Professional Forestry, Forestry Education, and Research

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DEVELOPMENT OF professional forestry in the Commonwealth of Massachusetts paralleled that of the United States in the late nineteenth century, although Massachusetts was not one of the nine states that had established a forestry administrative unit prior to 1900.[1] The early beginnings of forestry education came with the passage of the Morrill Act in 1862, which provided federal funds to states to establish and maintain a college in each state to teach agriculture and the mechanical arts. Massachusetts was the third state to agree to the stipulations to acquire such funding, a portion of which went to establish the Massachusetts Agricultural College, at Amherst, which admitted its first class in 1867.[2]

THE MASSACHUSETTS AGRICULTURAL COLLEGE

Although forestry was not initially part of the curriculum of the Massachusetts Agricultural College, it was noted as a subject to be taught as early as a year following the entry of the first class in 1867. Emphasis was primarily on tree planting and arboriculture (the science of the cultivation of trees and shrubs), not on forestry (the scientific management of forests for the continuous production of goods and services). Arboriculture was recognized in the curriculum in 1869, and a year later George B. Emerson, author of *Trees and Shrubs of Massachusetts,* was employed as a lecturer on the subject of arboriculture. The lectures covered "the planting and care of Trees for the production of Fuel, Timber, Fruit or other purposes."[3]

The third president, William S. Clark, was a former professor of chemistry, botany, and zoology at Amherst College, where he had graduated in 1848. He earned a Ph.D. in chemistry and botany from the

University of Goettingen in Germany. His interest in tree growth fostered the teaching of a course on this subject. Forestry was noted in the curriculum periodically during the 1880s, and in the botanical department there was a subsection headed "Forestry" in 1887. Subject matter focused on nursery and tree culture, and a course titled "Forestry and Landscape Gardening" was a six-hour elective until 1893, when it was dropped from the curriculum.[4]

One of the most significant mileposts in the recognition of professional forestry at the Massachusetts Agricultural College was a series of lectures by Dr. Bernhard E. Fernow, given in 1894 (sometimes reported as being in 1887) when he was chief of the Division of Forestry of the U.S. Department of Agriculture. Fernow was a German forester who had been trained in Prussia and had come to the United States in 1875, married an American, and became a citizen in 1883. In his annual report as chief of the Division of Forestry, he notes that the Massachusetts Agricultural College was one of seven colleges offering instruction in forestry. He and another German, Dr. Carl Schenk, and Gifford Pinchot, American but trained in France, were the initiators of professional forestry in the United States. These three men founded the earliest professional educational programs for forestry: Schenk operated the Biltmore School in Asheville, North Carolina, on the Biltmore Estate; Fernow formed the New York State College of Forestry at Cornell in 1898; and Pinchot and his family were the driving force behind the Yale School of Forestry, founded in 1900. Only the Yale program survives today.

Dr. Fernow's lectures obviously made an impact on the student community at the Massachusetts Agricultural College. Over subsequent years, *Aggie Life*, a student publication, carried a series of articles advocating the teaching of forestry. As is common today, students wanted to prevent the destruction of forests and to protect and conserve them from exploitation. The college's administration was slow to react to the students' urging, for little happened for nearly 10 years after the turn of the century.

THE HARVARD FOREST: A UNIQUE FOREST EDUCATION AND RESEARCH PROGRAM

In 1872, the year Arbor Day was founded, James Arnold, a New Bedford merchant, bequeathed to Harvard University $100,000 for the purpose

of acquiring 125 acres of the Bussey Farm. Charles Sprague Sargent was appointed the Arnold Professor of Dendrology and Director of the Arboretum. The purpose was to culture, create and, maintain on the Bussey estate in Jamaica Plain, near Boston, a collection of all trees, shrubs, and herbs, both native and exotic, that could be grown out of doors in that climate. The result was the well-known Arnold Arboretum, which has "contributed materially to our knowledge of the taxonomic and silvical characteristics of the trees and shrubs that have been included in it."[5] This initiated Harvard College's interest in trees and forests. It was some 35 years later, in 1907, that the less well known but equally impressive Harvard Forest in Petersham was acquired to serve as a forest demonstration area, a research station, and a teaching and field laboratory for students.

Forestry education received recognition at Harvard University because two members of the university's faculty, Charles S. Sargent and Alexander Agassiz, were interested in forestry issues and served on the Forest Commission of the National Academy of Science, formed in 1896 to consider reserving from settlement lands that were in the public domain. These lands were later to become national forests and public grazing lands. (Today administered by the U.S. Forest Service and Bureau of Land Management.) In addition, Dean N. S. Shaler of Harvard's Lawrence Scientific School and later head of the U.S Geological Survey, was also a proponent of forestry education at Harvard. The importance of his role is indicated by his depiction with Professor Richard T. Fisher, first forestry instructor at the Harvard Forest, in one of the museum dioramas at the Harvard Forest, and the naming of the main building for him. Harvard president Charles W. Eliot, was also nationally involved with conservation and forest issues as exemplified by his service as the first president of the National Conservation Association in 1909, a position from which he resigned a year later in favor of Gifford Pinchot.

Forestry teaching at Harvard College commenced in 1902–03 under the leadership of Richard T. Fisher and J. G. Jack, instructors on the staff of Harvard's Lawrence Scientific School, Department of Forestry, at Cambridge. From 1908–12 the department became a division and in 1912 the division became the School of Forestry. Initially, a bachelor of science degree in forestry was granted for the program; it took one to four years to fulfill requirements, depending on the student's back-

Figure 1. Albert C. Cline, the third director of the Harvard Forest, surveying downed old-growth white pine in Petersham, Massachusetts, after the 1938 hurricane. In the space of 48 hours, some 70 percent of the volume of the Harvard Forest blew down, abruptly terminating 30 years of research on white pine silviculture and setting the stage for a new program of teaching and research on long-term changes in northeastern forest ecosystems. Courtesy of Harvard Forest Archives.

ground. Instruction was primarily in the classroom, although some fieldwork was done on private properties. By 1907, Fisher had concluded that the undergraduate degree should not be offered but that there should be a limited number of students studying for the master of forestry degree with a focus on research and limited classroom teaching. Years later Professor H. S. Graves, director of the Yale School of Forestry, wrote:

> I regard Fisher's work in education as one of his largest contributions to forestry. He properly resisted the idea, still held by many, that a practical man with a moderate knowledge of forestry can meet the requirements of the profession. The great influence which the Harvard Forest has exerted and will continue to exert is derived from the high standards in education which Fisher set, from the character of his teaching, and from the vision of the broad significance of forestry in our national life which has been emphasized at the institution.[6]

The standards and philosophy set by Fisher have continued at the Harvard Forest to this day.

Fisher's career spanned 32 years, until his untimely death in 1934. Early faculty members of the Harvard forestry program and many of his students and those who came later became renowned professional foresters and forestry educators and researchers. One of these, Austin Cary, joined the Harvard College faculty in 1905 as an assistant professor, and was greatly admired for his contributions to New England forest practices and for writing one of the earliest published manuals on forestry. He left in 1911 to assume a position at the Maine Agricultural College at Orono. Another early instructor, Ralph C. Hawley, a student from 1904 to 1906, became a highly regarded professor at the Yale School of Forestry and wrote *The Practice of Silviculture,* first published in 1921.[7] Harold O. Cook, M.F. (master of forestry) 1907, started with the state that year, becoming the chief state forester of Massachusetts in 1919 and served in this role until 1962. Many other early graduates became leaders in the forestry profession, as forestry was still a new field and Harvard was among the pioneering institutions teaching the subject.

The acquisition of the Harvard Forest in 1907 greatly affected the teaching of forestry. There was no endowment, and needed operating funds came from the sale of 10 million board feet of harvestable old-field white pine. Students gained practical field experience by doing course work on the forest in fall and spring terms and taking classes in Cambridge during winter term. In 1907, when graduate study was instituted, the school came to be administered by the Graduate School of Applied Science and was renamed the Division of Forestry. In 1914 the forestry faculty was combined with the Bussey Institute as the

Faculty of Applied Biology. At this time, undergraduate instruction was discontinued and Harvard Forest became a graduate program. Director Richard Fisher's memorandum to the corporation stated: "The staff of the School is unanimous in believing that the time has come to . . . organize squarely and exclusively as an institution for research and the training of advanced specialists. . . . The School of Forestry, therefore, proposes to give up entirely its general course, to devote itself strongly to the research which the elementary teaching has hitherto precluded."[8] There was a relationship not only with the Bussey Institute but also with the Harvard Business School, where Fisher had a joint appointment. This formal tie ended when Fisher gave up his professorship in the Business School in 1924. However, Harvard's interest in the economic or business aspects of forests has continued up to the last decade of the twentieth century, alongside a primary focus on the biological and ecological foundations of forestry.

