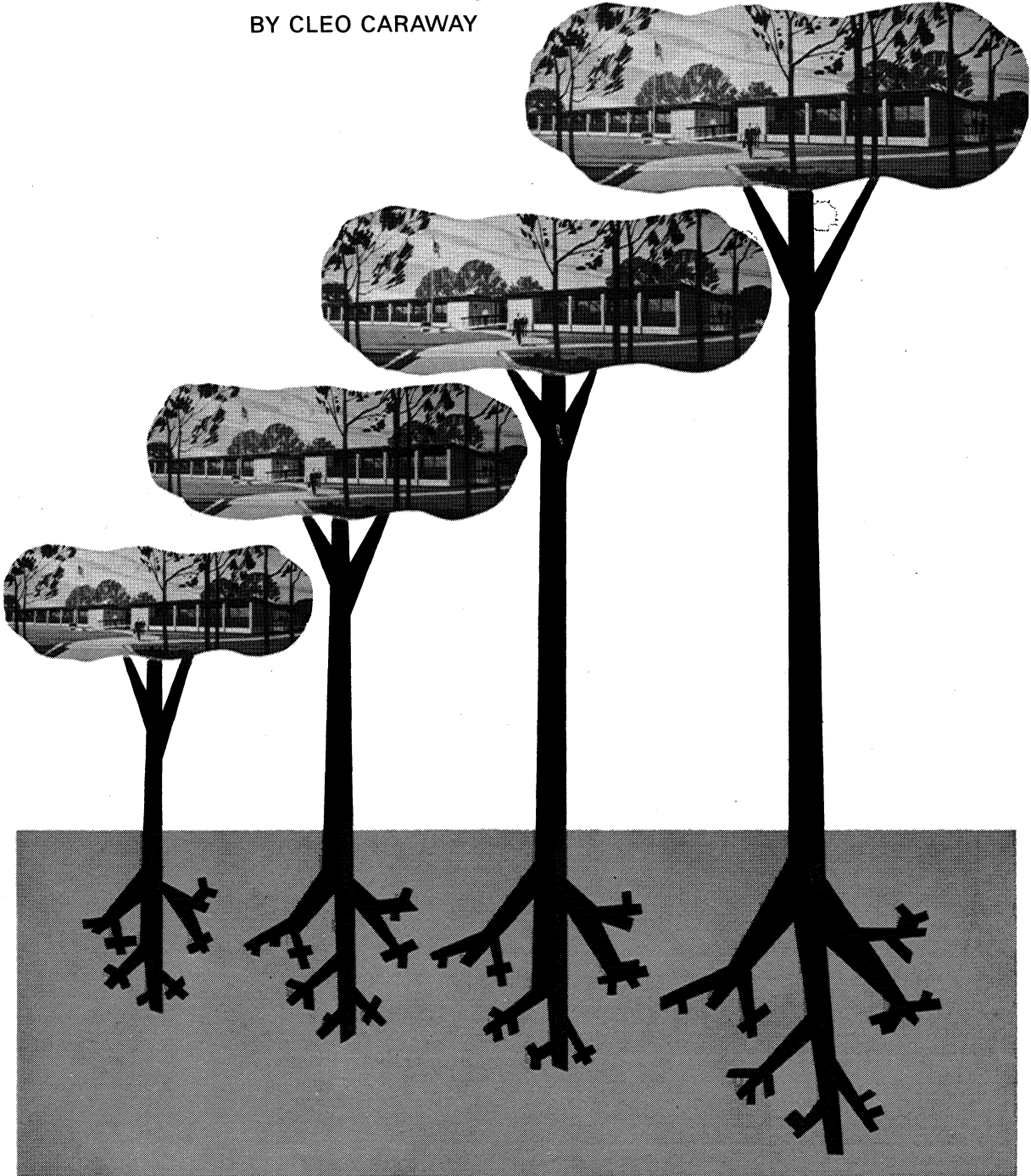


A FORESTRY SCIENCES LABORATORY ...and how it grew

JWS

BY CLEO CARAWAY



NORTH CENTRAL FOREST EXPERIMENT STATION
FOREST SERVICE U.S. DEPARTMENT OF AGRICULTURE

DEDICATION

To Dr. Delyte W. Morris, President of Southern Illinois University from 1948 to 1970, who worked vigorously and effectively with a succession of forest research administrators at Carbondale and left a legacy of cooperation that extends today to some 30 units throughout the University structure.



Donald H. Gott, American Walnut Manufacturers' Association; President Morris; C. D. Dosker, Gamble Brothers; and Richard D. Lane, Director, Central States Forest Experiment Station, at a major utilization conference jointly sponsored by Southern Illinois University and the Central States Station at SIU June 25-26, 1963.

**North Central Forest Experiment Station
John H. Ohman, Director
Forest Service—U. S. Department of Agriculture
Folwell Avenue
St. Paul, Minnesota 55108
1976**

THE AUTHOR

Cleo Caraway has served since September 1946 with the USDA Forest Service's Research Laboratory in Carbondale, Illinois. Her current assignment is Secretary in the Hardwood Processing Research Work Unit. An interest in literature and poetry provides her with a unique background for her own creative writing and for aiding staff scientists. In the recent past Cleo has co-authored a technical publication, and she is now published in the creative field also. She is a member of The National Society of Published Poets and of its affiliate member, the Illinois Society of Poets. She is a native of southern Illinois and has attended Southern Illinois University at Carbondale. In 1973 she received a USDA Superior Service Honor Award.



Cleo Caraway

ACKNOWLEDGMENT

It has been my privilege, during my career in the Forest Service, to serve as Secretary to several outstanding research administrators. They, along with my other colleagues—professionals, technicians, secretaries, clerks, and intermittent and part-time employees alike—have all had important roles in the development of a unique research organization dedicated to the perpetuation of a dynamic resource, the forests of these United States. I, as the only remaining member of the original staff of the Carbondale, Illinois, Forest Service field office, have attempted to record here how our unit grew from a rather austere, one-room office in the upstairs of the Old Post Office building in downtown Carbondale to a beautiful new Forestry Sciences Laboratory located in a scenic spot at the edge of Thompson Woods on the campus of Southern Illinois University at Carbondale.

I want to acknowledge here the contributions of early researchers from the old Central States Forest Experiment Station headquarters at Columbus, Ohio, and of the first two researchers assigned to Carbondale, Leon S. Minckler and Richard D. Lane, whose reports and analyses were invaluable aids. I want to express my appreciation to Robert W. Merz, who first entrusted me with the history assignment, and to Eugene F. Landt, who encouraged me to seek publication. I cannot forget the personal recollections (which added many an interesting sidelight) of “oldtimers,” especially those of Elbert Rendleman, who joined the staff in 1952 and is the only staff member still located at the unit’s Kaskaskia Experimental Forest. And credit should also be given to Albert F. Meyer, now retired from the University News Service, whose excellent photographic work is displayed throughout the history.

CONTENTS

	Page
Historical Background.	3
The Kaskaskia Experimental Forest—How it Got Started.	6
A New Field Center for Research at Carbondale.	12
A Program of Research—How it Progressed.	15
Cooperation—The Key to Growth.	25
A New Forest Service Structure—How the Carbondale Research Center Bridged the Gap.	44
Permanent Quarters.	46
New Project Missions.	51
A State & Private Forestry Field Office at Carbondale—A New Dimension.	63
A Look at Old Values in the Light of New Needs—A Catalyst for Change at Carbondale.	65
Summary.	69
Conclusion.	74
Selected References.	75

A FORESTRY SCIENCES LABORATORY— And How It Grew

Cleo Caraway

For many years a pig of iron with the word “LILLY” in raised letters on the surface was displayed at the headquarters of the Kaskaskia Experimental Forest about ten miles north of Elizabethtown, Illinois, in Hardin County. This pig, since donated to the Smithsonian Institute, was cast in the Illinois Iron Furnace (the first iron furnace in the State), which was operated in this area before and after the Civil War to smelt iron ore. The furnace was built in 1837 by Charlon Guard & Company of Indiana adjacent to the present south boundary of the Experimental Forest and began operation in 1839. According to local reports, the furnace was never a financial success. Apparently it was owned by different companies throughout its active life, including C. Wolfe & Company of Cincinnati, Ohio, and J. O. D. Lilly & Company, which incorporated it under the name of “Illinois Furnace” at Indianapolis, Indiana, in 1876.

The furnace was last operated by Lilly & Company for 3 years in the 1880's. Molten iron drawn from the furnace was allowed to run through a sand-lined trench into a casting shed, a frame building about 100 feet long and 30 feet wide. The shed floor was covered with fine sand, and the molds for the iron were dug into the sand to form “pigs.” Fuel for smelting the ore to produce the iron was charcoal made from trees in the area. Traces of charcoal deposits marking wood-burning sites have been uncovered while making log skid trails at the Experimental Forest. Christopher Conkle, a nearby farmer who worked at the Forest until 1958, recalled that about 1850 his father and grandfather cut wood in this area to make charcoal for the furnace. The forests have now grown back and, except for the old furnace, which has been restored at its original site near the juncture of Hogthief and Big Creeks in Hardin County, all evidence of this industry has disappeared (figs. 1 and 2).

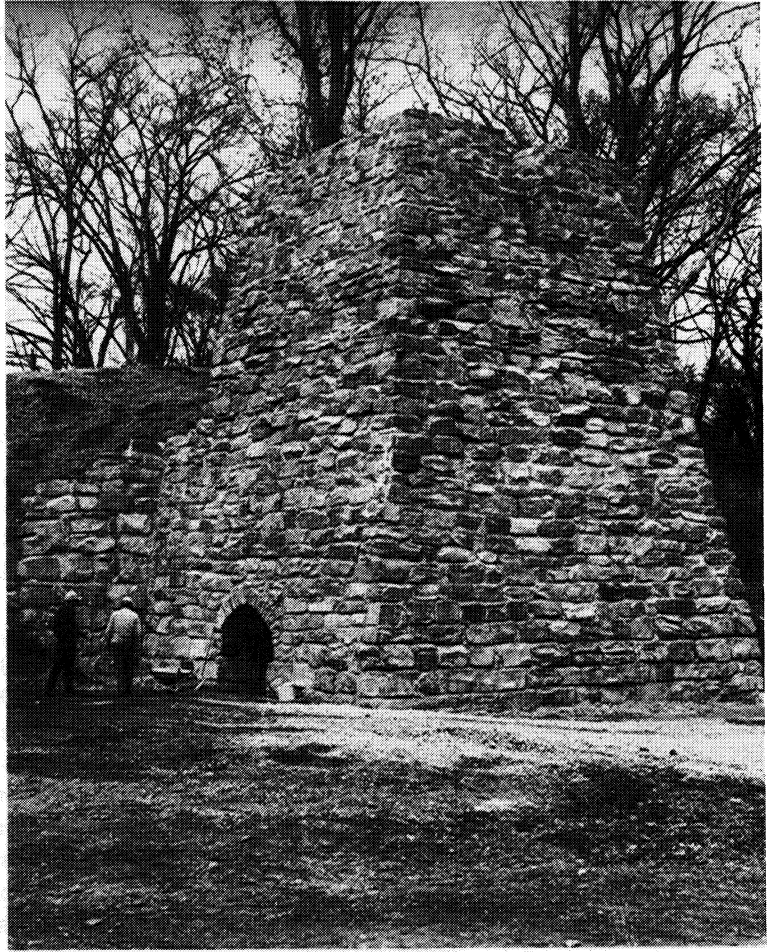
Figure 1. The remains of the Illinois Iron Furnace, about 1960 (photograph courtesy Shawnee National Forest).



This bit of history illustrates the basic difference between two important natural resources—the irreplaceable iron ore that was mined and smelted until the resource was exhausted or no longer profitable to exploit, and the dynamic wood resource that was cut and processed into charcoal to smelt the ore and has in the interim grown back. It was to learn how to better manage the wood resource for the future that the Carbondale Research Center and the Kaskaskia Experimental Forest were established.

The purpose of this report is to bring together items and events of historical significance regarding the Carbondale Center; its establishment; the subsequent years of organization and expansion; and, finally, the development of a comprehensive program encompassing silvicultural, genetic, protection, processing, and marketing research.

Figure 2. The restored Illinois Iron Furnace, November 1967. The restoration was completed in September 1966 by Job Corpsmen from the Golconda (Illinois) Civilian Conservation Center (photograph courtesy Shawnee National Forest).



HISTORICAL BACKGROUND

Early Settlement and Agricultural Development

Hardwood forests originally covered large areas in the southern third of Illinois and nearby regions in Indiana, Kentucky, and Missouri. The extreme northern end of Illinois and wide belts along the Mississippi and Illinois Rivers were also forested. Probably the finest hardwood timber in North America grew in bottomlands along the Ohio and Wabash Rivers. The whole west-central part of the State was tall-grass prairie with fingers of timber along the streams and in swampy areas.

Early settlers preferred the forested land of Illinois for settlement. They avoided the prairie because of a conviction that nonforested land was poor soil. This resulted in rapid clearing and settling in the southern part of the State and along secondary

streams, bottoms, and wooded uplands. The nearness of southern Illinois to the two large rivers also contributed to the early settlement and soil exploitation of that region.

Hardin County, Illinois, was settled in 1805 by emigrants from North Carolina who cleared little patches of land along the Ohio River where they raised vegetables and grain to supplement their diet of fish and game. Through the 19th and the early part of the 20th centuries, pioneers, who settled there and elsewhere in the hills of southern Illinois, western Kentucky, southwestern Indiana, and southeastern Missouri, were able to maintain a fairly prosperous living from the products grown on land that was cleared of forests.

The task of clearing was formidable because the most desirable land was covered with the largest trees. Stems 4 to 6 feet in diameter were common along the streams. White oak, red oak, white ash, black walnut, hickory, and yellow-poplar grew in the valleys and on north slopes; black oak, scarlet oak, post oak, hickory, and blackgum grew on the ridges and south slopes.

The period of most active farm development in this area was from the time of the Civil War to about 1890. The trend was toward large farms containing up to 700 acres. A cash market for potatoes was developed soon after the Civil War. The potatoes, which grew well on the newly cleared land, were harvested and hauled to the Mississippi River by ox team, loaded on flatboats, and floated to New Orleans. Only a few crops were raised after logging before erosion removed the loose upper soil. This market began to decline about 1877 and was gone by 1885 as the southern States, particularly Alabama and Mississippi, began to produce potatoes. Farmers, forced to seek another cash crop, chose wheat.

Wheat yields, good at first, became poor when continuous cropping and erosion depleted the soil. Fields were divided with changes in ownership and the soil became poorer and poorer until farming was reduced to subsistence levels. A livestock grazing act passed by the Illinois State Legislature in 1895 eliminated the easy convenience of allowing animals to run at large and increased the necessity of feeding. So as wheat yields declined and competition with Kansas wheat became too great, farmers began to grow more corn. This third type of nonrotation cropping was the final step in depleting the soil on many farms. Fields that once yielded 40 bushels of corn per acre eventually grew only 15 to 25 bushels.

Grain growing gave way to pasturing. The overcut woods became poor pasture and abandoned fields grew up in brush. The farmers began burning the woods and brush "to make the grass better and to kill ticks and snakes." This period, in the early 1900's,

was one of migration from the farm to other occupations. However, the depression of 1929 forced many families to return to the land and attempt to reclaim the abandoned farms.

Forest Exploitation

Clearing the land for farming accounted for most of the earliest cutting on ridges and stream bottoms alike within and adjacent to the present boundaries of the Kaskaskia Experimental Forest. Other cutting was to obtain wood for the construction of farm buildings, for fuel, and for operation of the Illinois Iron Furnace.

Commercial cutting of wood coincided with the limited requirements of the Illinois Furnace and the need for farmers to supplement their increasingly meager incomes with salable forest products. After the close of the pig iron industry, there was no further commercial demand until about 1890 when the stave-making industry came into the region. At that time, staves were "rived" by hand from the best white oak trees. The price paid to landowners averaged \$1.00 per tree. At first, cutting for staves was limited to a stand here and there.

Soon after the stave industry got underway, a few portable sawmills were brought into the community. Their first activity was sawing lumber for frame buildings. The practice was to move the mills from farm to farm. Soon the mills were exporting their best lumber. In the beginning, they sawed nothing but yellow-poplar, and only logs that were entirely free of knots. Reportedly, some of these poplars were 5 feet in diameter at the stump with a clear length of 60 feet.

The livestock law stimulated an era of fence building on the local farms, beginning in 1895; for this purpose a great deal of white, red, and black oak was made into rails.

In 1905 there was a new market for timber. Railway companies sent in buyers seeking tie material. Again, the demand was for white oak, and the remaining woods were scoured for trees suitable for railroad ties.

With the advent of tie-making, and competing with it, came a revival in stave manufacture, this time using stave saws. The two operations used up most of the remaining merchantable white oak. The sawmills wanted to saw some of this oak into lumber but were forced, when the poplar was gone, to depend chiefly on red and black oak. The best trees were cut, and few good trees were left except on inaccessible rocky hills and in narrow fringes along the streams.

Tie-making and lumber manufacturing continued intermittently; most of the timberland was cut over again and again until valuable oaks, ash, walnut, and yellow-poplar of commercial size all but disappeared. Activity was checked by the 1929 depression but was revived in 1936 and 1937 in the form of demand for mine timbers, hewn ties, farm lumber, and staves (fig. 3). The logging of black walnut was more sporadic than that of other important species but equally thorough. There was a demand for walnut gunstocks during the Civil War, the Spanish-American War, and again during World War I. A few years after World War I black walnut stumps were bought and removed for veneer. Although there was some demand for hickory, it was not as persistent and widespread as that for other timber species so some good commercial hickory was left uncut.

Figure 3. Bucking white oak into 38-inch stove bolts on the Shawnee National Forest (Hamilton Mayberry Timber Sales) February 10, 1939.



THE KASKASKIA EXPERIMENTAL FOREST— HOW IT GOT STARTED

The time of settlement and kind of crops varied somewhat; but the same general land-use pattern, as just described for Hardin County, occurred throughout the uplands of southern Illinois, western Kentucky, southwestern Indiana, and southeastern Missouri (fig. 4). The unproductive land, both cleared and uncleared, could not be reclaimed without public assistance. Research was needed to find practical methods to get the job done.

Forest research had long been an important activity of the Forest Service and other Federal agencies. Work in that field was greatly

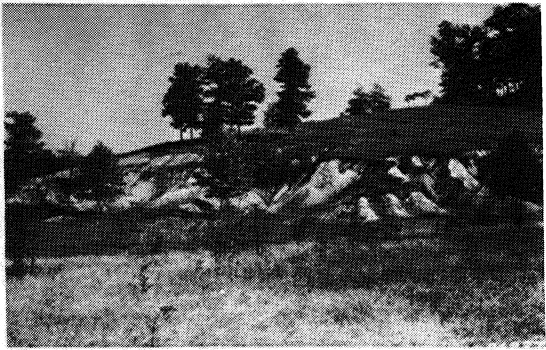


Figure 4. (Left) An ungrazed oak-hickory woodlot in McLean County, Illinois, in June 1928; and (Right) eroded, abandoned land cleared for grazing near Martinsville, Indiana (Morgan County), in 1931.

strengthened in the early 1900's. Regional forest experiment stations were established (from 1908 on) to conduct research in forest management, range management, forest and range economics, forest influences, and forest products; and the Forest Products Laboratory at Madison, Wisconsin, was established in 1910. The Branch of Research was organized in 1915 as a coordinate division of the Service with the same organizational status as administrative activities. Previously, forest research was conducted in part from the Washington Office, in part from the district (now regional) offices, and in part at the forest experiment stations. The passage of the McSweeney-McNary Act in 1928 authorized a comprehensive 10-year program of research in all phases of forestry and range management, including a nationwide forest survey.

In 1921 the first regional forest experiment station in the eastern United States was established with headquarters at Asheville, North Carolina (the first forest researcher assigned to Carbondale would come from this Station). Others soon followed. The Central States Forest Experiment Station was officially established in July 1927 with headquarters at Columbus, Ohio; and, after some changes in territorial boundaries, the Station became responsible for the Forest Service research program in Illinois and five other central States. Funds for the establishment of the eastern stations came largely as a result of the growing interest of private timberland owners in forestry.

A Congressional Act in March 1933 appropriated funds for the dual purpose of relieving unemployment and promoting conservation of natural resources. In addition to other activities it authorized use of the funds for forest research and for acquisition of land by purchase, donation, condemnation, or otherwise. An Executive Order of April 5 established the Office of Emergency

Conservation Work, which was popularly known as the Civilian Conservation Corps (CCC).

Late in 1933 emergency funds were allotted to the Central States Station for developing a field station in the newly established Shawnee National Forest purchase unit in southeastern Illinois (headquartered at Harrisburg, Illinois). After exploring the possibilities of this section thoroughly, a location was selected on Big Creek in Hardin County between Karber's Ridge and Elizabethtown; and thereby the "Southern Illinois Experimental Forest" was created through the purchase of privately owned, non-agricultural land in conjunction with the acquisition of similar land for National Forest uses. A 40-acre tract in Section 21, near the northeast corner of the experimental tract and a few miles south of Karber's Ridge, was purchased in 1934 for an administrative site. Mail could be brought to the Experimental Forest by rural delivery from Elizabethtown, Illinois; and freight and express offices were located at Rosiclare, about 14 miles away. A rural school was situated three-fourths of a mile from the headquarters site. Because no other land was acquired by the Forest Service during the 1934 to 1936 period when the Station's emergency funds were available for improvements, most of the work was confined to developing the field headquarters.

At a joint meeting, held in Chicago in March 1935, of the representatives of the Regional Office of the Forest Service at Milwaukee, Wisconsin, and the Central States Station, verbal agreement was reached on several details of organization and administration of the newly established experimental area. This was set down in a temporary Memorandum of Agreement in February 1936, in which the duties, obligations, and responsibilities of the two organizations, in connection with the administration, protection, and development of the area, were defined.

