

Pioneer Forest, Missouri's largest private landholding at some 150,000 acres, has been a lodestar of sustainability during more than half a century of dramatic oscillation in forest management goals and techniques nationwide. Its owner, Leo Drey, initially intended to demonstrate the potential for developing a viable natural resource-based economy in the Missouri Ozarks. But through his remarkably consistent vision and well documented management by single-tree selection, the forest came to represent a model of sustainability for other private forest holdings and a workable alternative to even-aged management regimes being promulgated on federal and state forests. On July 6, 2004, Leo Drey and his wife Kay signed over virtually the entire forest to the L-A-D Foundation, the most spectacular gift of real estate ever in Missouri, in order to assure that the forest will continue to lead and inspire into the future.

MISSOURI'S PIONEER IN SUSTAINABLE FORESTRY

Leo Drey purchased his first tract of Ozark timberland in eastern Shannon County on March 8, 1951. It was 1407 acres of oak, much of it butt rotten, but it had some pine reproduction plus some larger pines; there was not much grazing, there were no squatters or tenants, and theft was not bad.

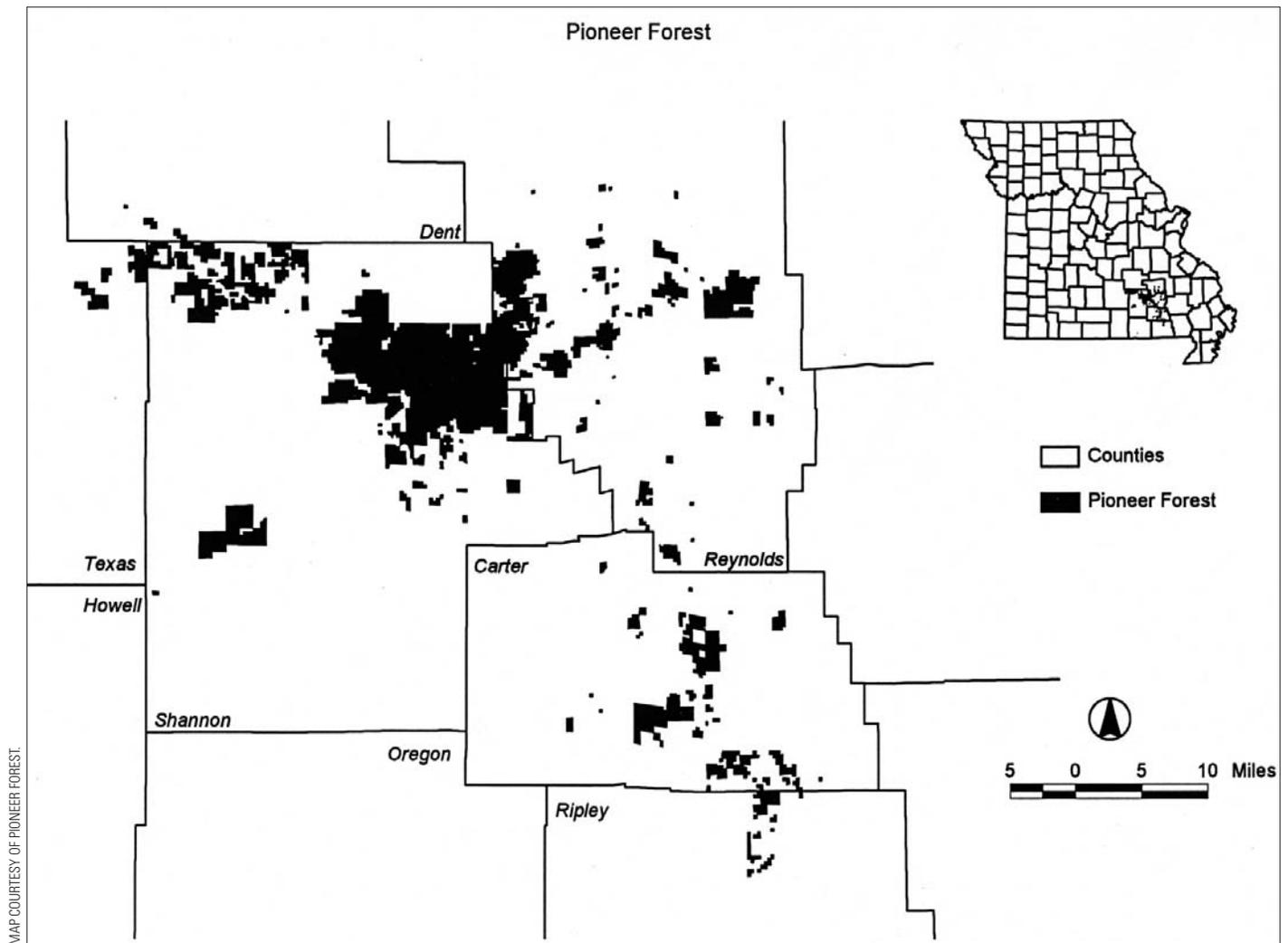
The owner wanted about \$4 an acre. So said Drey's notes, scratched in pencil on an envelope, along with a sketch map of parcels that were included or not. He had been impressed by the pines when he walked the tract with the owner in January, but in retrospect he decided he must have seen the same pines more than once that day.¹

