

# History of the School of Forestry, Fisheries and Wildlife

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# History of the School of Forestry, Fisheries and Wildlife University of Missouri-Columbia

The disciplines of forestry, fisheries and wildlife are similar in many ways, yet different in others. Although they are integrated into one academic program today, their histories are diverse. For that reason, much of the history that follows will consider forestry separately from fisheries and wildlife.

## Early History to 1970

### FORESTRY

Almost two decades ago, Dr. R. H. Westveld, first director of the School of Forestry, compiled a history of forestry education at the University of Missouri covering a century, from 1870 to 1969. The following is a brief summary.

In his search of early records, Westveld found that the rudiments of forestry education began when the legislature established the Agricultural and Mechanical Arts College in Columbia, on Feb. 24, 1870. The nature and extent of forestry activity, he learned, varied widely over the years. The first effort was concerned only with resident instruction; forestry was one of the topics covered in a broad course in agriculture. Later, instruction was expanded until, in 1912, a five-year curriculum in forestry was listed in the university catalog. Shortly thereafter, a small research program was initiated, and in 1926, forestry extension was added with the appointment of an extension forester.

From about 1871 to 1891, forestry subjects were included as portions of courses in agriculture, horticulture and landscape gardening. In 1892, the first course devoted primarily to forestry appeared in the horticulture curriculum. This was expanded to three courses in 1907.

A forestry department was established in 1912, and a faculty of three, along with student assistants, was employed to teach a five-year curriculum, including a summer camp session. Upon completion of the fifth year, a master of forestry degree was awarded. Students who completed four years were granted the bachelor of science degree. Initially, all 23 forestry courses offered were required for the master's degree. During the following nine years, 17 (or 19) students were awarded degrees. It is not clear why the Board of Curators abolished the program in 1921.

Research was initiated in 1911 with a \$500 allocation of funds. This figure doubled over the next eight years, and at least three projects were funded during that period. Although the initial forestry extension program survived for only a year in the 1920s, the program was re-instated in 1939, emphasizing landowner assistance and youth activities, and continued for the following 30 years with one full-time person.

During 1936-1946, a pre-forestry curriculum was offered in the Department of Horticulture, later the Department of Horticulture and Forestry. Following two years of study, students could transfer to established programs in other states. From 25 to 45 students were enrolled in this program prior to World War II, but during the war, enrollment dropped substantially.

In 1946, a four-year forestry program was instituted in the Department of Horticulture and Forestry, which in 1947 became a separate program in a Department of Forestry—the beginning of the present program. By the fall of 1948, a staff of seven persons had been assembled, and the curriculum was accredited by the Society of American Foresters in 1950.

To reflect the expanded scope of activity, the department was named the School of Forestry in 1957. The staff grew from three to 20 by 1970. Curricula relating to wood products, marketing and management were added. By 1969, 559 undergraduate degrees had been awarded in forestry. Graduate study at the master's level was initiated in 1950, and the doctoral program was approved in 1962. By 1969, 62 master of science degrees and five doctoral degrees had been awarded. During this period, various short courses were offered.

In 1958, the School of Forestry advisory council was established. At that time, it was composed of 59 key individuals who were knowledgeable in some aspect of forestry or the wood-using industries. The council was subdivided into five working groups and met at least annually. During its history, this broad-based citizen group contributed to school policies and promoted development of school programs.

Facilities for the forestry program were minimal in 1947. These were enlarged gradually until in June 1960, the school moved into the new agriculture building where more adequate quarters were provided. In 1947, the department was assigned University Forest, approximately 8,800 acres located in Butler County near Poplar Bluff, for use in its programs. A summer camp for undergraduate forestry student education, graduate student and faculty research and extension education were conducted there. Physical facilities at the forest were gradually developed to accomplish these objectives adequately.

In addition, the school acquired as a gift from John and Linda Schnabel the Schnabel Arboretum and Demonstration Woods, a tract

of 80 acres of river hill forest land above the Missouri River in Boone County. For 15 years, research was conducted on the Weldon Spring Experimental Forest of about 4,500 acres located some 88 miles east of Columbia along the Missouri River bluffs. Other research was undertaken at the Ashland Wildlife Research Area, 20 miles southeast of Columbia.

Research has been funded through the Agricultural Experiment Station from the Hatch Act, state appropriations and grants from other sources. Research during the early 1950s included small studies, some of which had begun as early as 1912. Research activities were expanded by establishment of the Columbia Forest Research Center and staffed by employees of the Forest Service, USDA, and from appropriations beginning in 1963 under the McIntire-Stennis Act for Cooperative Forestry Research. Research projects were classified in 12 areas: silviculture, ecology, economics, entomology, forest inventory, marketing, forest fire protection, pathology, wood technology and products, tree physiology, genetics and forest recreation.

From 1960-1969, the teaching budget had increased two and one-half times, research three times and extension six times. The total budget for 1969-70 was \$624,000: 35 percent teaching, 55 percent research and 10 percent extension. Faculty positions had increased from 15 to 19. Costs had increased substantially and enrollment had almost doubled.

The faculty grew in size and diversity to 20 persons and three extension personnel in 1970. From the first graduating class of 15 in 1949, the number of undergraduate degrees awarded increased to about 50 annually by 1970. Dr. Westveld retired as director in 1965, and Donald P. Duncan succeeded him for the next 20 years.

## **FISHERIES AND WILDLIFE**

Elsewhere on the campus, another story was unfolding in the 1930s. Dr. Rudolf Bennitt, Department of Zoology in the College of Arts and Science, assisted by Werner O. Nagel, had initiated a program of ecology and wildlife conservation, one of the first in the nation. It included courses in ornithology, ecology and principles of wildlife conservation. Two landmark publications were produced as the University program developed: a checklist of the birds of Missouri (Bennitt 1932) and a survey of the resident game and furbearers by Bennitt and Nagel (1937). Both are still used as basic sources for Missouri wildlife.

Bennitt was instrumental in obtaining support through the federal Works Progress Administration for the construction of Stephens Hall in 1937. It was the first building at any university that was built expressly for wildlife conservation. The establishment of the Ashland Wildlife Research Area, an outdoor laboratory for teaching, research and demonstration allowed for the development of a wildlife conservation program.

The wildlife conservation program was strengthened considerably when, in 1937, a state-wide referendum established the bipartisan, relatively independent Missouri Conservation Commission. Its first official act was to authorize state participation in a cooperative wildlife research unit at the University of Missouri.

The cooperative unit was established by an agreement among the U.S. Bureau of Biological Survey (now the Fish and Wildlife Service), the Missouri Conservation Commission and the University. The Conservation Commission provided operating monies, and the University contributed faculty and physical facilities. The predecessor of the Wildlife Management Institute also contributed financing. Cooperation among the agencies and the University included guidance of research priorities and direction of education, backed by funding from each.

Graduate fellowships in wildlife have been made available annually since 1939 from the Edward K. Love Conservation Foundation. Love, who established the foundation, was a member of the first conservation commission and was instrumental in forming the Conservation Federation of Missouri. The foundation provides money also for an educational program through the federation. In 1944, the estate of William H. Rucker of St. James, Mo., provided funds to endow a chair in wildlife conservation.

**The Cooperative Wildlife Research Unit established at the University of Missouri in 1937 was one of the first in the nation, (Clark and Baskett, 1986). Paul D. Dalke, a federal wildlife biologist, represented the U.S. Bureau of Biological Survey; and Professor Rudolf Bennitt and Werner O. Nagel, research associate, held University appointments. The University program was strengthened in 1944-45 with the arrival of Robert Campbell (fisheries) and William Elder (wildlife) as assistant professors of zoology. Bennitt was the first William H. Rucker professor. After Bennitt's death in 1950, he was succeeded by William Elder who held the chair for the following 34 years. Leigh Fredrickson currently is the Rucker Professor.**

Thomas Baskett became unit leader in 1948, and two years later, Arthur Witt, Jr. was appointed assistant professor of zoology to enlarge the University fisheries program. Ownership of the Ashland Wildlife Research Area was transferred from the federal government to the University in 1960. Gaylord Memorial Laboratory, on the Duck Creek Wildlife Management Area near Puxico, Mo., began operation as a cooperative venture with funds provided by the Missouri Department of Conservation. The program there is operated by the University. John Rogers was the first director. Leigh H. Fredrickson became director in 1967 and continues in the position.

