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DOMINION FOREST SERVICE

Forest Air Survey Leaflet No. 1

THE POLE SCALE

by

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THE POLE SCALE

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Image of Tree on Photograph

Fig. 1

In order to overcome the difficulty, the so-called "Pole Scale" (Fig. 1), in which small lines of various lengths are employed, has been devised by the writer. It is possible to match these small lines or poles with a tree's trunk and to select the particular pole that most nearly compares with it in length.

Fast and accurate measurement is facilitated because of the construction of the Pole Scale: the individual poles are also particularly distinct to the eye, owing to the offset of convenient during the process of adjustment to the tree's image. A further advantage lies in the manner in which the pole may be aligned with the axis of the tree's image. This is important in the case of a tree whose foliage obscures the base, making it necessary to estimate the point of juncture of the trunk and the tree's stem. There is also a natural ease of comparison between the poles and the tree trunk because of their common linear character. Furthermore a visual measuring device offers the least possible obstruction to the view in the

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THE POLE SCALE

Certain measuring devices, such as the Tree Height Grid and the Wedge Scale, which have been designed and employed by the Forest Air Survey Division of the Dominion Forest Service for the measurement of fine tree images in air photographs, have a disadvantage in that the lines which are used for measuring purposes have an obscuring effect at the top and base of the tree's image. In other words, if the tree's image is measured while in a position where it spans the distance between two delimiting lines (see Fig. 1), these lines will often obstruct and distract the view and prevent the greatest speed and accuracy of measurement, especially during stereoscopic examination. The difficulty could not be overcome by making the lines extremely fine, for not only would it be impracticable to do so by present methods, but also the lines must be heavy enough to be clearly visible.

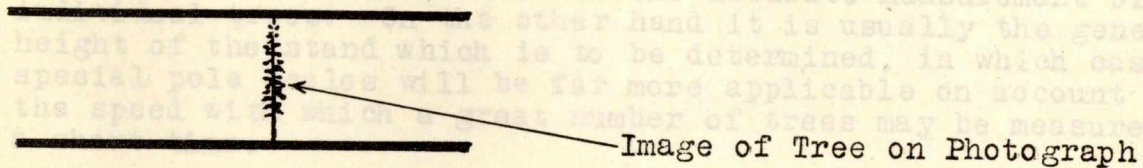


Fig. 1

In order to overcome the difficulty, the so-called "Pole Scale" (Fig. 2), in which small lines of various lengths are employed, has been devised by the writer. It is possible to match these small lines or poles with a tree's image and to select the particular pole that most nearly compares with it in length.

Fast and accurate measurement is facilitated because of the construction of the Pole Scale: the individual poles are also particularly distinct to the eye, owing to the effect of movement during the process of adjustment to the tree's image. A further advantage lies in the manner in which the pole may be aligned with the axis of the tree's image. This is important in the case of a tree whose foliage obscures its base, making it necessary to estimate the position of the point of juncture of the image and the tree's shadow. There is also a natural ease of comparison between the poles and the tree images because of their common linear character. Furthermore a slender measuring device offers the least possible obstruction to the view in the

measurement of closely grouped tree images. The Pole Scale as shown in Fig. 2 not only contains poles for measuring the length of tree images but also provides a few additional small poles for measuring the crown widths.

The question of the stereoscopic fusion of two poles for the purposes of measurement of tree images has not yet been investigated in detail.

A disadvantage of the Pole Scale as shown in Fig. 2 is that it requires the use of a converting factor in order to determine the tree's height. It is merely a measuring device like a foot rule and does not take into account the varying scales of the tree images. Special pole scales will therefore be constructed for both vertical and oblique photographs, in which the poles will be of the correct size for direct measurement. However, it will be necessary to reduce greatly the number of poles which may be selected for the measurement of any particular tree's image, and accordingly the original pole scale will remain the best device for the accurate measurement of individual trees. On the other hand it is usually the general height of the stand which is to be determined, in which case the special pole scales will be far more applicable on account of the speed with which a great number of trees may be measured in a short time.