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." He served five years in World War II and then served as assistant

to the treasurer of a shoe company before deciding to follow his calling to forest conservation. His father had died when Leo was a child and the family glass company was sold, so Leo had an inheritance with which to work.

Leo Drey invested in Missouri timberland with his eyes open but also with a large measure of faith. Most of the Ozarks was badly cut over, land had been further degraded by timber trespass and by frequent fires set by locals to encourage forage for their cattle and hogs that still roamed wild under the longstanding tradition of open range. Professional foresters told Drey he would need

BY SUSAN FLADER



MAP COURTESY OF PIONEER FOREST.

Location of the Pioneer Forest land holdings in 2000. It had reached nearly this extent by 1970.

about 25,000 acres to profitably employ one forester. Having a liberal arts background, Drey sought assistance locating and managing land from a former forestry instructor at the university. He bought about 10,000 additional acres in 1951 and 7,000 in 1952, and then in 1953 some 14,000 acres, including nearly 12,000 from the Moss Tie Co.—a warm-up for the big opportunity to come.

Drey was taking a break from fighting fire on state land at Peck Ranch at about 3 a.m. one morning in 1953 when Charlie Kirk, a forester for National Distillers Products Corp., 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. Kirk undoubtedly hoped that Drey would come to the rescue of the Distillers' tract, and Drey did not disappoint. He began an intense negotiation that ended on June 1, 1954, after six months of hard bargaining, with the purchase of 89,906 acres.

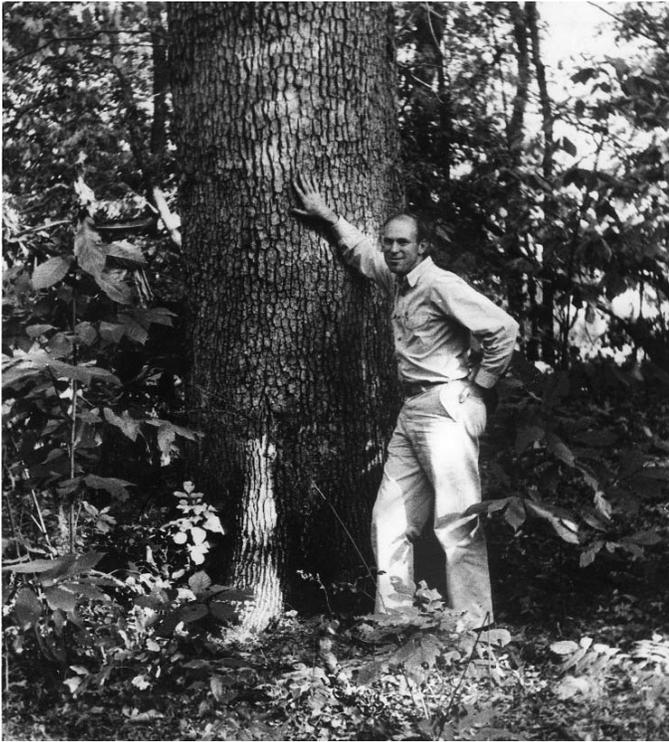
The new acquisition had once been a model private forest, and Drey intended to restore and manage it as such. The acreage had been assembled over the course of about forty years by the Pioneer Cooperage Company of St. Louis. In 1944 the firm hired Ed Woods, a forester with the U.S. Forest Service, to inventory

its remaining timber. When Woods advocated better forest management practices, the firm added Charles Kirk, formerly with the USFS in Minnesota and then with the Missouri Conservation Department, and several other staff.²