This policy change in 1914–15 established the future operation of the Harvard Forest education program. It has had small numbers of students, generally 5 to 12 in residence; teaching is informal and students actively participate in forest operations. Silvicultural research was emphasized during the early period. There was collaboration in research as well as in providing advice to businessmen, landowners, and government agencies. The 1938 hurricane devastated the forest's growing stock. Although much of it was salvaged, this event greatly lowered the forest's economic value, and its management has not since greatly contributed financially to the program's operation.

In 1932 Harvard Forest became a department within the Faculty of Arts and Sciences and a program in its Graduate School, where it has remained. W. Shepard became director in 1935, following Professor Fisher's death. He was followed by A. C. Cline, M.F. 1923 (1939–42), when Shepard took a leave to do war work. Cline put a new teaching policy into effect. Two general methods of instruction were initiated on a trial basis — "the research project method and the so-called case method." This was a shift "out of the mainstream of teaching silvicultural research which the forest had followed since 1914."[9]

No students were accepted during the war, but Dr. Stephen Spurr joined the staff as an instructor in forestry in 1941 and was made assistant director in 1942. Along with two research assistants, he worked on a wartime camouflage research project. Out of this research came

Dr. Spurr's development of forestry uses for aerial photogrammetry and a textbook on the subject published in 1948. Principally a forest ecologist, Dr. Spurr wrote three publications while at the Forest, two coauthored by A. C. Cline. Spurr left the Harvard Forest in 1950 to go to the University of Minnesota and then the University of Michigan, where he later became dean of the School of Natural Resources. He had an outstanding professional career in forestry education and as a textbook author. He served as president of the Society of American Foresters and capped a distinguished academic career as president of the University of Texas.

In 1946, Dr. Hugh Raup, a botanist, was appointed director of the Harvard Forest, and the first postwar student was admitted. Dr. Raup had been a staff researcher at the Forest and on the faculty of the Arnold Arboretum. He had been encouraged by Professor Fisher "to study the flora of the Forest to see whether his biological interest could explain the results of many silvicultural experiments."[10] Dr. Raup remained director until his retirement in 1967, having been on the Harvard faculty for 35 years. He continued earlier philosophies of graduate education, and he commenced building a staff to carry out both research and teaching.

Graduate students from liberal arts colleges who had majored in biology began to be accepted in 1951–52 for the M.F.S. (master of forest science) degree. The program remained small, with little change in the basic philosophy of educating students for the master's degree. Doctoral students did their research at the forest but enrolled in one of the other departments in Cambridge. Because Dr. Raup came from the biology faculty, the ties with the campus and programs at Cambridge increased. The appointment of Ernest M. Gould, Jr., a forest economist, to the Forest faculty in 1947 further strengthened ties with the Cambridge economists, especially Prof. John D. Black, with whom Dr. Gould had studied for his M.F.S and Ph.D. Professor Black, a resource economist, had a major influence on the subject of forestry economics as adviser to students who became leaders in this field.

Over the years, Harvard Forest has supported a great diversity of research interests, as illustrated by a statement in the 1992–93 annual report: "Through the years researchers at the Forest have focused on silviculture and forest management, soils and the development of forest site concepts, the biology of temperate and tropical trees, forest ecology

and economics and ecosystem dynamics."[11] Harvard Forest has always had an interest in historic human and natural disturbances in the forests of central New England, as "epitomized by the Harvard Forest Long Term Ecological Research (LTER) program established in 1988 through funding by the National Science Foundation."[12]

The most impressive educational programs at Harvard Forest have not necessarily been those that granted degrees but those that brought professional foresters to the Forest from all over the United States and the world. Some individuals visited for as long as a year, others for a few days. A series of two-week "Conferences on Forest Production" began in 1953 and were largely the responsibility of Dr. Gould, Dr. Raup, and the soil scientist John Goodlett (later replaced by Walter Lyford). From 1953 to 1956 the theme of these two-week conferences was "Forestry in Transition." The generally 15 to 20 professional foresters in attendance came from state, federal, private, and university employment. The diversity of these groups made for lively discussion both in the classroom and in the field, which was a major component of work during the day. Because participants were housed at the Forest, much informal discussion went on during mealtimes and in the evenings. The theme of the conferences from 1956 to 1959 was changed to "Investment Analysis as Applied to the Forest Resource." No conference was held in 1960, but they resumed in 1961 and went through 1965 with the theme "Balancing Forest Resource Use." The themes of these conferences reflect concerns of the times in forest-resource management, with the last series considering multiple-use issues. If held today, they would undoubtedly be focusing on biodiversity and ecosystem management.

Another important program, instituted in 1962, continues up to the present day: the Bullard Fellowships. This competitive program brings to the Forest midcareer scientists from all over the world for six months to a year of study and research. The interaction of these individuals — who generally have diverse interests — with one another, with the faculty and staff of the forest, and with visitors adds greatly to the intellectual milieu of the institution. Those who have had the honor to be granted a Bullard Fellowship or to interact with fellows, faculty, and staff would attest to this value of the Harvard Forest.

Harvard Forest hosts numerous groups interested in forest-resource use. It has excellent facilities and encourages their use at no or nominal cost in order to stimulate interest in forest-resource study and

use. Forestry degree programs throughout the country often include a stop at Harvard Forest while students tour the Northeast on field trips, not only to see the Forest and learn about ongoing research, but to see the dioramas in the Fisher Museum (for more on the Fisher Museum, see page 231).

In this limited space it is difficult to accord recognition to all the many faculty members over the years who have made major contributions to Harvard Forest and its worldwide recognition as a distinguished forestry research and educational institution. Details may be found in the published annual reports on file at the Forest. All of the leaders of the Forest have had outstanding abilities in their fields. More than that, they have had avocations that were equally rewarding, and their interests and interactions with people outside of the realm of their specializations made them distinguished human beings. Of these outstanding people, three of the most recent directors and the current one certainly deserve particular acknowledgement for their leadership.

Between 1968 and 1970, Dr. Ernest M. Gould, Jr., served as acting director and became assistant director in 1970 until his death in 1988. Ernie, as he was known to everyone, gave continuity to the institution through three directors and was probably better known throughout professional forestry circles than any of the other faculty members. After his death in 1988 the annual report for 1987–88 summed up his impact on the Forest: "His passing marks the end of the Harvard Forest as a research center in forestry in the sense that was originally conceived by Professor Fisher . . . and as it was modified and extended by Professor Raup and Professor Zimmerman. . . . All of us will miss Ernie's direct friendliness, his cheerful willingness to consult on all manner of issues, from personal to professional, to regional or national. His wisdom and good sense undergirded many facets of the Harvard Forest community in ways that have made Petersham and the Forest an important and memorable place for many people."[13]

Following the directorship of Dr. Raup (1946–67), Dr. Martin Zimmerman became the Charles Bullard Professor of Forestry on July 1, 1970. He served as an interim director, as did Dr. Gould, during the three years after Dr. Raup's retirement. Dr. Zimmerman assumed this position after a distinguished career with the Cabot Foundation as a researcher in tree physiology. "The forest inspired Martin not only to do many of his physiological experiments on trees growing in the

woods, but also to have an unusually broad interest in the technical and social problems of forest resource use and development. . . . Consequently, he came to take a special interest in the design and conduct of the long-term silvicultural experiments at the Forest." Dr. Gould described Zimmerman as a renaissance man with great abilities as an artist, a craftsman in stained glass, a builder of harpsichords, and a fine musician. He was an outstanding teacher who had "compassionate concern for each of his students." His tenure as director ended when death took him on March 7, 1984, at too young an age.[14]

Dr. John G. Torrey had moved to the Forest faculty in 1970, and became director following Dr. Zimmerman's death. Here was another individual who had been on the Harvard faculty for a long time and was familiar with his predecessors at the Forest, so he could readily carry on the traditions that had been established. Torrey had a "brilliant scientific career in the field of plant development and microbial symbioses. More importantly, he was a great mentor who guided the personal development of students, colleagues and friends through his wise understanding of science and people and his balanced approach to life."[15]

Dr. Torrey retired in June 1990 to pursue his interest in art collecting, particularly nineteenth-century British and American etchings. During his administration he oversaw the development of a program that will have a long-lasting impact on research at the forest. Along with Assistant Director Dr. David R. Foster, who succeeded him as director, Dr. Torrey was the principal architect of the "Long Term Ecological Research" (LTER) proposal to the National Science Foundation. This proposal involved multiple universities as well as disciplines: "The Harvard Forest is one of eighteen sites forming the Long Term Ecological Research (LTER) program of the National Science Foundation. Each site addresses ecological questions of a long-term nature; collectively the sites undertake comparative studies across ecosystems. The central theme of the Harvard Forest LTER is a comparison of the historically important physical disturbances and modern chemical disturbances in terms of their effect on forest ecosystem structure and function."[16] The long-term records of the forest will be valuable in explaining the historically important physical disturbance impacts. Dr. David Foster, an ecologist, joined the staff in 1983 and became assistant director of the Harvard Forest in 1988 when the position was vacated because of Dr.