Thomas Baskett left the campus in 1968 to become chief of wildlife research in the U.S. Fish and Wildlife Service, in Washington, D.C. He

returned as unit leader in 1973 and served in this capacity until retirement in 1985. A cooperative fishery research unit was established in 1962 with Richard Anderson as leader. The program was strengthened by the Paul K. Wehmiller Fund, an endowment established in 1971, the income from which is used for graduate fellowships in fisheries.

Numerous other persons served on the staffs of the University and the two federal Units for shorter periods (Clark and Baskett 1986; Table 2, page 30). Degrees in fisheries and wildlife were granted in early years by the Department of Zoology, College of Arts and Science, which was later combined with the Department of Botany to form the Division of Biological Sciences. Later an undergraduate degree program in fisheries and wildlife was established within the College of Agriculture.

During the period 1937-1973, the number of bachelor of science degrees granted is unknown because records were combined with those of students of several majors in arts and science and in agriculture. The number is estimated to exceed 800. By 1969, 133 M.A. degrees and 16 Ph.D. degrees had been granted in fisheries and wildlife.

## Growth and Development 1970 - 1987

As it entered the 1970s, the school, along with other units in the College of Agriculture, recognized its responsibility in undergraduate education, graduate education, research, extension and international programs. Also recognized was the effort by the staff in service activity—participation on University committees, professional and scientific societies, continuing education of professionals, education of the general public and civic activities. Significant changes were to occur in the 1970s. Dr. Westveld had retired in 1969 and moved to Florida.

The faculty in forestry rose to 23 including three with cross appointments in other departments. In 1970, forestry undergraduate enrollment was 260 (Table 1, page 29), with 28 percent from out-of-state; and 30 graduate students were in residence. In an attempt to make the process more systematic and consistent, the faculty in 1970 adopted guidelines for faculty selection promotion and tenure, and the director has followed the guidelines in assessing faculty performance and in making staff recommendations.

### SCHOOL OF FFW FORMED

In 1973, the School of Forestry merged with the fisheries and wildlife program from the Division of Biological Sciences in the College of Arts and Science, the Cooperative Wildlife Research Unit and the Cooperative Fishery Research Unit to form the School of Forestry, Fisheries and Wildlife, functioning as a unit under the director and the dean, College of Agriculture. All education and research programs, facilities and lands

were assigned to the new school. The advantages in this union include integration of the undergraduate programs which provides distinct advantages to students uncertain of which direction they wish to go. Research programs and graduate education have potential for better interaction.

The shift involved the transfer of four fisheries faculty and four wildlife faculty along with 200 undergraduates and 43 graduate students. The fisheries faculty included Campbell, Witt, Anderson and Reynolds. The wildlife faculty were Elder, Fredrickson, Goforth and Sparrowe. Reynolds and Sparrowe were Federal employees (Table 2, page 30).

Forestry faculty at that time included Adair, Bhullar, G.N. Brown, M.C. Brown, M.F. Brown, Chilman, Cox, Downing, Duncan, Garrett, Hinckley, Kearby, Kurtz, McGinnes, Moore, Musbach, Nash, Nichols, Pastoret, Paulsell, Polk, Settergren, Slusher and Smith (Table 2).

By 1974, the administrative load had increased with the combined staff and development of a multi-campus university. An assistant director in forestry (Richard Smith) and one in fisheries and wildlife (Arthur Witt) were appointed to function in a staff capacity to the director, and also to serve as director of graduate studies for their respective areas.

The fisheries and wildlife program had been housed only in Stephens Hall since 1938. Since the merger with forestry in 1973, limited office and laboratory space was made available to fisheries and wildlife in Lefevre Hall and Stewart Hall (total 9000 sq. ft.). Field areas important in fisheries and wildlife research include the Ashland Wildlife Research Area and Gaylord Memorial Laboratory in southeast Missouri. Forestry has been housed in the Agriculture Building since 1960 and at a house at 705 Hitt Street (total 15,759 sq. ft.). Field areas important in forestry research include the Ashland Wildlife Research area, University Forest in southeast Missouri and limited land and building space at South Farm.

During the period 1967-1985, Director Duncan led repeated attempts to gain more space, with laboratories and classrooms designed to more adequately suit our programs. Efforts to construct a new building failed. Proposals to modernize and remodel at least three older buildings on campus were unsuccessful. Each outside team brought to the campus to review and evaluate our programs has reached the conclusion that the lack of better physical facilities has hampered both education and research.

## **FACULTY AND STAFF CHANGES**

Faculty members of professorial and instructor rank who were employed in the period 1970-87 are listed in Table 2, page 30. The length of the list indicates an accelerated turnover, particularly from about 1975 to 1980. This group included several instructors and professors who went to

higher positions at other universities.

In forestry, changes included resignations, replacements and a few additions. After a reduction in extension funding in 1972, Edwin Wheeler resigned to enter business. The following year Kenneth Chilman resigned. In 1977, Gregory Brown and Kent Adair resigned to accept positions at other universities. Other resignations included Thomas Hinckley, Miles Brown, Mark Lapping and William Kearby. Instructors Downing, Tennyson, Graf, Hengerson, Nugent and Shaffer resigned after completion of their doctoral degree or for other reasons.

Replacements and additions include many of the faculty still serving in 1987: Garrett, Everson, Henderson, Kurtz, George, Cutter, Pallardy, Linit and Vogt. Several faculty members retired with long service records: Moore 1976, Nichols 1979, Polk 1980, Smith 1982, Nash 1984 and Paulsell 1987. Donald Duncan, after serving as director for 20 years, retired in 1985. He was succeeded by Albert Vogt, and Gene Cox became associate director.

In fisheries and wildlife, many of the changes involved federal employees who received promotions, new duties or transfers to other locations: Goforth 1973, Sparrowe 1976, Reynolds 1978, Samson 1980 and Anderson 1985. The number of university faculty in fisheries and wildlife for many years had been critically small. Much needed strengthening began in 1975 with the appointment of Jones in fisheries, followed by Taylor in 1978, who was replaced by Finger in 1980 and Coon in 1983 to succeed Witt. In wildlife, the staff was strengthened by the arrival of Fritzell in 1978, Wiggers in 1983 and Ryan to succeed Elder in 1984. Two of these were new positions. Rabeni and Drobney replaced departed federal employees in 1979 and 1986.

Meanwhile, faculty of long service retired: Campbell in 1978, Witt in 1983 and Elder in 1984. Baskett retired from federal service in 1985 but continues on grant support as professor emeritus.

## **CURRICULA DEVELOPMENT**

In 1970, two curricula were offered in forestry: general forestry (land management) and wood products. Numerous changes had been made in the general forestry curriculum to reduce the number of required forestry credits, to allow more elective courses and to integrate subject matter. One option permitted limited specialization. Flexibility in wood products was provided by elective courses and three specialization options: science, utilization and management. By 1972, it was realized that still greater flexibility was needed. The emerging pattern from faculty discussions was a strong general education core and a forestry core with several options. The union of forestry with fisheries and wildlife furnished the incentive to revise and coordinate the curricula. A major revision resulted in five curricula: forest management, urban and recreational forestry, forest science and specialization, and fisheries and

wildlife. A summary of credit hours in 1974 is given in Table 3, page 35.

Since the major revision was completed in 1973, numerous modifications have been accomplished. The changes were designed to provide the student with greater freedom in study content by increasing free electives and to broaden the curriculum in forestry to include all land uses. Courses were added to give greater exposure to political processes, budgetary processes, the role of the public in natural resources decision making, and public opinion sampling. Three courses have been added which are available to non-majors only.

Five curricula are in effect in 1987, but "urban" has been dropped from Recreational Forestry. Changes in credit hours, though minor, are reflected in Table 4, page 35.

**General education courses (including communications, mathematics, natural sciences, social sciences and humanities)** make a total of 60 to 63 credit hours. In forest management, professional forestry (including timber, watershed, range and wildlife habitat, and recreation land management) make up 52-53 hours. Recreational forestry includes many of the core courses of the forest management curriculum but replaces most of the biological-physical emphasis with courses in sociology, recreation and park administration, and horticulture. The wood products curriculum still maintains three areas of concentration: science, utilization and management with credit hours included under 50 hours of required courses. The forest science and specialization curriculum offers great flexibility to students who anticipate doing graduate work or who have a well-defined objective, but the program has become more structured by limiting the latitude in course selection. In fisheries and wildlife, by 1987, the general education core was increased by five credit hours and free electives were reduced.

