hs Mm Lt Mh Hk	2188	1980	43	N/A	6.98	6.13	5.62	0.88
		11	43.170518	-81.645331	Ms Ck Hs Mm Lt Mh Hk	4667	1980	120	N/A	20.77	5.97	6.83	2.66
		12	43.170566	-81.645365	Ms Ck Hs Mm Lt Mh Hk	3929	1980	128	N/A	19.96	7.61	8.04	2.40
Camp-ground	b8	1	43.162027	-81.66958	Wb	1852	1981	67	14.0	10.87	7.73	8.64	1.76
		2	43.161947	-81.669669	Wb	353	1981	12	7.2	1.95	4.36	8.39	0.17
	b9	1	43.161422	-81.669569	Hs	4286	1981	81		10.21	6.86	5.51	1.24
		2	43.161576	-81.669342	Hs	4026	1981	91		12.43	6.71	6.25	1.55
	c7	1	43.161151	-81.667753	Or	1323	1980	109	24.0	22.97	13.60	14.87	6.20
		2	43.16186	-81.667527	Wb	1528	1980	51	13.1	8.13	5.95	8.23	1.07
	c8	1	43.163474	-81.663436	Wb	2435	1982	122	21.3	22.18	10.30	10.77	5.24
		2	43.163517	-81.663434	Or	1391	1982	91	22.0	17.97	11.27	12.82	4.35
		3	43.16317	-81.66381	Wb Bd Bw Ob Or Ms	2006	1982	81	N/A	18.98	8.68	9.28	3.42
	d1	1	43.162378	-81.668922	Aw Hs	3800	1980	82	N/A	10.89	7.97	6.06	1.44
	d2	1	43.163125	-81.662459	Hb Hs	1905	1982	71	N/A	11.61	10.56	8.81	2.05
		2	43.163228	-81.662136	Hb Hs	2346	1982	93	N/A	15.62	10.85	9.19	2.76
		3	43.163639	-81.66247	Hb Hs	547	1982	22	N/A	3.75	8.32	9.32	0.51

Study Site	Experiment	Plot #	Latitude DD	Longitude DD	Species	Density (stems/ha)	Year Established	Stocking (%)	Site Index	Basal Area (m^2/ha)	Average Height (m)	Quadratic Mean DBH (cm)	Mean Annual Increment (m^3/ha/yr)
Campground, cont.	hpAw	1	43.16393	-81.656417	Aw	1292	1985	91	N/A	18.34	13.39	13.44	4.57
		2	43.164492	-81.656737	Aw	1600	1985	68	N/A	11.65	11.71	9.63	2.54
	hpMh	1	43.163615	-81.657357	Mh	1875	1985	76	N/A	12.74	9.80	9.30	3.02
		1	43.163178	-81.656538	Wb	1133	1985	64	23.4	12.20	9.51	11.71	3.25
	j8	1	43.166369	-81.669944	Bn Hs Hb Cot Ow Ms Lt	1441	1975	187	N/A	44.29	12.52	19.81	10.34
		2	43.166359	-81.669817	Bn Hs Hb Cot Ow Ms Lt	1356	1975	174	N/A	41.08	12.53	19.66	9.59
		3	43.166242	-81.669002	Bn Hs Hb Cot Ow Ms Lt	1017	1975	83	N/A	19.08	10.69	14.86	4.66
		4	43.166107	-81.669226	Bn Hs Hb Cot Ow Ms Lt	1240	1975	103	N/A	23.13	14.25	14.96	6.38
		5	43.166334	-81.668923	Bn Hs Hb Cot Ow Ms Lt	1395	1975	160	N/A	39.01	12.68	18.38	12.23
		6	43.166131	-81.669224	Bn Hs Hb Cot Ow Ms Lt	932	1975	117	N/A	32.53	11.24	19.41	13.10
		7	43.166097	-81.669025	Bn Hs Hb Cot Ow Ms Lt	593	1975	106	N/A	26.96	12.96	24.08	6.42
		8	43.165965	-81.668757	Bn Hs Hb Cot Ow Ms Lt	909	1975	146	N/A	40.18	11.94	22.62	10.33
		9	43.16611	-81.66858	Bn Hs Hb Cot Ow Ms Lt	1765	1975	178	N/A	42.20	12.64	16.96	10.03
	k3	1	43.161639	-81.666558	Wb Olive	855	1980	81	N/A	17.83	9.95	16.30	4.11
		2	43.161811	-81.666882	Wb Ob	1528	1980	84	N/A	15.70	8.35	11.44	3.34
		3	43.161856	-81.66693	Wb	2049	1980	63	13.3	9.61	6.18	7.71	1.30
		4	43.161964	-81.667217	Wb Lb	1049	1980	54	N/A	9.81	7.85	10.91	1.63
		5	43.161472	-81.667392	Wb Pw	1267	1980	89	N/A	17.92	11.38	13.42	4.16
		6	43.16148	-81.667126	Wb Lb	1067	1980	64	N/A	12.37	9.60	12.15	2.46
		7	43.16123	-81.666741	Wb Olive	1391	1980	96	N/A	19.22	10.70	13.26	4.15
		8	43.161305	-81.666635	Wb Pw	957	1980	75	N/A	15.74	10.74	14.45	3.52
		9	43.16081	-81.66698	Wb	1504	1980	55	13.4	9.02	6.39	8.72	1.32
		10	43.160928	-81.667307	Wb Olive	994	1980	39	N/A	6.51	5.51	9.13	0.77
		11	43.161084	-81.667365	Wb	1920	1980	61	12.9	9.41	5.73	7.90	1.15
		12	43.160196	-81.667266	Wb Ob	2086	1980	121	N/A	23.12	9.94	11.86	4.65
		13	43.160553	-81.667297	Wb Pw	1159	1980	54	N/A	9.50	6.88	10.22	1.52
		14	43.160342	-81.666978	Wb Lb	1410	1980	75	N/A	16.42	7.71	11.21	2.63
	k4	1	43.160479	-81.66773	Wb Pw	599	1980	50	N/A	10.60	9.40	14.99	2.27
		2	43.160628	-81.667822	Wb Pw	667	1980	72	N/A	16.34	10.53	17.67	3.62
		3	43.160411	-81.667859	Wb Pw	470	1980	35	N/A	9.13	9.43	13.85	1.97
		4	43.160872	-81.668034	Wb Pw	819	1980	66	N/A	13.80	9.22	14.65	2.83
		5	43.160867	-81.668202	Wb Pw	628	1980	57	N/A	12.50	8.95	15.92	2.73
		6	43.160894	-81.66844	Wb Pw	648	1980	59	N/A	12.83	10.47	15.87	3.05
		7	43.161029	-81.668501	Wb Pw	513	1980	49	N/A	10.70	11.01	16.30	2.53
		8	43.160692	-81.668644	Wb Pw	556	1980	78	N/A	18.81	14.39	20.76	5.16
		1	43.16373	-81.663762	Wb	667	1980	07	5.3	0.66	2.27	3.54	0.02
		2	43.16345	-81.663949	Wb	2222	1980	48	11.9	6.47	4.70	6.09	0.76
		3	43.163338	-81.663967	Wb Pw	1429	1980	72	N/A	13.09	7.76	10.80	2.22
		4	43.163312	-81.664243	Wb	3768	1980	71	12.1	9.03	4.59	5.52	1.01
		5	43.163598	-81.664113	Wb Pw	1429	1980	50	N/A	8.02	7.00	8.45	1.30
		6	43.163905	-81.664078	Wb	2500	1980	72	14.3	10.86	5.69	7.42	1.62
	k5b	1	43.163081	-81.664291	Wb	1630	1982	39	12.4	5.36	4.98	6.47	0.68
		2	43.162967	-81.664509	Wb	3788	1982	94	13.1	13.12	6.63	6.64	1.92
		3	43.1629	-81.664746	Wb Pw	1528	1982	86	N/A	16.21	5.11	11.62	1.92
		5	43.16314	-81.66567	Wb Pw	893	1982	52	N/A	9.89	9.05	11.88	2.36
		6	43.163009	-81.66557	Wb	2049	1982	97	20.1	17.47	9.50	10.40	3.83
	k8	1	43.164493	-81.661274	Wb Aw	1711	1983	103	N/A	20.71	11.50	12.13	4.65

Study Site	Experiment	Plot #	Latitude DD	Longitude DD	Species	Density (stems/ha)	Year Established	Stocking (%)	Site Index	Basal Area (m^2/ha)	Average Height (m)	Quadratic Mean DBH (cm)	Mean Annual Increment (m^3/ha/yr)
Campground, cont.	k8, cont.	2	43.164108	-81.661516	Wb	1566	1983	69	20.0	11.92	8.19	9.85	2.39
		3	43.16359	-81.661613	Wb	2143	1983	75	14.9	12.04	6.72	8.46	1.88
		4	43.16396	-81.66118	Wb Ms	1389	1983	56	N/A	9.42	7.38	9.28	1.76
		5	43.163887	-81.661173	Wb Ms	1148	1983	51	N/A	8.80	8.51	9.88	1.78
		6	43.163578	-81.661581	Wb Aw	1792	1983	101	N/A	19.12	11.37	11.66	4.36
		7	43.163833	-81.661607	Wb Ms	1283	1983	66	N/A	12.04	9.95	10.93	2.82
		8	43.164365	-81.661448	Wb Ms	966	1983	64	N/A	12.70	11.15	12.94	3.40
		9	43.164787	-81.661907	Wb	958	1983	30	13.8	4.59	5.51	7.81	0.66
		10	43.164486	-81.662141	Wb Aw	2130	1983	97	N/A	16.94	11.22	10.07	3.74
		11	43.164118	-81.662134	Wb Ms	1471	1983	70	N/A	12.52	8.40	10.41	2.66
		12	43.163841	-81.662161	Wb Ms	875	1983	42	N/A	7.61	9.74	10.53	1.78
		13	43.164316	-81.661246	Wb Olive	1000	1983	69	N/A	13.90	10.47	13.30	3.30
		14	43.164735	-81.661269	Wb Olive	833	1983	70	N/A	14.82	11.65	15.05	4.03
		15	43.164126	-81.661986	Wb Olive	917	1983	53	N/A	10.02	8.87	11.80	2.14
	k9	1	43.165127	-81.663286	Wb Olive	1050	1981	56	N/A	11.71	8.31	11.26	2.50
		2	43.164421	-81.663308	Wb	1625	1981	41	12.6	5.82	5.80	6.73	0.77
		3	43.16463	-81.663914	Wb	1806	1981	36	8.9	4.73	4.38	5.78	0.45
		4	43.164919	-81.663944	Wb Olive	188	1981	04	N/A	0.55	4.11	6.14	0.05
		5	43.165129	-81.664312	Wb	1795	1981	65	14.6	10.49	7.10	8.63	1.68
		6	43.164689	-81.664401	Wb Olive	188	1981	05	N/A	0.48	5.08	6.98	0.05
		7	43.164661	-81.664553	Wb Olive	750	1981	30	N/A	5.13	6.69	9.33	0.84
		8	43.164755	-81.665087	Wb Olive	1000	1981	48	N/A	8.57	7.46	10.45	1.42
		9	43.16509	-81.664943	Wb Olive	1131	1981	60	N/A	11.06	8.16	11.16	1.91
	m20	1	43.163315	-81.664809	Wb	1111	1982	50	14.8	8.65	7.87	9.95	1.54
		2	43.163303	-81.664787	Wb	1048	1982	23	11.9	3.06	4.99	6.10	0.37
		3	43.163436	-81.664738	Wb	1429	1982	79	15.4	14.93	8.35	11.54	2.72
		4	43.163465	-81.664858	Wb	1146	1982	50	14.7	8.76	7.85	9.87	1.57
		5	43.163667	-81.664777	Wb	1563	1982	74	15.9	13.14	9.64	10.35	2.73
		6	43.163602	-81.664695	Wb	1071	1982	14	9.0	1.53	3.97	4.27	0.17
		7	43.163557	-81.664595	Wb	1442	1982	80	14.6	15.11	7.99	11.55	2.64
		8	43.163673	-81.664538	Wb	1188	1982	16	7.2	1.75	3.34	4.32	0.14
		9	43.163705	-81.664646	Wb	1346	1982	58	13.8	10.09	6.96	9.77	1.59
		10	43.163747	-81.66479	Wb	1442	1982	62	15.2	10.68	8.27	9.71	1.93
		11	43.163882	-81.664733	Wb	481	1982	17	9.4	2.84	6.04	8.68	0.37
		12	43.163859	-81.664589	Wb	962	1982	32	9.4	5.03	5.46	8.16	0.60
		13	43.164344	-81.664233	Wb	1648	1982	61	13.7	9.97	6.44	8.77	1.55
		14	43.164225	-81.664272	Wb	1154	1982	23	8.5	2.97	3.85	5.72	0.32
		15	43.164243	-81.664421	Wb	1250	1982	45	12.4	7.22	5.67	8.57	0.95
		16	43.164296	-81.664604	Wb	1146	1982	41	11.9	6.67	6.01	8.61	0.85
	r11	1	43.162963	-81.659979	Wb	963	1984	38	14.4	6.44	6.34	9.22	1.03
		2	43.163255	-81.661335	Wb	1461	1984	76	19.5	13.49	8.71	11.01	2.80
	r12	1	43.163323	-81.659831	Wb Aw	1034	1985	37	N/A	6.23	8.67	8.65	1.02
		2	43.163273	-81.661287	Wb Aw	956	1985	52	N/A	10.72	9.55	11.30	2.05
	s10	1	43.161322	-81.668571	Mh	1605	1980	70	26.0	17.67	10.90	9.79	3.83
		2	43.161378	-81.668398	Mh	1158	1980	57	20.0	10.41	9.15	10.70	2.02
		3	43.161461	-81.668471	Mh	2963	1980	112	26.0	18.53	12.06	8.92	4.46
		4	43.161721	-81.668427	Mh	2000	1980	88	26.0	20.26	13.67	9.88	5.33
		5	43.161679	-81.668235	Mh	3415	1980	156	26.0	29.79	12.63	10.12	7.52
	s4	1	43.164986	-81.669469	Mh	2146	1974	81	24.0	15.03	10.01	8.91	2.86
	s6	1	43.164814	-81.670306	Mh	2184	1975	112	22.0	20.55	12.36	10.95	4.10
		2	43.164688	-81.669641	Mh	2275	1975	109	22.0	19.54	11.76	10.44	3.80
	s9	1	43.16309	-81.665404	Wb	1014	1981	34	12.7	5.45	6.94	8.27	0.78
		2	43.163361	-81.66506	Wb	2500	1981	82	14.2	12.80	6.59	8.07	1.99
		3	43.163704	-81.664837	Wb	2667	1981	101	19.6	16.55	7.38	8.89	3.30