Gould's death. As director since 1990, he oversees the Harvard Forest LTER program. Dr. Foster shares many traits with his predecessors, and so the Forest can look forward to very able leadership as it approaches its centennial year.

Since the mid-1970s the forest has increased its involvement with the rest of Harvard University, which reflects a return to some of the earlier philosophy of teaching undergraduates. Staff with faculty appointments teach classes in Cambridge and also teach students who travel out to the forest for field-oriented courses. Also, a number of those who hold faculty positions in Cambridge with the Graduate School of Design, the Kennedy School of Government, and the Earth and Planetary Science program are associates of the Harvard Forest. One popular course is the Harvard Forest Freshman Seminar, in which students come to the Forest for four weekends during the spring and focus on forest biology.

During the early to late 1970s summer undergraduate courses were offered at the Forest through the Harvard University Summer School. This has evolved into the Harvard Forest Summer Research Program, funded by the National Science Foundation, the Andrew M. Mellon Foundation, and the Harvard Forest endowment. Undergraduate students from a number of universities receive training, do independent research and study, and work on the Forest. In the summer of 1992 there was "a total of 34 undergraduate students and recent graduates in our summer program designed to provide first-hand experience in ecological investigations. Many students conducted independent research and all participated in a weekly seminar program and excursions to other research areas."[17]

A number of other teaching programs have been conducted over the years in conjunction with other departments at Harvard. Director Foster currently teaches "Forest Ecology" in the Biology Department and "Topics in Environmental Policy" with Dr. Charles H. W. Foster in the Kennedy School of Government. Landscape architecture students of the Harvard Graduate School of Design visit four weekends in the fall to consider the forest resource as a component of the rural environment, a subject that has become important in land-use planning and on national, state, and large industrial forests. The Forest is also used by the Department of Organismic and Evolutionary Biology and the School of Public Administration.

The Harvard Forest in Petersham, Massachusetts, has been an integral part of Harvard University throughout the Forest's history. Though it has at various times been closely associated with the Cambridge campus and at others has been more independent, it has always drawn from within the university for leadership. The importance of the Harvard Forest program has lain not in educating foresters for entry positions but in furthering the education of professionals, contributing to basic and applied forest-resources research, and exposing foresters to other disciplines associated with their work.

The Fisher Museum at the Harvard Forest

One of the outstanding public educational forestry exhibits in Massachusetts is the Fisher Museum at the Harvard Forest. The main theme of the museum is changing land use in central New England from the time of settlement, when forests covered the landscape, through a period when the forest was cleared for agricultural use, to the abandonment for agriculture and the land's reversion back to forest. This process is dramatically and artistically illustrated in a series of seven dioramas depicting the change over 230 years, from 1,700 to 1930. (Four of these dioramas are depicted on pages 44–48 of this volume.)

There are 16 other dioramas: a group of 10 that illustrate "silvicultural practices developed at the Harvard Forest for application to local forest conditions," and 6 that show "certain allied functions of modern forestry." The latter include a model on wildlife management, another on the control of soil erosion, and two models on forest fires; these models emphasize the wastefulness of developing forests only to have them destroyed through human carelessness. The large central model in the Fisher Museum is a reproduction of a stand of an old-growth forest on the Harvard Forest and a portion of Harvard Pond — a scene that suggests the great aesthetic and recreational value of the forest.[18]

The historical and silvicultural series were designed by Richard T. Fisher, the first director of the Forest. The models, constructed in the studios of Guernsey and Pitman at Cambridge between 1931 and 1941, are so lifelike that individual tree species can be identified.

Other exhibits in the museum illustrate land-use change in the town of Petersham. One map shows stone walls that once surrounded fields but now meander through forests. Other pictures and graphics

show the devastation wrought by the hurricane of 1938, insect and disease damage to trees and wood, and research on tree-root development. Posters illustrate current research at the forest, and historical features of the forest resource.

Since 1988, Dr. John O'Keefe has been coordinator of the Fisher Museum and has developed additional exhibits and slide presentations illustrating the history and theme of Harvard Forest and its educational and research activities. He has also made it more user-friendly, opening the museum to visitors during working hours from Monday to Friday and staffing it with volunteers on Saturday and Sunday from noon to four P.M. May through October.

UNIVERSITY OF MASSACHUSETTS, AMHERST

Over the ridge not too distant to the west and south of Petersham is the town of Amherst and the primary unit of the multicampus University of Massachusetts. As mentioned previously, this large state university started as the Massachusetts Agricultural College (MAC), one of two Massachusetts land-grant colleges founded under provisions of the Morrill Act of 1862. During the 1930s it was designated the Massachusetts State College and in 1948 the University of Massachusetts. Forestry has had some recognition almost from the beginning. Although very limited in early years, the program has grown along with the rest of the university system. In contrast to its private neighbor, Harvard Forest, the public institution focused on undergraduate forestry training in its early years. Not until the 1950s did it develop graduate programs and become heavily involved in research.

The need for a forestry program was recognized by MAC president Kenyon L. Butterfield following his appointment in 1906. He reorganized several departments into a Division of Horticulture in concert with Frank A. Waugh, who became the division's first head. In the president's report to the state legislature he stated: "In the matter of instruction, for instance, I think we should have a professor of Forestry. I suppose that I have had more letters from prospective students asking about forestry instruction here than on any other subject."[19] Without waiting for a response from the legislature, he created a Department of Forestry as part of the Division of Horticulture in 1909. He hired as the first faculty member Franklin A. Moon, a graduate in 1901 of Amherst

College and in 1909 of the Yale School of Forestry. The 1911 course catalogue listed two courses, dendrology and silviculture. A year later two additional courses were listed: "Advanced Forestry," which included forest economics, policy and law, forest mensuration, forest management, and lumbering; and "Silvics and Silviculture," which was a field component of the silviculture course.

Before he could begin teaching these newly listed courses, Professor Moon resigned to accept a position at the New York State College of Forestry at Syracuse University, where he subsequently had a distinguished career. A Yale classmate of Moon's, William Darrow Clark, replaced him. Clark expanded the forestry curriculum by adding a course, "Introduction to Forestry," for students not concentrating in forestry. Of the four major courses, three emphasized practical fieldwork. There were few students in the program — in 1913, one senior and five juniors — although the program was favorably noted in an October 1916 issue of the student newspaper: "The course in forestry offered to the students of MAC is, in every sense of the word practical."[20]

The Mount Toby Experimental Forest, located five miles away in Sunderland, was acquired in 1916 from the heirs of John L. Graves. He had been willing to sell it to the college for $30,000, but the state legislature was not willing or able to appropriate that amount of money for the acquisition. At Graves's death in March 1915 the property was inherited by two maiden ladies who were willing to sell the property for $15,000; they did so when the legislature appropriated funds for its purchase in May 1916. Professor Clark was very pleased with the acquisition and noted that the diversity of forest types represented those found in the entire state "from the Berkshire Hills to Cape Cod" and, "even more rare . . . are found in every stage of development."[21]

World War I disrupted the progress of the forestry program at the Massachusetts Agricultural College. William Clark resigned in 1920 and was replaced by Laurence R. Grose, also with an M.F. degree from Yale. The 1921 course catalogue stated: "The forestry major is designed to give a grounding in the branches of natural science upon which forest development is based."[22] However, within a year the focus of forestry instruction had shifted to providing a service-type course to agriculture students who were "prospective owners or managers of farm woodlots."[23] This change apparently occurred because the state legislature, which had in 1916 taken away MAC's fiscal autonomy and even the

autonomy of its curricular offerings, opposed any expansion of courses that did not deal with vocational instruction in agriculture. In part, too, this change may have resulted from national developments in forest policy. The passage of the Clarke-McNary Act in 1924 had as one of its four main objectives cooperation with states in reforestation and management, particularly "in providing nursery stock for the establishment of windbreaks, shelterbelts and farm woodlots on denuded or non-forested lands."[24] These legislative constraints led to the resignation of President Butterfield in 1924 and that of Professor Grose in 1930. Professional forestry education was at a new low, but this was to soon change when Robert P. Holdsworth replaced Professor Grose.

