

HARVARD

ALUMNI BULLETIN



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HARVARD ALUMNI BULLETIN

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COVER: An aerial view of the Harvard Forest. Photograph by Fairchild Aerial Surveys, Inc.

FRONTISPICE: At 1000, 27 October, Faculty Room, University Hall. Graduation exercises for ROTC seniors: Rear Admiral Felix X. Gyax, Commandant of the First Naval District, accompanied by Lieutenant H. A. Ljung, instructor in celestial navigation and aide to the executive officer, presents commissions to the new ensigns.

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TIMBER CRUISING WITH AERIAL PHOTOGRAPHS

BY WALTER D. EDMONDS, '26

WHEN a course in aerial forest photography was first announced by the Harvard Forest, some hesitation was felt over the possible response. Not more than sixteen students could be accepted; but these sixteen available places were immediately oversubscribed, so that two full sections of the course became necessary. The first section has completed its work and the second is now in session.*

The developments of the last few years in the field of aerial photography, developments largely accelerated by the war, have revealed the possibility of applying new techniques to type-mapping, timber cruising, and forest management, and experience to date has demonstrated that from fifty to ninety percent of the ground work in timber cruising can be eliminated by the proper use of aerial photographs. This course at the Harvard Forest is the first to be offered in the United States, making available to practical foresters the results of recent researches, both in military usage and in the controlled experimental work recently in progress at the Harvard Forest itself.

The work, initiated by the Harvard Forest staff, has been carried forward with the cooperation of the Fairchild Aerial Surveys, Inc., Polaroid Corporation, Eastman Kodak Company, U. S. Forest Service, Canada Dominion Forest Service, and the Royal Canadian Air Force. In its first year, this cooperative program has pioneered in the use of infrared and color film in forest type-mapping, in the development of a simplified instrument for type-mapping from aerial photographs directly onto a base map of a different scale, and in the development of an extremely simple and accurate gadget for measuring tree heights.

The use of aerial photography in forestry work is not new. It started in the first World War, and as early as 1920 Canadian Foresters began to use the airplane. At first they depended on

*The instructors are: Stephen H. Spurr, Harvard Forest; C. T. Brown, Jr., Harvard Forest; Earl J. Rogers, U. S. Forest Service; Myles Standish, Brown Company, Berlin, N. H. There are also two lecturers: Earl Church, Syracuse University; Philip Briegleb, U. S. Forest Service.

sketching techniques but soon switched to the aerial camera, and since then aerial type-mapping has been used extensively in Canada and the United States.

In 1925 the Germans began experimenting with the measurement of tree images on aerial photographs and the

WALTER D. EDMONDS, '26, author of *Drums Along the Mohawk and other novels*, was asked by the Editors to write this account of the new method of timber cruising by aerial photographs as developed by the Harvard Forest at Petersham. As a member of the Board of Overseers and of its Committee appointed to visit the Harvard Forest, Mr. Edmonds is an enthusiastic expositor.

calculation of tree-volume; but their devices involved the use of such complicated instruments that the process never got beyond the experimental stage.

The Canada Dominion Forest Service was the first organization to make timber cruises from aerial photographs in North America. In the Canadian method initiated in 1929, areas were measured by planimeter, tree heights by the lengths of their shadows, and stand volumes from relatively crude stand volume tables. In 1940, the consulting firm of Mason and Bruce used aerial

photographs in supplementing a ground cruise, both to classify timber stands and to estimate the apparent height of trees on stereoscopic photographs by means of parallax measurements.

In 1941, volumetric estimates from aerial photographs were first prepared east of the Mississippi by the Alleghany Forest Experiment Station of the U. S. Forest Service with two innovations of method, one of which substituted an actual tree count for the visual estimate of stand density used by the Canadians; and in 1943 the Brown Company in northern New England carried out the first extensive aerial timber cruise by an operating company, using modifications of the system developed by the Alleghany Station.

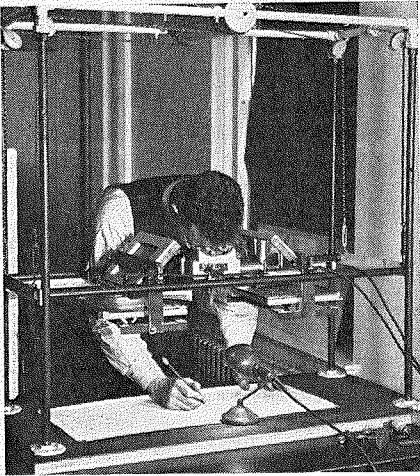
BUT TODAY, with the development of photogrammetry (the process of mapping directly from aerial photographs) and aerial photointerpretation, it is obvious that in the future the forester's work is going to be based largely on aerial photographs. Their value, already demonstrated, is being sharply defined by the work at Petersham; and their usefulness, which depended formerly on access to one of the very few highly complicated photogrammetric instruments in existence, is now made readily available by two simple instruments which permit the forester to transfer data from photographs, viewed stereoscopically, directly on to



THE CLASS IN AERIAL FOREST PHOTOGRAPHY

a map of a different scale. One of these, the multiscope, was developed jointly by the Harvard Forest and the Canadian Forest Service; the other, called the KEK plotter, was produced by the U. S. Forest Service.