In the construction of special pole scales for oblique photographs, use would be made of the mathematical solutions as employed in the construction of the Tree Height Grid, Fig. 4(a), which was originated by the writer in the pre-war years. Like the special pole scales the Tree Height Grid takes the scale of each tree's image into account. It has been constructed for use on various oblique photographs and consists of parallel lines spaced at intervals representing 100 feet of tree height. It is not expected that it would be entirely superseded by the special pole scales, because it will always be valuable for a rapid assessment of tree heights.

In oblique photographs truly vertical objects appear inclined in the direction of the plumb point, because, by the laws of perspective, parallel lines meet in a vanishing point. Accordingly, it is desirable, in drawing the special pole scale, to incline each pole to coincide with the axis of the tree's image. See sample photograph, Fig. 3.

FIG. 3. OBLIQUE AIR PHOTOGRAPH

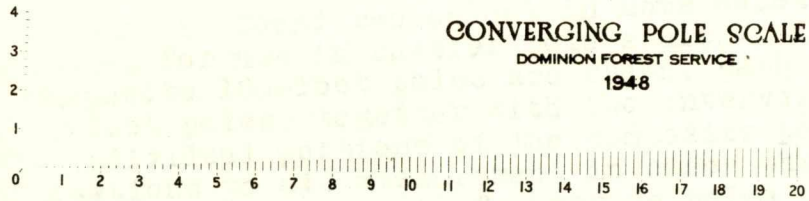


FIG. 2



FIG. 3. OBLIQUE AIR PHOTOGRAPH

It may be found convenient in some cases to employ composite poles for use in special pole scales. In Fig. 4(b) proposed composite 100-foot poles are shown, each consisting of three 20-foot poles, together with two intervals of 20 feet each. The individual portions of the composite poles would act as graduations to aid measurement in cases where space does not permit the employment of numerous poles of various lengths.

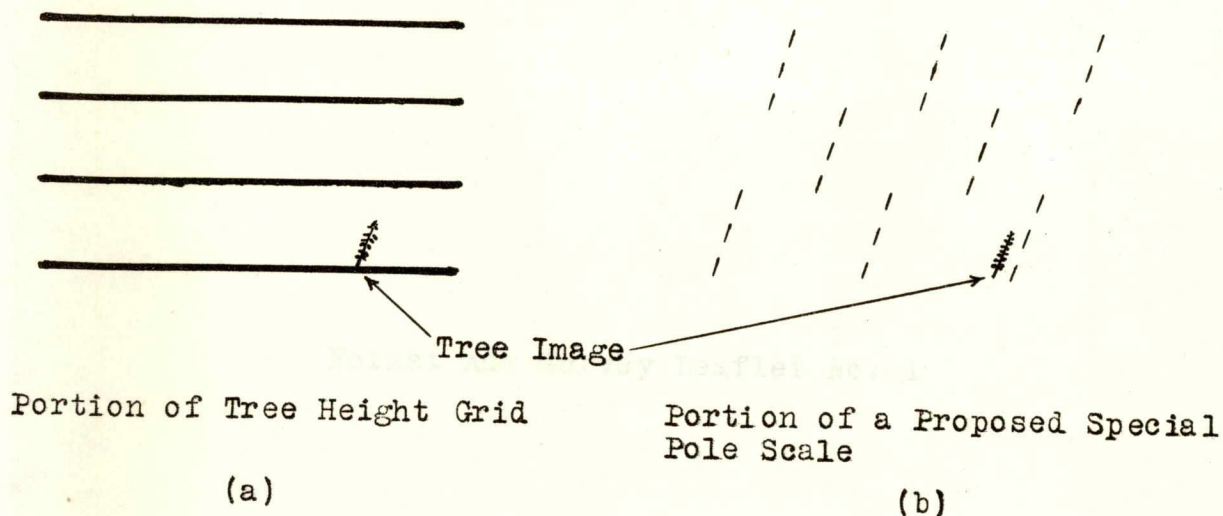


Fig. 4

The pole scales may of course be applied to the measurement of shadows as well as of tree images in the air photographs.