Professional Forestry Education at the University of Massachusetts

Professor Holdsworth led the forestry program for over 26 years, until he stepped down as department head in 1956 and retired in 1958. He was a 1911 graduate of Michigan State College and another product of the Yale School of Forestry, and also had a fellowship to the Royal Forest School in Stockholm, Sweden. He was a veteran of World War I and spent four years as a horseback ranger for the U.S. Forest Service in the West following his undergraduate education. Prior to entering into his graduate forestry training, Holdsworth had 11 years of experience in an import brokerage firm in Boston. His broad business experience and leadership qualities quickly benefited the fledgling forestry program. In addition, a change in the presidency of the college also created favorable circumstances to developing forestry at MAC. The new president, Hugh Potter Baker, a forester, came to the job in 1932 from a previous position as dean of the New York State College of Forestry at Syracuse University. Here was an ally for Holdsworth at the highest level in the college.

Even before President Baker's arrival, Holdsworth had initiated changes to move away from service courses aimed at agricultural students, reversing the philosophy that had been foisted onto Professor Grose by the administration and the legislature. The 1931–32 catalogue gave evidence that the program was once again directed at training students who intended to make a career of professional forestry. Four basic forest science courses were listed, and all entailed fieldwork on the Mount Toby Experimental Forest.

Professor Holdsworth developed a cooperative agreement with Dean Henry S. Graves of the Yale School of Forestry, which permitted

the best students at MAC after their third year to work toward a Yale M.F. (master of forestry) degree. Following the first year at Yale, the student would receive a B.S. from Massachusetts State College (as it was now called) and then after another year at Yale would be awarded the M.F. This program was a forerunner of a close association between Yale and the post-World War II University of Massachusetts, when many graduates of the latter went on to Yale for the M.F.

Through President Baker's efforts and those of Professor Holdsworth, the forestry program continued to grow, despite the fiscal constraints caused by the Depression. The prospect for employment brightened during the 1930s with the New Deal administration of President Franklin D. Roosevelt. The Civilian Conservation Corps recruited foresters to plan and oversee projects and assured virtually all forestry graduates a job. These jobs provided good training for leadership and gave many forestry graduates of this period their first foothold in the profession.

During the 1930s three faculty members were added to the program. First, J. Harry Rich was hired to teach in the area of forest products and wood technology. Then, in 1936, Reuben H. Trippensee was engaged to teach wildlife management. Professor Trippensee was the first faculty member of the department to hold a Ph.D. He taught two courses, "Principles of Wildlife Conservation" and "Introduction to Wildlife Management." Trippensee was a pioneer in the field of wildlife management, having written two standard textbooks widely used in forestry and wildlife education. The third person to join the faculty was Arnold D. Rhodes, who came in 1937, after earning an M.F. at Yale, to teach dendrology, silvics, and silviculture. He and Holdsworth had more positive influence on the growth of the department than anyone else.

Although World War II brought some slowdown in the development of what had become the Department of Forestry and Wildlife Management, the program continued throughout the war, even though some faculty members were called into the service. Upon their return in 1946 and 1947, the department had a growth spurt, adding courses and faculty. By 1945–46, the dean noted in his annual report, three more forestry courses had been added, one in silvics, another in forest protection, and the third in harvesting of forest products. By 1949–50 there were 13 courses in forestry, four courses in wood technology, and five in

wildlife management. Forestry could at last offer a full program to anyone who wished to major in the subject.[25] The extensive course offerings were possible because three faculty had been added. One, Paul Stickel, had experience with the U.S. Forest Service and was author of a textbook on seeding and planting of forests. He taught that subject, as well as forest protection (principally from fire). Two recent graduates of the Yale School of Forestry were added, Alton B. Cole and W. P. MacConnell, both of whom were MSC graduates who had returned to Yale after wartime service to earn M.F. degrees. Given the flood of veterans that entered the University of Massachusetts in 1948, Cole and MacConnell found themselves teaching students their own age or older. Cole was called back to the air force in 1951, because of the Korean Conflict, and was to make a career of the military except for a brief return to the faculty in the 1970s. Professor MacConnell has been a mainstay of the department since that time and holds the record for longevity on the department faculty — nearly 50 years as of this writing.

Two developments occurred as the decade of the 1940s ended. At that time the federal civil service required foresters employed in the U.S. Forest Service to come from programs accredited by the Society of American Foresters. The SAF carried out a thorough on-site review after Professor Holdsworth submitted an application for accreditation and filed a detailed report of the forestry B.S. degree program. Thus, the University of Massachusetts became one of the 21 accredited forestry programs nationwide; two others in New England had been accredited prior to World War II. Accreditation was a major step in aiding graduates to obtain other professional jobs and to be accepted in graduate school.

Two-Year Forestry Program in the Stockbridge School of Agriculture

A two-year program, called the Stockbridge School of Agriculture, was started in the Massachusetts Agricultural College following World War I to provide technical agricultural training. The school was named for Levi Stockbridge, who had been the MAC's farm superintendent and instructor in agriculture in 1867 and who later served as president of MAC from 1880 to 1882. When Holdsworth took over the forestry department in 1930 he felt that a two-year forest technology program leading to an associate's degree would be valuable in forestry, particularly to educate farmers in the management of farm woodlots. It was also a way to fulfill the desire of the legislature to provide vocational

agricultural courses. What evolved were two programs, one in wildlife (this program was relatively short-lived and was abandoned in the early 1940s) and one in forestry. The one in forestry is the more significant. After World War II there were 15 to 20 students per class in the Stockbridge forestry program, and faculty were teaching both two-year courses and four-year (baccalaureate) forestry courses, often with much the same subject matter. The large number of two-year students may have partly justified expansion of the faculty in the Departments of Forestry and Wildlife Management. But, as graduate degree programs were initiated in the late 1950s, faculty had to deal with the complexities of ranging from the technician level to the master's, and ultimately the doctoral level. An increased teaching burden caused the combining of some associate (two-year) degree courses with those for the B.S degree.

When the Society of American Foresters did its 1962 accreditation of the University of Massachusetts B.S. program, the forestry department was told that it would lose SAF accreditation unless a separate two-year degree program with an independent faculty was initiated. Therefore the decision was made in 1963 to drop Stockbridge's two-year forestry program. However, a two-year wood utilization program was initiated to train individuals for wood industry and retail lumber-sales jobs. This program ended in 1972. It should be noted that these programs were very valuable for students who could not qualify for entrance to the B.S. degree program or were uncertain about their academic goals. However, many of them (probably over half) continued their education either at the University of Massachusetts or at other institutions — a few even to the Ph. D. level.

Expanding Definitions of Forestry and Forest Resources: The Holdsworth Natural Resources Center

For about 10 years, from 1953 to 1963, the Department of Forestry and Wildlife Management was housed in the so-called Conservation Building, which had once been the offices of President Clark. In 1963 work was completed on the new Holdsworth Natural Resources Center, finally bringing all the department's faculty together under one roof. Professor Arnold Rhodes, the department head since 1956, was the driving force behind the new building; he worked closely with the architects in its planning and design. Holdsworth Natural Resources Center, was designed not only for teaching but for research, with large

classrooms, a library, laboratories and smaller research labs for faculty and graduate student use.

The increased growth and diversity of the Department of Forestry and Wildlife Management was overseen by Professor Rhodes. His philosophy was reflected in his remarks at the dedication of the Holdsworth Natural Resources Center in 1963: "Over the years departmental programs have broadened to embrace most of the major wildland resources with increasing emphasis upon the integration of the several uses of land, water, vegetation and people. The problem of the future of this nation of erupting population is to devise the means whereby man may live in harmony with his environment while yet benefiting from the economic, esthetic and spiritual values which the environment can provide."[26] Within the department, he built a staff to at least address the resources aspect of this philosophy. It was natural for the four major components — fisheries, forestry, wildlife, and wood technology — to form "sections," or minidepartments, and to elect their own leadership.

By the time the Department of Forestry and Wildlife Management moved into the new building, there had been additional diversification in its offerings. Fisheries biology was added to the wildlife biology program. The Cooperative Wildlife Research Unit added "Fisheries" to its name and thereby added fisheries biologists to the adjunct faculty. The growing emphasis on research, greater program diversity, a physical plant designed for graduate research, and numerous inquiries from potential students gave the impetus to the faculty to petition the Graduate Council in April 1966 for a Ph.D. program for all majors within the department. At this time there were 14 Ph.D.s. on the faculty, with another to receive the degree shortly. The trustees approved the petition in June 1966.