A labor force to carry on the improvements work at the Experimental Forest under the direction of representatives of the Experiment Station was one of the items of agreement. The Supervisor of the Shawnee National Forest was to furnish, for the duration of the Memorandum of Agreement or until the CCC was discontinued, a 27-man detail and 1 technical foreman from a nearby CCC camp on the National Forest. Whenever labor requirements were greater than the Corps could meet or when more skilled workers than the camp could supply were needed, a policy of engaging local men was to be followed.

Within the 1934 to 1936 period, with emergency funds and the labor detail from the CCC camp, it was possible to construct a five-room dwelling (fig. 5); an office building; a three-car garage and equipment building; a woodshed and tool house; a weather station;

Figure 5. The 5-room dwelling constructed at the Kaskaskia Experimental Forest for the Supervisor.



a water system; telephone communications (an old magneto-type telephone from this original installation was sent to the Communications Museum at the Forest Service Electronics Center in Beltsville, Maryland, on March 8, 1973); and grounds with drive-ways, stone walks, and retaining walls where necessary. During this period a ridge-top primary road system was planned in cooperation with the Shawnee National Forest. The roads were laid out and cleared. No grading or surfacing was done, but in dry weather most of these roads could be traveled by car. Claud E. Sutton, of the CCC, was hired as the first Superintendent in 1935. By 1936 approximately 1,000 acres of forest land had been acquired, surveyed, cruised, and mapped.

For several years the Station had been developing the Experimental Forest in southern Illinois under the informal agreement of February 1936. A joint decision had been made to submit a formal request for withdrawal of a larger area when sufficient land had been acquired to block out a suitable and representative tract. By 1938 approximately 1,200 acres within the proposed area had been acquired. At that time the Station and the Region felt it was possible to define exterior boundaries sufficiently to proceed with a formal request for withdrawal.

On April 27, 1938, Director Willis M. Baker of the Central States Station presented the first draft of a request for formal withdrawal of this area to Supervisor Galen W. Pike, the Regional Forester, and the Chief of the Forest Service. This tentative report recommended the establishment of the "Southern Illinois

Experimental Forest," the Station's first experimental forest, within the Shawnee Purchase Unit of the Forest Service and set the boundaries to enclose a gross area of 5,760 acres in Townships 11 and 12 South, Range 8 East, third Principal Meridian. The proposed exterior boundaries were made generously large with the idea that the next 5 to 10 years would indicate what land would ultimately be acquired.

Assistant Chief C. L. Forsling suggested that a more distinctive name be given the area. On September 12, 1938, Regional Forester Lyle F. Watts wrote Acting Director Ralph K. Day suggesting that the name of "Kaskaskia" be formally adopted since it was the most acceptable of the several that had been offered. The name was for the Indian tribe of that name rather than the village or river, both of which were some distance from the experimental area. The Kaskaskias roamed over most of southern Illinois and were probably the best known Indian tribe in the early history of the area.

Withdrawal procedure for the experimental area came to a standstill in the fall of 1938 because of changes in Directorship and the urgency of other work at the Station. At that time, the report was nearly ready for approval by the Chief, the Regional Forester, the Forest Supervisor, and the Director of the Station. In 1941, when Director J. Alfred Hall renewed the withdrawal procedures, it was necessary to revise the report to show current acquisition figures. On September 27, 1941, the report was forwarded to Regional Forester Jay H. Price for his approval and signature.

This first formal establishment report of the Kaskaskia Experimental Forest was approved by Acting Chief C. M. Granger on January 14, 1942. The exterior boundaries included a gross area of 5,811.285 acres within the drainage of Big Creek and Goose Creek in the east-central part of Hardin County, and embraced the area locally known as the Richland Hills and several sections of rolling land extending eastward to the Elizabethtown-Karber's Ridge road and northeastward in Section 21 to Big Creek. The southern end of the tract extended to within 4 miles of Elizabethtown on the Ohio River, and the northern boundary lay 2 miles south of Karber's Ridge. On the west it was bounded approximately by Goose Creek from Hickstown to its junction with Big Creek. The area thus formed a rough inverted right triangle with its base along the north line of Sections 19, 20, and 21 in Township 11 South, Range 8 East. Due to the interspersed nature of a large acreage of good to fair agricultural land that was not then purchasable, the exterior boundaries of the proposed area were selected to assure the early acquisition of a net area of

approximately 3,500 acres. At the time of this establishment report 1,400 acres of forested land had been acquired for the Experimental Forest.

Early Research

The area surrounding the administrative site was typical of southern Illinois forest conditions. It included a small tract of old growth hardwoods, a few hundred acres of good second-growth hardwoods, an extensive area of heavily cut and repeatedly burned oak-hickory forest, and a number of abandoned, eroding farms. Most of the forestry problems found in the unglaciated section of southern Illinois and in adjacent portions of Kentucky, Missouri, and Indiana were represented in this area.

Two studies begun before 1940 at the Kaskaskia are now among the oldest forest research plots in the eastern United States. One shows how hardwood forests grow and what they yield in wood products. The other analyzes the kind and rate of natural regeneration that occurs in these forests and in fields that have been abandoned for farming. A minimum of 6 inches of limestone rock was monumented around sassafras corner stakes to preserve these plot locations for posterity. They have been remeasured periodically since they were established in 1935. The last remeasurement of portions of these plots was in 1973.

Several other early studies included fall vs. spring seeding of hardwoods on mulched and unmulched seed spots on old fields, the influence of a leaf-litter mulch on the establishment and early growth of forest trees, the effects of site preparation on planted black locust, the effects of site preparation on planted shortleaf and pitch pine, logging damage in harvest cutting of upland hardwoods of southern Illinois, the extent and source of defects in upland hardwood stands, and the effect of ground cover on planted hardwoods.

These and other early research activities were being carried on by members of the Station's Columbus, Ohio, technical staff. It is interesting to note here that John R. McGuire, a Junior Agricultural Aid employed at Columbus, Ohio, in 1939 and now Chief of the Forest Service, lived at the Experimental Forest from April 16 to June 30, 1940, and supervised the remeasurement of succession, growth, and replication plots.

During World War II these early activities were drastically curtailed so that full time could be devoted to the war effort, chiefly in the fields of lumber and veneer production surveys and procurement of wood products for military needs.

A NEW FIELD CENTER FOR RESEARCH AT CARBONDALE

With the end of the war came the realization that the Nation's timberlands had been neglected and depleted during the emergency. High-quality lumber and plywood were almost impossible to obtain. Even pulpwood and fuelwood had been cut extensively. The need to take positive action to more fully utilize the forest products of southern Illinois (and similar adjacent areas) was made more apparent and even urgent when the U. S. Department of Labor declared southern Illinois to be an "economically distressed area" because of the critical unemployment (fig. 6). In response to the nationwide need, Congress authorized a substantial increase for forest research throughout the Country.

Figure 6. A southern Illinois hill country log house and family. Although this did not typify the general economic situation, it is a graphic illustration of the plight of some southern Illinoisans during the pre- and post-World War II period.



Funds for beginning the first Forest Survey in the Central States region (Illinois, Indiana, Ohio, Kentucky, Missouri, and Iowa) became available on July 1, 1946; and, coincident with initiation of the Survey, the Station took preliminary steps toward activation of a research center in southern Illinois and reactivation of the Kaskaskia Experimental Forest. Because of the potential for long-term cooperative research agreements, negotiations were underway for office space at Southern Illinois Normal University (the name was changed to Southern Illinois University in 1947) at Carbondale, Illinois, in Jackson County. No definite arrangements had been made by September 1946, when a field center for research was established in Carbondale with a temporary office in one room of the Post Office (fig. 7). The Carbondale field center was located about 65 miles from the Kaskaskia Experimental Forest in Hardin County.

Figure 7. The old Post Office building at the corner of Main Street and University Avenue in downtown Carbondale where the Carbondale field office had its first home (photograph courtesy General Services Administration).



Originally, it was planned that the staff at Carbondale would serve the needs of a rather specific area including most of Illinois and parts of Indiana, Missouri, and Kentucky. Although most of the field plots established in the development period after 1946 were concentrated in this area, it was later decided not to maintain specific boundaries for Carbondale and other field stations. Although some of the problems had local aspects requiring specific attention, usually there was general application possible over a much wider area. Thus, the research program policy was directed toward integrating and coordinating the field station programs into a broad attack on regional forestry problems.

At the outset, however, the program at Carbondale was concerned chiefly with about 42 million acres of land, of which 12 percent was forested (fig. 8). Included were four natural geographic divisions—the prairie, the bottomlands, the claypan, and the hilly uplands. The prairie division included north and north-central Illinois; the claypan included south-central Illinois and southwestern Indiana; the bottomlands were those adjacent to the Mississippi, Ohio, and Wabash Rivers in Illinois, Indiana, Missouri, and Kentucky; and the hilly uplands were located chiefly in southern Illinois, western Kentucky, and southwestern Indiana.

The northern part of this defined area was characterized by rich soils, intensive agriculture, and a concentration of industries in such urban communities as Chicago, Peoria, Moline, and Rock Island. Small, scattered farm woodlots made up the forests of this section. Corn-hog agriculture and industry dominated the economy, with a trend toward a decrease in forest acreage.

In the southern half of this general area the soils were poorer, there were fewer industries, and the topography was more rugged,

Figure 8. Problem area and divisions of Carbondale Forest Research Center, Central States Forest Experiment Station.



especially in the Ozark Uplift sections of southern Illinois and western Kentucky. It was anticipated that forestry could play a much more important role in the local economy here because this part of the area contained most of the timber.

In 1946 farm woodlands comprised 88 percent of the forest land in the area as a whole. These woodlots averaged about 40 acres in size. They were generally smaller in the northern than in the southern part of the province. Except for the Shawnee National Forest and the State Forests and Parks, there were few large forest holdings.

There were over 2,700 wood-using plants in the province in 1946, including over 1,600 sawmills; but, except for the sawmills, only 10

to 15 percent of all wood used in the plants was supplied from local timber.

The Center's territory was generally representative of the entire Central Hardwood Region, and for this reason the original specified boundaries were to become less meaningful. The largest forest type is oak-hickory, which occurs on the upland flats and hills throughout the region. In the coves and valleys are mixed hardwoods consisting of yellow-poplar, cucumber, basswood, beech, maple, ash, oaks, black walnut, hackberry, buckeye, and gums. Willow, cottonwood, soft maple, gums, oaks, hickories, cypress, honeylocust, sugarberry, and elm are found in the river bottoms. As previously described, most of the forests had been seriously depleted by frequent cutting, overgrazing, and fire which resulted in understocking and a high percentage of cull trees and inferior species. Fewer than 1 farmer in 20 managed his woodland according to forestry principles recommended at that time.

A PROGRAM OF RESEARCH— HOW IT PROGRESSED

The nucleus of a research center staff was recruited at Carbondale before the end of 1946. Efforts during the latter part of 1946 were expended largely in analyzing the forest situation in the area served and in developing plans for a research program aimed to solve the territory's major forest problems.

Dr. Leon S. Minckler came from the Lee Experimental Forest, Buckingham, Virginia (Appalachian Forest Experiment Station, Asheville, North Carolina), to Carbondale on September 10 to organize the work. Later in the month a secretary, Cleo Caraway, was added to the staff.

Donald F. Fassnacht, from the Lake City Ranger District, Osceola National Forest, Florida National Forests, reported for duty in October 1946 as Superintendent of the Experimental Forest. Because of inadequate financing and the War, the Forest had never been fully developed or operated effectively as an experimental area. Since 1938, the Station had depended on a few men hired locally for maintenance of the area, further expansion, and assistance in research. Some improvements had been made, including construction of an additional dwelling, a pumphouse, and 12.5 miles of roads. The new Superintendent immediately began work on the buildings and grounds at the Forest to provide attractive and comfortable living conditions for the staff.

Much of the early research at Carbondale was concerned with getting new crops of timber started. Established forests had to be

perpetuated and new ones started on land that was more suitable for growing trees than for any other use. In Illinois and the other Central States, this land included many hundreds of thousands of acres of old fields and strip-mined areas. In 1945 Congress had appropriated special funds earmarked for researching the spoil bank revegetation problem in the Central States. In November 1946 Deane W. Mather, who had been conducting for the Station an intensive survey of the mine spoil banks in Illinois and Indiana from the Urbana, Illinois, field headquarters, came to join the Carbondale staff. He immediately began making plans for cooperative planting tests as part of a region-wide study to determine the species of tree seedlings best suited to this land.

Several experimental plots were established in 1947 in Illinois and Indiana in cooperation with other Federal and State agencies, individual mining companies, the Illinois Coal Strippers Association, the Indiana Coal Producers Association, and the Agricultural Experiment Stations at the University of Illinois and Purdue University (fig. 9).

Richard D. Lane, from the Station's Ames, Iowa, Branch Station, was appointed Center Leader at Carbondale in February of 1947. Dr. Minckler became Project Leader of all Forest Management Research at the Center. A request was made for additional space in the Post Office; and on September 17, 1947, the Department assigned the Forest Service a two-room suite and an additional basement room.

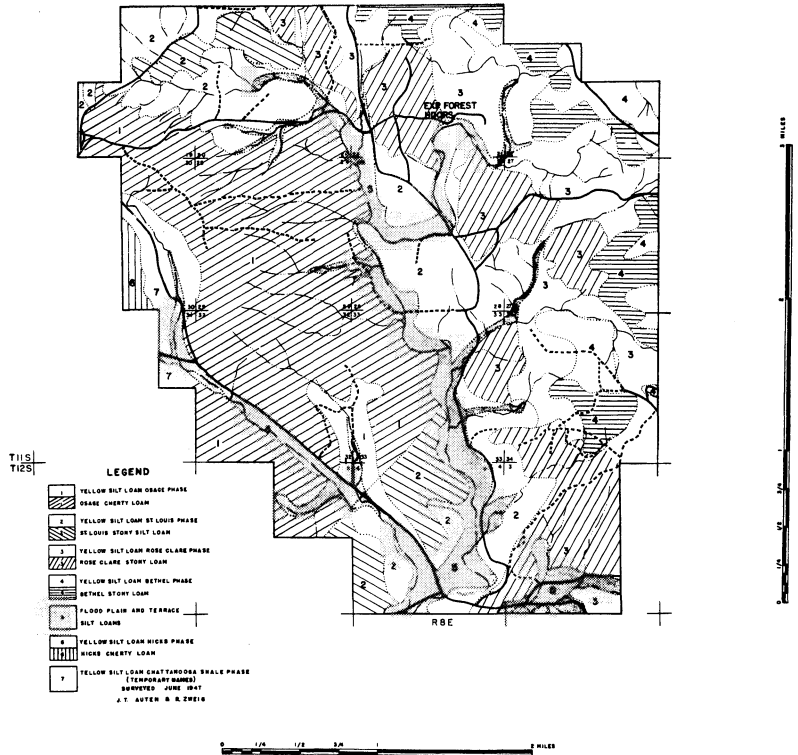
During the year much progress was made in preparing the Experimental Forest for a well rounded program. A complete system of primary, secondary, and tertiary roads was developed, including a map showing location of the roads, a cost analysis, and a construction priority list. The buildings were wired for electricity, and REA lines were extended to them. Some of the equipment needed for operating the Forest was procured. Boundary lines were resurveyed and marked, and base maps were prepared. A grid of base lines to be used in establishing experimental plots and compartments was laid out on the ground with identifying posts and markers spaced at frequent intervals. A complete sign system for the Forest was developed. A soils survey was completed in June 1947 by John T. Auten and Richard Zweig of the Central States Station at Columbus, Ohio; soil types were mapped (fig. 10), and the extent of their depletion was recorded.

Much of the planning essential in the initial period of organizing a research program was completed in 1947. In May of that year representatives from the Division of Research in the Washington Office and the Central States Station met at Carbondale to discuss and develop a research program for Carbondale. The program



Figure 9. Paul Seastrom, Manager of Land Projects, United Electric Coal Companies, DuQuoin, Illinois, was host to members of the Land Use Advisory Committee of the National Coal Association at Fidelity Mine on July 27, 1949. The party, 15 in number, was touring southern Illinois open-cut coal mines for the purpose of inspecting and studying various projects on land from which coal has been recovered by that mining method. The group, photographed in the yard of United Electric Coal Company's Fidelity Mines Club House west of DuQuoin in Perry County, includes: Back row standing, left to right: Paul Seastrom, Manager of Land Projects, United Electric Coal Companies; Ray Halloway, Resident Engineer, Fidelity Mine; Larry Cook, Executive Vice President, Ohio Reclamation Association, Cleveland, Ohio; Orel E. John, Farm Manager, Sinclair Farms, Inc., Huntsville, Missouri; R. T. Laing, Executive Secretary, Mineral Producers Association, Kittaning, Pennsylvania; Richard D. Lane, Officer in Charge, Carbondale Branch, Central States Forest Experiment Station, Carbondale, Illinois; A. J. Christiansen, Secretary-Treasurer, Illinois Coal Strippers Association, Chicago, Illinois; Dr. A. G. Chapman, Chief, Division of Forest Management Research, Central States Forest Experiment Station, Columbus, Ohio. Front row, left to right: Glenn H. Deitschman, Forester, Carbondale Branch, CSFES; T. C. Cheasley, Assistant to the President, Sinclair Coal Company, Kansas City, Missouri; Irwin H. Reiss, General Manager, Meadowlark Farm, Inc., Sullivan, Indiana; Clifford H. Adams, Public Relations Staff, Bituminous Coal Institute, Secretary NCA Land Use Committee, Southern Building, Washington, D.C.; B. H. Orton, Kentucky Reclamation Association, Hanson, Kentucky; A. F. Grandt, Special Research, First Assistant, Soil Experiment Fields and Crop Production, Illinois Agricultural Experiment Station, Urbana, Illinois; James H. Moore, Director, Kentucky Reclamation Association, Earlington, Kentucky; L. E. Sawyer, Director, Division of Forestry and Reclamation, Indiana Coal Producers Association, Terre Haute, Indiana; L. S. Weber, Land Use Engineer, Illinois Coal Strippers Association, Chicago, Illinois. Dr. A. G. Chapman (pictured above) was to receive the National Coal Association's 1973 Reclamation Award for his "pioneer efforts and valuable leadership in land reclamation research; his outstanding contribution to the sound development, conservation, and use of mined land; and his lifelong dedication to the improvement of man's environment" (photograph courtesy Coal Producers Association of Illinois).

Figure 10. Soil map, Kaskaskia Experimental Forest, Hardin County, Illinois, Central States Forest Experiment Station, U. S. Department of Agriculture, Forest Service.



evolved at this conference, with supporting data and background material, was incorporated in a preliminary program analysis. The program analysis, containing a summary of forest conditions in Illinois and similar areas in adjacent States, a summary of forest problems that should be solved by research, and a brief description of research projects to be undertaken immediately, was completed in September.

A three-phase system for studying the forest cultural problems in southern Illinois and adjacent areas was developed at the conference. First, it was planned to conduct studies on small plots to permit research on important problems without a large investment of funds. Secondly, silvicultural studies would be made on large plots or compartments of 20 to 30 acres. The cost and return features and applicability of the methods were to be tested in this phase. And, finally, those methods and techniques that were proved successful in the first two phases would be put to practice on a 400-acre management tract on the Experimental Forest.

An Advisory Committee (composed of representatives from Southern Illinois University; the University of Illinois; the Illinois Division of Forestry; the Shawnee National Forest; the Soil Conservation Service; and forest land owners, lumber producers, and

wood-using industries of the State) was organized. The Committee met in November 1947 and reviewed and unanimously approved the Center's recommended program of research (fig. 11).



Figure 11. Members of the Advisory Committee Meeting at the Carbondale Post Office November 20, 1947, included: Seated around table left to right: A. C. Foley, T. A. Foley Lumber Co., Inc., Paris; S. H. Hendrickson, President, Rockford Peerless Furniture Co., Rockford; Eugene Comte, American Legion Employment Committee, Murphysboro; Bruce Clark, State Conservationist, Soil Conservation Service, Urbana; D. L. Fassnacht, Superintendent, Kaskaskia Experimental Forest, Elizabethtown; R. W. Olson, Supervisor, Shawnee National Forest, Harrisburg; R. K. Train, Assistant Superintendent, KEF; L. S. Minckler, Silviculturist, Carbondale Branch, Central States Forest Experiment Station; and E. E. Nuutila, Acting State Forester, Illinois Division of Forestry, Springfield. Back row left to right: H. L. Mitchell, Director, and A. G. Chapman, Chief of Division of Forest Management, CSFES, Columbus, Ohio; J. W. Bristow, Secretary-Treasurer, Illinois Coal Strippers Association, Chicago; J. N. Spaeth, Head, Department of Forestry, University of Illinois, Urbana; L. S. Weber, Forester, ICSA, Springfield; and R. D. Lane, Officer in Charge, Carbondale Branch, CSFES (photograph courtesy Illinois Coal Producers Institute).

Because of the importance of forestry and forest industries to the economy of southern Illinois and because the forests of the area were concentrated in the southern portion of the State, it was recommended that the research be concentrated in the Upland Division during the early period of organization. Work in the Claypan and Bottomland Divisions rated second and third priority and was limited to preliminary exploratory investigations at that time. It was also agreed that the Illinois Agricultural Experiment Station would give attention to the farm forest problems of special importance in the northern part of the State.

During 1947 demonstrations in cutting practices, species adaptation to site, woodland management, and rebuilding a badly deteriorated farm woodland were established. In addition, a “natural area” was set aside on the Experimental Forest (fig. 12). This tract contains one of the oldest permanent plot studies in the eastern United States referred to previously under “Early Research.”



Figure 12. An 18-acre tract, as revealed by the latest survey, at the Kaskaskia Experimental Forest that was originally thought to be a virgin stand. It was discovered later that there was some early cutting there; however, records show that no cutting has been done since 1910, and it is being maintained in a protective status now. This mixed central hardwood stand has black oak, yellow-poplar, white oak, and hickory trees ranging in ages from 212 to 282 years and a white oak and a yellow-poplar more than 36 inches in diameter. Foot trails are maintained for visitors who wish to walk through this beautiful wooded area.