Study Site	Experiment	Plot #	Latitude DD	Longitude DD	Species	Density (stems/ha)	Year Established	Stocking (%)	Site Index	Basal Area (m2/ha)	Average Height (m)	Quadratic Mean DBH (cm)	Mean Annual Increment (m^3/ha/yr)
Camp-ground, cont.	s9, cont	4	43.163655	-81.665046	Wb	2556	1981	98	19.5	16.26	6.91	9.00	3.26
		5	43.163539	-81.665275	Wb	3750	1981	93	13.0	13.12	5.02	6.67	1.76
		6	43.163666	-81.665601	Wb	3333	1981	80	13.4	11.10	6.09	6.51	1.61
		7	43.163782	-81.665347	Wb	3056	1981	65	12.6	7.44	5.45	5.99	0.96
		8	43.163664	-81.665121	Wb	3667	1981	60	9.0	7.16	4.41	4.99	0.75
		9	43.16396	-81.665114	Mh	3472	1981	100	20.0	14.88	8.11	7.39	2.46
		10	43.164024	-81.665341	Mh	2111	1981	91	20.0	15.80	9.43	9.76	2.83
	u3	1	43.162811	-81.66915	Ms	495	1974	26	N/A	15.12	8.81	11.13	2.07
		2	43.162888	-81.669764	Ms	874	1974	48	N/A	16.65	8.76	11.36	2.38
		3	43.163269	-81.669591	Ms	1329	1974	90	N/A	25.81	11.76	13.17	5.12
		4	43.162876	-81.668857	Ms	882	1974	40	N/A	8.65	8.33	10.04	1.15
		5	43.163753	-81.670047	Ms	502	1974	25	N/A	13.43	8.64	10.78	1.77
		6	43.163854	-81.670291	Ms	658	1974	30	N/A	5.35	8.47	10.17	0.71
		7	43.164176	-81.670124	Aw	1333	1974	87	22.0	17.22	12.15	12.82	2.48
		8	43.164362	-81.669596	Aw	2227	1974	105	22.0	18.64	11.27	10.32	2.78
		9	43.164394	-81.669302	Aw	1151	1974	110	26.0	24.37	15.27	16.42	4.50
		10	43.16362	-81.669581	Aw	639	1974	44	20.0	8.87	11.21	13.27	1.19
		11	43.16384	-81.668727	Aw	629	1974	58	22.0	12.56	13.21	15.94	1.97
		12	43.164246	-81.668498	Aw	2480	1974	126	24.0	22.95	11.41	10.85	3.55
	v1	1	43.164649	-81.66899	Wb Aw Ms Or Ow Bd Ca Sy Am Lb	1144	1974	126	N/A	30.04	12.95	17.90	6.92
		2	43.164893	-81.669663	Wb Aw Ms Or Ow Bd Ca Sy Am Lb	1062	1974	140	N/A	38.90	14.19	20.00	8.36
		3	43.165883	-81.669918	Wb Aw Ms Or Ow Bd Ca Sy Am Lb	664	1974	108	N/A	28.80	14.95	22.76	6.35
		4	43.165266	-81.669532	Wb Aw Ms Or Ow Bd Ca Sy Am Lb	664	1974	101	N/A	24.93	16.61	21.87	5.45
		5	43.16511	-81.66888	Wb Aw Ms Or Ow Bd Ca Sy Am Lb	708	1974	71	N/A	27.51	12.19	16.82	5.44
		6	43.165729	-81.669063	Wb Aw Ms Or Ow Bd Ca Sy Am Lb	487	1974	74	N/A	29.05	15.50	21.86	6.46
	v2	1	43.165548	-81.667947	Pt	2222	1975	N/A	N/A	99.20	14.33	23.94	19.87
		2	43.166078	-81.670006	Wb Bn Cb Aw Or Ow MsMh Ma Pt Am	487	1975	53	N/A	17.60	13.19	17.80	3.67
		3	43.165548	-81.667947	Wb Bn Cb Aw Or Ow Ms Mh Ma Pt Am	911	1975	67	N/A	18.98	10.45	13.90	3.77
	x1	1	43.164128	-81.662587	Aw Ms	1528	1981	41	N/A	7.86	7.22	7.01	1.13
		2	43.164635	-81.662406	Ms	1852	1981	65	N/A	25.67	10.05	8.49	5.58
		3	43.164728	-81.663316	Aw Ms	1894	1981	72	N/A	16.23	10.19	8.96	3.22
Coulson	c5 c7	1	43.573991	-79.845662	AwBd	1895	1980	92	N/A	25.70	8.77	10.56	4.23
	c7	1	43.5745	-79.845243	Ms	1755	1980	60	N/A	13.33	7.95	8.31	2.04
	k4	1	43.575049	-79.846075	Wb	794	1972	67	14.9	14.31	11.39	15.15	2.38
		2	43.575187	-79.846357	Wb	1081	1972	49	9.7	8.56	7.04	10.04	0.90
	l1	1	43.575051	-79.846273	Wb	764	1968	140	25.0	24.80	15.47	24.49	6.34
		2	43.575111	-79.846842	Bd	2803	1968	116	N/A	19.85	8.33	9.50	2.07
	l2	1	43.575561	-79.845954	Aw	1415	1969	98	20.0	19.61	13.13	13.28	3.31
		2	43.575531	-79.845706	Aw	1415	1969	112	24.0	23.36	14.84	14.49	4.54
		3	43.575395	-79.845573	Aw	708	1969	50	18.0	10.00	13.44	13.41	1.51
		4	43.575276	-79.845377	Aw	354	1969	61	28.0	15.35	21.98	23.50	3.21
		5	43.575801	-79.845689	Wb	498	1969	89	27.5	22.78	20.94	24.14	6.28
	l2	6	43.57551	-79.84536	Wb	796	1969	89	25.6	20.48	15.10	18.10	4.97
	m1	1	43.575884	-79.844028	Wb	4600	1968	101	8.8	13.47	5.80	6.11	1.12

Study Site	Experiment	Plot #	Latitude DD	Longitude DD	Species	Density (stems/ha)	Year Established	Stocking (%)	Site Index	Basal Area (m^2/ha)	Average Height (m)	Quadratic Mean DBH (cm)	Mean Annual Increment (m3/ha/yr)
Coulson, cont.	m1	2	43.57591	-79.843941	Wb	3185	1968	61	6.5	7.65	4.27	5.53	0.45
		3	43.576123	-79.843701	Aw	1062	1968	32	12.0	4.95	8.77	7.71	0.43
		4	43.576175	-79.843502	Bd	3892	1968	105	N/A	31.88	6.54	7.05	2.82
	m10	1	43.574351	-79.844701	Aw Pw	681	1972	107	N/A	29.38	14.26	22.35	6.43
		2	43.573824	-79.845194	Pw Wb	1010	1972	64	N/A	12.48	10.48	12.54	2.25
		3	43.573406	-79.84566	Bd Pw	1945	1972	213	N/A	50.17	17.23	17.87	13.02
	m12b	1	43.577219	-79.844275	Ms	1443	1976	48	N/A	14.29	8.71	8.15	2.23
		2	43.577634	-79.842632	Aw	1443	1976	98	20.0	19.68	12.60	13.18	3.15
		3	43.577747	-79.842246	Bd	1297	1976	58	N/A	21.80	6.98	9.97	2.81
		4	43.577947	-79.842366	Wb	944	1976	54	13.1	10.25	7.55	11.76	1.38
		5	43.577389	-79.841571	Wb	865	1976	34	9.9	5.73	5.47	9.18	0.59
	m13	1	43.578236	-79.843364	Aw Pw Sw	1377	1978	133	N/A	32.37	12.16	16.52	7.26
		2	43.577235	-79.844956	Aw Pw Sw	1691	1978	130	N/A	35.13	10.32	14.26	7.69
		3	43.577797	-79.844487	Aw Pw Sw	918	1978	50	N/A	9.33	8.09	11.37	1.87
		4	43.577885	-79.844287	Aw Pw Sw	787	1978	102	N/A	26.39	13.55	19.85	7.27
		5	43.577943	-79.843827	Aw Pw Sw	918	1978	97	N/A	21.85	14.14	17.41	5.89
	m1ii	1	43.575779	-79.843472	Wb	6723	1968	123	8.5	16.17	4.86	5.39	1.17
		2	43.57569	-79.843598	Wb	4954	1968	122	7.4	17.08	4.48	6.63	1.19
		3	43.575538	-79.843712	Wb	2831	1968	104	13.6	16.92	8.89	8.72	1.94
		4	43.575233	-79.843755	Wb	1062	1968	81	16.5	16.79	14.34	14.19	3.09
		5	43.575827	-79.843756	Aw	708	1968	30	14.0	5.17	10.71	9.64	0.57
		6	43.575738	-79.843845	Aw	2831	1968	101	16.0	16.23	9.97	8.54	1.79
		7	43.575712	-79.843944	Aw	2123	1968	52	12.0	7.34	6.46	6.63	0.55
		8	43.575587	-79.844083	Aw	354	1968	17	14.0	6.18	10.51	10.55	0.60
	m2	1	43.575271	-79.844919	Wb	1019	1970	199	27.3	51.67	22.02	25.41	15.14
		2	43.574838	-79.843924	Aw	1062	1970	47	12.0	8.08	6.08	9.84	0.67
		3	43.575437	-79.844346	Wb	885	1970	106	24.7	24.71	18.02	18.86	6.13
		4	43.575629	-79.84464	Aw	2123	1970	162	20.0	33.58	12.80	14.19	4.57
	m4	1	43.576315	-79.845741	Aw Bd Wb	5238	1971	156	N/A	23.56	7.83	7.57	3.13
		2	43.576378	-79.845727	Aw Bd Wb	3333	1971	161	N/A	30.52	10.10	10.50	4.83
		3	43.576423	-79.845714	Aw Bd Wb	4762	1971	166	N/A	26.48	7.74	8.42	4.70
		4	43.576332	-79.845654	Aw Bd Wb	2857	1971	118	N/A	20.13	9.39	9.47	2.58
		5	43.576413	-79.845628	Aw Bd Wb	1429	1971	60	N/A	10.99	9.71	9.55	1.45
		6	43.576457	-79.845503	Aw Bd Wb	3810	1971	129	N/A	30.45	9.66	8.27	2.75
		7	43.576438	-79.845454	Aw Bd Wb	4286	1971	147	N/A	28.46	8.09	8.32	2.90
		8	43.576573	-79.845389	Aw Bd Wb	3333	1971	125	N/A	26.48	8.95	8.87	3.19
		9	43.576555	-79.845452	Aw Bd Wb	2857	1971	73	N/A	10.29	7.82	6.77	0.83
		10	43.57668	-79.845301	Aw Bd Wb	2857	1971	113	N/A	28.54	8.01	9.21	2.96
	m5	1	43.576175	-79.845285	Aw Pw Wb	1078	1971	83	N/A	17.24	11.32	14.27	3.23
	m6	1	43.576224	-79.842064	Pw Wb	1202	1972	90	N/A	17.69	9.16	13.96	2.62
		2	43.575754	-79.842767	Aw Pw	616	1972	51	N/A	12.74	11.56	15.03	2.51
	n1	1	43.57619	-79.843143	Bd	3875	1967	253	N/A	49.98	9.84	12.81	5.85
		2	43.576263	-79.843216	Bd	2768	1967	87	N/A	21.30	6.83	7.82	1.97
	n1	3	43.57628	-79.843178	Bd	2768	1968	124	N/A	25.76	7.75	10.00	2.00
		4	43.576387	-79.843027	Bd	3322	1968	115	N/A	24.47	8.41	8.39	2.65
		5	43.576378	-79.843052	Bd	2768	1968	148	N/A	27.46	10.11	11.24	3.25
		6	43.576441	-79.843076	Bd	3875	1968	214	N/A	40.05	9.74	11.47	4.64
		7	43.576502	-79.842864	Bd	3875	1968	235	N/A	45.49	11.48	12.23	6.38
		8	43.576557	-79.842925	Bd	3322	1968	217	N/A	50.17	10.87	12.84	6.59
		9	43.576592	-79.842875	Bd	3875	1968	309	N/A	73.92	11.16	14.58	10.26
	r6	1	43.574462	-79.845925	Bn Ck Hb Hop Lt Mm Oe Ow	1429	1978	103	N/A	20.86	11.39	13.63	5.07
		2	43.574588	-79.84591	Bn Ck Hb Hop Lt Mm Oe Ow	2801	1978	126	N/A	24.39	7.48	10.04	5.20

Study Site	Experiment	Plot #	Latitude DD	Longitude DD	Species	Density (stems/ha)	Year Established	Stocking (%)	Site Index	Basal Area (m^2/ha)	Average Height (m)	Quadratic Mean DBH (cm)	Mean Annual Increment (m3/ha/yr)
Coulson, cont.	r6, cont.	3	43.574614	-79.845811	Bn Ck Hb Hop Lt Mm Oe Ow	1801	1978	140	N/A	29.26	11.78	14.38	7.07
		4	43.574464	-79.846136	Bn Hb Hop Mm Mock Ob Oe Ow	1984	1978	91	N/A	13.80	9.24	10.17	3.03
		5	43.574526	-79.846011	Bn Hb Hop Mm Mock Ob Oe Ow	2894	1978	155	N/A	28.77	8.55	11.25	5.77
		6	43.574694	-79.845685	Bn Hb Hop Mm Mock Ob Oe Ow	1377	1978	86	N/A	25.27	9.85	12.48	6.50
		7	43.574716	-79.846131	Bn Hb Ob Oe Ow	2406	1978	189	N/A	39.45	10.49	14.45	10.06
		8	43.574636	-79.846194	Bn Hb Ob Oe Ow	1794	1978	144	N/A	30.36	11.88	14.68	7.81
		9	43.574779	-79.846092	Bn Hb Ob Oe Ow	2787	1978	201	N/A	40.94	9.64	13.68	10.60
Elson	k6	1	43.174357	-81.671025	Wb	469	1982	21	13.2	3.58	7.18	9.86	0.56
		2	43.174529	-81.671233	Wb Lb	1111	1982	69	N/A	13.33	10.04	12.36	2.95
		3	43.174444	-81.670365	Wb	1885	1982	69	14.1	11.13	6.87	8.67	1.73
		4	43.174333	-81.669165	Wb Pw	1076	1982	50	N/A	8.83	7.25	10.22	1.54
		5	43.173994	-81.667643	Wb Ms	876	1982	52	N/A	9.93	9.51	12.00	2.12
	k7	1	43.173815	-81.667851	Wb Olive	888	1983	54	N/A	10.55	8.19	12.30	2.06
		2	43.173698	-81.668443	Wb Olive	879	1983	58	N/A	11.83	9.87	12.87	2.79
		3	43.173348	-81.669014	Wb	1271	1983	43	13.2	6.84	5.16	8.28	0.88
Kilgour	c6	1	43.701662	-81.618875	Or	1654	1979	123	22.0	25.21	12.69	13.93	5.99
	s5	1	43.701084	-81.619233	Mh	1840	1976	84	24.0	14.75	12.92	10.10	3.02
	v4	1	43.683859	-81.604645	Wb Aw Bd Bn Ms Hs Hk Olive	633	1981	71	N/A	19.54	14.83	18.04	6.08
		2	43.683921	-81.604853	Wb Aw Bd Bn Ms Hs Hk Olive	1139	1981	115	N/A	54.51	14.48	16.93	15.90
		3	43.683795	-81.605083	Wb Aw Bd Bn Ms Hs Hk Olive	1013	1981	69	N/A	17.43	11.51	13.20	4.13
		4	43.683569	-81.605111	Wb Aw Bd Bn Ms Hs Hk Olive	253	1981	61	N/A	16.71	17.80	28.90	5.49
		5	43.683723	-81.604904	Wb Aw Bd Bn Ms Hs Hk Olive	1139	1981	62	N/A	12.96	11.54	11.38	3.04
		6	43.683572	-81.604737	Wb Aw Bd Bn Ms Hs Hk Olive	759	1981	86	N/A	26.45	12.80	18.18	6.60
		7	43.683429	-81.604591	Wb Aw Bd Bn Ms Hs Hk Olive	1392	1981	69	N/A	12.55	11.08	10.68	3.34
		8	43.68336	-81.604887	Wb Aw Bd Bn Ms Hs Hk Olive	380	1981	43	N/A	10.05	13.50	18.29	2.32
		9	43.68331	-81.60506	Wb Aw Bd Bn Ms Hs Hk Olive	1013	1981	64	N/A	12.63	10.75	12.56	2.65
		10	43.683167	-81.605074	Wb Aw Bd Bn Ms Hs Hk Olive	1266	1981	119	N/A	26.24	15.07	16.20	7.66
		11	43.683208	-81.604847	Wb Aw Bd Bn Ms Hs Hk Olive	380	1981	30	N/A	6.31	9.73	14.50	1.41
		12	43.683065	-81.604548	Wb Aw Bd Bn Ms Hs Hk Olive	1392	1981	80	N/A	15.32	8.71	11.80	2.57

