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Stratifying Photo Plots into Volume Classes . . .

by Crown Closure Comparator

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ABSTRACT: As an aid to aerial photo interpretation, a Crown Closure Comparator has been developed. Printed as a positive film transparency, this device shows tree crowns as open dots on a black background. The Comparator is used to stratify 1-acre plots into broad volume classes on single aerial photos using 4 crown-diameter and 9 crown-closure classes. It can also be used for stereo classification with mirror-type stereoscopes.

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RETRIEVAL TERMS: forest inventory; stand volume; crown closure; crown diameter; aerial surveying; photo interpretation; comparator; stereo comparator.

How do you measure crown closure on aerial photographs? There are several ways of determining the proportionate area, within a fixed boundary, covered by tree crowns projected vertically to the ground. Some photo interpreters prefer density standards;[1] others, dot grids;[2] and a few consider such devices as density overlays[3] and ocular estimates[4] best. Photo interpreters generally agree that the method to be used will depend on the photo survey problem.

We have developed a device for stratifying 1-acre photo plots into broad volume classes on 1:20,000 non-stereo photo coverage. Crown closure and crown diameter are the independent variables. We call this device the Crown Closure Comparator (fig. 1). It may also be used for stereo classifying, with mirror-type stereoscopes.

The Crown Closure Comparator is printed as a fine-grain positive film transparency to facilitate direct comparisons between closure standards and 1:20,000-scale aerial photo plots. Tree crowns are seen as open dots on a black background. When the Comparator is raised slightly above the surface of of the photograph, light reflected from the photograph illuminates the dots in the same gray tones as the forest canopy. Black areas surrounding the dots represent openings and shadows in the stand.

In making plot-to-plot comparisons, crown closure of the same degree will not appear the same when average crown diameter changes. Therefore it is difficult to select the best standard with density scales based on a single crown diameter. The Comparator helps the photo interpreter to decide by varying crown closure by four 10-foot crown diameter classes. The interpreter estimates average crown diameter to the nearest 5 feet. Then by using the appropriate crown diameter scale, or scales, he can slide the Comparator across the photographic plot location to find the best random distribution of dots representing crown closure. This comparison is aided by 1-acre circles between 10-foot diameter classes that enable the interpreter to outline the plot location as he progresses.

The Comparator can be reproduced for use in four photographic scales:

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[1] Moessner, Karl E. *A crown density scale for photo interpreters.* J. Forestry 45:434. 1947.

[2] Weber, F.P. *Aerial volume table for estimating cubic foot losses of white spruce and balsam fir in Minnesota.* J. Forestry 63:25-29. 1965.

[3] Losee, S.T.B. *Measurement of stand density in forest photogrammetry.* Proc. Annu. Meeting Can. Inst., Surveying and Photogrammetry 1956:17. 1956.

[4] Pope, Robert B. *Ocular estimation of crown density on aerial photos.* Forestry Chron. 36:1, 89-90. 1960.

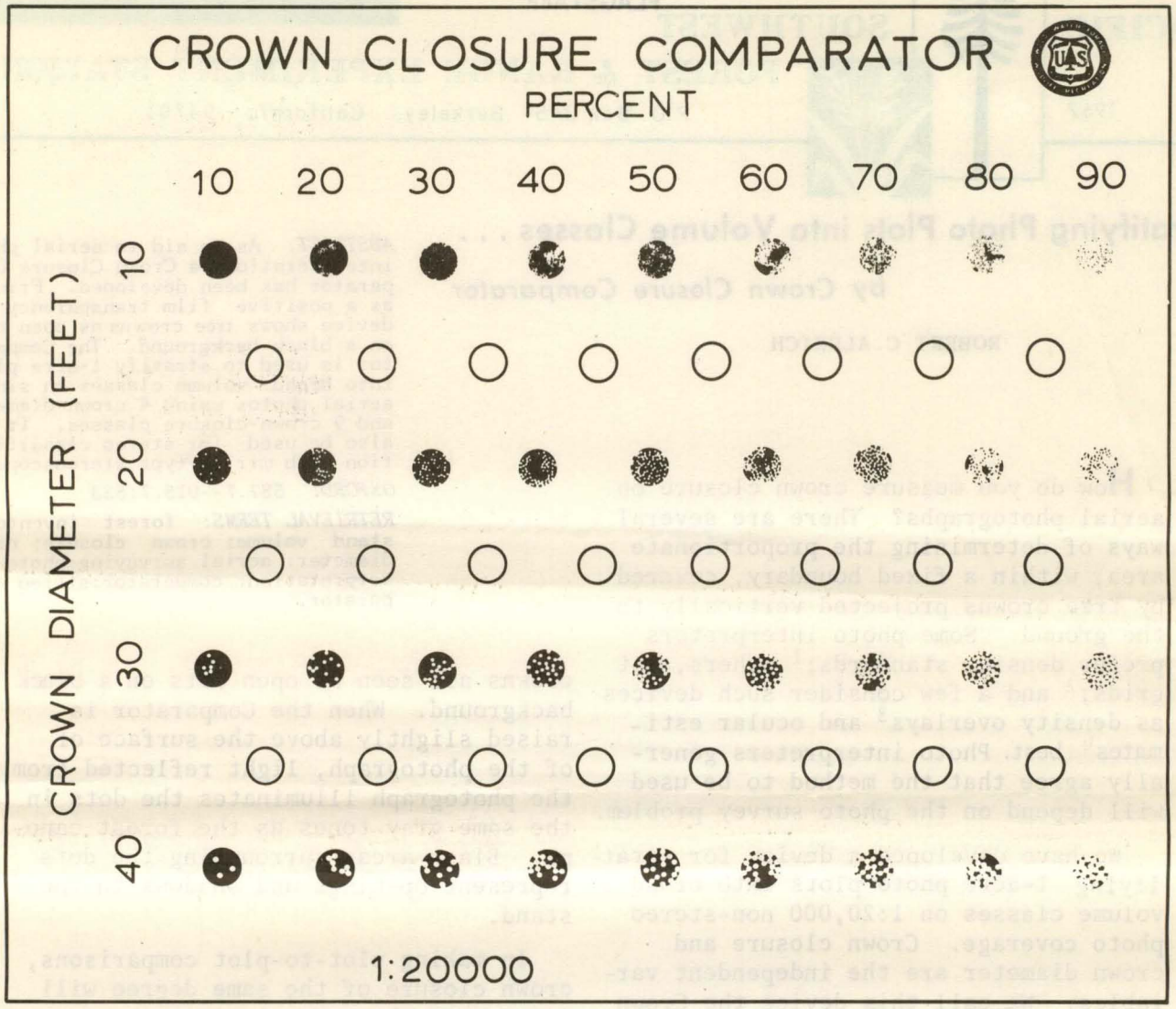

Figure 1.--*Crown Closure Comparator for 1-acre aerial photo plots is shown 1-1/2 times normal size. Normally it is printed as a transparency.*

1:12,000; 1:15,840; 1:20,000; and 1:30,000. The film transparencies may be purchased from the Division of Engineering, Forest Service, U.S. Department of Agriculture, Washington, D. C. 20250 at the following prices:

Crown Closure Comparator for 1-acre plots:

1:12,000	$2.50
1:15,840	2.00
1:20,000	1.75
1:30,000	1.55

The Author

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