The highest priority work at Carbondale was to determine how to manage existing hardwood stands for maximum sustained production and financial return. During 1947, 36 compartments (18 in the oak-hickory type and 18 in the mixed hardwood type) were surveyed and permanently marked on the Kaskaskia for experimental management studies. This comprehensive, long-term study was to be the major forest management research project at the Kaskaskia and served as a large-scale demonstration of the several management systems.

In September 1947 Deane Mather transferred to the Florida National Forest Ranger District at Ocala, Florida. In August 1948 Glenn H. Deitschman, who was working on a special project basis

on strip-mined land reconnaissance out of the Columbus, Ohio, office, came to Carbondale to assist in continuing and expanding research in reforestation of spoil banks and old fields. A conference to discuss and formulate plans for future spoil banks forestation research in the Carbondale Branch Province was held at Carbondale on September 22, 1948. The group, including representatives of the Illinois Coal Strippers Association, the Indiana Coal Producers Association, the United Electric Coal Company, the Central States Station, and the Carbondale Branch, agreed that demonstrations of the income-producing potentialities of existing planted or natural stands on spoils should be assigned top priority in future research work on Indiana and Illinois spoils.

Through formal cooperative agreements drawn in 1950 with the two Coal Associations, the financial assistance necessary to permit assignment of Glenn Deitschman to the Station's spoils bank project full-time was provided. Under these and several informal cooperative agreements, 23 studies, including the comprehensive survey of strip-mined land mentioned earlier, were initiated. Several papers were published as results became available, including Agriculture Handbook 166 in 1960. The Handbook, *Forestation of Strip-Mined Land in the Central States*, by G. A. Limstrom of the Station staff, was a summary and evaluation of all the work done and became a "bible" on reclamation for much of the industry. The coal industry was planting some 8 million trees annually in nine States of the Midwest during this period, and their programs were guided by the results of this research. The publication of the Handbook culminated the major part of this program, except for minor special studies and plantation maintenance.

A problem analysis covering all phases of planting and seeding was completed by Dr. Minckler and reproduced for limited distribution during 1949. This analysis provided the basis for a program of regeneration and plantation management research and proposed the studies initially needed to solve the problems in these fields.

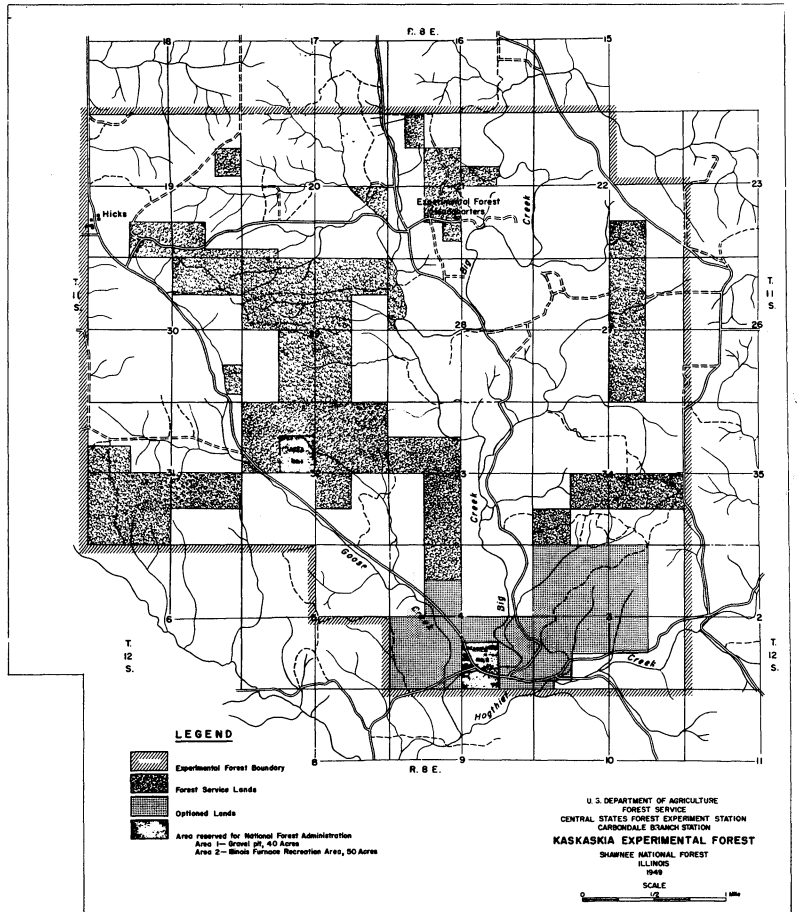
During the period 1948 to 1950, additional progress was made at the Experimental Forest. In 1948 construction was started on a primary road to provide access to a main body of timber. Further improvements were made in the buildings and the headquarters site (fig. 13), directional signs were erected, and trails were constructed through the natural area and to various experimental plots of general interest to visitors.

By 1949, actual title had been acquired on approximately 2,033 acres within the exterior boundaries of the Experimental Forest and an additional 755 acres had been optioned and approved by the Forest Reservation Commission (fig. 14). A revised establishment

Figure 13. The Kaskaskia Experimental Forest headquarters site in 1950.



Figure 14. A 1949 map of Kaskaskia Experimental Forest showing new boundaries and land acquisition.



report was approved by Acting Chief Granger on December 8, 1949, which expanded the boundaries of the Forest to enclose a gross area of 8,992 acres within the Shawnee National-Forest and recommended that this area be attached to the Carbondale Center.

During 1950, 1.9 miles of primary road were constructed; a new crawler tractor and other items of logging equipment were acquired; and, in cooperation with the Region 9 Division of Engineering, plans were prepared for the proposed garage and workshop for the Experimental Forest.

To conduct the comprehensive forest management compartment studies at the Kaskaskia it was necessary to cut and harvest timber crops. One of the most important developments at Carbondale during 1948 was the signing of a long-term cooperative agreement between the Central States Station and the Sahara Coal Company of Chicago and Harrisburg, Illinois. This agreement provided for cooperative harvesting and disposal of forest products scheduled for cutting in connection with the research program at the Kaskaskia. Early in 1949 this unique logging operation got underway. Under the terms of the agreement, the logging was done without cost to the government and the difference between the selling price of the products and the cost of harvesting was returned to the U. S. Treasury. The agreement was revised as necessary (1954, 1960, and 1964) and continued to serve the purposes for which it was prepared until May 8, 1969, when it was terminated after deactivation of the management research studies at the Experimental Forest.

Because markets for saw logs in the vicinity of the Forest were limited, progress on the forest management studies and other studies that required cutting and disposing of saw logs was hampered. Late in 1950, to help solve this marketing and utilization problem, a medium-size portable Corley sawmill was purchased and set up on wooden blocks and logs at the Forest. C. J. Telford, of the Forest Products Laboratory at Madison, Wisconsin, helped the KEF sawyer align the sawmill in 1951. Later, in July 1954, the mill was reset on concrete piers and 12- by 18-inch bridge timbers. To our knowledge, this was the only *operating* sawmill ever owned by the Forest Service. The mill and mill yard (fig. 15) also served to demonstrate good sawmilling practices; mill and equipment layout; and lumber grading, sorting, and stacking. Average production was from 100,000 to 120,000 board feet of lumber per year (records show that in a peak production period from April 1960 to October 1966, 1,054,130 board feet of lumber were sawn). The high-grade lumber was sold commercially for flooring, and the lower grades were sold to farmers and other local people. All proceeds from the lumber sales went back into the operation of the sawmill and the Experimental Forest.

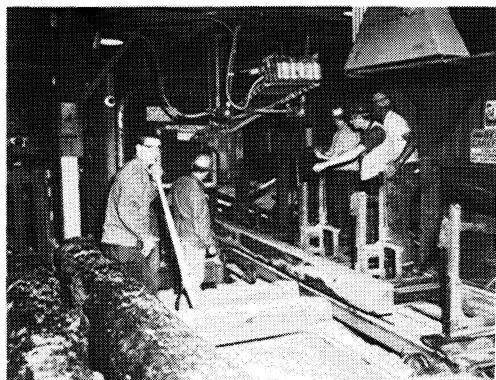


Figure 15. (Left) The sawmill that was located at the Kaskaskia Experimental Forest from 1950 to 1971 (this photo was taken during the Southern Illinois University Forestry Camp held at the Forest May 15-19, 1961, and shows a student operating the headsaw) and (Right) the KEF air-seasoning yard in 1961 showing roofed and unroofed piles of lumber.

Following a conference in April 1949 on forest products marketing in southern Illinois, a project was begun to develop a list of wood-using markets in the southernmost 16 counties of Illinois. Existing reports and data files were studied and wood-using plants and industry leaders visited to determine facts pertinent to the marketing of forest products. "A List of Wood-Using Markets Available to Southern Illinois" was completed and distributed early in 1950 to State and Federal employees of the Central States region and to industry cooperators. In cooperation with a committee appointed by the Governor of Illinois to consider plans for developing the industrial potential of southern Illinois, a report, "Suggested Expansion of Southern Illinois' Forest Industries," was prepared by Lane and O. K. Hutchison, of the Central States Station, and submitted to the committee. It contained preliminary data and findings of the marketing project. These findings were reported later and more fully in a technical report by Hutchison and Robert K. Winters, also of the Central States staff. Plans were made in 1951 for a survey of primary and secondary wood-using markets in southern Illinois and adjacent areas in cooperation with Southern Illinois University. Early in 1952, the results of these surveys were published in a directory of secondary wood users and in a directory of sawmills and other timber users. These publications, prepared by Southern Illinois University in collaboration with the Forest Service at Carbondale, completed a series of three directories to assist owners and processors of timber in southern Illinois.

On May 11, 1952, Superintendent Fassnacht transferred to the Southern Forest Experiment Station. Benjamin A. Roach returned to the Forest from military duty in Korea and became the new Superintendent July 1, 1952.

COOPERATION—THE KEY TO GROWTH

An important feature of a field research project is the opportunity for close, on-the-ground cooperation with local timberland owners, forest industries, and public and private agencies. During its first 6 years (1946 to 1952), the Carbondale staff had concentrated its research effort on (1) major forest management problems involving rehabilitation, management, and regeneration of native hardwood forests; (2) plantation management; and (3) forestation of old fields and coal-stripped land. Much of this early effort was made possible through cooperative assistance. The expansion of this cooperation during the ensuing years made possible the establishment of new research facilities, the initiation of new research projects, and an enlarged and diversified staff.

A Southern Illinois Forestry Conference was held in January 1949 at Southern Illinois University under the joint sponsorship of the University and Southern Illinois, Inc., in cooperation with the Illinois Technical Forestry Association. Technical foresters, conservationists, and representatives of business and industry in southern Illinois participated in the session. A second Forestry Conference was held at the University on November 8, 1950, as part of Forestry Week, proclaimed by Governor Adlai E. Stevenson in recognition of the vital nature of the forests in southern Illinois. The need to more fully manage, protect, and utilize the forests in southern Illinois and similar adjacent areas was clearly recognized by all agencies. As a result of this area effort and of the deep personal interest of Dr. Delyte W. Morris, President of Southern Illinois University, a Memorandum of Understanding between the University and the Forest Service was signed in December 1950 and a cooperative forest research program was initiated. This agreement was the single most significant step that would be taken in the development of the Carbondale Field Office into a nationally and internationally recognized center for forest research.

Quarters and Staff

On September 8, 1952, the Forest Service staff of four at Carbondale moved to quarters on the University Campus (fig. 16). They occupied the first floor of the University-owned Dowdell property at 103 East Park Street, where six offices and a storeroom were available (fig. 17). This was the first move since the Center was initially established and located in the Carbondale Post Office in September 1946.

An all-Station meeting and program conference was held at Carbondale February 23 to 25, 1954 (fig. 18). This all-Station meeting at a field office was another “first” for Carbondale. The report records: “The group considered the desirability of having an

Figure 16. The original staff of the Carbondale Research Center. From left to right: Leon S. Minckler, Silviculturist; Glenn H. Deitschman, Spoils Bank Specialist; Richard D. Lane, Research Center Leader; and Cleo Caraway, Secretary (photograph courtesy Southern Illinois University).



Figure 17. The old Dowdell house at 103 E. Park was the first on-campus home of the Carbondale Research Center. These quarters were made available after the cooperative agreement between the Forest Service and Southern Illinois University was signed and were occupied from September 1952 to November 1954. The land surrounding this old home originally belonged to Daniel A. Brush, the founder of the City of Carbondale, and now accommodates a high-rise University residence hall complex called Brush Towers (photograph courtesy Southern Illinois University).



Figure 18. Group attending annual meeting and program conference at Carbondale Research Center in February 1954 (left to right): Front row kneeling: Dr. W. E. Keepper, Director, Division of Rural Studies, SIU; K. A. Brinkman, Ames; R. D. Wray, Editor, Columbus; and G. H. Deitschman, Carbondale. Second row, standing: E. G. Champagne, Ames; H. C. Ager, Administrative Officer, Columbus; L. S. Minckler, Carbondale; R. K. Day, In Charge, Forest Utilization Service, Columbus; R. D. Lane, Carbondale; A. G. Chapman, Chief, Forest Management, Columbus; and H. E. Ochsner, Chief, Timber Management, Region 9. Back row, standing: F. B. Clark, Columbia; R. W. Merz, Athens; Russell R. Whitten, Acting Chief, Forest Insect Research, Columbus; B. A. Roach, Carbondale (Kaskaskia Experimental Forest); D. E. Herrick, Carbondale; Director W. G. McGinnies, Columbus; J. T. Morgan, Forest Economics, Columbus; F. G. Liming, Columbia; and G. A. Limstrom, Forest Management, Columbus.

annual Station-wide meeting. Everyone agreed that such a meeting is desirable and can be very productive. Suggestions were made that the meeting be rotated between the Centers and the Station and that time be set aside for field trips when the meetings are held at the Centers." The research programs of the Carbondale Center (and that of the Ames Center at Ames, Iowa; the "Buckeye Center" at Athens, Ohio; and the "Northern Ozark Center" at Columbia,

Missouri) were reviewed. The group approved, in general, a proposal that 50 percent of the research effort in the Carbondale Province be devoted to harvesting, utilization, and marketing problems. Thirty percent of the effort would involve the management of existing stands and 15 percent would be plantation management. The remaining 5 percent would be directed toward new forestation research.

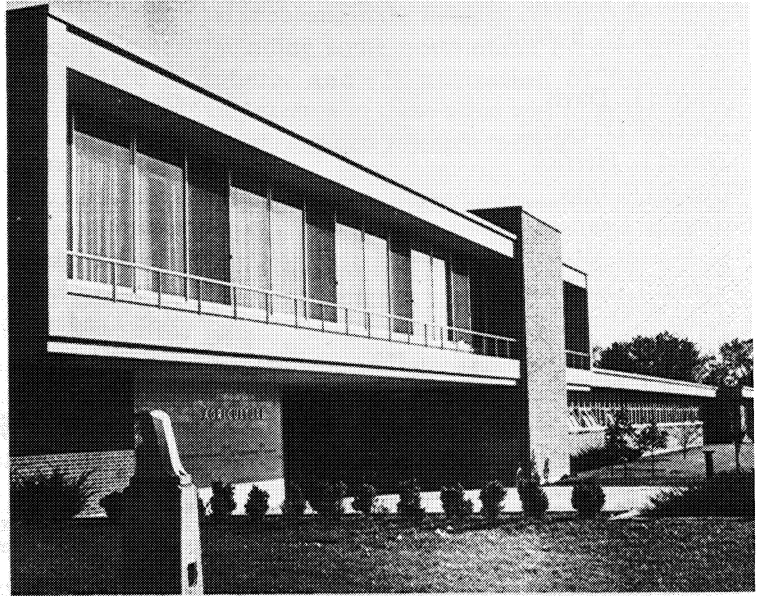
The expanded program and staff that were possible after the cooperative agreement with Southern Illinois University was initiated soon necessitated additional space. On November 23, 1954, the staff moved from the Dowdell house on East Park Street to 1312 South Thompson Street on the Campus (fig. 19). This old home, which the University purchased for temporary office space, had 10 rooms suitable for offices, a storeroom, and a kitchen, and housed the expanded staff consisting of the research center leader, a chief clerk, a statistical clerk, 3 secretaries, 4 research foresters, 5 wood technologists, and a forest economist.



Figure 19. The old Thompson house at 1312 S. Thompson St. became the second on-campus home of the Carbondale Research Center (from November 1954 to September 1957) when an expanding program and staff necessitated larger quarters. Theodore W. Thompson (great grandfather of Forestry Sciences Laboratory Technician Charles E. Helton), one of Carbondale's first settlers, also owned an 85-acre tract of land surrounding the house that included Thompson Woods and Thompson Lake. The wooded area, seen in the photo background, is preserved in a nearly natural state (only infirm and hazardous trees are being removed) as was agreed at the time the University acquired the land. The old home was razed to make room for the University's Student Center. Thompson Woods and Lake-on-the-Campus, as it is now called, provide a lunch-time respite for FSL "picnickers," fishermen, and birdwatchers.

In 1955 the University began construction of an Agriculture Building. A suite of offices was planned for the Forest Service in the southeast wing of the building. In the fall of 1957 the building was completed (fig. 20), and the Forest Service moved from the Thompson house on September 23. Eight offices, a reception room, a storeroom, and a small classroom were made available for the Center's staff of 16 employees stationed at Carbondale.

Figure 20. A front view of the Agriculture Building that was completed in 1957. The southeast wing of the building was occupied from September 1957 to October 1968 (photograph courtesy Southern Illinois University).



In deference to continuity, key staff changes are noted here. David E. Herrick, from the Forest Products Laboratory at Madison, Wisconsin, was employed December 21, 1952, to head up the new forest utilization project at Carbondale, which included primary utilization research at the Kaskaskia Experimental Forest and secondary utilization research at the Center's new auxiliary facility, the Wood Products Pilot Plant at SIU's Vocational Technical Institute near Carterville, Illinois. On September 11, 1955, Superintendent Roach, of the Kaskaskia Experimental Forest, transferred to the Berea (Kentucky) Research Center; and William T. Plass, of the Athens (Ohio) Center's Vinton Furnace Experimental Forest, became the new Superintendent. On September 16, 1956, Richard Lane, who had been in charge at Carbondale since 1947, was transferred to the Northeastern Forest Experiment Station (he was to return to the Central States Station as its Director on August 1, 1960). Robert W. Merz, who had been Center Leader at the Athens Center since its establishment in 1949, transferred to Carbondale August 26, 1956, to fill the vacancy created by Lane's transfer. And on February 10, 1957, Dr. Stephen G. Boyce, who had been associated with Merz in cooperative work

As of June 30, 1958, the staff at the Carbondale Center consisted of:

Name

Title

In Carbondale:

Robert W. Merz	Research Center Leader
Stephen G. Boyce	Project Leader, Regeneration and Genetics
Erwin H. Bulgrin	Technologist
William W. Burton	Chief Clerk
Cleo Caraway	Secretary
Dareld L. Davis	Forestry Aid
Mitchell D. Ferrill	Forestry Aid
David E. Herrick	Project Leader, Forest Utilization Research
*Donald F. Inks	Forester
John E. Krajicek	Forester
E. Wesley McCoy	Jr. Project Leader, FUR
James T. Micklewright	Jr. Project Leader, FUR
Leon S. Minckler	Project Leader, Forest Management
Lura L. Muzzarelli	Statistical Clerk
David J. Neebe	Forester
Joyce A. Re	Clerk-Stenographer
Russell A. Ryker	Forester

At the Pilot Plant:

William W. Rice	Superintendent-Instructor
Stanley H. Barham	Engineering Aid
Robert E. Bodkin	Laborer II
Wendell P. Clark	Technologist
Daniel E. Dunmire III	Technologist
Frederick E. Lloyd	Maintenance Foreman
Leslie N. Shive	Engineering Aid

At the Kaskaskia Experimental Forest:

William T. Plass	Superintendent
Clifford O. Nashland	Assistant Superintendent
Roy A. Conkle	Maintenance Man
Thomas M. Headlee	Technologist
Morris C. Lindsay	Laborer III
Robbie Oxford	Laborer III
Lawrence E. Rendleman	Forestry Aid
J. C. Schutt	Forestry Aid
Millard R. Spivey	Forestry Aid
Donald D. Vaughn	Laborer III
John D. Woerheide	Forester
James E. Wootton	Senior Forest Worker

*Military leave status.

at Ohio University, joined the staff to head up the new regeneration and tree improvement project.

With the utilization project, the new regeneration and tree improvement project, and the long-established forest management project headed by Leon Minckler, the Carbondale Field Office was organized and staffed to fulfill its "charter" and carry on a closely coordinated program of timber production and utilization research aimed to solve regional problems in the fields of (1) management of hardwood timber, including some bottomland hardwoods not being studied elsewhere, and (2) utilization of low-grade hardwoods. Intensified research in these areas was to generate the need for new areas of study and new research facilities.

Forest Surveys of Illinois

As mentioned earlier, funds authorized by Congress for initiating the first Forest Survey in the Central States region became available in July 1946. In August 1947 the Central States Station began an intensive survey of the forest resources of Illinois in cooperation with the Illinois Department of Conservation and the Illinois Agricultural Experiment Station. This survey was part of the nationwide study of forest resources being made by the Forest Service in cooperation with local agencies. In the course of the Forest Survey work, Keith Hutchison, who was assigned to work on the Survey in the Central States Station, devised a way to prepare generalized forest cover maps for States or parts of States by assembling a mosaic of photo-index sheets. A map of this kind was prepared for southern Illinois. In June 1949 the initial Forest Survey Release by the Forest Survey Organization of the Central States Station presented the significant statistics on forest area and timber volume for the State and for each of the three regions—the Prairie, the Claypan, and the Southern—into which the State was divided for the Survey. In December 1952 an analytical report for the State was published in cooperation with the University of Illinois, which interpreted forest area, timber volume, growth, and drain statistics in the light of existing and anticipated economic conditions.