Study Site	Experiment	Plot #	Latitude DD	Longitude DD	Species	Density (stems/ha)	Year Established	Stocking (%)	Site Index	Basal Area (m^2/ha)	Average Height (m)	Quadratic Mean DBH (cm)	Mean Annual Increment (m^3/ha/yr)
Norwich	u2	1	42.99267	-80.605111	Wb	1157	1974	120	20.8	27.13	12.96	17.28	5.51
		2	42.993217	-80.605256	Wb	1667	1974	126	17.9	25.27	11.74	14.11	4.71
		3	42.992626	-80.605764	Wb	435	1974	39	15.6	8.34	9.67	15.63	1.33
		4	42.992772	-80.606163	Wb	1733	1974	58	10.8	9.19	5.77	8.21	0.94
		5	42.992985	-80.606649	Wb	429	1974	28	14.4	5.66	7.81	12.96	0.79
		6	42.99347	-80.606596	Wb	554	1974	43	17.9	8.90	10.16	14.30	1.57
		7	42.993574	-80.605928	Wb	737	1974	50	17.3	10.02	10.13	13.16	1.76
		8	42.993113	-80.60585	Wb	584	1974	39	13.4	7.65	8.26	12.91	1.03
Port Blake	m16	1	43.332207	-81.740866	Ob	3630	1979	108	N/A	16.19	5.96	7.54	2.07
		2	43.332495	-81.7413	Oe	3529	1979	133	N/A	22.00	7.06	8.88	3.69
		3	43.33233	-81.741278	Ow	1000	1979	27	N/A	3.84	4.75	7.00	0.43
		4	43.332724	-81.741527	Bd	1855	1979	56	N/A	19.75	6.22	7.65	2.34
		5	43.332455	-81.741865	Oe	1923	1979	128	N/A	26.73	10.82	12.95	6.07
		6	43.333041	-81.742235	Ob	2238	1979	96	N/A	16.54	7.78	9.70	2.79
Riley	r7	1	43.157206	-81.645363	Wb	1154	1973	65	13.9	12.40	8.60	11.67	1.76
		2	43.157119	-81.645158	Wb	1111	1973	54	12.5	9.75	8.52	10.57	1.27
		3	43.157023	-81.644603	Wb	1688	1973	103	16.9	20.18	9.22	12.30	3.50
		4	43.157362	-81.644746	Wb	1279	1973	75	13.4	14.30	8.80	11.90	1.96
		5	43.157444	-81.645006	Wb	1333	1973	74	14.3	13.86	9.15	11.50	2.02
		6	43.157399	-81.645328	Wb	1000	1973	58	13.0	11.04	8.50	11.86	1.48
		7	43.157597	-81.645123	Wb	1279	1973	68	10.9	12.66	7.99	11.19	1.54
		8	43.157604	-81.644927	Wb	778	1973	44	13.4	8.31	9.47	11.66	1.18
		9	43.157447	-81.644518	Wb	1299	1973	53	9.7	8.99	7.01	9.36	0.98
		10	43.157784	-81.644593	Wb	988	1973	66	15.5	13.05	9.81	12.97	2.18
		11	43.157714	-81.644654	Wb	1169	1973	80	14.7	16.24	10.81	13.26	2.62
		12	43.157994	-81.644501	Wb	1111	1973	56	13.0	10.08	7.78	10.75	1.34
	r8	1	43.158744	-81.646797	Wb	1406	1973	95	14.1	19.10	10.04	13.11	2.87
		2	43.1586	-81.646169	Wb	1250	1973	68	12.5	12.83	8.88	11.40	1.70
		3	43.158492	-81.645755	Wb	1094	1973	70	13.5	13.80	9.66	12.63	2.01
		4	43.158255	-81.64601	Wb	469	1973	32	10.9	6.40	9.10	13.14	0.86
		5	43.158351	-81.646207	Wb	1406	1973	87	12.8	16.97	9.03	12.35	2.31
		6	43.158477	-81.646665	Wb	1563	1973	78	13.1	14.34	8.44	10.77	1.88
		7	43.1584	-81.646931	Wb	938	1973	28	7.3	4.28	4.15	7.60	0.41
		8	43.158535	-81.647003	Wb	1875	1973	64	9.5	10.14	5.81	8.27	0.96
		9	43.158185	-81.647192	Wb	1406	1973	90	15.5	21.74	9.49	12.65	3.50
		10	43.158338	-81.646676	Wb	1406	1973	47	8.1	7.54	4.92	8.23	0.63
		11	43.158201	-81.646894	Wb	1563	1973	101	14.1	20.05	10.34	12.74	3.11
		13	43.157927	-81.646044	Wb	938	1973	59	11.0	11.53	8.25	12.48	1.43
		14	43.15809	-81.646327	Wb	1094	1973	60	10.8	11.40	7.34	11.48	1.49
		15	43.158011	-81.646488	Wb	781	1973	60	13.0	12.41	8.94	14.18	1.77
Saddler	k2	1	43.120395	-81.801231	Wb Aw	750	1969	130	N/A	32.88	22.66	23.63	8.95
Schweitzer	j9	1	43.300671	-81.650273	Bn Hb Cot Cb Bw Ca	926	1976	88	N/A	19.46	11.98	16.36	4.35
		2	43.30098	-81.650143	Bn Hb Cot Cb Bw Ca	1481	1976	75	N/A	13.68	10.19	10.84	1.82
		3	43.300989	-81.650248	Bn Hb Cot Cb Bw Ca	1852	1976	116	N/A	22.64	11.33	12.48	3.43
		4	43.300978	-81.650409	Bn Hb Cot Cb Bw Ca	1607	1976	142	N/A	30.41	12.51	15.56	6.10
		5	43.300803	-81.650581	Bn Hb Cot Cb Bw Ca	1071	1976	103	N/A	22.71	10.07	16.46	4.85
		6	43.300929	-81.650771	Bn Hb Cot Cb Bw Ca	769	1976	46	N/A	8.83	8.40	12.09	1.71

Study Site	Experiment	Plot #	Latitude DD	Longitude DD	Species	Density (stems/ha)	Year Established	Stocking (%)	Site Index	Basal Area (m^2/ha)	Average Height (m)	Quadratic Mean DBH (cm)	Mean Annual Increment (m^3/ha/yr)
Schweitzer, cont.	j9	7	43.300767	-81.651189	Bn Hb Cot Cb Bw Ca	577	1976	51	N/A	10.92	9.05	15.49	2.64
		8	43.300208	-81.650662	Bn Hb Cot Cb Bw Ca	625	1976	71	N/A	16.47	14.73	18.32	4.91
		9	43.300182	-81.650462	Bn Hb Cot Cb Bw Ca	1803	1976	212	N/A	49.45	14.25	18.65	14.43
		10	43.300175	-81.650335	Bn Hb Cot Cb Bw Ca	816	1976	48	N/A	9.24	14.30	11.98	1.78
		11	43.300368	-81.650206	Bn Hb Cot Cb Bw Ca	1042	1976	102	N/A	22.56	16.14	16.61	5.83
		12	43.30034	-81.650133	Bn Hb Cot Cb Bw Ca	1071	1976	66	N/A	12.71	11.97	12.32	4.00
		13	43.300289	-81.649966	Bn Hb Cot Cb Bw Ca	1250	1976	92	N/A	18.80	13.20	13.87	4.54
		14	43.300329	-81.649757	Bn Hb Cot Cb Bw Ca	2857	1976	265	N/A	57.79	13.73	16.08	13.02
	r6	1	43.302057	-81.650718	Ow Bn Oe	1200	1978	127	N/A	28.67	11.30	17.44	6.24
		2	43.302024	-81.650946	Ow Bn Oe	1071	1978	100	N/A	21.87	12.00	16.16	4.70
		3	43.302171	-81.650872	Ow Bn Oe	1250	1978	92	N/A	18.71	10.80	13.84	3.43
		4	43.302316	-81.650538	Ow Bn Oe	926	1978	78	N/A	16.59	10.78	15.10	2.92
		5	43.302205	-81.650372	Ow Bn Oe	1200	1978	106	N/A	22.82	10.63	15.56	4.78
		6	43.302125	-81.650466	Ow Bn Oe	1087	1978	94	N/A	20.24	10.92	15.40	4.17
		7	43.302117	-81.650266	Ow Bn Oe	1333	1978	110	N/A	23.16	11.72	14.87	4.87
		8	43.30223	-81.650266	Ow Bn Oe	800	1978	35	N/A	6.08	8.85	9.83	1.04
		9	43.302277	-81.650399	Ow Bn Oe	1429	1978	95	N/A	18.70	9.63	12.94	3.24
		10	43.302147	-81.650196	Ow Bn Oe	1200	1978	91	N/A	18.88	11.25	14.16	3.62
		11	43.302208	-81.650179	Ow Bn Oe	1042	1978	62	N/A	11.88	9.94	12.05	2.10
		12	43.302208	-81.650139	Ow Bn Oe	1905	1978	173	N/A	37.51	12.05	15.83	8.06
Sylvan	j2	1	43.141097	-81.7844	Bd	2045	1969	228	N/A	58.28	14.94	18.03	11.06
		2	43.141147	-81.784431	Bd	2045	1969	159	N/A	55.55	12.37	14.37	9.56
		3	43.141191	-81.784497	Bd	2273	1969	184	N/A	50.70	12.00	14.75	8.42
		4	43.141189	-81.784561	Bd	909	1969	58	N/A	31.63	10.31	12.66	5.13
		5	43.1412	-81.784625	Bd	909	1969	27	N/A	9.29	7.94	7.59	1.19
		6	43.141238	-81.784645	Bd	1591	1969	73	N/A	42.22	10.78	10.12	6.06
		7	43.141272	-81.784683	Bd	455	1969	22	N/A	19.44	8.39	10.41	2.26
		8	43.141186	-81.784665	Bd	1136	1969	112	N/A	75.10	12.83	16.71	13.24
	m19	1	43.141057	-81.783474	Ck		1980	N/A	N/A	76.01	12.13	14.79	N/A
	p3	1	43.142521	-81.783939	Or	2381	1968	N/A	24.0	89.70	16.68	21.98	21.67
		2	43.142364	-81.784054	Or	1905	1968	N/A	24.0	46.91	17.98	17.78	10.28
		3	43.142431	-81.784075	Or	952	1968	N/A	N/A	30.12	17.90	20.14	6.82
		4	43.142469	-81.784111	Or	1429	1968	N/A	16.0	24.32	12.83	14.78	4.38
		5	43.142469	-81.784154	Or	2381	1968	N/A	20.0	49.96	12.24	16.41	9.68
		6	43.142346	-81.784153	Or	1905	1968	N/A	22.0	34.68	15.38	15.28	7.10
		7	43.142346	-81.784066	Or	2857	1968	N/A	22.0	60.73	11.47	16.51	13.97
		8	43.142342	-81.784134	Or	1905	1968	N/A	18.0	25.09	13.78	13.00	4.60
		9	43.142297	-81.7841	Or	2381	1968	N/A	20.0	40.74	13.80	14.82	7.37
		10	43.142285	-81.784023	Or	1905	1968	N/A	18.0	28.78	12.68	13.92	5.95
		11	43.142104	-81.784057	Or	1905	1968	N/A	22.0	56.28	16.45	19.47	13.66
		12	43.142211	-81.784037	Or	1905	1968	N/A	20.0	39.48	14.08	16.31	7.87
		13	43.142166	-81.784089	Or	1429	1968	N/A	24.0	62.29	19.30	23.65	14.24
		14	43.142143	-81.784123	Or	1905	1968	N/A	22.0	36.10	14.55	15.59	7.32
		15	43.142194	-81.784026	Or	1429	1968	N/A	20.0	30.18	15.57	16.46	5.84
		16			Or	952	1968	N/A	24.0	56.57	20.00	27.61	13.03
		17	43.142129	-81.78418	Or	1429	1968	N/A	20.0	26.87	14.63	15.53	4.84
		18	43.142013	-81.784056	Or	952	1968	N/A	16.0	5.76	11.25	8.81	0.88

Study Site	Experiment	Plot #	Latitude DD	Longitude DD	Species	Density (stems/ha)	Year Established	Stocking (%)	Site Index	Basal Area (m^2/ha)	Average Height (m)	Quadratic Mean DBH (cm)	Mean Annual Increment (m^3/ha/yr)
Sylvan, cont.	p3, cont.	19	43.142023	-81.784206	Or	1905	1968	250	22.0	59.28	17.48	19.98	12.32
		20	43.142002	-81.784168	Or	1905	1968	207	24.0	46.85	17.35	17.76	10.13
		21	43.141963	-81.784183	Or	1905	1968	305	24.0	75.60	18.90	22.57	16.80
		22	43.141909	-81.784145	Or	1429	1968	161	24.0	36.81	19.77	18.18	8.48
		23	43.141916	-81.784158	Or	952	1968	164	24.0	41.29	20.55	23.58	9.74
		24	43.141909	-81.784147	Or	1429	1968	319	24.0	84.52	20.97	27.55	20.25
		25	43.141831	-81.784103	Or	1429	1968	200	24.0	48.16	19.60	20.80	10.95
	R1	1	43.142714	-81.784198	Or	227	1969	03		0.29	6.90	4.00	0.03
		2	43.14275	-81.784259	Or	682	1969	52	18.0	10.75	13.33	14.14	2.19
		3	43.142766	-81.784404	Or	1591	1969	114	22.0	23.14	13.93	13.58	4.88
		4	43.142764	-81.784399	Or	1136	1969	111	24.0	24.65	13.98	16.58	5.37
		5	43.142728	-81.784448	Or	1136	1969	128	22.0	29.54	17.86	18.15	6.38
		6	43.142754	-81.784646	Or	1364	1969	124	24.0	27.21	16.62	15.90	5.98
		7	43.142764	-81.784827	Or	1364	1969	137	24.0	30.67	16.87	16.88	7.13
		8	43.142768	-81.784846	Or	1364	1969	227	24.0	57.27	20.52	23.07	13.94
		9	43.142749	-81.784868	Or	1364	1969	139	24.0	31.33	16.38	17.06	6.71
		10	43.142759	-81.784888	Or	1364	1969	167	24.0	39.48	18.52	19.16	9.09
		11	43.142786	-81.785006	Or	1364	1969	240	24.0	61.47	19.97	23.90	14.83
		12	43.142801	-81.785105	Or	1364	1969	188	22.0	45.48	15.60	20.56	9.46
		13	43.142806	-81.785139	Or	455	1969	68	24.0	16.73	18.90	21.60	3.87
		14	43.142772	-81.78512	Or	1364	1969	145	24.0	32.94	16.03	17.50	7.38
		15	43.142791	-81.78512	Or	1364	1969	163	24.0	38.33	19.80	18.87	9.10
		16	43.142801	-81.785111	Or	1364	1969	97	22.0	19.75	15.87	13.55	4.06
		17	43.142793	-81.78508	Or	1364	1969	111	22.0	23.43	15.72	14.76	4.87
		18	43.142789	-81.785001	Or	909	1969	54	20.0	10.42	14.08	12.05	2.05
		19	43.142807	-81.784964	Or	1364	1969	140	24.0	31.69	16.30	17.16	7.06
		20	43.142803	-81.784845	Or	1364	1969	76	20.0	14.31	12.72	11.53	2.72
		22	43.142802	-81.784459	Or	1364	1969	141	24.0	31.95	16.83	17.23	6.70
		23	43.142816	-81.784426	Or	455	1969	59	20.0	14.00	16.40	19.76	2.83
		24	43.142806	-81.784392	Or	682	1969	16	14.0	2.95	9.45	6.42	0.41
		25	43.14278	-81.784335	Or	682	1969	28	14.0	4.76	12.33	9.41	0.83
		26	43.142725	-81.784342	Or	682	1969	43	14.0	8.33	10.87	12.44	1.58
		27	43.142692	-81.78437	Or	1364	1969	92	22.0	18.42	13.25	13.08	3.86
		28	43.142698	-81.784414	Or	1364	1969	79	22.0	15.05	14.60	11.83	3.06
		29	43.142675	-81.784457	Or	1364	1969	128	24.0	28.12	16.12	16.17	6.24
		30	43.142676	-81.784549	Or	1364	1969	81	22.0	15.61	14.53	12.05	3.19
		31	43.142682	-81.784511	Or	1364	1969	114	22.0	24.43	17.33	15.07	5.31
		32	43.142729	-81.784601	Or	1364	1969	105	22.0	21.91	15.95	14.27	4.52
		33	43.14274	-81.784757	Or	1364	1969	96	22.0	19.54	15.22	13.48	4.00
		34	43.142756	-81.784842	Or	1364	1969	173	24.0	41.02	18.45	19.53	9.57
		35	43.142761	-81.784944	Or	1136	1969	89	24.0	18.57	14.40	14.39	4.13
		36	43.142769	-81.785038	Or	909	1969	115	24.0	27.42	17.08	19.55	6.03
		37	43.142709	-81.785135	Or	682	1969	44	16.0	11.53	13.24	12.68	2.50
		38	43.142711	-81.785091	Or	1364	1969	127	24.0	27.88	16.83	16.10	6.17
		39	43.14267	-81.785001	Or	1364	1969	146	22.0	33.39	13.67	17.62	7.03
		40	43.142726	-81.785001	Or	1136	1969	103	24.0	22.44	19.14	15.82	5.19
		41	43.14272	-81.784954	Or	682	1969	93	24.0	22.48	19.03	20.44	5.18
		42	43.142697	-81.784922	Or	1364	1969	115	24.0	24.62	15.92	15.13	5.32
		43	43.142691	-81.784816	Or	1364	1969	98	20.0	19.97	12.65	13.62	4.14
		44	43.142711	-81.784737	Or	1364	1969	164	24.0	38.58	18.43	18.94	8.93
		45	43.142743	-81.784656	Or	1364	1969	94	22.0	19.07	14.25	13.31	3.93
		46	43.142736	-81.784587	Or	1364	1969	133	24.0	29.64	16.42	16.60	6.33
		47	43.142684	-81.784455	Or	1136	1969	116	24.0	26.24	14.42	17.11	5.71
		48	43.142672	-81.784403	Or	1364	1969	104	20.0	21.65	12.42	14.19	4.18

