HARVARD FOREST

STAFF

The research staff of the Forest consists of Ernest M. Gould, Jr., Forest Economist, Walter H. Lyford, Soil Scientist, William F. Murison, Forest Biologist, Jack J. Karnig, Forest Manager for both the Harvard and Black Rock Forests, and myself. Barbara M. Kelley is business secretary and librarian, and Dorothy B. Waid is half-time assistant in the library. Marian S. Hambleton, a valued member of the secretarial staff for the past twelve years, retired on June 30, 1963. Charles F. Upham is Woods Superintendent.

STUDENTS AND RESEARCH FELLOWS

Two graduate students were in residence at the Forest during the year. The basic requirement for our degree of Master of Forest Science is the completion of an acceptable thesis based upon original research. Both of these men met this requirement successfully. One of them, Shaikh A. Jabbar, has returned to his position with the State Forest Service of India, and the other, Ronald W. Sorensen, has taken a position with the U.S. Forest Service. Two new graduate students arrived in June of 1963 to begin their year's work for the Master's degree. Both are from Rutgers, the State University of New Jersey.

A Charles Bullard Fellow, Mr. Robert Gregory of the U.S. Forest Service in Alaska, lived at the Forest throughout the year, and used it as his base for study and research. Other Bullard Fellows, based in Cambridge, come to Petersham for reference material as the occasion arose. One of these, Dr. William O'Regan of the U.S. Forest Service in California, spent several weeks here collaborating with Dr. Gould on the forest management simulation project described in another part of this report.

CONFERENCES AND SYMPOSIA

The ninth Harvard Conference on Forest Production was held at the Forest October 7-19, 1962. Twelve professional foresters attended. They represented industrial forestry, the U.S. Soil Conservation Service, the U.S. Forest Service and two State Forest Services, a university school of forestry, the Forest Service of Canada, the Cooperative Extension Service, and a private forest. The theme of the Conference was oriented to the problem of balancing the emerging and divergent uses of forest land. These uses include, in addition to the production of conventional and new wood products, the production of
water, forage for wild and domestic animals, and the development of land for aesthetic values and living space. The perplexities created by various concepts of "wilderness" and "natural areas" were explored, along with concepts that affect the traditional uses of forest. The need for clarity about the fundamental character of forest production and the identification of scarcity in resources, and the need to develop improved planning processes for the allocation of scarce resources, emerged as essential for guidance of public and private investment in forest land management.

In April, 1963, fifteen forest economists met at the Harvard Forest for a three-day discussion of mutual problems. These men came from schools, industries and government services, mainly located in the northeastern United States.

Also in April, 1963, the Forest was host to a Cabot Foundation Symposium on the "Formation of Wood in Forest Trees". About twenty-five of the leading world authorities in this field were gathered here for five days of stimulating discussion of current research. Their collected papers and recorded discussions will be published in book form by the Foundation.

Closely related to these more-or-less formalized conferences are the many informal discussions our staff has during the year with visitors who come to carry on research projects of their own, or to consult on methods and materials. There have been approximately 250 such visitors in the past year.

RESEARCH

Research on forest soils continued in the capable hands of Mr. Lyford, who completed the manuscript for a paper on "Landforms, soil with fragipans, and forest on a slope in the Harvard Forest". This paper was published during the year as our Bulletin No. 30. It was nearly eight years in preparation and bears the names, as co-authors, of John C. Goodlett and W. H. Coates who collaborated with Mr. Lyford in the earlier stages of the research. Mr. Lyford has also prepared drafts of four other papers, one of which will appear as Harvard Forest Paper No. 7 in the autumn of 1963. In the spring of 1963, he began intensive studies of the root systems of trees and the relation of the root systems to soil profiles and the microrelief of the forest floor. He has continued his recording of data on the behavior of water tables in the soils. In August of 1962 he presented a paper on Biological Influences in Soils at the National Meeting of the Soil Science Society of America at Ithaca, New York.

Dr. Murison spent several weeks at the Black Rock Forest in the summer of 1962, and shorter periods at other times during the year. He had an active part in the cooperative research program initiated with the Central
States Experiment Station of the U.S. Forest Service, described in my report on the Black Rock Forest. He also initiated, with Mr. Karnig’s assistance, comparative studies of wood production in stands of equal age, also mentioned in my report on the Black Rock Forest. At the Harvard Forest he began an experiment in Compartment IX of the Prospect Hill Tract: thinning, fertilizing and underplanting with Douglas fir in an old field white pine stand. In the fall term of 1962, he arranged and participated in the field work connected with a large area planning project conducted by the Graduate School of Design. This project was centered in the Quabbin Reservoir region southwest of the Harvard Forest. The work on our Black Brook Plantations in Hamilton, Massachusetts, was continued in the summer of 1962 under Dr. Murison’s design and direction.

