

File

A Localized Study of
the Release of Eastern Hemlock
by the Death of the American Chestnut.

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Problem.

To determine if Eastern Hemlock (*Tsuga canadensis*) was released when the American Chestnut (*Castanea dentata*) was killed by the Chestnut Blight (*Endothia parasitica*) in a restricted area on the Harvard Forest, Petersham, Massachusetts.

Area:

This study was conducted in a limited area of Prospect Hill IV amounting to approximately 2 acres of the stand as shown in Appendix page 5. A one-fifth acre strip was located at random by running a base line due east and then at ~~a~~^{the} three hundred foot mark running a one-fifth acre strip (66' x 132') due south.

The soil of the area is mapped as Gloucester stony loam. The aspect is northwest and slope varies from slight at the end of the strip to steep at the base line. It is well drained and has a good humus layer.

Chestnut Blight.

The chestnut blight was first observed in Petersham in the fall of 1910 by Professor J. G. Jack of the Harvard Forest School. Professor Graves in 1911 found a stand in Prospect Hill IV which was located just over the ridge from the area discussed in this paper, to be heavily infected, (Kittredge 1913). State Forester Bane (1916) states that, "The chestnut is doomed in the state of Massachusetts in a comparatively few years". Mr. Charles Upham, who was employed by the Harvard Forest during the year 1918

states that, "the trees on the stand involved in the present study had been killed three to four years before salvage which took place in 1918".

Method.

All the living trees 3" and above were tallied and the diameter recorded on a cumulative fifth acre tally sheet. Increment borings were taken from various hemlocks ^{that} ~~and~~ were selected ^{with} in respect to their position to the old chestnut stumps. The chestnut stumps on the fifth acre were tallied and their diameter recorded.

History of the Stand.

A careful examination of the Harvard Forest records provided no written description of the stand nor of any operation which had occurred. The only references or clues to its history were found in the map series of the Harvard Forest Atlas and from Mr. Charles Upham.

The map of 1830 of the town of Petersham shows this area with scattered trees, Raup and Carlson (1941). The land use history map of the Prospect Hill Block shows the area as pastured but never cultivated. Both these records can be accepted, as a red maple 148 years old was found dating to 1800 and a hemlock 130 years old dating to 1818 show that the area was not completely cleared, ^{after 1800}

The various Harvard Forest Stand Maps carry the area as follows:

<u>Year</u>	<u>Type</u>
1908	Chestnut
1919	Pine - hardwoods
1929	Hemlock - hardwoods
1937	Hemlock - hardwoods
1946	T-RO-RM-BB-4-6-B

It should be kept in mind that the area in question comprises only a small part of the main stand.

The hurricane damage for this immediate area is listed as relatively slight and this is borne out by the lack of any large number of wind thrown trees.

The ultimate type map as compiled by Spurr (1944) calls for this area to become upland hardwoods (Oak - Birch).

Data. (See appendix for original data).

(1). Present stand on 1/5 acre plot 3" and up.

Hemlock	47
Red Maple	9
Yellow Birch	2
*Others	14

*Others includes Paper Birch, Black Birch and Striped Maple.

(2). Chestnut stumps on 1/5 acre plot.

Number	19
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Approximate* volume of Chestnut removed in salvage 1,500
bd.ft./ 1/5 acre plot.

*After Shepard (1916).

(3). Increment borings of hemlock on the 1/5 acre plot showed definite and continued release after the death of the chestnut. If they were 7' or less from the chestnut the release varied from 26 to 30 years ago. This is not true for a tree which was 5' from a 15" stump as no release in the last 34 years was noted. Hemlocks which were 20' or more away from a stump showed little or no release in the 10 years following the death and removal of the chestnut.