Study Site	Experiment	Plot #	Latitude DD	Longitude DD	Species	Density (stems/ha)	Year Established	Stocking (%)	Site Index	Basal Area (m^2/ha)	Average Height (m)	Quadratic Mean DBH (cm)	Mean Annual Increment (m^3/ha/yr)
Sylvan, cont.	R1, cont.	49	43.142652	-81.784355	Or	1136	1969	134	22.0	31.23	14.76	18.66	6.55
		50	43.142609	-81.78432	Or	1364	1969	96	20.0	19.52	14.85	13.47	3.83
		51	43.142609	-81.784355	Or	1591	1969	187	24.0	43.67	18.33	18.65	9.87
		52	43.142614	-81.78443	Or	1364	1969	106	22.0	22.27	13.98	14.39	4.46
		53	43.142658	-81.78452	Or	1364	1969	107	22.0	22.31	16.57	14.40	4.69
		54	43.142627	-81.7846	Or	1591	1969	123	22.0	25.67	14.41	14.30	5.21
	r10	1	43.142181	-81.784292	Wb	1818	1969	91	13.7	16.55	8.23	10.74	2.29
		2	43.142174	-81.784525	Wb	1818	1969	67	8.7	11.09	6.28	8.79	0.97
		3	43.14218	-81.784786	Wb	1818	1969	100	13.2	18.76	7.36	11.44	2.45
		4	43.142248	-81.785035	Wb	682	1969	54	13.5	11.36	11.13	14.53	1.67
		5	43.142345	-81.785122	Wb	1364	1969	100	15.5	20.43	10.82	13.78	3.40
		6	43.142324	-81.78492	Wb	909	1969	64	11.3	12.87	9.28	13.39	1.77
		7	43.142261	-81.784764	Wb	1364	1969	57	9.7	9.76	7.23	9.52	1.01
		8	43.14228	-81.784519	Wb	2045	1969	65	8.9	10.09	5.52	7.91	0.88
		9	43.142469	-81.78437	Wb	1364	1969	88	16.1	17.51	9.65	12.76	3.19
		10	43.142363	-81.784852	Wb	1818	1969	77	11.1	13.21	7.00	9.59	1.51
		11	43.142455	-81.785036	Wb	1364	1969	76	14.0	14.40	9.12	11.57	2.01
		12	43.142374	-81.785262	Wb	1364	1969	107	16.3	22.41	12.68	14.43	3.89
	r1a	1	43.141746	-81.784118	Bd	2273	1969	114	N/A	20.85	9.59	10.78	2.71
		2	43.141761	-81.784262	Bd	1591	1969	136	N/A	29.24	12.53	15.26	4.78
		3	43.141786	-81.784305	Bd	2045	1969	117	N/A	22.33	12.57	11.76	3.43
		4	43.141703	-81.784426	Bd	2727	1969	206	N/A	46.26	13.95	14.09	7.65
		5	43.141798	-81.784407	Bd	2045	1969	165	N/A	34.96	12.96	14.72	5.81
	r1a	6	43.141875	-81.78442	Bd	2045	1969	145	N/A	32.84	11.66	13.53	4.95
		7	43.141980	-81.784688	Bd	2727	1969	150	N/A	28.32	11.26	11.47	4.11
		8	43.141941	-81.784658	Bd	2273	1969	124	N/A	25.59	11.69	11.39	3.99
		9	43.141796	-81.784663	Bd	2045	1969	143	N/A	32.33	12.89	13.43	5.39
		10	43.141715	-81.784826	Bd	2273	1969	142	N/A	36.26	11.19	12.47	5.79
		11	43.14178	-81.784827	Bd	1364	1969	70	N/A	23.50	10.01	10.92	3.54
		12	43.142023	-81.784854	Bd	2500	1969	131	N/A	35.45	10.44	11.12	5.24
	r1x	1	43.142822	-81.784489	Or	619	1969	47	22.0	9.69	13.94	14.12	1.97
		2	43.142592	-81.784987	Or	1681	1969	134	24.0	28.17	14.58	14.61	5.93
		3	43.14224	-81.784828	Wb	1079	1969	57	13.8	10.55	8.26	11.15	1.28
	s2	1	43.142409	-81.7838	Mh	2892	1973	88	22.0	13.46	9.74	7.67	2.44
		2	43.141998	-81.783982	Mh	3529	1973	131	24.0	21.37	12.99	8.79	4.26
		3	43.141692	-81.783915	Mh	2771	1973	73	24.0	13.88	7.84	6.97	2.76
	s5	1	43.141093	-81.783094	Mh	1900	1976	126	22.0	25.11	12.46	12.97	5.08
Vander-kant	j6	1	43.169603	-81.655372	Pt Ow	3333	1969	229	N/A	59.79	9.64	13.25	7.19
	r7	1	43.168902	-81.655508	Ck Ca	2000	1973	314	N/A	78.14	13.50	22.30	12.05
		2	43.168792	-81.65568	Ck Ca	2609	1973	265	N/A	60.52	12.63	17.00	8.85
		3	43.168841	-81.655884	Ck Ca	2174	1973	181	N/A	39.27	9.76	15.00	4.84
		4	43.168895	-81.656043	Ck Ca	1739	1973	260	N/A	65.47	10.40	21.65	9.89
		5	43.16872	-81.656126	Ck Ca	2500	1973	104	N/A	31.65	7.30	9.52	4.11
		6	43.16879	-81.655888	Ck Ca	2174	1973	241	N/A	56.37	13.94	17.97	9.44
		7	43.168736	-81.655761	Ck Ca	2609	1973	204	N/A	43.35	10.23	14.39	5.99
		8	43.168736	-81.655535	Ck Ca	1500	1973	115	N/A	31.39	8.93	14.22	4.44
		1	43.169499	-81.654087	Aw	1724	1973	104	22.0	20.14	14.36	12.20	3.10
		2	43.169456	-81.654246	Aw	2800	1973	166	22.0	32.43	15.14	12.02	5.57
		3	43.16952	-81.654337	Aw	3077	1973	191	20.0	36.71	12.25	12.38	5.35
		4	43.169344	-81.654545	Aw	2143	1973	112	20.0	23.96	10.27	11.10	3.67

Study Site	Experiment	Plot #	Latitude DD	Longitude DD	Species	Density (stems/ha)	Year Established	Stocking (%)	Site Index	Basal Area (m^2/ha)	Average Height (m)	Quadratic Mean DBH (cm)	Mean Annual Increment (m^3/ha/yr)
Vanderkant, cont.	r7, cont.	5	43.169398	-81.65442	Aw	2857	1973	158	22.0	29.25	14.59	11.47	4.76
		6	43.169351	-81.654172	Aw	2143	1973	155	22.0	31.37	14.55	13.72	4.89
		7	43.169233	-81.653969	Aw	2500	1973	125	18.0	25.77	10.29	10.77	3.61
		8	43.169306	-81.654361	Aw	1071	1973	31	14.0	9.10	5.65	7.39	1.47
		9	43.16932	-81.654604	Aw	2857	1973	143	22.0	35.39	8.61	10.76	5.50
		10	43.169191	-81.654559	Aw	3214	1973	164	20.0	32.87	10.04	10.88	4.90
		11	43.169198	-81.654502	Aw	3571	1973	198	20.0	40.55	9.95	11.52	5.99
		12	43.169093	-81.654593	Aw	2857	1973	97	18.0	20.86	7.34	8.26	2.71
		13	43.169493	-81.654956	Wb	1786	1973	116	14.2	22.61	10.62	12.75	3.57
		14	43.16937	-81.655015	Wb	1786	1973	75	10.2	12.76	8.00	9.58	1.52
		15	43.169091	-81.654984	Wb	1429	1973	54	8.5	8.85	5.73	8.92	1.05
		16	43.169009	-81.655045	Wb	714	1973	35	9.4	6.22	7.55	10.58	0.70
		17	43.16914	-81.654967	Wb	2143	1973	68	8.9	12.16	4.96	7.91	1.22
		18	43.16922	-81.654876	Wb	2143	1973	85	10.6	14.02	6.92	9.17	1.72
		19	43.169382	-81.654893	Wb	1071	1973	62	12.9	7.76	9.75	11.82	1.14
		20	43.169498	-81.654826	Wb	2143	1973	121	14.5	18.92	10.80	11.67	3.19
		21	43.169518	-81.6547	Wb	2500	1973	98	13.2	18.50	7.13	9.12	2.65
		22	43.169408	-81.654727	Wb	2143	1973	106	12.8	19.09	9.35	10.70	2.69
		23	43.169223	-81.654706	Wb	2500	1973	130	13.1	23.62	7.36	11.02	3.25
		24	43.168997	-81.65484	Wb	2500	1973	75	8.8	11.20	4.77	7.59	1.05
	s3	1	43.169253	-81.653912	Mh	3636	1973	143	20.0	23.85	11.08	9.14	4.13
		2	43.169191	-81.653604	Mh	3214	1973	97	20.0	15.24	10.48	7.63	2.48
		3	43.16925	-81.653223	Mh	3944	1973	105	16.0	15.59	9.00	6.98	2.21

Note: Site index not always calculated due to lack of site index curves.

APPENDIX 3
TREATMENT SUMMARY TABLE

Study	Experiment	Exp. Type	Soil	Treatments	Weed Control
Amos	b12	Pure	imperfectly drained clay loam	Effects of planting black walnut in containers; also seed source information	6.0 kg/ha a.i. Simazine in 1983, 1984, 1985.
Amos	b4	Pure	imperfectly drained clay loam	Seed source treatment	6.0 kg/ha a.i. Simazine in 1979, 1980, 1981 plus spot treatments with 2.0 kg/ha a.i. Glyphosate in 1981, 1983.
Amos	c6	Mixed	gravelly loam over clay loam	Row treatments; seedling preparation	1979, rototilled between rows, glyphosate within rows; 1980, 1981, 1982, 4.0 kg/ha a.i. Simazine broadcast over entire area.
Amos	m18	Mixed	imperfectly drained clay loam	3.75 kg/ha a.i. of princep 80w applied in May 1980	
Amos	m18	Mixed	imperfectly drained clay loam	5.6 kg/ha a.i. of princep 80w applied in May 1980	
Amos	m18	Mixed	imperfectly drained clay loam	7.5 kg/ha a.i. of princep 80w applied in May 1980	
Amos	m18	Mixed	imperfectly drained clay loam	Control, no treatment	
Campground	b8	Pure	loam	Effects of various seed sources	5.0 kg/ha a.i. Simazine in 1981, 1982, 1983, 1986, 1989 plus spot treatments with 2kg/ha a.i. Glyphosate in 1983, 1986, 1989.
Campground	b9	Pure	clay loam	Three row treatments; 2+0 seedlings with roots pruned to 96" length; 2+0 seedlings unpruned; 3+0 seedlings with roots pruned to 96" length.	2.2 kg/ha a.i. Simazine in 1981, 4.4 kg/ha a.i. Simazine in 1982, 1983; 2.0 kg/ha a.i. Glyphosate in 1982 as spot treatment around trees; 2.5 kg/ha a.i. Terbacil broadcast.
Campground	c7	Pure	loam	Row treatments	1980, rototilled between rows; 6.0 kg/ha a.i. Simazine in 1981, 1982; 2 kg/ha a.i. Glyphosate broadcast between trees 1985; 2.5 kg/ha a.i. Terbacil in April 1990.

Study	Experi-ment	Exp. Type	Soil	Treatments	Weed Control
Campground	c8	Mixed	clay loam		4.4 kg/ha a.i. Simazine in 1982, 1983, 1984; 4.4kg/ha a.i. of Princep Nie-T broadcast over the total area shortly after planting and in April of 1983 and 1984
Campground	d1	Mixed	clay loam		2.2 kg/ha a.i. Simazine in 1980 and 4.4 kg/ha a.i. Simazine from 1981 to 1984; 2.0 kg/ha a.i. Glyphosate in 1984.
Campground	d2	Mixed	clay loam	Alternate rows of shagbark hickory and bitternut hickory	4.4 kg/ha a.i. Simazine 1981, 1982, 1983; 2.0 kg/ha a.i. Glyphosate in 1984.
Campground	hpAw	Pure	variable from sand to clay loam		4.0 kg.ha a.i. Simazine in 1985,1986, 1987. Rototilled between rows in 1986. 2.0 kg/ha a.i. Glyphosate within rows 1986-1989.
Campground	hpMh	Pure	variable from sand to clay loam		4.0 kg.ha a.i. Simazine in 1985,1986, 1987. Rototilled between rows in 1986. 2.0 kg/ha a.i. Glyphosate within rows 1986-1989.
Campground	hpWb	Pure	variable from sand to clay loam		
Campground	j8	Mixed	loam	2.2 kg/ha a.i. of active Simazine in 1975 and 1976.	
Campground	j8	Mixed	loam	4.5 kg/ha a.i. of active Simazine in 1975 and 1976.	
Campground	j8	Mixed	loam	Control; rototilling between rows and manual hoeing around the seedlings	
Campground	k3	Mixed	clay loam	Alternate row of black walnut and bur oak	5.6 kg/ha a.i. Simazine in 1980, 1981, 1982; 2.0 kg/ha a.i. Glyphosate between rows of trees in 1984; 2.5 kg/ha a.i. Terbacil broadcast over all plots in April 1990.
Campground	k3	Mixed	clay loam	Alternate rows of black walnut and autumn olive	5.6 kg/ha a.i. Simazine in 1980, 1981, 1982; 2.0 kg/ha a.i. Glyphosate between rows of trees in 1984; 2.5 kg/ha a.i. Terbacil broadcast over all plots in April 1990.
Campground	k3	Mixed	clay loam	Alternate rows of black walnut and black locust	5.6 kg/ha a.i. Simazine in 1980, 1981, 1982; 2.0 kg/ha a.i. Glyphosate between rows of trees in 1984; 2.5 kg/ha a.i. Terbacil broadcast over all plots in April 1990.
Campground	k3	Mixed	clay loam	Alternate rows of black walnut and white pine	5.6 kg/ha a.i. Simazine in 1980, 1981, 1982; 2.0 kg/ha a.i. Glyphosate between rows of trees in 1984; 2.5 kg/ha a.i. Terbacil broadcast over all plots in April 1990.