In 1948 the Pioneer Forest, as it was then known, was sold to the National Distillers Products Corporation, which wished to replenish its stock of white oak cooperage for whiskey barrels. The tract by then was reportedly the largest hardwood forest in the nation under private management. It was dedicated in 1949 as Pioneer Tree Farm—Missouri Tree Farm Number One—before a large group of well appointed dignitaries. The Pioneer forestry staff, who transferred to Distillers with the land, began trying to persuade cooperage department head Leonard Steidel of the wisdom of selective cutting, inviting H.H. Chapman, Yale emeritus professor and one of the most influential foresters in America, to examine the practicability of managing the forest for a continuous yield of white oak and other products. After travelling 1500 miles by jeep and on foot through the Distillers' tract, Chapman pronounced the white oak reproduction "nothing short of spectacular;" he recommended guidelines for selective harvest and establishment of permanent sample plots to track future growth.³

The firm abandoned plans for four of six intended stave mills

PHOTO COURTESY LEO DREY.

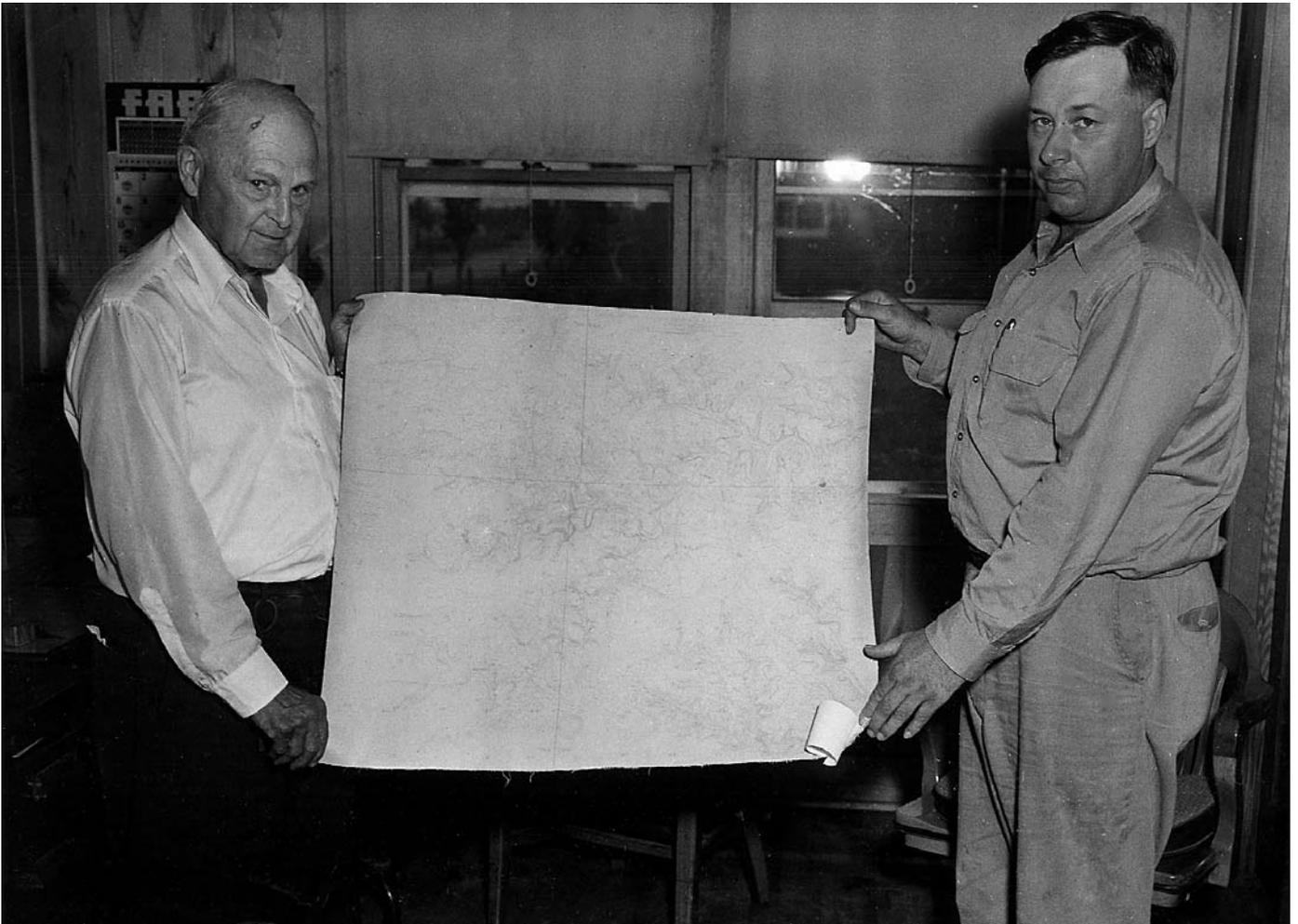


Leo Drey with a large White Oak on the Pioneer Forest.

and named the tract the Seton Porter Forest, after a former conservation-minded chairman of the board. It also began to advertise its newfound conservation consciousness and the white-oak-enhanced quality of its whiskies in the *Wall Street Journal* and other publications: "90,000 Acres of Natural Beauty . . . and Barrel Staves, Too!" A tract of old growth white oak in the Current River Hills was identified by Dr. Julian Steyermark of the Missouri Botanical Garden as a potential natural area, and in 1953 the forestry staff began negotiations with the Society of American Foresters for its designation as a virgin type association for white oak under a natural areas program SAF had established in 1947. Steidel died unexpectedly, and Distillers subsequently decided to liquidate the white oak. Perhaps because of the ongoing natural area negotiations, the destructive cutting resulted in considerable furor nationally, including a sharply critical editorial, "Not as Claimed," in *Nature* magazine. After castigating the "butchering" of the forest and its 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.⁴

