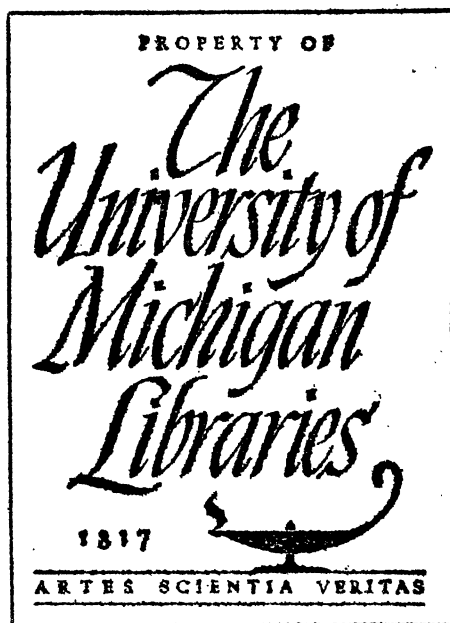
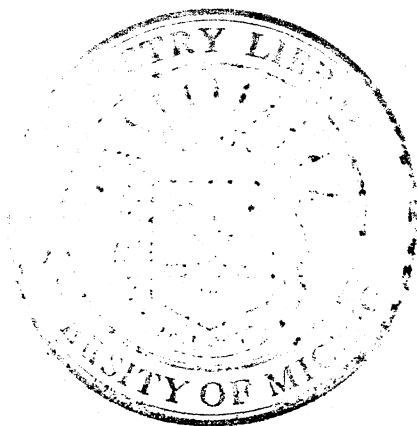


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A STUDY OF REPRODUCTION
IN A
HARDWOOD FOREST
OF
SOUTHERN MICHIGAN

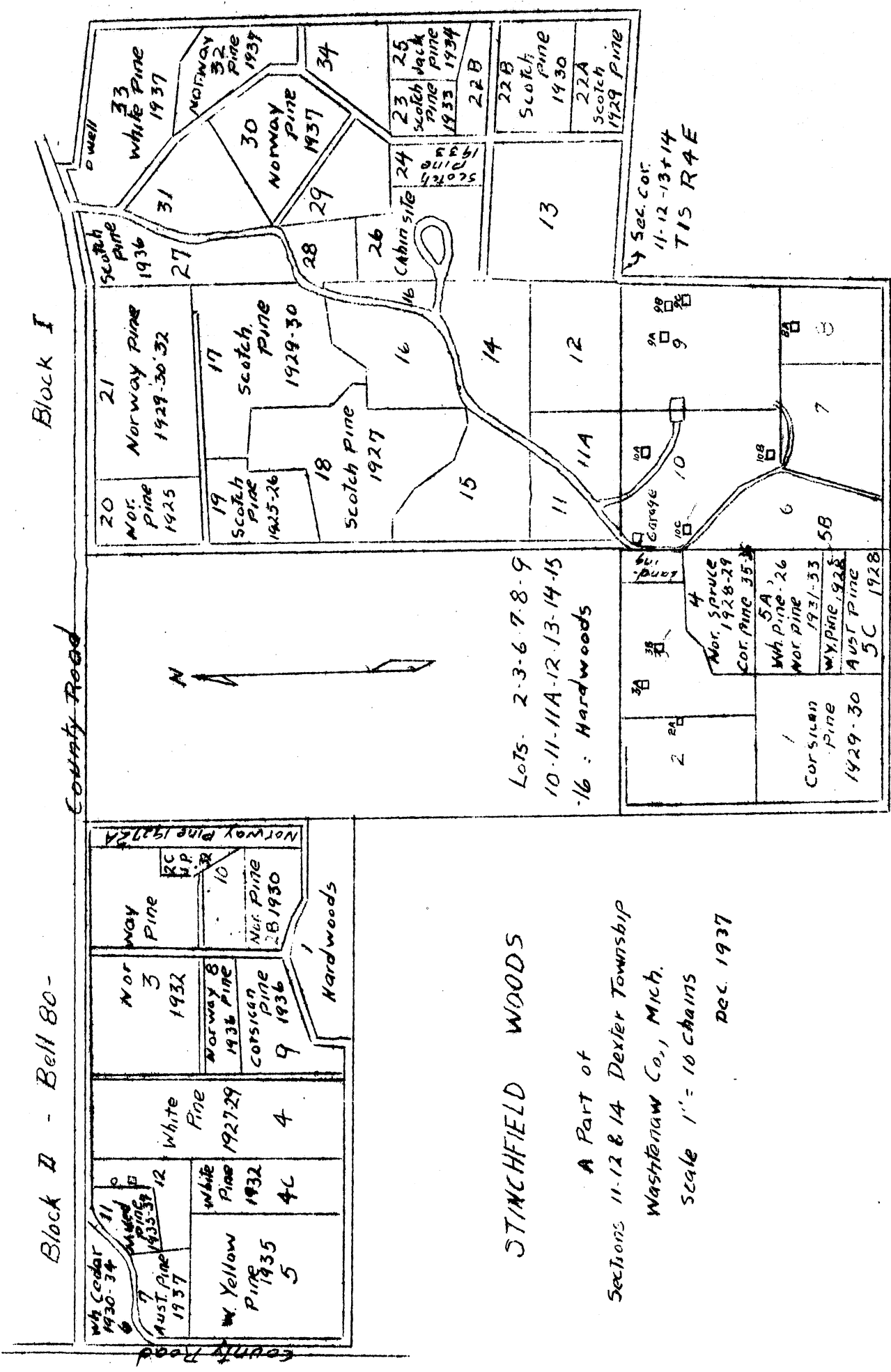
February 1, 1938

William E. Towell

A STUDY OF REPRODUCTION IN A HARDWOOD FOREST
OF SOUTHERN MICHIGAN

A study of reproduction in Stinchfield Woods was begun in 1930, with the establishment of eight permanent sample plots. The purpose of this study was to determine the kind, character, and amount of reproduction that would come in on a Southern Michigan hardwood area following the release from grazing and the protection from fire. Stinchfield Woods was acquired by the University of Michigan in 1925, previous to which time it had been used for sheep grazing and for amounts of cordwood and sawlogs as were needed. Besides being rather heavily culled over little or no reproduction was present, and there were evidences of fires throughout the area. Since these sample plots were established, permanent records have been kept on the reproduction present. In 1932 the reproduction on all the plots was measured and recorded, and in the spring of 1936 measurements were again taken and all the reproduction marked with metal tags so that permanent records of the individual seedlings could be kept. During the past fall of 1937 additional data were collected and reproduction that has appeared since the previous measurements was tagged. In addition, two more plots were established with the specific purpose of obtaining more data on the ash reproduction present.

