

MISSOURI'S PIONEER: A HALF CENTURY OF SUSTAINABLE FORESTRY

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Abstract—Pioneer Forest, at some 150,000 acres Missouri's largest private landholding, has been a lodestar of sustainability during more than half a century of dramatic oscillation in the goals and techniques of forest management nationwide. Initially intended by its owner, Leo Drey, to demonstrate the potential for developing a viable natural resource-based economy in the Missouri Ozarks, the forest, through Drey's remarkably consistent vision and well-documented management by single-tree selection came, over time, to represent a workable alternative to even-aged management regimes being promulgated on federal and state forests as well as a model of sustainability for other private forest holdings.

This historical analysis, based largely on original unpublished archival records, explores the history of the forest from its acquisition by Leo Drey beginning in 1951 to its donation to the L-A-D Foundation in 2004; it considers not only the development and management of the forest over more than a half-century of Leo Drey's ownership but also its relationship to other public and private lands in Missouri and to related conservation efforts of Leo Drey, such as the preservation of natural streams and natural areas, in the context of the history of conservation in Missouri and the nation.

ASSEMBLING A FOREST

Leo Drey purchased his first tract of Ozark timberland in eastern Shannon County near the Reynolds County line on March 8, 1951, from Doc Jim Buford of Ellington. It was 1,407 acres of oak, much of it butt rotten, but it had some pine reproduction plus some larger pines, and there was not much grazing. There were no squatters or tenants, and theft was not bad. Buford wanted about \$4 an acre. So said Drey's notes, scratched in pencil on an envelope along with a sketch map of 80's that were included or not. He had been impressed by the pines when he walked the tract with Buford on January 17, but, in retrospect, he decided he must have seen the same pines more than once that day.²

Drey was 34 years old, a 1939 graduate of Antioch College whose founder, Horace Mann, had entreated students, "Be ashamed to die until you have won some victory for humanity." The son of a St. Louis manufacturer of plate glass and canning jars—Drey Perfect Mason—he served 5 years in World War II and then as assistant to the treasurer of the Wohl Shoe Company before deciding to follow his calling to forest conservation. His father had died when Leo was a child, and the glass company was sold, so he had an inheritance with which to work (fig. 1).

The postwar years witnessed a turn to emphasis on private forest management after nearly half a century of preoccupation with the role of government in forest conservation. The U.S. Forest Service had been established in 1905, joining forestry programs previously established in a number of states, but Missouri was still in the throes of its greatest era of exploitative logging and would not see establishment of public forests until the depression years of the 1930s. The general assembly authorized acquisition of national forests in the early 1930s, and Missouri citizens, in 1936, approved a constitutional amendment for a new conservation commission with responsibility for

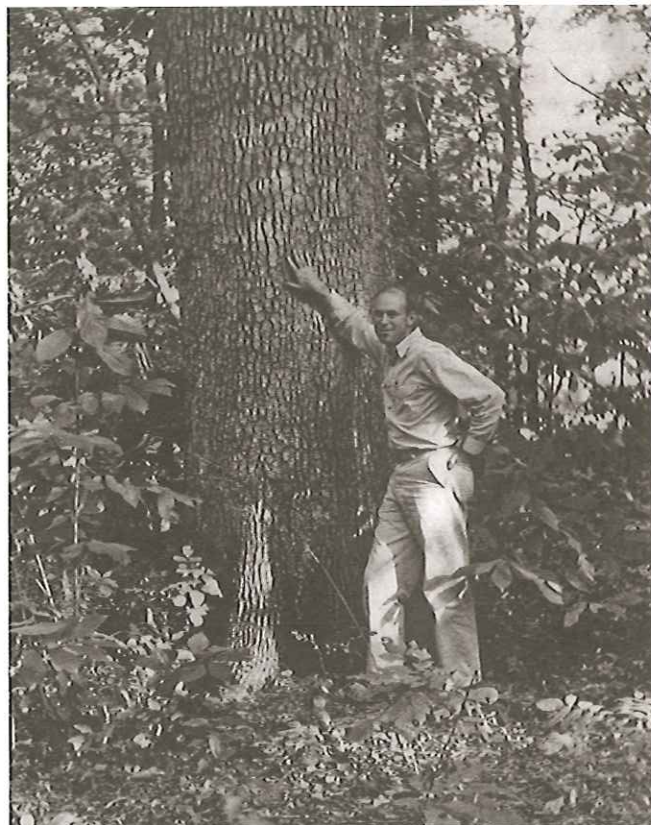


Figure 1—Leo A. Drey with an ancient white oak. (Courtesy of Leo Drey)

forests as well as for fish and wildlife, which had previously been overseen by a politically appointed game and fish commissioner. By then, most public officials nationwide had

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² This history is based largely on original unpublished correspondence, reports, and other records from the files of Leo Drey, Pioneer Forest, the L-A-D Foundation, other repositories, and on author interviews with various participants, as indicated at the beginning of the Literature Cited section. Only a few of the thousands of unpublished sources are separately listed in General References.

given up on private land management, and a succession of New Deal reports and plans called for half the timberland in the country to enter public ownership; in Missouri, 8 million acres of public forests were proposed—7 million federal and 1 million in state forests—out of about 15 million acres of forest land (Flader 2004). About 1.25 million acres of national forest and 125,000 acres of state forest had been acquired when the pressure for public purchase abated, and acquisition funds dried up during and after World War II. In 1946, the legislature adopted a forward-looking State Forestry Act, which was intended to encourage the practice of forestry on private lands.

Leo Drey invested in Missouri timberland with his eyes open but also with a large measure of faith. Most Ozark timberland was badly cut over and had been further degraded by timber trespass and by frequent fires set by locals to encourage forage for their cattle and hogs still roaming wild under the longstanding tradition of open range. He had considered buying land in Florida or Tennessee but decided against it because land titles ran back to old Spanish grants that could be devilishly troublesome, whereas in the parts of Missouri in which he was interested the titles were tied to the original federal rectangular survey. Professional foresters and industry leaders with whom he had consulted—among them state foresters George White and Bill Towell, University of Missouri professor R.H. Westveld, forest manager Ed Woods of National Distillers Products Corporation, and John Mabry of the T.J. Moss Tie Company—told him he would need about 25,000 acres profitably to employ one forester. With a liberal arts and business background, he was determined to rely on professional advice, so he sought assistance in land locating and management from Lee Paulsell, who resigned from his position as forestry instructor at the university to work for him (fig. 2). With Paulsell's help, Drey bought about 10,000 additional acres in 1951 and 7,000 in 1952, mostly in Carter and Reynolds counties. Then, in 1953, he bought nearly 14,000 acres, including large purchases of 9,099 and 2,812 acres from the Moss Tie Co. in Carter and Ripley counties. The Moss acquisitions would be warm-ups for the big opportunity to come.



Figure 2—Lee Paulsell, Leo Drey's first forester. (Courtesy of Pioneer Forest)

Drey was taking a break from fighting fire on state land at Peck Ranch at about 3 a.m. one morning in the fall of 1953 when Charlie Kirk, a forester for National Distillers, flopped in the weeds beside him to say that the company was liquidating its Missouri timber—nearly 90,000 acres, much of it in a nearly contiguous block in northeastern Shannon County that was considered the largest tract of old-growth white oak in the United States—and then would sell its land. Knowing that Drey had been buying up timberland, Kirk undoubtedly hoped that he would come to the rescue of the Distillers' tract. And Drey did not disappoint. He began an intense negotiation at corporate headquarters in New York City, in his own "hole-in-the-wall office" in St. Louis, and out on the land that ended on June 1, 1954, after more than 6 months of hard bargaining, with the purchase of 89,906 acres.

Much of the new acreage had been assembled over the course of 40 years by the Pioneer Cooperage Company of St. Louis, which was interested in oak for barrel staves. Pioneer had in turn sold to the Millman Lumber Company in 1937 the right to cut its yellow pine timber totaling about 60 million board feet, an operation that required some 11 years (Millman c. 1981). In 1940, Pioneer sold a 400-foot-wide strip of old growth pine along Highway 19 south of Round Spring to the state highway department for motorists to enjoy (warranty deed, PF). At about the same time, the firm asked the U.S. Forest Service to study the potential for operating its acreage as a business venture with good forestry practice (Anon. c. 1940). The findings were not encouraging; nearly two-thirds of the land was completely cut over and half of the remainder partly cut over, with the trees below average in thrift and a large quantity overmature. The forest was "decidedly understocked" with a shortage of "wood-making machines," said the report, the result of repeated fires having destroyed the young material and a small though exasperating amount of timber theft. "As a result, production suffers, and the factory may operate in the red." Nevertheless, much of the white oak in the old growth or partly cut stands was of medium or higher quality and vigor, and the climate and soils were relatively good. Instead of the current clearcutting, the report recommended hiring an experienced professional forester and staff to inventory, classify, and post the lands, develop management policy, and mark timber for "the business man's cut," or selection cutting of about 30 percent of the lowest quality and at-risk trees in order to allow better growth in the residual stand.

In 1945, Pioneer Cooperage decided to hire a professional forester, securing the services of Ed Woods, a forestry graduate of Washington State University who had come to Missouri with the U.S. Forest Service in 1933, and then local surveyor Paul Faulkenberry and M.G. "Gus" Hoyer from the Iowa Forest School. Woods advocated better forest management practices, and he was soon put in charge of production. On his recommendation the firm contracted with Millman to allow Pioneer to mark and reserve up to 200,000 board feet of mature yellow pine seed trees on the yet uncut pine acreage—eventually amounting to 1,076 trees on 3,200 acres—to provide for natural reproduction (PF corres. 1955, tract notes). The pathbreaking reservation of

seed trees in what was regarded as the only substantial tract of virgin pine left in the state created widespread interest, resulting in a request from Charles Callison of the *Missouri Conservationist* to publicize the effort—a cause of consternation to company officials who regarded their long-range management policies as still unsettled. To Woods's dismay, company officials caved in to Millman's complaints about under-scaling by letting Millman cut the 65 largest pines from the list of those reserved (PF corres. 1946).

In July 1946, control of Pioneer Cooperage was sold to the National Distillers Products Corporation of New York, and its business reorganized as the Pioneer Cooperage Division, with most of its staff intact. The focus of cutting thereupon shifted from red oak to white oak cooperage for whiskey barrels. In the next 2 years, the firm cut some 6 million board feet of white oak, a rate far in excess of growth; but Ed Woods and his staff persuaded cooperage department head Leonard Steidel of the wisdom of selective cutting, taking the timber that was overmature or at risk with a goal of improving the stand (NDPC 1948, Woods 1965). During the same period, the firm abandoned plans for four of six intended stave mills, and, in 1948, added another professional forester, Charles Kirk, formerly with the U.S. Forest Service in Minnesota and then one of the original foresters for the Missouri Conservation Commission, now called the Missouri Department of Conservation (MDC), to complete an inventory of the forest. Woods also won approval from Steidel and other corporate officials for designation of the Pioneer tract as Missouri's first official tree farm under a national program sponsored by American Forest Products Industries, and Arthur Meyer, chairman of the Missouri committee overseeing the program, wrote a laudatory history of Pioneer as a model of forest management (Meyer 1949). Missouri Tree Farm Number One was dedicated in September 1949 before close to 100 people, including some 70 professional foresters from Missouri and other states (PF).

As Ed Woods and his staff continued their cutting and began an ambitious program of tree planting for regeneration of pine and hardwoods on old fields and other vacant acreage, Woods also continued to work with Steidel to make the case to corporate officials for continued conservative management of the forest (fig. 3). In spring 1951, the firm renamed the Pioneer tract the Seton Porter Forest, after a former conservation-minded chairman of the board. In July, H.H. Chapman, Yale professor emeritus and one of the most influential foresters in America, accepted an invitation to examine the practicability of managing the forest for a continuous yield of white oak and other products (fig. 4). After traveling 1,500 miles by jeep and on foot through the forest, he pronounced the white oak reproduction "nothing short of spectacular," though fire control remained the most urgent problem; he recommended guidelines for selective harvest, silvicultural improvement, and establishment of permanent sample plots to track future growth (Chapman 1951). The firm began a continuous forest inventory in 1952, and it advertised its conservation consciousness and the white-oak-enhanced quality of its whiskeys in the *Wall Street Journal* and other national publications: "90,000 Acres of Natural Beauty . . . and Barrel Staves, Too!" (fig. 5).



Figure 3—Ed Woods and radio operator with a map of Seton Porter Forest. (Courtesy of Pioneer Forest)

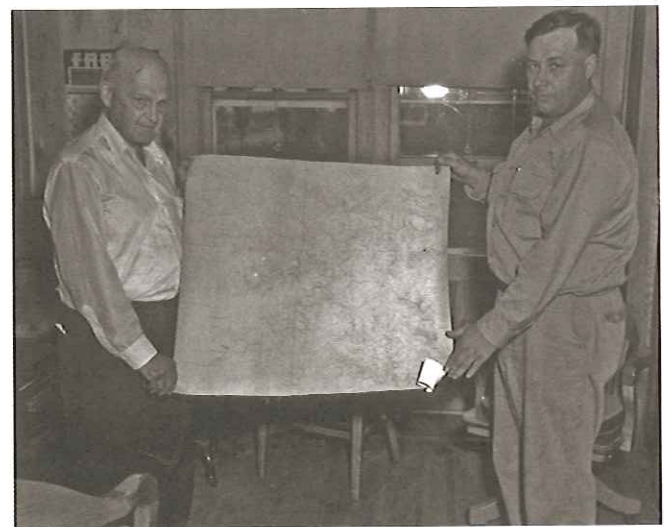


Figure 4—H.H. Chapman and Ed Woods in Salem headquarters, July 1951. (Courtesy of Pioneer Forest)

In March 1953, the chairman of the Society of American Foresters Committee on Natural Areas, John Shanklin, asked the firm to consider setting aside a tract of old growth white oak in the Current River Hills as a virgin-type association for white oak under a natural areas program SAF had established in 1947 (Shanklin 1953). In November, the forestry staff and five SAF members from Missouri selected a 10-acre plot in an area previously identified by Dr. Julian Steyermark of the Missouri Botanical Garden and began negotiations for the release of cutting rights (LD). In his enthusiasm for more conservative management of the forest, Woods even asked the Missouri Conservation Department to reintroduce beavers into the wild backcountry block in Shannon County (PF).

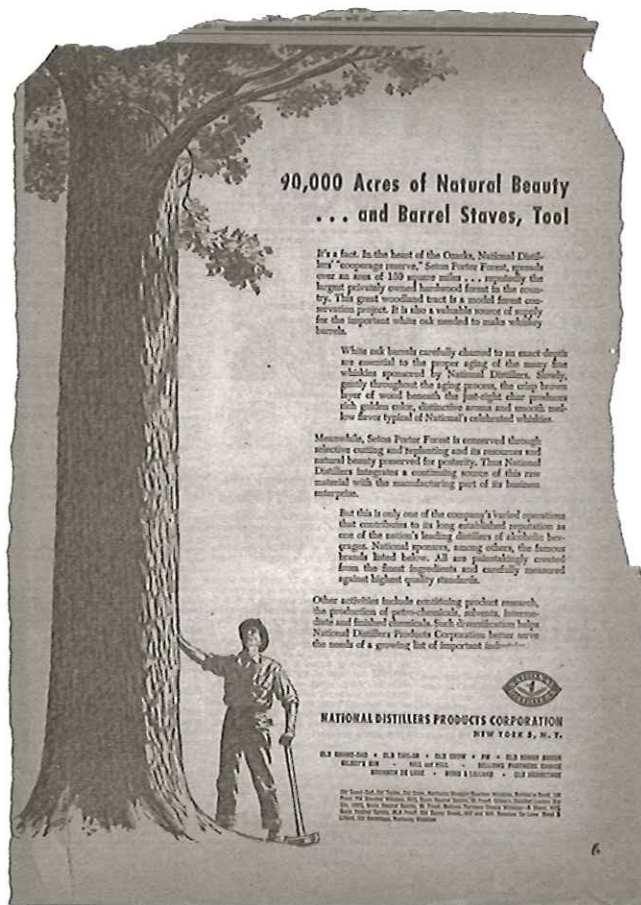


Figure 5—National Distillers advertisement in the *Wall Street Journal*, 1953. (Courtesy of Leo Drey)

But Steidel died unexpectedly and was replaced by an accountant, after which Distillers decided to liquidate the book value of its white oak, apparently for tax reasons; officials told Woods to cut 19 million board feet, including all trees over 12 to 14 inches in diameter at breast height (d.b.h.), within 3 years (LD, Woods 1965). Woods challenged the plan as “a cutting program not a forestry program” (Woods 1953) and alerted H.H. Chapman, who replied, “Damn all accountants!” (Chapman 1953). Probably because of the ongoing natural area negotiations and Distillers’ advertising campaign touting its model forest, the destructive cutting resulted in considerable furor in professional circles in Missouri and beyond, including letters to corporate headquarters and a sharply critical editorial, “Not as Claimed,” in *Nature Magazine* (1955). After castigating the “butchering” of the virgin white oak, the editorial noted that Distillers had sold off the forest, apparently to distance itself from the furor. The editorial did not say to whom the forest had been sold, implying that it was a lost cause in any case.

