

THE DETERMINATION FROM AERIAL PHOTOGRAPHS OF THE RELATIVE SURFACE VELOCITIES OF WATER*

IT HAS RECENTLY BEEN ESTABLISHED THAT THE RELATIVE SURFACE VELOCITIES OF WATER CAN BE DETERMINED FROM THE STUDY OF AERIAL PHOTOGRAPHS TAKEN UNDER SUITABLE CONDITIONS. PHOTOGRAPHS FOR THIS PURPOSE MUST BE TAKEN VERTICALLY AND IN A DIRECTION OPPOSITE TO THE FLOW OF THE STREAM, AT SUCH INTERVALS AS WILL GIVE AN OVERLAP BETWEEN ADJACENT PHOTOGRAPHS OF AT LEAST 50 PERCENT. THE PHOTOGRAPHS SHOULD NOT BE OF TOO SMALL A SCALE--ONE OF 500 FEET TO THE INCH HAS PROVEN SATISFACTORY, AND THE USE OF A LENS OF RATHER SHORT FOCAL LENGTH ALSO APPEARS TO BE ADVANTAGEOUS. THE BEST PHOTOGRAPHS SO FAR OBTAINED FOR THIS PURPOSE WERE TAKEN FROM AN ALTITUDE OF 4,000 FEET WITH AN 8" LENS.

THE VELOCITIES ARE DETERMINED BY A STEREOSCOPIC STUDY OF THE PHOTOGRAPHS SO OBTAINED. PHOTOGRAPHS OF LAND AREAS, WHEN VIEWED STEREOSCOPICALLY IN OVERLAPPING PAIRS, WILL SHOW IN HIGH RELIEF THE HILLS, VALLEYS AND OTHER PHYSICAL FEATURES OF THE TERRAIN. THIS CONDITION IS DUE TO THE ANGLES OF PARALLAX FORMED BY THE CHANGES IN ELEVATION OF THE VARIOUS FEATURES ON THE OVERLAPPING PRINTS, AND WHICH ARE FUSED UNDER THE STEREOSCOPE BY THE EYE OF THE OBSERVER, THUS CONVEYING A VERY VIVID IMPRESSION OF THE RELIEF. SIMILARLY, IN THE STUDY OF CURRENTS, ARTIFICIAL ANGLES OF PARALLAX ARE FORMED BY THE MOVEMENT OF THE WATER IN A DIRECTION OPPOSITE TO THE MOVEMENT OF THE AEROPLANE, AND THUS WHEN THE PHOTOGRAPHS ARE STUDIED STEREOSCOPICALLY, THE SURFACE OF THE WATER APPEARS TO RISE TOWARD THE EYE OF THE OBSERVER AS THOUGH IN THE FORM OF A HILL OR RIDGE. THE GREATEST DISPLACEMENTS IN THE SURFACE OF THE WATER HAVE TAKEN PLACE WHERE THE CURRENT IS THE GREATEST, AND CONSEQUENTLY SUCH POINTS APPEAR UNDER THE STEREOSCOPE TO BE HIGHER THAN THOSE WHERE THE MOVEMENT HAS BEEN LESS RAPID. IT IS THEREFORE POSSIBLE TO DETERMINE WITH A VERY FAIR DEGREE OF PRECISION, LINES OF EQUAL VELOCITY, JUST AS THE RELIEF OF THE GROUND CAN BE CONTOURED UNDER THE STEREOSCOPE. EDDIES, WHERE THE WATER MOVES IN A REVERSED DIRECTION, APPEAR AS DEPRESSIONS AND CROSS CURRENTS AT THE APPARENT ELEVATION OF THE SHORE LINE.

AS A QUALIFICATION TO THE ABOVE, IT SHOULD BE STATED THAT, IF THE SURFACE OF THE WATER IS CLEAR AND STILL, NO STEREOSCOPIC IMPRESSION CAN BE OBTAINED, AS THIS PLAIN SURFACE WILL NOT BE DIFFERENTIATED ON THE SUCCESSIVE PHOTOGRAPHS. IF, HOWEVER, THERE ARE WAVES, FOAM, DRIFTING DEBRIS, LOGS, OR ICE, EXCELLENT RESULTS CAN BE OBTAINED.

IF A RECORD OF THE VELOCITY IS AVAILABLE AT ONE POINT OF A STREAM, THE INFORMATION OBTAINED BY THE STEREOSCOPE CAN BE MADE QUANTITATIVE AS WELL AS QUALITATIVE.

PHOTOGRAPHS TAKEN UP A RIVER WHEN ICE IS RUNNING IN THE SPRING WOULD GIVE A VERY ACCURATE SURVEY OF THE VELOCITY OF THE CURRENT AT DIFFERENT POINTS.

TREE HEIGHTS FROM AERIAL PHOTOGRAPHS BY SIMPLE PARALLAX MEASUREMENTS REVIEW BY O. S. READING

A GRADUATE'S THESIS BY G. S. ANDREWS OF THE BRITISH COLUMBIA FOREST SURVEY HAS BEEN RECEIVED IN PAMPHLET FORM AS REPRINTED FROM THE FORESTRY CHRONICLE, JUNE, 1936.

MR. ANDREWS DESCRIBES A SIMPLE MICROMETER AND STEREOSCOPE USED FOR MEASURING THE PARALLAXES AND GIVES A THOROUGH DISCUSSION OF THE ERRORS AND LIMITATIONS OF THIS METHOD OF DETERMINING TREE HEIGHTS. THE LIMITATIONS OF PRESENT PHOTOGRAPHIC TECHNIQUE AND DIFFICULTIES DUE TO UNDERGROWTH, SLOPING GROUND AND CROWDED STANDS ARE DISCUSSED. WHEN USED IN CONJUNCTION WITH A LIMITED AMOUNT OF MEASUREMENT AND INSPECTION ON THE GROUND, THE METHOD ALREADY HAS CONSIDERABLE VALUE FOR VOLUMETRIC SURVEYS OF FOREST RESOURCES. CONTINUED IMPROVEMENT IN AERIAL PHOTOGRAPHIC TECHNIQUE MAY RESULT IN WIDE USE OF SUCH METHODS IN THE INTENSIVE FOREST SURVEYS OF THE FUTURE.

SUCH DETAILED STUDIES AS MR. ANDREWS DESCRIBES IN THIS PAPER HELP A GREAT DEAL IN THE PRACTICAL APPLICATION OF PHOTOGRAMMETRY TO FORESTRY. IT IS HOPED THAT HE MAY CONTINUE HIS WORK IN THIS FIELD.

*REPRINTED FROM THE "CANADIAN SURVEYOR", JANUARY, 1937.