The buyer 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. Though Distillers insisted on retaining the right to cut all remaining white oak over 15 inches diameter at breast height (dbh), Drey bargained

PHOTO COURTESY OF PIONEER FOREST.



H.H. Chapman and Ed Woods in the Salem headquarters, July 1951.

to reserve 300,000 board feet of white oak of his own choosing—not to cut but to protect. He selected the stand of 300-year-old trees that were already being discussed with SAF and other oaks nearby, and within a year the Current River Natural Area was dedicated, the first such designation in Missouri. Drey also bargained with Distillers for the equipment and the headquarters building in Salem and retained the forestry staff.

As of June 1, 1954, Drey had nearly 123,000 acres that he would rename Pioneer Forest out of respect for its history and in anticipation of his intent to pioneer in private land management in the Ozarks. 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.

In an article some years later Ed Woods would be able to cite a long list of pioneering “firsts” for the forest. 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 twenty active timber sales per year, which in turn maintained about one hundred 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* in 1956. “The challenge is whether I can spend money on it at the present rate and come out successfully.”⁵

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 further 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 continued for years. Hints of Ed Woods’s angst may be found here and there in his notes on the 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.” Somehow H.H. Chapman found out what Distillers was doing, for in early 1955 he wrote to Richard H. Pough of the American Museum of Natural History, “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.”⁶ Chapman, however, was apparently unaware that it was no longer National Distillers’ Seton Porter Forest, but Leo Drey’s Pioneer Forest, and Drey had a more durable set of values.



PHOTO COURTESY OF PIONEER FOREST

Ed Woods and radio operator with a map of the Seton Porter Forest.



PHOTO COURTESY PIONEER FOREST.

Ed Woods examines large white oaks on the Pioneer Forest in the early 1950s.