In 1959 the Forest Service began planning for a resurvey of Illinois' forests beginning in July 1961. This second comprehensive inventory of Illinois' forest resource was completed in November 1962. This survey was made by the Lake States and Central States Stations (fig. 21). The Illinois Department of Conservation and the University of Illinois assisted in collecting timber cut and product data. The North Central Region of the Forest Service collected data for the Shawnee National Forest, and the Agricultural Stabilization and Conservation Service provided the aerial photographs used. The Survey report was published in December 1965 by the Lake States Station. This report compared the new statistics with those

Figure 21. Clifford O. Nashland grading a black oak tree with members of the Lake States Forest Survey team in the "Natural Area" of the Kaskaskia Experimental Forest (1961).



of the previous Survey in 1948, weighed the changes, and pointed out trends that could affect future supplies for local wood-using industries.

Timber Production Research

The results of timber management research aid forest operators in producing wood in combination with other forest uses. Research in this field is directed toward the discovery, development, and demonstration of ways to produce high-quality timber. Timber production research is coordinated with research in wood utilization and marketing and with research in the management of the forest for water, wildlife, forage, and recreation benefits.

Illinois has a surplus of hardwood timber. This surplus is mostly low-grade and of certain undesirable species. There is a shortage of large, straight, defect-free logs of many species, especially black walnut, silver maple, cottonwood, the oaks, and yellow-poplar. During the decade (1950 to 1960) following the Memorandum of Understanding with Southern Illinois University and before the nationwide revision of the Forest Service research program in the mid-1960's, specialists at Carbondale developed a many-faceted program in timber production aimed at finding and demonstrating ways to produce high-quality timber.

Upland Hardwoods

In 1950 there was a need to develop management guides for farm woodlands and public forest land. Several studies were directed toward solving this problem and many valuable publications resulted. The first guide for wood owners, *Making Farm Woodland Improvement Pay*, was published in 1953. Three years

later a very popular guide, *How to Farm Your Forest*, was published as an attractive booklet by the University Press. This guide became a "best seller," and about 18,000 copies were widely distributed in many States and in several foreign countries. A guide for the upland forests of the entire Central Hardwoods Region, *Timber Management Guide for Upland Central Hardwoods*, was published by the Forest Service in 1962. In November 1962, with Southern Illinois University as host, State and Federal foresters from Missouri, Illinois, Kentucky, Wisconsin, and Indiana spent 2 days of training in the use of this guide.

Researchers continued to look for better ways to grow top-quality logs in the upland hardwood forests. One research report described the nature and occurrence of defects in upland oaks. A paper, prepared in cooperation with the utilization project, described a method to determine the value of reducing the number of defects in upland oaks and in yellow-poplar. And another paper specified alternating seed storage temperatures that result in germination of all viable yellow-poplar seed. In cooperation with SIU's Botany Department, a provenance study on basswood was established at the Kaskaskia. A forest area with yellow-poplar seedlings was made available to a graduate student in SIU's Forestry Department to study the relation of light and soil moisture to the growth of this species. These and other studies provided information to improve management guides for the upland hardwood forest.

Bottomland Hardwoods

Research foresters of both the University and the Forest Service had long recognized the tremendous potential of bottomland hardwood forests for producing wood. A number of observations were made earlier, but it was not until 1953 that men, money, and materials were available for cooperative studies. The first project was on a 16-acre area on the Kaskaskia Experimental Forest selected for studying and demonstrating silvicultural practices in a stream-margin forest. In 1956 and 1957 three studies were established in southeastern Missouri on the Mingo National Wildlife Refuge, Fish and Wildlife Service, U. S. Department of Interior in cooperation with the University of Missouri and the Missouri Conservation Commission. Published results provided information on (1) seed production and reproduction of pin oak in relation to stand conditions, (2) silviculture of pin oak on flooded and unflooded stands, and (3) pruning of pin oak. (In December 1968 these still-active studies were transferred to the Columbia, Missouri, field location of the North Central Forest Experiment Station.)

Many helpful guides to develop management procedures for the great timber resource potential of the bottomlands of southeastern

Missouri and southern Illinois were available from the bottomland forest research program being conducted at the Stoneville (Mississippi) Research Center of the Southern Forest Experiment Station. But it was found, when a visit was made to the Stoneville Center in August 1957, that the bottomland regions of Missouri and Illinois differ greatly from the Delta region in both forest types and species. Additional work designed for mid-Mississippi Valley conditions was necessary. Suitable forest areas were required to carry out experimental cultural treatments on various conditions of site, stages of development, soil types, frequencies of flooding, water table relations, etc. On April 1, 1958, the bottomland research at Carbondale was expanded through lease of about 380 acres of bottomland forest from the Pemiscot Land and Timber Company of Missouri. This area was referred to as the Bootheel Experimental Area. John E. Krajicek, of the Amana Experimental Forest, Ames, Iowa (Ames Forest Research Center), came to Carbondale in June 1958 to head up the bottomland research under Project Leader Minckler. A group of plots was established there in 1959 to study and demonstrate different silvicultural practices in a bottomland forest. These cooperative studies provided information on the rate of growth of several bottomland species, were valuable for demonstrating various practices to forest administrators, and resulted in better ways to establish natural tree seedlings and to plant trees in bottomlands.

But more research was needed to find ways to improve the quality of wood in bottomland trees and to produce salable wood in a shorter time. Some observations and studies already pointed to possible solutions: planting large seedlings in deep holes, controlling weeds with mechanical and chemical methods, and fertilizing nutrient-deficient soils.

Tree Improvement

Most of the cooperative studies in tree improvement were directed toward finding ways to select and breed trees for high-quality wood. In 1953 the Botany Department; the Forest Products Laboratory at Madison, Wisconsin; and the Station began investigating the abundance, location, and distribution of gelatinous fibers in cottonwood. These studies were important in determining that gelatinous fibers cause various defects in cottonwood lumber products. The environmental and genetic variability of fiber length, the specific gravity of wood, and the amount of gelatinous fibers in many trees were then investigated. And anatomical studies of variation in the wood structure of cottonwood, black walnut, and yellow-poplar were begun in 1962.

Main Brothers Box and Lumber Company established a poplar nursery in cooperation with the Forest Service in 1960. During the next 3 years clones of cottonwood and related poplars from many parts of the world were placed in the nursery at Karnak,

Illinois. The lumber company provided wood samples from these clones for cooperative studies of wood structure. These and other studies would make possible reliable recommendations for growing high-quality wood in short rotations and would help in the breeding and selection of trees that inherently produce high-quality wood.

General

The Kaskaskia Experimental Forest got a new Superintendent in 1960. William T. Plass transferred to the Regeneration and Tree Improvement project at Carbondale in May; and Russell A. Ryker, who had been on educational leave from Carbondale, became Superintendent in June.

Most of the timber production research administered from Carbondale had been conducted on the Experimental Forest; and on June 20, 1961, a revised Establishment Report was approved by Acting Chief Cliff adjusting the boundaries of the Kaskaskia to include an additional 270 acres of timbered land for experimental and demonstrational purposes. At the time of this Report, title had been acquired on approximately 3,313 acres within the exterior boundaries of the Kaskaskia.

During these years of intense activity at the Forest, the practice of employing local residents continued; some 35 technicians and a clerk-stenographer were hired from 1946 to 1961 to assist the 9 technical staff members who had tours of duty there. In November 1962 Ryker transferred to the Intermountain Station. John D. Woerheide served briefly as Superintendent (November 1962 to December 1963), and on December 31, 1963 Lawrence E. Rendleman became the new Superintendent.

The project had a continuing need for the "outdoor laboratory," but there was also a great need for indoor laboratories and greenhouses. Problems dealing with the genetics of trees, physiology of flowering and seed development, physiology of flower induction, wood structure, development of woody tissues, and many others would have to be studied in well equipped laboratories and greenhouses. Cooperation would be the key to the eventual establishment of these new research facilities.

Utilization Research

In July 1952 Congress appropriated \$35,000 earmarked for investigations in the utilization of hardwoods to be conducted by the Carbondale field office in cooperation with the University. During the next several months, Center Leader Lane spent much time preparing the research facilities, recruiting the research staff, and preparing study plans to get the program underway.

Primary Utilization

The primary utilization research program began in 1953 in the woods at the Kaskaskia Experimental Forest. Because the margin

for profit for a local hardwood logger was small, it was important to log efficiently and recover the highest value products. The results of two major studies on timber harvesting—one dealing with felling and bucking trees and the other with skidding—helped loggers estimate costs, select equipment, and generally better plan their hardwood logging operations.

In concurrence with recommendations of the Log Grade Committee of the USDA Forest Service 1957 Timber Quality Conference, a National Log Grade Project was established in 1958 to develop and carry out a coordinated program of research on log and tree grading. The program of timber quality research conducted at Carbondale as part of the Station's assignment of the Hardwood Phase of the National Log Grade Project resulted in the development and evaluation of a system of appraising the value of standing trees for factory grade lumber. A hardwood tree diagramming manual was prepared for the National Log Grade Project in 1961. The tree-value appraisal system has been adopted by the Forest Service for evaluating blocks of timber on National Forests to be offered for sale to timber operators and is now gaining acceptance, with some modification, by State and private foresters, commercial operators, and others.

Integrated pulpwood-saw log harvesting and the use of bolter saws for improving utilization were also studied at the Kaskaskia Experimental Forest. The sawmill and mill yard located at the Kaskaskia equipped the field office to study (1) techniques of sawing that would increase sawmill efficiency, minimize the volume of low-quality lumber produced, and increase profits; and (2) methods of air-drying lumber that would minimize degrading losses due to weathering.

Secondary Utilization

The Forest Service and the University began working on the idea of a Wood Products Pilot Plant designed to find new uses for southern Illinois' hardwood lumber supplies in 1950. By November 1952 the possibilities for establishing such a plant were advanced by the approval of supplementary agreements between the University and the Forest Service. This cooperative enterprise was intended to benefit the forest industries of Illinois and nearby regions by research, demonstration, and industrial woodworking training. Under the approved agreements the Forest Service would carry on research, supply personnel, and furnish necessary equipment. The University would provide a building for the plant and office space for the Center staff working there and conduct a worker-training program.

By late 1953 the project in the utilization of low-grade hardwoods was rapidly taking shape. The University had moved in

a 55- by 208-foot building to house the Wood Products Pilot Plant and was installing heat, water, light, and power facilities. The building, which was formerly a part of the war-time Illinois Ordnance Plant, was located on the campus of the University's Vocational Technical Institute near the city of Carterville. The basic production-type woodworking equipment purchased included a variety saw, a straight-line rip saw, a swing cut-off saw, a powered jointer, a single-surface planer, and a single-spindle shaper. This equipment was set up on a production-line basis with power conveyor systems between some units.

The wood utilization pilot plant work got added impetus in August 1954, when the Central States Station received an additional appropriation of \$150,000 for expanding this research program. In December 1954 the Woods Charitable Fund, Inc., Chicago, furnished a \$10,000 revolving fund for use at the Wood Products Pilot Plant. The funds were used for labor costs and purchase of lumber and other material needed for research at the Plant. Woods Charitable Fund, Inc., is a private foundation with headquarters in Chicago; the Treasurer and Vice President, Frank H. Woods, is also President of the Sahara Coal Company of Chicago and Harrisburg, Illinois, the major cooperater at the Kaskaskia Forest from 1949 to 1969. This agreement remained in effect until May 8, 1969, when the work emphasis at the Plant changed from product to processing research as described later.

The University and the Forest Service jointly employed William W. Rice (who had been Manager of Wood Service Co., a division of Reisen Lumber & Millwork Corp., Union, New Jersey) as Superintendent-Instructor at the Plant in November 1954.

During 1955 and 1956 the equipping of the Pilot Plant was accomplished (fig. 22). In addition to the basic equipment that had been installed earlier, an automatic cut-off saw, a radial saw, another straight-line rip saw, a band saw, a band resaw, a facing planer, a moulder, a three-drum endless bed sander, and several other smaller machines were acquired. The Plant was so arranged that flexible production lines could be developed; most units were serviced by a dust collection system and conveyors. A mill yard immediately adjacent to the Pilot Plant building was provided by the University, and air-drying facilities were installed in the yard. The University provided a straddle-truck and the Forest Service a forklift truck to permit package-handling of lumber.

Dedication of the cooperatively operated Pilot Plant (fig. 23), the only one of its kind in the Nation, was Saturday, November 12, 1955. Two hundred visitors including Federal and State forestry officials from various parts of the country attended this formal dedication.

Figure 22. Inside the co-operatively operated Wood Pilot Plant located at the Southern Illinois University Vocational-Technical Institute near Carterville, Illinois.

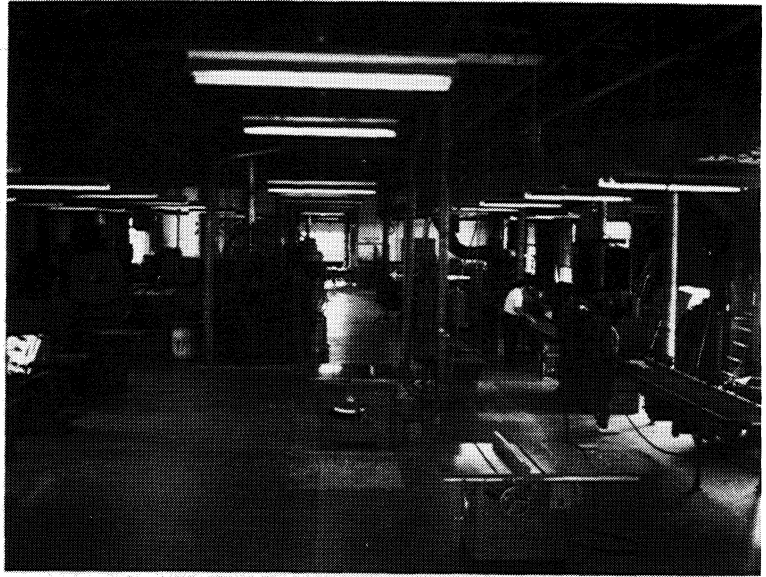
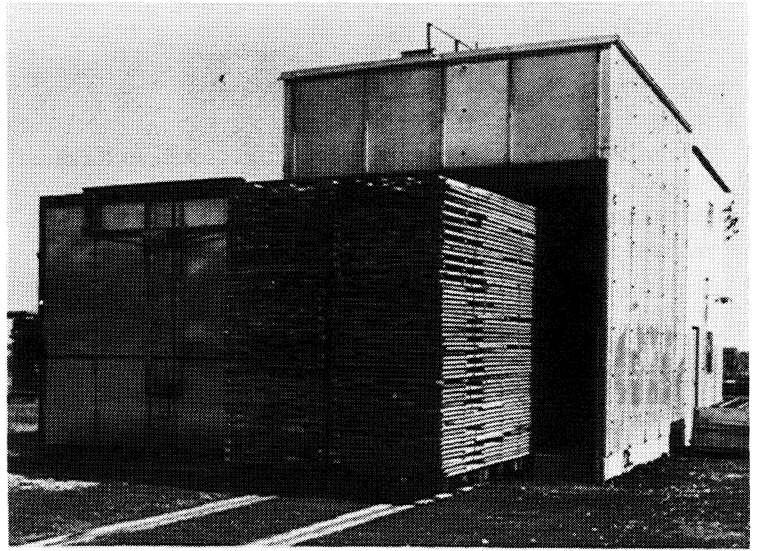


Figure 23. Congressman Kenneth J. Gray of West Frankfort, Illinois, speaks to some 200 persons attending the dedication of the new cooperative Wood Products Pilot Plant at the Southern Illinois University Vocational-Technical Institute Saturday, November 12, 1955.



In the spring of 1956 an experimental dry kiln (fig. 24) was constructed near the Pilot Plant's lumber storage yard. The kiln is 30 by 15 feet, including a boiler room, and can dry 6,000 board feet of lumber in a charge. The kiln was also to be used in cooperation with the Forest Products Laboratory to develop drying schedules for native hardwoods, for training VTI Industrial Wood Technology students in operating and maintaining a dry kiln, and for short courses and demonstrations. Facilities were later provided for dip- or soak-treating wood materials up to 16 feet long. A lumber stacking jig, used for piling lumber in packages with forklift trucks,

Figure 24. The experimental dry kiln at the Wood Products Pilot Plant complex.



was designed and developed by William Rice. This simple, time-saving device greatly facilitated uniform stickering of lumber for either air- or kiln-drying.

In 1958 the University constructed an office-classroom addition to the Pilot Plant building that provided office facilities for the University and Forest Service staff stationed there.

Construction of a much-needed dry storage building (fig. 25) began in June 1960. The building was experimental in nature and constructed almost entirely of native hardwood lumber. The plan for the structure was adapted from a basic design developed by Purdue University. Several variables were tested, including spacing of trusses; finishing materials and method of application; and the use of different hardwood species in the construction of laminated trusses, siding, and other wood members. The structure provided

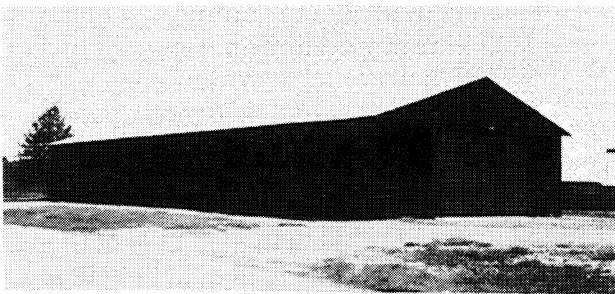


Figure 25. (Left) The experimental dry storage building constructed almost entirely of native hardwood lumber at the site of the Wood Products Pilot Plant and (Right) lumber stacks inside.

As of June 30, 1960, the staff at the Carbondale Center consisted of:

Name	Title
In Carbondale and at the Pilot Plant:	
Administration	
Robert W. Merz	Research Center Leader
Cleo Caraway	Secretary
Clerical Staff	
William W. Burton	Chief Clerk
Helen J. Lewey	Calculating Machine Operator
Linda L. Patchett	Clerk-Stenographer
Betty L. Young	Clerk-Stenographer
Timber Production Research Staff	
Leon S. Minckler	Project Leader, Forest Management
Stephen G. Boyce	Project Leader, Regeneration and Tree Improvement
John E. Krajicek	Forester
William T. Plass	Forester
Donald F. Inks	Forester
Ray Vinyard	Forestry Aid
Primary Utilization Research Staff	
Erwin H. Bulgrin	Project Leader, Primary FUR
James G. Schroeder	Technologist
Richard C. Schettler	Forestry Aid
Secondary Utilization Research Staff	
James T. Micklewright	Project Leader, Secondary FUR
William W. Rice	Superintendent-Instructor, Pilot Plant
Glenn A. Cooper	Technologist
Daniel E. Dunmire	Technologist
Frederick E. Lloyd	Maintenance Foreman, Pilot Plant
Stanley H. Barham	Engineering Aid
Robert E. Bodkin	Engineering Aid
Darrell E. Alley	Laborer III
Kenneth D. Gaddis	Laborer II
At the Kaskaskia Experimental Forest:	
Russell A. Ryker	Superintendent
Clifford O. Nashland	Assistant Superintendent
John D. Woerheide	Forester
Ronald W. Jokerst	Technologist
Millard R. Spivey	Forestry Aid
Lawrence E. Rendleman	Forestry Aid
J. C. Schutt	Forestry Aid
Cleo F. Winders	Clerk-Stenographer
James E. Wootton	Senior Forest Worker
Donald D. Vaughn	Senior Forest Worker
Robbie Oxford	Senior Forest Worker
Morris C. Lindsay	Senior Forest Worker
Roy A. Conkle	General Mechanic

storage room for lumber and wood products and housed a gang-rip saw. This facility completed the major installations necessary for a full program of secondary utilization research, training, and demonstration at the Wood Products Pilot Plant. Later, an all-hardwood A-frame office building (fig. 26), constructed at the Pilot Plant site, provided additional data on the use of native hardwoods and necessary office space for an expanded staff. Both buildings continue to serve as excellent functional and demonstrational facilities.

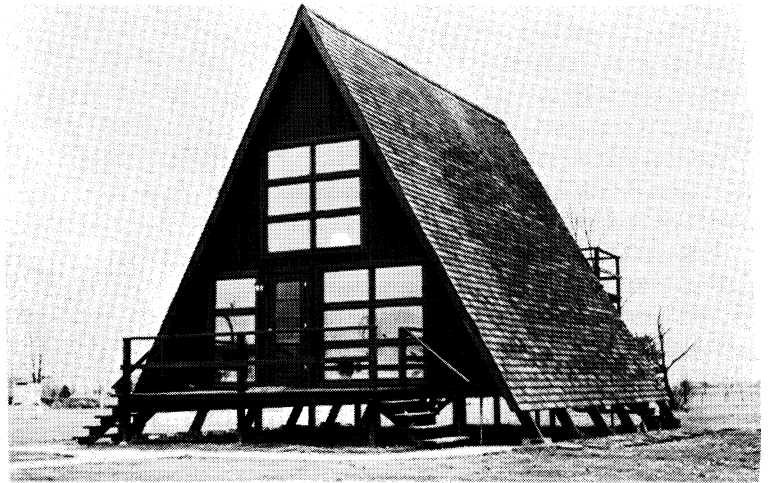
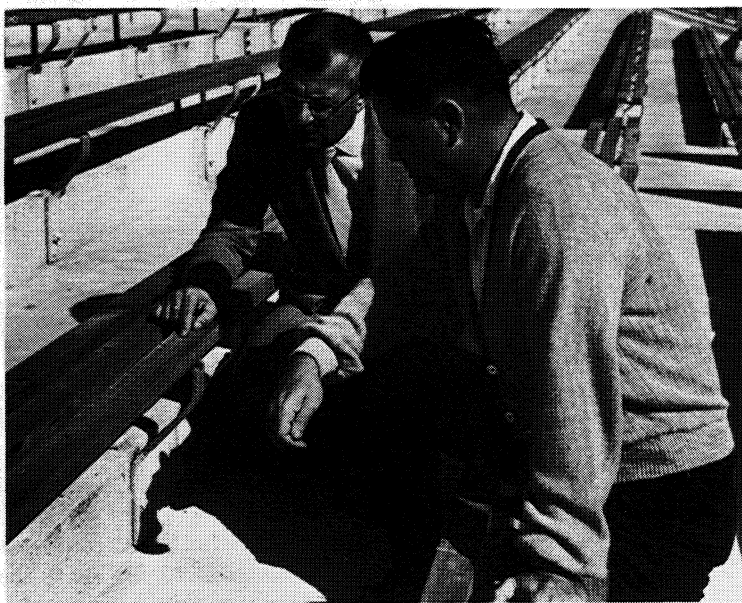


Figure 26. The all-hardwood A-frame office-demonstration building located in the Pilot Plant complex was built cooperatively with the Forest Products Technology Department of SIU's Vocational-Technical Institute and the Hardwood Action Council, an organization of several major hardwood associations. A 25-year lease of the building site was negotiated with SIU on August 5, 1965. The completion of the building in November 1965 provided new office space for the several members of the utilization staff stationed there and made the 1958 office-classroom addition to the Pilot Plant available to the University for their exclusive use.

