

A Study of Post
Hurricane Composition of the
Harvard Forest Tract in
Pisgah Mountain Area of Southwestern
New Hampshire

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Problem.

The problem is to determine the composition of the forest in the Harvard Tract of the Pisgah Mountain Section in Southwestern New Hampshire.

Introduction.

The area involved in this study is the Harvard Forest Tract in the Pisgah Mountain Section of Southwestern New Hampshire. This area of approximately twenty acres of virgin forest was given to the Harvard Forest in 1927. Since that time and even before the staff and students of the Harvard Forest carried on detailed studies of the area. In 1942 the results of this study were published as Harvard Forest Bulletin No. 21 by A. C. Cline and S. H. Spurr. In 1938 the old growth forest was completely destroyed by a hurricane. No salvage operations were undertaken and it is now possible to determine what species first occupy a virgin forest in this region when destroyed by natural forces of which man plays no part.

Method of Study.

One transect 6.6ft. wide by 350ft. long was taken. The transect was oriented east and west and in this way ran over a ridge and into a ravine to give a more complete picture of the area. All trees in this transect were recorded by species and every 50ft. a one-acre plot (6.6' by 6.6') was taken for more complete examination. In these seven one-acre plots the height and ages were recorded. The ages were determined by cutting down all trees in the plots and counting the annual rings. In each plot the soils were also examined to determine the depth of the organic layer and also to briefly note the soil particularly to see if the leached layer recorded before the hurricane (Cline and Spurr 1942) still

existed.

In addition to the transect four other plots (10' X 10') were taken at random. The purpose of taking these additional plots was to get a more representative sample of the entire area. In these last four plots all trees were recorded by species and an effort was made to determine which were on the ground prior to the hurricane, but in this case the trees were not actually cut down. The soil was also sampled as in the mil-acre plots.

Discussion.

Throughout the Harvard Tract on the Mt. Pisgah area Cline and Spurr listed the cover type as being White Pine, White Pine-Hemlock and Hemlock. At the present time this stand is composed of young growth 98% of which has appeared since the hurricane. This young growth in the samples taken is 28.1% Black Birch, 20.8% Red Maple, 17.3% Fire Cherry, 17.0% Hemlock, 10.6% Paper Birch, 4.7% Beech, 1.2% Red Oak and 0.3% White Pine. The total number of stems per acre is 5480.

The Black Birch was common on all sites. The Red Maple was most common on the ridge tops and the Hemlock on the lower slopes. The Red Oak was most plentiful on the ridges.

It was impossible to locate the Cline and Spurr plots on the ground, however they took 11 sample plots 0.1 acre in area in the Harvard Tract. In these plots they found a great deal of reproduction on the ground. This reproduction was divided in two classes; (1) less than one foot high and, (2) 1 - 15 feet in height. In the class of one foot and under they found 900 to 40300 stems per acre. In the class of 1 to 15 feet the

number of stems per acre varied from 200 to 5,000. It is not apparent from the data taken what has become of the advanced reproduction.

The soil samples taken throughout the area showed a humus layer averaging approximately two inches and leached layer varying from 3 inches in one plot to a trace in four of the plots. Griffith, Hartwell and Shaw 1930 found that the organic layers in the Pisgah Tract varied from 1.7 inches under hardwood to 5.4 inches under Spruce and Hemlock and 3.4 inches of organic matter under the White Pine - Hemlock stand. They found that the leached layer varied from 0.9 inches under the mixed hardwoods to 2.1 inches under the Spruce - Hemlock stands to 1.3 inches under the White Pine - Hemlock.

Apparently since the hurricane the undecomposed layer of organic material has been decomposing faster than it has been built up. It is now less than under the original White Pine - Hemlock stand and is now approximately the same depth as under the old growth mixed hardwood stands. The leached layer which averaged 1.3 inches under the White Pine - Hemlock stands is apparently becoming less pronounced although in one case a leached layer 3 inches deep was found.

Conclusions.

After a careful examination of the data collected it is found that 98% of the reproduction appeared since the hurricane. The five most important species in regard to percentage composition consist of Black Birch 28%, Red Maple 21%, Fire Cherry 17%, Hemlock 17%, and Paper Birch 11%. Beech and Red Oak are very low while White Pine

reproduction is almost negligible at 0.3%. The distribution of of the species followed rather definite patterns with the Black Birch generally well distributed and the Red ^Aple more common on the ridges and higher slopes with the Hemlock on the lower slopes and in the ravines.

The leached layer which was so well pronounced at the time of the original study is becoming less conspicuous while in only one plot was the layer equal to that of the original stand. The organic layer is also being reduced in most cases.