Stinchfield Woods is located in parts of Sections 11, 12, and 13; Dexter Township; Washtenaw County, Michigan. It comprises an area of 320 acres, approximately one-third of which is covered with hardwood timber. The stand is for the most part oak-hickory and is uneven aged. At the present time, because of the grazing, there is a gap in the size classes between the new reproduction and the four to six inch (D.B.H.) trees. The density of the stand is considerably below normal and many of the trees are of coppice origin. Large, overmature oaks can be found scattered throughout the stand.



In connection with the measurement of the reproduction and the establishment of the new plots, a special study was carried on to determine the amount and distribution of ash reproduction that has occurred from two separate white ash trees in Stinchfield Woods. Each of these trees, one in Lot 3 and the other in Lot 10, are isolated from other ash trees, which made it reasonably certain that the reproduction counted was the off-spring of the tree nearest which the survey was being conducted. These two trees were far enough apart so that the distribution from one did not coincide with the seedlings from the other.

The method used in this study involved a mill-acre line and plot cruise of the ash reproduction from each of the ash trees. Lines were run one chain (66 feet) apart and mill acre plots (6.6' X 6.6') were established every chain. On each plot the number of ash seedlings were counted and recorded as shown in figures II and III, where X represents the position of the seed trees. *seedlings?*

A 1.3% mill-acre cruise of Lot 3 shows the ash reproduction to be as much as 400 feet from the seed tree. The greatest distribution of seedlings is to the southeast, which shows a more or less prevailing northwest wind. Partial reproduction has been established by this white ash over an approximate area of five acres. Average stocking for this five acres, as determined by the cruise, is approximately 6,500 seedlings per acre, with small areas showing a stocking as great as 69,000 seedlings per acre basis. However, for more than one-half of this five acres the stocking averages only slightly more than 1,000 seedlings per acre, and, to the west, no reproduction is found more than three to four chains from the seed tree.

From the white ash tree in Lot 10 ash reproduction has been established as far as 350 feet to the east of the tree, while practically none can be found to the west. Partial stocking has been established over a two acre area, with an average of 1800 seedlings per acre. Maximum stocking as shown by the 1.3% cruise is 8,000 ash seedlings per acre, but, some areas between the cruise plots contain as many as 35 seedlings per mill-acre.

Distribution of Seedlings from White Ash in Lot 3

											N
	0	0	13	7	6	4	1	0	0		
0	0	8	36	27	12	9	3	0	0		
0	0	1	6	X	17	21	12	1	0		
0	1	3	18	20	69	16	4	3	0	0	
0	2	0	11	8	11	29	2	2	1	0	
	0	1	8	2	3	0	0	3	2	0	
	0	1	1	0	3	0	0	0	0	0	
	0	0	0	0	0	0	0	0	0	0	

Figure II

Distribution of Seedlings from White Ash in Lot 10

		N						
		0	0					
		1	0	0	0	1		
		0	2	0	5	0		
		0	7	3	1	1	3	
0	0	X	8	4	2	3	3	0
		0	5	3	2	2	1	0
		0	0	0	1	0	0	0
		0	0	0				

Figure III

Descriptions of New Plots

Lot 3 - Plot 3b : This plot is located just east of plot 2a on top of the same glacial moraine which extends east and west through the woods. The topography immediately surrounding the plot is generally level, with the exception of a steep slope into a glacial pot-hole a few feet to the north. The soil is a sandy to gravelly clay with relatively low organic content. The ground cover consists of patches of grass which are interspersed with bare spots covered with oak leaf litter one to three inches thick. No underbrush is present on or near the plot and only a few sparsely scattered weeds.

The surrounding stand is chiefly oak with some hickory and sassafrass. The diameter range is between 6 and 16 inches but largely between 8 and 12 inches. The stand is only moderately well stocked, the spacing or density of the crowns being .6 or .7.

Reproduction on the plot consists almost entirely of white ash with small amounts of cherry and sassafrass. Most of the ash seedlings are between 3 and 8 years of age. Approximately fifteen to twenty percent of the reproduction is infected with the oyster-shell scale (*Lepidosaphes ulmi*) and a few seedlings have been killed, but it appears that a large number will escape infection. The scale is spotty in occurrence although healthy plants can be found completely surrounded by infected ones. With the exception of the scale the reproduction seems to be quite vigorous and height growth is good. The ash reproduction that is present on the plot has been seeded-in by a large white ash tree (22" D.B.H.) about two chains to the northwest. This plot was established with the purpose in mind of obtaining growth figures of ash reproduction, as the only one of the other plots containing ash was at the bottom of the pot-hole in lot 3. Those seedlings that are badly infected with the scale have been indicated along with their height measurement.

Lot 10 - Plot 10c : This plot is located in lot 10 on the same glacial moraine as plots 3b and 2a and lies southwest of plot 10a. It is on a very gentle slope to the east and on the edge of a small glacial pot-hole. The soil is a sandy clay-loam and drainage from the plot is good. There is no distinct humus layer on the soil but the leaf litter is ^{measured} fairly good. The relationship of sod and litter is much the same as in plot 3b, although the amount of grass is not so great. There is no underbrush on the plot and very few scattered weeds.

The stand surrounding the plot is again chiefly black and white oak, with considerable cherry and some hickory and red cedar. The diameter range is from two to eighteen inches with the greater concentration of diameters being between eight and twelve inches. With the exception of a few hickories about two inches in diameter there are no size classes up to six inches, showing the effect of the continuous grazing before the area was acquired by the university. The crown density of the stand here is .5 to .6.

The reproduction, as on plot 3b, consists almost entirely of white ash, with some cherry and sassafras. The ages of the seedlings are mostly four to eight years, a majority of them showing an age of eight years. The oyster-shell scale shows on twenty to twenty-five percent of the reproduction, but, as on plot 3b, it does not appear that the scale will be fatal to all of the seedlings. Height growth is very good on this plot, several of the plants being eighty inches tall and over. The source of seed for this reproduction is a fourteen-inch (dia.) white ash just one chain northwest of the plot. This plot, too, was established for future study of ash growth and survival, and, as with plot 3b, the seedlings badly infected with the oyster-shell scale were indicated. In connection with the establishment of these plots mill-acre plots were established and the ash reproduction counted to determine the amount of seedlings that have been established by these two seed trees.