The product development research at the Pilot Plant complex was concerned mostly with the problem grades of hardwood lumber—No. 2 Common or poorer. The goal was to develop products that could be made from short or narrow clear-cuttings from lumber of these grades as well as products in which minor defects in the parts would be acceptable. Studies were made on portable farm structures, recreation structures, pallets, and paneling of different types. For most of the products studied, it was possible to obtain 40- to 60-percent yields of usable cuttings from No. 2 Common lumber. Hardwood picnic tables proved to be so

advantageous that the Crab Orchard National Wildlife Refuge, Fish and Wildlife Service, U. S. Department of Interior, installed 225 of them made from southern Illinois hardwoods on their grounds. The tables are also being used extensively on area National Forests that participated in the testing phase of this study. After a successful service test of native treated and untreated hickory seat slats at Southern Illinois University's McAndrew Stadium (fig. 27), the Physical Plant staff decided to replace all the slats in the stadium with hickory. Forest Service wood slat outdoor benches were used extensively at SIU to demonstrate how attractive and durable hardwoods can be. Six years of intensive research on sign substrates and finishes sponsored by the National Forest System Division of Engineering resulted in an estimated savings of \$1 million per year over a 4-year period.

Figure 27. Robert W. Merz, Utilization Project Leader, and James T. Micklewright, Technologist, examine the fastening method used for installing new seat slats of native hickory lumber in Southern Illinois University's McAndrew Stadium. This cooperative test installation was designed to compare the durability of native treated and untreated hickory seat slats with untreated Douglas-fir slats commonly used in outdoor stadium seats (photograph courtesy Southern Illinois University).



Another comprehensive study was made, in cooperation with the Forest Products Laboratory at Madison, Wisconsin, specifically for users of hard maple lumber. The objective was to find out whether it was possible and practical to develop and apply computer-generated alignment charts that determine which grade (or mixtures of grades) of lumber is best for producing specific dimension parts. Results have been found to be applicable for most other hardwoods. Industrial use of the charts is now widespread.

Many furniture and dimension firms use the charts for cost estimating and price quoting on orders, for predetermining the volume and grade or grades of rough lumber to process for orders, for spotting rough mill inefficiencies, and for standards for wage incentive programs. A modified version of the basic computer program has been used for developing new concepts; i.e., the Eastern Forest Products Laboratory at Ottawa, Ontario (Canada), has used it to optimize edging practices and to suggest better sawing patterns in the sawmill. Current projected research underway at the Forest Products Laboratory at Madison, Wisconsin, concerns designing new rough mill systems that will involve automatic lumber grading and cut-up based on defect location by sensing, as well as a new processing philosophy for the use of lower lumber grades. The alignment charts have now been computerized by the Forest Products Marketing Laboratory at Princeton, West Virginia (Northeastern Forest Experiment Station), and combined with linear program techniques. Forest Service State and Private Forestry specialists at Upper Darby, Pennsylvania, and Extension Specialists at Michigan State University have used these data as a base for a national rough mill improvement program. Field tests of the improved computer programs have been an unqualified success. A delivery system is the key—portable terminal units, suitable for industry use, are used to access the University of Michigan's central computer by telephone for instant and optimum results. Planning is now underway for developing the program and implementing it nationwide. The Laboratory at Carbondale is indebted to Mr. C. D. Dosker, who, when President of Gamble Bros. of Louisville, Kentucky, conceived and promoted the idea for this far-reaching research.

General

David E. Herrick, Project Leader of Utilization Research, transferred to the Washington Office September 21, 1958. Other Project Technologists assumed responsibilities for Primary and Secondary Utilization Research until a new Project Leader system of administration (described later) was begun at field offices in 1962. Then, Center Leader Robert Merz became Project Leader of all utilization research.

The long-range goal of the hardwood utilization project was to find new and more efficient ways to harvest and use the hardwood resource and thereby stimulate the lagging economy of southern Illinois and adjoining areas. The results of the research in tree grades, timber harvesting methods, sawmilling, seasoning, product development, and lumber yields have had wide application for timberland owners and operators and industry. The full impact of this program of forest utilization research is not yet known because interest continues almost a decade after the work emphasis has been changed. Requests for information on hardwood recreation

product development have been so persistent that the supply of published papers was exhausted; a new composite report, *Build Recreation Structures from Low-Grade Hardwoods*, was prepared to help fill the need for this type of information.

Marketing Research

After the utilization program began at Carbondale in 1952, it became apparent that a companion project was needed to study consumer preferences and acceptance, marketing channels, and the markets for hardwood products of all kinds. Carbondale was selected for the location of a new Market Development project because of the opportunity for an integrated utilization-marketing program pooling the talents and facilities of the Research Center and several departments of the University. The new project was to be an integral part of the research program of the Central States Station and would extend that program from the forest where the products are grown to the consumer who utilizes the finished wood product.

Edwin Kallio, formerly with the Minnesota Iron Range Resources and Rehabilitation Commission, Hibbing, Minnesota, joined the staff in September 1961 to head up the new marketing project. Jerry A. SESCO, a Junior Forester with the Oakmulgee Ranger District, Region 8, Forest Service at Centreville, Alabama, transferred to Carbondale in May 1963 to work with Kallio. And in January 1966 David C. Baumgartner, an Assistant Instructor in SIU's Forestry Department and a Ph.D. candidate in the Economics Department (the degree was granted in June 1973), joined the project.

The initial research program focused on evaluating the feasibility of expanding markets for the low-quality and little-used species of hardwoods that were abundant in the Central Hardwood Region. Several product-development studies focused on the market potential for specific hardwood products developed at Carbondale, including recreation structures, brick strip paneling, and various farm structures. Studies relating to wood-use trends in residential fencing and mobile homes were also conducted.

In addition to the support from Southern Illinois University, cooperative agreements with several other universities and organizations strengthened the program as it developed.

A NEW FOREST SERVICE STRUCTURE— HOW THE CARBONDALE RESEARCH CENTER BRIDGED THE GAP

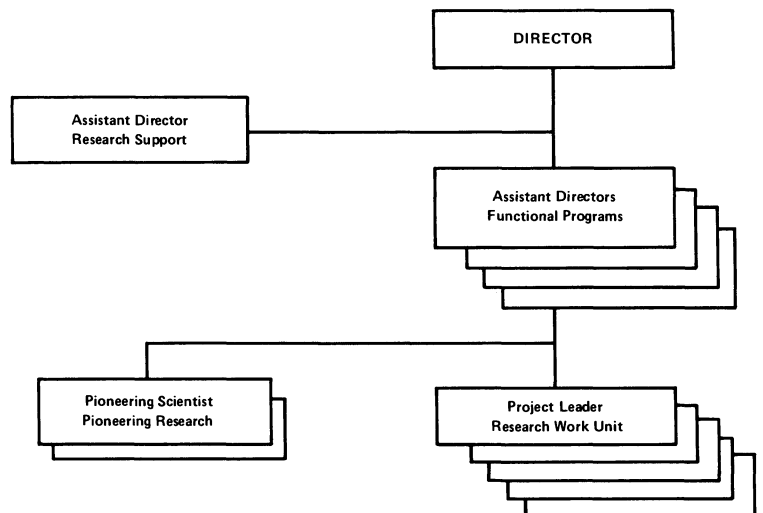
On January 25, 1960, the Forest Service Organization Study Committee submitted their report to Chief Richard E. McArdle

after a comprehensive Servicewide Organization Study. Changes in organizational patterns were recommended to correct major problems and accomplish Forest Service objectives in a more timely and economical manner. At the time of the report, research center leaders, reporting directly to experiment station directors, were responsible for conduct of one or more projects assigned to their centers, for research unit administration, and for external relations. Most centers, like Carbondale, had several project leaders, in different functional or scientific fields, assigned as subordinates to the center leader. Each Center had been charged with serving a specified geographical area and with solving the problems of the forest land managers (public and private) of the area.

The report recommended that Center programs be gradually modified until each Center would be working on the problem or set of related projects for which its location, facilities, and staff were best suited. Further, it recommended a new organization pattern for the conduct of the assigned research projects.

The Forest Service has, as its basic form of organization, a line and functional staff combination. Line responsibility carries authority for programming, directing, controlling, and issuance of policy to accomplish the delegated work. The functional staff members specialize in the technical aspects of the work. On July 26, 1960, the Chief announced his decisions concerning the Organization Study Committee report. In the Research arm of the Forest Service the new "line" authority (fig. 28) would extend from the Chief to station directors to division chiefs (or, later, assistant directors) to research project leaders in their respective fields of investigation located throughout the Station's territory (this line-staff organization concept would be altered again when the

Figure 28. Organization structure, Forest Service Research, Forest and Range Experiment Stations as modified after 1960 Organization Study.



technical and administrative burden became too great at the assistant director level and the need for more technical responsibility at the project leader level became apparent).

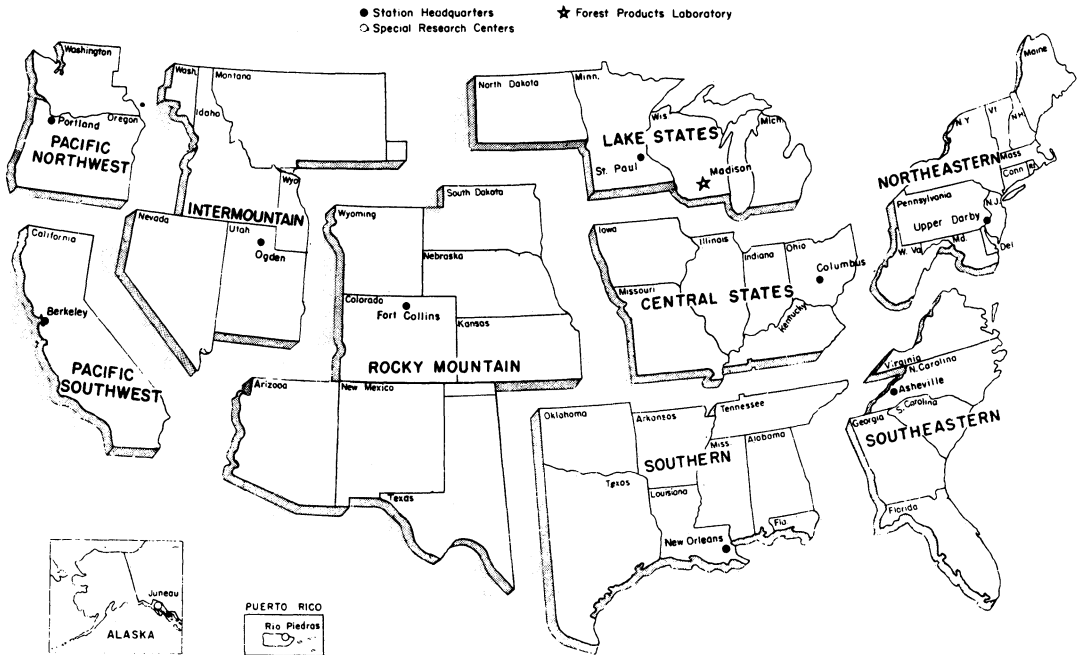
On April 16, 1962, Director Lane informed the Chief of the Station's progress in a transition from the research center leader pattern to the project leader system. And on July 27, 1962, he also informed the Carbondale Center of the changes made. The title "Research Center Leader" was discontinued, and Robert W. Merz became Project Leader for the Forest Products Utilization Project assigned to this location. Stephen G. Boyce became Project Leader of the Forest Management Research Project at Carbondale (combining the Regeneration and Tree Improvement Work and Forest Management work). No project leader position was immediately established for the new Marketing Project at Carbondale; but Edwin Kallio, who was assigned to that Project, became Project Leader September 29, 1963. A Genetics Project was approved for Carbondale in 1965 (described later). Each project leader was to report directly to the division chief at the Station level having overall responsibility for the projects to which they were assigned. Division Chiefs at the Central States Station became Assistant Directors in 1965.

A realignment of several Forest Experiment Stations followed the transition to the project leader system. Full responsibility for all Carbondale Projects was transferred from the closing Central States Forest Experiment Station to the newly incorporated North Central Forest Experiment Station on January 1, 1966 (fig. 29).

PERMANENT QUARTERS

Dr. William J. Tudor, Special Assistant to the Vice President at Southern Illinois University, appeared before the Senate Subcommittee on Appropriations for the Department of Interior and Related Agencies March 21, 1963, to present the first testimony favoring the construction of new research facilities. A prospectus for a new laboratory-office building was completed September 28, 1964. An appropriation of \$50,000 for the preparation of architectural and engineering plans was granted in the 1965 session of Congress. Fischer-Koscher-Bowden, a local architectural firm, was awarded a contract in March 1965 to complete the plans and submit them for approval to General Services Administration. In January 1965 Southern Illinois University leased to the Federal government for 99 years a 98- by 200-foot tract of land adjacent to its School of Agriculture Building upon which to build the laboratory. In 1966 the House-Senate Appropriations Conference Committee approved a \$690,000 appropriation for construction of the building; for General Services Administration and supervisory fees;

FOREST AND RANGE EXPERIMENT STATIONS AND FOREST PRODUCTS LABORATORY



FOREST SERVICE - U.S. DEPARTMENT OF AGRICULTURE FOREST AND RANGE EXPERIMENT STATIONS, FOREST PRODUCTS LABORATORY

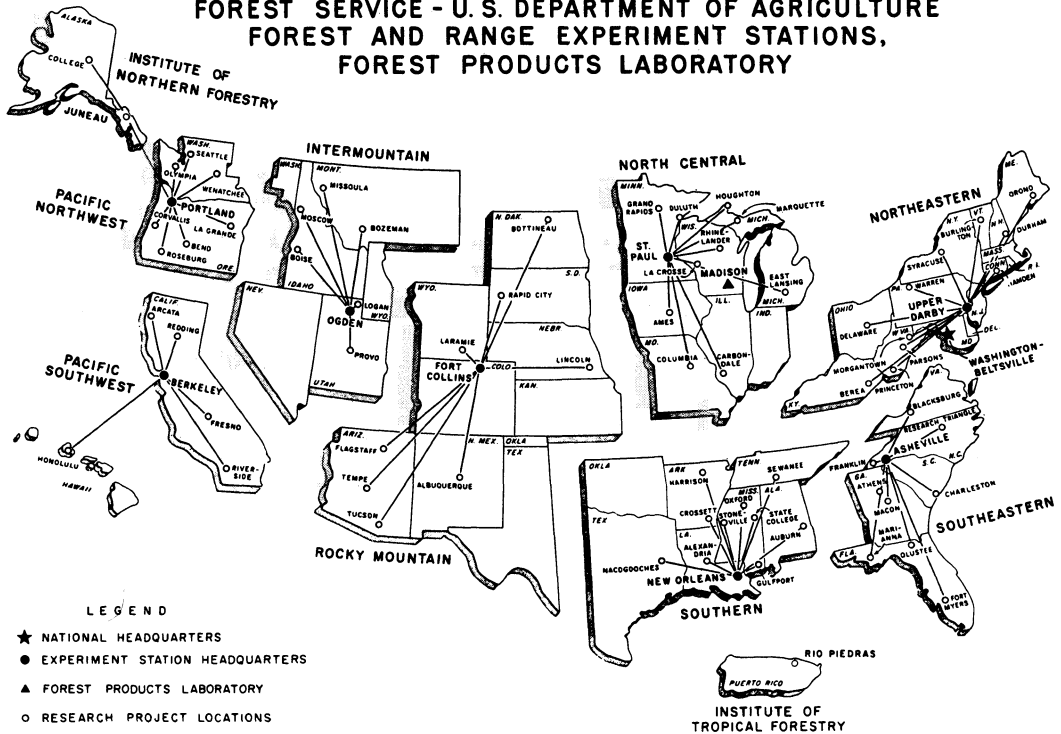


Figure 29. (Top) Forest and Range Experiment Stations and Forest Products Laboratory before realignment and (Bottom) after realignment.

and for some drainage, utility, and site work not included in the construction contract (fig. 30).



Figure 30. Donald H. Gott, American Walnut Manufacturers' Association; Senator Everett M. Dirksen of Illinois; and Dr. William J. Tudor, Southern Illinois University, appearing before the Senate Subcommittee of the Committee on Appropriations for the Department of Interior and Related Agencies to present testimony favoring the construction of new research facilities for the Forest Service's Carbondale, Illinois, Field Office March 16, 1966. Dr. Tudor, a public relations and Congressional liaison for SIU, appeared before the Subcommittee on Appropriations many times favoring a stronger Forest Service research program. On one occasion he appeared for the express purpose of thanking the Subcommittee for money already appropriated and to explain how the appropriation was being spent. The Congressional Record shows that Senator Carl T. Hayden of Arizona interrupted Dr. Tudor to say that, to his knowledge, this was the first time in history someone had appeared before the Subcommittee and had not asked for money.

The plans were approved by GSA and the contract was awarded June 22, 1967, to R. and R. Construction Co. of Alton, Illinois, with the provision that it be completed within 350 days after construction started. Workmen were still putting the finishing touches to the Forestry Sciences Laboratory (fig. 31) as the staff of scientists, technicians, secretaries, and clerks of the Carbondale Field Office moved in during the week of October 14, 1968. This new technical facility, with its specialized laboratories (fig. 32) and equipment rooms, also demonstrates the beauty and functionality of native hardwood timber. Twelve species are featured in the office wall paneling. One wall of the main lobby is lined with tiles from the bark of cork oak (*Quercus suber* L.) native to the northern shores of the Mediterranean Sea. Lichens growing on the cork have made a "living wall" which attracts a great deal of interest (fig. 33).

Figure 31. The Forestry Sciences Laboratory at SIU-Carbondale.

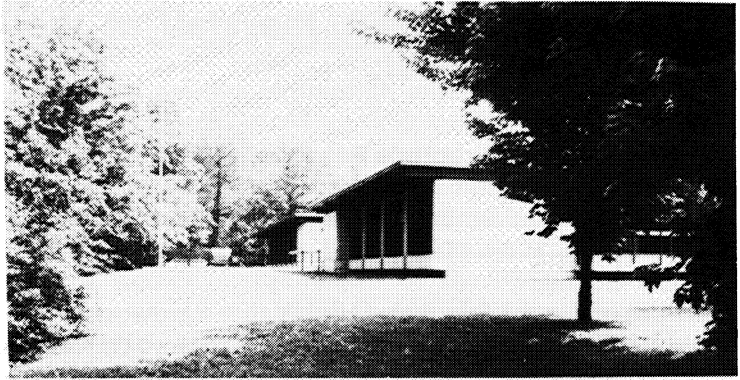


Figure 32. Scientists, technicians, and student workers use the well equipped basement laboratories to carry on a variety of research studies. Here, Glenn A. Cooper, Hardwood Processing Research Work Unit scientist, is using the Soxhlet extractive apparatus in a black walnut extractives study in the Wood Processing Lab.

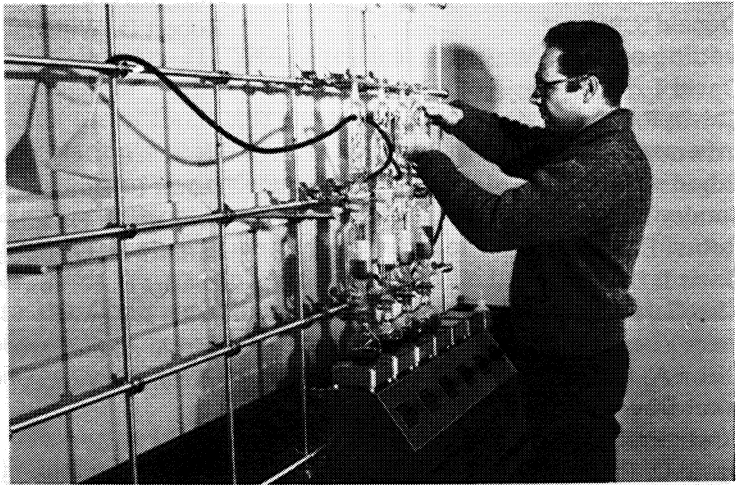


Figure 33. Eugene F. Landt, Project Leader of the Hardwood Processing Research Work Unit, and Harold A. Stewart, Project scientist, examining the Laboratory's "living wall."



As of September 1968, the staff at the Carbondale Field Location consisted of:

Director's Representative: Eugene F. Landt

Soil and Water Requirements for High-Value Hardwoods

Craig K. Losche, Project Leader

F. Danny McBride

Silviculture of Black Walnut and High-Value Hardwoods

Robert E. Phares, Project Leader

Darrell E. Alley

Martha K. Dillow

John E. Krajicek

Donald S. Nagel*

Clifford O. Nashland**

Lawrence E. Rendleman**

Millard R. Spivey**

Ray Vinyard

Robert D. Williams*

Breeding of Black Walnut

David T. Funk, Project Leader

Calvin F. Bey

Hardwood Processing

Eugene F. Landt, Project Leader

Stanley H. Barham***

Robert E. Bodkin***

Doris J. Brown

Cleo Caraway

Peter Yuen San Chen

Glenn A. Cooper, Jr.***

Daniel E. Dunmire III***

Kenneth D. Gaddis***

Barbara A. Gualdoni

Charles E. Helton***

Helen J. Lewey

Harold A. Stewart***

Leonard I. Yancey***

Market Development

Edwin Kallio, Project Leader

David C. Baumgartner

Jerry A. SESCO

*Located at Bedford, Indiana.