Greater emphasis has been given to maintaining up-dated course content and introducing students to theoretical and practical aspects of problem solving. Microcomputers have become innovative teaching tools. A grant of \$12,000 was obtained in 1984 to provide faculty training and software to use in 14 classes in which data are analyzed or statistical tests are made. Two other classes will have specialized programs written for classroom use.

In the 1984 fall semester, an honors program was established for qualified seniors. A cumulative grade-point average of 3.3 (on a 4.0 scale) is required for participation. The program, which is two semesters long, requires the planning, execution and presentation (written and oral) of a senior research project under faculty guidance. Satisfactory completion of the requirements permits a student to receive a B.S. degree with honors.

In 1980, the Gourman Report, an independent evaluation of educational programs, placed FFW at Missouri seventh in the quality of



its education among 31 similar undergraduate programs that were evaluated. In 1984, the Gourman Report showed that forestry at UMC ranked in the top 15 percent of programs evaluated, and fisheries and wildlife ranked in the top 8 percent.

## **ENROLLMENT AND DEGREES GRANTED**

Enrollment in forestry increased at a consistent rate during 1950-1969, and more than doubled by 1970. Then enrollment climbed rapidly to 432 in 1974 (Table 1, page 29). A similar trend was noted in fisheries and wildlife, from an estimated 162 students in 1970 to 368 in 1975. The surge in enrollment probably resulted from several causes. Repeated exposure of the public to environmental issues by the media in the 1960s resulted in increased sensitivity to environmental problems, which in turn attracted young people to careers in natural resources. The increased visibility given these fields in the school's new title, Forestry, Fisheries and Wildlife, attracted new students, particularly in fisheries and wildlife. Others made the selection because they were unsure of their educational goals.

Total enrollment swelled from 420 in 1970 to a peak of 774 in 1975 with approximately one-half in forestry and one-half in fisheries and wildlife. Nearly as rapidly, enrollment declined. This trend has been experienced by most renewable natural resource programs in the United States. The shrinkage in traditional employment opportunities has been partially responsible—also given much attention by the media. Through perseverance, some graduates found traditional jobs and numerous others discovered opportunities in non-traditional areas.

The majority of students enrolled in both forestry and in fisheries and wildlife come from an urban background, 60 percent from cities of 25,000 population or larger. The natural resource fields were once occupied almost exclusively by males but no longer are. Since about 1972, some 23 percent of the students are women. The number of beginning freshman students decreased to only 40 percent of all students entering. The remaining 60 percent transferred from other institutions or other divisions on campus. The greatest number of out-of-state students have come from Kansas and Nebraska because Missouri has a reciprocal education agreement under which students in forestry, fisheries and wildlife from these states do not have to pay non-resident fees. Several students have come from Illinois and other states to the east.

The number of undergraduate degrees granted since 1970 closely parallels enrollment with some delay time (Table 5, page 36). The peak of 148 in 1976 declined to 67 in 1987. Of the 1,531 degrees granted by the school in 17 years, 37 percent was in fisheries and wildlife, 52 percent in forest management, and 8 percent in wood products.

Trends in graduate enrollment and degree awards have been uneven during the past 20 years, with considerable reduction, particularly at the master's level, since 1983. The number of candidates in fisheries and wildlife has been somewhat larger than in forestry, particularly in recent years when funds for forestry assistantships have dwindled.

The forestry graduate program at the master's level has included three approaches. One offered an opportunity for qualified students with an undergraduate degree in the physical, biological or social sciences to acquire a professional forestry education. Such students probably would not master forestry skills as completely as a student who finished the four-year undergraduate curriculum, but they possessed useful training from non-professional fields. A second option permitted a master's candidate to specialize in a relatively limited aspect of land management for timber, water, recreation or other area; to improve competence in integrated decision making; or to become knowledgeable in wood products technology or wood industry management. A third gave opportunity for students to learn methods of research to solve problems or in basic scientific areas leading to new knowledge relevant to forestry.

The number of graduate degrees granted varies widely year to year, reflecting differences in individual study programs, the time required to collect and analyze data and students who may spend several semesters in absentia before completing a thesis or dissertation. Table 6, page 37, shows the number of degrees granted, 1970-1986. Almost 85 percent of the graduate degrees were master's, 46 percent in forestry, 25 percent in fisheries and 29 percent in wildlife. About 60 percent of the doctoral degrees were in forestry with the remainder divided evenly between the other two fields (Table 6, page 37).

## STUDENT ACTIVITIES

The school has enjoyed a reputation for strong student organizations, projects and programs. Participation is excellent, which may demonstrate a professional orientation. In orientation sessions and informal contacts in advisement and counseling, students are urged to take advantage of extracurricular activities and organizations within the school and on the campus. That these activities contribute to greater personal and professional development is emphasized.

**UMC Forestry Club** Since 1947, the club has provided opportunities for students in worthwhile projects and activities, encouraged a sense of professionalism and provided fellowship. Annual activities include a bean feed to welcome new students, a night initiation ceremony in the woods, field skills day, skeet shoot, square dance, spring barbeque, canoe float trip and awards banquet. The banquet caps the club's activities for the school year. It is a social event, but it also

serves to recognize academic achievement, scholarship recipients and the persons and organizations that sponsor scholarships.

Forestry students from 10 universities meet annually at a midwestern forestry student conclave to compete in sawing, chopping, tree identification and other field skills. The location is rotated among states. Missouri foresters spent about 10 years learning *how* to win events. Beginning in 1971, they won the championship in 10 of the following 16 years. Service projects of the club include a forestry education program at 12 public schools, observance of Arbor Day by distributing tree seedlings to fourth grade students and other service programs over the years. In 1976, the club planted trees on the Lenoir Home site, a city park, to commemorate the nation's 200th birthday. Campus plantings also have been made by the club. Members have also participated in blood drives and other public service activities.

Fundraising activities include operating a concession stand at football games and growing and selling Christmas trees. Proceeds finance club entertainment and travel. More noteworthy is an endowed club scholarship fund of more than \$40,000 from which income is used for scholarship awards. Additional club income is used for summer camp and other scholarships. During the years 1982-87 more than \$19,000 assisted almost 50 students.

For about 30 years, wives of married forestry students joined Lumber Jills, a club to stimulate interest in and knowledge of their husbands' future careers. Activities, guided by a faculty-wife advisor, included an annual tea, bake sale, hay ride, Christmas supper and potluck supper. In the late 1970s, interest in the club waned, presumably because of fewer student wives, and increased career opportunities for women.

**Xi Sigma Pi** is a national honorary forestry society that recognizes junior and seniors for high academic achievement, leadership qualities and high potential. Tau chapter was established at the University in 1952. The society makes an annual award to the freshman and senior with the highest academic achievement and provides speakers for special lectures. A tree identification trail has been established on the campus. Members offer a free tutoring service to forestry majors.

**Society of American Foresters (student chapter)** Chartered by the parent society in 1981, the chapter fosters professionalism and encourages students to join and become involved in the national society. Members arrange meetings with guest speakers, field trips and service on committees of the state society.

**Forest Products Research Society (student chapter)** The FPRS encourages students to develop interests in forest products utilization and technology. It serves the special interests of wood products majors, and its program is oriented accordingly. The chapter sponsors speakers and organizes field trips to visit facilities of wood-using industries.

The Wildlife Society (student chapter) has a long and successful history. Initially it was a student club that was organized in the 1930s and was chartered by the parent society in 1976. The Wildlife Society stimulates student interest and increases knowledge in the fields of fisheries and wildlife, brings focus to professional needs, problems and events of local and national concern and acquaints members with job opportunities.

Current activities include bi-weekly meetings, usually with guest speakers, and numerous professional and social events. Professional activities include spring and fall quail censuses and assisting at deer biological survey stations in cooperation with MDC, an annual Wildlife Film Festival, and catfish farming. Regular social events include a fall welcome picnic, turkey shoot, spring float trip, and a fishing contest. The club competes annually in the Midwest Wildlife Student Conclave along with clubs from 14 other universities. The 1976 and 1982 conclaves were held at UMC. Events consisted of presentation of papers, quiz bowl competition and field trips. The quiz bowl competition has been won by UMC twice in recent years. The main fundraiser for the society is operating a concession stand at football games.

