

This excerpt from the new book Hemlock: A Forest Giant on the Edge revisits and updates one of the Forest History Society's most frequently cited publications, Hugh M. Raup's article "The View from John Sanderson's Farm—A Perspective for the Use of the Land," and the land about which it was written.

THREE VIEWS FROM JOHN SANDERSON'S WOODLOT

The hemlock, which was abundant up to 1875, furnished not only lumber but tanbark. The great trees were cut down in June, and the bark was taken off and piled up to dry. It was used by local tanneries; there was one on West Street, where there is now a store, and another, a very prosperous one, conducted by Deacon Sanderson.

—A. F. Johnson, 1922¹

This farm formerly of more than 400 acres is situated in the Bennett Hill district of the north part of Petersham. Sixty years ago it was extensively cultivated by John Sanderson, one of the wealthiest farmers in northern Worcester County. He was killed in his barn in 1831 in the act of taking a pair of unruly oxen off the cart tongue.

—George Sumner Mann, n.d.²

It is likely the most famous farm in the scholarly fields of ecology and environmental history. When Hugh Raup transformed the slide show–based lecture that he had presented to enthusiastic audiences for years and published it as “The View from John Sanderson’s Farm—A Perspective for the Use of the Land,” he

produced an instant classic for the journal *Forest History* and opened the eyes of people in many disciplines. The article used the Harvard Forest dioramas and the history of colonial management of the farm that became the Harvard Forest to insist on the critical need to understand the role of humans and social forces in deter-

mining the fate of the land. The fundamental qualities of the land remained the same, he asserted, but the people and forces behind their actions changed over time, informed by incomplete knowledge of their circumstances:

BY DAVID R. FOSTER



DAVID FOSTER

John Sanderson's farm today, looking across cow pastures to the old Marsh place, known today as Fisher House.

I suggest that the principal role of the land and the forests has been that of stage and scenery. The significant figures have always been the people, and the ideas they have had about what they might do at specific points in time with the stage properties at hand. At each such point in time an actor could play his role only by the rules he knew—in terms of his own conception of his relation to the play of which he was a part. He was always hampered by lack of precise knowledge of the stage and its properties, the land and the forests. Perhaps more important than this, he had severely limited knowledge of the changing rules by which he and other actors of his time were playing. Both of these failings are perennial and no doubt will continue to be.³

Raup's influential piece drew from his decades of inquiry into land-use history in Petersham, Massachusetts, the extensive insights into the relationships among soils, vegetation, and human activity advanced by Steve Spurr, Earl Stephens, Walter Lyford, and others, and Ernie Gould's economic analysis of Harvard Forest's history as a financially unsuccessful forest manager. Published in 1966, "The View from John Sanderson's Farm" presaged by forty years the injection of social science into the field of ecology and the development of such programs as "Coupled Human Natural

Systems" by the Biology Directorate at the National Science Foundation. Along with Raup's other papers—"The History of Land Use at the Harvard Forest" and "Some Problems in Ecological Theory and their Relation to Conservation"—it extended the legacy of ecological studies grounded in history and seeking to advance conservation that were the hallmark of the Harvard Forest's first director Richard Fisher and have become the centerpiece of our Long Term Ecological Research program. "John Sanderson's Farm," as the piece became known, was immensely popular and quickly came to hold the distinction as the most-cited paper in the journal's history. The themes that Raup explored have also stayed alive and contentious as revealed by a recent challenge to his assertions regarding the failure of natural resource conservation by our colleague and Brandeis professor Brian Donahue in a 2007 article in *Environmental History* aptly called "The New View from Sanderson's Farm."⁴

In all of the illuminating focus on Sanderson's farm and fields, one very important fact largely escaped notice. Sanderson was more than a simple farmer, though he may have been typical in many regards. He was also a tanner whose most important building was a small water-powered tannery and most treasured piece of woodland was a hemlock forest. The tannery was a critical economic

engine in the Sanderson enterprise and one that helped John earn the reputation as a shrewd businessman and the distinction as the head of one of the richest families in the region. Meanwhile, the hemlock woodlot and the adjoining Black Gum Swamp, which despite its name was dominated by hemlock and red spruce, remained the only continuously forested parts of the expansive Sanderson farm through the eighteenth and nineteenth centuries. This “ancient woodland,” as the British would call such a heavily used but intact section of forest, provides us a great deal of history and many lessons. The resulting tales greatly inform our understanding of hemlock and its place and dynamics in the New England countryside. But they also expand on Raup’s insights regarding the relationship between humans and the land.