**Located at Elizabethtown, Illinois.

***Located at Carterville, Illinois.

NEW PROJECT MISSIONS

Dramatic changes in research missions at Carbondale were presaged by a series of events. A growth in Federal activities and peacetime spending during the postwar years necessitated a new approach to program planning and budgeting. The movement toward a program-oriented budget gained impetus with a recommendation from the Hoover Commission in 1949 and was made a legislative requirement by the National Security Act Amendments of 1949 and the Budget and Accounting Procedures Act of 1950. After several years in the developmental stage, a model system for translating strategic requirements into budgetary requests was put into effect in the Department of Defense in 1961 by Secretary Robert S. McNamara.

On January 31, 1964, President Lyndon B. Johnson, in his message on Agriculture, outlined to the Congress his views on better use of forest land and resources as a means of strengthening the Nation's economy. He directed the U. S. Department of Agriculture "to accelerate forest research to find new methods of wood utilization, better timber management techniques, improved fire protection, and more effective use of forest ranges." On April 15, 1964, Secretary of Agriculture Orville L. Freeman transmitted to the Congress a timely report entitled "A National Forestry Research Program" that outlined a balanced program of research in the major forest resource problems facing the Nation.

In August 1965, encouraged by the results of the Planning, Programming, Budgeting System (PPBS) in the Defense Department, President Johnson ordered that all Federal agencies develop their own PPB Systems expressly designed to improve the evaluation of Federal expenditures. On October 27, 1965, Secretary Freeman's Memorandum No. 1589 directed each of the Department's eight largest agencies, including the Forest Service, to take immediate steps to assist him in the establishment of the PPB System in the USDA. Program budgeting and long-range program planning had been familiar management tools in the USDA for many years, and long-range program planning was a well established practice in some of its constituent agencies, notably the Forest Service. But the advent of PPBS did signal a new evolutionary stage in the development of program planning and budgeting in the Department. The major changes occurred in four areas including (1) the development of a comprehensive program planning framework covering all USDA activities, (2) the introduction of Program Planning Committees—sometimes referred to as Program Task Forces—at the Department level, (3) the expanded and intensified use of systematic program analysis, and (4) the preparation of documented 5-year program and financial plans.

In October 1966 a "National Program of Research for Agriculture" was completed by a USDA-State Agricultural Experiment Station task force. It included an inventory of work in Fiscal Year 1965 and recommended allocations of resources for agricultural research in 1972 and 1977. This report was the first step toward a nationwide revision of the Forest Service research program. All currently active and proposed line projects had to be reviewed in relation to the 28 forestry research problem area goals and descriptions in the report. Project locations, possible consolidations, revisions, changes in number of scientists, and other modifications were considered in the program development. The research program at Carbondale underwent several changes (outlined on the following pages) that would make this unit a Forest Service center for hardwood research with emphasis on a strong specialization and competence in walnut research.

**Soil and Water
Requirements for
Black Walnut
and Other
High-Value
Hardwoods
(Research
Work Unit
FS-NC-1107)**

One project relocation, made essentially for economic reasons, was that of the Central States Project, "Silviculture of Upland Hardwoods with Emphasis on Site Evaluation and Methods of Controlling Undesirable Vegetation." This project was terminated at Athens, Ohio, and transferred to Carbondale. Project Leader Willard H. Carmean transferred to Carbondale April 25, 1965, to head up the Carbondale project. The proposed work of this revised project was to relate closely to the walnut culture project at Carbondale (FS-NC-1108 described later).

Before research can be started on any assignment, a Research Work Unit Description, the key document outlining the results of the program formulation process, must be developed and approved jointly by the Station involved and the Washington Office. The Description states the mission, selected problems, approach, and related aspects of the research assignment. It is a flexible program guide that can be revised as needed to permit the research to be currently aimed at high-priority problems. A new Research Work Unit Description for this project, approved January 24, 1967, outlined a 5-year program aimed at providing basic knowledge on the soils and water required for the culture of black walnut and other high-value hardwoods used for timber and related products. Craig K. Losche, formerly a soil scientist with the National Forest System, came to Carbondale April 12, 1967, and filled the Project Leader position when Carmean transferred to North Central Station headquarters at St. Paul, Minnesota, July 16, 1967.

The first job of this project was to identify and describe good sites for black walnut. By 1969 the Work Unit had soil-site data for 60 plantation plots in southern Illinois; most of the plots were established in cooperation with the Shawnee National Forest. From this research, prediction equations were developed for Illinois that

provide a firm basis for walnut site selection. However, because of the variability in the data, extension of results to adjacent areas through suitability tests seemed of doubtful value.

When soil-site research was discontinued, emphasis turned to cultural operations in both planted and natural stands. Close working relations with Project 1108 would be essential. With the combination of Projects 1107 and 1108, a multidisciplinary approach to correlated problems could be taken. Timber Management Research Assistant Director F. Bryan Clark, in the February 17, 1970, report to the Director of his functional supervision visit of Project 1107, recommended that this action be taken. Station Director David B. King and Branch Chief Karl F. Wenger of the Washington Office concurred. The new consolidated unit was activated July 1, 1970. A revised Research Work Unit Description for FS-NC-1108 incorporated the soils research work, and Losche was reassigned to the combined unit November 29, 1970.

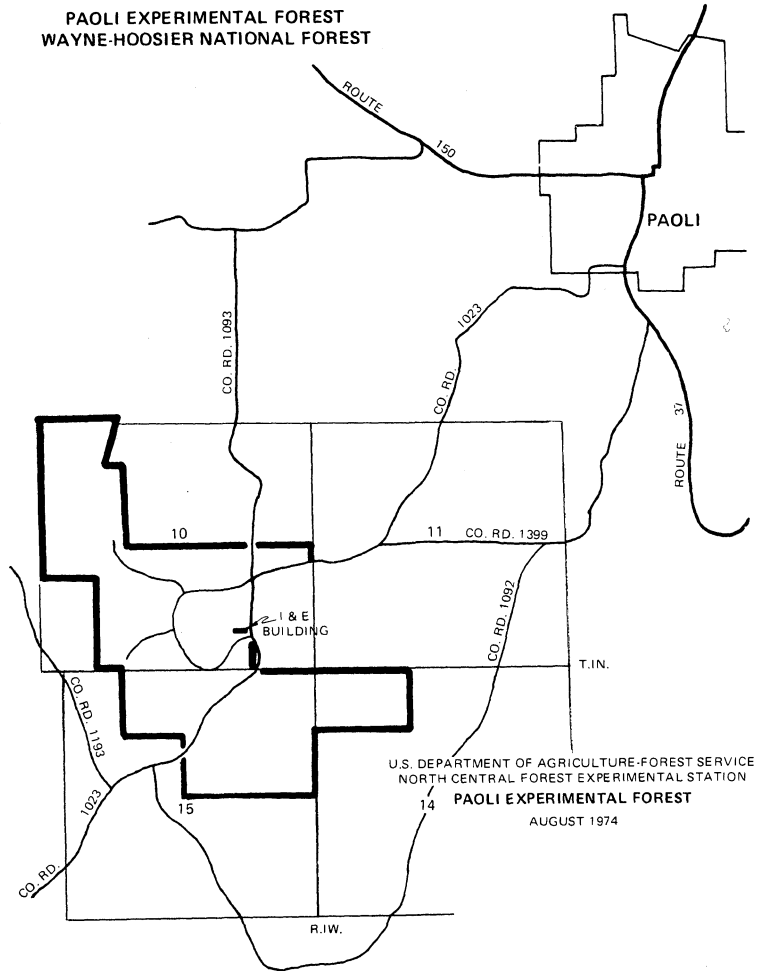
**Silviculture of
Black Walnut and
Other Fine
Hardwoods
(Research
Work Unit
FS-NC-1108)**

In June 1964 F. Bryan Clark, who had been Project Leader at the Bedford, Indiana, field office, came to Carbondale to fill the Project Leader position vacated by Boyce when he transferred to the Station headquarters at Columbus, Ohio. On May 9, 1965, David T. Funk, who had filled Clark's position at Bedford, was reassigned to the Forest Management Project at Carbondale. At the same time, Robert D. Williams, the only scientist remaining at Bedford, was also reassigned to the FM Project at Carbondale but was to remain at the Bedford field location.

On March 11, 1963, Chief Edward P. Cliff had issued an order establishing the Paoli Experimental Forest in an area 26 miles from the research field office at Bedford on the Tell City Ranger District of the Wayne-Hoosier National Forest. Thus, the reassignment in May 1965 of the Bedford field location to Carbondale gave the Forest Management Project here another "outdoor laboratory" (fig. 34).

The combined upland hardwood silviculture projects at Bedford and Carbondale were to have new scope and purpose. A Research Work Unit Description for Silviculture of Black Walnut and Other Fine Hardwoods was approved February 21, 1967. The mission of this Work Unit was to determine how to establish plantations, encourage natural regeneration, and improve growth and quality of immature black walnut and other fine hardwood trees on a wide range of sites for the production of high-quality timber and other related products. The area of research applicability is the Eastern Hardwood Region (commercial black walnut range).

Figure 34. The Paoli Experimental Forest area on the Wayne-Hoosier National Forest, a 612-acre tract particularly suited to long-term silvicultural and forest management studies.



Project Leader Clark became Assistant Director of Timber Management Research at St. Paul January 28, 1968; and Robert E. Phares came from the Ames, Iowa, field office to Carbondale as Project Leader February 25, 1968. Leon S. Minckler retired in September 1968 to take a teaching position at Virginia Polytechnic Institute, Blacksburg, Virginia; Richard C. Schlesinger was hired to fill his vacated position June 27, 1969.

After the soils research program (described previously) was combined with this Work Unit in 1970, the Research Work Unit Description was revised and approved December 14, 1970.

A new soil survey of Pope, Hardin, and Massac Counties (which included the Kaskaskia Experimental Forest area) was completed in 1970 by the Soil Conservation Service. This new information will assist the Carbondale silvicultural staff in planning the layout of

study areas for high-value hardwood research on the Experimental Forest.

This project and the genetics project described later used a team approach in developing new and improved cultural methods for growing black walnut and other fine hardwoods (fig. 35). Historically, the planting of hardwoods has been rather unsuccessful. Research has shown that early failures were the result of poor choice of planting sites, unsuitable planting stock, and failure to recognize the importance of weed control and other cultural practices during the early establishment of the plantations. Detailed soil-site studies mentioned earlier provided basic information on which soils are likely to be most productive for black walnut. Several studies showed that planting stock must meet minimum size standards if best results are to be obtained. And an active nursery research program helped nurseries produce enough high-quality seedlings to keep up with increasing demand and

Figure 35. Donald H. Gott, American Walnut Manufacturers' Association; Stephen G. Boyce, Washington Office Division of Timber Management Research; and Chief Edward P. Cliff (left to right) during the 1966 Walnut Workshop tour. They are inspecting the oldest walnut plantation at the Kaskaskia Experimental Forest established in 1963 to study the effect of fertilizing on early flowering. The subject of interest is the largest tree in the plantation, which has been dubbed "The Don Gott Memorial Tree."



**Breeding of
Black Walnut and
Other High-Value
Hardwoods
(Research
Work Unit
FS-NC-1402)**

resulted in the publication of a U. S. Department of Agriculture Handbook entitled *Hardwood Nurseryman's Guide*. Planting failures are now the exception rather than the rule, and the growth of black walnut plantations is two to three times as great as was customary before this research program was begun.

In November 1974 Robert Phares transferred to the Washington Office as Timber Management Staff Assistant, and Craig Losche transferred to the Rocky Mountain Region of the National Forest System at Denver, Colorado. John Krajicek retired in December 1974 to become Forester and Sawmill Manager for the Amana Society at Amana, Iowa.

A genetics project for the Carbondale field office was approved in the Washington Office on November 23, 1965. David T. Funk, who joined the staff of the Forest Management Research project at Carbondale in May 1965, was assigned to the new genetics project in December. Calvin F. Bey, who had been with the FMR project at Carbondale since July 2, 1962 (on educational leave at Iowa State University from September 1, 1963, to July 1, 1966), was reassigned to the genetics project August 30, 1966. Funk went on educational leave at Michigan State University September 25, 1966. It was not until July 1967 that the two men were assigned to the project full-time. Funk was designated Project Leader December 15, 1967; and F. Bryan Clark, FMR Project Leader, was relieved of responsibility for this project at the same time. The Research Work Unit Description for this new project was approved December 14, 1970. The specific project mission was to provide basic genetic knowledge required for the breeding of superior varieties of black walnut for timber products and to breed and release superior varieties.

Much effort centered on the development of another major new cooperative research facility. The lease negotiated with Southern Illinois University in January 1965 for Tract No. 1 for the new Forestry Sciences Laboratory also included Tract No. 2 for a Tree Improvement Center, a 43-acre tract in the University Experimental Farm area. Facilities include a 3-acre pond and pump-house to provide irrigation water, a storage building containing two walk-in coolers, and a shade house. A headhouse-greenhouse complex, jointly financed by the Forest Service (a supplement to the Cooperative Agreement with SIU provided \$45,000 for this project) and Southern Illinois University, was completed in November 1967 to be used for research by both agencies (fig. 36).

This new facility was formally dedicated August 2, 1966 (fig. 37) as part of the program of a 3-day Black Walnut Culture Workshop sponsored by the Forest Service, Southern Illinois University, and the American Walnut Manufacturers' Association.



Figure 36. The headhouse-greenhouse complex at the Tree Improvement Center, which is better known as "The Ranch."

Figure 37. Chief Edward P. Cliff wields a shovel in planting a hybrid walnut tree during dedication of the Tree Improvement Center at SIU's Farms near Carbondale August 2, 1966. The dedication was part of a 3-day Black Walnut Culture Workshop conducted in cooperation with the University and the American Walnut Manufacturers' Association (photograph courtesy Southern Illinois University).



**Culture, Genetics,
and Protection of
High-Value
Hardwoods
(Research
Work Unit
FS-NC-1151)**

Because of the shortage of walnut timber in the United States today, the primary purpose of this facility is to promote genetic improvement of walnuts. Various selections and species from different parts of the country and the world are being planted in the fields and in the greenhouses. Because Eastern black walnut is the most valuable species per board foot in the United States, it is being given particular attention. The aim is faster growth and better quality. The greenhouse is used for experiments in physiology and genetics, while breeding and seed orchard management studies are conducted in the field.

The project has now established several walnut seed orchards in cooperation with Midwestern State divisions of forestry, the National Forest System, and State and Private Forestry. Furthermore, with extensive help from numerous other cooperators, walnut seed has been collected in 26 States and 18 foreign countries, and experimental walnut plantations have been established in 17 States and 2 Canadian Provinces.

For some time a further consolidation of projects, in the interest of economy and efficiency, had been contemplated. After a General Functional Inspection by Washington Office Inspectors Krugman and Schultz in October 1974, a decision was made to combine all Timber Management Research Work Units at Carbondale. This multifunctional unit will combine the silvicultural and genetic research work units described previously (NC-1108 and 1402) and protection of high-value hardwoods from insects and disease (a new area of research for Carbondale). Insect and disease research, in relation to the management of high-value hardwoods, had been the "missing link" in the Carbondale program for some time and would aid researchers in their overall goal of faster and better quality growth of hardwoods.

The new Research Work Unit staff will include David Funk as Project Leader and Richard Schlesinger, Robert Williams, and Calvin Bey from the old silvicultural and genetic work units. Barbara C. Weber, an entomologist formerly with the Division of Plant Industry, Minnesota Department of Agriculture, St. Paul (and the first woman scientist at Carbondale), reported March 3, 1975, to research the protection of high-value hardwoods (fig. 38). Felix Ponder, a soil scientist formerly with the Jefferson National Forest, Roanoke, Virginia, reported for duty on June 8, 1975. And Plant Physiologist Willis J. Rietveld transferred from the Rocky Mountain Forest and Range Experiment Station, Flagstaff, Arizona, on March 1, 1976.

A new Research Work Unit Description was prepared to encompass the different disciplines. The Description was approved by the Washington Office March 12, 1976.

Figure 38. Project Leader David T. Funk and Entomologist Barbara C. Weber working in the Forestry Sciences Laboratory's beautiful Conference Room. This room features a 4-by 10-foot walnut veneer conference table made by a member company of the Fine Hardwoods-American Walnut Association and a windowed-wall with a cross-campus view.



**New and Improved
Systems, Methods,
and Techniques
for Processing
Hardwoods
(Research
Work Unit
FS-NC-3201)**

A revised Line Project Description was approved for the forest products utilization research project at Carbondale on November 23, 1966, and directed the efforts of this project toward improvement of hardwood processing systems. Products research became incidental.

Changes in the project staff were to occur also. Harold A. Stewart, a candidate for a Master's Degree from the University of Michigan (degree granted in April 1967), was hired May 8, 1966, for wood machining research. Robert W. Merz, who had been utilization Project Leader since 1962, accepted an Assistant Director position at the North Central Station effective August 1, 1967; and Eugene F. Landt, of the Washington Office Division of Forest Products and Engineering Research, replaced Merz as Project Leader November 5, 1967. Dr. William W. Rice, Superintendent-Instructor at the Wood Pilot Plant since November 1954, accepted a position at the University of Massachusetts in August 1967. Glenn A. Cooper, a Technologist with the project since June 10, 1959, took 1 year of educational leave in the fall of 1967 to be retrained at the University of Minnesota in wood drying. Peter Y. S. Chen, a Ph.D. candidate at the University of Minnesota (degree granted in June 1968), was hired March 24, 1968, to work on wood permeability. Daniel E. Dunmire, who had been with the project since June 10, 1957, transferred to State and Private Forestry, Upper Darby, Pennsylvania, March 23, 1969. And Howard N. Rosen, a Research Chemical Engineer with a Ph.D. degree from Northwestern University, was hired November 2, 1970, to apply engineering principles to wood stabilization problems.

The Station had successfully reoriented the emphasis of this Work Unit from one of hardwood product development to a well rounded, more basic program involving hardwood processing. The product development research showed how well some hardwoods could serve in products formerly made exclusively from more expensive softwoods. The hardwood processing research demonstrated how wood use could be extended.

As recognition of scientific achievement in one phase of the new processing research, the first United States Patent issued to a Carbondale scientist was presented to Glenn A. Cooper (and Physical Science Technician Stanley H. Barham) on June 25, 1974, for developing a new method of "Reducing Defects in Kiln Drying Lumber."

In response to recommendations made in the 1971 General Functional Inspection by Washington Office Inspectors Zerbe, Kotok, and Drow, the Research Work Unit Description was revised to include a highly specialized program of research and development on three problem areas (pretreatment, dryers, and machining) within a framework geared to the next 5 years. The mission (approved February 26, 1974) is to develop new and improved processes and conversion systems, reduce processing costs in the hardwood products industries, and extend the supply of high-value and high-quality hardwood timber. The team approach to this series of inter-related problems will culminate in a pilot plant demonstration of an economically feasible, rapid, hardwood dimension-part processing system (RAPRO).

In June 1973 Landt retired from the Forest Service and became a Utilization and Marketing Specialist for the Wisconsin Department of Natural Resources. Glenn Cooper served as Project Leader until August 1974, when he transferred to the Washington Office Division of Forest Products and Engineering Research. Frank E. Biltonen, a Research Industrial Engineer with the Station's Forest Engineering Laboratory at Houghton, Michigan, became Project Leader January 5, 1975 (fig. 39).

After the realignment with North Central Station, the Marketing Research Project shifted its program to evaluating the National market for farm and recreational structures. Specific attention was directed toward evaluating trends in all types of construction materials used, as well as in basic characteristics of the structures and methods of construction. A Research Work Unit Description was approved October 29, 1968. The Work Unit mission was to develop market opportunities for wood use in farm and recreation structures and to improve forest products marketing in the Central Hardwood Region.

Project Leader Kallio transferred to the Duluth, Minnesota, field office of the North Central Station June 15, 1969; and Ronald D.

**Improvement of
Forest Products,
Markets,
and Marketing
Practices
in the Central
Hardwood Region
(Research
Work Unit
FS-NC-4202)**

Figure 39. Project Leader Frank E. Biltonen in his office at the forestry Sciences Laboratory, which features a red oak paneled wall and decorative display panels demonstrating the potential of wood residue.



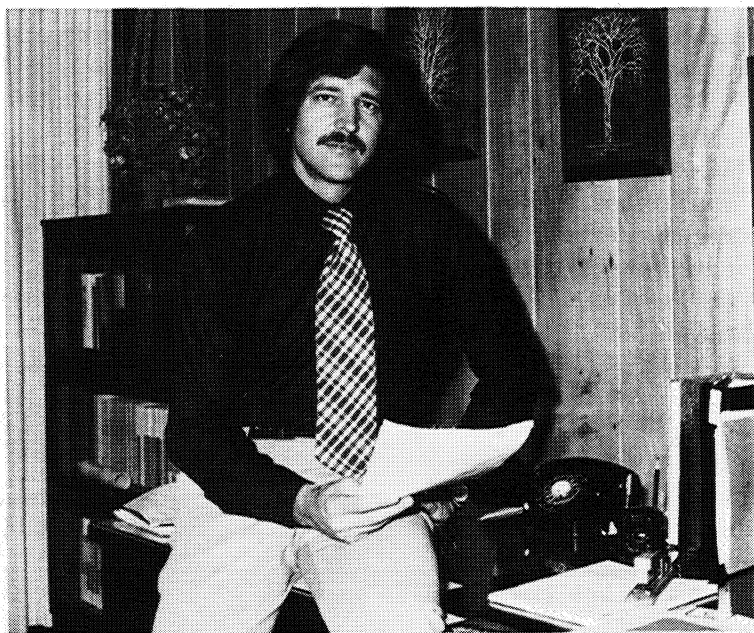
Lindmark, from Duluth, came to Carbondale June 29, 1969, to become the new Project Leader. Lindmark was granted his Ph.D. in Agricultural Economics and Rural Sociology from The Ohio State University in June 1971.