The buyer, of course, was Leo Drey. In his negotiations with Distillers, Drey was determined to salvage as much as possible of the integrity of the forest despite the ongoing liquidation. He sought at first to purchase the entire forest intact, with an agreement to supply Distillers with 18 million feet of cooperage stock over a period of 9 years, but the firm insisted on retaining the right to cut all remaining white oak (LD). The best he could do was to limit the cutting to trees over 15 inches in d.b.h. and to reserve 300,000 board feet in large trees of his own choosing (fig. 6). He selected several stands of white oak, including some in the vicinity of the 300-year-old trees already under discussion with SAF, and within a year, following conveyances by both Drey and Distillers, the 10-acre Current River Natural Area would be dedicated as the first official natural area in Missouri (Shanklin 1955).³ Drey also bargained for the equipment and the headquarters building in Salem and retained five of the forestry staff—Ed Woods, Charlie Kirk, Russel Noah, Rayborn Skaggs, and Paul Corder. Just as the negotiations were concluding, Drey would later recall, Distillers added another request—to reserve a one-half interest in any minerals that might be found. After checking with a geologist and hearing no intimation of any minerals of value, he agreed to the provision.

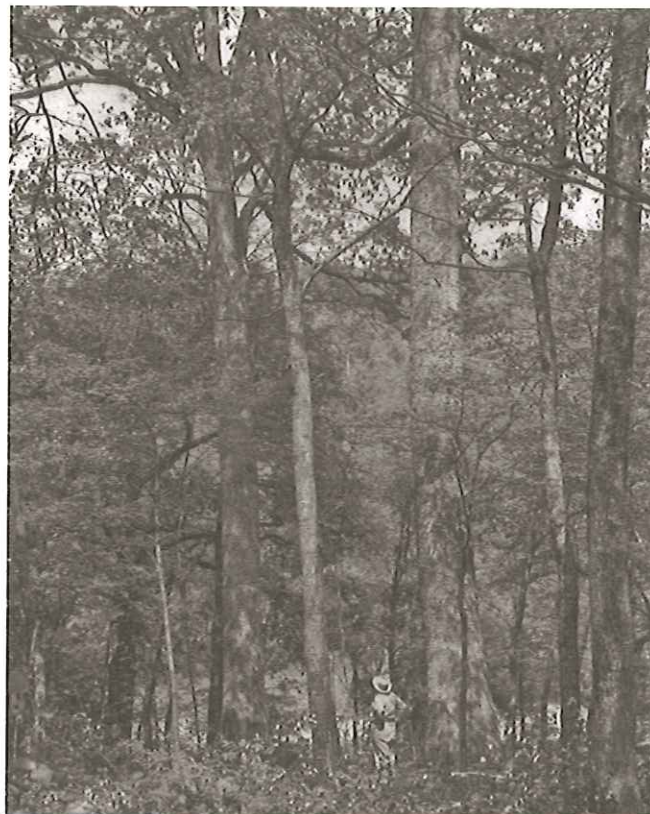


Figure 6—Large white oaks on Pioneer Forest, early 1950s. (Courtesy of Pioneer Forest)

³ In May 2005, the L-A-D Foundation, Pioneer Forest and representatives of the Missouri Natural Areas Committee and the Society of American Foresters would celebrate the 50th anniversary of the first natural area in Missouri by dedicating an additional 255 acres for an expanded Current River Natural Area equal in quality to the original 10-acre tract (Drees and others 2005).

As of June 1, 1954, Drey had nearly 123,000 acres that he renamed Pioneer Forest out of respect for its history and in anticipation of his intent to pioneer in private land management in the Ozarks (Drey 1963). The land had cost him an average of \$4.12 an acre, he calculated; the cost was a measure of the limited economic potential for forest land in the Ozarks at the time. To manage the operation he had a team of five headed by Woods as general manager and Kirk as forester, Lee Paulsell having left to take over the University Forest near Poplar Bluff shortly before Drey had begun negotiating for the Distillers' tract.

In an article some years later, Ed Woods (1965) would be able to cite a long list of pioneering "firsts" for the forest—"the first private forest to undertake the job of maintaining itself solely by the sale of stumpage [standing timber] from its lands," the first to adopt the International Log Rule in its sales and also in the cruising of its own timber, the first in Missouri with its own radio frequency, the first to adopt the mechanical tree planter, chain saws, four-wheel drive vehicles, crawler tractors, and 6 by 6 army trucks in the rugged terrain of the Ozarks. Most important, it pioneered in what Woods called "the unceasing job of timber stand improvement," tracked and documented by a system of sample plots covering its entire acreage. And it pioneered in maintaining about 20 active timber sales per year, which in turn maintained about 100 families and their communities. It also opened its lands to public recreation and designated some tracts as samples of uncut old growth. "I could cut out and get back the purchase price of the land," Drey told a reporter for the *St. Louis Post-Dispatch* (Leeman 1956). "The challenge is whether I can spend money on it at the present rate and come out successfully."

The early years of the new Pioneer Forest were a struggle. It could not have been easy for Drey or his foresters to witness the cutting of nearly 12 million board feet of white oak worth an estimated \$1 million by National Distillers in 1954 alone, and the heavy cutting would continue. Hints of Ed Woods's angst may be found here and there in notes on his tract records: "butchered for bolts by NDPC contractors," or "National Distillers crew slobbered around over the section trying to cut the bolts but only got the easy ones" (PF). Early in 1955, H.H. Chapman wrote to Richard H. Pough of the American Museum of Natural History that his recommendations for the management of the forest had been "totally ignored and violated." He went on to charge, "The practices now pursued in this supposed 'Tree Farm' are . . . grossly and criminally wasteful of the material in the trees cut, in every possible respect, so that it can be truthfully stated that nowhere even in the heyday of destructive logging practices was there a worse example of wood butchery than is now taking place in the Seton Porter Forest" (Chapman 1955, LD). It was no longer National Distillers' Seton Porter Forest, however, but Leo Drey's Pioneer Forest, and Drey had a more durable set of values.

PIONEER IN REGIONAL DEVELOPMENT, 1955–1976

Ever the idealist, Leo Drey was probably more dedicated to pioneering a course of regional development for the benighted Ozarks than he was in turning a personal profit. His vision for

the future of the region was not essentially different than that of many Ozarkers in that it built on the woods, waters, and wildlife that had always sustained the area. But, at a time of postwar change nationwide and in Missouri, the means Drey would favor to secure that future would sometimes risk conflict with his new neighbors.

The heavy-handed harvesting by contractors for National Distillers coincided with a period of major drought and fires that resulted in the loss of yet another 12 million board feet of timber to natural causes. To make matters worse, the Shannon County tax assessor greatly overvalued the land, in Drey's view, leading Drey to enter a protracted and widely reported legal dispute with the county. Drey had entered some of his holdings under the state's Forest Crop Program, by which landowners were allowed to defer part of their annual taxes while timber was regenerating in exchange for following management guidelines and paying a yield tax when the timber was harvested; but, he had not done so in Shannon County, where his holdings amounted to nearly 20 percent of the county's taxable land. He believed in supporting the local economy, but he was willing to fight for the principle of fair and equal taxation.

When the assessor in 1955 valued Drey's 87,414 acres in Shannon County at \$376,655—more than the \$360,692 he had paid for it—Drey succeeded in winning an order from a circuit judge in Clayton, in St. Louis County, reducing the assessment to \$108,207, based on the usual assessment at 30 percent of fair market value (SLPD 1956). But Shannon County continued to assess the land at nearly \$5 an acre, arguing that it was worth \$15-20, and the State Tax Commission of Missouri and another circuit judge supported the county (Leeman 1960). When a case involving taxes due for 1957-1959 was heard by the Missouri Supreme Court in 1961, the court sent it back to the tax commission, asking it to investigate whether there was an intent to discriminate against Drey since it was obvious that property in the county was not being assessed uniformly (SLPD 1961). Drey and the county agreed in July 1962 to a compromise worked out by the tax commission whereby Drey paid about \$52,000 plus penalties and interest for 5 years of back taxes, down from about \$78,000, and the land would be assessed at an average of \$4.50 an acre. Both sides expressed satisfaction, with Drey explaining that the long litigation had "established the important principle that timberland should be treated the same as any other property in assessments" (CW 1962). The reality, of course, is that Drey drove a hard bargain in his purchase of timberlands and his sound management constantly increased their value.

The protracted and highly public dispute with Shannon County was an irritant in Drey's effort to establish Pioneer Forest as a good corporate citizen of the Ozarks, but it did not prevent him from undertaking other initiatives during those years to advance his vision of sound private forest management. In addition to fighting for the principle of equitable taxation, he decided to extend the inventory system established by National Distillers to his entire holdings in order to track improvements in timber stands. He also led an effort through a new Missouri

Forest Industries Committee to increase public awareness of the problems of fire and open-range grazing and the promise of forest conservation, chairing a major conference on Missouri forest resources in 1958. He cooperated with The Nature Conservancy and other groups to promote the concept of wild, free-flowing rivers protected by national legislation, beginning with the Current River that flowed through some 35 miles of his holdings. In each effort, his stance was that of a private landowner advancing programs and policies favorable to sound private forest management and regional development.

From the start, Drey was determined to measure and demonstrate the effectiveness of his management through a continuous forest inventory (CFI). The U.S. Forest Service, under authorization from the McSweeney-McNary Act of 1928, had completed its first intensive survey of Missouri forest resources in the late 1940s (King and others 1949). Following H.H. Chapman's recommendation, Woods and Kirk, in 1952, had sought assistance from Calvin B. Stott, who had begun developing CFI methodology for the U.S. Forest Service in the 1930s (Stott 1968), to mark out a system of 1/5-acre circular survey plots in order to maintain an inventory of volume, growth, harvest, and mortality on National Distillers' holdings. In 1957, Drey and his managers resolved to repeat the inventory every 5 years on the entire holdings of Pioneer Forest, with sample plots to represent each 320 acres. Stott helped them set up a complex, 152-step system to track some 12,000 individual trees, using IBM punch cards that could be processed in a new "mechanical brain" (SLPD 1957) at the Ford Forestry Center in L'Anse, MI (fig. 7). The Pioneer inventory was a more comprehensive and intensive system than that of the U.S. Forest Service in that it would track each individual tree over 5 inches in d.b.h. on the same plots every 5 years, whereas the service inventories would be more sporadic (1947, 1959, 1972, 1989) and more schematic, utilizing a much less dense system of ground plots that varied from survey to survey. The Pioneer Forest inventory, conducted religiously every 5 years at considerable expense, would become the longest continuous forest inventory in the central hardwood region, and it would gain increased credibility and value with the years (fig. 8).

Drey began working with other private timberland owners and wood-processing industries in 1955 to form a Missouri Forest Industries Committee affiliated with American Forest Products Industries, Inc. (AFPI), an educational and public relations organization spun off from the National Lumber Manufacturers Association that coordinated the American Tree Farm System and sought to increase public awareness of the need for forest fire prevention. As the owner of the first officially designated tree farm in Missouri, constituting the bulk of the 141,000 acres in the state system at the time, Drey was the natural choice for chairman. He hosted the committee at his headquarters in Salem and at a barbecue at Randolph Hole on the bank of the Current River chronicled by *St. Louis Post-Dispatch* columnist Leonard Hall (1956). The new committee ran a "Keep Missouri Green" campaign and worked through schools to "preach the gospel of forest conservation" (DP 10-12-55). AFPI claimed credit nationally in the 1950s for a 90-percent reduction in the

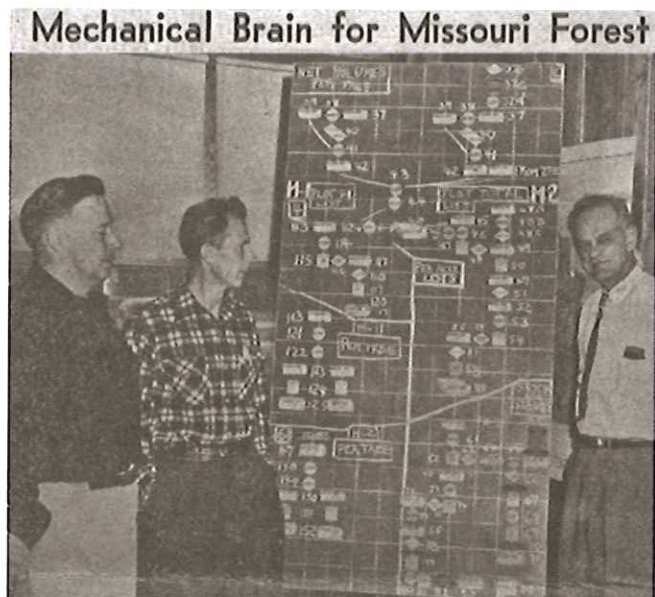


Figure 7—Ed Woods and Charlie Kirk (left) view a blackboard schematic of the continuous forest inventory system for Pioneer Forest developed by Cal Stott (right) in April 1957. (Courtesy of Pioneer Forest)

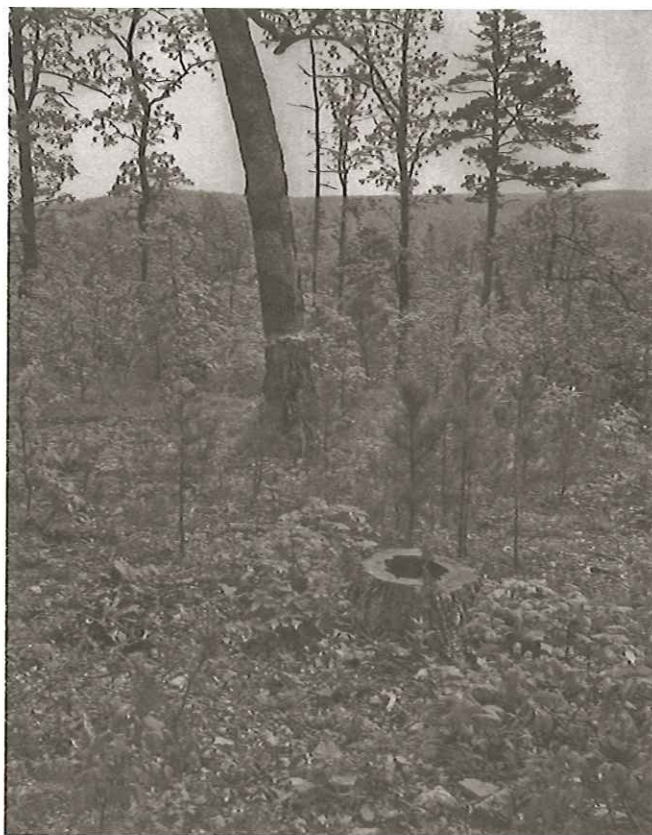


Figure 8—The 1957 inventory following National Distillers' heavy harvest indicated there were fewer than 1200 board feet per acre on Pioneer Forest. (Courtesy of Pioneer Forest)

incidence of forest fire, though in Missouri the credit for an even more dramatic reduction by that time was attributable largely to the efforts of the forestry division of the new Missouri Conservation Commission.

Under Drey's energetic leadership, the Missouri Forest Industries Committee in 1957 began planning for a statewide fire conference, its focus later broadened to forest resources more generally, including wildlife, water, and recreational as well as industrial potential (DP f8-37). They cast a wide net in their organizing, endeavoring to engage not only landowners, businesses, and forestry groups but youth groups (scouts, 4-H, Future Farmers of America), conservation organizations (Audubon, Conservation Federation, Izaak Walton League, Nature Conservancy), recreational interests, women's and men's clubs, social and educational organizations, federal and state agencies, and the media. It was the first major forestry conference in Missouri. Held October 18, 1958, in Jesse Hall Auditorium on the University of Missouri Campus, it featured a headline array of speakers, including the governor and attorney general, a U.S. senator, and federal and state forestry officials. A business leader from Chicago talked about the outlook for an Ozark pulp and paper industry; the outlook was good, he said, but dependent on an adequate supply of wood from small private owners. Leonard Hall addressed the scourge of open range grazing, which would not finally be terminated statewide by law until 1967, despite years of dogged campaigning by Spencer Jones, Drey, Hall and other conservationists. In his own speech, Leo Drey encouraged landowners and policymakers to "convert lazy acres into busy acres" through sound forest management (Drey 1958).

If there was a subtext for the conference beyond raising public support for forest conservation, it was to build political support for protection of the Current and Eleven Point rivers as national rivers in order to defeat proposed dams and reservoirs. Senator Stuart Symington, undoubtedly with prior encouragement, called for "thoughtful attention" to the proposal; other speakers commented favorably, and it was reportedly a topic of discussion during breaks (DP f11, Drey to Idol f28, f36, f231). Leonard Hall's book about the Current River, *Stars Upstream*, had just appeared with its argument for a free-flowing stream. Within a few years, Drey and Hall would be pitted against each other with competing proposals for how to protect the rivers, but, in 1958, they and most others at the conference were united in their desire to protect the streams from dams by some sort of national designation.

Dams on the Current and Eleven Point had been among dozens authorized in Missouri in the 1930s. Two dams at Blair Creek and Doniphan on the Current, proposed by the U.S. Army Corps of Engineers in the 1940s, had been beaten back by an unusually strong coalition of local and statewide interests, both public and private, but, in the early 1950s, the dam proposals resurfaced in the course of further flood-control studies. Blair Creek was the major drainage of the National Distillers' holdings purchased by Leo Drey, who now owned nearly 35 miles of frontage along the Current River in the vicinity of the proposed dam. Drey had been an avid floater of Ozark streams even before he owned land

there, so he was supportive of efforts to forestall the dams and preserve the rivers by developing the recreational resources of the region, as proposed in a National Park Service led, federal-state cooperative plan issued in 1956 (MDRD 1956), but he had some misgivings about the extent of public ownership and the scope of mass recreation development focused on the narrow river corridor in subsequent National Park Service proposals (fig. 9).