JOHN SANDERSON’S HEMLOCKS

Around Shaler Hall, the Harvard Forest’s headquarters, it is known simply as “the hemlock forest.” Any reference to John Sanderson’s woodlot today would likely draw blank expressions from the undergraduates who spend their summers measuring trees there or the scientists who have dedicated their lives to understanding it. The area is thoroughly dominated by hemlocks, which give it its well-deserved local name, including a few that approach 250 years in age. One of our oldest and most intensively studied forests, it is just a short walk from our main building, in the heart of our thousand-acre Prospect Hill tract. Age, history, and access make it a premier site for research, but the allure of the hemlocks and their peaceful environment with its quiet yet distinctive background sounds are unspoken motivation for every study conducted there.

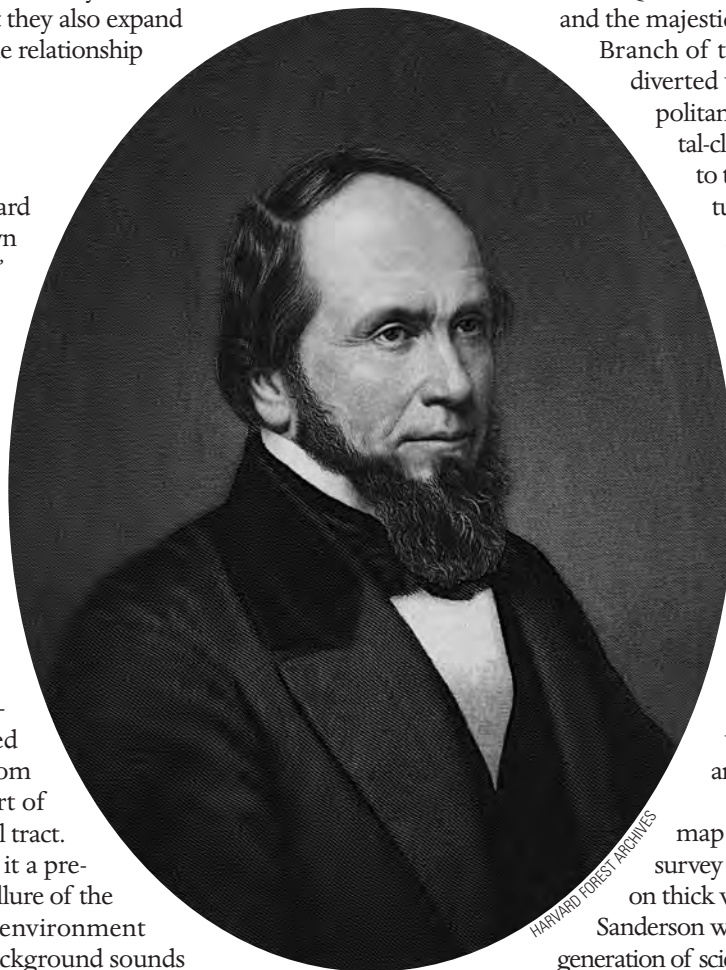
The stand does have remarkable scientific assets to draw researchers, most important of which is an unrivaled catalog of data. These records range from a century of detailed maps to 10,000 years of fossil records on climate, disturbance, and forest dynamics. We have a decadal record of the fluxes of carbon dioxide, energy, moisture, and other substances into and out of the woods, along with minute-by-minute graphs of water flow in small streams that drain the area. The atmospheric measurements come from a set of instruments positioned just above the forest atop a tower capped by a twenty-foot pole that once served as the mast of a small sailing vessel. This is just part of the bizarre array of ecological equipment and paraphernalia that distinguish (and occasionally clutter) the forest. The tower sports another item that garners considerable attention from afar, a digital camera that yields cap-

tivating panoramas posted hourly on a website. The view scans across the tops of the hemlocks, pines, and hardwoods to the fire tower atop Prospect Hill. Whether in brilliant sunlight, heavy mist, or skies filled with fat flakes of snow, the images convey information about the state of the foliage and plants that can be related to the streams of environmental data flowing in tandem from many other devices towards a central digital archive, where all are curated for use by scientists across the globe.