The Sample Plot Measurements

All reproduction on the sample plots was measured to the nearest quarter inch in height as it stood on the ground. On each plot all seedlings were recorded as to their height, species, and tag number. Reproduction that has appeared since the plots were last measured and tagged in 1936 was also tagged and measured. As far as possible the amounts of reproduction that originated as natural seedlings, sprouts, or plantings has been recorded with the totals from each plot.

To aid in the counting and measurement of the reproduction each plot was divided into four strips by strings attached to small stakes, as is shown in figure IV.

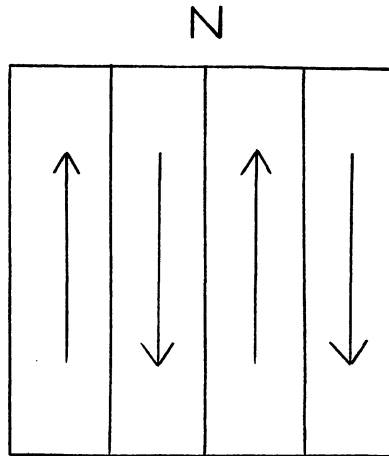


Figure IV

In the following tables the measurements shown are in inches. For all reproduction numbering from 1 to 637 the first column of figures for any species indicates the 1936 measurement of that seedling and the second column shows the present height. All new reproduction has been recorded separately and the tag numbers are from 2832 to 3423. In the data for the new plots, 3b and 10c, those seedlings which have S following the height measurement are those badly infected with the oyster-shell scale. The total number of seedlings on each plot, their origin, and the number and size of trees on the plots are shown at the end of the measurement data for each plot.

Lot 2 - Plot 2A

Tag No.	Sassafrass		Cherry	Hickory
1	27"	30"		
2	61	78		
3	11	18		
4	12	15		
5			11½	16

New Reproduction

Tag No.	Sassafrass	Cherry	Hickory	Oak
2832				3 3/4
2833		6½		
2834		7		
2835		7½		
2836		3¼		
2837				5¼
2838				5 3/4
2839		5½		
2840				4
2841				4¼
2842	3½			
2843				4¼

Total reproduction on plot - 17, all seedlings

Trees on plot: White Oak - 5½"
 Black Oak - 6"

Lot 3 - Plot 3A

Tag No.	Ash	Sassafrass	Cherry
6			27 $\frac{1}{2}$ " 35"
7	12	22 $\frac{1}{4}$	
8	14	19 $\frac{3}{4}$	
9	24	27 $\frac{1}{2}$	
10	13	19	
11	10	15 $\frac{1}{4}$	
12			9" 7 $\frac{1}{2}$ "
13	7	10 $\frac{1}{2}$	
14	14 $\frac{3}{4}$	32	
15	10	19	
16	21	31 $\frac{1}{2}$	
17			18 23
18	28 $\frac{1}{2}$	44 $\frac{1}{2}$	
19	10	40	
20	9	24 $\frac{3}{4}$	
21	9	14	
22			13 13 $\frac{1}{2}$
23			22 $\frac{1}{2}$ 31
24	18	34 $\frac{1}{2}$	
25	17 $\frac{1}{2}$	28 $\frac{3}{4}$	
26	18	35	
27	28	35	
28	11	23	
29	16	18 $\frac{1}{2}$	
30	27 $\frac{1}{2}$	46 $\frac{1}{2}$	
31	31	51	
32	37	53	
33	18	27	
34	26 $\frac{1}{2}$	34 $\frac{1}{2}$	
35	15 $\frac{1}{2}$	21	
36	10 $\frac{1}{2}$	17	
37	18	24	
38	22	38	
39	15	31 $\frac{3}{4}$	
40	35 $\frac{1}{2}$	55	
41	17 $\frac{1}{2}$	25	
42	12	14	
43	8 $\frac{1}{2}$	10	
44	11	32 $\frac{1}{2}$	
45	55	82	
46	7 $\frac{1}{4}$	12 $\frac{1}{2}$	
47	16	18 $\frac{1}{4}$	
48	9	14 $\frac{1}{4}$	
49	16 $\frac{1}{2}$	19	
50	10	11 $\frac{1}{2}$	
51	27	36 $\frac{1}{2}$	
52	11 $\frac{1}{2}$	16	
53	35	50	
54	10	22	
55	10	16 $\frac{3}{4}$	
56	10	11 $\frac{1}{2}$	
57	8	14 $\frac{1}{2}$	
58	7	10	
	18	48	

Tag No.	Ash	Sassafrass	Cherry
59	43	63	
60	35	56 $\frac{1}{2}$	
61	20 $\frac{1}{2}$	24 $\frac{1}{2}$	
62	27	32	
63	39	61	
64	30	35 $\frac{1}{2}$	
65	13 $\frac{1}{2}$	27 $\frac{3}{4}$	
66	7	9 $\frac{1}{2}$	
67	14	27	
68	51 $\frac{1}{2}$	71	
69	28 $\frac{1}{2}$	34	
70	27 $\frac{1}{2}$	47	
71	24	57	
72	27 $\frac{1}{2}$	47 $\frac{1}{2}$	
73	17	27 $\frac{3}{4}$	
74	11	16 $\frac{3}{4}$	
75	18 $\frac{1}{2}$	26 $\frac{3}{2}$	
76		41 dead	
77			39 51
78	57	70	
79	47	44	
80	17	31	
81	13 $\frac{1}{2}$	21 $\frac{3}{4}$	
82	10	12 $\frac{1}{2}$	
83	7 $\frac{1}{2}$	18	
84	10	18 $\frac{1}{2}$	
85	15	17 $\frac{1}{4}$	
86	15	dead	
87	21	26 $\frac{1}{2}$	
88		55 61	
89	7$\frac{1}{2}$	dead	
90	18	31	
91	20	33 $\frac{1}{2}$	
92	11 $\frac{1}{2}$	20	
93	50	68	
94	25	33	
95	21	27 $\frac{1}{2}$	
96	22 $\frac{1}{2}$	34	
97	24	48	
98	12 $\frac{1}{2}$	19	
99	8	14	
100	8 $\frac{1}{2}$	9 $\frac{3}{4}$	
101	29	32 $\frac{3}{2}$	
102	16	29	
103		36 42	
104	30	39	
105	29	27 $\frac{3}{4}$	
106	9	15	
107	41	65	
108	10	dead	
109	26	27 $\frac{1}{2}$	
110	13	24	
111	21	44	
112	17	31 $\frac{1}{2}$	
113	20	26	