Tree Species and Abbreviations

Common Name	Abbreviation	Scientific Name
Black Birch	BB	Betula lenta
Red Maple	RM	Acer rubrum
Fire Cherry	F.C.	Prunus pennsylvanica
Hemlock	T	Tsuga canadensis
Paper Birch	PB	Betula papyrifera
Beech	Be	Fagus grandifolia
Red Oak	RO	Quercus borealis maxima
White Pine	WP	Pinus strobus

HARVARD FOREST RECORDS

Stand: Pisgah Tract

By: E. E. Smith
J. H. Scudder

Date:

Data gathered on mil-acre plots

Plot # 1													
Species FC													
Age 8													
Ht. 6'													
Soil: 4" humus, matted mor trace of leached layer													
Exp. Ridge top													
Plot # 2													
Species BB FC FC FC RM BB BB BB PB PB BB FC BB													
Age 8 2 5 3 4 4 4 9 10 10 4 3 3													
Ht. 9' 2' 7' 3' 6' 3' 4' 8' 14' 10' 3' 3' 4'													
Soil: 4" humus, matted mor, 1/2" leached layer													
Exp. Ridge top with slight westerly exposure													
Plot # 3													
Species FC FC BB FC BB													
Age 6 6 10 7 10													
Ht. 6' 5' 10' 9' 12'													
Soil: 3" matted mor, 3" leached layer													
Exp. West													
Plot # 4													
Species FC RM BB BB BB													
Age 9 10 4 4 10													
Ht. 8' 9' 5' 2' 14'													
Soil: 2" matted mor, 1" leached layer													
Exp. West													
Plot # 5													
Species T													
Age 120													
Ht. 14'													
Soil: Granite outcrop with a light layer of humus.													
Exp. West													

HARVARD FOREST RECORDS

Stand: Pisgah Tract

By: E. A. Smith
J. R. Seudder

Date:

Data gathered on mil-acre plots

Plot # 6

Species FC BB

Age 10 7

Ht. 12' 7'

Soil: 2" matted mor, $\frac{1}{2}$ " leached layer

Exp. West

Plot # 7

Species F T

Age 35 45

Ht. 10' 9'

Soil: 2" matted mor, 1" leached layer

Exp. Ravine

HARVARD FOREST RECORDS

Stand: Piagah Tract

By: E. E. Smith
J. H. Scudder

Date: November 10, 1948

Summary of Transect and Plots

Slope	Expos	Area	BB	HM	FC	T	PB	Be	RO	WP			
Transect													
East slope		25x6.6	5	4	3	1	1	-	2	-			
Ridge top		75x6.6	28	37	15	3	3	-	-	-			
West slope		250x6.6	48	16	32	44	22	11	1	1			
Plot # 1													
Ridge	South	10x10	5	8	-	8	1	1	1	-			
Soil: 2" humus layer, trace of leached layer. One pre-hurricane hemlock													
Plot # 2													
Ridge	SW	10x10	1	2	2	2	-	1	-	-			
Soil: 2" humus layer, trace of leached layer. One fire cherry and two hellocks, pre-hurricane													
Plot # 3													
Ridge top		10x10	1	4	3	-	1	3	-	-			
Soil: 1 1/2" humus layer, trace of leached layer. One pre-hurricane beech.													
Plot # 4													
Ridge	East	10x10	8	-	4	-	8	-	-	-			
Soil: 2" humus layer, trace of leached layer. No pre-hurricane trees.													
Total		.06 Acre	96	71	59	58	36	16	4	1			
Total per Acre			1543	1141	948	932	597	257	64	16	5480		
Percent Comp.			28.1	20.8	17.3	17.0	10.6	4.7	1.2	0.3	100%		

HARVARD FOREST RECORDS

Stand:

By:

PLOT # 1

Date: Oct. 26, 1948

6.6' x 6.6' - 43.6' to 50.0'

