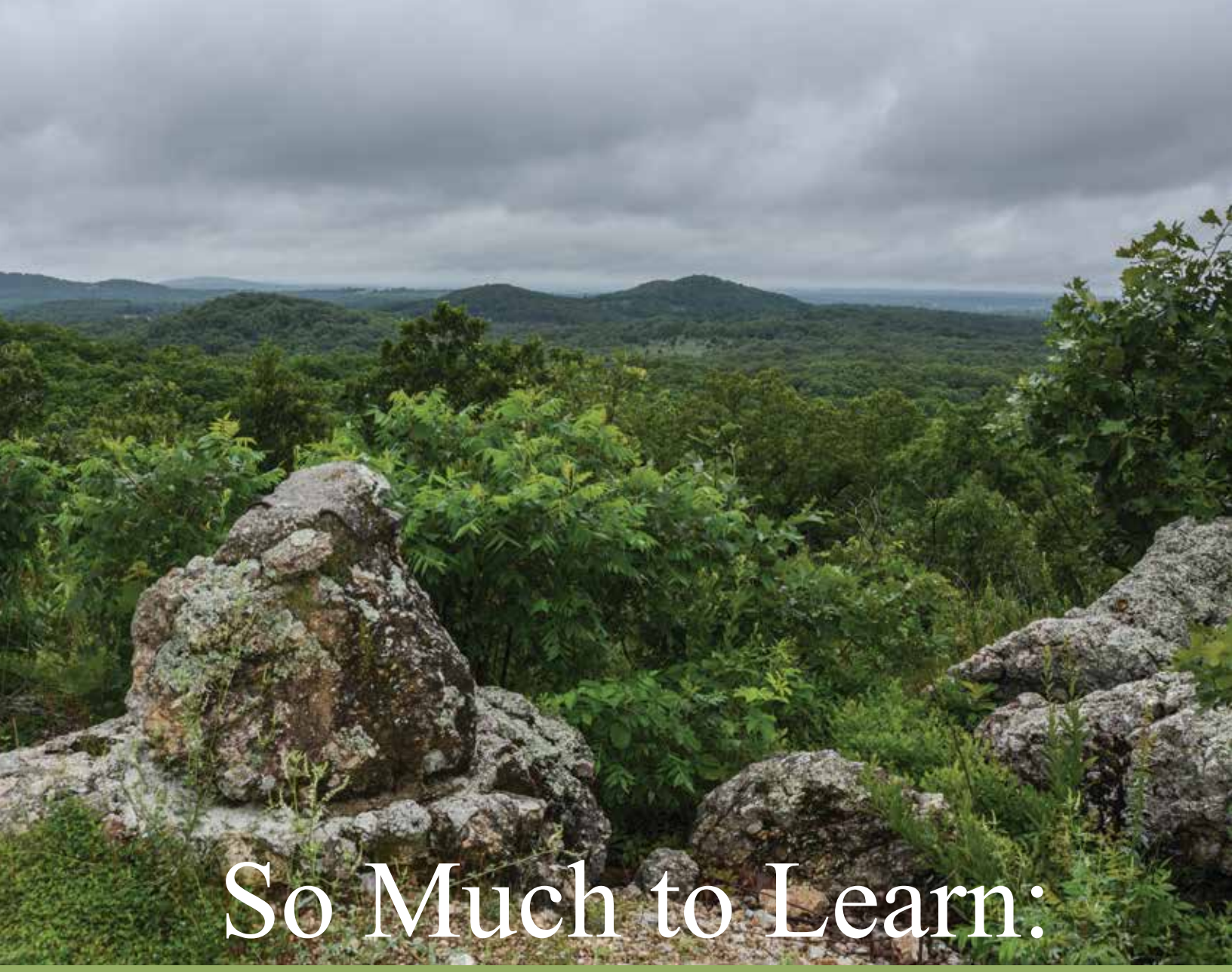

So Much to Learn:

Understanding Missouri's Landscape The Early Years of the Missouri Conservation Commission

BY QUINTA SCOTT

Caney Mountain Conservation Area, Ozark County, Missouri

Les Wright walked out his front door early one morning, leaned over to pick up his morning paper, straightened, and was startled to find a deer ambling down his neighbor's driveway. Wright lives ten houses away from Kingshighway, a busy north-south thoroughfare through the center of the City of St. Louis, where ambulances tear down the street to a large medical center ten blocks away.

When you have altered a landscape, as we altered the Ozarks in the nineteenth and early twentieth centuries, you have to learn to understand the ecosystems you have destroyed in order to restore them. To learn how to restore Missouri's landscape, its various agencies had to learn how climate, geology, soils, and waters determined what grew where and who lived where in Missouri's diverse ecosystems before European settlement. This process began in Missouri in the 1930s and continues to this day.

Before European settlement an estimated 700,000 deer ranged across the entire state of Missouri, across the prairies north of the Missouri River, and across the forested Ozarks to the south. Missourians turned the prairies over to row crops and stripped the Ozarks of their oak and pine. Deer lost habitat and places to hide from predators, whether four-legged or two-legged. In 1934 the U.S. Forest Service estimated that there had been as many as 250,000 turkeys running wild through 32,000,000 acres of forested cover in Missouri before European settlement. Like the deer, turkeys lost food and cover as loggers denuded the forests or burned them in the fall, destroying the acorns and other forest fruit turkeys depend on for winter food.[1]

It is hard to believe that in the first decades of the twenty-first century, when deer run rampant through suburban yards and graze on city lawns, that Aldo Leopold, in his Report on a Game Survey of the North Central States, counted 564 deer in Missouri in 1926, but noted that the figure was probably too low, because many could be found in state parks where 300 had been recently planted. Eight years later Dr. Rudolf Bennitt and his student, Werner O. Nagel, upped the total no more than 2,000 in their census of Missouri game.[2] Bennitt and Nagel published their survey in 1937 just as Missouri's Conservation Commission became an agency independent of changes in Missouri's political whims.