As a bandwagon for National Park Service development of the rivers gained steam, Drey began meeting with the Ozark Committee of the Nature Conservancy and other Ozarkers to shape an alternative proposal more sensitive to the concerns of local residents who wanted more sustained economic development and less interference with their way of life. They formed a Current-Eleven Point Rivers Association that sought to forge a consensus among a wide array of local groups around a multiple-use program that would emphasize forestry and wood-using industries, locally controlled watershed conservancies, and small impoundment recreational areas (f 1, 231). In a lengthy 1959 letter to Governor James T. Blair, Jr., (f 172), Drey made the case for comprehensive planning for "the wise, harmonious development of the two great natural assets of the Ozarks—the region's forested watersheds and their running rivers," with full local participation. He advised only limited additional public land acquisition—without resort to eminent domain—and more creative use of individually negotiated scenic easements tailored to the natural values, land uses, and appropriate recreation patterns along particular stretches of rivers or highways and near springs, caves, and other natural features. He also advocated safeguarding the unique wild values of the rivers by dispersing recreation to the extensive woodlands of the region; this could be accomplished by developing hiking, riding, and jeep trails, small impoundments and scenic overlooks—not only on public lands "but on private as well if the owners are agreeable." Surely the owner of Pioneer Forest was agreeable, so long as his forestry operations could continue (fig. 10).



Figure 9—Leo Drey owned 35 miles of frontage along the Current and Jack's Fork Rivers. Left to right: Leo Drey, Ed Woods, and Charlie Kirk. (Courtesy of Pioneer Forest)

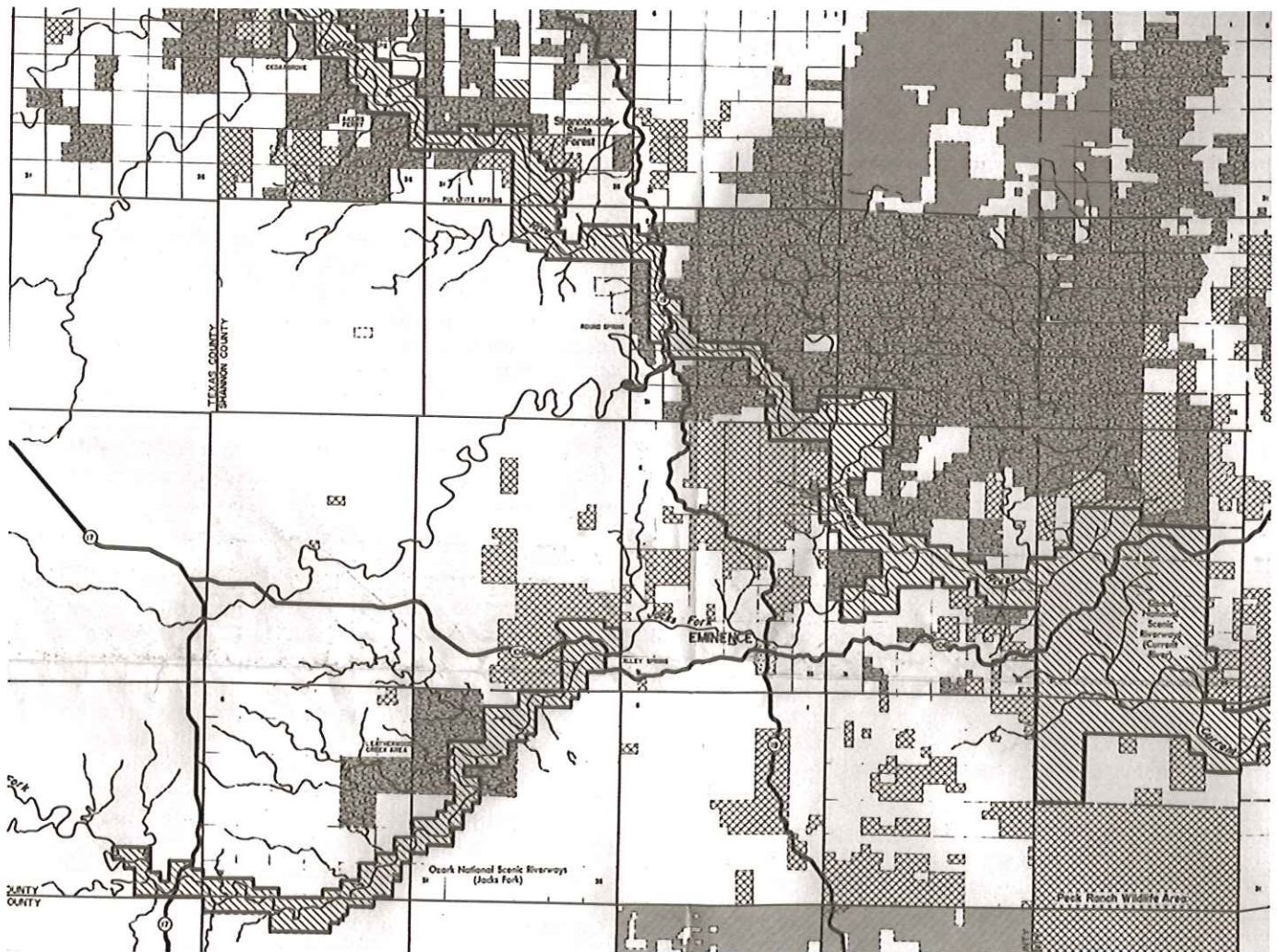


Figure 10—Pioneer Forest (tree crowns) in relationship to Ozark National Scenic Riverways (diagonals within corridors), Missouri Conservation Department land (cross-hatch), and national forests (shaded). Source: Bureau of Outdoor Recreation (Stokes 1976).

In his effort to find an alternative to the National Park Service and encourage more extensive planning for economic development in the region, Drey engaged in intense correspondence with Sigurd Olson of Ely, Minnesota, ecologist Robert McDermott of Pennsylvania State University, economist Mason Gaffney of the University of Missouri, forest consultant August Beilmann, and many others, most of whom sought gently to temper Drey's optimism about the willingness of Ozarkers to accept the sort of comprehensive planning he envisioned (DP f 199, 204, 226, 232). With little support for regional planning, Drey and his colleagues developed a proposal for management of the rivers by the U.S. Forest Service that incorporated their notion of scenic easements, dispersed recreation and other aspects of multiple use management, including continued timber production and mining (Drey 1960). By 1961, there were two contending bills in Congress, a measure providing for a National Park Service-managed Ozark Rivers National Monument introduced by Congressman Richard

Ichord in the House and Senators Stuart Symington and Edward Long in the Senate, all Democrats, and a bill drafted by Drey and St. Louis attorney Davis Biggs to establish a U.S. Forest Service-managed Ozark Scenic Riverways, introduced by St. Louis Congressman Thomas Curtis, a Republican (Stevens 1997; see also Senate 1961, 58-80). Though neither bill made it out of committee, the contest opened a rift between Leo Drey and his friend Leonard Hall, who supported the National Park Service bill.

The election of 1960, which brought the Kennedy Administration to office, had made a victory for Drey's alternative considerably less likely, introduced as it was by a Republican. Secretary of the Interior Stewart Udall, who floated the Current with Ichord, Hall, and National Park Service officials in September 1961, became an advocate for National Park Service management and won President Kennedy's endorsement, effectively defusing the objections of the U.S. Forest Service, the major landholder

in the region (Sarvis 2002, 47). Even the Missouri Conservation Commission agreed to endorse the National Park Service bill after negotiating assurances that their land would not be taken without their consent and that hunting would be allowed along the rivers, prompting charges from Drey that they were thereby undermining the future of forestry and markets for forest products in the region (DP f 227).

By 1962, it was clear that Missouri would be a proving ground for a new concept of national rivers advocated in the report of the Outdoor Recreation Resources Review Commission (1962). At Senate field hearings in June 1962 at Big Spring State Park, Drey forcefully argued for preservation of the quality rather than quantity of the recreational experience along the riverways by developing economic incentives for management of their forested watersheds along conservation lines. Using diagrams drawn by his sister-in-law (fig. 11), he charged that the National Park Service proposal, though seemingly—when viewed from “celestial heights”—aimed at regional development through preservation of the rivers, would actually—when viewed from a proper perspective with one’s feet on the ground—overshoot preservation and fall short of development by its emphasis on mass recreation (DP f 177). Several months later, Drey circulated his own proposal for a system of national riverways, explaining that many more rivers could remain wild and natural if they were secured through conservation easements to restrict development in riparian corridors, rather than

through government ownership; the easements could be held by whatever agency—federal, state, or private—was most appropriate for the particular river, whatever agency was best able to encourage and demonstrate proper management and productive use of timbered watersheds by private owners (House 1963, 65-67; DP f 232). Along the Current and Eleven Point, that would be the U.S. Forest Service.

Though Ozark voters in the November 1962 elections favored local candidates opposed to the National Park Service approach, most of the significant political players at the national level supported a considerably revised National Park Service measure in the 1963 Congress. The new bill removed the entire Eleven Point River and the Ripley County portion of the lower Current, a region of significant national forest ownership, good farm land, and strong local opposition to the National Park Service; on the remaining land it provided for easements as well as outright acquisition, the easements intended, perhaps, as a sop to Drey, and it contained language satisfactory to the MDC providing for hunting, fishing, and retention of their lands.

In a last ditch effort to forestall passage, Drey and 41 other riverway landowners signed “letters of intent” by which they would offer voluntary scenic easements to the state, not to the federal government, and Drey himself toyed with the idea of donating a recreation easement of some 50,000 acres to the state as a Current River Remote Area (Senate 1963, 74, 84-85; DP f 232). Knowing that National Park Service officials were

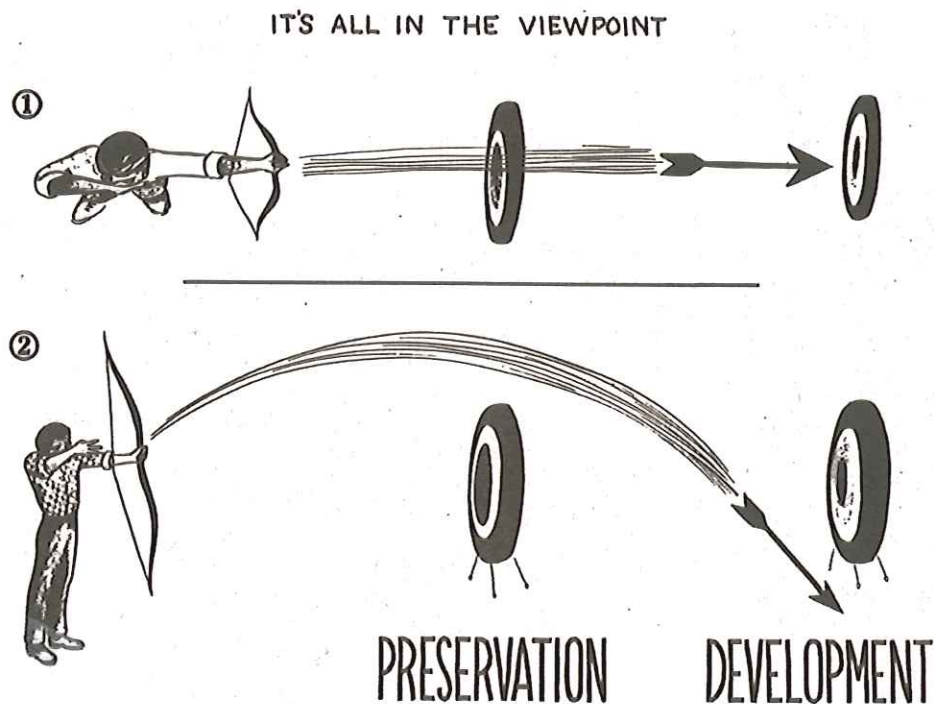


Figure 11—Park Service proposal overshooting preservation and falling short of development, as sketched by Leo Drey’s sister-in-law. (Courtesy of Leo Drey)

distrustful of easements, he also worked with his foresters, Ed Woods and Charlie Kirk, on a statement on the “possible effects on Pioneer Forest of the loss of approximately 10 percent of its present area” (DP f 177). The 13,000 acres of Pioneer lands within the proposed boundaries held some of the finest standing timber on the richest, deepest soil, according to the statement. Moreover, some 30 of the 400 permanent sample plots in Pioneer’s continuous forest inventory would be lost, including nearly all of the fast-growing bottomland hardwoods type, potentially invalidating the comparative value of the inventory. And Pioneer’s heavy investment in timber stand improvement would be interrupted before its benefits could be realized either by the firm or by the local economy. But there is no evidence Drey ever circulated the statement or spoke in public hearings about his own potential personal losses.

The bill for National Park Service administration of the Ozark National Scenic Riverways passed Congress in August 1964 and was signed into law by President Lyndon Johnson on August 27, thereby establishing the country’s first national river. By that time, the secretaries of Interior and Agriculture had already appointed a study team to establish criteria and suggest rivers for a national system of wild rivers. Four years later, Congress followed through with the Wild and Scenic Rivers Act which, much as Leo Drey had suggested, provided for administration by whichever federal agency was most appropriate in the region. Missouri’s Eleven Point was included among the first nine rivers designated, and it was placed under the jurisdiction of the U.S. Forest Service.

In the immediate aftermath of enactment of the National Park Service bill, Drey was understandably upset, even shell-shocked, about the divisiveness within the conservation community and the beating he himself had taken. In a letter to MDC Director William Towell intended to mend badly frayed personal relations, he even suggested, “I’m no longer sure that I know what conservation means, or that there is any longer a place for me in the pic[t]ure. . . . If the emphasis is to be on recreation throughout the region, there is no point in pouring money into the sort of intensive forestry we’ve been practising[sic] because it won’t pay off. Mind you, I’m not saying I won’t make money out of our land, because I will, one way or another. I’m only saying it can no longer be taken for granted that forestry should be, can be, or will be practiced by private landowners in the Ozarks.” After adding that he was even thinking of devoting his efforts to other interests such as education and health rather than conservation, he pulled back a bit: “I haven’t quite decided to pick up my marbles and quit, but I’m giving it serious consideration because it seems that the basic premise on which I’ve been operating in the Ozarks—that the timber should be developed and the rivers preserved—is about to be reversed” (DP f 227).

But even as he expressed his dismay and seeming uncertainty about his own future in conservation, Drey, with his characteristic idealism, had been engaged in educating gubernatorial candidates about Missouri’s conservation needs—especially a statewide system of scenic rivers (DP f227). The winner of the 1964 contest, Warren Hearnese, appointed

a Governor’s Wild Rivers Advisory Committee that included Drey and other members he had suggested. Drey immediately offered a list of 19 rivers for the committee to study and, months later, suggested draft language for a state wild rivers bill that emphasized protection of streams by scenic easements (DP f 152, 167, 170, 164).

After 4 years of meetings and failed legislative efforts, a coalition of urban environmentalists in 1970 launched an initiative petition campaign aimed at voter enactment of a state system of scenic rivers by simple zoning of some 850 miles along 20 Ozark streams against further development (Adams 1970). The initiative campaign put Drey on the spot, as he was then president of the Coalition for the Environment, a St. Louis umbrella organization he had helped found in 1969 whose board agreed to endorse the initiative, whereas Drey himself had long been committed to working with local landowners in the Ozarks and protecting their rights. Now urban environmentalists were urging him to jump into the campaign to put it over, on the grounds that no bill could satisfy the more recalcitrant Ozarkers (DP f 155). But sober second thoughts following the bombing of a campaign leader’s car led finally to abandonment of the initiative; and, after a thousand angry landowners packed a hearing on yet another attempt at a legislative bill, the scenic rivers measure was dead (Wolf 1971).

In retrospect, it is likely that condemnation of lands and other management problems of the National Park Service along the Ozark National Scenic Riverways in its early years helped to fuel landowner opposition to the state scenic rivers bill (Sarvis 2000). Drey himself was disturbed that the National Park Service was using easements opposite the way he thought appropriate, offering perpetual easements for lands with cabins and other nonconforming developments that should have been condemned, or, at most, granted life tenure, but buying out farmers by insisting on public right of access to easements, which in practice forced most farmers to sell or be condemned. On his own Pioneer Forest, while Drey preferred to offer easements, the National Park Service insisted on condemning his most valuable land near Round Spring State Park, for which he received \$100 an acre, and trading interior lands formerly owned by other condemned landowners to him for some of his other riverine lands. He was able to retain only 961 acres along the river under easement (DP f 149, 157). Meanwhile, public use of the rivers, including motorized equipment, burgeoned out of control, so much so that by 1973 even Leonard Hall, glossing over his own role in the conflict, bemoaned the overemphasis on recreation: “Thus the Riverways, except as an area for mass boating, is failing its purpose to preserve the stream, its fauna and flora, and its scenery in their natural condition.”