Species	FC												
AGE	8												
Ht.	6'												
Soil	4" Humus, Trace of leached layer - Matted mor												
Exp.	Ridge Top												
PLOT # 2 - 93.4' to 100.0'													
Sp.	BB	FC	FC	FC	RM	BB	BB	BB	PB	PB	BB	FC	BB
AGE	8	2	5	5	4	4	4	9	10	10	4	3	3
Ht.	9'	2'	7'	3'	6'	3'	4'	8'	14'	10'	3'	3'	4'
Soil	Matted mor 4" deep - 1/2" leach - Good B ₁ Layer												
Exp.	Almost ridge top with slight westerly exposure												
PLOT # 3 - 143.4' to 150'													
Sp.	FC	FC	BB	FC	BB								
Age	6	6	10	7	10								
Ht.	6'	6'	10'	9'	12'								
Soil	3" matted mor - 3" leached layer - Granite												
Exp.	Westerly exposure.												
Plot # 4 - 193.4' to 200'													
Sp.	FC	RM	BB	BB	BB								
Age	9	10	4	4	10								
Ht.	8'	9'	5'	2'	14'								
Soil	Matted mor 3" deep - 1" leach layer - Bilayer												
Exp.	Westerly exposure.												
Plot # 5 - 243.4' to 250'													
Sp.	T												
Age	120												
Ht.	14'												
Soil	Granite outcrop with light layer of humus												
Exp.	Westerly exposure												
Plot # 6 - 293.4' to 300'													
Sp.	FC	BB											
Age	10	7											
Ht.	12'	7'											
Soil	Matted mor 2" - 1/2" leached layer and a B ₁ horizon												
Exp.	Westerly exposure												
PLOT # 7 343.4' to 350.0'													
Sp.	T	T											
Age	35	45											
Ht.	10'	9'											
Soil	2" matted mor - 1" leached layer - indefinite depth of B ₁												
Exp.	Ravine												

HARVARD FOREST RECORDS

Stand:

By:

Date:

Slope-Exposure	Area	BB	RM	FC	T	P.B.	Be	RO	WP				
Reverse 350'													
East-Slope	250x6	5	4	3	1	1	-	2	-				
Ridge-top	250x6	28	37	15	3	3	-	-	-				
West-Slope	250x6	48	16	32	44	22	11	1	1				
Plot #1	10'x10'	5	8	-	8	1	1	1	-				
Ridge-South													
Plot #2	10'x10'	1	2	2	2	-	1	-	-				
SW-Slope													
Plot #3	10'x10'	1	4	3	-	1	3	-	-				
Ridge													
Plot #4	10'x10'	8	0	4	-	8	-	-	-				
Ridge													
Total / .06 acre		96	71	59	58	36	16	4	1				
Total / acres		1543	1144	948	932	597	257	64	16	=	5480		
Percent Comp.		28.1	20.8	17.3	17.0	10.6	4.7	1.2	0.3	=	100%		

HARVARD FOREST RECORDS

Stand:

Pisgah

By: E. Emmett Smith

Date: November 9, 1949

Plot # 1 15' x 15'

Has	R.M.	P.B.	B.B.	S.M.	R.O.	Be.	F.C.	
□ 8	□ 8	1	5		1	1		One dead hemlock 14" dbh
One pre-humane hemlock in plot.								Soil - Humus layer 2" deep - slight leached layer (too small to measure) light coffee brown color below leached layer.
Aspect: On ridge slightly southern exposure								

Plot # 2 10' x 10'

Has	R.M.	P.B.	B.B.	S.M.	R.O.	Be.	F.C.	
2	2		1			1	2	One Fir, cherry and two hemlocks are pre-humane. Aspect S-E and sloped. Soil: 3" humus layer - slight leached layer - light brown soil.

Plot # 3 10' x 10'

Has	R.M.	P.B.	B.B.	S.M.	R.O.	Be.	F.C.	
4	1	1				3	3	One bush pre-humane. Ridge top. Soil 1 1/2" humus - trace of leached material - soil light coffee brown.

Plot # 4 10' x 10'

Has	R.M.	P.B.	B.B.	S.M.	R.O.	Be.	F.C.	
	□ 8	□ 8					4	No pre-humane trees - Ridge top. Soil 2" humus layer 1 1/2" leached layer - light coffee brown soil below.

HARVARD FOREST RECORDS

Stand: Pisgah Forest
Summary

By: ELS
JHS
LPS
Date:

Expos. & R ²	RM	T	FC	R.O.	BB	WP	SL	HL	Se	AM	P.I.	St.M.P.
East Slope 35	4	1	3	2	5					1	1	
Ridge 75	37	3	15		38						3	
West Slope 350	16	44	32	1	48	1		2	11		32	
Totals	57	48	50	3	81	1		3	11		36	
Plot 2 10' x 10' (Ridge-South)	8	8	-	1	5				1		1	-
Plot 3 " (SW Slope)	2	2	2	-	1				1		0	-
Plot 4 " (Ridge)	4	2	3	-	1				3		1	-
Plot 5 " (Ridge)	0	0	4	-	8				-		8	-
	71	58	59	4	96	1			16		36	
Per Area	1141	932	948	64	1543	16			257		579	= 5480
	20.8	17.0	17.3	1.2	28.1	0.3			4.7		10.6	= 100%