With the help of Aldo Leopold, a pioneer in the theory of land management for wildlife, and Nash Buckingham, a popular wildlife writer, Missouri passed the constitutional amendment that established its Conservation Commission in November 1936. The new agency had several tools at its disposal when it opened its doors the following year. Aldo Leopold's 1930 *Game Survey of Missouri* provided the agency with a picture of the state of Missouri's game; his 1932 *Game Management* provided a managing philosophy. Leopold's work reflected that of Herbert Stoddard, who had examined the life and habits of quail and published the first field study for land management for wildlife in 1931. In 1934 Bennitt and Nagel fleshed out the state of Missouri's game with their own survey. All three—Leopold, Bennitt, and Nagel—laid out the goal for the new commission: Game restoration and management dependent on professional administration, scientific research, trained

(Left) Long Bald, Lander's Bald, Tater Cave Mountain, Big Acorn Knob, Bear Cave Mountain, Long Mountain, Morrison Knobs, Stony Knob, Little Stony Knob, Caney Mountain: These and six others are the Gainesville Monadnocks. The Missouri Department of Conservation has incorporated the eleven in the Caney Mountain Conservation Area, the site of the first management plan created by the new Missouri Conservation Commission in 1941. The monadnocks are isolated rocky cones, capped by the remnants of dissolved Mississippian limestone that once formed the plateau from which the cones were derived. After the limestone decomposed, what was left were mounds of erosion resistant chert, breccia, cemented together with silica.

professional foresters and game managers, and an educated public that understood its role in conservation.

The first director, Irwin Bode, who came with the recommendation of Leopold, could provide professional management. His first employees came from the old Fish and Game Commission, which had managed the state's hatcheries. He had money from the federal 1937 Pittman-Robertson Wildlife Restoration Program, which raised its funding through taxes on the sale firearms, ammunition, and archery equipment, to hire professional foresters and game managers. In 1939 Bode used the funds to hire nine young scientists who initiated the effort to build Missouri's wildlife restoration program.

What Missouri had done to protect wildlife before 1937 had not worked. In spite of the open and closed seasons on hunting, in spite of the new system of state parks that protected wildlife, and in spite of the new funds that had gone into managing wildlife, when Bennitt and Nagel did their census, they identified fewer than 100 ruffed grouse, not more than 2,000 deer, and about 3,500 wild turkeys. In addition, they noted that quail and rabbits were declining along with raccoons, muskrats, and mink. They took no census of fish, because severe drought and wild fires in denuded forests eroded soils, which slid down steep hillsides to muddy streams. The state's fisheries had declined.[3]

In 1939 the commission entered into an agreement with the U.S. Biological Survey, the University of Missouri, and the Wildlife Management Institute—a private, nonprofit scientific organization established by hunters in 1911—to establish The Cooperative Wildlife Management Program, a research unit. Dr. Paul Dalke, from the Biological Survey, led the program. Bode's young biologists, most of them recent graduates, worked in the Federal Aid-Wildlife Research Program in Missouri (Mo.1-5R), which started on December 1, 1938, and ended on June 30, 1943.[4]

The biologists divided their work into three phases. First, they surveyed the state's ecological regions to identify why wildlife was losing ground, opportunities that could give critters a chance to recover, and ways to persuade landowners and hunters to cooperate in applying their research to wildlife restoration. Second, they tested those methods by developing Cooperative Management Units on Private Lands, where several landowners pooled their lands to protect their properties from over shooting. Third, they prepared comprehensive management plans for individual species. The biologists approached their research with a sense of urgency; they had so much to learn. They surveyed trends in land use, economic conditions, and the numbers and distributions of individual species. At first Bode assigned the biologists to various regions, but as the size and complexity of the task before them became apparent and money became available, several took on studies of individual species: Charles Schwartz studied the prairie chicken; Carl Noren, raccoons; David L. Spencer, deer and turkeys; and A. Starker Leopold, turkeys. Even before individual biologists completed their studies, others snapped up their data and used it. When Noren completed his raccoon study in 1941, Werner O. Nagel expanded it into a study of all furbearers and ventured into a study of the relationships between soil fertility and the size and health of furbearers. He asked the question: Why does a forty-acre pasture in the glaciated prairie of northern Missouri support eight head of cattle and several dens of healthy spotted skunks, while you would be hard put to find any spotted skunk in a forty-acre pasture on a rock-strewn ridge, which supported the same number of cattle in the southern Missouri Ozarks? He concluded that the common factor was the quality of the soil that produced food and cover that the skunk depends on. Arthur H. Denney picked up Nagel's study and expanded it to cover the impact of soil types and fertility on all game species.

The work of Noren, Nagel, and Denney

changed the criteria for gauging the productivity of game. Aldo Leopold had used the types of vegetation that provide food and cover to study the health and numbers of game in his *Game Survey* and *Game Management*. While they modeled their Missouri Game Survey on Leopold's work, Bennitt and Nagel took it a step further and broke down their study into Missouri's zoogeographic regions: the Northern Glacial Region, the Western Prairie, the Ozark Highlands, and the Mississippi Lowlands. In their preliminary studies, Bode's biologists looked at land use as a factor in determining the health of game. Nagel and Denney based their work on the research of William A. Albrecht and Merritt F. Miller and Herman Henry Krusekopf, all soil scientists at the University of Missouri. Albrecht had concluded that fertile soils produce healthier farm animals. Miller and Krusekoph had classified, described, and mapped the soil types across the state.