Study	Experiment	Exp. Type	Soil	Treatments	Weed Control
Campground	k3	Pure	clay loam	Black walnut	5.6 kg/ha a.i. Simazine in 1980, 1981, 1982; 2.0 kg/ha a.i. Glyphosate between rows of trees in 1984; 2.5 kg/ha a.i. Terbacil broadcast over all plots in April 1990.
Campground	k4	Mixed	clay loam	Individual spots with diameter of 1.2m; 4.7 kg/ha a.i. of Roundup applied in September 1979; 7.0 kg/ha a.i. of Princep 80w applied in May 1980, 1981, 1982.	
Campground	k4	Mixed	clay loam	Individual spots with diameter of 1.2m; 4.8 kg/ha a.i. of Kerb 50w applied in October 1979; 7.0 kg/ha a.i. of Princep 80w applied in May 1980, 1981, 1982.	
Campground	k4	Mixed	clay loam	Individual spots with diameter of 1.2m; 7.0 kg/ha a.i. of Princep 80w applied in May 1980, 1981, 1982.	
Campground	k4	Mixed	clay loam	Individual spots with diameter of 1.2m; control, no weed control	
Campground	k4	Mixed	clay loam	Strips 1.2m wide; 4.7 kg/ha a.i. of Roundup applied in September 1979; 7.0 kg/ha a.i. of Princep 80w applied in May 1980, 1981, 1982.	
Campground	k4	Mixed	clay loam	Strips 1.2m wide; 4.8 kg/ha a.i. of Kerb 50w applied in October 1979; 7.0 kg/ha a.i. of Princep 80w applied in May 1980, 1981, 1982.	
Campground	k4	Mixed	clay loam	Strips 1.2m wide; 7.0 kg/ha a.i. of Princep 80w applied in May 1980, 1981, 1982.	
Campground	k5	Mixed	loam	Alternate rows of black walnut and white pine	5.0 kg/ha a.i. Simazine broadcast in 1982, 1983, 1984. Spot treatments with 2.0 kg/ha a.i. glyphosate in 1987, 1989.
Campground	k5	Pure	loam	Black walnut spaced 1.5m x 1.5m	5.0 kg/ha a.i. Simazine broadcast in 1982, 1983, 1984. Spot treatments with 2.0 kg/ha a.i. glyphosate in 1987, 1989.
Campground	k5	Pure	loam	Black walnut spaced 3.0m x 1.5m	5.0 kg/ha a.i. Simazine broadcast in 1982, 1983, 1984. Spot treatments with 2.0 kg/ha a.i. glyphosate in 1987, 1989.
Campground	k5b	Mixed	loam	Alternate rows of black walnut and white pine	5.0 kg/ha a.i. Simazine applied in strips 1.0 m wide in 1982, 1983, 1984; 2.0 kg/ha a.i. Glyphosate broadcast in autumn 1987; 6.0 kg/ha a.i. Simazine Broadcast in 1988 and 1991.

Study	Experi-ment	Exp. Type	Soil	Treatments	Weed Control
Campground	k5b	Mixed	loam	Alternate rows of black walnut and white pine	5.0 kg/ha a.i. Simazine applied in strips 1.0 m wide in 1982, 1983, 1984; 2.0 kg/ha a.i. Glyphosate broadcast in autumn 1987. 6.0 kg/ha a.i. sprayed 1991.
Campground	k5b	Pure	loam	Black walnut spaced 1.5m x 1.5m	5.0 kg/ha a.i. Simazine applied in strips 1.0 m wide in 1982, 1983, 1984; 2.0 kg/ha a.i. Glyphosate broadcast in autumn 1987; 6.0 kg/ha a.i. Simazine Broadcast in 1988 and 1991.
Campground	k5b	Mixed	loam	Black walnut spaced 1.5m x 1.5m	5.0 kg/ha a.i. Simazine applied in strips 1.0 m wide in 1982, 1983, 1984; 2.0 kg/ha a.i. Glyphosate broadcast in autumn 1987. 6.0 kg/ha a.i. Simazine sprayed 1991.
Campground	k5b	Pure	loam	Black walnut spaced 3.0m x 1.5m	5.0 kg/ha a.i. Simazine applied in strips 1.0 m wide in 1982, 1983, 1984; 2.0 kg/ha a.i. Glyphosate broadcast in autumn 1987. 6.0 kg/ha a.i. Simazine sprayed 1991.
Campground	k5b	Pure	loam	Black walnut spaced 3.0m x 1.5m	5.0 kg/ha a.i. Simazine applied in strips 1.0 m wide in 1982, 1983, 1984; 2.0 kg/ha a.i. Glyphosate broadcast in autumn 1987; 6.0 kg/ha a.i. Simazine Broadcast in 1988 and 1991.
Campground	k8	Pure	clay loam	Black Walnut	4.0 kg/ha a.i. Simazine in 1984, 1985, 1986; 2.0 kg/ha a.i. Terbacil and 1.0 kg/ha a.i. Simazine in 1989, north side white ash 2.5 kg/ha a.i. Terbacil 1990
Campground	k8	Pure	clay loam	Black walnut and autumn olive interplanting	4.0 kg/ha a.i. Simazine in 1984, 1985, 1986; 2.0 kg/ha a.i. Terbacil and 1.0 kg/ha a.i. Simazine in 1989, north side white ash 2.5 kg/ha a.i. Terbacil 1990
Campground	k8	Mixed	clay loam	Black walnut and silver maple interplanting; 2 m between rows, 1.5 m within rows	4.0 kg/ha a.i. Simazine in 1984, 1985, 1986; 2.0 kg/ha a.i. Terbacil and 1.0 kg/ha a.i. Simazine in 1989, north side white ash 2.5 kg/ha a.i. Terbacil 1990
Campground	k8	Mixed	clay loam	Black walnut and silver maple interplanting; 3 m between rows, 1.5 m within rows	4.0 kg/ha a.i. Simazine in 1984, 1985, 1986; 2.0 kg/ha a.i. Terbacil and 1.0 kg/ha a.i. Simazine in 1989, north side white ash 2.5 kg/ha a.i. Terbacil 1990
Campground	k8	Mixed	clay loam	Black walnut and white ash interplanting	3.0 kg/ha a.i. Simazine in 1983, 4.0 kg/ha a.i. Simazine in 1984 and 1985; 2.0 kg/ha a.i. Glyphosate in July 1989.
Campground	k8	Mixed	clay loam	Black walnut and white ash interplanting	4.0 kg/ha a.i. Simazine in 1984, 1985, 1986; 2.0 kg/ha a.i. Terbacil and 1.0 kg/ha a.i. Simazine in 1989, north side white ash 2.5 kg/ha a.i. Terbacil 1990
Campground	k9	Pure	clay loam	Alternate rows of autumn olive already planted in 1981 and black walnut planted in 1984	3.0 kg/ha a.i. Simazine in 1981, 1982, 1983; 4.0 kg/ha a.i. Simazine in 1984, 1985, 1986; 2.0 kg/ha a.i. Terbacil in 1989 and 1990

Study	Experi-ment	Exp. Type	Soil	Treatments	Weed Control
Campground	k9	Pure	clay loam	Alternate rows of autumn olive and black walnut planted in 1983	3.0 kg/ha a.i. Simazine in 1981, 1982, 1983; 4.0 kg/ha a.i. Simazine in 1984, 1985, 1986; 2.0 kg/ha a.i. Terbacil in 1989 and 1990
Campground	k9	Pure	clay loam	Black walnut; 2x2m spacing	3.0 kg/ha a.i. Simazine in 1981, 1982, 1983; 4.0 kg/ha a.i. Simazine in 1984, 1985, 1986; 2.0 kg/ha a.i. Terbacil in 1989 and 1990
Campground	m20	Pure	clay loam	2.0 kg/ha a.i. Roundup; irrigated	
Campground	m20	Pure	clay loam	2.0 kg/ha a.i. Roundup; not irrigated	
Campground	m20	Pure	clay loam	6.0 kg/ha a.i. Princep + 2.0 kg/ha a.i. Roundup; irrigated	
Campground	m20	Pure	clay loam	6.0 kg/ha a.i. Princep + 2.0 kg/ha a.i. Roundup; not irrigated	
Campground	m20	Pure	clay loam	Rototilled and hoed; irrigated	
Campground	m20	Pure	clay loam	Rototilled and hoed; not irrigated	
Campground	m20	Pure	clay loam	Weeds mowed; irrigated	
Campground	m20	Pure	clay loam	Weeds mowed; not irrigated	
Campground	r11	Pure	clay loam		4.0 kg/ha a.i. Simazine in 1984, 1985, 1986; 2.0 kg/ha a.i. Terbacil and 1.0 kg/ha a.i. Simazine in 1989, north side white ash 2.5 kg/ha a.i. Terbacil 1990
Campground	r12	Mixed	variable from sand to clay loam		4.0 kg/ha a.i. Simazine in 1984, 1985, 1986; 2.0 kg/ha a.i. Terbacil and 1.0 kg/ha a.i. Simazine in 1989, north side white ash 2.5 kg/ha a.i. Terbacil 1990
Campground	s10	Pure	loam	Spacing 1.5m x 1.5m	4.4 kg/ha a.i. Simazine in 1981, 1982, 1983.
Campground	s10	Pure	loam	Spacing 3.0 x 1.5 m	4.4 kg/ha a.i. Simazine in 1981, 1982, 1983.
Campground	s4	Mixed	clay loam	Row treatments; seedling age and time of planting.	Rototilled between rows, hoeing around trees for 1975, 1976, 1977; rototilling between rows and 2.0 kg/ha a.i. Glyphosate within rows in 1978, 1979; 4.0 kg/ha a.i. Simazine over entire area in 1980, 1981.
Campground	s6	Pure	clay loam	Row treatments	Rototilled between rows and 2.0 kg/ha a.i. Glyphosate within rows in 1976, 1977, 1978; 4.0 kg/ha a.i. Simazine broadcast over entire area in 1980 and 1981.
Campground	s9	Pure	clay loam	1983 application of 200kg/ha N in the form of 680kg/ha of Ammonium Nitrate; 6.0 kg/ha a.i. Simazine in years 1981-1990 and spot treatments with 2.0 kg/ha a.i. Glyphosate; irrigated.	

Study	Experiment	Exp. Type	Soil	Treatments	Weed Control
Campground	s9	Pure	clay loam	1983 application of 200kg/ha N in the form of 680kg/ha of Ammonium Nitrate; mowed between rows in years 1981-1990; irrigated.	
Campground	s9	Pure	clay loam	6.0 kg/ha a.i. Simazine in years 1981-1990 and spot treatments with 2.0 kg/ha a.i. Glyphosate; not irrigated or fertilized.	
Campground	s9	Pure	clay loam	Mowing between trees in 1981-1990; not irrigated or fertilized.	
Campground	u3	Pure	loam	Spacing 1.8m x 1.8m	4.0 kg/ha a.i. Simazine in 1974, 1975, 1976.
Campground	u3	Pure	loam	Spacing 1.8m x 1.8m	4.0 kg/ha a.i. Simazine in 1974, 1975, 1976; 2.0 kg/ha a.i. Glyphosate 1986.
Campground	u3	Pure	loam	Spacing 1.8m x 1.8m	3.0 kg/ha a.i. Simazine in 1974, 1975, 1976.
Campground	u3	Pure	loam	Spacing 2.75m x 2.75m	4.0 kg/ha a.i. Simazine in 1974, 1975, 1976.
Campground	u3	Pure	loam	Spacing 2.75m x 2.75m	3.0 kg/ha a.i. Simazine in 1974, 1975, 1976.
Campground	u3	Pure	loam	Spacing 3.75m x 3.75m	4.0 kg/ha a.i. Simazine in 1974, 1975, 1976.
Campground	u3	Pure	loam	Spacing 3.75m x 3.75m	3.0 kg/ha a.i. Simazine in 1974, 1975, 1976.
Campground	v1	Mixed	loam	16 seedlings of each of the 10 species planted in four clusters of four consecutive seedlings within a row. Clusters randomly distributed within each treatment plot.	3.0 kg/ha a.i. Simazine in 1974, 1975, 1976; 2.0 kg/ha a.i. Glyphosate between rows of trees in summer 1979.
Campground	v1	Mixed	loam	16 seedlings of the 10 species planted in a specific row. Rows randomly distributed within each replication.	3.0 kg/ha a.i. Simazine in 1974, 1975, 1976; 2.0 kg/ha a.i. Glyphosate between rows of trees in summer 1979.
Campground	v2	Pure	loam	Unknown	3.3 kg/ha a.i. Simazine in 1975, 1976, 1977
Coulson	c5c7	Mixed	imperfectly drained clay loam	Determine the effects of temperature and packaging method on overwinter cold storage of hardwood seedlings	4 kg/ac a.i. Simazine in 1978, 79, 80. Spot treatment with 2.0 kg/ha a.i. Glyphosate in 1980 and 1982.
Coulson	c7	Pure	imperfectly drained clay loam	Determine the effects of temperature and packaging method on overwinter cold storage of hardwood seedlings	Rototilling between rows, 2.0 kg/ha a.i. Glyphosate within row in 1980. 3.0 kg/ha a.i. Simazine broadcast over entire area in 1981 and 1982.
Coulson	l1	Pure	imperfectly drained clay loam	Age of planting stock, 1+0, 1+1, 1+3; planting method, planting hole made with 10 inch auger or planting hole made with planting spade	9.0 kg/ha a.i. Simazine in 1968, 4.5 kg/ha a.i. Simazine in 1969 and 1970