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 to 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 post-war 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 occurred during a period of major drought and fires that resulted in the loss of yet another 12 million board feet of timber in the mid-1950s. And 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. He believed in supporting the local economy, but he was willing to fight for the principle of fair and equal taxation. After the Missouri Supreme Court sent his case back to the tax commissioner for rehearing, Drey and the county eventually compromised.⁷ The reality, of course, is that Drey drove a hard bargain in his purchase of timberlands and his sound management constantly increased their value.

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. Following Chapman's recommendation, Woods and Kirk in 1952 had sought assistance from Calvin B. Stott, who had developed CFI for the service, to mark out a system of one-fifth-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 five 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" at the Ford Forestry Center in L'Anse, Michigan. The Pioneer inventory was a more comprehensive and intensive system than that of the forest service, in that it would track each individual tree over five inches dbh on the same plots every five years, whereas the forest service inventories would be more sporadic (1947, 1959, 1972, 1989) and more schematic, using a much less dense system of ground plots that varied from survey to survey. The Pioneer Forest inventory, conducted religiously every five years at considerable expense, would become the longest CFI in the central hardwood region, and it would gain increased credibility and value with the years.⁸

Meanwhile, during the late 1950s and early 1960s Drey became deeply involved in a political struggle over the future of the Current and Jack's Fork rivers that ran through nearly 35 miles of his land. In order to defeat proposed dams and reservoirs, he helped lead an effort to build political support to protect the Current and Jack's Fork as national rivers. But Drey had some misgivings about the extent of public ownership and the scope of mass recreation focused on the narrow river corridor in National Park Service proposals.

With the Ozark Committee of the Nature Conservancy and other Ozarkers he helped shape an alternative more sensitive to the concerns of local residents who wanted more sustained economic development and less interference with their way of life. They favored a multiple-use program under the aegis of the U.S. Forest Service that would emphasize forestry and wood-using industries, locally controlled watershed conservancies and small impoundment recreational areas, with only limited additional public land acquisition and with more creative use of individually negotiated scenic easements. Drey advocated safeguarding the unique wild values of the rivers by dispersing recreation to the extensive woodlands of the region—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.⁹

By 1961 there were two contending bills in Congress, a measure providing for a park service-managed national monument introduced by several Democratic legislators and a bill drafted largely by Drey to establish a forest service-managed Ozark Scenic Riverways, introduced by a Republican. The support of Interior Secretary Stewart Udall and the Kennedy administration for the park service version sealed the doom of Drey's version, however doggedly he continued to fight for it.

The bill for park service administration of the Ozark National Scenic Riverways passed Congress and was signed in August 1964, thereby establishing the country's first national river. It would be the prototype for the National Wild and Scenic Rivers Act of 1968 which, much as Leo Drey had earlier suggested, provided for scenic easements and for administration by whichever federal

agency was most appropriate in the region. Missouri's Eleven Point River was included among the first nine rivers designated, and it was placed under the jurisdiction of the U.S. Forest Service.

On his own Pioneer Forest, while Drey preferred to offer easements, the 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 rivers under easement. Meanwhile, public use of the rivers, including motorized equipment, burgeoned out of control, just as he had predicted.

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. 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. Park service officials were not interested in participating in recreation management on Pioneer Forest, however, viewing their responsibility as confined solely to the river corridor. But out of his discussions with the BOR and staff in Missouri's new Department of Natural Resources grew plans for an Ozark Trail extending from St. Louis to Arkansas. 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, providing a critical link between the Mark Twain National Forest to the north and the Scenic Riverways to the south.¹⁰

THE PIONEER SYSTEM OF FOREST MANAGEMENT, c. 1970

During all the turmoil over the Ozark National Scenic Riverways and related measures, forest management activities continued on Pioneer very much as they had from the start. 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. Three of the staff were assigned to supervise districts at some distance from the Salem headquarters, while Woods and Kirk handled the Salem district and other administrative and supervisory matters.

In each district, foresters monitored the forest, marked boundaries, marked 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 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. 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 ten to fifteen active timber sales on the forest, each harvesting about forty percent

of the standing volume for a total harvest of about one to three percent of standing volume on the forest as a whole.

In the early years there was a good deal of trial and error 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 early years of their single-tree selection system 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.