In his survey, Denney sampled 38 15-mile-square areas of different soil types across the state, chosen on the basis of land use, wildlife, and vegetative cover. When he took his results and applied them to other similar areas of the state, he could draw a picture of who lived where in what habitat. He concluded that soil determined vegetation, the density of game species, and their distribution, behavior, and health. In short, he concluded that the more fertile the soil, the healthier the rabbits, raccoons, and quail. Denney's research gave others the tools to prepare detailed management plans for each species within the state's various watersheds, including his own survey of the Meramec River watershed.[5]

To study deer and turkey, Bode stationed A. Starker Leopold at the Caney Mountain Refuge in Ozark County and David Spencer at the Skaggs Ranch, formerly the five-thousand-acre St. Louis Game Park and Agricultural Company, in Taney County, which the Conservation Commission began managing in 1939. Both incorporated Denney's work on soils into their studies.

Thurman's Sink, St. Louis Game Park and Agricultural Company, aka Drury-Mincy Conservation Area, Taney County, Missouri

The game park did not fare well after Moses Wetmore— president of Liggett and Meyers Tobacco in St. Louis, who founded the park in 1891—died in 1910. While his partner, George McCann, president of Old Coon Tobacco in Springfield, continued managing the park, the fire line was not maintained, trees invaded the border, and the deer-proof fence surrounding a five-hundred-acre enclosure stocked with deer broke down. The animals escaped. In 1917 McCann sold the park to the Ozark Livestock and Game Company, which raised hogs, mules, and cattle, and did not maintain the deer fence.

Steep ridges, deep hollows, moderately sloping uplands, cedar glades, oak-hickory-pine forests, creeks, a sinkhole, and three miles of bank on the White River characterized the game park.

Frank Drury House, Drury-Mincy Conservation Area

In 1929 Marion Barton, called M.B., Skaggs of Safeway Grocery Stores purchased the park as well as the Frank Drury ranch north of the park and other properties. He repaired the fences and buildings, wrapped an additional 160 acres in a deer-proof fence, and ran 650 head of cattle year 'round, which grazed forage down to the nubs. Charles Baker lived with his family in the Drury House in the 1950s. While at Drury-Mincy he designed a trap that could safely capture and transport deer. Today Missouri State University's Bull Shoals Field Station, which restored the house, uses it for its headquarters and dormitory for students who come to the refuge to study the wildlife, forests, and glades.[6]

Gasconade stony loam-black and silty soil characterized the glades. It supported grasses, herbs, and shrubs in very shallow soils, and a few stunted trees.

Cedar Glade, Skaggs Ranch, aka Drury-Mincy Conservation Area, Taney County, Missouri.

Skaggs removed the livestock in 1935; the grass came back. When the Conservation Commission took over management of the park, Skaggs gave David Spencer and Paul Dalke access to records that detailed how the park had been managed in the fifty years it had been in private hands.[7]

The Mississippian limestones—specifically Burlington limestone, which is moderately cherty and once formed a plateau that covered Ozark and Taney Counties—dissolved into Clarksville gravely loam. Where the soil contains small amounts of chert, it supports forests composed of oaks, hickories, and some walnut. Where the soil contains more gravel and is dryer and less fertile, black jack oak and black oak grow. The broad, gentle oak woodlands of Bear Mountain give way to steep hills and cliff-top glades overlooking the White River.[8]

Bear Mountain, Skaggs Ranch, aka Drury-Mincy Conservation Area, Taney County, Missouri

Spencer and Dalke opened their study with descriptions of the soils and plant covers that characterized the landscape, using Miller and Krusekopf's classifications. They found Huntington silt loam on the river bottoms and Clarksville loam, underlain by limestone, in the uplands, which they subdivided. Clarksville stony loam—best suited for timber and wildlife production and found on the high, steep slopes—supported post oak and black jack oak on dry sites on the southern slopes and white and northern red oaks on moist sites on the northern slopes. Clarksville gravely loam could support agriculture if one chose to clear out the rocks and cut the black jack oak. Hardpan clay underlay Lebanon silt loam, which supported hard-to-drain post-oak flatwoods, unsuitable for agriculture. Gasconade stony loam—black silty soil that characterized the balds—supported grasses, herbs, and shrubs in very shallow soils and a few stunted trees, which were suitable for grazing only.

In the years since Miller and Krusekopf published their *Soils of Missouri*, soil scientists have refined their classifications. In the region outside of the Drury-Mincy Conservation Area, scattered cedars and a few hardwoods grow on moderately sloped hillsides. The soil is either Clarksville gravely loam, which can host cool and warm season grasses, or Hailey gravely loam, which also supports forage for livestock. Both support timber. Where the two occur together, the Clarksville soil is generally found upslope of the Hailey. Because both drain fast and well and can become droughty, overgrazing can cause erosion.[9]

Landscape Outside Drury-Mincy Conservation Area, Taney County, Missouri

When Spencer and Dalke arrived at Skaggs Ranch in 1939, they found penned-in deer outnumbered the acreage that could support them in the enclosure. They faced two ironic conditions: inside the enclosure where the deer had browsed, all the woody shrubs and vines, grasses, valued by livestock, flourished. Outside the enclosure where livestock had grazed, all the grasses, woody shrubs and vines—valued by deer and other wildlife—flourished. They found that tree cover was similar to its original composition and density. In droughty years, when oaks produce few acorns, the deer depended on the grasses, became malnourished, and lost vitality. To provide winter food for deer, Skaggs and the biologists set out bales of hay and corn for turkeys and squirrels, which the deer also used.[10]

Drury-Mincy Conservation Area, Glade, Taney County Missouri

M.B. Skaggs was as generous with his deer as he was with his records. He gave the state 50 deer a year, for a total of 750 over time. They went to refuges like Indian Trail State Forest and Caney Mountain Wildlife Refuge. During the winter of 1940 it was Spencer's responsibility to trap and box up the 53 adult bucks; 27 does, many pregnant; yearlings, some males; and fawns—load them onto a truck, and cart them to the new Caney Mountain Refuge in Ozark County—a brutal drive, even today—where Bode had stationed Starker Leopold.