**FFW Student Council** The school regularly involves students in matters of policy and decision-making that affect the students and undergraduate program. There is an elected Forestry, Fisheries and Wildlife Student Council, sanctioned and funded by the University. It is composed of four members of each class (two forestry students and two fisheries and wildlife students) and serves as a liaison vehicle for communication and negotiation between students, faculty and administration. Students serve on a number of school committees, as appropriate, to provide student viewpoints and suggestions. The council arranges the school's graduation ceremonies and maintains a supply of camping equipment for student use.

Panels of selected graduate and undergraduate students are frequently used in the process of interviewing candidates for faculty positions. The procedure was last used during selection of the present director of the school. Student panels have been regularly involved in accreditation and program evaluation reviews.

**Year Book** The forestry club published the *Missouri Log* from 1949 to 1973. Graduates for the year were pictured along with a summary of their extracurricular activities and summer job experience. Student organizations reported on activities for the year and students wrote feature articles. Earlier issues contained technical articles by well-known foresters and administrators. Each yearbook was dedicated to a respected friend of the school.

Beginning in 1974, the *Missouri Log* was succeeded by *Environs*, which included activities of fisheries and wildlife majors. The emphasis

was modified to reflect student interests and environmental concerns. By 1982, publishing costs had increased and even with advertising revenue and gifts, costs far exceeded revenue from book sales, and the yearbook was discontinued.

## **EXTENSION AND CONTINUING EDUCATION**

After the death of Leighton McCormick in 1968, the position of extension forester remained vacant for one year. John Slusher was hired to fill the vacancy in 1969.

During the next several years, personnel in the school's extension program were involved in formation of the Midland Empire Hardwood Association, the Missouri Nut Growers' Association and the Missouri Forest Products Association. Special emphasis was given to work shops and short courses, with sawyer training and forest management for absentee landowners in urban areas highlighted. One urban workshop drew over 250 landowners who controlled more than 40,000 acres of Ozark timberland.

A need for an extension effort in fisheries and wildlife has been evident since the 1930s. The merger of forestry with fisheries and wildlife in 1973 finally provided the means of adding extension programs in fisheries and wildlife. In 1974, FFW extension hosted a national symposium on timber and wildlife management. Pressures also developed for information on recreational and commercial fishing and pond and lake management on private property. More traditional educational program efforts on woodland ecology, forest management, and tree planting continued. A number of training manuals, technical guides and media releases were produced.

In the field of wood utilization and marketing, a timber harvesting course for high school vocational agriculture students was initiated and piloted in the Salem, Mo., school system in the early 1970s. Extension personnel also worked with the wood industry and others to develop workable air pollution and safety regulations and to develop markets for the industry's waste materials. Edwin Wheeler's resignation in 1972, coupled with diminished funding, curtailed further contributions.

Educational efforts in the mid-1970s stressed information about new wood products and their uses, market surveys, wood preservation techniques and energy saving practices relating to wood. As a result of educational programs by wood products personnel, several hundred all-weather wood foundations were placed in use in the mid-Missouri area.

An effort was begun in 1976 to expand extension's ability nationally to respond to the growing need for education in the area of renewable natural resources. John Slusher served on an Extension Committee to evaluate renewable natural resource education needs. He also served on a four-person USDA planning team in Washington, DC in 1978 to

develop the National Plan for Renewable Natural Resources Extension. The plan was submitted to Congress, resulting in the RREA Act of 1978 with an authorization of \$15 million annually. The first appropriation, for \$2 million, was made four years later. Missouri's RREA state plan was developed with the assistance of the school's advisory council and submitted to USDA in 1982.

With the resignation in 1979 of Miles Brown, the position was closed. The FFW's extension program was reduced to 1.5 full time equivalent (FTE) positions. Partial funding of the Renewable Resources Extension Act in the early 1980s revitalized the extension program. Four persons were hired or contracted with to provide services. Carol Trokey was employed as a forestry specialist. Joseph Dillard was assigned on a one-half time basis, by contract with the MDC as a fisheries specialist. John Phelps was assigned some extension wood products duties through a split appointment, and Richard Smith was employed on a part-time basis as a consultant to work with Phelps to conduct a survey of the composition and economic impact of Missouri's forest product industry. A quarterly log market report was also initiated in the early 1980s in cooperation with the wood industry and the state forester. When Joe Dillard returned to full-time employment with Missouri Department of Conservation in 1986, Deretha Freiling was employed as fisheries and wildlife specialist. A number of new publications were developed by them.

Emphasis on aquatic education has centered on development of materials for youth programs, pond and lake management workshops for personnel who work with private landowners, the formation of a Missouri Aquaculture Advisory Council and a Missouri Aquaculture Plan. Assistance to county and area extension personnel through in-service training and consultation with individual landowners also received initial priority. Fish Farm Days and its forerunner, Tree Farm Day, developed in conjunction with Ag-Science week of the College of Agriculture, have become major annual educational events of the school. A forestry newsletter was initiated in 1977.

The school has developed a limited extension program in land use and outdoor recreation through split appointments with Alan Everson and his immediate predecessor, Mark Lapping, who both carried small-percentage appointments in extension. Primary emphasis of the recreation program has been to improve the information base and planning skills of state and federal professionals managing public lands.

A major emphasis in extension forestry throughout the 1970s and early 1980s was in the area of Agro-forestry, particularly in relation to black walnut crops. Extension foresters and other School faculty prepared walnut management guidelines used by 20 other states. They also cooperatively developed several demonstration areas relating to

walnut and crop management regimes. In 1986, an expanded program was initiated with other College of Agriculture departments and outside agencies to develop a demonstration farm for integrating natural resource and agricultural management practices in the Ozarks.

## RESEARCH

Research in the 1970s provided a vehicle for graduate education and a means of strengthening the undergraduate teaching program by keeping faculty informed of new developments. In addition, research could contribute to: solving problems in Missouri; bolstering the extension and continuing education programs; aiding public agencies, private landowners and wood-using industries; and in the long run, increasing the basic knowledge required to solve applied problems.

Wildlife research in the early years included pioneer work in bobwhite quail populations, wild turkeys, biology of furbearers and waterfowl and management of wetlands. In the aquatic field, early research included acid pollution characteristics in stripmine lakes and freshwater fishery management.

Many of these efforts continued, and studies were added concerning pollution in both terrestrial and aquatic systems, indices of fish populations, the biology and management of mourning doves, and means of habitat evaluation.

In recent years, emphasis has been given to forest wildlife, furbearers, predators, and birds of grassland and agricultural systems. On the aquatic side, both reservoirs and streams have been studied concerning nutrients and fish communities. A significant accomplishment in wildlife research deals with habitat evaluation procedures. In 1977, *A Handbook for Habitat Procedures* was completed by two professors and two graduate students in the cooperative wildlife research unit. It has generated world-wide demand, and the research is being pursued vigorously to improve techniques and methodology.

In forestry research, the main thrust in the 1980s was directed to biological aspects of forestry, but specific efforts are made in resource management and wood science. Major projects are in hardwood ecology and silviculture, environmental influences on wood formation, tree-water relations, forest entomology, low temperature stress physiology, and multi-cropping of black walnut. A second area concerns forest hydrology, including water quality, forest soils and the effects of acid rain. Projects also are active in wood and wood residue utilization, forest economics and forest recreation.

The research program has been one of the most productive in the nation. Through 1983, forestry research at UMC was ranked first for seven out of the preceding eight years (in second place the other year) among 60 McIntire-Stennis participating institutions in the United

States by the Cooperative State Research Service of USDA. On a per-scientist basis in 1982, Missouri ranked first in number of graduate students, number of completed M.S. degrees and in number of non-refereed publications. Missouri was third in refereed journal publications and fourth in completed Ph.D.s.

Opportunities for cooperation among institutions and for research are numerous in the Columbia and Jefferson City vicinity. State and federal agencies provide a multifaceted nucleus for cooperative research, teaching, extension and continuing education in forestry, fisheries and wildlife conservation. The Jefferson City/Columbia area may contain the most complete array of conservation and natural resources research facilities and personnel in the nation.

The U.S. Forest Service established a research unit in Columbia in cooperation with the University in 1948. Over the years, research has been conducted in the area of silviculture, fire, range, economics and wildlife habitat. This research helped national forests in the central states in their multiple resource management planning and gained national recognition for the unit.

The U.S. Fish and Wildlife Service has stationed one to four biologists on campus since creation of the Cooperative Wildlife Research Unit in 1937. In addition, the Mississippi Flyway office was located here in the 1970s, staffed by three biologists, and the National Fisheries Contaminant Research Center is located near the campus with about 100 employees. When the U.S. Fish and Wildlife Service area office in Kansas City closed in the early 1980s, the ecological services office moved its staff of seven people to the UMC campus.