Study	Experiment	Exp. Type	Soil	Treatments	Weed Control
Coulson	l1	Pure	imperfectly drained clay loam	Age of planting stock, 1+0, 1+1, 1+3; planting method, planting hole made with 10 inch auger or planting hole made with planting spade	4.5 kg/ha a.i. Simazine in 1968, 2.2 kg/ha a.i. in 1969 and 1970
Coulson	l2	Pure	imperfectly drained clay loam	Age of planting stock, planting method, fertilization combinations	4.5 kg/ha a.i. Simazine in 1969, 4.5 kg in 1970, 1971.
Coulson	l2	Pure	imperfectly drained clay loam	Age of planting stock, planting method, fertilization combinations	9.0 kg/ha a.i. Simazine in 1969, 1970, 1971.
Coulson	m1	Pure	imperfectly drained clay loam	Row treatments; weed control and age of planting stock related	
Coulson	m10	Mixed	imperfectly drained clay loam	Three rows, 3 treatments; Tr. 5 - 6 furrows plowed to one side, Tr. 6 - 3 furrows plowed from either side to the middle in spring, Tr. 8 - 3 furrows plowed to one side.	3.4 kg/ha a.i. Simazine in 1973, 1974, 1975.
Coulson	m10	Mixed	imperfectly drained clay loam	Two rows, two treatments; Tr. 2 - 3 furrows plowed from either side to the middle in autumn. Tr. 6 - 3 furrows plowed from either side to the middle in spring.	3.4 kg/ha a.i. Simazine in 1973, 1974, 1975.
Coulson	m10	Mixed	imperfectly drained clay loam	Two rows, two treatments; Tr. 2 - 3 furrows plowed from either side to the middle in autumn. Tr. 6 - 3 furrows plowed from either side to the middle in spring.	9.0 kg/ha a.i. Simazine in 1973, 1974, 1975.
Coulson	m12b	Pure	imperfectly drained clay loam		4.5 kg/ha a.i. Simazine in 1976, 1977, 1978
Coulson	m12b	Pure	imperfectly drained clay loam		6.7 kg/ha a.i. Simazine in 1976, 1977, 1978
Coulson	m13	Mixed	imperfectly drained clay loam	Control, no site preparation	3.4 kg/ha a.i. Simazine in 1978 and 4.5 kg/ha in 1979 and 1980.
Coulson	m13	Mixed	imperfectly drained clay loam	Spraying Roundup in July at 6.0 kg/ha a.i.	3.4 kg/ha a.i. Simazine in 1978 and 4.5 kg/ha a.i. in 1979 and 1980.
Coulson	m13	Mixed	imperfectly drained clay loam	Spraying Roundup in Sept. at 4.0 kg/ha a.i.	3.4 kg/ha a.i. Simazine in 1978 and 4.5 kg/ha a.i. in 1979 and 1980.
Coulson	m13	Mixed	imperfectly drained clay loam	Spraying Simazine in Nov. at 12.0 kg/ha a.i.	3.4 kg/ha a.i. Simazine in 1978 and 4.5 kg/ha a.i. in 1979 and 1980.
Coulson	m1ii	Pure	imperfectly drained clay loam	4.5 kg/ha a.i. princep April 1974 and 1975	

Study	Experiment	Exp. Type	Soil	Treatments	Weed Control
Coulson	m1ii	Pure	imperfectly drained clay loam	9.0 kg/ha a.i. princep April 1974 and 1975	
Coulson	m1ii	Pure	imperfectly drained clay loam	Control	
Coulson	m2	Pure	clay loam	Age of planting stock	Control
Coulson	m2	Pure	clay loam	Age of planting stock	9.0 kg/ha a.i. Simazine applied shortly after planting and 4.5 kg a.i. applied in the spring of the second and third growing season
Coulson	m2	Pure	clay loam	Age of planting stock	3.4 kg/ha a.i. Simazine applied shortly after planting and 2.2 kg a.i. in the spring of the second and third growing season
Coulson	m4	Mixed	imperfectly drained clay loam	1.7 kg/ha a.i. active granular Kerb 50w applied in autumn of 1970; 5 kg/ha a.i. Simazine applied April 1975, 1976	See 'Treatments' column
Coulson	m4	Mixed	imperfectly drained clay loam	1.7 kg/ha a.i. granular Kerb 50w applied in spring of 1971; 6.7 kg/ha a.i. Simazine applied April 1975, 1976	See 'Treatments' column
Coulson	m4	Mixed	imperfectly drained clay loam	1.7 kg/ha a.i. Kerb 50w applied in autumn of 1970; 1.7 kg a.i. Simazine applied April 1975, 1976	See 'Treatments' column
Coulson	m4	Mixed	imperfectly drained clay loam	1.7 kg/ha a.i. Kerb 50w applied in spring of 1971; 3.4 kg a.i. Simazine applied April 1975, 1976	See 'Treatments' column
Coulson	m4	Mixed	imperfectly drained clay loam	Control, no treatment	See 'Treatments' column
Coulson	m5	Mixed	imperfectly drained clay loam	Row treatments; interplanting with Sw	Wb - 6.7 kg/ha a.i. Simazine in 1971, 1972, 1973; Aw - 4.5 kg/ha a.i. Simazine in 1971, 1972, 1973.
Coulson	m6	Mixed	imperfectly drained clay loam	Row treatments; not measured. Effects of site preparation and weed control	9.0 kg/ha a.i. Simazine in 1972 and 4.5 kg/ha a.i. in 1973
Coulson	m6	Mixed	imperfectly drained clay loam	Row treatments; not measured. Effects of site preparation and weed control	3.4 kg/ha a.i. Simazine in 1972 and 2.2 kg/ha a.i. in 1973.
Coulson	n1	Pure	imperfectly drained clay loam	Planting hole made with planting spade; 5.0 grams of triple super-phosphate placed in bottom of planting hole	4.5 kg/ha a.i. Simazine in 1968, 1969 and 1970; Kerb application 1.7 kg/ha a.i. Over total area in April of 1971.
Coulson	n1	Pure	imperfectly drained clay loam	Planting hole made with planting spade; 5.0 grams of triple super-phosphate placed on one square foot of soil surface around each seedling	4.5 kg/ha a.i. Simazine in 1968, 1969 and 1970; Kerb application 1.7 kg/ha a.i. Over total area in April of 1971.

Study	Experiment	Exp. Type	Soil	Treatments	Weed Control
Coulson	n1	Pure	imperfectly drained clay loam	Planting hole made with planting spade; control, no fertilizer applied	4.5 kg/ha a.i. Simazine in 1968, 1969 and 1970; Kerb application 1.7 kg/ha a.i. Over total area in April of 1971.
Coulson	r6	Mixed	imperfectly drained clay loam	Interplanting of trees not previously planted in Ontario	4.5 kg/ha a.i. Simazine in 1978, 1979, 1980, 1981. Spot treatments with glyphosate 2.0 kg/ha a.i. in 1982, 1985.
Elson	k6	Mixed	clay loam	Alternate rows of black locust and black walnut	6.0 kg/ha a.i. Simazine in 1982, 1983, 1984 spot treatments with 2.0 kg/ha a.i. Glyphosate in 1988.
Elson	k6	Mixed	clay loam	Alternate rows of black walnut and silver maple	6.0 kg/ha a.i. Simazine in 1982, 1983, 1984 spot treatments with 2.0 kg/ha a.i. Glyphosate in 1988.
Elson	k6	Mixed	clay loam	Alternate rows of black walnut and white pine	6.0 kg/ha a.i. Simazine in 1982, 1983, 1984 spot treatments with 2.0 kg/ha a.i. Glyphosate in 1988.
Elson	k6	Mixed	clay loam	Pure walnut	6.0 kg/ha a.i. Simazine in 1982, 1983, 1984 spot treatments with 2.0 kg/ha a.i. Glyphosate in 1988.
Elson	k7	Mixed		Alternate rows of black walnut and autumn olive	6.0 kg/ha a.i. Simazine in 1983, 1984, 1985; 2.0 kg/ha a.i. Glyphosate around trees in 1988; 2.5 kg/ha a.i. Terbacil April 1990 where required
Elson	k7	Mixed		Black walnut and autumn olive alternate in the same row	6.0 kg/ha a.i. Simazine in 1983, 1984, 1985; 2.0 kg/ha a.i. Glyphosate around trees in 1988; 2.5 kg/ha a.i. Terbacil April 1990 where required
Elson	k7	Mixed		Pure walnut	6.0 kg/ha a.i. Simazine in 1983, 1984, 1985; 2.0 kg/ha a.i. Glyphosate around trees in 1988; 2.5 kg/ha a.i. Terbacil April 1990 where required
Kilgour	c6	Pure	well-drained sand	Row treatments; packaging	6.0 kg/ha a.i. Simazine shortly after planting and in April of 1982 and 1983; Spot treatments with 2.0 kg/ha a.i. Glyphosate in the summers of 1981 to 1984 to control field bindweed
Kilgour	s5	Pure	gravelly loam	Row treatments; age and size of planting stock	Rototilled between rows and 2.0 kg/ha a.i. Glyphosate within rows in 1976, 1977, and 1978; 4.5 kg/ha a.i. Simazine broadcast over entire area in 1979 and 1980.
Kilgour	v4	Mixed	changing with topography from loam to silt loam	Hardwoods interplanted with autumn olive; 1.5m x 1.5m	4.0 kg/ha a.i. Simazine shortly after planting and in April of 1982 and 1983; Spot treatments with 2.0 kg/ha a.i. Glyphosate in the summers of 1981 to 1984 to control field bindweed
Kilgour	v4	Mixed	changing with topography from loam to silt loam	Hardwoods interplanted with autumn olive; 3.0m x 1.5m	4.0 kg/ha a.i. Simazine shortly after planting and in April of 1982 and 1983; Spot treatments with 2.0 kg/ha a.i. Glyphosate in the summers of 1981 to 1984 to control field bindweed
Kilgour	v4	Mixed	changing with topography from loam to silt loam	Hardwoods; 1.5m x 1.5m	4.0 kg/ha a.i. Simazine shortly after planting and in April of 1982 and 1983; Spot treatments with 2.0 kg/ha a.i. Glyphosate in the summers of 1981 to 1984 to control field bindweed

Study	Experiment	Exp. Type	Soil	Treatments	Weed Control
Kilgour	v4	Mixed	changing with topography from loam to silt loam	Hardwoods; 3.0m x 1.5m	4.0 kg/ha a.i. Simazine shortly after planting and in April of 1982 and 1983; Spot treatments with 2.0 kg/ha a.i. Glyphosate in the summers of 1981 to 1984 to control field bindweed
Norwich	u2	Pure	clay loam	Spacing 3.0 x 1.5m	6.0 kg/ha a.i. Simazine in 1972, 1973, 1974; Spot treatments with 2.0 kg/ha a.i. Glyphosate in 1982
Norwich	u2	Pure	clay loam	Spacing 3.0m x 3.0m	6.0 kg/ha a.i. Simazine in 1972, 1973, 1974; Spot treatments with 2.0 kg/ha a.i. Glyphosate in 1982
Norwich	u2	Pure	clay loam	Spacing 4.5m x 3.0m	6.0 kg/ha a.i. Simazine in 1972, 1973, 1974; Spot treatments with 2.0 kg/ha a.i. Glyphosate in 1982
Norwich	u2	Pure	clay loam	Spacing 4.5m x 4.5m	6.0 kg/ha a.i. Simazine in 1972, 1973, 1974; Spot treatments with 2.0 kg/ha a.i. Glyphosate in 1982
Port Blake	m16	Pure	poorly drained clay	1+0 seedlings at 1.5m x 1.5m spacing	5.6, 4.5, and 3.0 kg/ha a.i. Simazine broadcast over the entire area in 1979, 1980 and 1981 respectively
Port Blake	m16	Pure	poorly drained clay	2+0 seedlings at 1.5m x 1.5m spacing	5.6, 4.5, and 3.0 kg/ha a.i. Simazine broadcast over the entire area in 1979, 1980 and 1981 respectively
Port Blake	m16	Pure	poorly drained clay	2+0 seedlings at 3.0m x 1.5m spacing	5.6, 4.5, and 3.0 kg/ha a.i. Simazine broadcast over the entire area in 1979, 1980 and 1981 respectively
Riley	r7	Pure	sandy loam over sand	200.0 kg/ha of N applied as 680 kg/ha of Ammomonium Nitrate	5.0 kg/ha a.i. Simazine in 1973 and 1974; 6.7 kg/ha a.i. Simazine in 1978, 1980, 1981 and 1984.
Riley	r7	Pure	sandy loam over sand	400.0 kg/ha of N applied as 1360 kg/ha of Ammomonium Nitrate	5.0 kg/ha a.i. Simazine in 1973 and 1974; 6.7 kg/ha a.i. Simazine in 1978, 1980, 1981 and 1984.
Riley	r7	Pure	sandy loam over sand	Control	5.0 kg/ha a.i. Simazine in 1973 and 1974; 6.7 kg/ha a.i. Simazine in 1978, 1980, 1981 and 1984.
Riley	r8	Pure	sandy loam over sand	100.0 kg/ha of N as 340 kg/ha of Ammonium Nitrate applied in the spring of 1980 and 1982 plus 6.7 kg/ha a.i. of Simazine applied in the spring of 1980, 1981 and 1982.	
Riley	r8	Pure	sandy loam over sand	100.0 kg/ha of N as 340 kg/ha of Ammonium Nitrate applied in the spring of 1980 and 1982 plus 6.7 kg/ha a.i. of Simazine applied in the spring of 1980, 1981 and 1982; 8.0 kg/ha a.i. Simazine and 50 kg/ha N in 1986.	
Riley	r8	Pure	sandy loam over sand	100.0 kg/ha of N as 340 kg/ha of Ammonium Nitrate applied in the spring of 1980 plus 6.7 kg/ha a.i. of Simazine applied in the spring of 1980, 1981.	

Study	Experiment	Exp. Type	Soil	Treatments	Weed Control
Riley	r8	Pure	sandy loam over sand	100.0 kg/ha of N as 340 kg/ha of Ammonium Nitrate applied in the spring of 1980 plus 6.7 kg/ha a.i. of Simazine applied in the spring of 1980, 1981; 8.0 kg/ha a.i. Simazine and 100.0 kg/ha N in 1986.	
Riley	r8	Pure	sandy loam over sand	200.0 kg/ha of N as 680 kg/ha of Ammonium Nitrate applied in the spring of 1980 plus 6.7 kg/ha a.i. of Simazine applied in the spring of 1980, 1981.	
Riley	r8	Pure	sandy loam over sand	200.0 kg/ha of N as 680 kg/ha of Ammonium Nitrate applied in the spring of 1980 plus 6.7 kg/ha a.i. of Simazine applied in the spring of 1980, 1981; 8.0 kg/ha a.i. Simazine and 200.0 kg/ha N in 1986.	
Riley	r8	Pure	sandy loam over sand	6.7 kg/ha a.i. of Simazine applied in the spring of 1980, 1981.	
Riley	r8	Pure	sandy loam over sand	6.7 kg/ha a.i. of Simazine applied in the spring of 1980, 1981; 8.0 kg/ha a.i. Simazine applied in 1986.	
Riley	r8	Pure	sandy loam over sand	Control	
Riley	r8	Pure	sandy loam over sand	Control; 8.0 kg/ha Simazine a.i. applied in 1986.	
Saddler	k2	Mixed	silt loam	To determine the effects of species age, species mixtures, fertilization and stem pruning on tree survival and growth	3.4 kg/ha a.i. of Simazine in April 1969. Rototilling between rows in June and July of 1969, 1970 and 1971
Schweitzer	j9	Mixed	clay loam	2.2 kg/ha Princep shortly after planting; 2.2 kg/ha Princep 1977; 2.2 kg/ha Princep 1978; spacing 1.5m x 1.5m	
Schweitzer	j9	Mixed	clay loam	2.2 kg/ha a.i. Princep shortly after planting; 4.5 kg/ha a.i. Princep 1977; 4.5 kg/ha a.i. Princep 1978; spacing 1.5m x 1.5m	
Schweitzer	j9	Mixed	clay loam	4.5 kg/ha a.i. Princep shortly after planting; 4.5 kg/ha a.i. Princep 1977; 4.5 kg/ha a.i. Princep 1978; spacing 1.5m x 1.5m	
Schweitzer	j9	Mixed	clay loam	4.5 kg/ha a.i. Princep shortly after planting; 6.7 kg/ha a.i. Princep 1977; 6.7 kg/ha a.i. Princep 1978; spacing 1.5m x 1.5m	
Schweitzer	j9	Mixed	clay loam	Control; rototilling between rows and hoeing around trees for 3 years; spacing 3.0m between x 1.5m within rows	