When the Agricultural Experiment Station of the University of Missouri studied the restoration of Missouri's forests in 1937, researchers concluded that the thin, rocky soils on steep slopes, runty trees, and sparse herbs that were unpalatable to livestock made glades unsuitable for grazing. However, research might prove that grass forage could be grown on glades that then could be turned over to livestock. Today, we understand that glades have their own special herbs, forbs, and grasses. Critters—roadrunners, Missouri collared lizards, and others—found nowhere else live here.[11]

Deer Lick Glade, Caney Mountain Conservation Area, Ozark County, Missouri

In early summer the spade-like leaves of Prairie Dock (*Silphium terebinthinaceum*) poke up among the purple coneflowers and grasses of Deer Lick Glade. In early summer the leaves are tender and shiny, but by fall they are coarse, hairy, and inedible. Their yellow flowers bloom July to September and attract Ruby-throated hummingbirds, bees, and beetles. Wildlife eats the flowerheads and Goldfinches the seeds.[12]

During the time Starker Leopold worked at Caney Mountain Wildlife Refuge, he lived in a small log cabin, perched on a bluff overlooking Caney Creek.

Starker Leopold's Cabin, c. 1940, Caney Mountain Conservation Area

The conservation commission purchased 5,530 acres for the Caney Mountain Conservation Area in February 1940 to protect the eastern wild turkey, in a region where the last known deer had been killed in 1910 but where the landscape was suitable for deer, turkey, and other wildlife. Spencer and Leopold released the deer. Only eight, no males, strayed from the refuge, but they remained close by. Dogs or wolves killed two of the does. By June 1941, Leopold concluded that the restoration of deer at Caney had been successful and the delivery of another fifty would reestablish deer to Ozark County.[13]

In the five years Starker Leopold worked for the commission, he took charge of the turkey program; designed the management plan for Caney Mountain near Gainesville; wrote a general management plan for the State's turkeys in 1943; and, working with Dalke, completed a 1942 survey of turkeys across the state. His 1941 management plan for the Caney was an experiment that built on the work of Herbert Stoddard, Aldo Leopold, and Rudolf Bennitt and Werner Nagel.

A. Starker Leopold, 1913–1983, Portrait, Courtesy of the Aldo Leopold Foundation, www.aldoleopold.org, Charles W. Schwartz, Photographer.

Starker Leopold, his wife Betty seated next to him, and her sister, Kay, in the one-room cabin where Starker lived for a year while working at Caney Mountain. He cooked in the fireplace or on a pot-bellied stove, which also heated the cabin. He cooled his perishables in a spring box at the base of the bluff and the edge of the Caney Creek floodplain. He slept in a bunk that had been notched into the logs when the cabin was built. Betty lived in West Plains during this period and occasionally commuted to Caney Mountain. Courtesy of the Aldo Leopold Foundation, www.aldoleopold.org, Charles W. Schwatz, Photographer.[14]

Purple coneflowers mix in with the grasses and grow up to the edge of a classic oak savanna on the dry, rocky soil of Long Bald. Bees and butterflies—Monarchs, Painted Ladies, Swallowtails, Sulfurs, and Whites—find them attractive. Goldfinches eat the seeds come fall.[15]

Long Bald, Caney Mountain Conservation Area, Ozark County, Missouri

Starker Leopold opened his plan by noting that the Caney refuge had never been overgrazed or overburned and therefore was suitable for turkeys; that Clarksville stony loam, underlain by limestone, characterized a landscape of steep hills and deep hollows; that Caney Creek bottoms provided sites for food patches; that there was a remnant wild population of turkeys that could serve as breeding stock; and that turkeys prefer the herbaceous ground cover growing under "the savanna-like stands of timber," like Long Bald, that could supply cover and food: mast—nuts from oaks and fruit from dogwood, cedar, and ironwood or hornbeam trees.

Black-eyed Susan (*Rudbeckia hirta*), a member of the Aster family (*Asteraceae*), mix in with Big Bluestem grass (*Andropogon gerandii Vitman*). Black-eyed Susan appeals to a wide range of insects: bees, flies, wasps, butterflies, and beetles. Bees collect their pollen and feed on their nectar. Conservationists use them in prairie restoration. They tolerate a variety of soil conditions, including the dry, rocky soils of glades. Big Bluestem appeals to deer, songbirds, and small mammals.[16]

Glade, Caney Mountain Conservation Area, Ozark County, Missouri

These prescriptions echoed Aldo Leopold's in *Game Management*: that the new refuge be closed to hunting; that controlled burns be instituted, which Stoddard had done in Georgia but which Aldo only mentioned tangentially; that timber be harvested under a balanced program; that 15 to 25 percent of the new refuge be open land, distributed throughout; that supplemental food plots and watering ponds be constructed; that tick-bearing livestock be fenced out, as both bloodsucking ticks and hogs have a taste for young turkey poults; and that wolves and coyotes be trapped, which also led to the penning of neighborhood dogs, preventing them from stalking turkeys in the refuge.