In spite of his misgivings about the National Park Service, Drey began discussions as early as 1965 with the regional director of the Bureau of Outdoor Recreation, a sister agency established in 1962, regarding ways in which the recreational opportunities on Pioneer Forest might be coordinated with those of the riverways, the national forests, and state agencies to better serve the public (DP f 523). Drey had not given up his dream of more dispersed recreation in the region—focused on trails,

primitive camping, and related activities back from the rivers—and he was willing to cooperate by making his land available, especially on the big block east of Current River near Round Spring. Perhaps owing to bureaucratic rivalries and the desire of the National Park Service to get its feet on the ground in the riverways before branching out, a BOR study was put off until 1974, when recreation planner Gerald Stokes prepared a broad—some thought even grandiose—range of proposals for development of recreation on Pioneer Forest (DP f 512).

When Stokes subsequently reported that National Park Service officials were not interested in participating in recreation management on Pioneer Forest, viewing their responsibility as confined solely to the river corridor, Drey contracted with the Coalition for the Environment in St. Louis, MO for yet another study that would help in assessing priorities for recreational development in light of federal and state agency attitudes (DP f 513). From the two recreation studies (Stokes 1976, Bedan and Goetz 1976), and especially from the mapping of Pioneer lands in juxtaposition with public lands, grew plans for an Ozark Trail extending from St. Louis, MO to Arkansas, a proposal enthusiastically supported by staff in Missouri's newly established Department of Natural Resources (DP f 523-25). The first segment of this trail to be completed, with help from Sierra Club volunteers, traversed Pioneer Forest for nearly 13 miles along Blair Creek (fig. 12), providing a critical link between the Mark Twain National Forest to the north and the Ozark National Scenic Riverways to the south (Creighton 1979).

THE PIONEER SYSTEM OF FOREST MANAGEMENT, ca. 1970

During all the turmoil over the Ozark National Scenic Riverways, the proposed state scenic rivers bill, and the Pioneer Forest recreational studies, forest management activities continued on Pioneer very much as they had from the start (fig. 13). At nearly 150,000 acres by 1970, the forest was still operated by five foresters and technicians—the same five who had transferred to Drey from National Distillers—though a sixth would soon be added in anticipation of the retirement of Ed Woods, who had suffered a series of strokes. Three of the staff were assigned to supervise districts at some distance from the Salem headquarters—Russ Noah at Eminence in Shannon County, Rayborn Skaggs at Bunker on the Reynolds-Dent county line, and Paul Corder at Ellington in Reynolds County—while Woods and Kirk handled the Salem district and other administrative and supervisory matters (SLPD 1962, Merritt 1962).

In each district, foresters monitored the forest, marked boundaries, marked and scaled trees for timber sales, and supervised sales, visiting each active sale at least once a week to ensure that the harvest, skidding, and transport of trees were not causing unnecessary damage. Sales were put out on bid to local sawmills or loggers, and staff made an effort to schedule sales fairly evenly in the areas worked by certain loggers and mills so as to help keep them in business. They generally marked trees only about a week in advance of harvest, placing

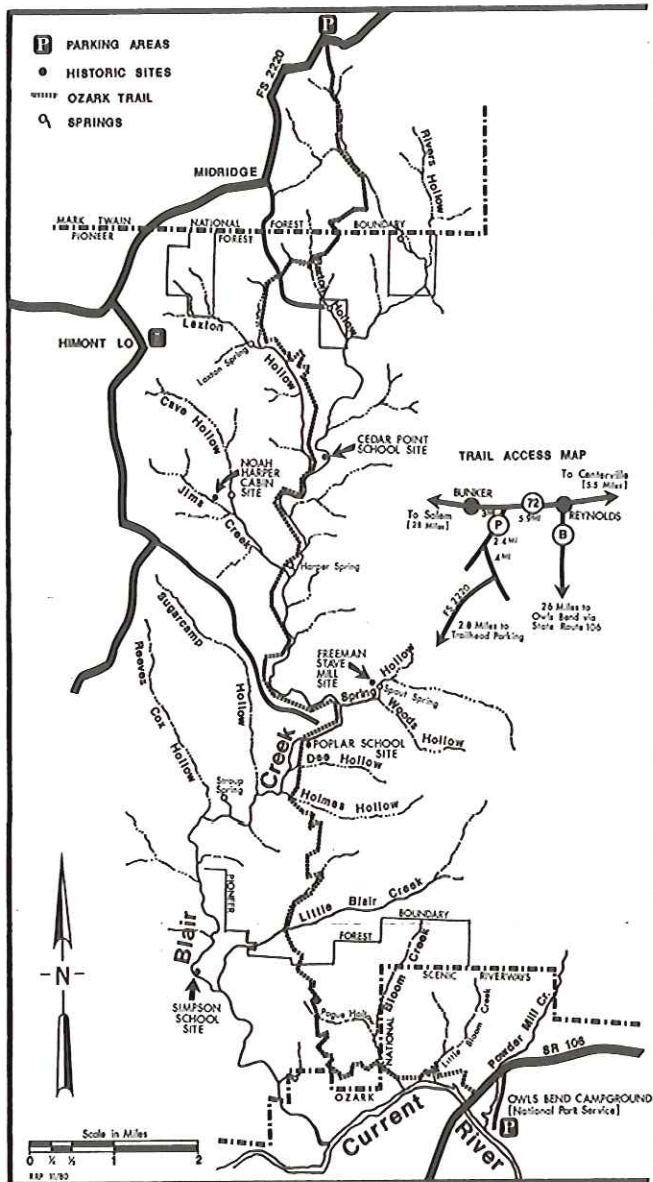


Figure 12—The route of the Ozark Trail through Pioneer Forest, connecting the Mark Twain National Forest with the Ozark National Scenic Riverways, from a 1980 Pioneer Forest brochure. (Courtesy of Pioneer Forest)

paint both at breast height and at the base of the stump, so they could check regularly to make sure the proper trees were being cut. And they asked loggers to harvest from the bottom of the slope toward the top, using marked trees as fulcrums for the skidding cables, so as not to damage trees intended to remain. In those years there were 10 to 15 active timber sales on the forest, each harvesting about 40 percent of the standing volume for a total harvest of about 1 to 3 percent of standing volume on the forest as a whole (Iffrig and others 2004).

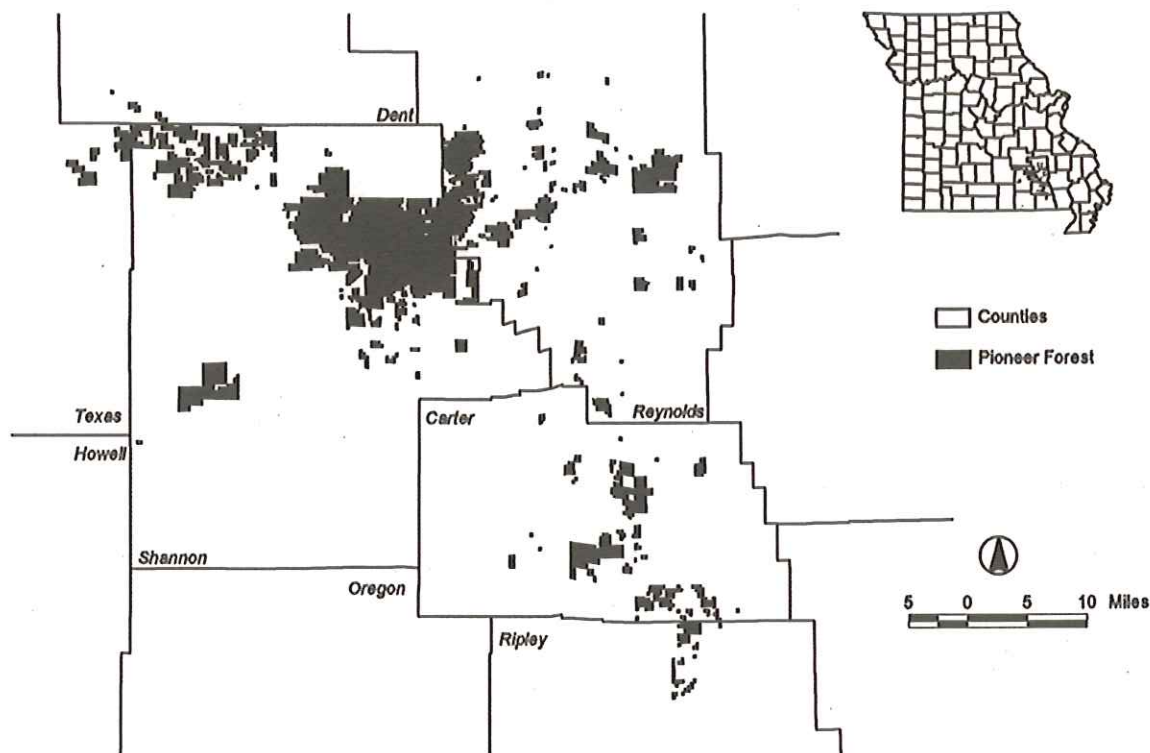


Figure 13 (right)—Pioneer Forest. By 1970 the forest had reached nearly its extent as of 2000, when this map was made. (MoRAP)

In the early years of their single-tree selection system, there was a good deal of trial and error experimentation in the marking of timber and scheduling of sales. Woods and Kirk apparently intended to return to each unit approximately every 12 years, but, by 1970, they were beginning to realize that once every 20 years was more realistic. In the beginning, they removed a large amount of rotten or deformed material, as relatively few trees were fully mature and ready for harvest. In marking trees for removal, they had to be cognizant of slope and soil conditions and the desirability of creating sufficient space and light to favor young reproduction of desired species as well as continued growth of the best specimens in a range of species and size classes. But, in truth, there was little to go on except observation and instinct. Despite the fact that selection cutting had been standard procedure in the U.S. Forest Service for decades, and both Woods and Kirk, as well as Noah, had experience with it elsewhere in the country, there had been little work on the rotation for oak-hickory in Missouri and virtually no long-term research.

The paucity of long-term data made the Pioneer staff more committed than ever to keep up their continuous forest inventory, even though it required a great deal of effort every 5 years for their small field staff to painstakingly locate, measure, and record individual trees on each of the more than 450 1/5-acre sample plots (fig. 14). By the 1972 inventory, the average board-foot volume per acre had increased from about 1,200 in 1952 to more than 1,750 (Trammel 1998), in spite of all the

white oak harvested by National Distillers as well as Pioneer's improvement cuttings and losses from drought, fire, ice, and windthrow. If Pioneer was not yet fully paying its way, at least the quantity of standing timber was increasing.

As owner of the forest, Leo Drey operated out of an unpretentious room in the Syndicate Trust Building in downtown St. Louis, MO handling all financial transactions and keeping records, which he stored in an office safe. Though he had spent weeks on end in the Ozarks in the early 1950s when he was getting started, his marriage to Kay Kranzberg of St. Louis in 1955, followed within 7 years by the arrival of three children (Laura, Leonard, and Eleanor), led him to cut back on his time away from home. In any case, his involvement in conservation issues and his myriad land transactions and forestry activities required massive paperwork—Drey never employed a secretary—as well as countless meetings with fellow activists and lawyers in the city. But, he loved spending days afield with his foresters, and he rarely missed monthly meetings and field trips of the Karkhagne Club, an association of foresters and other Ozarkers founded by Ed Woods to discuss land management issues. The Karkhagne, a figment of Woods's imagination, was a mythical beast with a habit of eating section corners (Woods 1964); it was reputed to make its home in the wilder reaches of Pioneer Forest (fig. 15).

In addition to his efforts on the Ozark Riverways and the scenic rivers bill, Drey was also deeply involved in conservation campaigns nearer home. He was a founder and first president of



Figure 14—Russ Noah and Paul Corder measuring a tree during the Pioneer Forest inventory. (Courtesy of Pioneer Forest)

the St. Louis Open Space Council in 1964 and worked tirelessly for passage of a proposed \$25 million bond issue to acquire 5,000 acres of land for 24 major parks in St. Louis County that fell a heartbreaking 376 votes short of a required two-thirds majority in 1966. He was also a founder and president of the Missouri Coalition for the Environment, which fought against encroachment of development on flood plains, against pollution and sprawl, and for environmental quality and parks, joining the Open Space Council in a successful effort in 1969 to secure a smaller bond issue to enable purchase of 2,800 acres. Through both organizations he also promoted a national recreation area along the lower Meramec River, in part to forestall proposed dams (Sanford 1970, Drey c.1984).

On his own, Drey established the L-A-D Foundation in 1962 to acquire, protect, and promote forests and natural areas. Some of his own forest contained significant sites, and he was also a soft touch for conservationists seeking a savior for other threatened areas. In December 1970, concurrent with adoption by the Missouri Conservation Commission of a new policy providing for establishment of a state system of natural areas, Drey announced the availability of four sites—Cave Spring in Shannon County, Clifty Creek Natural Arch in Maries County, Balancing Rock Narrows on the Piney River in Texas County, and Grand Gulf in Oregon County—for lease to any public agency that could protect them while allowing public access (Adams 1970). The following year the foundation contributed funds to a survey of natural areas being coordinated by Professor William H. Elder of

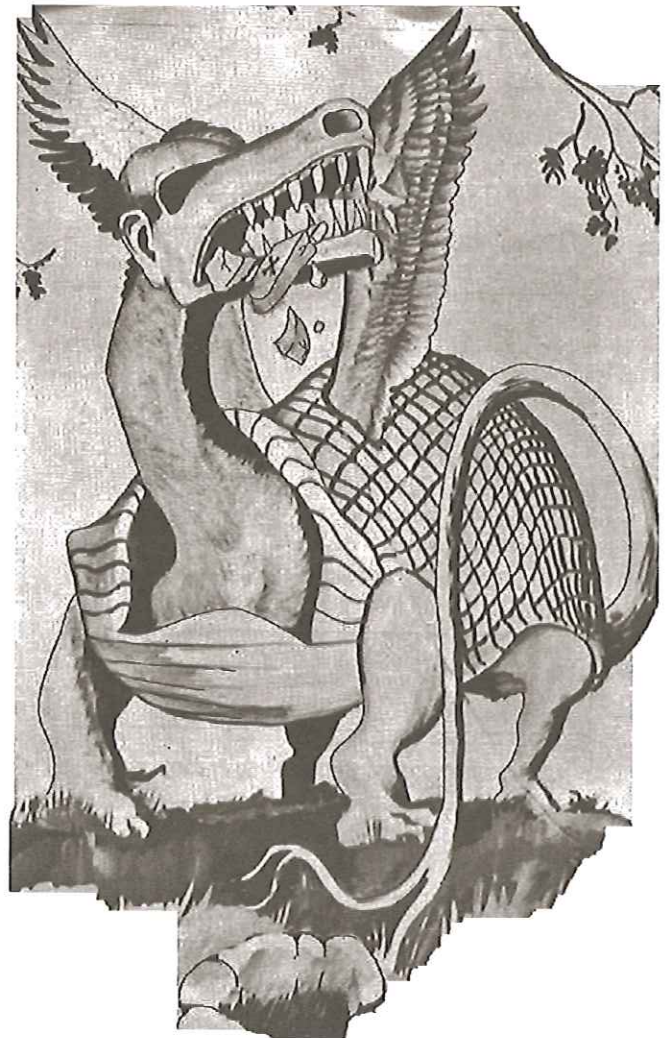


Figure 15—A drawing of the Karkhagne by Ward Degler from Ed Woods' description. Source: Woods, *Missouri Log*, 1964.

the University of Missouri. Two L-A-D sites, Clifty Creek and Piney River Narrows, were included in the first set of natural areas designated by the state in 1971, a number that would grow to eight by the end of the decade (Kramer and others 1996). In 1974, Drey transferred to the L-A-D Foundation the ownership of the 961 acres along the Current and Jacks Fork rivers under scenic easement to the National Park Service. And, in 1975, the foundation began funding a county-by-county survey of natural areas headed by R. Roger Pryor (1980).

As owner of Pioneer Forest, hoping to demonstrate that he could make a profit through conservative land management, Drey must have been somewhat disheartened by his prospects after 20 years of operating experience. During the entire period from the mid-1950s to the early 1970s, stumpage prices for timber remained stagnant, not even keeping pace with inflation, so that in real terms, they declined (Hamatani and Goslee 2008: fig. 7). In 1970 and for several years thereafter, prices were

lower than at any time since 1954-55, when severe drought had thrown a glut of salvaged timber on the market. The stagnant prices in the 1960s and early 1970s probably resulted from weak economic conditions during the Vietnam War, exacerbated by massive clearing of forest land for pasture in the Ozarks that further glutted the market for sawlogs; the U.S. Forest Service reported that more than 1.7 million acres of commercial forest land had been converted to other uses between its 1959 and 1972 surveys in Missouri.

By an ironic twist of fate, the Pioneer enterprise during these years was buoyed by substantial revenue from an unexpected source—royalties from the mining of newly discovered veins in the rich new lead belt known as the Viburnum trend, which became the leading lead-producing area in the world. When Drey was first asked by an exploration firm to allow wildcatting on his land, he said no. But he was soon informed by William Blunt of National Distillers, with whom he had originally negotiated for the land, that he was not being fair; under terms of his contract to purchase the Distillers' land, the firm had reserved a one-half interest in any minerals found on the property and now wished to profit from it. So, Drey reluctantly signed an option agreement with Bear Creek Mining Co., the exploration subsidiary of Kennecott Copper Co. He eventually bought out National Distillers' half interest in order to forestall mining on any additional land, but mining continued under a 50-year lease he had signed in 1969 with Ozark Lead Company, another subsidiary of Kennecott (later Doe Run), in return for which he would receive substantial mineral royalties (LD).

