

# MINNESOTA FORESTRY NOTES

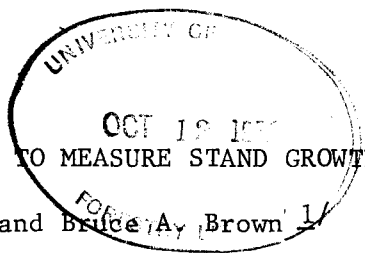
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DENDROMETER BANDS TO MEASURE STAND GROWTH

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Stand density is frequently expressed in terms of basal area. The total basal area per acre provides a measure of growth commonly used in silvicultural recommendations. A study was designed to investigate seasonal growth relationships on a per acre basis at the University of Minnesota Forest Research Center near Cloquet, Minnesota. Vernier tree band dendrometers were used to compare two density levels in a 46-year old white pine plantation previously described <sup>2/</sup>.

The bands were constructed as described by Liming <sup>3/</sup> from 1/2" aluminum metal tape. Calibration scales were scribed on the bands by means of a hand knife and a homemade template. The vernier scale was scribed on a separate piece of metal as was suggested by previous users <sup>4/</sup>.

All trees 3.6" and larger were equipped at d.b.h. with bands so individual tree data could be converted to basal area per acre. A few trees smaller than 3.6" d.b.h. were not used because the bands could not be tightened properly. Two 1/10 acre plots were used: Plot #4 with 66 trees had 190.79 square feet of basal area per acre and Plot #5 with 57 trees had 144.95 square feet of basal area per acre.

The first band expansion on the plots was recorded on May 23. For the remainder of the growing season the bands were read weekly. The basal area growth patterns for the two plots are quite similar. The denser plot (190.79 sq. ft.) showed the smaller basal area increase, 2.09 square feet per acre. Plot #5 (144.95 sq. ft.) increased 3.26 square feet per acre (Table). The data show that both plots had completed 50% of their basal area growth by June 21, about one month after band expansion was first recorded (Figure). The bands also revealed that growth in the larger diameter classes began several weeks before that of the smaller diameter classes.

The bands can be useful in determining seasonal amounts of stem expansion for trees growing under different environmental conditions. However, the user should recognize the limitations insofar as precision is concerned. At times the cambial growth may be so small that it is hidden by the expansion and contraction of the stem. The band reading may merely reflect these changes rather than true growth. The negative readings in the table indicate that stem contraction was greater than the actual growth during these periods. The amount of contraction recorded in late September and early October exceeded the basal area increment for several weeks prior.

Consequently, there is a need for a clear understanding of the term "growth" when using tree bands. It should be emphasized that "growth" represents total change in circumference outside the bark and not necessarily actual wood increment.

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<sup>2/</sup> Brown, B. A. 1963. Improvement cutting in a 46-year old white pine plantation. Minn. For. Notes No. 131.

<sup>3/</sup> Liming, F. G. 1957. Homemade dendrometers. Jour. For. 55:575-577.

<sup>4/</sup> Mesavage, C. and W. S. Smith. 1960. Timesavers for installing dendrometer bands. Jour. For. 58:396.

Figure. Accumulated basal area increment of white pine plots.

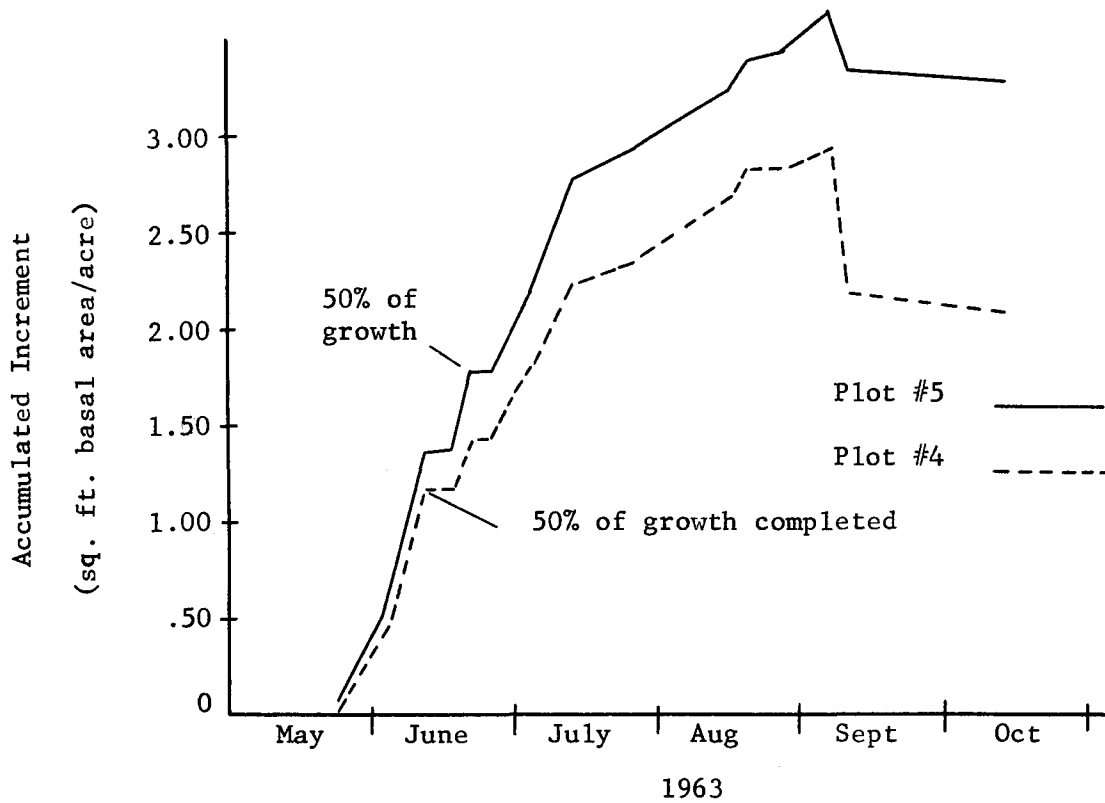


Table. Summary data for dendrometer band readings for 1963 growing season.

1963 Date of Reading	Plot #4			Plot #5		
	Basal Area/ Acre	Increment BA/Acre	Accumulated Increment BA/Acre	Basal Area/ Acre	Increment BA/Acre	Accumulated Increment BA/Acre
Begin	190.79			144.95		
5/23		.032	.032		.069	.069
6/3		.420	.452		.495	.564
6/11		.723	1.175		.793	1.357
6/17		.005	1.180		.015	1.372
6/21		.262	1.442		.400	1.772
6/25		-.016	1.426		.021	1.793
6/28		.165	1.591		.121	1.914
7/3		.180	1.771		.245	2.159
7/12		.447	2.218		.619	2.778
7/24		.131	2.349		.141	2.919
8/15		.342	2.691		.317	3.236
8/19		.117	2.808		.143	3.379
8/26		.007	2.815		.057	3.436
9/6		.127	2.942		.209	3.645
9/10		-.764	2.178		-.303	3.342
10/13		-.085	2.093		-.084	3.258
End	192.88			148.21		