Giant Cane Stand, Caney Creek Floodplain, Caney Mountain Conservation Area, Ozark County

Caney Mountain is named after the giant cane, which grows on the Caney Creek floodplain, below Starker's cabin. Elsewhere at Caney, the MDC is working to restore giant cane to the refuge.

Leopold Starker cultivated thirty food-plots as carefully as a farmer might cultivate his wheat or corn. He fertilized and rotated three crops on one-acre plots—cane, winter wheat, and black-eyed peas—all good turkey food. With deer as well as turkeys in mind, he added corn to the winter menu at feeding stations adjacent to eleven food plots.

As Leopold implemented his plan in April 1940, he counted turkey tracks after a heavy snow and came up with an "accurate track census" of 10 birds on the 5,500-acre refuge. He estimated that there were 35 in the 75,000-acre region. Within four years the population had increased to 88 on the refuge, and to 310 in the 120 square miles surrounding the refuge.[17] (*Image: Missouri Department of Conservation*)

Lastly, Leopold proposed a full-time employee with a long list of duties: patrol the refuge; maintain the food plots, winter feeding stations, and ponds; clean mud from the springs; maintain the fence; detect and suppress fire; trap wolves in season; keep in touch with the neighbors and enlist their cooperation in the success of the project; and count accurately the number of turkeys and deer in the refuge. The job fell to W. J. Morrison, a local resident, who fostered relationships with his neighbors. When Morrison died in 1942, his son Bernice took over and worked closely with Starker.[18]

The Conservation Commission supplied Morrison with the tools: a horse, a pick-up truck, a scraper for building ponds, farm implements, fire-fighting equipment, other tools, and a house to live in. The tools could be shared with neighbors, particularly the scraper for building ponds. In the event of a big fire, other employees could be hired temporarily.

Long Bald, Caney Mountain Conservation Area

Between January 1 and April 15, 1942, Starker and Dalke took a survey of turkeys in Missouri. They chose winter because after the "fall shuffle," turkeys settle into stable flocks and keep to well-defined territories for the winter. They interviewed farmers, hunters, country storekeepers, and game wardens, those people most likely to know where turkeys flocked. They did not finalize their count in any given territory until they had three reports in agreement as to place and numbers of turkeys. Their survey determined where turkeys were found and where they could be found given the right conditions. They established that Missouri had 4,340 birds living in 596 flocks across 31 counties, mostly in the Ozark region of the state. They found that the heaviest populations inhabited the thin-soiled balds, covered in limestone soils. They noted that balds draped by granitic soils hosted the fewest turkeys. They declared that "overgrazing, overburning, slashing, and poaching" had led to the bird's decline. Once poaching stopped, the bird began to recover.[19]

Wildlife Pond at Food Plot 59 in the high northern reaches of Caney Mountain Refuge.

During the survey, Starker discovered that turkeys nest within three hundred yards of water. While Caney Creek and seventeen springs supplied ample water throughout the refuge, Starker built 17 ponds in its dry regions to encourage the birds to nest everywhere. Because livestock had been fenced off, turkeys and deer did not have to compete with cattle for access to water.

Pussytoes (Antennaria parlinii) thrive in sandy or rocky soils, where there is less competition with tall grasses and forbs. Quail, deer, and rabbit feed on the leaves, which are semi-evergreen.[20]

In June 1943 Leopold completed his report, *Wild Turkey Management in Missouri*, under the Federal Aid-Wildlife Program. In his summary he noted that turkey restoration should happen on areas characterized by Clarksville stony loam, where 75 percent of the remaining turkeys lived in 1942, or on areas characterized by Clarksville gravely loam, where another 15 percent lived; that native birds responded well to management efforts while game farm birds did not; that poaching, fire, and grazing were the biggest impediments to restoration, and their control would accelerate the process; and that conservative land use, which would build up soil rather than deplete it, would serve the same purpose. Finally, he concluded that management efforts should be reviewed in two to three years. He and David Spencer did so in 1946.[21]

Long Bald, Caney Mountain Conservation Area, Clarksville Stony Loam, Ozark County, Missouri

In June 1943 Starker took a leave of absence to write his Ph.D. thesis, *The Nature of Heritable Wildness in Turkeys*, based on his work in Missouri.[22] Starker found the brains and pituitary glands of turkeys to be bigger in wild birds than in pen-raised birds, even those with wild parents, but raised in pens. When released into the wild, 75 percent died in the first year. Others retreated to the safety of local barnyards. Nor did they breed at the rate of wild birds. Based on Starker's findings the Missouri Conservation Commission abandoned its experiment of raising turkeys in pens.[23]
The rest of his colleagues in the Federal Aid to Wildlife Program dispersed when the program ended on June 30, 1943. Most went into the military. Little or no research was done until after the end of World War II, when the research program started again.

Glade and Monadnock, Caney Mountain Conservation Area, Ozark County, Missouri

Leopold, Spencer, and Dalke returned to Caney Mountain and Skaggs Ranch in 1946 to evaluate what they had learned about managing turkeys and the success of their efforts. They published their conclusions in *The Ecology and Management of Wild Turkey*, in which they reiterated and enlarged on what they had learned in the early 1940s: Turkeys eat a wide variety of foods across the seasons: buttercups, sorrels, blue-grasses in early spring, and insects when they arrive in June, but also walking-sticks in October. Throughout the rest of the summer, the birds sampled various plants across various landscapes from the bottoms of hollows up the ravines to the stony ridge-tops. Acorns, particularly the small ones from post and blackjack oaks that grow on the balds, were their favorites. The trio went on to report on a familiar list of ecological relationships, including breeding habits and nesting failures, to which they added the disruptions that adversely affect turkey habitat: fire, flood, drought, disease, parasites, and predators.