51 48

3 2 1 1

Tag No.	Ash	Sassafrass	Cherry
114	26 $\frac{1}{2}$	51 $\frac{1}{2}$	
115	10	17	
116	39	49	
117	20	28	
118	13	19 $\frac{1}{2}$	
119	10	11	
120	19	17 $\frac{1}{4}$	
121	36	48	
122	14 $\frac{1}{2}$	20 $\frac{1}{2}$	
123	6 $\frac{1}{2}$	20 $\frac{3}{4}$	
124	19	29 $\frac{1}{2}$	
125	15	38	
126	10	18 $\frac{1}{2}$	
127	11	19	
128	10	11 $\frac{1}{2}$	

15
New Reproduction

Tag No.	Ash	Sassafrass	Cherry
2844	8"		
2845	4 $\frac{1}{4}$		
2846	6 $\frac{1}{4}$ ←		
2847	5 $\frac{1}{2}$		
2848	7 ←		
2849	12 $\frac{1}{2}$		
2850	11 $\frac{1}{2}$		
2851	8		
2852	12 $\frac{1}{2}$		
2853	7 $\frac{1}{2}$ ←		
2854	7		
2855	4 $\frac{1}{4}$ ←		
2856	15 $\frac{1}{4}$		
2857	4 ←		
2858	14 $\frac{3}{4}$		
2859	8		
2860	9		
2861	7 $\frac{1}{2}$		
2862	12 $\frac{1}{4}$ ←		
2863	8		
2864	7		
2865	9		
2866	7 $\frac{1}{2}$		
2867	16 $\frac{1}{2}$		
2868	6 $\frac{1}{2}$		
2869	12		
2870	5		
2871	10		
2872	13 $\frac{1}{2}$		
2873		6 ←	
2874	12 $\frac{1}{2}$		
2875		12 ←	
2876	14		
2878	9 $\frac{1}{2}$		
2879	26		
2880	7		

34

2

Tag No.	Ash	Sassafrass	Cherry
2881	10 $\frac{1}{2}$		
2882	4 ←		
2883	6 $\frac{1}{2}$		
2884	8		
2885	11 $\frac{1}{4}$		
2886	12 $\frac{1}{2}$		
2887	5$\frac{1}{2}$		
2888	13 ←		
2889	5 ←		
2890	8 $\frac{1}{2}$		
2891	12 $\frac{1}{4}$		
2892	12 $\frac{1}{2}$		
2893	25		
2894		37	
2895	12 $\frac{1}{2}$		
2896	31 $\frac{1}{4}$		
2897	7 $\frac{1}{2}$		
2898	13 $\frac{1}{4}$		
2899	12		
2900	11 $\frac{1}{4}$		
2901	6 $\frac{1}{4}$		
2902	14 $\frac{1}{2}$		
2903	6 $\frac{1}{2}$		
2904	10		
2905	9 $\frac{1}{2}$		
2906	7		
2907	6 $\frac{1}{2}$		
2908		17 $\frac{1}{2}$	
2909	8		
	27		

Total reproduction on plot - 184, all seedlings

Lot 10 - Plot 10A

Tag No.	Cherry	Sassafrass	Oak	Hickory	Maple
129	9	10 $\frac{3}{4}$			
130	14	dead			
131	8	11			
132	7	7			
133	11	12			
134	11	19 $\frac{1}{2}$			
135				11	12
136	14	17			
137	11	11 $\frac{1}{2}$			
138	6	7 $\frac{1}{2}$			
139	18	24			
140			17	21 $\frac{1}{2}$	
141	11	19			
142	4	dead			
143				3	4
144	20	26 $\frac{1}{2}$			
145	22	24			
146			4	4 $\frac{1}{2}$	
147	27	30			
148	13	18			
149	4	dead			
150	22	19			
151	11	13 $\frac{1}{2}$			
152	10	12			
153	6	6 $\frac{1}{2}$			
154	7	11			
155	7	12			
156	7	8			
157					8
158	12	12			9 $\frac{1}{2}$
159	11 $\frac{1}{2}$	17			
160	12	14			
161	8	15			
162	15	18			
163	16	19			
164	15	23			
165	14 $\frac{1}{2}$	19			
166	11	23			

New Reproduction

Tag No.	Cherry	Sassafrass	Oak	Hickory	Maple
2910		17 $\frac{1}{2}$			
2911		3 $\frac{1}{2}$			
2912	4 $\frac{1}{4}$				
2913	3 $\frac{1}{2}$				
2914		16 $\frac{1}{2}$			
2915		8			
2916		8 $\frac{1}{4}$			
2917		5			
2918		4 $\frac{1}{2}$			
2919					3 $\frac{1}{4}$
2921		5 $\frac{1}{2}$			

Tag No.	Cherry	Sassafrass	Oak	Hickory	Maple
2922					3 ←
2923					4
2924	4½ ←				
2925					4
2926		4½			
2927		4			
2928		4½			
2929		5 ←			
2930	5				

Total reproduction on plot - 55, all seedlings

Trees on plot: Hickory - 4"
 " - 2"
 White Oak - 5½"

Lot 9 - Plot 9A

Tag No.	Cherry	Hickory	Oak	Elm	Maple
167			19 34 $\frac{1}{2}$		
168	11 18 $\frac{3}{4}$				
169	5 11				
170	5 7 $\frac{1}{4}$				
171	5 dead				
172	7 9				
173		10 11 $\frac{1}{4}$			
174	5 dead				
175			6 8		
176				7 19	17 29 $\frac{1}{2}$
177					
178	11 18				
179			7 11 $\frac{1}{2}$		
180					12 16 $\frac{3}{4}$
181	13 23 $\frac{1}{2}$				
182				16 31	
183	8 8				
184				40 70	
185	11 15 $\frac{1}{2}$				
186		8 9 $\frac{1}{2}$			
187	10 16 $\frac{1}{2}$				
188			8 8		
189		4 5			
190		6 7			
191			9 11 $\frac{1}{2}$		
192					19 29 $\frac{3}{4}$
193					14 29
194		5 dead			
195					23 32
196			5 $\frac{1}{2}$ 7		
197			20 22		
198			24 26 $\frac{1}{2}$		
199					36 46
200				31 55	
201		7 14			
202			11 13		
203			10 20		
204					36 51
205		14 19			
206	13 20 $\frac{1}{2}$				
207				23 45	
208					17 20 $\frac{3}{4}$
209			17 19		
210			20 dead		
211			20 dead		
212			6 7 $\frac{1}{2}$		
213				25 49	
214			18 24 $\frac{1}{2}$		
215	16 18 $\frac{1}{2}$				
216	12 16 $\frac{1}{2}$				
217		6 8 $\frac{1}{2}$			
218			9 9 $\frac{1}{4}$		
219			21 24 $\frac{1}{4}$		
220		5 dead			