Stephens Hall originally housed the research arm of the Missouri Department of Conservation beginning in the 1940s. It has since moved into its own building a few blocks from campus, where nearly 50 fisheries and wildlife biologists are available for cooperative research with the school.

## Outlying Areas

### **ASHLAND WILDLIFE RESEARCH AREA**

The Ashland Wildlife Research Area, in southeastern Boone County, is 20 miles from the Columbia campus. It covers 2,280 acres, about 70 percent forested. The remaining 30 percent consists of reverting old fields, forest plantations, croplands and open pasture.

The land was purchased in the 1930s by the U.S. Resettlement Administration to retire marginal land from cropping. The University of Missouri and the U.S. government entered into a 50-year lease arrangement for the University to use the area for wildlife research and



as an arboretum, though the latter has not developed. The government dammed Brushy Creek to form the 17-acre Ashland Lake, demolished most of the old farm buildings and built the lake house, or laboratory, near the damsite of Ashland Lake. The structures were built with WPA labor; the University had input into design and location.

Federal responsibility for the area passed through several agencies, finally resting with the U.S. Fish and Wildlife Service. During the early 1950s, the government deeded the area to the University, with the understanding that it would continue to be used primarily for wildlife research and closely allied purposes.

In 1988 the AWRA was dedicated as the Thomas S. Baskett Wildlife Research and Education Center to recognize his long and distinguished service to the University.

Since 1946, management and operation have been performed by resident caretakers and managers. Base funding for operation and maintenance is from the Missouri Agricultural Experiment Station. Most research personnel, facilities and supplies are funded from grants.

The primary management objective is to provide an area typical of central Missouri oak-hickory forests to offer research biologists the maximum potential for study of wildlife populations, their habitat and their management. Close cooperation between the Department of Conservation and the University is facilitated through a memorandum of agreement.

Over the years, facilities have been built in addition to the lakehouse residence and laboratory, which include a manager's residence, shelter for field courses, forestry maintenance and support laboratory, shade house - headhouse, garage and various storage sheds, pens and kennels.

Wildlife research projects underway or recently completed include:

- Timber-wildlife, a 12-year project designed to evaluate the response of selected wildlife populations to small-area clearcuts of timber. Ruffed grouse populations, habitats and behavior are studied intensively, with a foundation of 17 years of data. Songbird communities, woodcock and small mammals are monitored periodically. Results from treated and control areas will be compared.

- Squirrel population dynamics. Alternative hunting seasons are tested to determine effects on the population dynamics of gray and fox squirrel populations.

- Habitat evaluation models are tested and refined on several plots for gray squirrel, fox squirrel and ruffed grouse.

The wildlife area has served as a study area for seven Ph.D. dissertations and 35 masters theses in fisheries and wildlife. More than 60 publications in professional journals have been based on work there.

Forestry projects largely concern basic research including:

- Ecology and physiology of an oak-hickory forest. Temporal and spatial variations in carbon dioxide concentration, throughfall and

stemflow of precipitation, succession and physiological ecology. Sophisticated equipment records data from field environmental and physiological sensors. Field equipment includes photosynthesis measuring apparatus and devices for monitoring moisture, light and temperature. Television antenna towers and scaffolding furnish access to tree crowns.

- Effects of foliar-applied fertilizers on growth and micorrhizal development of shortleaf pine and black oak was done in the shadehouse under automatic mist irrigation.

- Other projects concern the effects of small clearcuts on soil microbial activity and nutrient availability, response of sugar maple to silvicultural practices, growth of hybrid poplar and acid precipitation on forest soils.

Forestry research at the Ashland Wildlife Research Area has produced 27 masters theses and 7 Ph.D. dissertations. From 1974 to 1984, 54 papers were published in scholarly journals, and numerous talks have resulted from work performed there.

The area is used extensively for field trips by classes in ecology, dendrology, ornithology, herpetology, mammalogy, forest inventory, limnology and wildlife ecology. In 1979, one-week field sessions were initiated as part of a wildlife management techniques course. Up to 30 seniors spend the week in residence while conducting a series of exercises. A permanent shelter was erected in 1982, but living conditions are still primitive.

## **GAYLORD MEMORIAL LABORATORY**

The Gaylord Memorial Laboratory is located on the Duck Creek Wildlife Management Area near Puxico, Mo. The area is one of the few remaining large swamps in southeast Missouri, which also includes the Mingo National Wildlife Refuge. This environment offers outstanding opportunity for research in fisheries and in wetland and waterfowl ecology. The laboratory has been operated cooperatively by the University and the Missouri Department of Conservation since 1960. After formation of the School of Forestry, Fisheries and Wildlife in 1973, funding from the Missouri Agricultural Experiment Station and interaction with College of Agriculture scientists expanded the laboratory's research capability.

The program at Gaylord Laboratory has a primary focus on graduate education. Numerous graduate programs have been developed to provide information for wetland-waterfowl management. The cooperative agreement between the University and the Department of Conservation for operating the laboratory, and its location, provide a unique framework where graduate students can develop valuable skills in many aspects of resource management other than research.

Productivity of the laboratory increased significantly starting in 1973 because of an increase in staff and increased opportunities for

research support. A permanent technician was salaried by the Agricultural Experiment Station in 1976. A permanent secretarial position was established in 1980 from the Missouri Department of Conservation operational funds and from grants and contracts.

The major research effort during the 1970s centered on a continuation of studies dealing with wood duck and hooded merganser nesting ecology, moist-soil management, lowland hardwood ecology and a new emphasis on the wintering ecology of waterfowl. Studies on the bioenergetics of wood ducks became the cornerstone of much of the energetic work on waterfowl. Concurrently, a major effort was placed on developing multidisciplinary research programs with other specialists with expertise in fisheries, limnology, soil science and nutrient cycling. The stature of the laboratory program continued to grow. Twelve students (nine M.S. and three Ph.D.) received advanced degrees, 30 manuscripts were published, and the first postdoctoral program was completed between 1973 and 1980.

By 1982, the laboratory was recognized as a leading research station in the fields of waterfowl and wetlands. Resource agencies began seeking advice on management matters from laboratory staff and students. In response, a new effort was initiated to develop short courses and workshops to fill a void in the continuing education of field professionals. Published and new information was synthesized for immediate use by managers. The laboratory was identified as being at the cutting edge in the arena of moist-soil management, lowland hardwood ecology and the wintering ecology of waterfowl. An international meeting on the wintering ecology of waterfowl was held at the laboratory in April 1982 in cooperation with the Canadian facility, Delta Waterfowl and Wetlands Research Station. Forty leading experts on waterfowl spent three days at Gaylord Laboratory focusing on problems relating to the non-breeding season. This meeting stimulated widespread interest in this neglected area of investigation. A second international meeting was held on wintering waterfowl in Galveston, Texas, in January 1985. This meeting continued to identify Gaylord Laboratory as one of the leading institutions where new ideas for waterfowl research during the non-breeding season were generated and where research findings were conveyed to management personnel. Between 1982 and 1987, two postdoctoral, nine M.S. and 3 Ph.D. candidates completed programs, and 51 manuscripts were published.

Current emphasis continues to provide syntheses for land managers, including publication of handbooks on managing waterfowl habitats, invertebrate management and green tree reservoir management. A system of moist-soil management is under development in cooperation with the U.S. Fish and Wildlife Service and Technology Inc. of Palo Alto, Calif.

## UNIVERSITY FOREST

In 1947, 8,800 acres of land in Butler and Wayne counties was assigned to the Department of Forestry for use in its programs. These lands were part of the remainder of the grant of lands to the State under the Morrill Act of 1862, the legislation that supported establishment of state universities to teach agricultural and mechanical arts. In 1960, a large exchange of land was completed with the U.S. Forest Service to consolidate both national forest and university ownerships. Several other land exchanges with private owners were made, and boundary problems were resolved, which resulted in a net ownership of 7,309 acres.

During the past 40 years, the forest has been used for the school's three principal missions: teaching, research and extension. Three managers have directed the work: J. M. Nichols and Lee Paulsell during the 1950s and Ralph Musbach 1956-87. Since 1970, John Sauer, Ernest Richmann and Johnny Harty have retired as workers, the latter with 35 years of service. The present staff includes Alfred Harty and James Joiner.