Immediately outside the fences of Caney Mountain, the balds have been cleared and the fields turned over to livestock.

Landscape Outside Caney Mountain Conservation Area, Ozark County, Missouri

Leopold, Spencer, and Dalke described the tension between forests and livestock and proposed a series of management ideas—land use changes, actually—that echoed many of the recommendations Leopold had alluded to in his 1943 report. Indiscriminate logging, which had depleted the forests, would have to be stopped; overgrazing of livestock would have to be stopped; the burning of dead forage to produce green grass and kill ticks would have to be stopped. All the logging, grazing, and burning had led to soil erosion and the muddying of once-clear Ozark streams. They proposed that the Ozarks as a whole be developed for timber production and watershed protection to prevent soil erosion. Doing so would require a "wholesale revision of an economic and social system based on land industries" that included logging, grazing, and agriculture.

Leopold and Dalke reported that over a thousand turkeys, a mix of wild- and game-farmed birds, had been released at Indian Trail between 1925 and 1938, of which 159 remained in 1942. It was the survival of the population of wild birds that made Indian Trail a candidate for turkey restoration on its balds, underlain by Clarksville stony loams.[24]

Glade, Indian Trail State Forest, Dent County, Missouri

Leopold and Dalke foresaw a varied pattern of dense forests, open woodlands, and clearings. They outlined a plan to achieve such a pattern: Log mature trees to make room for new stands. Girdle undesirable species and defective trees, let them die, and remove them; not only would such a pattern of development work for turkeys, but it would work for deer and other wildlife. Restrict livestock to secondary sites—open stands of trees, where forage could be grown in the understory and where cattle would not overgraze the land; control of grazing would mean bringing more and more land into national forests and state refuges. And they raised the possibility of private landowners engaging in forestry. Farmers have been planting crops in the bottomlands along Ozark streams since the beginning of European settlement. As Starker suggested in his master plan for Caney Mountain, row crops on the bottoms could provide wildlife with winter food.[25]

When the U.S. Forest Service established the Eleven Point and Wilderness Refuges, ten miles apart in Oregon County in 1938, both had remnant populations of wild turkeys. However, of the 125 game-farm turkeys released into the Eleven Point Refuge by 1938, only 40 remained in 1942. On the other hand, where no game-farm turkeys were released at the Wilderness Refuge in 1938, Leopold and Dalke counted 134 in 1942.[26]

Eleven Point Refuge, Mark Twain National Forest Oregon County, Missouri

Dalke, Starker Leopold, and Spencer concluded their report with recommendations for refuges, both national forests and state refuges, that echoed the work of Stoddard, Aldo Leopold, Sr., and Bennitt and Werner: Close refuges to hunting, control grazing, control fire, maintain native turkey stock, devise a balance program for forests and wildlife, grow food patches, construct ponds, control predators, and tell your story to the public.[27]

Bare Rock Limestone Glade, Peck Ranch Conservation Area, Shannon County, Missouri

In spite of the efforts of Starker Leopold at Caney Mountain to restore turkeys to Missouri, their populations continued to decline. Based on Starker's research, the commission stopped restocking game-farm turkeys. Attempts to restock turkeys with birds from Maryland and Pennsylvania also failed. Turkeys continued to decline. Only when the commission began capturing native birds and restocking appropriate habitats and as public support grew did Missouri's turkey population start to increase. Not until 1960 did Missouri open turkeys to hunting.[29]

In 1945 the Missouri Conservation Commission purchased Peck Ranch, 23,763 acres of granite and limestone balds and extensive oak-pine forests, as a site for turkey restoration. While turkeys do not thrive on soils derived from granite, they do on soils derived from limestone. The commission started with a local population of nine birds, which increased to thirty-two by 1954, when managers began to release wild-trapped birds into the refuge. The people who lived in the region around Peck Ranch agreed to protect the birds.[28]

Peck Ranch Conservation Area, Shannon County, Missouri

As for the deer: In 1947 Aldo Leopold and David L. Spencer, writing in the *Journal of Wildlife Management*, noted that "the Missouri deer herd is expanding so rapidly that there is trouble ahead unless the herd is kept shot down to range capacity." By the time he died a year later, Aldo Leopold was entertaining the idea that deer were a "weed species," living in a wolfless landscape, browsing on every available tree, able to adapt to changing landscapes and environments. A hunter shot the last Missouri wolf in 1950, ironically in Taney County, site of the Drury-Mincy Conservation Area. The conservation agency's work in restoring deer to Missouri's landscape has been so successful and their natural predators have become so rare that deer can be found ambling quiet streets off busy urban boulevards.[30]

So what did Aldo Leopold and Nash Buckingham have to say about the work of the Missouri Conservation Commission? Both kept in touch with the goings on at the agency. In 1945 Nash Buckingham weighed in on the accomplishments of the commission and praised it as being "twenty years ahead of its times." He noted the success of Starker Leopold's turkey program and praised Arthur Denney's breakthrough study that tied land use, soil type, and soil fertility to increases in Missouri's wildlife populations.[31]

If Buckingham was effusive in his praise, Leopold had a warning: "The conservation movement in Missouri at this moment is like a fisherman, wading a swift and deep bass stream. To get across without wetting his feet, he had to stop on four slippery rocks. Missouri has reached the third rock and is still right side up. Where is the fourth?"