With the multiscope and proper aerial photographs, a forester can accurately



THE HARVARD MULTISCOPE. With this instrument a forester can type-map up to 10,000 acres a day.

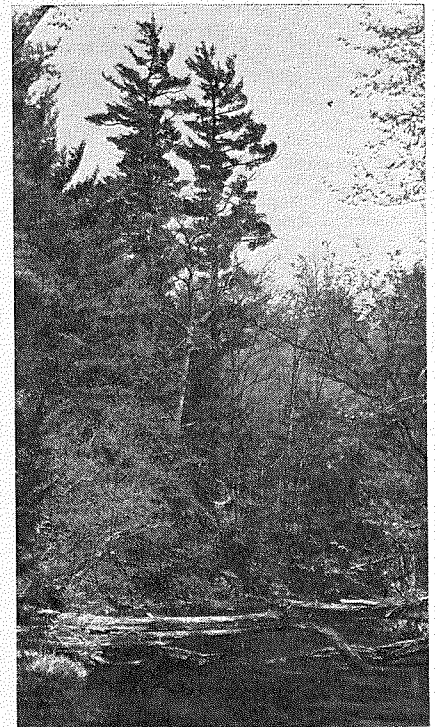
ly type-map up to ten thousand acres a day. This alone would be dramatic evidence of the possibilities of modern aerial timber cruising. Of course, even with the old high-level photographs, it was possible to prepare a reasonably accurate stand-map, provided the forester classified the stands—whose outlines could be traced on the photographs—by ground visits. But with modern stereoscopic photographs, features which frequently escaped the old single lens are now identifiable, such as type and

age-class lines, boundary lines, and cutting boundaries. Moreover, infrared and color film today make possible the identification of practically all species of softwood and the segregation of many species of hardwood.

Tree heights now may be measured either by shadow length or by the parallax wedge, a very simple device developed at the Harvard Forest, which permits an accuracy within five percent with a scale of a thousand feet to the inch. So it is obvious that aerial photographs have become as indispensable a tool to the practising forester as calipers and the volume table. There are limitations, of course, to the measurements that can be obtained from photographs. It is still necessary to supplement the information gained from them with ground checking; but with proper correlation of what might be called ground-sampling and aerial survey, the time and labor saved the forester, and the increased accuracy of his work will be of inestimable value. Furthermore, the employment of photographs is of great usefulness in forest management: the location of trails, estimation of pest damage, and fire control are a few obvious instances.

The correlation of knowledge gained through the development of aerial photography in the war, and its development in practical forestry, has been due in part to the ideal laboratory facilities at Petersham with its unique records of stands available for every yard of the forest; but more largely it is due to the enterprise of the young and enthusiastic staff. It is interesting to note that the course is being attended in large

part by professional consulting foresters and foresters for paper and lumber companies. Among their number are two former professional foresters who



SWIFT RIVER IN THE FOREST

have been serving as pilots in the War. Their response to the course has been enthusiastic.

Two Up, Two Down

The Crimson eleven celebrated the passing of the season's halfway mark last Saturday with a 25-0 walkaway victory over the United States Coast Guard Academy team, which gave them a balanced entry of two wins and two losses on the first page of their 1945 football ledger. Enthusiastic local Boston sports writers the next morning described the Harvard team's performance in the Coast Guard game as "brutally formal" and compared the opponents to "quiz kids competing against a college faculty."

Some of the Harvard fans may not have recognized the words, but few of them failed to remember the tune—the same sung only the weekend before for the U. S. Submarine Base team, after it had handed Dick Harlow's men an 18-7 sinking which was even more lopsided on the statistic sheets.

Harvard closed the first half of that game with a 7-0 lead, which came in the closing minute of the second period when Harvard's Leo Flynn, '46, outsprinted Navy's Vic Moravec to clutch a long forward pass from Charlie Roche, '49. Frank LeBart, a Naval ROTC student, kicked a well-placed conversion.

To most of the fans the seven-point lead looked big enough to buy the victory, but



USING A PLANE TABLE IN THE HARVARD FOREST