THE CHALLENGE OF SILVICULTURAL REVOLUTION, 1965–1985

The early 1970s were a time of transition in the Ozarks to a more intensive form of forestry characterized by even-aged management, or clearcutting, rather than uneven-aged management of the sort long practiced on Pioneer and on federal and state lands up to that time. The shift came later to the Ozarks than to other forests in the West, South, and East. It began on private industrial lands during World War II when firms such as Weyerhaeuser in the Pacific Northwest began practicing tree farming, using clearcutting to prepare land for new high-yield stock that would grow quickly to maturity. During the dramatic housing boom after the war, private operators sought permission to harvest timber by clearcutting on national forests, but the U.S. Forest Service adamantly insisted on the time-honored practice of single-tree selection and, in fact, advocated public regulation to forestall destructive clearcutting on private lands. As political pressures to increase the cut from public forests mounted, the U.S. Forest Service finally in 1955 authorized clearcutting on the Boise National Forest in Idaho. Clearcutting was soon being practiced on national forests throughout the West, where it was said by its proponents to be necessary for regeneration of Douglas-fir, lodgepole pine, and other species that are intolerant of shade (Hirt 1994: 137).

In the East, U.S. Forest Service officials initiated the new practice of even-aged management in 1964; one of the earliest national forests to see extensive clearcutting was the Monongahela National Forest in West Virginia. An early intimation of the applicability of the new technique to the oak-hickory forests of the Ozarks came in a 1962 article by U.S. Forest Service research forester Benjamin Roach on "Practical Silviculture for Central Hardwood Stands," published in the *Southern Lumberman*. "With the silviculturist obligated primarily to growing products for industry," Roach wrote, "it follows that he should do so as efficiently as possible. . . . And to keep silvicultural costs low, he must be satisfied with doing only what is necessary to produce the required products, not what might be desirable to produce the ideal forest." Researchers in Missouri conducted a 40-acre clearcut on the Sinkin Experimental Forest near Bunker in the mid-60s, but the first commercial clearcut on a public forest in Missouri did not occur until 1969, in a sale near Eminence overseen by District Forester Charles Santhuff on MDC land (Trammel 6-24-02).

As public outrage erupted nationwide over clearcutting on national forests as far flung as Montana, West Virginia, and Alaska, and as millions of acres of hardwoods on public and private lands in Missouri were being converted to pine or to pasture by aerial spraying and planting, wildlife biologists in the MDC, concerned about adverse impacts on wildlife, began working with foresters in MDC and on the Mark Twain to develop a cooperative program to assure a variety of wildlife habitat in each management unit (Evans 1974). Specially funded by Congress in 1974, it was called the Missouri Plan owing to its pace-setting cooperative elements. Along with the later onset of clearcutting in Missouri, the Missouri Plan may have had the effect of forestalling controversy of the sort witnessed elsewhere, even though the plan was fundamentally grounded in even-aged management.

Most of the silvicultural research that was being done in the 1960s and 1970s, almost all of it funded by the U.S. Forest Service or by private industry, focused on highly specialized studies of the most efficient way to grow timber volume and enhance present net worth through even-aged management, with little emphasis on tree size and quality (Boyce and Oliver 1999: 430). That was also what was being taught in forestry schools. Clint Trammel visited Pioneer Forest on a forestry field trip during his junior year at the University of Missouri in 1967 and was so impressed by Ed Woods and his uneven-aged management system that he came back on his own two weeks later, pitched his tent on Big Creek, and spent the weekend exploring the forest. But when he raved about it to a professor he was told, "Don't worry about it. It's just an experiment. It won't work." This was the attitude that pervaded the ranks of professional foresters at the university, in the conservation department, and on the Mark Twain all during the 1970s and into the 1980s, Trammel recalled (interview). To them, Leo Drey was just cutting timber, not managing the forest; he would find out in time that he wasn't getting reproduction of oak and that his forest would become increasingly dominated by less valuable, shade-tolerant maple (fig. 16).



Figure 16—Pioneer Forest Manager Ed Woods, Owner Leo Drey, and Chief Forester Charlie Kirk. (Courtesy of Pioneer Forest)

But, regardless of prevailing attitudes, Trammel jumped at the chance to apply for a rare opening on the Pioneer Forest staff in 1970 and was hired. In 1972, when Ed Woods retired and Charlie Kirk took over as forest manager, Trammel was promoted to chief forester. That fall, Terry Cunningham, who had experienced similar attitudes at MU during his quest for a degree, was hired as a temporary to help with the 1972 forest inventory and then was kept on to handle operations near Van Buren. Rayborn Skaggs retired in 1975 and was succeeded by his son Danny, who had learned the trade and the forest by accompanying his father. Trammel became forest manager in 1979 when Charlie Kirk retired, and Cunningham took over as chief forester. Another veteran, Paul Corder, became ill and died in 1980. So, except for Russ Noah at Eminence, who would continue until 1985, the forest, by 1980, witnessed a turnover of the original staff that had come from Distillers—and from Pioneer Cooperage before that—and a new generation was in charge on Pioneer, none of them yet out of their 30s.

The 1970s and early 1980s must have been lonely years for the staff on Pioneer, especially for the younger recruits whose entire education had emphasized the virtues of even-aged management and detailed the myriad problems of older uneven-aged approaches. They kept doing what they had been doing—what they learned from the seasoned staff and what their boss, Leo Drey, wanted them to do: continue to individually mark trees by single-tree selection. But, Drey was dubbed “conservation’s Don Quixote” in the popular media (Stevens 1971) because of his leadership in environmental causes as well as his dreams for Pioneer, and professional foresters, most of whom were circling the wagons to ward off attacks by environmentalists, began to look askance at the management of Pioneer as well. Trammel and Cunningham in particular, after they were left in charge by the retirements of Woods, Kirk, and the other veterans, admitted they felt quite isolated from the professional forestry fraternity, wondering whether, in fact, their

system would work in the long run. Virtually all the silvicultural studies published in those years, and there were hundreds of them, were saying one couldn’t expect to get oak reproduction without clearcutting. There was virtually no research on uneven-aged management in the central hardwoods region.

Charlie Kirk, who had begun his career in the 1930s and had come to Missouri in 1938, the first year of the new state forestry division, had been socialized into the profession in a different era when single-tree selection was the norm. It was not until the last decade of his career that he witnessed the wholesale revolution in silvicultural orthodoxy. Shortly before he retired, he wrote a moving rumination on his own management philosophy born of 40 years of experience in the Ozark woods: “I Think on It Often” (Kirk 1979). There was a spot high under his right shoulder blade that itched off and on for years. It finally occurred to him, he said, “that this itch occurs only when the mind is wrestling with questions that have, at least to me, no immediate, concrete answer. I have learned the hard way that whenever this shoulder itches, I should rethink my answers.”

For 30 years, he admitted, he had been haunted by something Cal Stott said: “There is little doubt that man has the authority to say what will happen to a wild woods. The question is, does he have the wisdom?” Kirk compared rings in cross-sections of two 16-inch black oaks recently cut on Pioneer, one of which was 14 inches in diameter at age 22 but grew only 2 inches in its final 12 years, whereas the other was only 11 inches at age 68 but had grown a full 5 inches in the next 7 years. His shoulder itched as he pondered the imperfect art of marking timber. He ended with a litany of altered ideas in a “strange half-century of forestry,” from condemnation to acceptance of fire and clearcutting, to the shift from multiple to single use, to the glib notion of preservation, and the “silvicultural suicide” of diameter-limit cutting. “I am older now—I have come to know that things are not always as they seem,” he concluded; “I am older now—my shoulder continues to itch.”

The new young crew on Pioneer soldiered on into the 1980s, conducting the seventh forest inventory in 1982. Trammel decided to save money by doing his own computer work rather than sending the raw data to Michigan, so he bought a Radio Shack Model 3, taught himself programming, and then waited anxiously for 2 full days while the machine crunched the data. Volume was up to more than 2,000 board feet per acre from only about 1,200 in 1952. Even more heartening, growth per acre per year had again started to rise after stagnating and then falling during the late 1970s, a time of rather significant losses from oak decline (Trammel and others 1998: 4). Prices for timber also began to rise in the late 1970s after decades of stagnation, leading to a more profitable enterprise. The inventory seemed to suggest that the various commercial tree species were maintaining their relative proportion of the forest mix and that the various diameter classes were also maintaining themselves or increasing (Iffrig and others 2004). But 30 years of data were hardly enough to answer long-range questions of oak reproduction, especially in view of the deluge of skepticism about uneven-aged management in the silvicultural literature.

There had been an independent study of the Pioneer data by David Larsen for a 1980 masters thesis in forestry at the University of Missouri, but it did not directly assess the management system on Pioneer. Larsen, who had grown up in Salem near the Pioneer headquarters and participated in the 1977 inventory, utilized CFI data and experimental plots on Pioneer to test the applicability of a growth and yield model developed for loblolly pine to upland oak-shortleaf pine stands in Missouri. But, aside from anecdotally noting the inability of pine to compete well with oak, the study did not address the issue of even versus uneven-aged management. Another MU master's thesis in forest ecology by Tim Nigh and others (1984, 1985), which sampled sites on Pioneer as well as other forests in the Ozarks and along the Missouri River, found widespread invasion of sugar maple, especially in the loess hills along the Missouri River but also in scattered areas across the Ozarks, and a striking paucity of oak regeneration, a pattern largely attributable to a reduction in site disturbance through fire, grazing, and heavy logging. Surely such findings must have been unsettling to the Pioneer staff.

PIONEER'S ROLE IN CONTROVERSIES OVER PUBLIC LAND MANAGEMENT, 1985–1995

The prospects for uneven-aged management in the Ozarks were addressed in a limited way during a planning process for the Mark Twain National Forest under the leadership of Forest Supervisor Leon Cambre, which began in 1980 and led to an approved Land and Resource Management Plan in 1986. The process had been mandated by the National Forest Management Act of 1976, which in turn had been precipitated by a 1975 federal appeals court decision that clearcutting on the Monongahela National Forest violated a requirement in the 1897 Organic Act to harvest only “dead, matured, or large growth” trees that had been individually marked, a practice the U.S. Forest Service had religiously followed for more than half a century before switching to clearcutting. The 1976 act repealed the 1897 act and legalized clearcutting, but it also expanded requirements for protection of environmental quality and for broad public involvement in the planning process. Every forest in the nation engaged in NFMA planning during the 1980s, and in virtually all there was a contest of interests. Before coming to the Mark Twain, Cambre had been in Washington, DC helping to shape the 1976 act, so he was committed to making a success of the planning process in Missouri.

In the 1970s and early 80s, Missouri had an unusually effective coalition of environmental groups and individuals—the Missouri Wilderness Coalition—that established a good working relationship with Cambre and the staff of the Mark Twain during its successful effort to secure congressional approval of seven wilderness areas on the forest totaling more than 63,000 acres between 1976 and 1984 (Karel 1978, Farmer 1999). During

the forest planning process, the coalition was especially intent on securing more protective management for seven additional areas totaling 39,000 acres that could also qualify as wilderness. When the U.S. Forest Service issued its draft plan in 1985, environmentalists were generally pleased with recognition of the seven de facto wilderness areas as “sensitive” and with efforts to protect other special areas and scenic rivers, though they favored suspension of timber harvest in all such areas. They also appreciated the plan's emphasis on management for wildlife values, but they challenged the emphasis on deer, rabbits, and turkeys—all ubiquitous species that thrive under clearcutting—rather than interior forest species such as bears, mountain lions, certain hawks, and red-cockaded woodpeckers. And, they indicated a general preference for uneven rather than even-aged management (Sierra Club 1985).

If environmentalists were generally supportive of the proposed plan, the forest industry and local Ozarkers were outraged, believing that the plan would unduly restrict future timber harvests and access roads. In one newspaper account (Auchly 1985), the reporter even managed to cast Pioneer Forest Manager Clint Trammel with the industry opposition when Trammel rated the plan at best a C- and questioned the closing of some access roads. In fact, Trammel, unlike the industry, was also opposed to the plan's increased goals for timber harvest—up to an average 105 million board feet per year, from 78 million in 1984—fearing that smaller diameter trees would be taken before they were mature. And he must also have been dismayed by the emphasis on even-aged management, though he apparently did not publicly question it.

The final plan for the Mark Twain issued in 1986 increased the acreage on which uneven-aged management would be applied to 166,000 acres, or about 11 percent of the forest, even though it argued that “research does not support the wide-spread use of the uneven-aged system in the Ozark area when perpetuation of the oak forest is the objective.” The U.S. Forest Service pledged, however, to evaluate the effectiveness of the uneven-aged system during the next 10 to 15 years and, if results were positive, to analyze its potential for greater application (USDA-FS 1986).⁴

It was the first chink in the armor of the clearcutting juggernaut, and it came in the only possible place on public lands in Missouri, as the MDC at the same time was taking a turn toward even more adamant insistence on even-aged management. Relations between Leo Drey and his foresters, on the one hand, and the forestry leadership of MDC, on the other, had grown increasingly testy during the 1970s and early 1980s, in part over differences in management philosophy exacerbated by a decade-long, unsuccessful effort to effect a mutually beneficial land exchange (PF). Then in 1985, a new governor, John Ashcroft, appointed his campaign manager, Rolla lumberman John Powell, to the conservation commission. Powell, whose

⁴ In 2005 the USDA Forest Service would issue a revised forest plan and accompanying environmental impact statement for the Mark Twain grounded in principles of ecosystem management (USDA-FS 2005). About 29 percent of the forest would be managed with an emphasis on restoration of natural communities by prescribed fire and other techniques; about 67 percent would be identified as suitable for timber management. But with an emphasis on adaptive management and flexibility of techniques, the balance of even- and uneven-aged management under the new plan would be somewhat unclear and hence a matter of concern to the staff of Pioneer Forest and others (Trammel and others. 2005).

own 18,000-acre tree farm was a model of conservative, even-aged management, had long been a fierce opponent of wilderness and an unabashed advocate of clearcutting, and he would become the dominant force on the commission for the next 12 years. The commission in turn promoted state forester Jerry Presley to department director and Presley appointed the longtime head of the Missouri Forest Products Association, Gerald Ross, as state forester; both remained strongly committed to even-aged management of state forests.

Following through on the Mark Twain's commitment to move forward with uneven-aged management, U.S. Forest Service officials arranged for 39 employees including foresters, rangers, wildlife biologists, and technicians to visit Pioneer Forest in June 1987 to view and discuss its management system with Trammel, Cunningham, and Leo Drey (fig.17). The group toured eight sites on the forest, discussing everything from Pioneer's objectives and history to its strategies for marking, the history of cutting in the various stands, methods for working with loggers, the CFI system, and the prospects for reproduction of various species (Melick 1987).

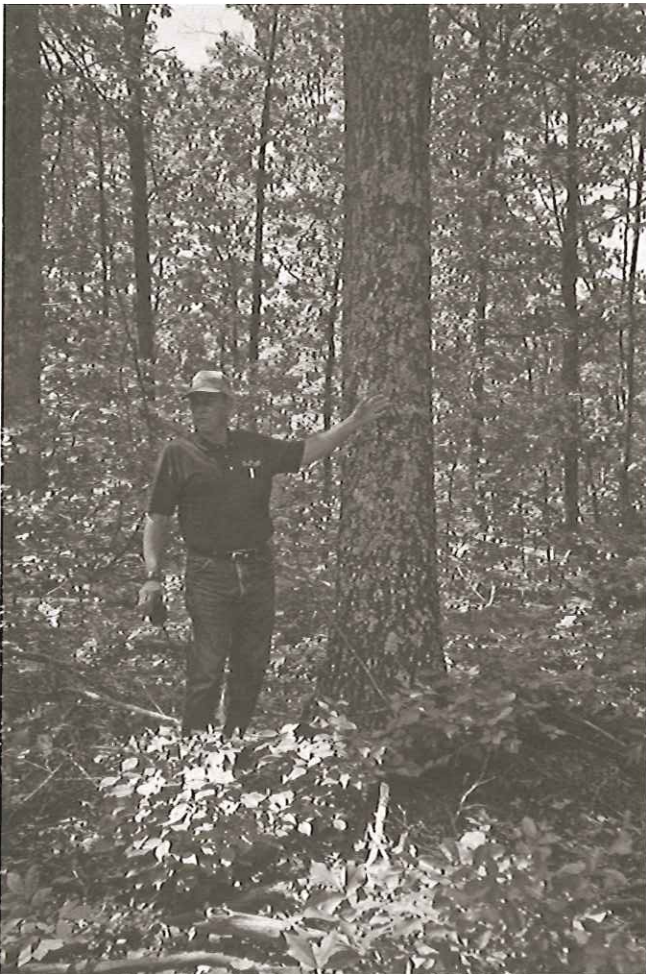


Figure 17—Forest Manager Clint Trammel leading a tour on Pioneer Forest. (Photo by Susan Flader)

In addition, two silviculturists on the Mark Twain, Jay Law and Ross Melick, worked more closely with Pioneer staff in the course of special studies of how they might implement the new approach. Pioneer was the only forest in Missouri with substantial experience in uneven-aged management and, as Law and Melick now increasingly appreciated, there was precious little other research or experience to use as a guide. What published research there was dealt almost entirely with failures of the method elsewhere in the country, so they would of necessity have to start with an examination of the Pioneer system. The two had somewhat different assignments. Law, who had experience with single-tree selection early in his career in the Lake States and drafted the sections of the revised forest plan dealing with uneven-aged management, put in some measured plots on the Salem district and worked with Craig Lorimer at the University of Wisconsin to develop brief "how-to" guidelines for applying the method (Law and Lorimer 1989). Though the guidelines drew on the Pioneer methodology, they recommended group selection to create openings of up to .35 acre if oak regeneration was desired. Melick, as part of his quest for advanced silvicultural certification, was preparing to recommend silvicultural prescriptions for the first 68 acres selected for uneven-aged management on the Mark Twain, three stands near the Mill Creek Recreation Area in the Rolla District (interviews, Law and Melick).