Beginning in 1948, summer camp sessions are held each year to teach students field techniques in tree measurements, ecology and silviculture, surveying, logging and milling. Since 1970, 862 students have completed the six-week sessions.

Research at the forest has included effects of fire on tree survival and growth, improvement of young oak stands and a long-term study of tree growth and yield. The largest project concerns the influence of timber harvesting on water yield and quality. Recently, studies of soil and water were initiated to learn the effects of aluminum on tree root development and growth and the movement of aluminum through soil and streams. In 1983, a sampling station was established for the National Atmospheric Deposition Programs to address the problem of atmospheric depositions, including acid rain. In the last 17 years, 14 theses and 13 papers have resulted from research at the forest.

Extension and continuing education activities have included short courses to train sawmill sawyers and a course for 25 practicing foresters in logging, milling and grading of logs and lumber. Five areas of several acres each were cut to demonstrate the appearance of different methods of tree stand harvesting to visiting groups. The forest has hosted meetings of the Advisory Council and Society of American Foresters.

The activities have required the development of an extensive physical plant. Over the years, 21 buildings have been constructed and some have been remodeled. Various kinds of equipment were acquired. More than 50 miles of road have been built, and land boundary lines have been surveyed and monumented. Protection of the forest from wildfires has been a continuing effort, and damage has been minor. More than 1.4 million board feet of timber have been harvested, about one-half by the forest crew and the balance by private operators. Almost

one-half million feet of lumber products have been produced in the sawmill.

## International Programs

William Elder was a Guggenheim Foundation Fellow 1956-57 for research in England and Holland. In 1965-66, his research in Rhodesia and Botswana was supported by a Fulbright Fellowship, and a National Science Foundation grant covered research in Zambia during the summers of 1967 and 1968. He also carried on research in Hawaii in 1957 and cooperated with the Delta Waterfowl and Wetlands Research Station in Canada beginning in 1948. Arthur Witt, Jr. worked in Thailand as an inland fisheries expert to their government in 1964-65, supported by the United Nations Forestry Advisement Organization. In 1965, A. J. Nash, on leave for two years, served on the UN/FAO staff in India to educate forester specialists in modern methods of organizing a national forest inventory and in analyzing data.

Since 1970, participation in international programs has been limited to: meetings of organizations, symposia or advisory trips for other governments, all having international perspectives and participation; faculty research; and training students from other countries.

Faculty have attended various symposia, seminars and other meetings in foreign countries (Argentina, Austria, China, Egypt, England, Finland, Germany, Japan, New Zealand, Portugal, Spain, Sweden, and Tunisia) as opportunities arose.

A. J. Nash served as a consultant to forestry development projects in Surinam and Brazil. The school received a contract from UN/FAO to undertake a forest inventory and computer program in 1972 in Surinam. As a result of a fact-finding mission to the state of Para, Brazil, in 1970 by Nash and staff members from the University of Missouri-Rolla, a contract was approved by USAID in 1975 for a three-week seminar on forest inventory methods to be given in Belem, Para. Recently, three faculty members traveled to Costa Rica to participate in expanding relationships in research opportunities between the College of Agriculture and a Central American Consortium of agriculture and natural resources groups.

John Jones went to Nepal twice in 1986 to teach the Nepalese water quality analyses so they could conduct a nationwide inventory of water resources for purposes of fishery development. Limnological characteristics of some 50 water bodies in central and southern Nepal were assessed. In two 1987 trips, he determined whether thermally stratified zones have enough oxygen to support fish and how the plankton peak develops.

Leigh Fredrickson served as senior scientist at Hallett Station, Antarctica, during November 1970. He carries on waterfowl and

wetland research with the Delta Station in Canada and has projects in Alaska and Hawaii.

The third aspect of international program participation is the training of students from other countries. From 1970 to 1976, more than 100 undergraduate students, 14 graduate students and 6 post-doctorals received forestry education here. In the 1950s, most foreign students came from India, Pakistan and Thailand. Then Taiwan sent numerous students, most at the graduate level. African nations, notably Nigeria, Ghana and Liberia, followed, with smaller numbers from Asian countries. The number of foreign students has declined since about 1980, but a few are in residence each year. In fisheries and wildlife, 10 foreign students have earned advanced degrees; they were from Africa, Brazil, China and Thailand.

## The Advisory Council

The Advisory Council had its origin in 1951 as the forestry subcommittee of the College of Agriculture Advisory Council. Upon recommendation of the subcommittee, an independent forestry advisory council was established in 1958. Representing various fields of forestry related business and land management, a broad-based citizen group of 59 members was formed to counsel the school in its teaching, research and extension programs and to acquaint individuals, organizations and legislators with the needs of the School. Ex-officio members represented public agencies; the director of the school functioned as Secretary.

Under the constitution and bylaws, officers were elected and members selected affiliation with one of five working groups: arboriculture, land management, manufacturing, recreation and sales. A development committee was added in 1963 to encourage financial support of the school. At first, each working group held an annual spring meeting, and the entire council met in the autumn. Later, working group meetings were replaced by a meeting of the executive committee, consisting of officers and the chair of each working group.

This arrangement worked satisfactorily. The council met annually, frequently beginning the meeting with a field trip at a location concerned with natural resources. This was followed by an indoor meeting with a luncheon and featured speaker. Meetings usually were scheduled so that members could attend a football game the following day. Membership since 1970 has varied between 75 and 85 as knowledgeable persons were found and became interested and as others completed a term of service.

In 1971, after reviewing the objectives and organization, the executive committee concluded that an arrangement other than working groups could better reflect the primary mission of the school. Accordingly, the working groups were replaced by standing committees: extension

and continuing education, international programs, research and graduate education, undergraduate education and development. Several years later, the international programs committee was included under extension and continuing education. Standing committees meet at least once each year, ordinarily as part of the annual council meeting.

After the School of Forestry, Fisheries and Wildlife was formed in 1973, members with interests in fisheries and wildlife were added to the council. At present, about 20 percent of the council membership represents fisheries and wildlife.

Meetings continue with the same general format, a field trip followed by a formal meeting. Frequently, faculty members reported on significant research achievements, trips to meetings or proposed curriculum changes, and the director made an annual report. Discussion in the standing committees often resulted in recommendations to the director. Featured speakers at the luncheons included University administrators, legislators, state officials and prominent conservation leaders.

It is difficult to assess the contributions and accomplishments of the council. First and possibly the most significant is the countless hours of deliberation, thought and advice offered by council members, in addition to the time sacrificed from job or business, travel expense and gifts to the school. Indeed, the school is without doubt better because of their understanding and friendship. Five areas in which the council has contributed significantly are given below.

The council assisted at critical times in securing passage of the McIntire-Stennis Act (1962), under which federal funds support research and graduate education at forestry schools in the United States, by influencing key members of Congress as to the need and benefits of the legislation.

In curriculum development, the council assisted with several major revisions, including the present ones: forest management, recreational forestry, forest science and specialization, wood products and fisheries and wildlife. In particular, we have relied on their advice concerning the wood products curriculum.

They have helped guide the direction of the school following six periodic program reviews by the Society of American Foresters and the Cooperative State Research Service, USDA. At least one council member has served as a member of a review team.

In continuing education, they have been instrumental in suggesting program topics and speakers for short courses that have covered almost every major area related to natural resources.

During the past 25 years, about a million dollars in gifts have been received by the school. Gifts have come from students, alumni, faculty, business firms, foundations, clubs and associations and friends. Some gifts are specifically restricted to certain uses, others are for general purposes. The sustained drive and innovative effort in promoting gift

giving has been provided by the development committee, and gifts of council members have been generous. They have often funded worthwhile activities for which no other source was available. The school is indeed indebted to the council.

## Program Reviews

In 1971, 1980 and 1986, three reviews of the forest management and recreational forestry programs have been made for accreditation by the Society of American Foresters.

A comprehensive program review (all programs) was made by representatives of the Cooperative State Research Service, USDA, in 1976, and a review of the Fisheries and Wildlife programs was made by CSRS representatives in 1982. In 1984, a comprehensive review of the forestry program was completed by the Cooperative State Research Service, USDA, representatives of two UMC departments and of other forestry schools.