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 five years for their small field staff painstakingly to locate, measure, and record individual trees on each of the more than 450 one-fifth-acre sample plots. By the 1972 inventory, the average board-foot volume per acre had increased from about 1200 in 1952 to more than 1750, 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. But 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. In 1970 and for several years thereafter, prices were lower than at any time since 1954–1955, when severe drought had thrown a glut of salvaged timber on the market.¹¹

As owner of the forest, Leo Drey operated out of an unpre-



PHOTO COURTESY OF PIONEER FOREST

The 1957 inventory indicated there were fewer than 1200 board feet per acre on the Pioneer Forest.



Pioneer Forest Manager Ed Woods, Owner Leo Drey, and Chief Forester Charlie Kirk.

tentious room in the Syndicate Trust Building in downtown St. Louis, handling all financial transactions and keeping records without the aid of a secretary, as well as continuing his involvement in an array of environmental issues. In 1962 he had established the L-A-D Foundation 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. The foundation helped to fund natural area surveys in Missouri, and after the state established a system of natural areas in 1971, eight L-A-D Foundation properties were included in the new system within the first decade.

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 and South. In the East, forest service officials initiated the new practice of even-aged management in 1964, beginning on the Monongahela National Forest in West Virginia. The first commercial clearcut on a public forest in Missouri did not occur until 1969 on state land.

Most silvicultural research done during the 1960s and 1970s was funded by the forest service or by private industry. It 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. 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 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 Missouri Conservation Department, and on the Mark Twain National Forest during the 1970s and into the 1980s, Trammel recalled. 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.¹²

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. Trammel became forest manager in 1980 when Charlie Kirk retired, and Cunningham took over as chief forester. All but one of the original staff that had come from Distillers—and from Pioneer Cooperage before that—retired by 1980 and

a new generation was in charge on Pioneer, none of them yet out of their 30s.

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 two full days while the machine crunched the data. Volume was up to more than 2000 board feet per acre from only about 1200 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. 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. But thirty years of data were hardly enough to answer long-range questions of oak reproduction, especially in view of the deluge of skepticism in the silvicultural literature.

PIONEER'S ROLE IN THE CONTROVERSY OVER PUBLIC LAND MANAGEMENT, 1985–1990

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. Likely as a result of effective participation by environmental organizations throughout the planning process, the 1986 plan provided for uneven-aged management on 166,000 acres—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.”¹³

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 Missouri Department of Conservation at the same time was taking a turn toward even more adamant insistence on even-aged management. A new governor, John Ashcroft, appointed an unabashed advocate of clearcutting, John Powell, to the conservation commission in 1985, and he would be the dominant force on the commission for the next twelve years. The commission in turn selected foresters strongly committed to even-aged management as department director and state forester.

Following through on the Mark Twain's commitment to move forward with uneven-aged management, forest service officials arranged for nearly forty employees to visit Pioneer Forest in June 1987 to view and discuss its management system. In addition, two silviculturists on the Mark Twain, Jay Law and Ross Melick, worked closely with Pioneer staff in the course of special studies of how they might implement the new approach, though both recommended group rather than single-tree selection if oak regeneration was desired.¹⁴

While the Mark Twain staff was 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, 1100 people in southern Missouri signed a petition of protest against the clearcuts, winning considerable media coverage. A new group called Mark Twain Forest Watchers visited Pioneer Forest to study its system, 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 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. By 1991 the Mark Twain reported a shift from seventy percent even-aged and less than 1 percent uneven-aged sale acres in 1988 to twenty-nine percent even-aged and thirty-two percent uneven-aged sales.¹⁵

When Chief Robertson in 1990 announced a shift nationwide to a new ecosystem-based approach, designating Arkansas's Ouachita a “new perspective” forest and imposing a moratorium on clearcutting, the Missouri Department of Conservation (MDC) director further 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.”¹⁶ In numerous meetings and debates in Missouri at the 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.