Numerous faculty changes during the 1960s created an increasing diversity of research interests and course offerings. Dr. Charles F. Cole, a fisheries biologist, joined the faculty in 1964. Dr. Trippensee retired at this time and was replaced by Dr. Fred Greeley, who changed the wildlife program's emphasis from forest management to the zoological aspects of wildlife. In 1966 Dr. Carl Carlozzi joined the faculty to head up a new major, Natural Resource Studies. This program attracted students who wanted more freedom of course choices than that offered by a major in either forestry or wildlife management. Other additions in the department duing the late 1960s and early 1970s were Dr. Brayton

F. Wilson, in tree physiology; Dr. William W. Rice, a specialist in wood drying, in wood technology; Dr. Joseph S. Larson, in wildlife, with emphasis on wetlands ecology; and Dr. Michael Ross, in fisheries biology. There were also major changes in the Wildlife and Fisheries Cooperative Research Unit. Upon Dr. Sheldon's retirement, Dr. Wendell Dodge became unit leader; the assistant leader was a fisheries biologist, Dr. Roger Reed. Two additional staff members were added to the unit, one in wildlife and the other in fisheries.

When he stepped down as head of the Department of Forestry and Wildlife Management in 1972, Professor Rhodes was replaced by an alumnus of the class of '50, Donald R. Progulske. As an undergraduate Dr. Progulske had majored in wildlife management and minored in forestry; he earned his doctorate in wildlife biology at the University of Missouri in 1956. From there he went directly to the faculty at South Dakota State University, where he had served during the previous nine years as head of the Department of Wildlife and Fisheries Science.

During Dr. Progulske's tenure, undergraduate forestry classes burgeoned from an average size of 25 to 30 students to 70 to 80. These enrollments continued into the late 1970s and early 1980s. At just about the time the faculty considered implementing some limits on class size, enrollments started to drop. By the mid-1980s there was some question as to whether the forestry major could continue to survive because of low student enrollment.

Progulske remained department head until 1980. Because of fiscal constraints then in force, a national search for a new head was not permitted and the faculty elected Dr. Joseph Larson as chairman. When Dr. Larson went on to form and head the university's Environmental Institute in 1983, the faculty turned to another longtime member of the forestry faculty to serve as chairman of the Department of Forestry and Wildlife Management, Donald L. Mader. In poor health by 1985, Dr. Mader indicated his desire to step down as chairman and the university was finally convinced to support a national search for a new department head. Donald G. Arganbright, with a background in wood products from the University of California, Berkeley, became department head in 1986. Arganbright inherited a difficult situation, given the six years of transitory departmental leadership and declining student enrollments. Many faculty changes and another period of fiscal constraint meant that when a faculty member voluntarily left or retired, a replacement of that

position's discipline was not assured. The forestry section suffered the most because its faculty had been in place the longest and were closest to retirement. As faculty numbers shrank, some key disciplines were no longer covered, and it was difficult for the forestry program to retain its accreditation by the Society of American Foresters. However, as of 1997 the program is still accredited and recent faculty additions bode well for continuation of accreditation.

In summary, forestry education within the University of Massachusetts and its predecessor colleges developed as a professional education program for a total of 42 years under the guidance of two men — Robert P. Holdsworth (26 years) and Arnold D. Rhodes (16 years). They were energetic, dedicated individuals who were able to take advantage of the times in which they served to develop a program that was highly ranked among those of all institutions nationally. Both Holdsworth and Rhodes served on the state Board of Natural Resources, which provided a close link between this state agency and the university. Succeeding department heads have not served in this capacity. In the 24 years since Professor Rhodes stepped down, there have been two department heads and two chairmen, whose average terms of service have been six years, compared with an average of 21 years for Holdsworth and Rhodes. Not only has the position of department head become much more complex because of additional academic programs, but the faculty is much larger and the university administration's demands on department heads is greater.

Forestry Research at the University of Massachusetts

In contrast to the situation at the Harvard Forest, research has been of secondary importance at the University of Massachusetts. In 1882 the Massachusetts Agricultural Experiment Station was established by the state legislature at the urging of MAC president William Clark. In 1887 the federal government passed the Hatch Act, which provided funds to assist states in establishing agricultural experiment stations, including forestry research. But because most stations were under the direction of agricultural professionals, forestry received minimal funding.

Federal funding of forestry research has been important to the University of Massachusetts. In 1923 an appropriation by Congress, initiated by Senator Henry Cabot Lodge, established a Forest Experiment Station of the U.S. Department of Agriculture (USDA), Forest

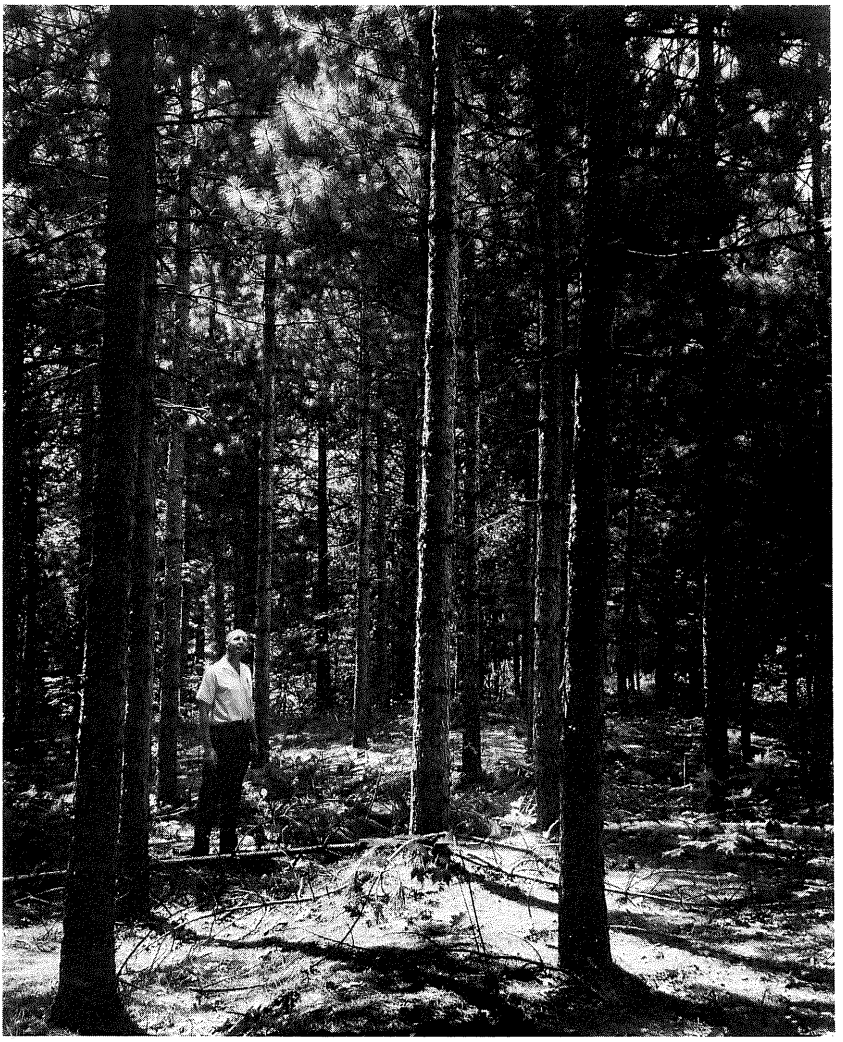

Figure 2. A managed pine stand in the Mount Tobey Experimental Forest, Sunderland. This forest, acquired by the University of Massachusetts in 1916, is still used for teaching and research. Holdsworth Natural Resources Center Library, University of Massachusetts, Amherst.

Service on the campus. The station's research focused on measuring growth on the Mount Toby Forest and the effects of the chestnut blight on the changing composition of the forest. The station remained for only nine years, at which point it was moved to New Haven, to be associated with the Yale School of Forestry. During those nine years it

had three directors, all of whom achieved distinction in the field of forestry education and research: S. T. Dana, J. S. Boyce, and C. E. Behre.

The master's program in wildlife management created in 1942 under Dr. Trippensee's guidance was enhanced in 1948 with the establishment of the Massachusetts Cooperative Wildlife Research Unit under the direction of Dr. William Sheldon. This unit enabled the program to attract graduate students by offering research assistantships and also provided for advanced course offerings by Dr. Sheldon as an adjunct faculty member. This federally funded project was supported by the Wildlife Restoration Act of 1937, commonly known as the Pittman-Robertson Act, which provided funds to the states from the federal tax on firearms, shells, and cartridges. These funds were apportioned on the basis of the number of licensed hunters and a state's total area. Forestry did not at that time enjoy such dedicated research funds.