Study	Experiment	Exp. Type	Soil	Treatments	Weed Control
Schweitzer	r6	Mixed	clay loam	200.0 kg/ha N in spring 1980	3.8 kg/ha a.i. of Simazine in 1978-1980; 2.0 kg/ha a.i. of glyphosate as spot treatments in 1978-1982
Schweitzer	r6	Mixed	clay loam	400.0 kg/ha N in spring 1980	3.8 kg/ha a.i. of Simazine in 1978-1980; 2.0 kg/ha a.i. of glyphosate as spot treatments in 1978-1982
Schweitzer	r6	Mixed	clay loam	Control	3.8 kg/ha a.i. of Simazine in 1978-1980; 2.0 kg/ha a.i. of glyphosate as spot treatments in 1978-1982
Sylvan	j2	Pure	sand	1969 and 1970 - 1.1 kg/ha a.i. Simazine 50W	
Sylvan	j2	Pure	sand	1969 and 1970 - 3.4 kg/ha a.i. Simazine 50W	
Sylvan	j2	Pure	sand	1969 and 1970 - 5 kg/ha a.i. Simazine 50W	
Sylvan	j2	Pure	sand	1969 and 1970 - 6.7 kg/ha a.i. Simazine 50W	
Sylvan	m19	Pure	sand	1) control, no treatment 2) 2.8 kg/ha a.i. of Princep 80w applied in May 1980 3) 5.6 kg/ha a.i. of Princep 80w applied in May 1980	0, 2.8 or 5.6 kg/ha a.i. Simazine in 1980 and 4 and 3.0 kg/ha a.i. in 1981 and 1982 respectively
Sylvan	p3	Pure	sand	1968 - 2+2; Planting holes made with 10 inch soil auger; 3 foot wide cover of black plastic	
Sylvan	p3	Pure	sand	1968 - 2+2; Planting holes made with 10 inch soil auger; 3 foot wide cover of black plastic; 1972 - 3.4 kg/ha a.i. of Kerb; 6.7 kg/ha a.i. Princep; 1973 - 6.7 kg/ha a.i. Princep; 1974 - 6.7 kg/ha a.i. Princep	
Sylvan	p3	Pure	sand	1968 - 2+2; Planting holes made with 10 inch soil auger; 4.5 kg/ha a.i. Simazine	
Sylvan	p3	Pure	sand	1968 - 2+2; Planting holes made with 10 inch soil auger; 4.5 kg/ha a.i. Simazine; 1972 - 3.4 kg/ha a.i. of Kerb; 6.7 kg/ha a.i. Princep; 1973 - 6.7 kg/ha a.i. Princep; 1974 - 6.7 kg/ha a.i. Princep	
Sylvan	p3	Pure	sand	1968 - 2+2; Planting holes made with 10 inch soil auger; 6.7 kg/ha a.i. Simazine	
Sylvan	p3	Pure	sand	1968 - 2+2; Planting holes made with 10 inch soil auger; 6.7 kg/ha a.i. Simazine; 1972 - 3.4 kg/ha a.i. of Kerb; 6.7 kg/ha a.i. Princep; 1973 - 6.7 kg/ha a.i. Princep; 1974 - 6.7 kg/ha a.i. Princep	
Sylvan	p3	Pure	sand	1968 - 2+2; Planting holes made with 10 inch soil auger; control	

Study	Experiment	Exp. Type	Soil	Treatments	Weed Control
Sylvan	p3	Pure	sand	1968 - 2+2; Planting holes made with 10 inch soil auger; control; 1972 - 3.4 kg/ha a.i. of Kerb; 6.7 kg/ha a.i. Princep; 1973 - 6.7 kg/ha a.i. Princep; 1974 - 6.7 kg/ha a.i. Princep	
Sylvan	p3	Pure	sand	1968 - 2+2; Planting holes made with planting spade; 2.2 kg/ha a.i. Simazine	
Sylvan	p3	Pure	sand	1968 - 2+2; Planting holes made with planting spade; 2.2 kg/ha a.i. Simazine; 1972 - 3.4 kg/ha a.i. of Kerb; 6.7 kg/ha a.i. Princep; 1973 - 6.7 kg/ha a.i. Princep; 1974 - 6.7 kg/ha a.i. Princep	
Sylvan	p3	Pure	sand	1968 - 2+2; Planting holes made with planting spade; 3 foot wide cover of black plastic	
Sylvan	p3	Pure	sand	1968 - 2+2; Planting holes made with planting spade; 3 foot wide cover of black plastic; 1972 - 3.4 kg/ha a.i. of Kerb; 6.7 kg/ha a.i. Princep; 1973 - 6.7 kg/ha a.i. Princep; 1974 - 6.7 kg/ha a.i. Princep	
Sylvan	p3	Pure	sand	1968 - 2+2; Planting holes made with planting spade; 4.5 kg/ha a.i. Simazine	
Sylvan	p3	Pure	sand	1968 - 2+2; Planting holes made with planting spade; 4.5 kg/ha a.i. Simazine; 1972 - 3.4 kg/ha a.i. of Kerb; 6.7 kg/ha a.i. Princep; 1973 - 6.7 kg/ha a.i. Princep; 1974 - 6.7 kg/ha a.i. Princep	
Sylvan	p3	Pure	sand	1968 - 2+2; Planting holes made with planting spade; 6.7 kg/ha a.i. Simazine	
Sylvan	p3	Pure	sand	1968 - 2+2; Planting holes made with planting spade; 6.7 kg/ha a.i. Simazine; 1972 - 3.4 kg/ha a.i. of Kerb; 6.7 kg/ha a.i. Princep; 1973 - 6.7 kg/ha a.i. Princep; 1974 - 6.7 kg/ha a.i. Princep	
Sylvan	R1	Pure	sand	112.1 kg/ha a.i. ammonium nitrate	4.5 kg/ha a.i. Simazine in 1969-1971
Sylvan	R1	Pure	sand	112.1 kg/ha ammonium nitrate; 112.1 kg/ha potassium sulphate	4.5 kg/ha a.i. Simazine in 1969-1971
Sylvan	R1	Pure	sand	112.1 kg/ha ammonium nitrate; 112.1 kg/ha triple super phosphate; 56.0 kg/ha potassium sulphate	4.5 kg/ha a.i. Simazine in 1969-1971
Sylvan	R1	Pure	sand	112.1 kg/ha ammonium nitrate; 56.0 kg/ha potassium sulphate	4.5 kg/ha a.i. Simazine in 1969-1971
Sylvan	R1	Pure	sand	112.1 kg/ha ammonium nitrate; 56.0 kg/ha triple super phosphate	4.5 kg/ha a.i. Simazine in 1969-1971

Study	Experiment	Exp. Type	Soil	Treatments	Weed Control
Sylvan	R1	Pure	sand	112.1 kg/ha ammonium nitrate; 56.0 kg/ha triple super phosphate; 112.1 kg/ha potassium sulphate	4.5 kg/ha a.i. Simazine in 1969-1971
Sylvan	R1	Pure	sand	112.1 kg/ha ammonium nitrate; 56.0 kg/ha triple super phosphate; 56.0 kg/ha potassium sulphate	4.5 kg/ha a.i. Simazine in 1969-1971
Sylvan	R1	Pure	sand	112.1 kg/ha ammonium nitrate; 112.1 kg/ha triple super phosphate; 112.1 kg/ha potassium sulphate	4.5 kg/ha a.i. Simazine in 1969-1971
Sylvan	R1	Pure	sand	112.1 kg/hapotassium sulphate	4.5 kg/ha a.i. Simazine in 1969-1971
Sylvan	R1	Pure	sand	112.1 kg/ha triple super phosphate	4.5 kg/ha a.i. Simazine in 1969-1971
Sylvan	R1	Pure	sand	112.1 kg/ha triple super phosphate; 112.1 kg/ha potassium sulphate	4.5 kg/ha a.i. Simazine in 1969-1971
Sylvan	R1	Pure	sand	112.1 kg/ha triple super phosphate; 56.0 kg/ha potassium sulphate	4.5 kg/ha a.i. Simazine in 1969-1971
Sylvan	R1	Pure	sand	224.2 kg/ha ammonium nitrate	4.5 kg/ha a.i. Simazine in 1969-1971
Sylvan	R1	Pure	sand	224.2 kg/ha ammonium nitrate; 112.1 kg/ha potassium sulphate	4.5 kg/ha a.i. Simazine in 1969-1971
Sylvan	R1	Pure	sand	224.2 kg/ha ammonium nitrate; 112.1 kg/ha triple super phosphate	4.5 kg/ha a.i. Simazine in 1969-1971
Sylvan	R1	Pure	sand	224.2 kg/ha ammonium nitrate; 112.1 kg/ha triple super phosphate; 56.0 kg/ha potassium sulphate	4.5 kg/ha a.i. Simazine in 1969-1971
Sylvan	R1	Pure	sand	224.2 kg/ha ammonium nitrate; 112.1 kg/ha triple super phosphate; 112.1 kg/ha potassium sulphate	4.5 kg/ha a.i. Simazine in 1969-1971
Sylvan	R1	Pure	sand	224.2 kg/ha ammonium nitrate; 56.0 kg/ha potassium sulphate	4.5 kg/ha a.i. Simazine in 1969-1971
Sylvan	R1	Pure	sand	224.2 kg/ha ammonium nitrate; 56.0 kg/ha triple super phosphate	4.5 kg/ha a.i. Simazine in 1969-1971
Sylvan	R1	Pure	sand	224.2 kg/ha ammonium nitrate; 56.0 kg/ha triple super phosphate; 112.1 kg/ha potassium sulphate	4.5 kg/ha a.i. Simazine in 1969-1971
Sylvan	R1	Pure	sand	224.2 kg/ha ammonium nitrate; 56.0 kg/ha triple super phosphate; 56.0 kg/ha potassium sulphate	4.5 kg/ha a.i. Simazine in 1969-1971
Sylvan	R1	Pure	sand	56.0 kg/ha potassium sulphate	4.5 kg/ha a.i. Simazine in 1969-1971
Sylvan	R1	Pure	sand	56.0 kg/ha triple super phosphate; 112.1 kg/ha potassium sulphate	4.5 kg/ha a.i. Simazine in 1969-1971
Sylvan	R1	Pure	sand	56.0 kg/ha triple super phosphate; 56.0 kg/ha potassium sulphate	4.5 kg/ha a.i. Simazine in 1969-1971
Sylvan	R1	Pure	sand	Control, no treatment	4.5 kg/ha a.i. Simazine in 1969-1971

Study	Experi-ment	Exp. Type	Soil	Treatments	Weed Control
Sylvan	r10	Pure	sand	Not positive	6.7 kg/ha a.i. Simazine in 1969-1971; 9.0 kg/ha a.i. Simazine in 1975 and 1976
Sylvan	r1a	Pure	sand	224.2 kg/ha of N plus 112.1 kg/ha of P applied as 500 lb of triple super phosphate	4.5 kg/ha a.i. Simazine in 1969-1971; 4.5 kg/ha in April 1975, 1976, 1977
Sylvan	r1a	Pure	sand	448.3 kg/ha of N plus 112.1 kg/ha of P applied as 500 lb of triple super phosphate	4.5 kg/ha a.i. Simazine in 1969-1971; 4.5 kg/ha a.i. in April 1975, 1976, 1977
Sylvan	r1a	Pure	sand	Not positive	4.5 kg/ha a.i. Simazine in 1969-1971; 4.5 kg/ha a.i. in April 1975, 1976, 1977
Sylvan	r1x	Pure	sand		
Sylvan	s2	Pure	sand		Mowing between trees for 5 years followed by 4.5 kg/ha a.i. Simazine in years 6-10.
Sylvan	s2	Pure	sand		2.0 kg/ha a.i. Paraquat in years 1-3 followed by 4.5 kg/ha a.i. Simazine in years 6-10.
Sylvan	s2	Pure	sand		Rototilling between rows and manual hoeing in years 1-3 followed by 4.5 kg/ha a.i. Simazine in years 6-10.
Sylvan	s5	Pure	sand	1) 2+0 seedlings 2) 3+0 seedlings 3) 4+0 seedlings 4) 2+1 transplants 5) 2+3 transplants	2.0 kg/ha a.i. Simazine in 1976-78, rototilling between rows and 2.0 kg/ha a.i. Paraquat within rows in 1977-78.
Vanderkant	j6	Mixed	poorly drained clay loam		
Vanderkant	j7	Mixed	clay loam	2.2 kg/ha a.i. Princep in 1974 and 1975	
Vanderkant	j7	Mixed	clay loam	4.5 kg/ha a.i. Princep in 1974 and 1975	
Vanderkant	j7	Mixed	clay loam	6.7 kg/ha a.i. Princep in 1974 and 1975	
Vanderkant	j7	Mixed	clay loam	Control (plot rototilled)	
Vanderkant	r7	Pure	clay loam	200.0 kg/ha of N applied as 680 kg/ha of Ammonium Nitrate	4.5 kg/ha a.i. Simazine in spring of 1979 and 1980
Vanderkant	r7	Pure	clay loam	200.0 kg/ha of N applied as 680 kg/ha of Ammonium Nitrate	6.7 kg/ha a.i. Simazine in 1979, 1980.
Vanderkant	r7	Pure	clay loam	200.0 kg/ha of N applied as 680 kg/ha of Ammonium Nitrate	6.7 kg/ha a.i. Simazine in 1979, 1980; 6.7 kg/ha a.i. Simazine 1984, 1985, 1986.

Study	Experi-ment	Exp. Type	Soil	Treatments	Weed Control
Vanderkant	r7	Pure	clay loam	400.0 kg/ha of N applied as 1360 kg/ha of Ammonium Nitrate	4.5 kg/ha a.i. Simazine in spring of 1979 and 1980
Vanderkant	r7	Pure	clay loam	400.0 kg/ha of N applied as 1360 kg/ha of Ammonium Nitrate	6.7 kg/ha a.i. Simazine in 1979, 1980; 6.7 kg/ha a.i. Simazine 1984, 1985, 1986.
Vanderkant	r7	Pure	clay loam	400.0 kg/ha of N applied as 1360 kg/ha of Ammonium Nitrate	6.7 kg/ha a.i. Simazine in 1979, 1980.
Vanderkant	r7	Pure	clay loam	Control	4.5 kg/ha a.i. Simazine in spring of 1979 and 1980
Vanderkant	r7	Pure	clay loam	Control	6.7 kg/ha a.i. Simazine in 1979, 1980.
Vanderkant	r7	Pure	clay loam	Control	6.7 kg/ha a.i. Simazine in 1979, 1980; 6.7 kg/ha a.i. Simazine 1984, 1985, 1986.
Vanderkant	s3	Pure	clay loam	4.7l/ha of Gramoxone sprayed around individual trees in June, July, August for the first three years after planting	
Vanderkant	s3	Pure	clay loam	Mowing with power mower in June, July, August of the first three years after planting	4.5 kg/ha a.i. Simazine in 1978-1984.
Vanderkant	s3	Pure	clay loam	Rototilling between rows and manual hoeing around individual trees in June, July, August of the first three years after planting	4.5 kg/ha a.i. Simazine in 1978-1984.

APPENDIX 4
SELECTED EXPERIMENT SURVEY NOTES AND DESCRIPTIONS

CAMPGROUND

Horse Pasture – Aw, Wb, Mh

The old horse pasture is broken up into four sections of species: white ash, black walnut, hard maple and mixed nut species (butternut, heartnut, buart nut). The mixed nut area was in poor condition and we decided not to measure these exotic species. The fertilization on this experiment was not carried out because of research curtailment. This entire area was well-drained (except parts of mixed nut area). White ash and hard maple were very consistent in growth with little mortality. Much of the walnut was dead or is growing very poorly. An area of walnut that exhibited good growth was measured.