Trammel's boss Leo Drey was frequently in the spotlight himself during these years, owing to his involvement in two other hotly



Leo Drey at Greer Spring.

contested issues: the disposition of the most pristine of Missouri's big springs and a major effort to protect the state's remaining natural streams. He succeeded in the first when he offered \$4.5 million to buy and hold Greer Spring and its 7,000-acre surrounding tract until the U.S. Forest Service could come up with the funds to purchase it for the Mark Twain at cost less a \$1 million donation from himself and Anheuser-Busch. He failed in the second when a ballot initiative for a Missouri Natural Streams Act went down to defeat in November 1990. There were numerous articles on Drey in the media during these years, ranging from one suggesting he was "public enemy number one" in the Ozarks to a laudatory account in *Audubon* under the title, "Every State Should Have a Leo Drey."¹⁷

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 recognition of the viability of its system of uneven-aged management. Prices for oak stumpage had begun to increase substantially in the late 1970s, and 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 single-tree selection system for securing oak reproduction for the long term, as opposed to the even-aged system practiced by most public and industrial forests. However, enough student and professional interest had been piqued by the clearcutting issue to result finally in some research. Owing in part to the need of the Mark Twain National Forest for a more solid basis on which to apply the uneven-aged approach, the U.S. Forest Service 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.

Clint Trammel recalled a visit to Pioneer by the first of the students, Ed Loewenstein, and several professors during which he asked Loewenstein what he would write if he found evidence that the Pioneer system actually worked and whether he then expected his professors to sign the dissertation. Such was the level of trust at the time. As Loewenstein recalled, Trammel was looking for an advocate, while 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 six months, find the system *did not work*, and then move on to something important. Instead, he would devote more than a decade to studies of Pioneer.¹⁸

In summer 1994, before the graduate students had completed their research, the Mark Twain asked a high-powered review team to spend a week visiting sites where staff had initiated uneven-aged and other types of vegetation management and comment on their practices. The team also stopped at Pioneer but, although its report 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."¹⁹

In his comments on the report, Trammel 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?"²⁰ 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 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. It was the first 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. 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. Hence the conclusion: "The single-tree selection system can be used to sustain an uneven-aged oak forest."²¹

As additional publications based on the Pioneer research appeared in the second half of the nineties, each confirming and supplementing the others, Pioneer ecologist Greg Iffrig made deliberate efforts to recruit other non-forestry research projects from colleges and universities in the region and beyond in an effort to learn more about other components of the ecosystem. These included a study of relative abundance of migrant songbirds in response to different managed forest treatments, and one of the diversity of leaf-litter arthropod communities that demonstrated the benefits of Pioneer's uneven-aged system in generating a spatial gradient throughout the landscape that maximized diversity.

At a symposium to commemorate the 50th anniversary of Pioneer Forest in 2001, Loewenstein observed 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 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

Edward Loewenstein examining a tree diameter on the Pioneer Forest.



PHOTO COURTESY EDWARD LOEWENSTEIN

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.²²

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 using ten times as much wood as an ordinary sawmill. Although the conservation department and many professional foresters tended to view chip mills as opening a significant new market opportunity, especially for low-grade 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 continue 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.²³

Drey and Trammel joined other concerned landowners, higher-value producers, and activists 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, and the governor responded 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. The governor’s committee began with 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 from a spectrum of interests including the Pioneer staff, who explained their approach and methods and, for the first time, made a case for the economic advantages of uneven-aged management over even-aged. Despite all committee members agreeing on the need for better management of



Sherffius cartoon from St. Louis Post-Dispatch, October 19, 2001.

PHOTO COURTESY SUSAN FLADER



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.

private lands and the fact that Missouri was one of the few states without any forest practice 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.²⁴

As it became obvious that little of substance would come from the governor's committee the Pioneer staff formed a new entity, Pioneer Consulting Group, to promote the benefits of their system of single-tree selection and to help other private landowners with management planning, timber marking and sale services. They hosted tours of the forest, developed a Pioneer website and began issuing a periodic newsletter, *The Acorn*. By early 2001, a Google search for "single-tree selection forest management" brought up the Pioneer site first.