In 1954 Holdsworth gained support for forestry research from the College of Agriculture Experiment Station. This enabled the hiring in 1956 of the first forestry faculty member with a Ph.D., Donald L. Mader, a forest soils scientist from the University of Wisconsin. Although Dr. Mader was to focus on research, he also taught courses in forest soils. Professor Rhodes, who had just succeeded Holdsworth, now had some ammunition to proceed with a proposal to the university trustees for a master's program in forestry, which was approved in June of 1957. Another Ph.D., Harold B. Gatslick, joined the faculty to replace J. Harry Rich, who retired in 1958, and by 1963 a second position in wood technology was added with the appointment of Dr. R. Bruce Hoadley.

Forestry research received a major boost with passage in 1962 of the Cooperative Forestry Research Act (McIntire-Stennis Act). There was now a dedicated source of federal forestry research funds allocated to the agricultural experiment station to augment the Hatch Act monies, which had been doled out only sparingly to forestry research projects in the past.

Since inception of the doctoral degree program in the mid-1960s, research has been a mandatory portion of a faculty member's performance evaluation. Research publications in refereed journals are required if faculty are to earn tenure and then to progress in rank. The diversity of the faculty in disciplines other than forestry has meant that a wide range of research has been undertaken.

Some forestry research, mostly in applied silviculture, has been

done by faculty over the years, much of it on Mount Toby Experimental Forest and the so-called farm woodlots adjacent to campus. The allocation of Hatch funds to forestry in the mid-1950s marked the beginning of more formal forestry research. A certain percentage of Hatch appropriations was required to be used in marketing research, and there was also a provision for "regional research," research undertaken cooperatively by faculty from various universities, both requirements taken advantage of by forestry faculty in the areas of forest soils and wood products.

One of the first regional projects was carried out by Professor Harry Rich, with other faculty from northeastern universities, to describe the marketing of wood products. This research comprised several different projects, with the final ones undertaken by Dr. Robert S. Bond, a forest economist, who joined the faculty in the fall of 1956. Most of these regional researchers were either forest or natural-resource economists. Following completion of the cooperative effort on timber-product marketing, several projects examined forest recreation, which was becoming a major use of the forest as a result of improvements in automobile transportation, the improved post–World War II economy, and greater leisure time for the working public.

Field research and teaching were enhanced by the gift to the university in 1951–52 of a 1,200-acre tract of forestland in Pelham by Mrs. Esther Hyde Cadwell, which became the Cadwell Memorial Forest. She offered it to the university because she could no longer afford the taxes and had not been able to find an acceptable buyer. The parcel was abandoned agricultural land that had been heavily cut over after naturally becoming reforested, and it thus provided research and teaching opportunities quite different from Mount Toby. Professor Herschel G. Abbott, who had joined the faculty in the mid-1950s to teach forest protection, dendrology, and subjects related to forest regeneration, used Cadwell for studies of planting, direct seeding, and the consumption by rodent populations of natural seed sources.

Dr. Donald Mader did extensive research on forest soils, some of which was carried out with other university faculty as regional research. He and Professor MacConnell initiated research on the Quabbin Reservoir watershed of the Metropolitan District Commission just to the east of Amherst. This large reservoir, created in the early 1930s to supply Boston and surrounding communities with drinking water,

has a watershed of more than 50,000 acres. Though the watershed area is managed for forest products, its primary purpose is to protect the watershed to assure high-quality water. Professors MacConnell, Mawson, and Mader played a major role in initiating management of this vast resource because of a graduate student, Fred M. Hunt, who became the Quabbin watershed's first forester. Hunt set up a continuous forest inventory system and gathered the first data, from which an intensive management program has evolved. The watershed property has also provided a wilderness-type habitat for wildlife research.

One of the longest ongoing pieces of research in the department has derived from Professor MacConnell's interests in aerial photo interpretation of the forest. The project started as a land-use map of the entire state done from aerial photographs; more recently it has utilized the latest technology of satellite imagery. The work has found many users and attracted numerous grants from federal, state, river basin, and other regional agencies. The project has provided large amounts of funding for temporary and full-time positions as well as stipends for numerous graduate students over approximately a 30-year period. Massachusetts is uniquely fortunate to have such a store of land-use information at its disposal.

As new forestry faculty joined the Department of Forestry and Wildlife Management in the mid- to late-1970s, new research interests came to the fore. Dr. Brayton F. (Bill) Wilson did research on tree physiology; Dr. William Patterson worked on prescribed fire as a forest management tool, not only in Massachusetts but on a national scale; and Dr. Matthew J. Kelty undertook silvicultural research.

Another accomplishment of Professor Rhodes was the 1971 agreement with the Northeastern Forest Experiment Station to establish a unit in conjunction with the department to do research related to wildlife and urban forestry. This agreement brought a U.S. Forest Service research unit back to the campus after a hiatus of nearly 40 years. The first unit leader, Jack Ward Thomas, earned his Ph.D. in wildlife at the university while in this position, later transferring to Bend, Oregon, to take a position in wildlife research. From there he was appointed chief of the U.S. Forest Service in the Clinton administration. The unit continues, but has since been downsized and has gone through changes in emphasis; now its focus is primarily wildlife research.

As the Department of Forestry and Wildlife Management grew, the wood science and technology program, later called building materials and technology, became a separate section but remained involved in forest-product research. This research was greatly enhanced by the laboratory and woodworking machine room, which included experimental dry kilns, heretofore lacking, that came with the new building in 1963. One focus of research has been to improve the utilization of low-quality timber, of which there is a large supply in Massachusetts. Various species were tested for making particle board, oriented strandboard, and taking clear cuttings and regluing them into panels (dubbed the System Six method) for furniture and cabinets.

Drs. William Rice and Alan Marra have been the primary researchers in these areas. Dr. Rice focused much of his effort on wood drying; through his efforts and those of others, the Wood Processing Center was created at the Tillson Farm area on the eastern edge of campus. The center consists of a sawmill; wood-fiber laboratory complete with log crusher, hammermills, and a flaker; a 10 thousand board foot commercial-size dry kiln; an improved air drying yard; and a trailer that is used as a classroom, laboratory, and small conference area. Dr. R. Bruce Hoadley has worked on the design of wooden propeller blades for windmill electrical generation and is working on the "swelling pressure properties of wood and related areas of elastomer assembly of wood products and furniture joint analysis."[27] In addition, he is often called upon for legal testimony because of his expertise in wood anatomy and wood identification .

Before his retirement in 1977, Dr. Harold Gatslick worked diligently to promote wood-industry plant development in the state, especially for industries that would exploit underutilized species. With graduate students, Dr. Robert S. Bond studied locally important wood industries and their structure and marketing techniques, especially the pallet industry. Under later funding from the U.S. Forest Service and just prior to retiring in 1977 to become director of the Pennsylvannia State University's School of Forest Resources, Dr. Bond did extensive studies of labor in the primary wood-processing industries of the Northeast.

Over the past 30 years, as the department has changed its emphasis from primarily undergraduate education to include graduate education, research, and public outreach, research has been a major activity of the faculty in the Department of Forestry and Wildlife

Management — a contrast to the forestry program's first half century. This broadening of activities in forestry derives in part from the university's being a public institution and thus sensitive to changes in public policy.

Extension Forestry

Extension forestry has been an important component of the forestry program at the University of Massachusetts since its early establishment as the Massachusetts Agricultural College. When the rural sociologist Kenyon L. Butterfield became president of the Massachusetts Agricultural College in 1906, he asked the academic faculty to take on extension education, i.e., education of the general public. The then forestry professor, William Darrow Clark, responded to this request with a plan for a full-time person doing forestry extension and setting up demonstration plots throughout the Commonwealth on private lands of willing participants. Limited financial resources kept this plan on paper until the 1930s, when it was implemented under Professor Holdsworth's leadership.

Agricultural extension work became a cooperative activity between the U.S. Department of Agriculture and the land-grant colleges in 1914 with passage of the Smith-Lever Act. Again, as with agricultural research under the Hatch Act, the federal government provided matching funding to stimulate programs by states. It can be speculated that Professor Holdsworth convinced the college that Smith-Lever funds should be used to hire a person in this area. Robert B. Parmenter, Massachusetts' first extension forester, joined the faculty in about 1937 and held this position until his retirement in 1956. His role as extension forester was quite different from today. The norm at that time was for public foresters to perform services for private forest landowners. More like the early state service foresters, the extension forester dealt primarily with individuals, meeting with them on their lands, giving them advice, and even marking timber and assisting them with timber sales. Parmenter did, however, work closely with state district foresters to organize field meetings and did some radio broadcasts.