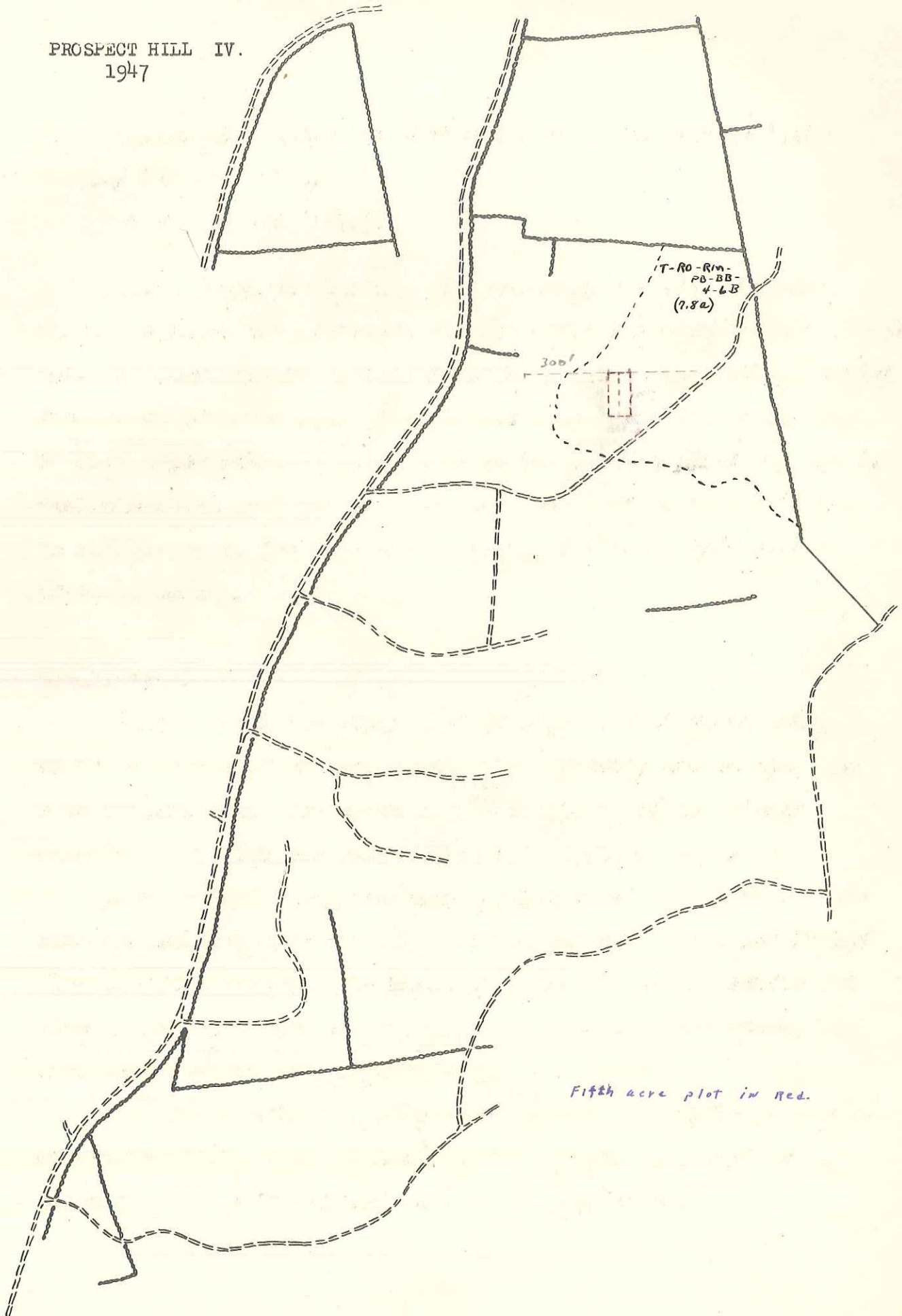
Conclusions.

Hemlock which was within 10' or less of a chestnut stump showed a degree of release varying in intensity and in time from 4 to 8 years after the death of the chestnut and no release occurred before the removal of the dead chestnut trees.