John Sanderson’s hemlocks shade the headwaters of two small watersheds that drain to separate coastal waterways. One flows to the vast Quabbin Reservoir down Bigelow Brook and the majestically wooded course of the East Branch of the Swift River. From there it is diverted via a buried aqueduct to metropolitan Boston, where it provides crystal-clear and unfiltered drinking water to that urban population and is eventually released into Boston Harbor, Massachusetts Bay, and the Atlantic Ocean. The other watershed contains the ages-old course of water flowing north to the Millers River, then west to the Connecticut Valley and south by way of New England’s largest river through the heart of Connecticut to Long Island Sound. Thus, beneath the hemlocks it is possible to examine the intimate interactions between living and decaying plants, diverse organisms, and layers of soil that condition waters that eventually end up in kitchen sinks or seas miles and years apart.

Since its appearance on the first map of the Harvard Forest—a crude survey that was hand-inked and colored on thick vellum by the Class of 1907—the Sanderson woodlot has been studied by every generation of scientist to reside in Petersham. Over the years, the collections of peculiar equipment and studies in those woods have yielded data that fill many archive drawers and digital storage devices. The work has advanced the missions and tapped

the funding of nearly every federal agency that cares about the environment—NASA, Department of Energy, Environmental Protection Agency, U.S. Forest Service, and National Science Foundation. Today, these interests and many others converge on an 80-acre plot in the heart of the woodlot where every stem down to a thumb’s width is measured, mapped, and recorded. Funded by the Smithsonian Institution and Harvard University, this effort to link the intimate dynamics of every plant in the woods to its environmental drivers and the forest processes that control the movement of gases, material, and water is part of a global network of plots that extends from Malaysia to Australia, Brazil to Panama, and Yosemite on to Ontario and finally New England.



John Sanderson Jr., the third generation head of the farm, sold the property in Petersham, acquired a farm in the fertile Connecticut Valley, established a highly successful bank, and became a state senator.

For decades, the Sanderson woodlot has contributed to all that we know about hemlock. These days we are converging on the woodlot in earnest, for it has become our ground zero in the documentation and analysis of the latest chapter in the species' tumultuous history, its response to the hemlock woolly adelgid. We strive to follow the tiny insect to understand its movement and behaviors, and we seek to know, long before the first overt signs of collapse occur, when the trees first feel this foe's damage. We will document the ripples of cause and effect as the gradual changes in the health, function, and form of this grand foundation species reverberate through the environment, other plants, and habitats of these woods. All the while, the scene of slowly dissolving hemlocks will wrench the hearts of those objective scientists tending the instruments, counting the insects, and archiving those seemingly endless streams of data. Hugh Raup was right. The relationship of people to this woodlot and the tree that dominates it is a story in itself.

ÅSA'S HOLLOW

My first foray into John Sanderson's woodlot was on a steamy July day in 1983. The ancient hemlock forest immediately captivated me with its contrast to the rest of the second-growth landscape that I had thus far seen in Petersham. I'd recently been studying wilderness landscapes in the vast forest and wetland expanses of Labrador, so I was drawn to the chance to study the oldest and least disturbed part of this Harvard Forest landscape.

From my brief reading of Steve Spurr's 1950s research, I knew that a few trees in this stand dated back a couple of centuries to the town's founding, but beyond that the story faded. How long had hemlock been here and how had the scene changed through the millennia? When did these trees get established, and what did the colonial landowners do with its original ancient growth? Had it changed much or were Spurr and Hugh Raup correct in asserting that this and other ancient woodlands—at Slab City and Tom Swamp—were reasonable analogs for the forests that had prevailed in this landscape for thousands of years? The literature that I had uncovered thus far left all of these questions unanswered, and even my cursory reading of this landscape suggested that it would be impossible to derive any more information from the trees and forest itself unless we applied tools and approaches unavailable to my predecessors.