After a General Functional Inspection of the Work Unit in August 1972 and a General Research Inspection in September, it was decided to revise the Work Unit Description and redirect the Unit's work toward problems relating to the region's emerging pulp and paper industry, to the changing forest and associated land-use and management patterns, and to the use of wood residues.

In October 1974 Lindmark became Assistant Director for Planning and Application at the Intermountain Forest Experiment Station. Jerry SESCO, who received his Ph.D. in Economics from Southern Illinois University in August 1974, became the new Project Leader in November (fig. 40).

A new Research Work Unit Description was approved in the Washington Office August 16, 1976. The mission is to evaluate the impacts and implications of an expanding pulp and paper industry and changing forest and associated land management patterns on the timber related economy, and determine the market opportunities for selected forest products, including wood residues, in the lower North Central Region.

Figure 40. Project Leader Jerry A. Secso in his Laboratory office, which features a sycamore paneled wall enhanced by attractive wall hangings.



**Palzo
Reclamation
Project
(Sewage Disposal
on Forest and
Associated Lands,
Research
Work Unit
FS-NC-1651,
East Lansing,
Michigan)**

The Station's continuing involvement with problems associated with reclamation of strip-mined land is represented by a new project. On February 16, 1972, a meeting was held in Carbondale to develop a coordinated research program on the so-called Palzo Tract of the Shawnee National Forest, an area located in Williamson County, 6 miles southeast of Crab Orchard, Illinois. This surface-mined tract of 300 acres was purchased by the Forest Service in 1967 after the removal of two coal seams. Since that time revegetation efforts have been almost totally unsuccessful on the ungraded acid spoil. In addition to the unproductive condition and unacceptable appearance of this land, the drainage water from the area is polluting Sugar Creek, a nearby stream. The Shawnee National Forest began a project to rehabilitate the Palzo Tract to a productive condition and to stop the drainage of pollutants from the area into Sugar Creek.

Treated municipal waste (anaerobically digested sewage sludge) has some of the nutrients essential for plant growth and will reduce acidity of spoil by the addition of basic cations. The goal of this project is to safely utilize this sludge to reclaim extremely acid and toxic strip-mined land. If this goal is accomplished, it will demonstrate the solution of two pressing environmental problems: (1) how to recycle urban wastes back to the land rather than dump them into streams, lakes, and oceans or bury them; and (2) how to reclaim barren strip-mined land that is polluting our streams and return it to a productive status.

A Palzo Research Coordination Group was organized with representatives from several area agencies (the Shawnee National Forest, the North Central Forest Experiment Station, Southern Illinois University, the Illinois Agricultural Experiment Station, and the Illinois Environmental Protection Agency). The North Central Station is chairing the group, which is coordinating all research activities with members of the Carbondale Timber Management staff working with Dean Urie, Project Leader at the East Lansing, Michigan, field office on this project.

A STATE & PRIVATE FORESTRY FIELD OFFICE AT CARBONDALE— A NEW DIMENSION

Resource Use and Management (Northeastern Area, State & Private Forestry)

As a result of the Forest Service reorganization, the new Northeastern Area State & Private Forestry division of the Forest Service at Upper Darby, Pennsylvania, set up several project locations in a 20-State area, one of which was in Carbondale. The first three staff members were John K. Brownell, who reported in May 1966 from Region 9, Milwaukee, Wisconsin; George R. Niskala, who came in April 1967 from the Defense Construction Supply Center, Columbus, Ohio; and Burl S. Ashley, who came from the Ohio Division of Forestry in May 1968. Their mission in the functional division of Cooperative Forest Management was to work through the State foresters to help primary and secondary wood-using industries and to cooperate with the Research arm of the Forest Service and other agencies working for the same purpose. They were quartered in a temporary office near the Research staff offices in the Agriculture Building until the Research staff moved to the new Forestry Sciences Laboratory in October 1968.

By 1971 it was apparent that a modification of the S&PF organization was necessary to enable it to discharge its added responsibilities. Within the Northeastern Area, five field offices, including the one at Carbondale, were reorganized into multi-functional units to facilitate closer on-the-ground technical assistance through subject matter specialists. The Area was organized into three major units: (1) Resource Use and Management, (2) Environmental Protection and Improvement, and (3) Organization Management and Related Assistance. Specialists assigned to the Resource Use and Management (RUM) Unit at Carbondale provided technical and consultive services to State and private leaders involved in cooperative forestry programs and related activities. Their services included Resource Planning, Resource Management, and Resource Use in five States—Illinois, Indiana, Iowa, Missouri, and Ohio.

John Brownell retired in April 1971; and William C. Troxel transferred from the Des Moines, Iowa, S&PF field office in June 1971 to serve as Director's Coordinator of the entire RUM Unit and to work as a Resource Planning specialist. Other specialists in his Group were Alan E. Pigg, who transferred from Research to S&PF as a full-time employee in August 1972, and Charles E. Gresham, who transferred from the Atlanta, Georgia, S&PF office in October 1972. Horace A. Lucas, who transferred from the Upper Darby office in February 1971, served as a Resource Planning specialist until he retired in June 1972; Glenn A. Roloff, who came from Region 5 of the National Forest System at San Francisco, California, in May 1971, worked in this Group until September 1974 when he transferred to Region 1 at Missoula, Montana; and Thomas M. Welsch, who came from the Corps of Engineers at Kansas City, Missouri, in November 1974, transferred to the St. Paul, Minnesota, field office in July 1975. Major efforts of the Resource Planning Group were river basin studies, the small watershed program, the resource conservation and development program, and Corps of Engineer projects.

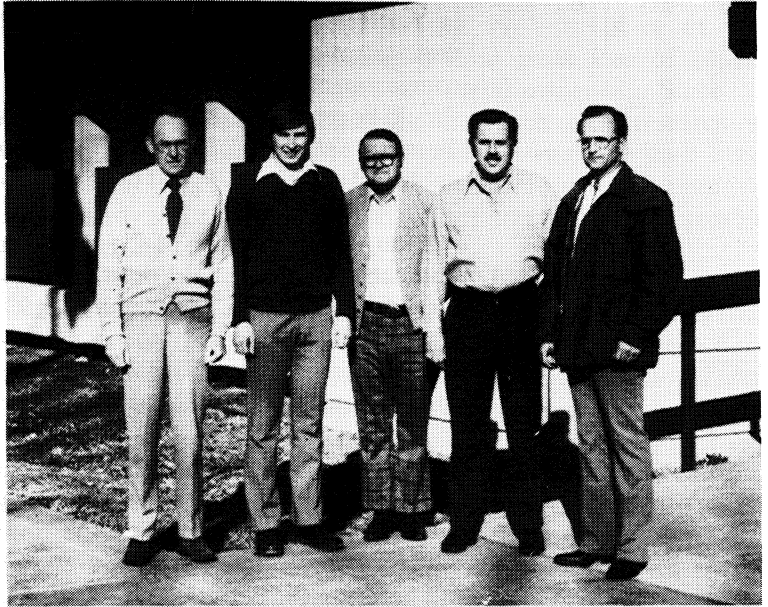
Burl Ashley, the Resource Management specialist, provided services and advice in silviculture, tree nurseries and planting, tree genetics, forestry incentives, urban and community forestry, general forestry assistance projects, wild and scenic river studies, and large forest property management. Burl was also charged specifically with the dissemination of research information on black walnut.

Research implementation was an important part of the Resource Use specialist, George Niskala. In addition, technical assistance was provided to industry, in conjunction with the State Forester's staff; to loggers; and to primary and secondary processors.

The cohesive working force of Research scientists and S&PF specialists at the Forestry Sciences Laboratory successfully filled the growing need for specialized technical advice and service.

Then, in 1975 a national program of austerity and the need for increased management efficiency prompted the reduction in S&PF field offices from five to three. The Carbondale field office was notified December 30, 1975, by Director Robert D. Raisch, North-eastern Area, S&PF, Upper Darby, Pennsylvania, of the impending closure of the office and transfer of personnel (fig. 41). Burl Ashley, Charles Gresham, and Alan Pigg transferred to the S&PF field office at Morgantown, West Virginia, in May and June 1976. George Niskala transferred to the NEA, S&PF headquarters office in Upper Darby, Pennsylvania, in June. William Troxel, the Director's Coordinator at Carbondale, transferred to the Malheur National Forest, Region 6, John Day, Oregon, in June. And the

Figure 41. The S&PF technical staff shortly before their departure from the Laboratory at Carbondale: Left to right: Burl S. Ashley, Alan E. Pigg, Charles E. Gresham, George Niskala, and William C. Troxel.



S&PF office at Carbondale, which had been an effective force in the dissemination of Laboratory research results, was officially closed as of June 30, 1976.

A LOOK AT OLD VALUES IN THE LIGHT OF NEW NEEDS— A CATALYST FOR CHANGE AT CARBONDALE

The Forest Management Compartment Studies— Their Potential

In December 1968, in response to recommendations from a 1965 Functional Research Inspection and a 1966 operational review of the Kaskaskia Experimental Forest, a technical review (by staff members from the Washington Office, Region 9, the North Central Station, the Northeastern Station, the Shawnee National Forest, the Illinois Division of Forestry, Southern Illinois University, and the University of Illinois) of the comprehensive forest management compartment system was made. The reviewers agreed that treatment in the compartments should be suspended. The general consensus of the group was that the study had outlived its usefulness, that the management variables of rotation length and cutting cycle were mainly economic and thus subject to change, and that more information was needed on tree quality but that the compartment study would not provide this information. A plan for closing the study was approved by Acting Deputy Chief Dickerman of Research in February 1969. After an additional review of the study

in April 1974, it was decided that the value of the area for demonstration purposes was limited but that one or two of the compartments in which group selection silviculture was practiced should be retained as demonstrational areas. A final report, *Sixteen Years of Selection Silviculture in Upland Hardwood Stands*, was published early in 1976; and the study was closed in June.

After the deactivation of the management research studies at the Kaskaskia Experimental Forest, the sawmill located at the Forest was declared surplus. On March 18, 1971, it was transferred to the University of Georgia at Athens, where it will be used for teaching and demonstrational purposes. The building at the Kaskaskia which housed the sawmill was removed in March 1973.

The Experimental Forest Areas— and Beyond

The bottomland research on the Bootheel Experimental Area in southeast Missouri mentioned previously was phased out when (1) the assignment of species to the Southern Forest Experiment Station (specifically cottonwood and cherrybark oak) eliminated the need for further research on them here and (2) the Pemiscot Land and Timber Co. had a prospective buyer for a portion of the research area and requested a mutual cancellation of the agreement. The agreement was terminated November 1, 1965.

The report of the General Functional Inspection of administration at the North Central Station made by Washington Office Inspectors Anderson, Hanemann, Hice, and Prokop during the period May 19 to 29, 1969, included recommendations concerning review and possible adjustment of all land administered as experimental forests.

For some time, in order to get the variety of sites needed for current and planned silvicultural and genetic research, it had been necessary to get away from the Experimental Forests. Region-wide studies were intentionally planned to get a better sampling of location effects over the range of walnut, and the bulk of Carbondale's research programs were being conducted on land off the two Experimental Forests. The Supervisors of the Shawnee and the Wayne-Hoosier National Forests (the boundaries of which encompassed the Kaskaskia and the Paoli Experimental Forests) had cooperated fully in locating the specific sites needed for research and had made such areas readily available. Thus, there was decreasing justification for operating the Experimental Forests except to maintain older studies that still have research value.

The Kaskaskia Experimental Forest in Hardin County, Illinois, had been established in 1949 to provide an area generally representative of more than 4 million acres of upland hardwoods in the Central States for experimental and demonstrational purposes.

The boundaries established in the 1961 revision of the establishment report encompassed a total gross area of 10,245 acres, of which 3,313 acres were in Federal ownership. Since the 1961 revision of the establishment report, much of the research on the scattered tracts of land in Federal ownership had been completed. Furthermore, research missions had changed significantly since 1961, and much of the area had no foreseeable value to current research projects.

Chief Cliff signed on April 3, 1972, an order revising the boundaries of the Kaskaskia Experimental Forest to include only those areas where research is still in progress plus an additional area to meet foreseeable future needs. The boundary revisions outlined in this report reduced the gross area from 10,245 acres to 2,169 acres. All the land within the revised boundaries is Federally owned, so the net acreage is the same as the gross acreage (fig. 42).

With the decrease in research being conducted at the Kaskaskia at this time, the local staff had been reduced to two full-time technicians, Rendleman and Millard R. Spivey, and neither of them lived in the quarters maintained at the administrative site. An Informal Memorandum of Understanding was entered into on July 1, 1972, between the North Central Station and the Shawnee National Forest, in which the entire Administrative Site on the Kaskaskia, including all offices and associated buildings, was turned over to the Shawnee for future management and maintenance. The Understanding provided that certain buildings and related facilities would be available for use by the Station personnel for a fixed annual fee.

The Paoli Experimental Forest, particularly the southern block, contained several active studies, some of which would be maintained for several more years to protect long-term investments in studies in progress. Although there was private land on the west side of the Paoli Experimental Forest that could be useful to current research projects, there seemed to be no real justification at the time of the review and subsequent report for either increasing or decreasing Federal ownership for research in this area. At present, no further land adjustment for the Paoli is contemplated.

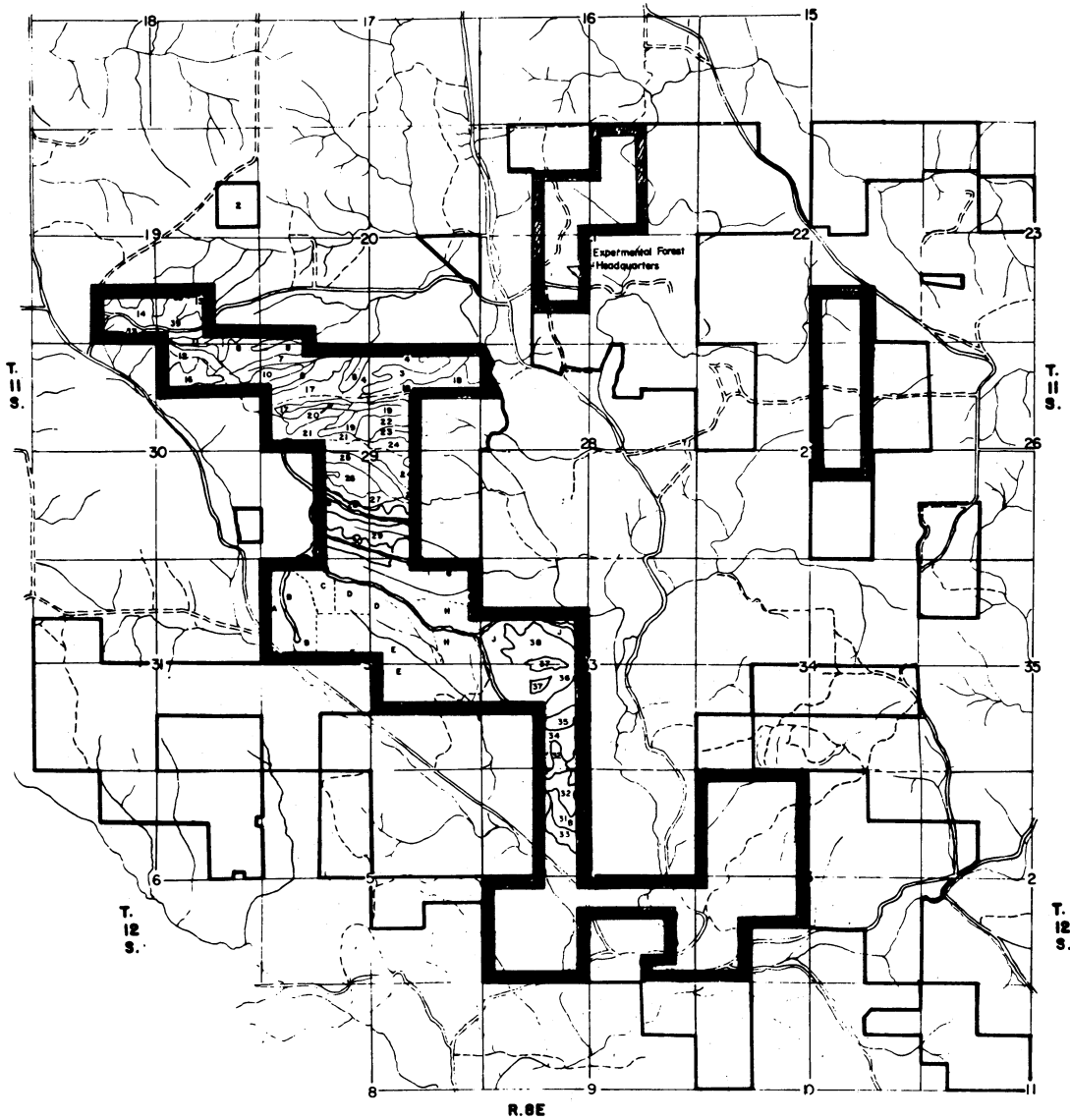
The Wood Processing Pilot Plant— Its Future

Since the joint establishment of the Wood Products Pilot Plant at the Vocational Technical Institute in November 1952, Southern Illinois University and the Forest Service have cooperated closely in the operation of the Pilot Plant. After the mission of Research Work Unit NC-3201 was changed in 1966 to hardwood processing, the work of the Pilot Plant changed and, although cooperation was still close, the VTI program did not participate as extensively in Forest Service projects as before. Then, in 1970, the Forest

KASKASKIA EXPERIMENTAL FOREST

SHAWNEE NATIONAL FOREST

R. 8E.



LEGEND

- | | |
|--------------------------|-------------------------------------|
| 1 THROUGH 40 | COMPARTMENT NUMBERS |
| BLOCKS-A,B,C,D,E,G,M,I,J | PILOT PLANT MANAGEMENT UNITS |
| ===== | ALL-WEATHER ROADS |
| - - - - - | TRACTOR ROADS |
| ~~~~~ | DRAINAGE CONTINUOUS FLOW |
| ~~~~~ | DRAINAGE STORM RUN-OFF |
| ===== | NATIONAL FOREST LANDS |
| ===== | KASKASKIA EXPERIMENTAL FOREST LANDS |

U.S. DEPARTMENT OF AGRICULTURE - FOREST SERVICE
 NORTH CENTRAL FOREST EXPERIMENT STATION
KASKASKIA EXPERIMENTAL FOREST
 REVISED - 1971

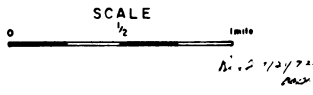


Figure 42. The 1971 Revised boundaries of the Kaskaskia Experimental Forest.

Products Technology Course at VTI was closed due to lack of students. However, the University continued to use the Pilot Plant for classes in a building construction program.

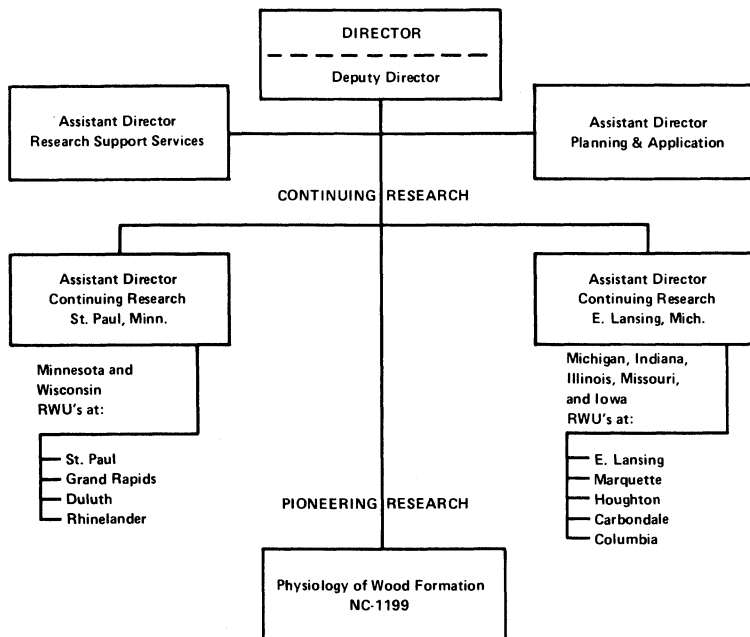
In the spring of 1971 the SIU Board of Trustees announced that all of VTI (now School of Technical Careers) would be moved to the Carbondale campus within 4 or 5 years. Plans have been made for the construction of a new School of Technical Careers on the Carbondale campus as the fourth segment of the Engineering and Technology complex. Some STC courses have already moved into Carbondale, but all courses that require the use of heavy equipment in the four buildings on the Carterville campus will remain there until the new STC building is completed. Thus, for the time being, it seems probable that the Forest Service will be able to stay at the Carterville campus and use the Pilot Plant building and yard space for research. An extended cooperative agreement with the University could provide for use of the new facilities in the School of Technical Careers on the Carbondale campus in the event that the program at the Carterville campus is discontinued.

SUMMARY

On July 4, 1976, our Nation celebrated its 200th Anniversary. In this, our Bicentennial Celebration year, the ever-increasing and diverse needs of our industrialized society continue to dictate change. New dimensions are being added to the Forest Service's job; and a "self-critique" of its mission and organizational approaches to accomplish that mission are necessary at about 10-year intervals. A Forest Service Organization Study, designed to recommend alternatives that would improve performance of all units to the extent they are influenced by organization structure, policies, and procedures, was activated March 22, 1973, by Chief McGuire. On August 24, 1973, the Chief announced his Forest Service Organization Action Plan. Changes to be made in Station organizations were designed to strengthen the responsiveness of Research to the Nation's needs and should provide faster transfer of research findings to on-the-ground application. The new Station structure (fig. 43) is a departure from the conventional line-staff organization concept that the Stations have had in recent years, and will further decentralize the administration of the Research program. The Research Work Unit remains the basic unit for all Research in the Forest Service. The major impact of this new structure on Carbondale (and other field locations) will be the increased technical responsibility of the Project Leaders and scientists in increasingly comprehensive programs of research.