The possibility of securing a relatively pure stand of hemlock as advanced by Frothingham (1915) and by Merrill and Hawley (1924), i.e., removing the hardwood overstory with a sufficient advance growth of hemlock will produce almost a pure stand, has been borne out in this limited area.

Also the conclusion advanced by Frothingham (1915), Merrill and Hawley (1924) and Marshall (1927) that the diameter of the hemlock bears no direct relation to the age of a hemlock which has been suppressed was also indicated.

PROSPECT HILL IV.
1947



Fifth acre plot in red.

HARVARD FOREST RECORDS

PH IV #3
 Stand: Hemlock stand -
 CHESTNUT REMOVED 1918

By: E.E. Smith

Date: OCT. 13, 1948

LINE DUE SOUTH FROM 300' MARK ON BASE LINE

1/5 Acre Plot.

Release

NOTES

Tree #	Species	Diam.	LOGS + BOLTS	APP. AGE	SUPPRESSED AGE - CENTER	Released	Years From outside	NOTES
1	HEM.	11"	1 Log 1 Bolt	104	-	-	21	30' from chest. stump
2	"	11 1/2"	1/1	130	-	-	22	Gradual - very slow growth - 2nd chestnut nearby
3	"	14"	2/0	107	-	-	Gradual	6' from small chest. stump
4	BD	WIND THROWN NEXT TO TREE #3						
5	RM	6"	0/5	-	-	-	-	Small tree with hard rot.
6	YB	12"	4/5	-	-	-	-	4' from a small chest. stump
7	Hem	12"	1/2	66	30G	14A-39A	27A	3 chest. spruce stumps - 9" inch - 3' away
8	"	14"	1 1/2/0	84	40-50G	29A-56A	27M	13" chest. stump - 7' away
9	"	8"	-	38	-	-	26(A) 26(B)	STUMP SIDE - 15" stump 6' away STANDING STUB SIDE 9" stub 2' away
10	CHST	4"	-	25	-	-	-	Dead snag next to #9 No stumps near (20') very even growth.
11	Hem	11"	-	44	-	-	-	
12	"	12"	-	71	5G	21A-	(52A)	5' from 15" stump
13	"	12"	-	81	14(G)-41G	26(A)-56(B)	25(G)	4' from 15" stump
15	"	16"	-	85	5(A)-50G	31(B)-58(B)	28(A)	next to 4 stump spruce + alders.

OUT SIDE PLOT

#14	RM	10"	0/4	148	26A- 100-115G	60-68G 120A	30A	(Near chestnut stumps?)
16	NO CORE - 4 chestnut stumps around old stump hole. Older in (app.) 60 years. - Suppressed as 23 year old age (app. 1880) and continued suppressed until time chestnuts died.							
17	Hem.	16"	2 1/2/0	77	-	-	-	Very gradual growing slowly Growth - No chestnut stumps near.

HARVARD FOREST RECORDS

Stand: PH 12 #3

By: E. E. Smith

1/5 acre strip 66' x 132'

Date: OCT. 18, 1948

Chestnut Stumps on 1/5 acre plot.

Diam	-At	Top of	Stump	v. 1/5 acre	vol / 1/5 acre
4"	•	1		10	10
5"	•	1		15	15
6"	•	1		22	22
7"	••	3		30	90
8"	••	2		42	84
9"	•	1		56	56
10"	••	2		73	146
11"	••	2		89	178
12"	•	1		111	111
13"	•	1		125	125
14"	••	2		166	332
15"	••	2		191	382
19 Total / 1/5 acre plot				1551	ll. ft. / 1/5 acre.
				5	
				7755	ll. ft. / acre.

Basis chestnut vol. from Shepard's vol. tables for spruce
 chestnut in mass. - (7 files of student work; Harvard Forest, Petruschan, Mass.)

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