Dr. Gould’s research during the year has been concerned primarily with the simulation program to be described below. In August of 1962, he went to the U.S. Forest Service’s Pacific Southwest Forest and Range Experiment Station at Berkeley as a consultant on recreation research. He also attended the Service’s national symposium on recreation research at Berkeley in April, 1963. In August, 1962, he gave an address at the meeting of the Western Farm Economic Association at Reno, Nevada.

In connection with my own research I made a journey to Denmark and England in February and March of this year. I gave seminar papers at the University of Copenhagen and at University College in London, and gave a paper at the 50th Anniversary meeting of the British Ecological Society in London. While in England, I visited the Botany School at Cambridge, the Forestry School at Oxford, and the British Forestry Commission’s Experiment Station at Alice Holt. In September of 1962 Mr. Lyford, Dr. Murison and I had a most profitable 10-day journey with research personnel of the Forest Service of Canada, visiting woodlands under various types of management in the Clay Belt region of Ontario and Quebec.

Research under the aegis of the Cabot Foundation is described more fully in another report, but should be mentioned here because much of it is conducted at the Harvard Forest. Dr. Martin H. Zimmermann and Dr. Brayton F. Wilson have continued their work on the physiology of trees and the development of wood from cambial tissues. The steady growth of this type of basic research at the Forest contributes heavily to the usefulness of the whole Institution.

Research at the Harvard Forest during the past half century has shown that realistic forest resource planning must deal with a rather pervasive uncertainty which flows from the fact that forests are affected by a complex of only partially understood physical, biological and social forces. Some silvicultural aspects of this research were summarized in our progress report bulletins of 1947 (Bull. 23) and 1956 (Bull. 27), both by A.C. Cline and R.J. Lutz. More recent analyses of the Forest’s research experience are in Bulletin 28 by John C. Goodlett, and in Bulletin 29 by Ernest M. Gould, Jr.
An attempt to utilize these research results along with those of other institutions was made by Dr. Gould in collaboration with Solon L. Barraclough (Bull. 26, 1955).

Foresters in the past have tried to cope with uncertainty by developing master plans which were then revised at intervals of varying length. The time spans involved in the growing of trees have led inevitably to extension rather than shortening of these intervals, whereas existing circumstances demand that decisions on resource allocation be made at ever-shortening intervals. It would be useful, therefore, to find an approach to forest planning that would produce a continuous stream of resource allocation decisions.

A first step toward developing such a continuous planning process lies in the organization of available information about resource-use alternatives. One method of achieving this organization is through simulation and the use of a computer, taking advantage of the fact that a modern machine can perform tedious calculations quickly, store and retrieve vast amounts of data, and make simple decisions.

A simulation model was first devised at the Harvard Forest by Dr. Gould in 1960. It was designed to imitate some of the essential activities carried out on a small forest holding used to raise and sell sawlogs. Although it was an extremely simple model, and involved the use of only a hand-operated calculator, its impact as a demonstration mechanism, and its promise as a research tool seemed to warrant further study.

Much progress has been made with this study during the past year by Dr. Gould in collaboration with Dr. O'Regan. A generous grant from the Harvard Computing Center has covered the cost of the use of the Center's facilities, and the Northeastern Forest Experiment Station of the U.S. Forest Service has provided a sum from its cooperative aid funds to meet incidental expenses. A somewhat more elaborate simulation model has been devised, imitating the same kind of activities as the earlier one. It has been programmed to operate on the IBM 7090 computer so that in a few minutes of machine time one can see the consequences of a forest management policy that would otherwise take 150 years of operations in a real forest and in actual time. Even though this model is a mere beginning, the results suggest that its further elaboration will prove fruitful.

WOODS OPERATIONS AND BUILDING IMPROVEMENTS

Operations in the woods during the year consisted mainly of harvest and improvement cuttings on about 35 acres of land. These yielded about 50,000 board feet in sawlogs and about 200 cords of fuelwood. Three small areas in the Prospect Hill Tract (in Compartments II, VII and VIII) yielded about 9,000 board feet of mature and overmature hemlock for which there was an immediate market. Most of the wood, however, came from Compartment IX of this tract, which yielded nearly all of the fuelwood, and about 41,000 board feet of logs. Most of this was hardwood which was sold in the form of
logs. A notable improvement in our road system in the Prospect Hill Tract was achieved by constructing a connection, along the southwest base of Prospect Hill, between dead end woodland roads leading in from the north and south sides of the tract.