Researchers at Carbondale have probed everything from seed collection for breeding better trees through the growth cycle of the

Figure 43. New organizational structure of the North Central Forest Experiment Station.



forest to products that are useful to many and diverse consumers. The three Research Work Units—Timber Management, Hardwood Processing, and Marketing Development—are now involved in more than 90 active studies. More than 400 publications have been authored by the Carbondale staff. We have recorded visits from 42 States, the District of Columbia, Puerto Rico, the Virgin Islands, and 39 foreign countries.¹ Three Carbondale scientists have traveled abroad. Steve Boyce traveled in Yugoslavia and Italy in August and September 1962. He represented the Forest Service at the Eleventh Annual Meeting of the International Poplar Commission in Yugoslavia and later visited the forest experiment station in Rome and the Poplar Institute at Cassale on the Po River. Dave Funk visited Yugoslavia in September 1971 for a technical review of seven active forestry projects (research conducted under the auspices of foreign research grants) and to assist in the development of new research proposals. Cal Bey traveled to Stockholm, Sweden, in August 1974 to present a paper on population genetics at a meeting of the International Union of Forestry Research Organizations (IUFRO). And Dave Funk went

¹*Afghanistan, Austria, Australia, Belgium, Brazil, Canada, Ecuador, England, Ethiopia, France, India, Iran, Iraq, Ireland, Israel, Italy, Jordan, Liberia, Libya, Malaysia, Nepal, The Netherlands, Nigeria, Norway, Pakistan, Peru, The Philippines, The Republic of China, Somali, South Africa, South Korea, South Vietnam, Spain, Sweden, Tanganyika, Thailand, Turkey, West Germany, and Yugoslavia.*

abroad again in 1976 to attend the XVI IUFRO World Congress held in Oslo, Norway, June 20 to 26 and to take a postconference genetics tour ending in Stavanger, Norway, June 27 to July 2. Dave was Co-Chairman of two IUFRO Working Parties and co-authored an invited paper on "Status and Trends in Nut Species Breeding."

More than 225 wood industry officials, professional foresters, soil and water conservationists, and timber research specialists from State, Federal, regional, and private agencies in 28 States and Canada attended a 2-day Walnut Workshop held at Southern Illinois University August 2 and 3, 1966. The Workshop included a tour of timber research and recreational developments in the Crab Orchard National Wildlife Refuge and at the Kaskaskia Experimental Forest (fig. 44).

Figure 44. F. Bryan Clark, Forest Management Project Leader at Carbondale, with the 1966 Walnut Workshop tour group at a young walnut plantation site on the Kaskaskia Experimental Forest near the Old Iron Furnace.



The overwhelming response to this meeting and to the published proceedings, *Black Walnut Culture*, helped generate the organization of the Walnut Council, a common-interest group of more than 650 landowners, foresters, and industry representatives whose primary goal is to promote the exchange of information on tending and utilizing black walnut trees. The Walnut Council, the North Central Station, the Northeastern Area S&PF, and SIU's Forestry Department sponsored a 4-day symposium on "Black Walnut As A Crop" held August 14 to 18, 1973, at SIU (fig. 45). Nearly 300 specialists and others from public and private agencies and forest products industries throughout the Central States

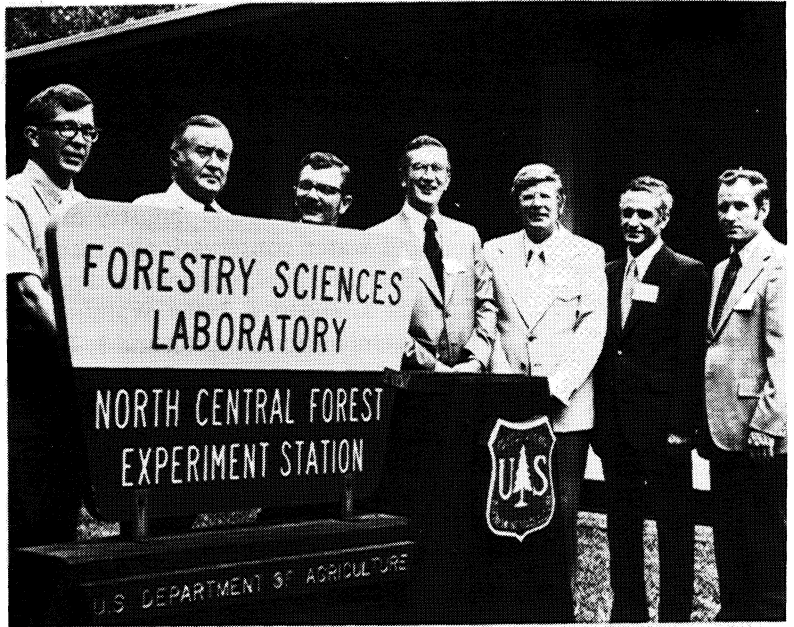


Figure 45. (Left to right) Dr. David T. Funk, Genetics Project Leader at Carbondale (and Walnut Council Tree Improvement Committee Chairman); Donald H. Gott, Executive Director, Fine Hardwoods-American Walnut Association; Dr. John H. Ohman, Director, North Central Station; Dr. John R. McGuire, Chief, Forest Service; Gene W. Grey, Assistant State Forester of Kansas (and Program Chairman of Walnut Symposium); Dr. Ali A. Moslemi, Chairman, SIU Forestry Department; and Dr. Robert E. Phares, Silviculture Project Leader at Carbondale (and Walnut Council Secretary-Treasurer), shown at entrance to Forestry Sciences Laboratory during the 1973 Walnut Symposium.

attended the symposium to discuss urgent problems and progress made in recent years in black walnut tree improvement, culture, and use.

The Forestry Sciences Laboratory staff takes advantage of many opportunities to project and disseminate research information through publications, attendance at a wide variety of meetings, membership in professional organizations, the printed news media, radio and television shows, and exhibits. Thus, through their many contacts, the scientists at Carbondale learn what still needs to be done and where their research effort can contribute most.

Present staff of Forestry Sciences Laboratory:

Chief of Laboratory: David T. Funk

Research Support Services: Doris J. Brown

Brenda L. McCarthy

Culture, Genetics, and Protection of High-Value Hardwoods (FS-NC-1151)

David T. Funk	Project Leader
Darrell E. Alley	Forestry Technician
David M. Baines	Forestry Technician
Calvin F. Bey	Research Geneticist (Plant)
Paul M. Clark**	Forestry Technician
Michael S. Cook	Forestry Aid
Martha K. Dillow	Secretary (Stenography)
David M. Johnson	Biological Laboratory Aid
F. Danny McBride	Forestry Technician
Felix Ponder, Jr.	Research Soil Scientist
Lawrence E. Rendleman*	Forestry Technician
Willis J. Rietveld	Research Plant Physiologist
Richard C. Schlesinger	Research Forester
Barbara C. Weber	Research Entomologist
Robert D. Williams**	Research Forester

New and Improved Systems, Methods, and Techniques for Processing Hardwoods (FS-NC-3201)

Frank E. Biltonen	Project Leader
Robert E. Bodkin	Physical Science Technician
Cleo Caraway	Secretary (Stenography)
Peter Y. S. Chen	Forest Products Technologist
Kenneth D. Gaddis***	Physical Science Technician
Charles E. Helton	Physical Science Technician
Paul D. Parks	Physical Science Technician
Howard N. Rosen	Research Chemical Engineer
Harold A. Stewart	Forest Products Technologist
Edward C. Workman, Jr.	Physical Science Technician

Improvement of Forest Products Markets and Marketing Practices in the Central Hardwood Region (FS-NC-4202)

Jerry A. Sesco	Project Leader
David C. Baumgartner	Research Forester
Donna W. Colombo	Clerk-Stenographer
David J. Polak	Computer Programmer

*Located at Rt. 3, Elizabethtown, Illinois.

**Located at 1615 J Street, Bedford, Indiana.

***Located at Building #4, School of Technical Careers, Carterville, Illinois, campus.

CONCLUSION

Franklin Benjamin Hough of Lowville, New York, often referred to as the "Father of Forestry in America," was a historian, a naturalist, a statistician, and a physician who served in the Civil War. In his capacity as Director of the U. S. Census in 1870, he became deeply concerned over the widespread forest devastation caused by fires and careless logging throughout the East and in the Great Lake States at that time. Hough decided to enlist the prestige of the Nation's leading scientists in his cause for forest protection. In August 1873 he delivered a forest preservation speech to the American Association for the Advancement of Science at its 22nd annual meeting in Portland, Maine. This historic paper, "On the Duty of Governments in the Preservation of Forests," was to have notable consequences.

At Hough's suggestion, the AAAS "Resolved, That a committee be appointed by the Association to memorialize Congress and the several State Legislatures upon the importance of promoting the cultivation of timber and the preservation of forests, and to recommend proper legislation for securing these objects." The committee formulated a statement that pointed out the great public injury likely to result from the rapid exhaustion of the forests of the country, with no effectual provision against waste or for the renewal of the supply, and requested the creation of a commission of forestry. The memorial was transmitted to Congress February 19, 1874, by President U. S. Grant with a special message of approval. Finally, on August 15, 1876, an Appropriations Act, through a rider, appropriated \$2,000 for the employment by the Commissioner of Agriculture of an expert to study and report on forest conditions. Hough was appointed on August 30 as the Federal government's first forestry agent.

From this modest beginning has evolved the present Forest Service with its nationwide network of National Forests, Forest and Range Experiment Stations, the Forest Products Laboratory, the State and Private Forestry organization, and thousands of professional and scientific personnel. Within this epic lies the story of the Carbondale, Illinois, Forestry Sciences Laboratory—and how it grew.

SELECTED REFERENCES

Published

- Boyce, Stephen G. 1964. 1963 annual report, cooperative forest research program, South. Illinois Univ., Cent. States For. Exp. Stn. 23 p., illus.
- Carbondale Branch Staff. 1948. The Kaskaskia Experimental Forest, Carbondale Branch Station. Cent. States For. Exp. Stn. Misc. Release 2, 12 p., illus.
- Central States Forest Experiment Station Staff. 1938. Tenth annual report (annual investigative report for 1937 and program for 1938). Cent. States For. Exp. Stn. 61 p.
- Central States Forest Experiment Station Staff. 1947. Twentieth annual report, 1946. Cent. States For. Exp. Stn. 39 p.
- Central States Forest Experiment Station Staff. 1948. Twenty-first annual report, 1947. Cent. States For. Exp. Stn. 46 p., illus.
- Central States Forest Experiment Station Staff. 1949. Twenty-second annual report, 1948. Cent. States For. Exp. Stn. 58 p., illus.
- Central States Forest Experiment Station Staff. 1951. Twenty-fourth annual report, 1950. Cent. States For. Exp. Stn. 65 p., illus.
- Central States Forest Experiment Station Staff. 1954. Twenty-seventh annual report, 1953. Cent. States For. Exp. Stn. 63 p., illus.
- Central States Forest Experiment Station Staff. 1956. Meet informin' Norman, annual report 1955. Cent. States For. Exp. Stn. 40 p., illus.
- Clepper, Henry. 1973. A notable anniversary (editorial). *Science* 181(4101):p. 703.
- Cooper, Glenn A., Calvin F. Bey, Ronald D. Lindmark, and Richard C. Schlesinger. 1972. Better hardwoods—from seeds to sawlogs and mills to market. *South. Lumberman* 225(2800):111-114, illus.
- Dana, Samuel Trask. 1956. Forest and range policy—its development in the United States. 455 p. McGraw-Hill Book Co., Inc.
- Essex, Burton L., and David A. Gansner. 1965. Illinois' timber resources. USDA For. Serv. Resour. Bull. LS-3, 56 p., illus. *Lake States For. Exp. Stn., St. Paul, Minnesota*.
- Forest Survey Organization. 1949. Forest resources of Illinois. Cent. States For. Exp. Stn. For. Surv. Release 7, 53 p., illus.
- Hosner, John F. 1952. Southern Illinois timber markets. 31 p. South. Illinois Univ.
- Hosner, John F. 1952. Wood markets for southern Illinois. 39 p. South. Illinois Univ.
- Hough, Franklin B. 1874. On the duty of governments in the preservation of forests. *In American Association for the Advancement of Science Twenty-Second Meeting, Portland, Maine, August 1873, Proc. Part II, Section B.* p. 1-10. The Salem Press, Salem, Mass.
- Hutchison, O. Keith, and Robert K. Winters. 1951. Marketing the farm forest products of southern Illinois. Cent. States For. Exp. Stn. Tech. Pap. 123, 39 p., illus.
- Kallio, Edwin. 1965. 1964 annual report, cooperative forest research program, Southern Illinois University, Central States Forest Experiment Station. 11 p., illus.
- King, D. B., and R. K. Winters. 1952. Forest resources and industries of Illinois. *Illinois Agric. Exp. Stn. Bull.* 562, 95 p., illus.

- Lesley, J. P. 1859. *The iron manufacturers' guide to the furnaces, forges, and rolling mills of the United States.* p. 138. John Wiley, New York.
- Merz, Robert W. 1958. *Annual report, cooperative forest research program, Southern Illinois University, Central States Forest Experiment Station.* 11 p.
- Merz, Robert W. 1960. *Annual report, cooperative forest research program, Southern Illinois University, Central States Forest Experiment Station.* 12 p.
- Merz, Robert W. 1962. *Annual report, cooperative forest research program, Southern Illinois University, Central States Forest Experiment Station.* 25 p., illus.
- North Central Forest Experiment Station. 1973. *Rebuilding a resource—50 years of forestry research.* 15 p., illus.
- Putnam, F. W., ed. 1874. *American Association for the Advancement of Science Twenty-Second Meeting, Portland, Maine, August 1873, Proc.* p. 429. The Salem Press, Salem, Mass.
- Risser, Hubert E., and Robert L. Major. 1968. *History of Illinois mineral industries.* Illinois State Geol. Surv. Ed. Ser. 10, 30 p., illus.
- Starke, Aubrey. 1935. *The indigenous iron industry of Illinois.* J. Illinois State Hist. Soc. 27(4):432-440.
- U. S. Department of Agriculture. 1966. *A national program of research for agriculture.* 272 p., illus.
- U. S. Department of Agriculture. 1968. *The planning-programming-budgeting system in the U. S. Department of Agriculture.* 25 p., illus.
- USDA Forest Service. 1960. *Gearing the organization to the job ahead.*
- USDA Forest Service. 1964. *A national forestry research program.* Misc. Publ. 965, 34 p., illus.
- USDA Forest Service. 1973. *Design for the future, a Forest Service organization review.* 161 p.
- USDA Forest Service. 1973. *The earth... its resources... its people.* 32 p., illus. Northeast. Area State and Priv. For., USDA For. Serv., and cooperating State agencies.
- USDA Forest Service. 1969. *Forestry Sciences Laboratory, Carbondale, Illinois.* 6 p., illus. North Cent. For. Exp. Stn., St. Paul, Minnesota.

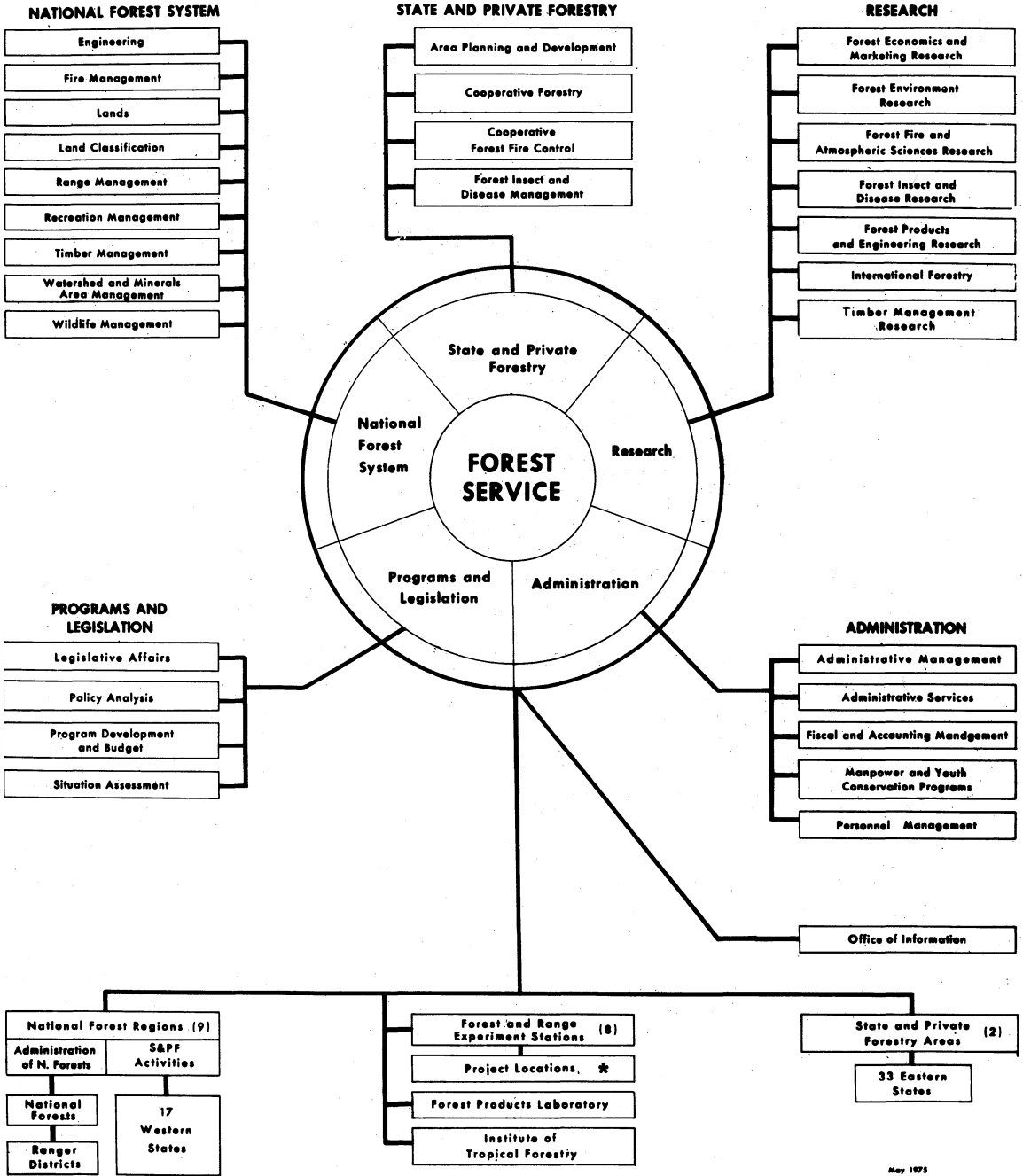
**Unpublished
References on File
at North Central
Forest Experiment
Station,
Carbondale, Illinois**

- Auten, John T., and Richard Zweig. 1947. *The Kaskaskia Experimental Forest; a soil survey.* 21 p.
- Central States Forest Experiment Station. 1960. *Inspectors'-eye view of the Central States Station, 1960.* 73 p.
- Central States Forest Experiment Station. 1961. *Establishment report for the Kaskaskia Experimental Forest.* 28 p.
- Central States Forest Experiment Station. 1962. *Establishment report for the Paoli Experimental Forest, Wayne-Hoosier National Forest.*
- Central States Forest Experiment Station and Region 9, Forest Service. 1941. *Memorandum for the Chief.* 10 p.
- Central States Forest Experiment Station and Region 9, Forest Service. 1949. *Memorandum for the Chief.* 6 p.
- Clark, F. Bryan. 1970. *Memorandum to D. B. King, Director on functional supervision, FS-NC-1107.*

- Dickerman, M. B., and D. N. Quinney. 1972. General research inspection, North Central Forest Experiment Station, September 11-25, 1972. 42 p.
- Fowells, H. A., R. E. Buckman, and C. E. Ostrom. 1965. Functional research inspection of timber management research at the Central States Forest Experiment Station, October 4-22, 1965. 35 p.
- Giffen, W. D. 1939. Memorandum for Forest Supervisor, Shawnee.
- Krugman, Stanley L., and Robert P. Schultz. 1974. Report of functional research inspection, North Central Forest Experiment Station, September 30 to October 4 and October 29 to November 4, 1974. 23 p.
- Lane, Richard D. 1947. Program analysis, Carbondale Branch Station. Cent. States For. Exp. Stn., 45 p., illus.
- Lane, Richard D. 1954. Summary of annual meeting and program conference. 17 p.
- Losche, Craig K. 1972. Effect of sewage sludge on the physical and chemical properties of coal mine spoil and the spoil leachate. 8 p.
- Minckler, Leon S. 1946. Informal problem analysis: Carbondale Branch of the Central States Forest Experiment Station. 19 p.
- Mitchell, Harold L. 1946. Memorandum to Assistant Chief, Research, Washington Office. 5 p.
- North Central Forest Experiment Station. 1972. Revision of boundaries of Kaskaskia Experimental Forest. 4 p.
- Shawnee National Forest and Central States Forest Experiment Station. 1936. Memorandum of agreement between the Regional Forester and the Director, Central States Forest Experiment Station. 6 p.
- Sutton, Claud E. 1938. The Southern Illinois Experimental Forest (Southern Illinois Branch, Central States Forest Experiment Station). 17 p.
- Zerbe, J. I., E. S. Kotok, and J. T. Drow. 1971. Report of functional research inspection, North Central Forest Experiment Station, Forest Products and Engineering Research.

ORGANIZATION CHART

U.S. DEPARTMENT OF AGRICULTURE FOREST SERVICE



May 1973

*Forestry Sciences Laboratory at Carbondale, Illinois