Melick's more discursive unpublished report (1989) began with an unusual "apologia" in which he acknowledged that his project design had been influenced by "political realities"—the need to move expeditiously toward initiating and evaluating uneven-aged management "as directed in the Forest Plan"—and hence his report included more detail than usual about various questions related to fire, insects and disease, regeneration, herbicides, genetics, logging damage, and economics under uneven-aged management, and it omitted formal evaluation of a complete range of silvicultural alternatives. Melick recommended "selection with groups" as the harvest method for all three stands, evidently drawing on Law's guidelines and seeking a compromise between shelterwood, which was already being utilized as an even-aged technique on the Mark Twain, and single-tree selection as practiced on Pioneer.

Melick's report acknowledged the greater difficulties of applying uneven-aged management on a public forest with lack of prior experience in the techniques, frequent staff turnover, and more restrictive contracting requirements. Pioneer foresters, by contrast, were able to work closely with loggers to prevent damage to unmarked trees, and they could terminate contracts immediately if excessive damage occurred. Nevertheless, Melick concluded that uneven-aged management had substantial applicability not only in visually sensitive areas or in riparian or other fragile environments but also on upland sites with some of the best potential for high-value timber products such as white oak, which was often cut prematurely in even-aged rotations. Although there were as yet no detailed economic comparisons of the two regimes in management of central hardwoods, and the staff on Pioneer was unable to provide a

benefit/cost analysis, there were some data emerging from southern pines (Guldin and Baker 1988) that suggested an advantage for uneven-aged management in producing and sustaining large good-quality sawtimber yields, especially from cutover stands; and virtually all the oak-hickory forests in the Missouri Ozarks had been cut over. The prospects for uneven-aged management obviously did not appear as bleak to Melick as they did to most other professional foresters in Missouri.

While Mark Twain foresters—now under a new supervisor, B. Eric Morse—were taking initial steps toward implementation of uneven-aged management in limited areas, they continued with clearcuts on the bulk of their acreage. In early 1988, 1,100 people in southern Missouri signed a petition of protest against the clearcuts, winning considerable media coverage. Several of them formed a group called Mark Twain Forest Watchers, which began studying federal law and the 1986 forest plan to find leverage points for citizen action (Dorst 1988). They also visited Pioneer Forest to study and photograph uneven-aged management, after which they filed an official appeal with the U.S. Forest Service contending that environmental assessments for proposed timber sales had to be site specific and assess the effects of uneven-aged as well as even-aged management. To their amazement, not only did they win on the Mark Twain, but Forest Service Chief F. Dale Robertson on February 6, 1989, issued a directive to all regional foresters nationwide to undertake site-specific analysis for all timber sales in implementing forest plans (Dorst 1989). By 1991, the Mark Twain reported a shift from 70 percent even-aged and less than 1 percent uneven-aged sale acres in 1988 to 29 percent even-aged and 32 percent uneven-aged sales (USDA-FS 1991).

The larger context of the Missouri struggle and the relatively rapid shift toward uneven-aged management on the Mark Twain included renewed public uproar over clearcutting on national forests nationwide combined with the ready example of successful single-tree selection technique on the neighboring lands of Pioneer Forest. Missouri foresters including Clint Trammel and environmentalists, including Hank Dorst of Forest Watchers, traveled to a number of conferences in Arkansas, where foresters and environmentalists had been debating clearcutting for years. Trammel found himself so disgusted by the attitude of Arkansas foresters at one meeting that he walked out (interview).

In 1990, beleaguered U.S. Forest Service Chief Robertson announced a shift nationwide to a new ecosystem-based management approach called "New Perspectives." When Arkansas's Ouachita was designated a "new perspective" forest with a moratorium imposed on the use of clearcutting, MDC Director Presley (1990) roiled the waters in Missouri with a widely circulated letter of protest to Robertson, suggesting the decision was largely based on "the emotionalism of ill-informed preservationists" and asking that MDC be notified in ample time to provide input if anything similar were contemplated for the Mark Twain. Commission Chair John Powell (1990) backed him up, railing against environmental fanatics who dared to challenge "good sound professional resource management expertise."

In numerous meetings and debates in Missouri around that time, Trammel was invited to present the prospects for single-tree selection, leading to much greater visibility for Pioneer Forest with environmentalists, in the media, and even among professional foresters. But there is some evidence that even Trammel, who was working on a master's degree in forestry at the University of Missouri at the time, was not entirely convinced of the greater benefits of uneven-aged management. In private correspondence with Drey (LD 9-18-90), he acknowledged his "very real concern" about "the increasing effort to eliminate even-aged management as an option because of emotional rather than biological reasons." "Leo," he explained, "even-aged management is the 'best' way to manage oak-hickory forest. The silvics of the species call for open sunny areas for best growth of regeneration. . . . Your decision to use uneven-aged management means you have decided to accept the trade-offs necessary to make the system work. Both Ed and Charlie must have discussed this with you in the past. We get less regeneration. We get a slower rate of growth. We get a reduced volume per acre. . . . I can easily show on Pioneer that uneven-aged management works. It would be far more difficult to show that it works 'best.'"

Drey, however, was not dissuaded: "Nothing we do will ever eliminate the use of even-aged management by the government. No fear of that, and that's not our purpose, which I'd say is rather to demonstrate that individual tree selection is a viable option, so land managers can then make informed decisions in accordance with their priorities." Ed and Charlie had already established the parameters of the operation before he bought out National Distillers, Drey explained (LD 9-21-90). "Realizing that they were operating in a complicated field with many unknown interrelationships, I believe both felt that they didn't want to be as manipulative as the government is, with their installation of food plots, their construction of watering holes, and their clear-cutting. In fact, if I understood them, they thought it best to go light on the land and to try to follow nature's lead rather than to clear cut and then regenerate after such heavy manipulation." And then the kicker: "I'm not sure about Charlie, but I know Ed was fully convinced that his method was not uneconomic, and he had it as one of his basic goals to show that such was indeed the case."

Leo Drey himself was frequently in the spotlight during the late 1980s and early 1990s, owing to his involvement in two other hotly contested issues, the disposition of the most pristine of Missouri's big springs and a second major effort to secure an act to protect the state's remaining natural streams. A media frenzy erupted over Greer Spring (fig. 18) and its surrounding 7,000-acre tract when Anheuser-Busch negotiated to purchase it in 1987 with assistance from The Nature Conservancy, intending to extract more than 2 million gallons of water a day to bottle and sell. Drey, a longtime member of TNC's Missouri board, was so incensed by this threatened "commercial exploitation and degradation" that he eventually stepped forward with an offer of \$4.5 million to buy and hold the Greer Spring tract himself, arranging a creative deal with Busch for each of them to donate \$500,000 through the Trust for Public Lands to reduce the price for eventual U.S. Forest Service acquisition of the land as an



Figure 18—Leo Drey at Greer Spring. (Courtesy of Leo Drey)

addition to the Eleven Point National Wild River (Bertelson 1988). Congress finally appropriated funds, and the tract was conveyed to the Mark Twain in 1992, after an intense political effort to prevent leaving a large part of it open to clearcutting.

There were numerous articles on Drey in state media at the height of the Greer issue, including one that reached back to the Shannon County tax battle of the 1950s to suggest that Drey was still regarded as “public enemy number one” in Shannon County for fighting against economic development. Drey responded that he felt he was helping the economy through all his local contracting for Pioneer, then admitted feeling a bit hurt by the negative attitudes of some Ozarkers, saying quietly to the reporter, “I respect them and admire them. . . . They value their independence and their freedom. You have to respect that” (Lemons 1988). The most appreciative account of Drey’s management of Pioneer and his efforts for Greer and other causes appeared in the magazine of the National Audubon Society under the title, “Every State Should Have a Leo Drey” (Jackson 1988).

When the Greer Spring issue heated up, Drey was already involved—quietly behind the scenes—in strategizing and financing an effort to win support in Missouri through yet another initiative petition campaign for a system to protect the state’s remaining natural streams: “The greatest unfinished piece of conservation business in Missouri,” supporters called it (Bradley 1996). The measure would have designated stretches of 52 streams on which dams, bankside clearcutting, all-terrain vehicles, and loud motors would be prohibited. At Drey’s insistence, owing to his respect for Ozarkers’ desire to control their own destiny, it also offered local governments and citizens the opportunity to prepare management plans enforceable by a review commission within the Department of Natural Resources.

But the MDC, having several times promised Drey to remain neutral on the issue, came out publicly in strong opposition to the initiative, citing potential interference with its own management prerogatives; and, after a raucous campaign with

charges and countercharges from angry partisans on both sides, the Natural Streams Act went down to resounding defeat in November 1990, an election in which environmental initiatives nationwide were turned down by voters. So upset was Drey with the ethics of the foresters running MDC that he refused to participate in several forestry conferences, allowed his membership in the Society of American Foresters to lapse, and removed Pioneer Forest from the Tree Farm Program. He had joined at a time when the Ozarks were ravaged by fire, open-range grazing, grandmawing, and overcutting, he explained, but he had always been managing for biodiversity and ecosystem sustainability and was “no longer comfortable” with the program’s heavy emphasis on timber production (LD).

Yet another environmental initiative in which Leo Drey and Pioneer Forest became deeply involved also eventually blew up. As scientists worldwide began developing an international system of Man and the Biosphere reserves under the auspices of UNESCO in the 1980s, scientists in the Midwest became more aware of the globally significant biodiversity of the Ozarks. A National Park Service biologist at the Ozark National Scenic Riverways, David Foster, took the lead in developing a proposed Ozark Highlands Man and the Biosphere (MAB) Reserve in Missouri and Arkansas, centered in the Current and Jack’s Fork River region in which Pioneer Forest was located and along the Buffalo River in Arkansas. He enlisted various entities in the two states including state and federal natural resource agencies, the Nature Conservancy, and Pioneer Forest in a cooperative planning effort to prepare a nomination. Drey and his staff, including Greg Iffrig—a naturalist hired in January 1992 as a sixth employee to handle recreation, natural areas, and various research and writing projects for Pioneer—were keen to partner in the biosphere effort, as their lands would be the only substantial privately managed forest included in an otherwise largely public effort, and they would be able to demonstrate the feasibility of protecting biodiversity while engaging in profitable forestry on private land.

In January 1993, they submitted nomination papers (Iffrig 1993) for the entire acreage of Pioneer Forest and, in addition, for eight properties owned by the L-A-D Foundation in the biosphere area. Seven of the L-A-D properties totaling 910.5 acres, most of them already officially designated as Missouri Natural Areas, and six additional reserves on Pioneer Forest totaling 1,963 acres were proposed for management as strict nature reserves. Another L-A-D property, Grand Gulf, was already a registered National Natural Landmark; the 159-acre tract in Oregon County near the Arkansas line, known as “Missouri’s Little Grand Canyon” and promoted as a park since 1939, had been acquired by Drey in 1970 for preservation and leased to the state for one dollar a year for inclusion in the state park system in 1984. The 350-acre Laxton Hollow Reserve, an old growth remnant that Pioneer was protecting for research and comparison with the surrounding second-growth forest, was proposed in the resource reserve category. And the remaining 154,279.5 acres of Pioneer were proposed as a multiple-use management area that could help promote local participation, regional planning, and integrated rural development—efforts in which Leo Drey had been interested ever since his earliest days as a forest owner.

Unfortunately, by the time the complex interagency nomination was completed and nearing approval, a backlash began in the Ozarks among property rights activists who charged that the biosphere project was a United Nations conspiracy to confiscate Ozark land and herd Ozarkers into concentration camps in an effort to implement an environmental world government. The leadership of the opposition was well organized and linked to similar “wise use” and property rights movements elsewhere in the nation. It may have been emboldened by the stunning election victory in November 1994 of the Republican ‘Contract for America,’ and it successfully appealed to Ozarkers’ traditional distrust of government in mass meetings throughout the region (Rikoon and Goedeke 2000). The result was that not only the biosphere nomination but also other promising cooperative planning, resource management, and ecosystem restoration efforts among federal and state agencies and private groups in Missouri were quietly killed by the agencies responsible for them.

VINDICATION, 1990–2000

In spite of all the turmoil in the Ozarks, for Pioneer Forest the decade of the 1990s was a period not only of increasing profitability of forest operations but also of more widespread professional recognition of the viability of its management system. Prices for oak stumpage had begun to increase substantially in the late 1970s. With an increasing export market for oak, a strong domestic economy spurring demand for lumber (Hoover 1985), and continuing investment in management to enhance the quality of standing timber especially in larger dimensions, Pioneer Forest was beginning to repay its owner’s faith and commitment.

As the last decade of the century began, the jury was still out on the viability of Pioneer’s system of uneven-aged management for securing oak reproduction for the long term, as opposed to the even-aged system practiced by most public and industrial forests. But, enough student and professional interest had been piqued by the clearcutting issue of the late 1980s to result finally in some research. Owing in part to the need of the Mark Twain for a more solid basis on which to apply the uneven-aged approach being demanded by citizens and mandated by U.S. Forest Service officials, the North Central Research Station and the forestry program at the University of Missouri initiated a project in the early 1990s to describe the methods used on Pioneer Forest, analyze its continuous forest inventory data, and assess the results on the ground. Three graduate students would focus on different aspects of the study: Edward Loewenstein came first (fig. 19), and began working immediately on age and size structure; Zhiming Wang investigated predictability of diameter distributions; and Monty Metzger focused on oak regeneration.

Clint Trammel recalled a visit to Pioneer, probably in the fall of 1991, by Loewenstein and several professors in which he asked Loewenstein what he would write if he found evidence that the Pioneer system worked and whether he expected his professors to sign the dissertation. Such was the level of trust at the time (though Trammel might have worn a grin, as he was himself finishing up a master’s thesis with one of the same



Figure 19—Edward Loewenstein at work on Pioneer Forest. (Courtesy of Edward Loewenstein)

professors). As Loewenstein recalled, Trammel was looking for an advocate, whereas he and the other researchers were committed to scientific inquiry and would report the results just as they found them. Loewenstein has also admitted, however, that he originally thought he would work 6 months, prove the system did not work, and then move on to something more interesting. Instead, he would devote more than a decade to studies of Pioneer.

In 1993, when the research had scarcely begun, silviculturist Paul Johnson, who was coordinating the study for the research station in Columbia, published an assessment of oak ecology and silviculture as a contribution to resolving the conflict over management of oak forests (Johnson 1993). In it he acknowledged, for perhaps the first time in a U.S. Forest Service research publication, that single-tree selection, though generally “considered inappropriate for managing oak forests,” has “nonetheless been used successfully for 50 years on a large industrial forest in the Missouri Ozarks.” Though he did not name

the forest, he cited personal communication with Clint Trammel; and he went on to describe the method, to suggest there was evidence it could be sustainable, and to call for further study.

As the three students began their fieldwork on Pioneer, yet another graduate student, Michael Jenkins, completed a master's thesis in 1992 that utilized sites on Pioneer as well as on the University Forest and the Mark Twain to study the vexing problem of widespread oak decline. Oak decline was a consequence of the rapid exploitation of the pine and pine-oak forests of the Ozarks around the turn of the century, which had been followed by the establishment of fairly homogeneous even-aged stands of scarlet and black oak on sites formerly dominated by pine. These aging and dense, unthinned stands, stressed by drought, were now dying synchronously over large areas; more than 35 million board feet of dead or dying timber had been harvested in salvage sales on the Mark Twain alone between 1980 and 1986. Although Pioneer, too, had suffered some losses, its losses were not as severe or continuing as on the Mark Twain and the University Forest, and its regeneration was more favorable. At the Central Hardwood Conference in 1993, Jenkins and his professor, Stephen Pallardy, suggested that the uneven-aged management practiced on Pioneer not only harvested substantial numbers of oaks before they died but also reduced stress on the remaining trees and opened the canopy to allow regeneration (Jenkins and Pallardy 1993).

While the Missouri graduate students were engaged in their research, U.S. Forest Service Chief F. Dale Robertson in June 1992 officially announced a new policy direction, ecosystem management, to guide the national forest system in its second century. Appropriately ambiguous and crafted to address political exigencies in the continuing controversy over clearcutting (Freeman 2002), the new policy emphasized an ecological approach and a broader range of values than the older policy of sustained yield management with its emphasis on timber.

Whether to explore the implications of ecosystem management or in continuation of its effort to develop a viable approach to uneven-aged management as mandated by the 1985 forest plan, the Mark Twain in summer 1994 asked a team of silviculturists, wildlife biologists, and an ecologist, among them Paul Johnson and David Larsen, to spend a week visiting various sites where Mark Twain staff had initiated uneven-aged and other types of vegetation management and comment on their practices. One of the scheduled stops was at Pioneer, but a thunderstorm intervened, and the team left after only a few minutes. Although their report (Johnson and others 1994) recommended a full spectrum of silvicultural systems including uneven-aged, it questioned the applicability of the Pioneer system of single-tree selection, noting there was "no written prescription or procedure for this method" and it was "scientifically unproven and entails risks that may be unacceptable"—a finding that produced substantial tension between Trammel and team members. In his comments on the report, Trammel (1994) asked rhetorically, "How can a group of such influential people in research and academia, fields of supposedly open-mindedness, make favorable comments about uneven-aged management and, in the same breath, discredit the longest applied study in Missouri and probably

in the eastern United States." Instead of single-tree selection, the review team recommended "group selection with thinning between groups," a method they said could draw on "guidelines based on years of research on regenerating oak in clearcuts."