New Reproduction

Tag No.	Cherry	Hickory	Oak	Elm	Maple
2931					8
2932				10	
2933			9		
2934	7 $\frac{1}{2}$ ✓				
2935			4		
2936	5 $\frac{1}{2}$ ✓				

Total reproduction on plot - 60

Planted	9	(Maple)
Sprouts	26	(Oak & Elm)
Seedlings	25	

Lot 9 - Plot 9B

Tag No.	Cherry	Maple	Oak	Hickory
221			12 17 $\frac{1}{4}$	
222	11	22		
223	9	13 $\frac{1}{4}$		
224	36	65		
225	13	13 $\frac{1}{4}$		
226	7	14		
227	8	12 $\frac{1}{2}$		
228	8	13 $\frac{1}{2}$		
229	10	14 $\frac{1}{4}$		
230	13	30 $\frac{1}{2}$		
231	11	14 $\frac{1}{2}$		
232	11	23		
233	14	24 $\frac{3}{4}$		
234	7	19 $\frac{1}{2}$		
235	5	8		
236	14	19 $\frac{1}{2}$		
237	14	19		
238	15	30		
239	17	36 $\frac{1}{4}$		
240	17	30		
241	15	22		
242	10	16 $\frac{1}{2}$		
243	10	16		
244	19	36 $\frac{1}{2}$		
245	8	dead		
246	17	26		
247	7	15		
248	11	21		
249	12	22 $\frac{1}{2}$		
250	9	15		
251	8	13		
252	10	13 $\frac{3}{4}$		
253	14	dead		
254	19	36		
255	10	13		
256	9	11		
257	18	31		
258	26	36		
259	12	19 $\frac{1}{2}$		
260	15	23 $\frac{1}{2}$		
261	15	29		
262	7	16		
263	16	35		
264	15	33		
265	13	27 $\frac{1}{2}$		
266	10	22 $\frac{1}{2}$		
267	10	21 $\frac{1}{2}$		
268	11	22 $\frac{1}{2}$		
269	10	20		
270	9	12 $\frac{1}{4}$		
271	14	24 $\frac{3}{4}$		
272	9	21 $\frac{1}{2}$		
273	11	dead		
274	7	dead		

Tag No.	Cherry	Maple	Oak	Hickory
275	11	14 $\frac{1}{2}$		
276	9	16 $\frac{1}{2}$		
277	19	37		
278	9	9		
279	8	12		
280	10	17 $\frac{1}{2}$		
281	9	10 $\frac{3}{4}$		
282	13	18 $\frac{1}{2}$		
283	14	37		
284	19	32 $\frac{1}{2}$		
285	13	32		
286	12	11 $\frac{1}{2}$		
287	12	22 $\frac{3}{4}$		
288	20	24 $\frac{3}{4}$		
289	22	36 $\frac{1}{4}$		
290	12	20 $\frac{3}{4}$		
291	13	25 $\frac{3}{4}$		
292	10	16		
293	6	10		
294	8	9 $\frac{1}{4}$		
295	12	16		
296			8	dead
297	12	dead		
298	10	dead		
299			15	21
300	12	23		
301	7	10		
302	14	17 $\frac{1}{2}$		
303	9	10 $\frac{1}{4}$		
304	10	9 $\frac{1}{2}$		
305	15	23		
306	10	20		
307	10	11 $\frac{3}{4}$		
308	8	11		
309	8	24 $\frac{3}{4}$		
310	9	6 $\frac{1}{2}$		
311	11	dead		
312	9	22		
313	8	8		
314	12	29 $\frac{1}{2}$		
315	8	16		
316	6	7 $\frac{1}{4}$		
317	8	10		
318	7	dead		
319	9	12 $\frac{1}{4}$		
320	9	dead		
321	9	15		
322				8 dead
323			31	dead
324	11	dead		
325	8	9 $\frac{1}{4}$		
326	9	19 $\frac{1}{2}$		
327	11	18 $\frac{1}{4}$		
328	10	15		
329	7	28		
330	17	22 $\frac{1}{2}$		

Tag No.	Cherry	Maple	Oak	Hickory
331	12	14		
332	11	$19\frac{1}{4}$		
333	27	42		
334	20	38		
335	12	$20\frac{1}{2}$		
336	11	16		
337	12	$18\frac{1}{4}$		
338	20	$32\frac{3}{4}$		
339	22	38		
340	12	17		
341	8	14		
342	13	$18\frac{1}{2}$		
343	7	$14\frac{1}{4}$		
344	11	20		
345	9	24		
346	13	$18\frac{3}{8}$		
347	14	$20\frac{3}{8}$		
348	11	$18\frac{3}{4}$		
349	9	17		
350	11	$22\frac{1}{4}$		
351	16	$23\frac{1}{2}$		
352	12	$17\frac{1}{2}$		
353	13	$28\frac{1}{2}$		
354	16	$20\frac{1}{2}$		
355	12	$19\frac{1}{2}$		
356	14	31		
357	10	18		
358	13	$32\frac{1}{4}$		
359	7	dead		
360	11	$13\frac{1}{4}$		
361	10	dead		
362	10	$12\frac{1}{4}$		
363	7	$11\frac{1}{2}$		
364	12	$29\frac{1}{2}$		
365	28	43		
366	9	19		
367	10	22		
368	12	$18\frac{1}{4}$		
369	12	dead		
370	9	14		
371	9	dead		
372	7	$11\frac{1}{2}$		
373	7	$16\frac{1}{2}$		
374	9	16		
375	8	15		
376	9	18		
377	7	12		
378	7	17		
379	12	$15\frac{1}{2}$		
380	9	$10\frac{1}{2}$		