R12 – Wb

A large experiment containing walnut spaced 1.5 x 3.0 m throughout. Growth was extremely poor on the east end of the experiment and got progressively better slightly uphill to the west. Drainage was moderate with some low spots where silver maple had been planted. Autumn olive, which had not been planted here, was particularly abundant, sometimes making it difficult to navigate.

R11 – Wb, Aw, Ms

A large site of walnut/white ash inter-planting with silver maple planted in the wetter areas. A large, seasonally wet area transects through the middle of this experiment where growth of all species is extremely poor, if the trees were still living. In the more productive areas, the ash appeared to outgrow the latter, restricting the walnut growth. Most areas with ash grew well.

K8 – Wb, Aw, Ms, Olive

An inter-planting experiment with five different treatments at 1.5 x 3.0 m and 1.5 x 2.0 m spacing (three reps). (1) Pure close-spaced walnut blocks were generally in good condition with consistent performance. One block in the northwest corner had a high rate of mortality due to poor drainage. (2) Walnut/ash blocks showed very good ash growth while walnut performance was relatively poor; all blocks were well-drained. (3) and (4) Walnut/silver maple blocks (1.5 x 2.0 m, 1.5 x 3.0 m) exhibited almost 100% mortality of silver maple. Walnut growth was average. (5) Walnut/autumn olive blocks had the best walnut growth on the site. This may be because there was 100% mortality in olive, thus doubling the amount of growing space for walnut.

D2 – Hs, Hb, Olive

Two treatments, one with both hickory species and the other with both hickory species interplanted with autumn olive. Only the pure hickory treatments were re-measured. This site was well-drained except for the northwestern block, which had high mortality and a variety of other species growing in it. On blocks with better conditions, both shagbark and bitternut hickory were growing very well.

C8 – Wb, Or, Bd, Bw, Ow, Ms

This was a mixed species experiment. Three plots were recorded on this well-drained site. The northern side of the plot appeared a bit wetter, judging by the species growing on site (European alder). Two rows of walnut and

two rows of red oak were sampled separately side by side. Both of these plots expressed good growth. The third plot characterized the whole experiment; we sampled several rows of each species. Walnut had been severely encumbered by vines and was growing very poorly; red and white oak and basswood demonstrated good growth while silver maple and white birch were mostly dead.

X1 – Aw, Wb, Ms

This experiment is not found in the GLFC Study Registry or other document collections. It is a poorly drained site with three distinct sections. (1) Walnut/ash inter-planting had variable growth from the west to the east of the experiment, but in general, it was poor and had considerable mortality. (2) Silver maple had excellent growth in a very wet area. Many large stems were growing from each individual tree and had low mortality. (3) Pure white ash showed average growth and low mortality.

K9 – Wb, Olive

This was a large experiment to determine walnut growth when interplanted with autumn olive at different spacings. The area was well-drained and bordered with windrows of Norway spruce. (1) 1.3 x 3.0 m spaced walnut/olive demonstrated the best growth for walnut and almost 100% mortality in olive. (2) Close-spaced inter-planting of the two species showed considerably less growth. (3) Pure walnut showed average growth. The site was highly variable, but showed generally poor growth.

K5 (b) – Wb, Pw, Ae

K5 and K5b are replicates of each other; the difference being that K5b was treated with mechanical weed control and Simazine in 1988 and 1991, respectively. European alder had spread throughout the north section of K5. Three treatments were measured for both K5 and K5b. In general, K5b had better growth throughout all treatments and was slightly better drained. Mortality in white pine was variable but averaged approximately 50%. A very wet spot accounted for no presence of the planted species in the northern section of K5b.

M20 – Wb

Twenty-four plots of twenty-four trees, this experiment had two treatments. Four weed control treatments occurred within irrigated and non-irrigated sections. The site appeared to have moderate drainage and the weed control treatments appeared to show differences in walnut growth.

S9 – Wb, Mh

Similar to experiment M20, this experiment combined weed control treatments with irrigation treatments. In 1983, fertilizers were applied to the northern half of each block. The walnut section had good growth and all blocks were measured. The hard maple was in very poor condition and only two blocks remained intact enough to be measured.

K3 – Wb, Ob, Pw, Lb, Olive, Ae

European alder blocks were not included in our sampling. Walnut interplanted with olive had exceptional growth; almost all olive was dead, leaving widely spaced walnut. There was a very high mortality rate in black locust plantings. Bur oak grew well on the site and white pine grew well but showed significant mortality. This site was relatively elevated compared to the rest of the campground and had very good drainage.

C7 – Wb, Or

Exceptional growth of red oak as the experimental site sloped down, very poor growth of walnut was observed. A wet area covers some of the walnut section where much of the walnut has died. Red oak growth was characterized by very tall trees reaching over 19 m.

K4 – Wb, Pw

The treatments in this experiment are defined by different Princep 9T® (Simazine) applications for select rows. The site has a rolling topography and is bordered by the railroad tracks to the south and a stream to the southwest. Growth of walnut was variable depending on the amount of white pine on site. White pine had a much lower survival rate in the lower portion of the site.

S10 – Mh, Olive

This is a spacing and olive inter-planting experiment where the olive/hard maple blocks were almost completely dead. Measurements of wide-and close-spaced hard maple showed good growth but had significant mortality. The site was well-drained and sloped slightly to the north.

D1 – Aw, Hs

This experiment appears to have been modified from its original design. It is located at the back of a large field and many of the original species have been replaced with white ash. Growth rates were average for the two species. The site was well-drained.

B8 – Wb

Seed source experiment at 1.5 x 3.0 m spacing. Site was well-drained and all trees demonstrated very poor growth.

B9 – Hs

Treatments were row-based and involved seedling preparation. The experiment is surrounded by spruce windbreaks on the south and west sides. A well-drained site with average shagbark hickory growth.

U3 – Ms, Aw

This is a large 6', 9' and 12' spacing experiment covering most of the western section of the campground. Most of the site was well-drained except the northwest corner. Silver maple growth was good on surviving trees (high mortality) and more prominent in the wet area mentioned above. White ash had very good growth in each block and performance was relative to the spacing.

S6 – Mh

This L-shaped experiment is on a well-drained site near the western entrance of the planting area. As with other hard maple plantings, there was consistent performance and average growth.

V1 – Wb, Aw, Ow, Lb, Bd, Or, Ca, Ms, Am, Sy

This experiment is a large multi-species planting with exceptional growth, flat and well-drained. Low survival was exhibited for mountain ash and black locust. Species of exceptional growth included walnut, catalpa, white ash, silver maple and basswood reaching diameters over 30 cm and heights over 20 m.

S4 – Mh

Small strip (200m) of hard maple, five rows wide. This experiment showed poor growth, site was flat but well-drained.

V2 – Pt, Cb, Ow, Wb, Aw, Or, Bd, Sy, Bn, Ms, Mh, Cot, Ma, Lt

A mixed planting experiment containing a variety of species. This is a relatively flat, well-drained site. Growth was very good throughout, but high mortality was noted for butternut and amur maple. Excellent growth was noted for white ash, basswood, thornless locust, black cherry and tulip poplar.

RILEY

R7 – Wb

This is a flat site with good drainage located west of the railway past the first bridge. The plantation was in excellent condition and clearly marked with old metal stakes. Growth was moderate with little mortality. Every block was measured enabling detailed analysis per treatment.

R8 – Wb

Similar site to R7, but a low wet area in the middle of the experiment hindered growth. The rest of the site had average growth depending on treatment. Blocks cannot be found using rows, as they change direction throughout the experiment. Some metal stakes still remain from previous measurements and were used in identifying blocks.

ELSON

K6 – Wb, Pw, Ms, Lb

A walnut inter-planting experiment. This was a well-drained area on the north side of the Parkhill reservoir. High mortality was found in all the interplanted species. Walnut growth was similar between interplanted species.

K7 – Wb

A walnut/autumn olive inter-planting experiment with most olive dead, although high quantities of olive were found in the pure walnut section where they were not planted. Aside from a small wet section in the middle of the experiment, the site was well-drained and had good growth within the olive inter-plantings and poor growth in the pure walnut block.

PORT BLAKE

M16 – Ow, Ob, Oe, Bd

Four species planted at different spacings. This site is flat and well-drained. Bur oak and European oak grew very well, where white oak appeared to have failed completely. Basswood experienced average growth at medium spacing and was not present throughout the rest of the experiment.

VANDERKANT

S3 – Mh

Soil amendment and weed control experiment located on the north side of the Parkhill Conservation Area. An upland site with very good drainage, average growth and little mortality. The southern end of the experiment drops steeply into a valley.

R7 – Wb, Aw

Average growth for both of these species. It is a well-drained site located adjacent to S3. Ash appeared to be better suited to the site than the walnut and growth was more consistent. Minimal mortality was found in both species.

R2 – Pt, Ow, Wb

Only one block was still intact. It was decided to only measure species of interest and some abundance: tulip poplar and white oak. The site was well-drained in the west and poorly drained in the east. Many missing and dead trees throughout the experiment area.

J7 – Ca, Ck

Excellent growth of catalpa and Kentucky coffeetree. The experiment includes multiple species: Russian olive, Japanese quince, serviceberry, sycamore, lilac, European mountain ash, butternut. Site was well-drained and relatively flat.

AMOS

B4 – Wb

A small experiment with poor growth and high mortality. Trees were progressively worse on the northern portion of the experiment due to a wet area.

B12 – Wb

Another small experiment originally designed to investigate seed sources. Growth is very similar to B4.

C6 – Wb, Bw, Mh

This experiment was split into two treatments. (1) Walnut and white birch is interplanted. Walnut had poor growth and birch, when alive, had good growth. (2) grew both poorly and well; both were measured to illustrate the differences. The site was well-drained and sloping slightly north.

M18 – Ms, Ck, Mm, Lt, Mh, Hk

Variability in growth from the east to the west sides of the experiment. Thornless locust grew well and had less mortality than most other species on site. Overall, growth on this site was very poor. The site is near the road and has a wet area in the south end.

SCHWEITZER

J9 – Bn, Hb, Cb, Cot, Bw, Ca

A large mixed planting experiment which experienced variable growth from one end of the site to the other. High mortality was found for white birch, black cherry and butternut throughout the experiment. Growth in bitternut hickory was not great, but was very consistent in showing little mortality. Good growth was observed in both cottonwood and catalpa. The site was moderately drained with a creek transecting the southern border.

R6 – Oe, Ow, Bn

An experiment to determine fertilizer effects, R6 has an assortment of mortality rates and good growth throughout the blocks. This site was poorly drained and may hold seasonal water. White oak showed good growth and the least amount of mortality. English oak had high mortality; the dead trees appeared to have died recently as they were quite large. Butternut growth was variable; most stems were dead or growing poorly.

KILGOUR

V4 – Aw, Wb, Ms, Mm, Hk, Bn, Am, Bd, Olive (South Kilgour)

A small mixed species experiment with rolling topography and good drainage. Spacing differences accounted for some of the differences in growth. Some very large black walnut and white ash were found at this site.

C6 – Or (North Kilgour)

This small experiment demonstrates good growth of red oak. A trail had been cut through the middle of the experiment for hydro lines. It appears that white birch had also been planted on site in places where oak had possibly died. Well-drained site.

S5 – Mh (North Kilgour)

Very consistent experiment with almost no mortality. This very secluded plantation was surrounded by a large uphill slope to the west and a spruce plantation to the east and north. Growth was good and consistent throughout.

NORWICH

U2 – Wb

Black walnut spacing trial. The site sloped gradually from east to west about 15%. Growth varied depending on treatment and site location. Growth at the bottom of the slope was much poorer than that at the top. Also a large amount of cankers were noticed on the walnut throughout the experiment.

SYLVAN

S5 – Mh

Small row treated experiment with good drainage and average growth located on the south side of the laneway. Some mortality was present.

M19 – Ck

A mixed species experiment where only the Kentucky coffee tree was measured because of its good growth. Only one row, comprised of about 15 trees.

S2 – Mh

The southern section of this experiment is in poor shape due to poor drainage and ingrowth of other species. The rest of the experiment varied from poor to excellent growth in some rows.

R1A – Bd

Blocks in this experiment were very easy to identify because of the spacing between each block (same for Exp. R10 and R1). Growth was very good in all blocks, drainage was good and the site had relatively flat topography. Original treatments involved applying different dosages of fertilizers; a second application of fertilizer treatments was completed in 1981.

R10 – Wb

Moderate growth in this experiment located between the basswood and red oak experiments. Topography is flat; drainage is good. Large amounts of wild raspberry are growing within this experiment. Original treatments included the application of different dosages of fertilizers; a second application of fertilizer treatments were completed in 1981.

R1 – Or

Fifty blocks were measured capturing many large red oaks. The easterly portion of the experiment demonstrated very poor survival. Large amounts of ingrowth were found here, including white ash, Scots pine, white pine and white elm. Original treatments included applying different dosages of fertilizers; a second application of fertilizer treatments were completed in 1981.

P3 – Or

Excellent growth expressed in this experiment. It was thinned in 1986 to promote crop trees, had good drainage and flat topography. Blocks were found with ease as previously used metal stakes were easily located.

J2 – Bd

Small basswood experiment located just north of laneway. Appeared to have moderate drainage and a high percentage of mortality. Trees that were still present were growing well. Many multi-stem trees were also found here.

COULSON

C5/C7 – Bd, Aw

The southern portion of this experiment had been removed for access. Basswood was growing well with ash performing poorly. Drainage was good and many multi-stem basswood are present.

C5,6 – Wb

Complete failure. Silver maple had been used to refill this area.

C7 – Ms, Aw

Poor growth of silver maple and ash. Many multi-stem maple. Poor drainage.

K4 – Wb

Low survival rates were observed in this small experiment. Variable growth within experiment and had poplar ingrowth from nearby experiments, which are starting to take over the site.

L-1 – Bd, Aw, Wb

White ash section had completely failed. A neighbor mentioned a small fire had come through this experiment. Basswood exhibited poor growth. Black walnut had excellent growth. Its location next to the creek and good drainage enabled this species attain maximum growth.

L-2 – Aw, Bd

Another site with excellent growth mainly due to it location near the creek. The pruning of the walnuts produced excellent, clear bole heights.

M1 – Aw, Wb

This experiment had some of the poorest growth of both walnut and ash, but still surviving.

M2 – Aw, Bd

All sections of this experiment were near the creek. Accordingly, the walnut grew exceptionally well with some of the tallest walnuts recorded throughout all sites and experiments.

M4 – Wb, Bd, Aw

Walnut had completely died, where basswood and ash were growing well. Well-drained site near highway.

M5 – Sw, Wb, Aw

White spruce had died off due to walnut roots, thus leaving plenty of room for the walnut to grow. This well-drained site had good growth of walnut and ash.

M6 – Wb, Pw, Mh, Aw, Cot

All four hardwoods were interplanted with white pine. The sugar maple block had completely failed. Cottonwood/pine had good growth, but cottonwood survival was poor. This was the same for the white ash block. Walnut/pine had severe die off of the pine due to root touching with walnut and the walnut were growing well with good form and survival.

M12B – Po, Ms, Aw, Bd, Wb

All blocks had very good survival. Growth was average among all species. Well-drained.

M13 – Aw, Pw, Sw

White ash was interplanted with white spruce and white pine. Very good growth of the conifers and poor growth of white ash.

N1 – Aw, Bd

White ash had failed completely and basswood was growing very well.

R4 – Wb

This experiment had failed completely.

R6 – Hs, Ow, Hb, Bn Oe, Mm, Lt, Ck, Ob

Mixed experiment with variable growth. European oak was the dominant species in every block. Very poor growth of Kentucky coffee tree, white oak, bitternut hickory and butternut where alive. Bur oak had good survival but poor growth. Poorly drained.