Each review had a similar format. The director and faculty prepared a self-evaluation report containing information about the University, the facilities, the teaching, research and extension programs of the School and faculty qualifications and productivity. The report along with other information was sent to the members of the review team, four to seven in number, prior to their visit to the campus. During the campus visit, facilities were examined and meetings were arranged with faculty, students, alumni, representatives of supporting departments and administrators. Based on observation and discussion and team members' knowledge of other comparable institutions, a preliminary oral report was made at the end of the team's visit. This was followed by a more complete written report. Evaluations have consistently pointed out commendable accomplishments and strengths along with weaknesses and deficiencies.

The Society of American Foresters visiting team in 1971 recommended reaccreditation of the program. They noted positive aspects of the parent institution, relative autonomy of the school, quality of advising and the close relationship of students and faculty.

They found the undergraduate curriculum to be inflexible, with a lack of programs for exceptional students. It was suggested that inadequate attention was given to the quantitative aspects of forest management. Classroom, office and laboratory facilities were rated as inadequate, and a thorough review of space needs was suggested. The team was critical of limitations on faculty travel and sabbatical leave policies.

The report of the comprehensive review team based on a visit to the campus in December 1976 was critical but constructive. They found an attitude of respect and affection among students and instructors. The



faculty was considered well qualified to advise graduate students, and numerous opportunities existed for students to work on current problems with state and federal agencies. The team recognized the school's excellent reputation for research and graduate education in fisheries and wildlife.

Numerous suggestions for strengthening programs were offered. An opportunity exists, they reported, for integrating undergraduate education programs, offering more quantitative science and a capstone course for seniors. Student-professor contacts should be expanded along with opportunities for students to gain field experience and participate in school governance. A serious understaffing in fisheries and wildlife was noted, both at undergraduate and graduate levels. Additional graduate courses are needed along with more interaction between students and faculty.

Extension efforts should be fully coordinated with similar activities of public agencies, the team said. Applied research and demonstrations could be expanded by part-time appointments of faculty engaged in research.

The use of team approaches in research should be encouraged, and research should be coordinated with the Missouri Department of Conservation program, Design for Conservation. Suggestions were made to set priorities and concentrate efforts on certain areas of investigation.

In 1980, a Society of American Forsters team representing the committee on accreditation, visited the campus to review the forest management and recreational forestry programs. Both programs were reaccredited, but another review in five years was recommended to determine whether sufficient progress in eliminating deficiencies had been achieved.

The team was complimentary concerning the institution, students, alumni and advisory council. The diversity and breadth of experience of faculty were noted as well as the number of aggressive research projects. Greater use of sabbaticals was recommended, as was the development of means of improving instructional skills.

Reviewers noted that the curricula were heavily oriented toward bio-physical sciences and somewhat lacking in social and behavioral sciences that would expose students to political processes, public finance, decision-making and public opinion polls. New faculty positions in these areas were recommended for consideration. Funding of the program was rated as modest and physical facilities as poor.

A review of the fisheries and wildlife program was conducted by a team sponsored by the Cooperative State Research Service, USDA, in 1982. It was found that substantial progress had been achieved in creating a holistic approach to research, and that focusing diverse disciplines on a common problem should be continued and expanded.

The small extension program could reach a large audience by working through field personnel of the Department of Conservation. Other sectors of the public could be reached by offering mini-courses.

The education program, it concluded, was served by a small over-worked faculty, but opportunities for some relief exist by using the talents of numerous agency cooperators in the Columbia area. A reassessment of course offerings was needed, increasing the use of a systems approach to resource management and offering integrating courses. Facilities needs were noted as a key concern of the review team.

A special review of the forestry program was made in 1984 by a team composed of two forestry school executives, two faculty members of supporting UMC departments, an extension forestry administrator and a USDA research administrator.

As observed in previous reviews, facilities were found to be crowded and dispersed and faculty salaries low. The research program was considered strong but heavily oriented to ecophysiology. Strengthening of research in wood products, marketing, economics of management and wood science was recommended. Greater support of research from grants and contracts was encouraged.

The extension program, though small, was considered to be excellent. Several suggestions were made to disseminate information more effectively. The undergraduate program was commended for its national reputation, but inadequate attention to management, economics and public policy were observed. The team commended the quality of students and the productivity of graduate students and faculty.

The most recent review was made by a SAF team early in 1986. The team was asked to evaluate the forest management and recreational forestry program with respect to SAF standards for accreditation. As in previous reviews, similar opportunities for improvement were found: poor quality of physical facilities, a need to broaden the curriculum and establish a process for evaluating teaching effectiveness. The team reported a number of strengths, including a faculty dedicated to undergraduate teaching, a bright and enthusiastic student body, supportive administration, alumni and advisory council. Accreditation by the Society of American Foresters was continued.

## Goals and Objectives

Beginning in 1970, the director has prepared a statement of goals and objectives for the following five years covering the missions in extension, research and teaching. The actions required to achieve goals in these three areas to fulfill needs of the state in education inevitably depend on funding. Although substantial progress has been made during each five-year period, achievements have fallen short of stated goals. Inadequate funding has had a telling effect.

It seems almost ludicrous that the total budget for 1947-48 was \$46,000, but salaries then were modest and equipment and facility needs were relatively simple. Funding steadily progressed to \$608,000 in 1970-71, with most of the increases representing added support for research. The extension budget was small, a one-man program.

Total funding grew to \$1 million in 1974-75 and continued to rise to slightly more than \$2 million in 1980-81. Funding continued at approximately that level for four years, increasing to about \$2.4 million in 1985-86 and the following year.

The composition, however, has changed greatly. State support for higher education has suffered repeated reductions, and research appropriations have dwindled. Only federal appropriations through the Renewable Resources Extension Act have been sufficiently large to expand the extension program. Replacements have come from substantial increases in research grants and contracts and gifts to the School from numerous sources. If the effects of price inflation are considered, total funding has seriously declined during the last 12 years.

The most recent goals and objectives statement is titled *Five-Year Planning Report, January 1987-January 1992*. In the report, it is recognized that budget reductions and other fiscal problems first must be addressed. But an intensive development program will be attempted to (1) construct a modern building to house all programs and cooperators (2) endow three professorships, (3) secure a significant scholarship endowment to promote student excellence. A second approach will be to increase cooperation with outside agencies to more efficiently use available funds, and a third strategy will use development funds and grants to attract matching support from the University.

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Table 1. Undergraduate Enrollment, fall semesters,  
1970-1986.

Academic Year	Forestry	Fisheries and Wildlife	Total
1970	260	162*	422
1971	315	185*	400
1972	401	200*	601
1973	431	200	631
1974	432	315	747
1975	406	368	774
1976	362	356	718
1977	351	317	668
1978	319	273	592
1979	243	216	459
1980	227	193	420
1981	195	175	370
1982	164	156	320
1983	141	151	292
1984	130	139	269
1985	121	138	259
1986	113	118	231

\*Estimated

Table 2. Faculty, 1970-1987

Name		Initial Rank	Promotions	Reason for Separation
		Forestry		
Ruthford H. Westveld	1936-1938	Asst. Prof.		Resigned
	1947-1969	Professor	Director	Retired
	1985			Died
Richard C. Smith	1947-1982	Asst. Prof.	Assoc. Prof. Prof., Asst. Director	Retired
J. Milford Nichols	1948-1979	Field Forester	Asst. Prof. Assoc. Prof.	Retired
R. Brooks Polk	1949-1980	Instructor	Asst. Prof. Assoc. Prof.	Retired
Lee K. Paulsell	1949-1951	Instructor		Resigned
	1953-1987	Asst. Prof.	Assoc. Prof. Professor	Retired
Andrew J. Nash	1955-1984	Asst. Prof.	Assoc. Prof. Professor	Retired
Ralph A. Musbach	1956	Instr.	Asst. Prof. Assoc. Prof.	
Kenneth E. Moore	1957-1976	Instr.	Asst. Prof. Assoc. Prof.	Retired
Carl D. Settergren	1960	Instr.	Asst. Prof. Assoc. Prof. Prof.	
Gene S. Cox	1960	Assoc. Prof.	Prof. Acting Director Assoc. Director	