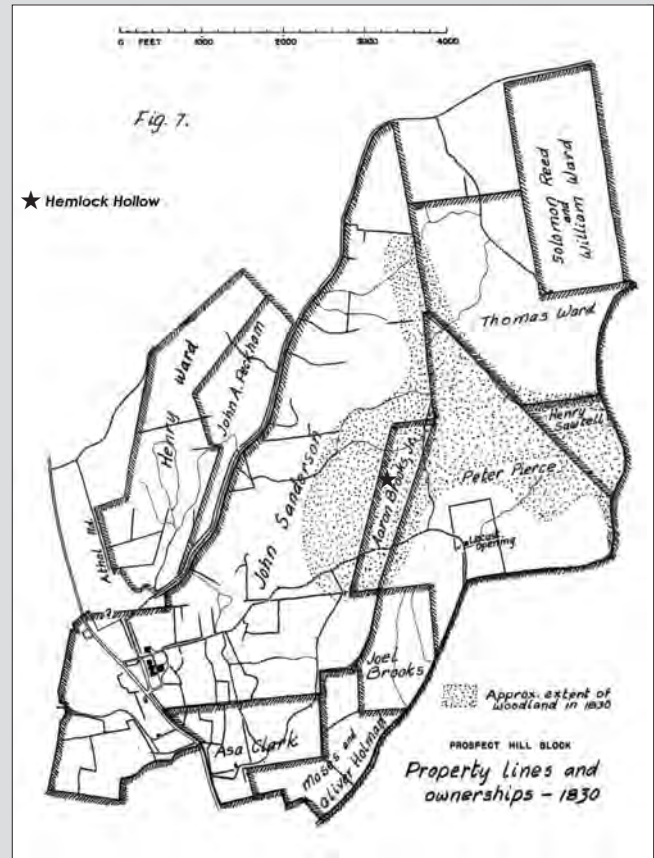
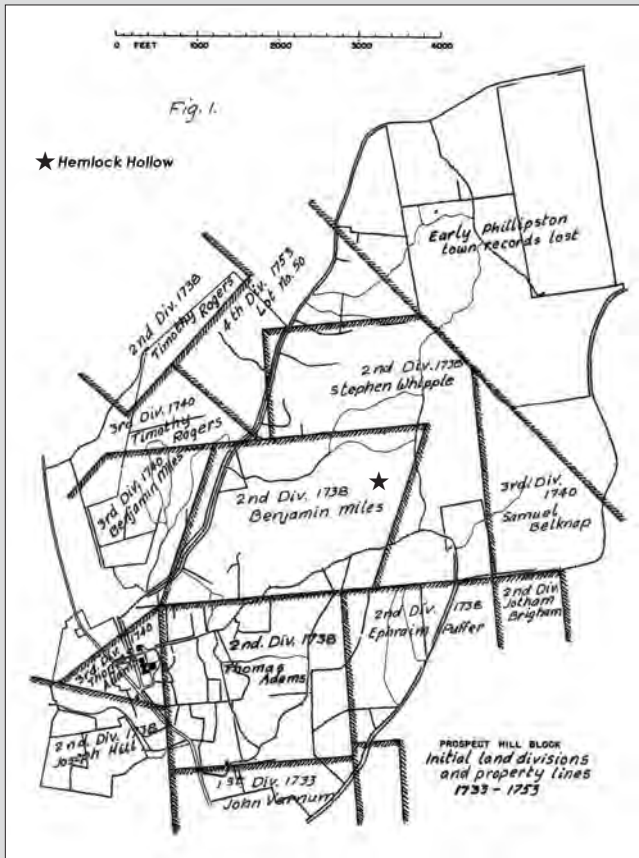
A sediment-filled coring tube and other gear adjacent to Hemlock Hollow in the old Sanderson woodlot.

DAVID FOSTER

As I hiked along pondering these things, the hemlock's deep shade offered me some modest respite from the July heat, but my golden retriever soon found a more refreshing niche—a small woodland pool filled with mud and just enough water to reach her belly. As she sank down into the water, it occurred to me that the muds below might reveal the deep history of these woods and open up insights into its even wilder past. That the idea came from my dog Åsa was apt, since she was named for the daughter of a Swedish friend and fellow paleoecologist who would have relished the scene and the direction of my thoughts.

If we carefully analyzed the mud for the remnants of the plants, bugs, and other materials that accumulate over time, the pool might reveal information going back hundreds or even thousands of years. We might get lucky and be able to complement the early studies of Spurr and others with some innovative paleoecology.

But a dose of reality dashed that flight of scientific elation. Åsa had beelined to the center of the tiny pool. Wouldn't every moose,



COURTESY OF HARVARD FOREST

The early land division and evolution of the Sanderson farm. Hemlock (or Åsa's) Hollow is indicated by the star.

wolf, and deer that had passed this way through prehistory have sought similar refreshment? Wouldn't the destruction have escalated during recent centuries, when most woodlots were grazed by cattle, sheep, and hogs? The large trees and thick mossy ground-cover had a pristine appearance, but the mud in this small pool was likely a churned-up soup.

Still, it seemed worth exploring, even though the effort turned out to be both challenging and comical. The pool was only about 20 feet across and held just a few inches of water, but the only way we could establish a solid and stable platform over the water and mud surface was to deploy our standard equipment—an immense pontoon boat fashioned from two 18-foot-long canoes bridged by an eight-foot sheet of marine plywood lashed across the thwart. This unwieldy nautical vessel spanned nearly the entire depression. Feeling self-conscious and even a little foolish, we completed our work with spirits buoyed by the retrieval of nearly a meter of dark, oozy sediment.