The review team, which included ecologist Douglas Ladd of the Missouri Nature Conservancy, also endorsed and encouraged the use of fire on the Mark Twain to control competing vegetation, prepare sites, and restore natural processes to the landscape. Most scientists and land managers had come relatively late to an appreciation of the role of fire in Missouri ecosystems, probably because of the long and intense effort to stamp out woodburning by Ozarkers, but, by the 1990s, the use of prescribed burning was accepted practice in the Nature Conservancy, in Missouri state parks, and in the natural history and wildlife divisions of the conservation department to restore prairies, glades, savannas, and other ecosystems. Most forest managers, however, whether on the Mark Twain, in the conservation department, or on the staff of Pioneer Forest, still resisted the use of fire in working forests, believing they could accomplish the same results more efficiently through timber harvest. When Pioneer's Greg Iffrig asked Ladd to comment on the silvicultural issues regarding uneven-aged management and single-tree selection, Ladd (1994) said he was unqualified, but he volunteered the observation that the woodlands on Pioneer "appeared relatively low in vegetational diversity per unit area," saying: "I think it will be difficult for Pioneer to exemplify a high quality, upland timbered landscape without including fire as an ecological tool." The skepticism that summer was coming from both ends of the professional conservation spectrum. It was a low point for the Pioneer staff.

The sole support for the Pioneer model that summer came from Carolyn Pufalt of the Sierra Club, who expressed her disappointment in the review team's dismissal of the Pioneer system to Mark Twain supervisor Randy Moore, adding: "It is somewhat ironic that the research team judges consideration of single-tree selection to entail unacceptable 'risks.' Oh that such voices of caution could have been raised within the agency years ago against clearcutting" (PF).

The first substantial scientific analysis of the Pioneer system was completed by Ed Loewenstein in May 1996 when his dissertation, with its analysis of Pioneer's CFI data and measurements from a random field sample of 600 oaks, was officially accepted. Testing CFI plots aggregated in three groups by time since harvest to determine the minimum spatial scale at which the forest could be said to exhibit a balanced uneven-aged distribution, he found the minimum to be a remarkably small 0.6 acres; that is, any randomly selected 0.6-acre plot would likely exhibit the distribution of the forest as a whole. A year earlier, he and three of his advisors had presented preliminary results of his study at the Central Hardwood Conference (Loewenstein and others 1995). It was the first report of an extensive examination of single-tree selection in an oak-hickory forest west of the Mississippi River and the most sophisticated independent analysis of Pioneer Forest data up to that time, and it demonstrated that the forest was not shifting toward shade-tolerant species, that the density of the most valuable species, white oak, had increased three-fold since 1954

while basal area more than doubled, and that the other species held their relative proportions (fig. 20). Hence the conclusion: "The single-tree selection system can be used to sustain an uneven-aged oak forest."

When Ross Melick of the Mark Twain invited Loewenstein and Johnson on another tour of management sites in June 1996, the three collectively found themselves backing away from the earlier emphasis on group selection under the formally structured approach developed by Law and Lorimer in 1989 and edging toward the more flexible single-tree selection system applied on Pioneer, recognizing, as Melick (1996) put it, that uneven-aged management "requires a different mindset than even-aged." But they also recognized that Pioneer and the Mark Twain had very different forest conditions when they began uneven-aged management. Mark Twain lands had in general been cut over somewhat earlier than Pioneer, which was in more remote and rougher terrain, and the oak that sprouted on former pine lands in the Mark Twain had been protected from cutting and fire since the early 1930s. By the 1990s, many of the stands were mature with tightly closed canopies, many were suffering from oak decline, and there was relatively little oak reproduction in the understory. It would not be easy to convert such fully stocked stands to uneven-aged management.

Much of Pioneer Forest, by contrast, had been quite heavily harvested in the 1940s and 1950s by Pioneer Cooperage and National Distillers so that Drey's management system began with a relatively open, understocked forest. Moreover, Pioneer foresters had religiously been doing improvement cuttings during which they consciously removed a higher proportion of scarlet, black and other red oak species—especially weak or deformed trees—in order to favor reproduction of the more valuable white oak. They were thus using regular cutting to mimic the function of natural fire and had maintained the forest in diverse, uneven-aged stands at the lower end of the stocking range.⁵ Hence, the hesitance of some professional foresters to recommend direct application of Pioneer's methods to the Mark Twain. Nevertheless, Melick accepted with gratitude 15 bound copies of Loewenstein's dissertation for distribution to Mark Twain staff.

In April 1997, at Melick's invitation, Loewenstein organized an uneven-aged management training session for some 20 U.S. Forest Service staff and a few MDC foresters at which discussion again turned to the applicability of the Pioneer system to the Mark Twain. MDC was initiating uneven-aged management with a group-selection system on three of nine 1000-acre study sites devoted to a cooperative Missouri Ozark Forest Ecosystem Project; the other sites would be managed by even-aged and no-harvest treatments. With the applicability of single-tree selection to similar relatively dry ecosystems of the Ozarks now less in doubt, discussion at the training session turned to more managerial and functional questions of how to take a system developed on private land and apply it to public land. When Johnson, Larsen and other instructors, for example, said



Figure 20—Pioneer Forest, 1996. (Photo by Susan Flader)

the place to start was an inventory of stands to be managed, national forest trainees said they didn't have the staff or budget to do it (interviews: Johnson, Larsen, Loewenstein, Melick).

This led the group to compare staffing levels on Pioneer and the Mark Twain. Pioneer had long operated with five foresters and technicians plus ecologist Iffrig to manage 154,000 acres, while the Mark Twain in the mid-90s had a staff of some 280 on 1.5 million acres. The Mark Twain thus had four to five times as many staff hours per acre as Pioneer, though, to be sure, many were wildlife, fisheries, recreation, or planning specialists rather than foresters, and a good many were clerical or maintenance personnel; the Mark Twain also had far more physical infrastructure and a much higher level of public use. The disparity in staffing led in turn to top-of-the-head calculations of how much time people with forestry training actually spent in the field per acre of forest on the Mark Twain as compared with Pioneer; here virtually everyone was astounded to realize that Pioneer staff likely spent as much as four times more time per acre on the ground as Mark Twain foresters, who were often chained to their desks doing environmental assessments and legal compliance. It was a graphic illustration of the costs of public service, accountability, and bureaucracy on national forests as compared with private land (interviews).

There were other consequences of U.S. Forest Service bureaucracy, especially in the new era of ecosystem management. On Pioneer, unlike the Mark Twain, there was very little staff turnover, and all its people spent years of apprenticeship; they were intimately familiar with the forest and the marking system and spent at least a day per month in the field together to cross-check their judgments and calibrate their work, advantages that could hardly be expected on a national forest. When the instructors suggested that perhaps uneven-aged management could be implemented by a single silvicultural team that would handle marking and supervision

⁵ These practices closely parallel management of uneven-aged stands elsewhere in the Nation, such as the well-documented research in southern pines at Crosssett (Baker et al. 1996).

of timber sales for the entire Mark Twain, trainees pointed out that no district ranger would let someone from outside the district come in to do the management. And besides, money was allocated in separate pots by Congress for inventory, marking, timber stand improvement, sale administration and regeneration as well as other functions such as wildlife and fish, soil and water, recreation, roads, and fire protection, and the funds were not interchangeable, making integrated management such as that practiced on Pioneer virtually impossible. It was a bureaucratic system inherited from the postwar era when the emphasis shifted to maximum timber production by the most efficient possible means—even-aged management—and all could agree it was poorly suited to the new emphasis on ecosystem values (interviews). The U.S. Forest Service, and, even in time, the MDC, would develop their own more standardized versions of uneven-aged management, but many observers—especially environmentalists—would argue that they were not the same as on Pioneer.

In the second half of the 1990s, several additional publications based on the Pioneer research appeared, each confirming and supplementing the others (Wang 1997, Larsen and others 1997, Larsen and others 1999, Lootens and others 1999, Loewenstein and others 2000). These studies, several published in the *Canadian Journal of Forest Research*, were a major confirmation through the methods and language of science of the management approach being applied on Pioneer. Perhaps most significant was the 1999 U.S. Forest Service report by Larsen, Loewenstein, and Johnson that summarized the findings and made silvicultural recommendations for others wishing to pursue uneven-aged management in the Ozarks, based almost entirely on what was learned on Pioneer.

Meanwhile, in an effort to learn more about other components of the ecosystem, perhaps in part to get at the concerns raised by TNC forest conservationist Doug Ladd and others about the difficulty of enhancing ecosystem quality and biodiversity without the use of fire, Pioneer's Greg Iffrig made deliberate efforts to recruit other nonforestry research projects from colleges and universities in the region and beyond. The first was a 1995 M.S. thesis in biology by E.M. Annand at the University of Missouri-Columbia measuring the relative abundance of migrant songbirds in response to different managed forest treatments (Annand and Thompson 1997). L.A. Herbeck (Herbeck and Larsen 1998, 1999), also at the university in Columbia, found that plethodontid salamanders maintained relatively higher densities on Pioneer than in forests elsewhere under even-aged management. Several years later, N.M. San Diego of St. Louis University completed an M.S. thesis (2001) on the diversity of leaf-litter arthropod communities under different management treatments that demonstrated the benefits of Pioneer's uneven-aged management in generating a spatial gradient throughout the landscape that maximized diversity. Several other St. Louis University students began related studies conceived as part of a long-term ecological research project, one of which (LaVigne 2002) calculated the average turnover rate for Pioneer's canopy to range from 189 to 228 years. Pioneer Forest developed a long-term relationship with the Cave Research Foundation concerning critical habitat for endangered species. And other

studies of black bears and the potential for red-cockaded woodpeckers were also in the works.

Perhaps most significant was new research about the historical role of fire in the Current River watershed where the bulk of Pioneer Forest lands are located. University of Missouri geography graduate student Michael Batek completed a thesis on presettlement vegetation of the watershed in 1994, grounded in detailed analysis of Public Land Survey notes from the early 19th century. Batek and others (1999) then extended the analysis by combining with dendrochronology-based fire histories to reconstruct disturbance regimes and utilizing GIS to relate to geological parent material, topography, and mean fire intervals. The results revealed a distinct fire 'shadow' northeast of the Current River above its junction with the Jack's Fork, where Pioneer's big block is located. Dendrochronologist Richard Guyette, who had participated in the Batek study, then extended the analysis in a series of papers (2000, 2002, 2003) that developed implications of the concept of topographic roughness. As he writes (this volume), "Here lies Pioneer Forest 'in the heart of roughness,' a landscape that has resisted the pressures of human population and disturbance for millennia." He goes on to suggest that Pioneer's management system effectively mimics historic disturbance regimes, as supported by studies of forest interior wildlife species, especially those sensitive to disturbance.

At a symposium to commemorate the 50th anniversary of Pioneer Forest in 2001, Loewenstein observed (SF notes) that he had spent the last decade trying to figure out just what it is that the foresters on Pioneer do, but they themselves are not able to tell you; they can only show you on the ground. The book has not yet been written, he said—though a book on *The Ecology and Silviculture of Oaks* that drew in part on the Pioneer data was even then nearing publication (Johnson and others 2002). The system works on Pioneer, Loewenstein explained, because of its dedicated staff and its extremely low turnover. So instead of trying to describe what the Pioneer foresters were doing, he had designed his research to see if they were accomplishing what they said they were trying to accomplish. And they are, he concluded: "Every argument that has been leveled against Pioneer Forest seems to be invalid from the data we have collected." As he put it, the Pioneer foresters were practicing as much art as science. "They are magicians," he said, but there was no gainsaying their success.

PIONEER AND THE MANAGEMENT OF PRIVATE FOREST LANDS, 1997–2004

Just as the uneven-aged management practiced on Pioneer began to gain professional credibility and even to be applied, to some extent, on public forests in Missouri, a new threat to private forests of grave concern to Leo Drey and his staff appeared on the horizon: the entry of two high-capacity chip mills to the Missouri Ozarks with the likelihood of more to come. There were already 140 such mills operating elsewhere in the southeastern states, each capable of gobbling 10 times as much wood as an ordinary sawmill. Though the MDC and many professional foresters tended to view chip mills as opening a

significant new market opportunity, especially for low-grade or 'cull' material that needed to be cleared out in order to establish a vigorous new forest, Drey and his foresters were concerned that the very scale of demand could result in a wave of destructive clearcutting, watershed erosion, and land conversion not seen in Missouri since the logging era a century earlier. In Drey's view, the market problem was no longer as severe as in years past, and the voracious new chip mills might 'steal' the timber that smaller local mills needed to operate. With the new industrial-style logging equipment used to supply chip mills, there would be increased pressure on individual landowners and speculators to allow complete clearing of their land (Vaughn 1997, Drey 1997, Gray and Guldin 2001).

The threat loomed especially large to Clint Trammel, who had begun cooperating with the Dogwood Alliance, a coalition of 60 grassroots organizations across the South that was working to document the problems caused by chip mills and to protect forests from the devastation of clearcutting. He wrote a number of articles for the organization's newsletter on his experiences with Pioneer, most of which were subsequently incorporated in a report, *Forest Management for the 21st Century* (Smith 1999), fully a quarter of which was devoted to the alternative represented by Pioneer Forest.

As they began seeing large-scale clearcuts of material apparently headed for the new mills, Drey and his staff invited property owners, foresters, loggers, politicians and environmentalists on a field trip in May 1998 to view the devastation, compare with management on Pioneer, and debate the issue on the ground (Uhlenbrock 1998). A fact sheet the Pioneer staff produced for the tour contrasted the low value, low employment (10 mill workers) and devastated land resulting from a year's operation of one of the chip mills with the higher value product, higher employment (35-40 sawmill workers) and healthy forest on an equal number of acres in a year of Pioneer's operations. A few days later, the *St. Louis Post-Dispatch* (1998) editorialized on Missouri's need for sustainable forestry on private lands, spotlighting the Spencer family of loggers, three generations of whom had cut timber on Pioneer Forest—responsibly—since the 1950s.

Though many professional foresters, especially in the conservation department, continued to support the chip mills for their market potential, Drey joined other concerned landowners, higher value producers, and environmentalists in appealing to Governor Mel Carnahan for a moratorium on new chip mills until the state had a proper program in place to lessen their impact. The governor responded in September with an executive order establishing an Advisory Committee on Chip Mills, ordering state agencies to refrain from providing any further incentives to mills until the committee reported, and directing a more restrictive permitting process.

Deliberating for nearly 2 years in a remarkably open process with public participation, the governor's committee began by considering chip mills but moved inevitably to the problem of forest management—or rather, the lack of it—on private lands, which constituted 85 percent of Missouri's 14 million acres of forest land. The committee heard presentations and received

statements from a spectrum of individuals, many of whom had previously prepared materials for a conference on sustainability of the state's private forests convened at the University of Missouri-Columbia by the Environmental Studies Program and various co-sponsors in March 1999 (Flader 2004). Included was a paper by the Pioneer Forest staff (Iffrig and others 2004) explaining their approach and methods and, for the first time, making a case for the economic advantages of uneven-aged management over even-aged.

Unlike the debate over the Mark Twain Forest Plan in the mid-1980s, when Pioneer may have been in certain people's minds but was not discussed publicly as an example, during the deliberations of the governor's committee there was scarcely a session when the Pioneer experience was not invoked by someone. In June, the advisory committee and its entourage traversed the southeastern Ozarks, visiting a chip mill, lands clearcut for the mill, and other harvest sites, and ending at Pioneer, which a reporter described as looking "more like a state park" (Leonard 1999). The Pioneer staff submitted a six-page letter of commentary on the committee's draft report, making the case yet again for more attention to single-tree selection in Missouri and arguing that even-aged management carried more uncertainties than uneven-aged for the long-range future of Ozark forests, especially in view of the frequent turnover of ownership on most private lands and the chip mill-induced spur to clearcutting and land conversion (Trammel and others 1999). But, though all members of the governor's committee agreed about the evident need for better management of private lands and though Missouri was one of the few states without any forest practices regulatory programs whatever, when it came down to voting, a majority was unwilling to approve any recommendations that encroached in the least on private property rights (Lewis 2004).

As it became obvious that little of substance would come from the governor's committee—and as independent research on Pioneer vindicated the viability of uneven-aged management—the Pioneer staff, with the full encouragement and support of Leo Drey, formed a new entity, Pioneer Consulting Group, to promote the benefits of their system of single-tree selection and help other private landowners with management planning, timber marking, and sale services. Some 97 percent of the timber sold from private land in Missouri was harvested without a forest management plan or advice from a forester, making it vulnerable to exploitative logging. Trammel and Cunningham had offered their services as consulting foresters on their own time for years, but the new consulting group had an important educational mission and promoted the staff's services as a viable economic alternative to clearcutting for the chip market. In December 1999, they began test mailings to all private landowners in Reynolds County with 400 acres or more, then expanded to include owners with more than 200 acres in the procurement area of the currently operating chip mills. They produced a flier and a primer on uneven-aged management, offered landowners an initial visit and consultation at no cost or obligation, and invited them to field days on Pioneer Forest, the first of which was at Ellington in June 2000 (PF, PCG 2000). In an effort to keep in touch with landowners who expressed

interest in management assistance, they also developed a Pioneer website and began issuing a periodic newsletter, *The Acorn*, with news from the consulting group and the forest. By early 2001, a Google search for “single-tree selection forest management” on the worldwide web brought up the Pioneer Forest site first.