In 1958, John H. Noyes took over as extension forester. He was a native of Connecticut, with an undergraduate degree from that state's university and an M.F. from the Yale School of Forestry. Having come into the profession in 1939 following the hurricane of 1938, Noyes went

to work with the U.S. Forest Service helping with the Timber Salvage Administration, a program implemented by the Roosevelt administration to recover the millions of board feet of timber the storm had blown down. Following World War II, Noyes rejoined the U.S. Forest Service and held a number of positions that broadened his experience. It was fortuitous that in his work with the U.S. Forest Service he was involved in both state and private forestry when the Massachusetts extension forester position became available. Professor Rhodes had known Noyes before the war when they were both at Yale. Rhodes respected his abilities, so he was hired.

Professor Noyes changed the way extension forestry was conducted in Massachusetts and made an impact on it throughout the nation. He worked with groups of people, developing many publications so that forest landowners could order these pamphlets and read up on topics before they actually met with a professional forester. He was the driving force in the founding of many organizations, such as the Massachusetts Christmas Tree Growers and the Massachusetts Land League (which became the Massachusetts Forestry Association). He worked not only with forest landowner groups but also with professional foresters to keep practicing foresters up-to-date on new developments. From the late 1950s to the early 1970s, when he moved into college administration to become assistant director of extension, Professor Noyes oversaw forestry extension's most productive period. His replacement stayed only three years, and fiscal constraints meant that no one was permanently put into the position. As they had been under President Butterfield, faculty were asked to take on extension in addition to their teaching and research duties. In practice, the teaching responsibilities took precedence over forestry extension services and the latter received little attention.

Again, as in the case with forestry research, there was national pressure on the Congress to provide for dedicated funds for forestry extension activities so as not to have to rely on agricultural Smith-Lever funds. Although conventionally considered a part of agriculture, forestry was often the "poor cousin" when it came to funding for research and extension activities, even in regions where forestry was more prominent than agriculture. In 1982, the Cooperative Forestry Extension Act was passed, which provided dedicated funds to be used exclusively for forestry extension. Although it has never been funded to the

full authorization, as is also true for the Cooperative Forestry Research Act, the act has provided funding to strengthen the program.

In Massachusetts the act enabled the University of Massachusetts to hire Chistina Petersen as extension forestry assistant in 1985. Although it was only a part-time position, Petersen initiated a renewal of extension forestry activities with the state's forest landowners and the resumption of cooperative work with foresters in the state Division of Forests and Parks. Petersen resigned in 1994, but her efforts and those of an extension evaluation committee formed in the Department of Forestry and Wildlife led to the hiring of Dr. David B. Kittredge, Jr., as extension forester with a university faculty appointment. Kittredge, a Yale School of Forestry and Environmental Studies graduate, has responsibilities beyond extension for formal teaching and research in order to assure tenure consideration and permit future promotions.

Extension remains an important aspect of the University of Massachusetts program, but it has been greatly affected in recent years by cuts in the state budget. At one time there was a strong county-based extension program in addition to that found at the university campus, but cutbacks have greatly reduced these programs and eliminated forest-resource specialists at the county level. Recently, there has been a growing recognition of the importance of outreach by the university in agriculture and many other areas. This "outreach" not only provides technical knowledge to many businesses, but also gives the university greater visibility and recognition for its contribution to the state's economic and environmental well-being. Since three-fifths of Massachusetts is currently forested, there is good reason for extension forestry to help educate the landowning public and the cadre of professional foresters who work with them.

Forestry at University of Massachsetts Mirrors National Trends

Dr. Donald Arganbright, since 1988 the head of the Department of Forestry and Wildlife Management, resigned in July 1995 to accept a comparable position at Northern Arizona University. His tenure saw many developments in the university and in the College of Agriculture (now the College of Food and Natural Resources), of which the Department of Forestry and Wildlife Management is a part. Declining enrollments in forestry, a national phenomenon, required persuasive

arguments at the college and university levels to permit the replacement of faculty who resigned or retired, especially in the face of reduced fiscal support at the federal and state levels. In August 1996, a new department head, Dr. William McComb, took up the reins. Dr. McComb, whose graduate studies were in wildlife, has had a wide-ranging teaching and research career at the University of Kentucky and, most recently, Oregon State University. His challenge is to keep a diverse faculty together as the various programs within the department seek funds to maintain or expand their programs.

Other important changes at the university have been more societal than institutional. For example, forestry was a male-dominated profession until the late 1960s. Susan Koons, '67 was the first female to earn a forestry B.S. degree at the University of Massachusetts. Since that time, many women have entered the profession of forestry and have distinguished themselves in teaching, research, and leadership. A University of Massachusetts forestry graduate student, Jane Difley, was the first woman to become president of the Society of American Foresters, a national professional organization with around 20,000 members, and the first woman to head the Society for the Protection of New Hampshire Forests.

Until women began earning doctoral degrees in forestry their faculty roles were not on the teaching staff but in extension. For a brief period in the mid-1970s, Nancy Arny Pywell was an extension forestry assistant; as discussed above, Christina Petersen was appointed to this position in 1985. Her appointment became possible as a result of funds made available under the 1982 Forest Resources Extension Act. At about the same time, Linda Deegan, a marine biologist, joined the department faculty.

Currently three women hold positions on the faculty: Ann Lewis, assistant professor of forestry, earned her Ph.D. degree from Harvard in the Department of Organismic and Evolutionary Biology in 1987, having initiated her studies with the late director of the Harvard Forest, Dr. Martin Zimmerman. Lucie K. Ozzanne became an assistant professor of building materials and technology in August 1995, after she completed her doctorate at Penn State University. Martha E. Mather, an adjunct assistant professor, is a fisheries biologist and assistant unit leader of the Massachusetts Cooperative Wildlife and

Fisheries Research Unit. Recruitment of additional minorities and women, in spite of strong efforts by the university and department, has been hampered by a shortage of candidates.

As of 1995, there is a new program in the department, arboriculture and park management. This marks the return of a two-year degree program to the department after a hiatus of 23 years (since the Stockbridge School of Agriculture wood utilization program was terminated). It is taught by Dr. H. Dennis Ryan, associate professor of arboriculture and urban forestry, and Thomas Houston, lecturer in arboriculture. This program had been housed in the Department of Landscape Architecture and Regional Planning for many years, but it is appropriate for it to be in the forestry department now, for urban forestry has become a nationally recognized submajor in other forestry education programs. The question may be posed as to whether it will become a full-fledged baccalaureate program in the future.

OTHER FORESTRY EDUCATION PROGRAMS

Three other programs in the Commonwealth in addition to the professional forestry education programs at Harvard and the University of Massachusetts have taught some forestry. Following World War II, Nichols Junior College in Dudley had a modest program to provide students with a forestry-conservation background. This was developed primarily because of the business-related opportunities and the college administration's recognition that such a program would be popular with students. During the early to mid-1950s, weekend field exercises were conducted at a camp in Rutland owned by the college to give students training in dendrology, silviculture, and mensuration. All of these courses were rudimentary because of time constraints and the college's hiring of a variety of individuals, mostly professionally trained foresters, to teach on a temporary basis. There was no organized curriculum at a professional level.[28]

Two nondegree programs at a vocational level were offered at the Essex Agricultural School in Danvers and at the Smith Vocational School in Northampton. The first was developed largely because two teachers at the school had received forestry degrees and had an interest in Christmas-tree and tree-nursery production. The Smith Vocational School program was more broad-based and actually was directed at

training individuals to work in the woods and do logging. The school engaged faculty to teach these subjects, usually someone with a forestry degree, and had its own woodlot on which the students did fieldwork. The Smith School program continues today.

A number of programs at the local, state, and national level have made the general public more aware of the profession of forestry and have stimulated the expansion of forestry services. Professional forestry is not yet a century old in the United States and is not very well known or understood by the public. In Germany and the Scandinavian countries, forestry is a highly regarded profession. Here in the United States, too often foresters are thought to be despoilers of the forest resource, as opposed to stewards. The public views the cutting of trees negatively, rather than as a cultural activity to encourage or regenerate forest growth, improve wildlife habitat, protect watersheds, and provide a safe sylvan recreational experience.

PROFESSIONAL FORESTRY IN MASSACHUSETTS

Professional forestry in the state was largely related to state employment until the post-World War II years, when it became possible to earn a living as a private forestry consultant. As William Rivers documents elsewhere in this book, there has been a state forester since just before the turn of the century. In 1906, Alfred Akerman was replaced in that role by F. William Rane, who came to the post from the New Hampshire College of Agriculture and Mechanic Arts, where he had taught forestry. He became a lecturer in forestry at the Massachusetts Agricultural College coincident with his appointment as state forester.[29] In 1907, Rane hired Harold O. Cook, a recent M.F. graduate of Harvard College in Petersham, as the first forester for the state who had a professional forestry degree.