Back in the lab, however, disappointment settled in as graduate student Tad Zebryk processed the mud and began to examine the resulting microscope slides for pollen. His scans revealed no variation between the various samples: each level had more or less a similar plant composition. Even more troubling was the nature of the vegetation that the pollen counts revealed. Through much of the length of the core he found ragweed, a common weed of agricultural fields whose appearance in large numbers we conveniently use to identify the onset of colonial clearing of the New England forest. My fears based on Åsa's romp in the pool appeared to be well justified: the core was clearly one homogeneous mess.

In a fairly desperate appeal for solutions and alternative expla-

nations as we examined these discouraging results, I turned to Tad and asked what he thought. As if he had been jolted into a new mode of concentration, his brow creased and then his finger pointed toward the wrinkled and mud-stained map of the coring site. Brown-streaked fingerprints obscured parts of the outline of the basin and the concentric lines that marked each contour at 10 centimeters of depth. I had been impressed when he produced this bathymetric map and wondered to myself how he had done it. Now, he rather sheepishly admitted that since there was no easy way to probe the pool, he had simply put on hip boots and waded across the depression in a series of straight parallel lines, noting the depth of water and mud every meter. It hadn't dawned on him that we might just end up coring in one of his footsteps.

In no time, we had loaded the pickup with canoes, plywood, rope, and coring gear and were on our way back to Åsa's Hollow. By following our detailed notes and positioning our platform just a few feet west of the original hole, we were able to retrieve a new meter of mud from a location that we hoped had escaped Tad's well-intentioned but destructive transect. Back in the lab we were heartened by the appearance of discrete fine black layers of charcoal in the green matrix as we sliced the core lengthwise. Detailed graphs from one section of the core depicted highly resolved fluctuations in mineral matter, charcoal, and the pollen of many plant species. When radiocarbon dates arrived back from the lab, each of the dates fell into nice chronological order and the truly ancient nature of the record was revealed. We were euphoric. At nearly 10,000 years old and comprising minute particles of plants, soil, and charcoal from within 50 feet of the tiny pool, this core and its record eventually became recognized as

one of the most detailed and spatially resolved histories of the New England landscape. And quite remarkably, it portrays the dynamics of a single forest in which hemlock was challenged yet thrived for more than 8,000 years. Our perseverance in coring brought us important discoveries, some major publications, and the need for a more proper designation of the site: Hemlock Hollow.

The story from that mud is told elsewhere in the book *Hemlock*, but the distinctive features emerging from this Sanderson woodlot site are worth highlighting. The long, continuous record has a unique quality, its local scale: the pool was surrounded by trees whose pollen rained onto its surface and whose branches blocked pollen from more distant sources. By matching this local record with the somewhat broader picture obtained at the Black Gum Swamp a hundred yards away, we were able to place the hemlock forest in a larger context of regional-scale vegetation and climate change.

The prominent message from this record was that hemlock has been the predominant tree in John Sanderson's woods since it first migrated north to New England 8,000 years ago under a warming climate. A second notable fact was that whenever major disturbances hit this site and altered the forest, hemlock always recovered and reassumed its dominant role. In each case, whether fire, drought, insects, or people were involved, hemlock returned as part of what must have been an impressive scene of towering trees—hemlock, pine, birch, oak, spruce, and black gum—that would have darkened the tiny woodland hollow. The process of recovery was excruciatingly slow in human terms, each instance requiring 500 years or more before hemlock assumed its greatest abundance and settled into its dominant role for the next thousand years or more. This record provides a new perspective on the forest that we walk through today. In many ways, the Sanderson woodlot has the appearance of an ancient forest. Yet the larger trees just barely exceed 200 years in age, and the pollen record tells us the forest is still less than midway in recovery from the colonial-era disturbances wrought by John and his kin.

Given the widespread emergence of the hemlock woolly adelgid throughout the stand in 2012, the forest will never reach an old-growth condition this time around before this new dynamic of hemlock death begins. We look to the mid-Holocene hemlock decline 5,000 years ago for perspective on how this adelgid episode may play out. The optimistic message emerging from the ancient



Archaeologist Dianne Doucette (lower left) and students excavate John Sanderson's tannery.

script is that hemlock has always recovered from past devastating blows, so there is strong likelihood that the species will recover from this new one. The sobering news is that following that great prehistorical decline, it took hemlock nearly 2,000 years to regain its former abundance.