On April 26, 1938, Aldo Leopold answered his question when he spoke at the dedication of the Ashland Wildlife Area in Boone County, south of Columbia. He congratulated Missourians on making it across the first three rocks: wanting conservation, the quality of their leadership and their law, and the new government agency's willingness to do the research to learn how to "make your fields, woods, and waters productive." He pointed to Bennitt and Nagel's Game Survey as proof of "how much remains to be found about cropping quail, turkey, deer, and furs."

He ended his introduction by asking, "Who is going to practice conservation on the land?" This was the fourth rock. If only one-fifth of Missouri's lands were in public hands in the form of state refuges and parks and national forests, then Missourians were going to have to learn to practice land conservation on the other four-fifths. Missouri's farmers would have to be as willing to produce wild crops—quail in their hedge-rows or fish in their creeks or ponds. "Until the gameless farm is considered unbalanced," he concluded, "we will not have conservation in Missouri."[32]

Acknowledgements:

First, without the help of Randall Roy, manager of both the Caney Mountain and Drury-Mincy Conservation Areas, this article would not have been written. He provided me with a copy of Starker Leopold's management plan for Caney Mountain. He endured numerous emails about this and that and pleas to open the gates to no-go areas in both refuges. He also told me where to find turkeys, which I didn't. Finally, he introduced me to Celeste Prussia, manager of the Bull Shoals Field Station. Missouri State University operates the field station at the Drury-Mincy Conservation Area in Taney County.

Prussia spent a day with me, guiding through the no-go places at both Caney Mountain and Drury-Mincy. She arranged for my visits to Starker Leopold's cabin and Caney and Frank Drury's house at Drury-Mincy. John Peter opened the cabin for us. Prussia also alerted me to the location of Charles Schwartz's photographs of Starker Leopold at Caney Mountains.

Maria Kopecky, at the Aldo Leopold Foundation, tracked down Charles Schwartz's photograph of Starker Leopold at Caney Mountain. I am immensely grateful to her and the foundation for the quick last-minute service.

Cliff White, with the Media Gallery at the Missouri Department of Conservation supplied me with images of turkeys.

ENDNOTES

[1] Rudolf Bennitt and Werner O. Nagel, *A Survey of the Resident Game and Furbearers of Missouri, Columbia*: University of Missouri Studies, Vol. 12, No. 2, April 1, 1937, 56-7, 77-8.

[2] Aldo Leopold, *Report on a Game Survey of the North Central States* (Madison, Committee on Restoration and Protection of Game, Sporting Arms and Ammunition Manufacturers' Institute, 1931), 195; Bennitt and Nagel, *A Survey of the Resident Game and Furbearers of Missouri*, 6–7.

[3] Bennitt and Nagel, *A Survey of the Resident Game and Furbearers of Missouri*, 6–7; Missouri State Parks, "The History of Missouri's State Park System," http://mostateparks.com/page/59044/history-missouris-state-park-system.

[4] I. T. Bode, in A. Starker Leopold, Project Manager, "Wild Turkey Management in Missouri," Conservation Commission, State of Missouri, Division of Fish, Game and Forests, Game Section, June 30, 1943, Foreword.

[5] Charles Callison, *Man and Wildlife in Missouri: A History of One State's Treatment of its Natural Resources* "Harrisburg: The Stackpole Company, By special Arrangement with the Edward K. Love Conservation Foundation, 1953", 56–8.; Bill T. Crawford, "The Research Story," in Werner O. Nagel, ed., *Conservation Contrasts* (Jefferson City: Missouri Department of Conservation, 1970), 236–40; James F. Keefe, *The First 50 Years* (Jefferson City: Missouri Department of Conservation, 1987), 50; Werner O. Nagel, *The Harvests, Economic Values, and Soil-Fertility Relationships of Missouri Furbearers, Preliminary Surveys*, 1940–45, Surveys and Investigation Projects, Missouri 1-5R, Pittman-Robertson Program, Jefferson City Missouri Conservation Commission, Game Section, August 1953, 2, 25–26; Directory of Field Activities of the Bureau of Biological Survey, 1939, Washington, D.C., U.S. Department of Agriculture, 1939, 57; Leopold, "Wild Turkey Management in Missouri," 27.

[6] Celeste Prussia, Manager, Bull Shoals Field Station, Drury-Mincy Conservation Area, Email, September 10, 2015; Jesseis Hunting and Outdoors Forum, "Wild Turkeys not always plentiful in Missouri," http://www.jesseshunting.com/forums/archive/index.php/t-8160.html.

[7] Paul D. Dalke and David L. Spencer, "Development and Land Use on a Private Gamer Preserve in Southern Taney County, Missouri," *Journal of Wildlife Management* 8, no. 1 (January 1944): 1–6; Lynn Morrow, "The St. Louis Game Park: Experiments in Conservation and Recreation," *White River Valley Historical Quarterly* 36, no. 4 (Spring 1997).

[8] M. F. Miller and H. H. Krusekopf, *The Soils of Missouri* (Columbia: University of Missouri, College of Agriculture, Agricultural Experiment Station, January 1929), 72–73; Timothy A. Nigh and Walter A. Schroeder, *Atlas of Missouri Ecoregions* (Jefferson City: Missouri Department of Conservation, 2002), 100.