New Reproduction

Tag No.	Cherry	Oak	Sassafrass
2937	$14\frac{3}{4}$		
2938	15		

Tag No.	Cherry	Oak	Sassafrass
2939	6		
2940	7		
2941	8 $\frac{3}{4}$		
2942	7		
2943	12 $\frac{1}{2}$		
2944	7 ✓		
2945			12$\frac{1}{2}$ (Witch Hazel)
2946	7 $\frac{3}{4}$		
2947	5 $\frac{1}{2}$		
2949	14 $\frac{1}{4}$		
2950	16 $\frac{1}{4}$		
2951	12 $\frac{1}{2}$		
2952	10		
2953		7	
2954	7 $\frac{1}{2}$		
2955	6 $\frac{1}{2}$		
2956	8		
2957	6		
2958	5$\frac{1}{4}$		
2959	8 ✓		
2960	7 $\frac{3}{4}$		
2961	11 $\frac{1}{4}$		
2962	14 $\frac{1}{2}$		
2963	7 $\frac{1}{4}$		
2964	21 $\frac{1}{2}$		
2965	11		
2966	13		
2967	21		
2968	9 $\frac{1}{2}$		
2969	12 $\frac{1}{2}$		
2971	12 $\frac{3}{4}$		
2972	9 $\frac{1}{2}$		
2973	8		
2974	14		
2975	12 ✓		
2976	9 ✓		
2977	11		
2978	8		
2979		7 $\frac{1}{2}$	
2980	11 $\frac{1}{4}$		
2981	13		
2982			14 $\frac{1}{2}$
2984	9 $\frac{1}{2}$		
2986	13 $\frac{3}{4}$		
2987	13		
2988	9 $\frac{1}{2}$		
2989	10 $\frac{1}{4}$		
2990	13 $\frac{1}{4}$		
2991	11 $\frac{1}{4}$		
2992	11 ✓		
2993	17 $\frac{1}{2}$		
2994	8 $\frac{1}{2}$		
2995	17		
2996	33		
2997		8 $\frac{1}{2}$	
2998	20		

51

Tag No.	Cherry	Oak	Sassafrass
2999	11 $\frac{1}{2}$ ✓		
3000		4 $\frac{1}{2}$	
3001	10 ✓		
3002	13 $\frac{1}{2}$		
3003	24		
3004	18		
3005	10		
3006	17 $\frac{1}{2}$		
3007	12		
3008	6 ✓		
3009	10 ✓		
3011	18		
3012	16		
3013	14 $\frac{1}{2}$		
3014	13		
3015	17		
3016	16		
3017	56		
3018	54		
3019	14 ✓		
3021	13 ✓		

Total reproduction on plot - 223

Planted 2
Seedlings 222

Lot 9 - Plot 9C

Tag No.	Cherry	Maple	Hickory	Oak
381		7 $5\frac{3}{4}$		
382	7 8			
383				3 $3\frac{1}{2}$
384	9 11			
385				7 9
386			9 dead	
387	7 6			
388		10 $11\frac{1}{2}$		
389		9 8		
390	6 $9\frac{1}{2}$			
391	10 11			
392	5 $5\frac{1}{2}$			
393				7 $6\frac{1}{4}$
394		8 9		
395		8 dead		
396	7 $6\frac{1}{2}$			
397	9 $11\frac{1}{2}$			
398		5 6		
399	7 8			
400	8 dead			
401				6 $7\frac{1}{2}$
402	10 12			
403		8 7		
404	15 18			
405	12 19			
406		9 10		
407	8 8			
408			5 4	
409	6 $7\frac{1}{2}$			
410				4 $4\frac{1}{2}$

New Reproduction

Tag No.	Cherry	Maple	Hickory	Oak
3022				5
3023				7
3024				4
3025				5
3026		$8\frac{1}{2}$		
3027	6			
3028				4
3029	$5\frac{1}{4}$			
3030				8
3032			$5\frac{3}{4}$	
3033				$3\frac{1}{2}$
3034	14			
3035		$4\frac{1}{2}$		
3036	8			
3037		$23\frac{1}{2}$		
3038				$5\frac{1}{2}$
3039	$5\frac{1}{2}$			
3040	$6\frac{1}{2}$			
3041	$6\frac{1}{2}$			

Tag No.	Cherry	Maple	Hickory	Oak
3042		$5\frac{1}{2}$		
3043	25			
3044				$8\frac{1}{2}$
3045	$14\frac{1}{4}$			
3047				9 $\frac{1}{2}$

Total reproduction on plot - 51

Planted	10
Natural	41

Trees on plot: Black Oak - $14\frac{1}{2}$ "

Lot 8 - Plot 8A

Tag No.	Hickory	Oak	Sassafrass
411		8 9	
412	9 6 $\frac{1}{2}$		
413	7 8		
414	4 dead		
415		6 7	
416	6 6		
417	6 5		
418	5 5		
419	4 5		
420		5 dead	
421		5 5	
422	8 15		
423	6 6 $\frac{1}{2}$		
424	8 8 $\frac{1}{2}$		

New Reproduction

Tag No.	Hickory	Oak	Sassafrass
3048			22
3049			22 $\frac{1}{2}$
3050			28
3051			27
3053			24
3054	8		
3056			35
3057			30 $\frac{1}{2}$
3058			31 $\frac{1}{2}$
3060			10 $\frac{1}{2}$
3061			18
3062			8 $\frac{1}{2}$
3063			12 $\frac{1}{2}$
3064			9
3065			8
3067			11 $\frac{1}{2}$
3069			14
3070			9 $\frac{1}{2}$
3071		6	
3072		25	
3073			11

Total reproduction on plot - 33, all seedlings

Lot 10 - Plot 10B

Tag No.	Cherry	Oak	Sassafrass	Hickory
425	3			
426	3			
427	3			
428	4			
429	3			
430	4			
431	4			
432	7			
433	3			
434	4			
435	6			
436		3		
437	5			
438	3			
439	4			
440	7			
441	6			
442	4			
443	4			
444	6			
445	7			
446	6			
447	6			
448	7			
449	7			
450	7			
451	6			
452	7			
453	8			
454	8			
455	5			
456	6			
457	5			
458	5			
459	6			
460	5			
461	7			
462	7			
463	10			
464	8			
465	9			
466	8			
467	10			
468	6			
469	5			
470	4			
471	11			
472	7			
473	6			
474	9			
475	9			
476	9			
477	6			
478	7			