A truly wonderful message emerges from this lengthy story of Åsa's Hollow. It is a story of serendipity. The studies that Richard Fisher, Bob Marshall, Earl Stephens, and Tad Zebryk pursued were all based on collecting every last scrap of historical evidence that can be gleaned from any available source about a tree or a site or a landscape and its changes over time. Each episode has been a novel pursuit. The different forms of evidence and the nature of the resulting information and its messages are never known at the outset. In this kind of historical and ecological research, any source is fair game, and the boundaries are limited only by one's imagination and the quirks of history. In some cases, like Pisgah or the Sanderson woodlot, the site itself reveals most of the story, told by peculiar sources like cut stumps, downed

wood, buried soils, and the mud in a woodland depression.

In other cases, someone comes across the notes, samples, and charts left by Harvard Forest predecessors in the official archive or an attic or bookshelf and sees with a new set of eyes that they contain gems of information. Who would have guessed that three graduate students in the 1920s would have preserved a record of tree growth from clearcut old-growth forests at Pisgah in the form of a series of paper strips stuffed in a yellowed envelope? And, yet 60 years after these penciled marks captured every decade of growth in those stems, they told a compelling story of age-old growth and release after disturbances.

In another instance, a heavy, oversized volume of handwritten pages has sat for decades on a bookshelf in our archives, known generally to contain daily notes made by one of the early classes at the Harvard Forest, back when our residential “Community House,” the old Sanderson farmhouse, was the heart and center of the entire enterprise. The entries are dated, and the volume has been leafed through by dozens of bored or aimless scholars looking for a bit of diversion over the years, but it took a historically oriented and ecologically aware scholar who knew more than a little about Harvard Forest alums to recognize the writing in the volume and the insights that it holds. The tight script is Bob Marshall’s, and the journal turns out to capture a single, singular year in Harvard Forest history—the initiation of the greatest experiment in the institution’s history and the year that Marshall forged the Harvard Forest approach to forensic ecology. That record stimulated the new focus on Marshall that led to the recovery of his plot and the discovery of his role in developing historical approaches in ecology.

So, there is a lot of serendipity in our science, as we find unusual records that no one ever thought of seeking or even guessed were there. After all, who would have expected an unbroken 10,000-year record of forest growth and death to emerge from a small pool in the woods that had been ignored for decades and was likely disturbed by animal, man, and forest processes? And how have so many scholarly books been written about the founder of the Wilderness Society without a single writer’s stumbling on a treasure trove of personal writings, data, and unpublished photographs that have sat for decades in Petersham and that capture a joyous and inspirational period in the young man’s upbringing? And therein lies the other side of our science coin. To seize on serendipity requires insight as well as a bit of perseverance. In their quest to use colonial records to understand the nature of very early New England, landscape historians and scientists overlooked the fact that the notations of which trees served as boundary and corner markers provided an unbiased record of the composition of the forests before they were disturbed by the new immigrants. It took imaginative ecologists and others to recognize this. Serendipity is key, but seldom do historical gems fall right into your lap, or announce themselves on the other end of a telephone line. But that too can happen.

SERENDIPITY AND HISTORY

It was the autumn of 1999. A dealer in rare books was on the phone, saying that the Petersham Historical Society had suggested that the Harvard Forest might be interested in a book he wanted to sell. He often picked up boxes of miscellaneous books and old journals at auctions, he said, and a recent haul included the account book for a farm in Petersham. I asked the name of the family.

“Sanderson,” he replied. As I sat silent, he continued. “The volume begins in 1775 and runs well into the 1800s. It must cover multiple generations, for it contains a couple of different hand-writings. It is organized in the typical style of a farm or business account book with pages listing expenses and others tallying income against the names of various individuals.”

Then, he played his trump card. “I gather that the Sandersons once owned your land and that you all have some interest in its history.”

With this pronouncement I got right down to business. In a matter of minutes we had arranged for him to bring the leather-bound volume to Petersham for us to assess its contents. Then we broached but did not resolve the challenge of establishing a fair value for something that was worthless to the world and yet priceless to the Harvard Forest.

