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*Photogrammetric Methods in Reforestation Surveys**

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APPRECIABLE progress has been made during the last decade in the management of our forest lands in British Columbia. Artificial reforestation through planting and seeding is carried out by government and industry on an increasing scale.

Regeneration surveys are conducted on logged and burned lands to establish the state of reproduction and to determine the areas which need reforestation.

In the Douglas fir region of this province, the Forest Service requires that these surveys traverse the area to be examined with strips not more than 10 chains apart. At intervals of 1.25 chains along each strip a group of 4 milacres has to be tallied. Acceptable stocking is defined as 31 per cent or more of the milacres stocked, provided not more than four consecutive groups of 4 milacres are completely blank. Areas of 10 acres or more that are not satisfactorily stocked have to be delineated on a map of a scale of not less than 20 chains to the inch. These standards apply to forest lands where a period of eight years has elapsed since logging or burning.

These specifications are minimum requirements. It is apparent that the costs of such surveys will be appreciable when conducted over larger areas. The results may be statistically sound but it is obvious that a 10 chain spacing of examination strips can only provide a very rough estimate. The field-examiner's guess of what is in between the strips constitutes the sole basis for evaluation of about 90 per cent of the area covered. In other words, this type of survey answers one question only and that is: The number of trees established per acre. It does not give any description of the stand.

The use of air photographs and their detailed interpretation in the conduct of reforestation surveys can materially improve the results and, at the same time, cut down the costs.

The basic reason for this statement is simply the fact that an experienced interpreter can see on high-quality air-photos of approximately 20 chain scale, coniferous seedlings 2 to 3 feet high. If the photography is flown in late fall, these small trees can even be seen under dense herbaceous cover of Willow and Bracken fern.

This fact then enables the forester-interpreter to delineate on the photographs, without any field examination, three broad classifications:

1. Areas which are obviously fully stocked
2. Areas which appear partially stocked
3. Areas which appear not stocked.

What he cannot see, of course, are small seedlings of less than 2 feet height.

With this classification the costly field sampling with examination strips every 10

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chains can be restricted to those areas described as partially stocked.

The fully stocked types are sampled at random only for species composition and age.

The same random sampling is carried out on those areas classified as not stocked, in order to determine the possible presence of small seedlings.

This survey method will provide all the necessary forest inventory data and not just the number of trees per acre. And the costs are substantially lower.

A rough calculation might illustrate this point. Assume that a logged-over area of about 10,000 acres or 16 square miles has to be surveyed.

With ground methods a crew of 2 men has to run 8 line miles per square mile, or a total of 128 miles (8×16). At the rate of 2 miles per day, which represents a fair average, the crew will need 64 working days for examination strips. Add an additional 6 days for travel etc. and the field work will be completed after 70 days. If the work is carried out by a service organization, the costs per crew-day can be assumed as approximately $55.00. Board and lodging of field crew might average $10.00 per day. The field work cost would then total approximately $4,500.00. If a suitable 20 chains map exists the office compilation might amount to one half of the field time which is 35 crew days or approximately $1,900.00. Thus, the total costs of this survey by ground methods would be approximately $6,500.00 or 65 cents per acre.

Using the previously outlined survey method based on *air photography* the costs would be as follows:

Dual photography, 6″ and 12″ with photo-scales of 40 and 20 chains respectively at 3 cents per acre..	$ 300.00
Planimetric mapping at 20 chains scale at 3.0 cents per acre.....	300.00
Photo interpretation of 12″ photos with 10 acres minimum type size at 6 cents per acre.....	600.00
	$1,200.00
Field examination. Will average one third of field time of ground methods or 23 crew days @ $55.00 plus $10.00 for B/L..	1,500.00
Transfer of types to map at 2 cents per acre.....	200.00
Office compilation. Same time as field work. 23 crew days @ $55.00.....	1,300.00
	$4,200.00

The total cost of this air survey method would be approximately $4,200.00 or 42 cents per acre, or roughly one third less than the ground survey costs.

These costs will, of course, vary to some extent in different locations. The basic fact will remain, however, and that is that photogrammetric methods in reforestation surveys will provide considerably more information for less money.

*Photo Holder for Stereoscopic Viewing**

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THE photo holder herein described is a device used by the author for rapidly orienting stereoscopic pairs of vertical aerial photographs under a mirror or prism stereoscope. It is of simple construction, and when properly used in viewing stereoscopic pairs of photographs, it will prevent eye strain that may otherwise develop with mis-oriented pairs of photographs.

The holder (Figure 1) consists of two units joined together by a sliding-arm assembly. A photo-holding plate is attached to each unit and can be rotated. Each plate (see Figure 1) has four corner cleats and three centering cleats for holding the photograph in place. The three centering cleats are so located that when they are aligned with three of the fiducial marks on the photograph, the principal point of the photograph is over the axis of rotation.

A small spring-loaded self-winding reel such as is used to hold a measuring tape, is

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