4

Tag No.	Cherry	Oak	Sassafrass	Hickory
479	7	7 $\frac{1}{4}$		
480	11	11 $\frac{1}{2}$		
481	8	dead		
482	8	8 $\frac{1}{2}$		
483	6	7 $\frac{1}{2}$		
484	5	8		
485	10	10		
486	8	dead		
487	9	8		
488	9	12		
489	10	13 $\frac{1}{2}$		
490	7	dead		
491	8	dead		
492	8	dead		
493	8	dead		
494	6	9 $\frac{1}{2}$		
495	9	11 $\frac{1}{2}$		
496	11	11		
497	11	dead		
498	12	dead		
499	9	dead		
500	11	dead		
501	11	13 $\frac{1}{2}$		
502	8	dead		
503	7	dead		
504	7	dead		
505	7	dead		
506	10	dead		
507	6	dead		
508	12	dead		
509	13	15		
510	13	14		
511	7	11		
512	10	dead		
513	9	dead		
514	10	dead		
515	10	14		
516	6	dead		
517	8	8		
518	7	8 $\frac{1}{4}$		
519	10	12		
520	9	dead		
521	12	12		
522	11	12		
523	12	14 $\frac{1}{2}$		
524	9	dead		
525	6	dead		
526	10	dead		
527	11	dead		
528	10	dead		
529	11	11		
530	7	9		
531	7	dead		
532	7	8		
533	6	10 $\frac{1}{2}$		
534	5	7		

Tag No.	Cherry	Oak	Sassafrass	Hickory
535	8	dead		
536	7	10		
537	13	14		
538	5	6 $\frac{1}{2}$		
539	11	11		
540	11	12 $\frac{1}{2}$		
541	17	dead		
542	10	15		
543	9	dead		
544	13	15 $\frac{1}{2}$		
545	6	7		
546	6	7		
547	6	7 $\frac{1}{4}$		
548	8	11		
549	10	16		
550	13	dead		
551	11	dead		
552	10	11 $\frac{1}{4}$		
553	9	11		
554	9	dead		
555	7	9		
556	7	dead		
557	8	9 $\frac{1}{2}$		
558	10	11 $\frac{1}{2}$		
559	8	10		
560	11	13		
561	6	10		
562	7	8		
563	12	12		
564	7	9 $\frac{1}{2}$		
565	8	9		
566	7	7 $\frac{1}{2}$		
567	6	7 $\frac{1}{2}$		
568	6	6 $\frac{1}{2}$		
569	9	9 $\frac{1}{2}$		
570	9	11		
571	11	dead		
572	9	10 $\frac{1}{2}$		
573	12	13 $\frac{1}{2}$		
574	10	11 $\frac{1}{2}$		
575	9	10		
576	11	19		
577	6	6		
578	7	11 $\frac{1}{2}$		
579	8	10 $\frac{1}{2}$		
580	9	10		
581	8	7 $\frac{1}{2}$		
582	7	8 $\frac{1}{2}$		
583	8	12 $\frac{1}{2}$		
584	7	8		
585	5	4 $\frac{1}{2}$		
586	13	18		
587	9	15 $\frac{1}{2}$		
588	7	10		
589	10	13		
590	8	9		
591	6	11		

Tag No.	Cherry	Oak	Sassafrass	Hickory
592	18	23 $\frac{1}{2}$		
593	7	19 $\frac{1}{2}$		
594	32	46		
595			40	44
596	7	12 $\frac{1}{4}$		
597			30	51
598			6	6
599	11	dead		
600			40	51
601	8	15		
602	7	8 $\frac{1}{2}$		
603	7	7		
604	6	6 $\frac{1}{2}$		
605	7	7 $\frac{1}{2}$		
606	6	7 $\frac{1}{4}$		
607	7	7 $\frac{1}{2}$		
608	8	8		
609	13	12 $\frac{1}{2}$		
610	8	9 $\frac{1}{2}$		
611	10	12		
612	5	dead		
613	9	10 $\frac{1}{2}$		
614	6	8		
615	7	11		
616	6	7		
617	5	6		
618	5	4		
619			5	23
620	10	10 $\frac{1}{2}$		
621	7	7 $\frac{1}{4}$		
622	7	13		
623	10	10		
624	10	12		
625	6	7		
626	7	9 $\frac{1}{2}$		
627	8	dead		
628	7	8		
629	8	9 $\frac{1}{2}$		
630	10	11 $\frac{1}{2}$		
631	5	8		
632	14	18		
633	9	12		
634	7	9		
635	7	10		
636				4
637	8	10 $\frac{1}{2}$		5 $\frac{1}{2}$

New Reproduction

Tag No.	Cherry	Oak	Sassafrass	Hickory
3074		3 $\frac{1}{4}$		
3075	13			
3076	5			
3077	6			
3078			9	

Tag No.	Cherry	Oak	Sassafrass	Hickory
3079		4		
3081	6 ←			
3082	5			
3083	8 ←			
3084	5			
3085		3 ←		
3086	8			
3087			14 $\frac{1}{2}$	
3088			35	
3089			6 $\frac{1}{4}$ ←	
3090	5			
3091			15	
3092			22 $\frac{1}{2}$	
3094	15			
3095	6 $\frac{1}{4}$			
3096			44	
3097			31	
3098			24	
3100			44	
3101			50	
3102			33	
3103			31	
3104	6			
3105	7			
3106			15	
3107			14 $\frac{1}{2}$	

Total reproduction on plot - 198

Sprouts 8 (sassafrass)

Seedlings 190

Trees on plot: none (8" sassafrass stump)

Mortality of Cherry: 23%

New Plot

Lot 3 - Plot 3B

Tag No.	Ash	Sassafrass	Cherry
3108		46	
3109		40	
3111	7		
3112	22		
3113			14
3114	$8\frac{1}{2}$		
3115	$13\frac{1}{2}$ S		
3116			$10\frac{1}{2}$
3117	8		
3118		16	
3119	$26\frac{1}{2}$		
3120	$22\frac{1}{2}$		
3122	18		
3123	$18\frac{1}{2}$		
3124	11		
3125	$7\frac{1}{2}$		
3126	$9\frac{1}{2}$		
3127	$17\frac{1}{2}$ S		
3128	15		
3129		63	
3130	12		
3131	22		
3134		$8\frac{1}{2}$	
3135	8		
3136	6		
3137	15		
3138	$9\frac{1}{2}$		
3139	9		
3140	21		
3141	14		
3143	$8\frac{1}{2}$		
3144	21		
3145	9		
3146	7		
3149	9		
3150			21
3151	24		
3152	7		
3153	17		
3154	12		
3155	21		
3156	38		
3157	7		
3159	$14\frac{1}{2}$		
3160	$8\frac{1}{2}$		
3161	10		
3162	15		
3163	10		
3164	$11\frac{1}{2}$		
3165	8		
3166	12		
3167	$11\frac{1}{2}$		
3168		35	