When he arrived and I began flipping through its well-handled pages filled with notations, the value of “priceless” increased tenfold in my mind. When I recognized the details of actions and transactions that it contained, the deal was sealed. In blue ink and flowing hand, the inside cover read “Jonathan Sanderson 1775.” Inside, most pages were dense with columns written in a range of cursive scripts by different hands. The notations shared a similar organization, but at first glance each was indecipherable. I could make out the pattern—name, date, item, number. Then, with a bit of effort, words took form. First, the names were familiar from the cemetery just 50 yards down Main Street from where I sat. The nineteenth-century neighborhood was all there—Mann, French, Wheeler, Sanderson, and more. Then there were the items—cows, cattle, cheese, hay, butter, and bark. And finally, as others joined me to share in this impromptu exploration, we began to decipher activities—laying stone walls, mowing fields, and driving cattle to Boston. In the front section of the volume, the numbers were British, with pounds, shillings, and pence. Every page was revealing. As I read on, a real world began to take form. This was a world of concrete items, actions, and daily decisions by real people in a distant landscape that I now walk and study every day—a world previously known only through artifacts like stone walls in the woods, census figures, ancient newspaper accounts, and trees growing in abandoned fields. In my hands, the account book was speaking directly in words and numbers.

The deal was done—for \$750. In no time, my assistant Linda Hampson dropped all her other tasks and was poring over the words and struggling with the handwriting. She dived into the volume and transcribed and formatted each page on her computer screen so that it mirrored the original and allowed us to concentrate on content rather than the laborious challenge of deciphering the unfamiliar scripts. In the effort, we discovered that she brought two personal advantages to this effort. Her personal passion for New England history and antiquities made many terms, actions, and scenes familiar. And when completely stumped by a word, she could take it home to her Yorkshire-born husband, who frequently recognized it as slang from the old sod.

We learned much about the Sandersons and their farm as the transcribed volume took shape; over time it transformed our understanding of our land, its history, and the hemlock woodland. Some insights were quotidian, like the routine purchase and bartering of animals, labor, and local farm produce. Others opened our eyes to the unsuspected breadth of the world of eighteenth- and nineteenth-century farm families. Most remarkable was the frequency with which the Sandersons engaged the commercial world in

Boston and beyond, selling cheese and butter, purchasing calico and other cloth, tools, and goods like sugar, and dealing with drovers and neighbors who would share in the task of driving the livestock to the Brighton slaughterhouses or on to Boston markets.

There were other major revelations. Many of the nineteenth-century stone walls that bisect our woods and line the old roads were not built by the strapping men of the Sanderson family, as we had always imagined. Rather, the tallies of workdays in the journal indicated that a family who rented a separate farm in the town of Shutesbury from John Sanderson had spent weeks assembling these walls. Many other debts were worked off in part by laboring in Sanderson's fields and improving his land. Learning about previously unknown real estate assets, the great number of cattle, oxen, and horses that passed through the farm, and the scale of business conducted, we came to recognize that men in rural New England like John Sanderson were not poor dirt farmers scratching a living out of barren and rocky soil. Rather, they were successful and calculating businessmen who thrived in a world where land could be improved through hard labor, and materials were regularly exchanged with neighbors, distant cities, and far flung parts of the world. Going back to the census, newspaper accounts, and gazetteers, we confirmed that Petersham was one of the most prosperous towns in northern Worcester County. A town leader, John Sanderson was considered among the most successful of its citizens.

From the journal it also became clear that John was a diversified producer of foods, goods, and services, as well as a broker of diverse assets. Beyond farming, he was a small industrialist, as indicated by one gazetteer that stated "much of [Sanderson's] wealth came from his tannery." The leather business was inextricably linked to the land, for it depended on hides produced on local farms that were soaked for months in vats of tannin-rich solution derived from the ground-up bark of hemlocks from local woodlots. John's wife, Lydia, carried the family and farm enterprise forward with son John when her husband died at age 62. They all seem to have been shrewd business operators. From this small tanning industry, they turned a regular profit in hard cash that was then invested in the farm or other land holdings. Hugh Raup concludes his history of John Sanderson's farm by noting that the family wisely sold out at the height of land values in Petersham and then purchased a magnificent farm in the agriculturally rich Connecticut Valley town of Bernardston, where they started one



DAVID FOSTER

A large stone used to grind hemlock bark sits on a stone pier adjacent to the stream that supplied the tannery operation.

of the region's major banks, raised prize oxen, and launched additional careers that included politics for John Sanderson Jr., a state senator. This success was grounded in no small measure in the hemlock woodlot that provided a critical raw material and the small stream that powered the tannery.