Cook had a long career with the state and became Chief Forester when Rane retired in 1919. In subsequent years the commissioner of conservation, often a political appointee with no forestry training, served as the titular state forester. In reality, whoever is chief forester acts in the capacity of state forester.

Harold Cook's career spanned over 50 years. His autobiography, *Fifty Years a Forester,* published by the Massachusetts Forest and Park Association in 1961, is a fascinating description of a forester's career.

Cook was heavily involved with the acquisition of state forest property, in reforestation, and in organizing the Civilian Conservation Corps program for Massachusetts in addition to his educational work in speaking to groups and giving advice on the ground to forest landowners. As is still the case with today's chief forester, Cook had multiple responsibilities and was often called upon to undertake activities for which he had no formal training.

John H. Lambert, Jr., a graduate of the University of Maine (1929) and Yale School of Forestry (1930), came to work for the Massachusetts Department of Conservation in 1932 as a state forest supervisor in the Berkshires. He, too, had a long, distinguished career with the department and provided much of its professional leadership following World War II. Lambert officially replaced H. O. Cook as chief forester in 1962, although he had, for all intents and purposes, been unofficially carrying out the duties for 10 years or more.

The Cooperative Farm Forestry Act (known as the Norris-Doxey Act), passed by Congress in 1937, gave states matching funding to provide asssistance and educational programs to farm woodland owners, who at the time were the predominant owners of private forestland in Massachusetts. All of these activities gave further impetus to professional forestry in the state. But until the late 1940s, private forestry services were little in demand.

Federal legislation again made an impact on professional forestry with passage of the Cooperative Forest Management Act of 1950. This was an expansion of the Norris-Doxey Act in that it provided matching funding to states to employ foresters and to provide services to private woodland owners. Whereas the earlier act referred to "farm foresters," under the new act the term was "service foresters" — meaning assistance was not restricted to woodland owners engaged in some form of agriculture. Farms continued to be abandoned and were often inherited or purchased by individuals who had no interest in farming, but did wish to own forestland. Over the past half century, the number of these landowners, referred to as nonindustrial private forest landowners (NIPFLOs), has grown, but the average area of each ownership has declined.

As money was appropriated to increase the number of foresters employed by the state, professional foresters became increasingly evident. In Worcester County, for example, in the mid-1950s one district forester (state-funded) covered the entire county. By the mid-1980s the

county had a forest supervisor, two assistants, three service foresters (north, central, and south), and two management foresters for the state forests in the county. Today, there is at least one service forester and at least one management forester in every county, with the exception of Suffolk, Dukes, and Nantucket counties.

The service forester's role has changed greatly. Much of the work is more regulatory: monitoring forest cutting under the Forest Cutting Practices Act (Chapter 132, Massachuesetts General Laws) and approving Forest Management Plans as required by the Forest Tax Classification Law (Chapter 61, M.G.L.), which is optional to forest landowners who wish to reduce their ad valorem tax. In the beginning of the public forestry assistance program, government foresters would spend much more time with individual landowners on the ground and even mark their timber for cutting and advise them on how to go about selling it. This activity is now the purview of the consulting forester — an individual or group who are private entrepreneurs providing professional forestry services for a fee.

By the 1970s, there were many federal programs to educate woodland owners about the importance of managing their forest land and, particularly, the advantages of hiring a professional forester to assist them in the sale of timber. There are increasing numbers of woodland owners who have no knowledge about the forest and how to manage it. Although too few have sought professional foresters' advice, the large numbers of Massachusetts owners, an estimated 235,000 owning 10 acres or more, has enabled consulting foresters to make a living doing this work. A September 1993 publication of the University of Massachusetts Extension System lists 87 private forestry consultants who will assist landowners with forest management for a fee. Not all of these are full-time consultants, as some have other jobs and some are semiretired.

SUMMARY

The development of forestry in Massachusetts has paralleled that of the United States as a whole, but genuine leadership has also been provided by Massachusetts organizations over the years. For example, some of the earliest lectures in the country about forestry were presented at the Massachusetts Agricultural College by B. E. Fernow, one of the first professional foresters to advocate and implement management of

forests in the United States. The Commonwealth provided leadership to the profession through its two outstanding academic and research institutions at Harvard University and the University of Massachusetts. Although the former has emphasized graduate-level education and the latter, undergraduate studies, they have both made major contributions, even beyond their formal degree programs. The Harvard Forest with its Bullard Fellowships has made an international contribution in promoting contact among professional foresters, and between professionals and researchers. The Conferences on Forest Production brought public, private, and academic foresters together from this country, Canada, and even some other nations. The University of Massachusetts also conducted national and international conferences that were precedent-setting. One of the outstanding ones, "Trees and Forests in an Urbanizing Environment," held in August of 1970, brought together some of the leaders in this subject area and was instrumental in establishing the Northeastern Forest Experiment Station's new research unit on the campus at Amherst. In addition, the university's Department of Forestry and Wildlife Management has hosted numerous regional conferences for members of the forestry and wildlife professions.

Throughout the twentieth century, forestry itself has become increasingly complex. Both public and private forests are scrutinized ever more closely today by an increasingly environmentally aware public. The challenge is to educate landowners and students to manage forests as ecosystems and for biodiversity as well as for, or even instead of, timber or recreation. Up until 25 years ago, there was little doubt about what foresters did. They managed woodlands primarily for timber products, and recreation, wildlife habitat, and watershed protection were considered secondary uses. As different paradigms of the forestry profession emerge, Massachusetts can and will continue to adjust its forestry education programs to fit the changing times.

NOTES

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3. Massachusetts Agricultural College, *Eighth Annual Report* (Boston, 1871), p. 27. Cited in Gordon, *Forestry,* p. 4.
4. Massachusetts Agricultural College, *Thirtieth Annual Report* (Boston, 1893), p. 27. Cited in Gordon, *Forestry,* p. 6.
5. Samuel T. Dana, *Forest and Range Policy* (New York: McGraw-Hill, 1956), p. 79.
6. Harvard Forest, *The Harvard Forest* 1907–1934: A Memorial to Its First Director, Richard Thornton Fisher (Petersham, Mass.: Harvard University, 1935), p. 40.
7. David M. Smith, Jesup Professor of Silviculture at the Yale School of Forestry, coauthored revisions of this text and ultimately became the sole author. The most recent revision was coauthored by two additional individuals, one of whom is Matthew J. Kelty, of the University of Massachusetts faculty.
8. H. Raup and E. Gould, "Harvard Forestry School, History of Instruction," discussion draft, ca. 1955 (Harvard Forest Archives), p. 2.
9. Ibid., p. 5.
10. Ibid., p. 4.
11. David R. Foster (director of the Harvard Forest), *Annual Report of the Harvard Forest,* 1992–93 (Petersham, Mass.: Harvard University, June 1993), p. 5.
12. Ibid., p. 5.
13. John G. Torrey (director of the Harvard Forest), *Annual Report of the Harvard Forest,* 1987–88 (Petersham, Mass.: Harvard University, August 1988), p. 4.
14. *Annual Report of the Harvard Forest,* 1983–84 (Petersham, Mass.: Harvard University), no. pp.
15. Foster, *Annual Report,* 1992–93, p. 6.
16. Ibid., p. 16.
17. Ibid., p. 19.
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21. W. D. Clar, "The Mount Toby Demonstration Forest," *Yale Forest School News,* October 1, 1916 (University of Massachusetts Archives, Group 15, Series 14, "Mount Toby Reservation, General"). Cited in Gorden, *Forestry,* p. 28.

22. *Massachusetts Agricultural College Bulletin* 14 (January 1922), p. 81. Cited in Gordon, *Forestry,* p. 10.
23. *Massachusetts Agricultural College Bulletin* 15 (January 1923): 79; Massachusetts Agricultural College, *Sixty-first Annual Report* (Boston, 1924), p. 62; Anonymous, "A Brief Chronological Summary Concerning the Program in Forestry at the University of Massachusetts" (University of Massachusetts Archives, Group 25, Series F6/2), p. 2. Cited in Gordon, *Forestry,* p. 21.
24. Dana, op. cit., p. 222.
25. *Massachusetts Agricultural College Bulletin* (Boston, 1942–43), p. 35. Cited in Gordon, *Forestry,* p. 13.
26. "Dedication of Holdsworth Hall" (pamphlet), remarks of A. D. Rhodes (University of Massachusetts Archives, Group 25, Series F6/2), p. 3. Cited in Gordon, *Forestry,* p. 14.
27. Department of Forestry and Wildlife Management, University of Massachusetts, *Focus* 1977, vol. 11, 1977.
28. In 1958, Nichols College became a four-year institution emphasizing business management.
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