In summer 2000, in the wake of the disappointing results of the governor’s advisory committee and a lack of legislative enthusiasm for any action on forest practices, Clint Trammel, Terry Cunningham, and several landowners, forest products manufacturers, and environmentalists in the Ozarks met to lay the groundwork for a new organization, Value Missouri, that would work to improve forest management on private lands and develop new markets for higher quality timber and value-added manufacturing. The idea was to develop public support and an infrastructure in Missouri for ecologically responsible forest management and certification of timber products along the lines of an international movement that had been developing since 1993 under the leadership of the Forest Stewardship Council (FSC). Clint Trammel had already been deeply involved in establishing a parallel effort for responsible forestry, the Forest Stewards Guild, founded in 1997 by forest managers across the nation who were dedicated to an approach similar to that on Pioneer; and he participated on a committee that refined FSC certification standards for forests in the United States. These and related efforts had already resulted in independent third-party certification of some 6 million acres of public and private forest in the United States and some 38 million acres worldwide (Kerasote 2001). The idea was not only to maintain the ecological integrity of the forest environment but also to assure responsible handling throughout the entire chain of custody from harvest through production to the point of retail sale, in the hope of commanding a better price at market from consumers willing to pay. Supporters saw Value Missouri as a way both to encourage environmental stewardship and to improve markets for higher value-added forest products in Missouri.

As they geared up to promote more responsible management of private forest lands in the Ozarks in the late 1990s, Leo Drey and the Pioneer staff also redoubled their efforts to provide education and recreation for the general public on Pioneer Forest itself. Shortly after Greg Iffrig was hired as staff naturalist in 1992, he had begun efforts to develop a self-guiding interpretive drive in the forest off heavily traveled Highway 19 south of Round Spring. The Missouri Department of Transportation offered to sell Drey the bulk of the adjoining strip of virgin pine that had been sold to them unharvested by Pioneer Cooperage in the 1940s as a sample of Ozark pinelands before the great cutover. It was reportedly (Eddleman and Clawson 1987) in these remnant virgin pines that the last red-cockaded woodpeckers in Missouri were sighted back in 1946. The way was cleared for purchase of the excess right-of-way from the state by the L-A-D Foundation in 1996, and by 1998 Iffrig had developed a marked walk through the pines and a drive through several miles of managed forest, complete with marker posts and an interpretive leaflet (fig. 21).

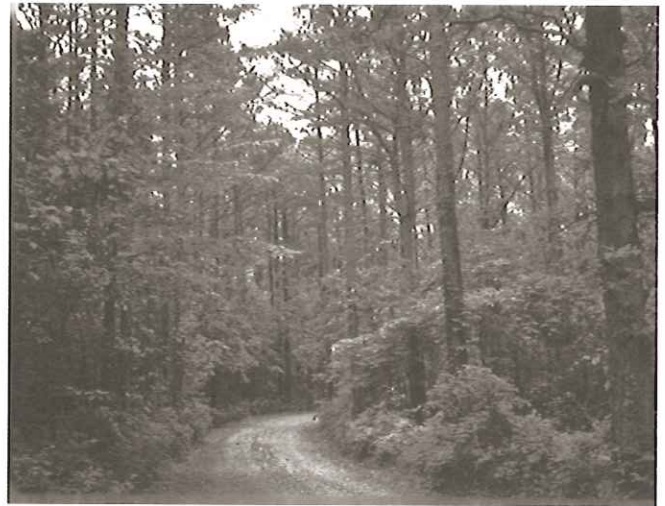


Figure 21—Interpretive drive on Pioneer Forest near highway 19 south of Round Spring, 1998. (Photo by Susan Flader)

Another effort in which Drey had been interested for more than three decades also came to fruition around the turn of the century—the establishment of a 60,000-acre backcountry recreational area on managed forest in the huge, nearly roadless block of Shannon County land he had acquired from National Distillers in 1954. After the Ozark National Scenic Riverways declined to accept responsibility for provision of public recreation on the tract in the 1970s, Drey and the Pioneer staff had gone ahead with plans for the Ozark Trail, which had been built and maintained across 13 miles of the forest largely with volunteer labor from the Sierra Club and other organizations. Drey had always allowed public access for hunting, fishing, picnicking and hiking, and he had leased a small tract within the area to his alma mater, the John Burroughs School in St. Louis, for construction of bunkhouses and a lodge at which they could conduct an environmental camp for their students and, he hoped, for the use of local school groups and others. But he was also willing to provide for somewhat greater recreational utilization of the area, if only he could gain cooperative assistance from some public agency without relinquishing ultimate authority. State park director Fred Lafser back in 1978 had proposed a recreational easement and a visitor center, perhaps with an interpretive museum and outdoor education programming, but Drey had concerns about overuse, regimentation, and “who will be in charge.”

In 1990, Drey had broached the matter again with the director of the Missouri DNR, in view of the positive relationship he had developed with the agency for management of Grand Gulf and Dillard Mill as state parks. The agency responded with a proposal to restore “an original Ozark wilderness ecosystem” similar to what Henry Schoolcraft would have seen when traversing the Ozarks nearly two centuries earlier. They would restore the landscape to pre-settlement conditions through prescribed burning to create savanna and woodland meadows, and reintroduce elk, bear, and mountain lions, an effort that

would probably require fee title to all or a substantial part of the restoration area approximating 50,000 acres (DNR 1990). Drey and his advisors regarded the plan as grandiose and out of keeping with Pioneer's objectives as a working forest, and discussion again stopped.

When Drey's protégé and environmentalist alter ego Roger Pryor suddenly passed away in spring 1998, Drey and his staff resolved to move ahead with designation of 61,000 acres in the Shannon County block as a backcountry recreational area in honor of Pryor, whether or not a cooperative management arrangement could be struck with a public agency. Drey announced the Roger Pryor Pioneer Backcountry at a Missouri Coalition for the Environment dinner in Pryor's memory in fall 1999. Two areas within the backcountry would also honor Pioneer foresters Ed Woods and Charlie Kirk for their dedication to and vision for the forest. Two years later, in conjunction with the forest's 50th anniversary, Drey and the Pioneer staff dedicated the backcountry in honor of Pryor, Woods, and Kirk, and DNR Director Stephen Mahfood announced his agency's intention to conclude a cooperative recreation agreement between the forest and the Division of State Parks (fig. 22).

The agreement, which took the form of a lease of trails and by-ways for hiking and overnight primitive camping with maintenance and enforcement by DNR, would be signed in March 2002, and by 2004 the park division would have staff on the ground in the backcountry.

A few days after the Pryor Pioneer Backcountry dedication, the Pioneer staff hosted a symposium at the Missouri Botanical Garden in St. Louis to commemorate the 50th anniversary of Drey's management of the forest (fig. 23). The *St. Louis Post-Dispatch* ran a touching editorial cartoon of an oak with a limb embracing Drey, and many papers ran special accounts of the occasion and of Drey's contributions over the years (Sherffius 2001, Allen 2001, Todd 2001).

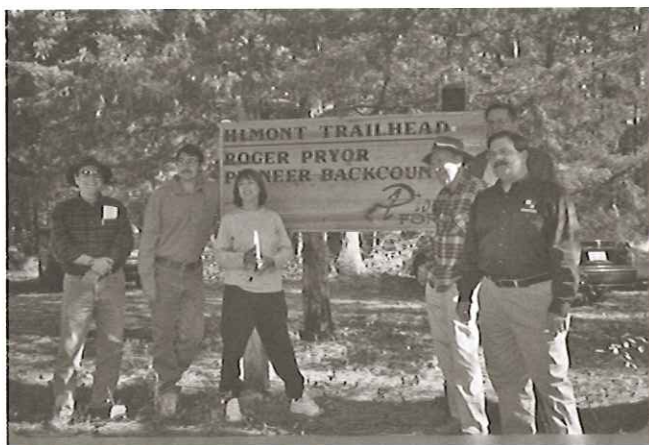


Figure 22—Dedication of the Roger Pryor Pioneer Backcountry, October 14, 2001. Left to right: Forest Manager Clint Trammel, Randy Skeeter (grandson of Ed Woods), Linda Pryor (widow of Roger), Leo Drey, L-A-D Foundation President John Karel, DNR Director Stephen Mahfood. (Photo by Susan Flader)

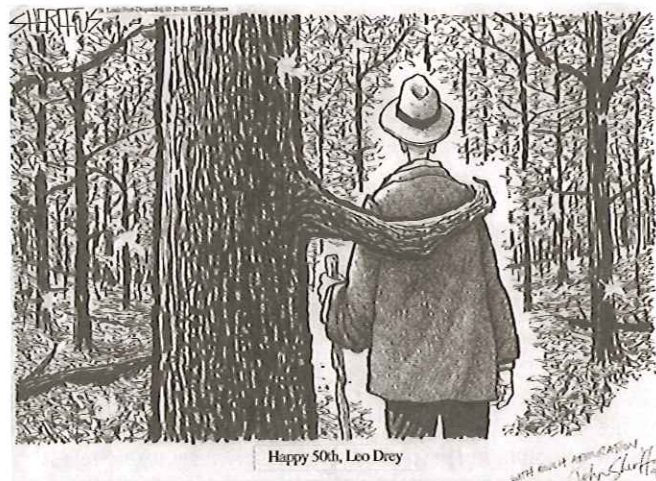


Figure 23—Sherffius cartoon from *St. Louis Post-Dispatch*, October 19, 2001. (Courtesy of Leo Drey)

Not content to rest on laurels, Leo Drey decided in spring 2002 to fund the certification of forestry operations on the entire acreage of Pioneer Forest through the SmartWood Program of the Rainforest Alliance, according to procedures and criteria for ecological and social sustainability approved by the Forest Stewardship Council (Brown and others 2001). An independent team of four specialists in forestry, ecology, and sociology from Arkansas, Tennessee, and Mississippi spent a week visiting field sites on Pioneer in June 2002, conducting public meetings and interviewing Pioneer staff, loggers, millers, and neighbors about the environmental, silvicultural and socioeconomic aspects of Pioneer's operations. Obviously impressed by the quality of forest management on Pioneer and the compelling historical record of its success, the team focused on helping Pioneer staff put in place a more detailed system of documentation to assure that knowledge of the system could be passed successfully to new staff who would one day take over on Pioneer (Trammel and others 2003).

SmartWood announced Pioneer as the first forest in Missouri to be granted FSC certification in February 2003, and a documented chain of custody through certified loggers and sawmills to Smith Flooring in Mountain View would soon be in place to make wood from Pioneer available to consumers as the first Missouri-produced and certified forest products (Acom, 2003). With Pioneer's large volume undergirding the economic viability of the process, the way was now paved for Pioneer Consulting and Value Missouri to encourage other landowners, foresters, loggers, sawmills, and producers to join the system (fig. 24).

Even as the certification was underway, a graduate student in forest economics at Duke University, Makoto Hamatani, spent several weeks at Pioneer's Salem headquarters analyzing inventory and sale records to assess the profitability of the operation over the years. Though the stagnant or decreasing prices for Ozark timber for the first two decades of Drey's ownership had been masked by increases in standing volume

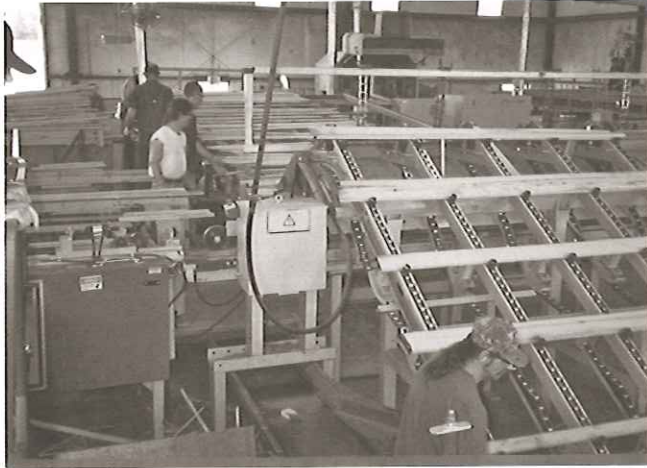


Figure 24—Certified oak flooring, harvested from Pioneer Forest, coming off the line at Smith Flooring in Mountain View, Missouri, bound for the new LEED-certified headquarters of the Missouri Department of Natural Resources in Jefferson City, 2004. (Photo by Susan Flader)

per acre and the continuing purchase of land, beginning with the 1972 inventory the acreage of Pioneer Forest was roughly constant and the price of timber began to rise, increasing substantially in the 1990s. Hamatani found that the standing volume in the three decades since 1972 had increased about 2.5 times whereas the sale price of timber had risen more than four-fold, especially in the 1990s, for an asset value approximately 9 times as high in 2001 as it had been in 1972. In the last 6 years, moreover, income had been exceeding expenses by an average of more than 50 percent (Hamatani and Goslee 2008). Clearly the single-tree selection method was profitable for Leo Drey and presumably could be also for other Ozark landowners who had sufficient acreage or joined cooperatives of the sort encouraged by Pioneer Consulting and Value Missouri.

In Fall 2002, the Pioneer staff began field work for their 11th forest inventory, which would give them a 50-year record of growth and change on Pioneer's permanent 1/5-acre plots, now numbering 486. For the first time, they entered data directly into laptop computers in the field, saving substantial time, and their PC now crunched the data in 7 seconds rather than 2 days. Some of the more than 15,000 trees in the inventory plots had been individually measured every 5 years since the first inventory in 1952, whereas others had been cut, and new trees had grown into the 5-inch diameter sample range. Beginning with the 1997 inventory, however, at the suggestion of Ed Loewenstein and other researchers on Pioneer, the inventory now included all other trees and shrubs between 1.6 and 5 inches in diameter (an additional 20 to 25,000 trees), in order to better track reproduction success (Acorn 2003). Standing volume had nearly tripled in the half century of Drey's stewardship whereas species composition had remained relatively stable, except for an increase in the more valuable white oak and pine (fig. 25).

The 50-year record of continuous inventory on Pioneer coupled with the financial results of forest operations and the university studies of forest structure and reproduction success amply confirmed Leo Drey's vision when he began acquiring land in the Ozarks a half century earlier. It was possible to manage Ozark timberlands in a conservative, sustainable fashion for a full array of ecological, social, and cultural values and make a profit besides. Drey and his staff had persevered in a remarkably consistent system of management and documentation for over half a century, during which the standard practices taught in forest schools, applied on public lands, and documented in thousands of research papers had turned 180 degrees from uneven to even-aged management. Through their openness to independent research and their willingness to share their experience and results—even with those who openly doubted their methods and, on occasion, even their professional competence—Drey and his staff had demonstrated the viability of a management system that could yield an array of ecological, social, and esthetic values increasingly appreciated by many. Pioneer Forest had played a significant role in the adoption of new management approaches on national and even, to some extent, state forests in the region. The greatest challenge for the future would continue to be that on which Leo Drey had embarked a half century earlier, to encourage other owners of private lands in the Ozarks to follow Pioneer's lead (fig. 26).

It was time to look to the future. On July 6, 2004, after nearly a year of legal effort to sort out land titles, descriptions, and myriad other details, Leo Drey and his wife Kay signed over nearly the entire forest, valued at some \$180 million, to the L-A-D Foundation (L-A-D 2004, Lewis 2005). Their intent was that the not-for-profit foundation would ensure the management of the working forest as well as the natural areas through environmentally sound and sustainable practices, much as Leo Drey himself had done, for long-term public benefit. Not only would the forest continue to serve as a demonstration of ecologically and socially sustainable management, but the income stream from its operations would be available to mount a more substantial educational and public outreach effort. It was the most spectacular gift of real estate in Missouri and perhaps ever in the annals of American forestry, and it was Leo and Kay Drey's way of perpetuating the Pioneer tradition.

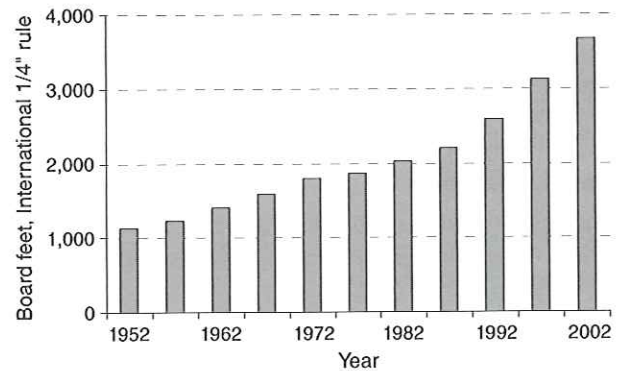


Figure 25—Board feet per acre on Pioneer Forest, 1952-2002, from continuous forest inventory data. (Pioneer Forest)



Figure 26—Pioneer Forest staff (left to right): Dan Skaggs, Tim Dyer, Terry Cunningham, Mike Adams, Clint Trammel, L-A-D Foundation President John Karel, Leo Drey, Greg Iffrig. (Courtesy of Pioneer Forest)

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