With other landowners, forest products firms and environmentalists in the Ozarks, Trammel and Cunningham helped found another new organization, Value Missouri, that would work to improve forest management on private lands and to 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. In 2003, the entire acreage of Pioneer was certified by the Smart Wood program under Forest Stewardship Council criteria—the first certification in Missouri and one of the largest on private land in the nation—and soon a sawmill and a major hardwood flooring firm were also certified, allowing for a complete chain of custody from forest to market.²⁵

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 backcountry recreational area on managed forest in the huge, nearly roadless block of Shannon County land he had acquired from National Distillers in 1954. Drey had always allowed public access for hunting, fishing, and hiking, but he wanted to encourage more recreational use of the area, if only he could gain cooperative assistance from some public agency without relinquishing ultimate authority. When his 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 as a backcountry recreational area named in Pryor's memory, whether or not a cooperative management arrangement could be struck with a public agency. Three years later, in conjunction with the celebration of the forest's fiftieth anniversary under Drey's stewardship, the Roger Pryor Pioneer Backcountry was dedicated, and the director of the Missouri Department of Natural Resources announced a forthcoming cooperative agreement between the forest and the Division of State Parks for recreation management. It would be half the size of the entire 80-unit state park system.

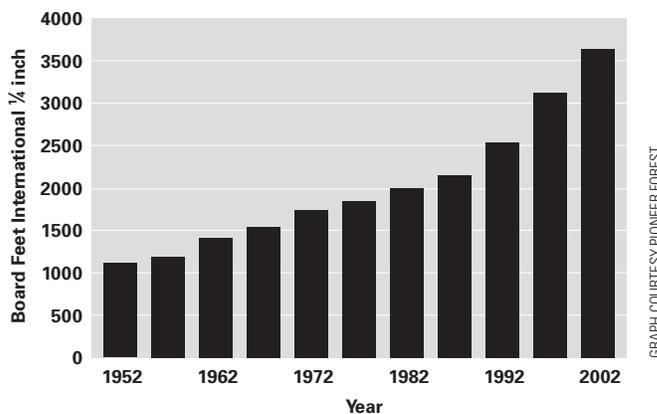
In fall 2002, the Pioneer staff began field work for their eleventh forest inventory, which would give them a fifty-year record of growth and change on Pioneer's permanent one-fifth-acre plots, now numbering 486. For the first time they entered data directly into laptop computers in the field, and their PC now crunched the data in seven seconds rather than two days, even though they had more than doubled the number of stems measured. They included all trees and shrubs rather than just those larger than

five inches in diameter to better track reproduction success. Standing volume had nearly tripled in the half century of Drey's stewardship, while species composition had remained stable except for an increase in the more valuable white oak and pine. A concurrent study of inventory and sale records by Makoto Hamatani, a graduate student in forest economics at Duke, found that the sale price of timber had risen more than four-fold, especially in the 1990s, for an enormously increased asset value. In the last six years, moreover, income had been exceeding expenses by more than 50 percent.²⁶

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 half a century earlier, to

PIONEER FOREST BOARD FEET PER ACRE



Volume per acre (board feet) on the Pioneer Forest, 1952–2002 as taken from the continuous forest inventory data.

encourage other owners of private lands in the Ozarks to follow Pioneer's lead. The spectacular gift to the L-A-D Foundation in July 2004 of virtually the entire extent of Pioneer Forest, now valued at some \$180 million, was Leo and Kay Drey's way of perpetuating the Pioneer tradition. □

NOTES

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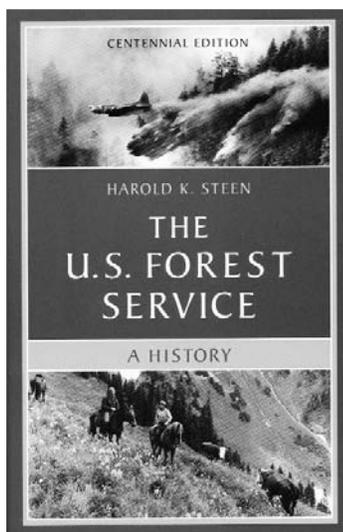


PHOTO COURTESY PIONEER FOREST.

Pioneer Forest staff (l to r): Dan Skaggs, Tim Dyer, Terry Cunningham, Mike Adams, Clint Trammel, L-A-D Foundation President John Karel, Leo Drey, and Greg Iffrig.

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