Building improvements have consisted chiefly of maintenance and minor alterations. The only exception was the construction of a new room in the basement of Shaler Hall, to be used primarily for drafting. It is a partial solution to the increasing pressure for desk and study space in the part of the building originally designed for this purpose.

HARVARD BLACK ROCK FOREST

The Harvard Black Rock Forest is owned and administered by a separate educational corporation in New York State. It is supported by funds held in trust for the purpose by the President and Fellows of Harvard College.

Locally the Forest is supervised by Mr. Jack J. Karnig, Forest Manager. Woods operations and research are planned in consultation with Harvard Forest personnel who have visited Black Rock frequently during the year. Cutting and other work in the woods was done by local contractors except for that carried out by one employee.

RESEARCH

During the mid-1930's, while the Black Rock Forest was yet in the possession of the late Dr. E.G. Stillman, a series of experiments in forest fertilization was initiated there. These experiments were designed and carried out by Mr. Harold L. Mitchell, one of whose associates at the time was Mr. Raymond Finn. Both of these men are now connected with the U.S. Forest Service, and are engaged in research on the physiology of trees and the properties of wood. The experiments at Black Rock were carefully laid out and thoroughly documented, and were among the first of their kind performed on American trees.

In 1961, Mr. Finn proposed that the fertilization experiments be re-examined, to determine whether the fertilizers put in the soils 25 years ago were still being utilized by the trees, and whether these fertilizers had affected the physical properties of the wood produced by the trees. To this end a collaborative research agreement was made between the Black Rock Forest and the Central States Forest Experiment Station. In July, 1962, Mr. Finn and associated personnel from the Station, together with Dr. Maxon Y. Pillow and Mr. Mitchell from the Forest Products Laboratory at Madison, Wisconsin, came to Cornwall, relocated the old fertilization plots, and supervised the gathering of material for study. About fifty logs of white ash, tulip tree and red oak were cut by student labor and sent to the Madison laboratory.

A research grant of $6000 from a generous donor who prefers to remain anonymous came to the Black Rock Forest in the spring of 1963. It is for research on forest fire fuels, and is to be used, in part, to finance a
graduate student whose interest lies in this field. A student was chosen during the late spring, and began his work in June.

Other research projects at the Black Rock Forest are as follows. In the past year, Dr. Murison and Mr. Karnig began an investigation designed to show the relative rates of wood production in young natural stands of deciduous trees, and in red pine plantations of similar age. Green weights of white ash, red maple and red pine were obtained for about 12 trees, and sample portions of leaves, branches and trunks were taken to the Harvard Forest for more intensive study. The study of growth rates of overstory trees in forests whose understory has been removed by chemical weeding was continued. The growing season of 1963 was the third consecutive one in this series of measurements. The pitch pine progeny experiment mentioned in my report for 1961-62 also was carried forward successfully. In January, 1963, Mr. Karnig presented two research papers at the Northeastern Weed Control Conference in New York. These papers described his experiments with the use of chemical control techniques in the culture of trees in the Black Rock Forest.

WOODS OPERATIONS AND BUILDING IMPROVEMENTS

Fifty-nine cords of fuelwood were cut in Compartments III, IV, VI, XVI, and XVII, all of it sold locally in the vicinity of Cornwall. Due to a threat of land-taking by a utility company in the northeastern part of the Forest, it was decided to remove all usable timber from the area involved. During the year Compartments V and XVII yielded about 21,530 board feet of sawtimber. The village of Cornwall-on-Hudson owns land in the same general area, and our contractors removed about 65,500 board feet from this also. By agreement with the village we retained all stumpage income from its land.

Favorable weather conditions throughout most of the year resulted in a minimum of road maintenance work. Funds budgeted for maintenance were therefore used for construction of about 1200 feet of what will be known as the "Hall Road". This road was begun by the former owner of the Forest, and we have worked at it as time and funds have been available. Completion is planned for 1963-64.

The Black Rock Forest has always been short of residential and office housing. In the spring of 1963, because of the termination of the lease under which we have acquired living and office space for our manager during the past ten years, it was decided to renovate the one house the Forest owns that could be made usable. Permission to expend reserve funds was granted by the Corporation, and the reconstruction was well along at the end of the fiscal year. It was expected to be ready for occupancy by late August. Office space, for the time being, will be found in a small building owned by the Forest in the village of Cornwall-on-Hudson and formerly used as a laboratory.

Hugh M. Raup
Director