[9] U.S. Department of Agriculture, Natural Resources Conservation Service, Soil Survey of Taney County, Missouri, 44d Clarksville gravelly loam, 45f Hailey gravelly loam, http://www.nrcs.usda.gov/Internet/FSE_MANUSCRIPTS/missouri/MO213/0/Taney_MO.pdf; *Ibid*., Soil Map of Taney County, http://www.nrcs.usda.gov/Internet/FSE_MANUSCRIPTS/missouri/MO213/0/map12.pdf.

[10] Dalke and Spencer, "Development and Land Use on a Private Gamer Preserve in Southern Taney County, Missouri," 1–6;

[11] R.R. Hill, et.al., "Grazing Control," in F.B. Mumford, Director, *Forest Restoration in Missouri*, University of Missouri College of Agriculture, Agriculture Experiment Station, Bulletin 392, November 1937, 76.

[12] Illinois Wildflowers, "Prairie Dock," http://www.illinoiswildflowers.info/prairie/plantx/pr_dockx.htm.

[13] Jim King, Oral history interview with David L. Spencer, October 25, 1999, Anchorage, Alaska, http://digitalmedia.fws.gov/cdm/fullbrowser/collection/document/id/1177/rv/singleitem; Leopold, A. Starker, "Report on the Management of the Caney Mountain Turkey Refuge," State of Missouri, Conservation Commission, June 30 1941, 8.

[14] Celeste Prussia, Manager Bull Shoals Field Station, Missouri State University, Email, September 8, 2015. I am indebted to Prussia for gaining me access to Starker Leopold's cabin and off-road regions at the Caney Mountain Conservation Area, August 20, 2015.

[15] Illinois Wildflowers, Purple Coneflower, http://www.illinoiswildflowers.info/prairie/plantx/pur_coneflowerx.htm.

[16] Missouri Wildflower Guide, Black Eyed Susan, http://www.missouriwildflowerguide.com/flowerBlackEyedSusan.html; Illinois Wildflowers, Black Eyed Susan, http://www.illinoiswildflowers.info/prairie/plantx/be_susanx.htm; U.S. Department of Agriculture, Natural Resources Conservation Service, Plant Fact Sheet, Big Bluestem, http://plants.usda.gov/factsheet/pdf/fs_ange.pdf.

[17] A. Starker Leopold, "Report on the Management of the Caney Mountain Turkey Refuge," State of Missouri, Conservation Commission, June 30 1941, 1–19; James G. Dickson, *The Wild Turkey: Biology and Management* (Mechanicsburg, Pennsylvania: Stackpole Books, 1992), 298–99.

[18] Francis Skalicky, "Birth and Rebirth at Caney Mountain," *Missouri Conservationist* (May 2010), http://mdc.mo.gov/conmag/2010/05/birth-and-rebirth-caney-mountain?page=full.

[19] A. Starker Leopold and Paul D. Dalke, "The Status of Wild Turkeys in Missouri," *Journal of Forestry* 41, no. 6 (June 1943), reprint; Paul D. Dalke, A. Starker Leopold, and David L. Spencer, *The Ecology and Management of Wild Turkey in Missouri*, Technical Bulletin no. 1 (Jefferson City: Missouri Conservation Commission, 1946), 18.

[20] Randall Roy, Wildlife Management Biologist, Missouri Department of Conservation, Email, October 31, 2014; Illinois Wildflowers, "Plantain-Leaved Pussytoes," http://www.illinoiswildflowers.info/savanna/plants/pl_pussytoes.htm.

[21] Leopold, A. Starker, "The Wild Turkey in Missouri," Missouri Conservation Commission, Federal Aid to Wildlife Program, June 30, 1943.

[22] Robert A. McCabe, "Aldo Starker Leopold, 1913–1983," National Academy of Sciences, http://www.nasonline.org/publications/biographical-memoirs/memoir-pdfs/leopold-a-starker.pdf; Ralph J. Pratt, "In Memoriam: A. Starker Leopold," https://sora.unm.edu/sites/default/files/journals/auk/v101n04/p0868-p0871.pdf.

[23] Nash Buckingham, "Wild or Tame Birds," *Game Bag: Tales of Shooting and Fishing* (New York: G.P. Putnam's Sons, 1945), 70–72, 84, 171.

[24] Starker and Dalke, "The Status of Wild Turkeys in Missouri," 434.

[25] Paul D. Dalke, A. Starker Leopold, and David L. Spencer, *The Ecology and Management of Wild Turkey in Missouri*, Technical Bulletin no. 1 (Jefferson City: Missouri Conservation Commission, 1946), 68–71.

[26] Starker and Dalke, "The Status of Wild Turkeys in Missouri," 434.

[27] Dalke et.al., *The Ecology and Management of Wild Turkey in Missouri*, 77–78.

[28] Missouri Department of Conservation, "Wild Turkey Restoration," http://mdc.mo.gov/discover-nature/wildlife-restoration/wild-turkey-restoration.

[29] Dunbar Robb, "Wildlife Management," in Nagel, ed., *Conservation Contrasts*, 252–53.

[30] Susan L. Flader, *Thinking Like a Mountain: Aldo Leopold and the Evolution of an Ecological Attitude toward Deer, Wolves, and Forests* (Columbia: University of Missouri Press, 1974), 148–51, 171–72, 255; Aldo Leopold, *Sand County Almanac* (NewYork: Ballantine Books, 1966), 137–41; Missouri Department of Conservation, Grey Wolf (Timber Wolf), http://mdc.mo.gov/discover-nature/field-guide/gray-wolf-timber-wolf.

[31] Buckingham, "Wild or Tame Birds," 84, 95, 171.

[32] Aldo Leopold, "Whither Missouri?" *The Missouri Conservationist* 1, no.1 (July 1938), 6.