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3

Tag No.	Ash	Sassafrass	Cherry
3169	16		
3170	34S ←		
3171	9 $\frac{1}{2}$		
3172	18		
3173	31		
3175	13 $\frac{1}{2}$ ←		
3176	34		
3177	25		
3178	11 $\frac{1}{2}$		
3179	23 $\frac{1}{2}$		
3180	18 S		
3181	14 S ←		
3182	13		
3183	25 $\frac{1}{2}$ S		
3184	21 S		
3185	28		
3186	39 S		
3187	26 S ←		
3188	16		
3189	17 $\frac{1}{2}$		
3190	19		
3191	33		
3192	29		
3193	22		
3194			26
3195	25		
3196	19		
3197	28		
3198	16 S		
3199	8		
3200	17		
3201	54		
3202	43		
3204	26 $\frac{1}{2}$		
3205	19		
3206	11 ←		
3208			32
3209	27		
3210	24		
3211	35 $\frac{1}{2}$		
3212	12		
3214	22 $\frac{1}{2}$		
3215	23		
3216	10		
3217	11		
3218	14 $\frac{1}{2}$		
3219	10		
3220	14		
3221	53 $\frac{1}{2}$		
3222		8 ←	
3223	50		
3224	29		
3225	24		
3226	20		
3227	30		
3228	26		
3229	40		

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1

2.

Tag No.	Ash	Sassafrass	Cherry
3230	26 S		
3231	30$\frac{1}{2}$		
3232	33		
3233	25		
3234	30		
3235	40		
3236		35 ←	
3237	21 S		
3238		44	
3239	55		
3240	13		
3241			18 ←
3242	28		
3243	47		
3244		11	
3245		6 $\frac{1}{2}$	
3246	46		
3247	52		
3248		36	
3249	22		
3250	52 $\frac{1}{2}$		
3251	43 S		
3252	14		
3253	13		
3254	9		
3255	11 $\frac{1}{2}$		
3256	12 ←		
3257	10		
3258	8		
3259	11 $\frac{1}{2}$		
3260	16		
3261	25		
3262	13		
3263	29 S		
3264	12		
3265	17		
3266	47		
3267	38		
3268	21		
3269	33		
3270	13		
3271	12 $\frac{1}{2}$		
3272	14 ←		
3273	12 $\frac{1}{2}$ ←		
3274	11		
3275	12		
3276	27		
3277	16 S		
3278	10		
3279	9		
3280	30 $\frac{1}{2}$		
3281	14 S		
3282	39		
3283	38 S		
3284	23 S		
3285	15 S		
3286	14 $\frac{1}{2}$		
3287	27		
3288	21 S		
3289	14		
3290	9		

Tag No.	Ash	Sassafrass	Cherry
3291	12 S		
3292	20 S		
3293	7		
3294	31		
3295	36		
3296	44		
3297	37		
3298			30
3299	42		
3300	14		
3301	7		
3302		14	
3303		16	
3304		27	
3305	8		
3306	10		
3307	32		
3308		41	
3309	11		
3310	11 $\frac{1}{2}$		

10
Total reproduction on plot - 191, all natural seedlings

New Plot

Lot 10 - Plot 10C

Tag No.	Ash	Cherry	Sassafrass
3311		14	
3312	23 S		
3313	14 S		
3314		10	
3315	46		
3316	15		
3317	10		
3318	21 S		
3319		9	
3320	10		
3321	11		
3322	41		
3323		8	
3324	13		
3325	26		
3326	33		
3327	27		
3328	16 S		
3329	30		
3330	11		
3331	43		
3332	11 S		
3333		19	
3334		11	
3335		13	
3336	59		
3337		10	
3338	45		
3339	32 S		
3340	10		
3341	25		
3342	24		
3343	44		
3344	20		
3345	15		
3346	19		
3347	12		
3348	42		
3349	33		
3350	55		
3351	41		
3352	63		
3353	40		
3354	14		
3355	85		
3356	60		
3357	28		
3358	12 S		
3359	12 S		
3360	38		
3361	80		
3362	36		

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8

Tag No.	Ash	Cherry	Sassafrass
3363	25		
3364	18 S		
3365	67		
3366		23	
3367	26 S		
3368	60		
3369	35 S		
3370	24		
3371	81		
3372	41		
3373	27 S		
3374	36		
3375	73		
3377	54		
3378	64		
3379	30		
3380	80 S		
3381	46		
3382	70		
3383	63		
3384	37		
3385	30 S		
3386	40		
3387	28		
3388	67		
3389		22	
3390	54 S		
3391	33		
3392	10		
3393	32		
3394		7	
3395		15	
3396			68 (Witch Hazel)
3397		12	
3398	38		
3399			19
3400	51 S		
3401	59		
3402		21	
3403	52		
3404	16		
3405	70		
3406	15		
3407	68		
3408	60 S		
3409		19	
3410	43		
3411	73		
3412	89		
3413			70
3414	52		
3415	65		
3417	62		
3418	35		
3419	14		
3420	79		
3421	19		
3422	26		
3423	20 49		

Total reproduction on plot - 111, all natural seedlings

Summary

Although data for this study is far from complete, certain conclusions can be made at this time regarding the reproduction in Stinchfield Woods:

1. Reproduction on the whole is not of the most desirable species, but an increase of oak and maple can be seen on some of the plots.

2. Heavy grass cover seems to be the greatest obstacle to the establishment of reproduction, as is shown by the fact that what new seedlings present are on spots where no sod is present.

3. The lack of reproduction on Plot 8a shows the necessity of plantings in the open spots throughout the woods to obtain the desirable species.

4. The rather high mortality of the cherry reproduction is undoubtedly due to the poor moisture holding capacity of the gravelly soil on the glacial deposits and to the dry situations that have existed during the last few years.

5. Ash reproduction has come in very favorably since the release from grazing, the greatest difficulty being a lack of seed trees. The growth of this reproduction is very good, and it does not appear that the oyster-shell scale will affect all of the seedlings.

6. Cherry, sassafrass, and ash seedlings become established easier and are better able to withstand the competition of the grass cover than oak and hickory.

7. Reproduction has become established better on low moist sites than on the drier ridges, which is undoubtedly due to better moisture conditions and better seed bed conditions for germination.

8. Because of the grass cover and possibly a lack of oak and hickory seeds planting may be necessary under the present stand. (Note: For future reference, a rather heavy crop of acorns fell in the fall of 1937).

9. Literature on the effects of grazing is quite plentiful, but there seems to be a shortage of specific literature upon the establishment of reproduction following the release from grazing.

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