E. Allen McGinnes, Jr.	1960	Assoc. Prof.	Prof.	
James P. Pastoret	1961	Asst. Prof.	Assoc. Prof.	
Albert R. Vogt	1961-1966	Asst. Instr.		Resigned
	1985	Prof. & Director		
Donald P. Duncan	1965-1985	Prof. & Director		Retired
Gregory N. Brown	1966-1977	Asst. Prof.	Assoc. Prof.	
			Prof.	Resigned
Miles C. Brown	1966-1979	Asst. Prof. and Ext. Spec.		Resigned
Kent T. Adair	1967-1977	Asst. Prof.	Assoc. Prof.	Resigned
			Prof.	
F. Glenn Goff	1967-1970	Asst. Prof.		Resigned
Kenton B. Downing	1967-1973	Instr.		Resigned
Edwin Y. Wheeler	1967-1972	Asst. Prof. & Ext. Wood Tech.	Assoc. Prof.	Resigned
Kenneth C. Chilman	1968-1973	Asst. Prof.		Resigned
Merton F. Brown	1969	Asst. Prof.	Assoc. Prof.	
joint appt., Plant Pathology			Prof.	
John P. Slusher	1969	Asst. Prof. & Ext. Forester	Assoc. Prof.	
			Prof.	
William H. Kearby	1969-1980	Asst. Prof.	Assoc. Prof.	Resigned
joint appt., Entomology				
Thomas M. Hinckley	1971-1979	Asst. Prof.	Assoc. Prof.	Resigned
Hardeep S. Bhullar	1972	Asst. Prof.	Assoc. Prof.	
joint appt., Recreation & Parks Admin.				
Larry C. Tennyson	1974-1977	Instr.		Resigned
Phillip E. Graf	1974-1978	Instr.		Resigned

Table 2. Faculty, 1970-1987 (continued)

Name	First Appointment	Initial Rank	Promotions	Reason
Forestry (continued)				
H. Eugene Garrett	1975	Assoc. Prof.	Prof. Asst. Director	
Mark Lapping	1975-1976	Assoc. Prof.		Resigned
William B. Kurtz	1975	Assoc. Prof.	Prof.	
Roy C. Hengerson	1976-1979	Instr.		Resigned
Alan R. Everson	1977	Assoc. Prof.		
Gray S. Henderson	1978	Assoc. Prof.	Prof.	
Milon F. George	1978	Asst. Prof.	Assoc. Prof.	
Bruce E. Cutter	1978	Instr.	Asst. Prof. Assoc. Prof.	
R. Michael Nugent	1979-1981	Instr.		Resigned
Robert M. Shaffer	1979-1982	Instr.		Resigned
Stephen G. Pallardy	1980	Asst. Prof.	Assoc. Prof.	
Marc J. Linit	1980	Asst. Prof.		
joint appt., Entomology				
John P. Dwyer	1983	Instr.		
Carol B. Trokey	1983	Forestry Ext. Asst.		
Kim E. Lowell	1984	Asst. Prof.		
Fisheries and Wildlife				
Robert S. Campbell	Z* 1944-1978	Asst. Prof.	Assoc. Prof. Prof.	Retired



William H. Elder	Z	1945-1984	Asst. Prof.	Assoc. Prof. Prof.	Retired
Thomas S. Baskett	F**	1948-1968	Leader, WRU Asst. Prof.	Assoc. Prof.	Transferred
		1973-1987	Leader, WRU Prof.		Retired
Arthur Witt, Jr.	Z	1952-1983	Asst. Prof.	Assoc. Prof. Prof. Asst. Director	Retired
Richard O. Anderson	F	1963-1985	Leader, FRU Asst. Prof.	Assoc. Prof.	Transferred
Daniel W. Coble	F	1967-1971	Asst. Leader FRU Asst. Prof.		Transferred
Leigh Fredrickson	Z	1967	Asst. Prof., Dir. Gaylord Memorial Lab	Assoc. Prof. Prof.	
W. Reid Goforth	F	1968-1973	Leader WRU Asst. Prof.		Transferred
Rollin D. Sparrowe	F	1969-1976	Asst. Leader WRU Asst. Prof.		Transferred
James B. Reynolds	F	1972-1978	Asst. Leader, FRU Asst. Prof.		Transferred
John R. Jones		1975	Asst. Prof.	Assoc. Prof. Prof.	
Fred B. Samson	F	1976-1980	Asst. Leader, WRU Asst. Prof.	Assoc. Prof.	Transferred
William B. Taylor		1978-1980	Asst. Prof.		Resigned

Table 2. Faculty, 1970-1987 (continued)

Name		First Appointment	Initial Rank	Promotions	Reason
Fisheries and Wildlife (continued)					
Erik K. Fritzell		1978	Asst. Prof.	Assoc. Prof. Asst. Director	
Charles F. Rabeni	F	1979	Asst. Leader FRU Asst. Prof.		
		1985	Leader F&W RU	Assoc. Prof.	
Terry R. Finger		1980-1987	Asst. Prof.		Resigned
Thomas G. Coon		1983	Asst. Prof.		
Ernie P. Wiggers		1983	Res. Assoc.	Asst. Prof.	
Frank R. Thompson		1983	Res. Assoc.	Res. Investigator	
Joseph G. Dillard		1983-1985	Fisheries Ext. Spec.		Resigned
		joint appt., MO Dept. of Conservation			
Mark R. Ryan		1984	Asst. Prof.		
Deretha A. Freiling		1985	Fisheries & Wildlife Ext. Spec.		
Ronald D. Drobney	F	1986	Asst. Leader F&W RU Assoc. Prof.		

\*Z - Dept. of Zoology, later Div. of Biological Sciences, College of Arts & Science, then FFW

\*\*F - Federal employee, U.S. Bureau of Biological Survey, later U.S. Bu. Sport Fisheries and Wildlife, now Fish and Wildlife Service

Table 3. Undergraduate Curricula Adopted 1973  
in credit hours

Curriculum	General Education Core*	Professional Core	Required Courses	Free Electives	Total
Forest Management	57	11	53-54	13-14	135
Urban and Recreational Forestry	57	11	40-43	19-22	130
Forest Science and Specialization	57	11	40	22	130
Wood Products Area specialization	57	11	21 26	15	130
Fisheries & Wildlife	57		43-44	24-25	125

\*communications 9, mathematics 9, natural sciences 21, social sciences and humanities 18.

Table 4. Undergraduate Curricula, 1987  
in credit hours

Curriculum	General Education Core	Required Courses	Free Electives	Total
Forest Management	60	52-53	19-20	135
Recreational Forestry	63	59	13	135
Forest Science and Specialization	63	57	10	130
Wood Products	60	51	19	130
Fisheries & Wildlife	62	44-45	18-19	125

Table 5. Baccalaureate degrees granted, by curriculum, 1970-1986

Year of Completion <sup>1</sup>	Forest Management	Wood Products	Recreational Forestry	Forest Science, Specialization	Fisheries and Wildlife <sup>2</sup>	Total
1970	49	3	0	0	—	52 <sup>3</sup>
1971	48	9	0	0	—	57
1972	49	3	0	0	—	52
1973	38	2	0	0	—	40
1974	87	6	0	1	38	132
1975	77	5	0	2	50	134
1976	76	7	5	1	59	148
1977	60	10	7	0	66	143
1978	52	5	4	3	51	115
1979	56	10	2	2	48	118
1980	32	11	3	1	47	94
1981	46	8	4	2	53	113
1982	40	15	3	1	31	90
1983	30	6	4	3	28	101
1984	19	7	1	1	30	58
1985	12	6	0	1	28	47
1986	20	4	3	1	39	67
Total	791	117	36	19	568	1531

<sup>1</sup>Total graduates in May, August and December of each year

<sup>2</sup>Degrees recorded in Arts and Science and in Agriculture, 1970-1973

<sup>3</sup>Includes 17 graduates who actually received degree in January 1971: University calendar changed

Table 6. Graduate degrees awarded, 1970-1986

Year	Forestry		Fisheries		Wildlife		Total	
	Master	Doctor	Master	Doctor	Master	Doctor	Master	Doctor
1970	13	1	4		3		20	1
1971	12	1	5	1	4		21	2
1972	10	1	2		5		17	1
1973	4	4	3		5	1	12	5
1974	5	3	3		7		15	3
1975	8		4	1	3		15	1
1976	8	2	3	2	7	1	18	5
1977	3	4	5		6	1	14	5
1978	6		6	1	5		17	1
1979	7	1	6		5		18	1
1980	13	2	6	1	5	1	24	4
1981	11	2	5		1	1	17	3
1982	8	2	2		9	1	19	3
1983	10	3	7	1	9	1	26	5
1984	6	4	4	1	1		11	5
1985	1	1	3	1	3	2	7	4
1986	6	1	1		5	1	12	2
Total	131	32	69	9	83	10	283	51

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