Every town in New England had one or more tanners along with the operations needed to produce enough leather to meet the demands for work, home, and pleasure. Despite their ubiquity, such small-scale tanneries are poorly understood by historians and archaeologists, and their ecological implications are completely unexplored. When we launched the archaeological excavation of John Sanderson's tannery in collaboration with Elizabeth Chilton at the University of Massachusetts and Dianna Doucette at Harvard's Peabody Museum, we were surprised to learn that it was the first attempt in the northeastern United States to excavate a tannery and learn exactly how such critical operations were constructed and run. The stream provided two resources—water

to wash the gore off the hides and soften them through soaking, and the energy to drive the immense grindstone that shredded the hemlock bark so that its rich tannins could be leached out. Brought by the wagonload, hides and hemlock bark converged at the tannery. The skins headed to a separate building for flensing and beaming, processes that hand-stripped the fat from the hide and then limbered it up by working it over a wooden beam. The bark was delivered to the mill, shredded, and then soaked in water with the hides in deep vats.

Knowing this, the history and use of the hemlock woodlot became much clearer. Jonathan Sanderson, the family patriarch, began to carve his farm from the Petersham wilderness in the 1770s, just decades after the town was founded. Over time his son John followed his lead and expanded the arable and pasture lands out from this Main Street homestead. Because the hemlock woodlot and Black Gum Swamp were a large distance from the barns and had poor drainage and low fertility, they were among the family's last acquisitions. But in the extensively cleared landscape of the early nineteenth century, timber, firewood, and bark became increasingly scarce and valuable commodities. The Sandersons cut the woodlot heavily the first time and then harvested it repeatedly, presumably husbanding the many resources and favoring species that served specific needs for the farm businesses. Chestnut, which sprouted prolifically, was cherished for posts, beams, and other building material because of its rapid growth, straight grain, and resistance to decay. Oak and pine timber could be readily sold or used as needed. But for John and his major industry, hemlock was critical. Its sustained abundance in the woods must have been a result of deliberate management. Although hemlock wood was much less valuable than that of many other species, the bark would have kept the tannery crew busy, including brother Joel, who ran the operation and supervised three to five men and boys.

Our tannery excavation remains in its early stages, progressing slowly as it also serves as a focal activity in our summer research and educational program that teaches integrated historical approaches to ecology and conservation. But through the efforts of Dianna Doucette, archaeologist Tim Binzen, and some superb students, the general layout of the buildings and operation of the site have become clear. A small Cape-style house with numerous ell for barns, sheds, a well house, and outhouse sat atop the steeply rising banks of a brook that reaches ten feet across during a spring freshet.

Today, it is a lovely scene of trees and stone and water, but in the tannery's heyday, the same view would have been bleak and likely nauseating. The land was undoubtedly treeless and bare, with cartways and trails eroding the slopes and stream banks. The stench of putrid hides and their scrapings would have filled the air and accompanied the fetid odors emanating from dozens of vats filled with hides soaking in the tannic baths. The stream, with its many duties, would have wandered from the marsh above through an open pasture filled with cattle, into the millpond and mill, past all of the working men and processing areas, and then left the site filthy with an infusion of silt, manure, and trimmed fat, all stained dark brown from the bark. On a steamy August day, travelers on the Athol-Petersham road would have hurried past.

The grueling effort of running the tannery was very much a seasonal boom-or-bust affair. Today the stream seldom runs in the summer once the trees leaf out and the forested watershed

begins to evaporate vast quantities of water. In the deforested landscape that John Sanderson knew, this atmospheric diversion of water by trees would have been substantially reduced, yielding more streamflow, but the tanner would still have had to use weather and ingenuity to run his mill for a few months each year. Water was stored in two locations. A half-acre millpond sits behind a massive rock dam that spans the valley within view of both the tannery and the miller's house. A quarter-mile upstream, nearly ten acres of marsh is dammed today by beavers that have capitalized on the long, low rock dam that the Sandersons erected and used to manage the large volume of water. By controlling the flow from the marsh, they could have kept the millpond full.

The census records from Petersham list three tanneries, with Sanderson's regularly noted as the most productive. Joel Sanderson and his crew processed about a thousand hides a year, an extraordinary yield given that each could require up to a year of soaking. The operation would have required an extensive complex of vats and processing capability, for which our archaeological foray is just beginning to account. At the same time, this level of production would have consumed an immense amount of hemlock bark, likely far more than would have been produced from the farm alone. Consequently, in this business, as in most of their other enterprises, the Sandersons were engaged in a constant stream of transactions with many people.

This commercial venture brought considerable cash to the farm and allowed it and the family to prosper. At its heart lay the fields that produced the cattle, swine, goats, sheep, and calves and the woodlot that harbored a grove of hemlock that endured throughout the tumultuous New England colonial period. The farm journal records the labor of cutting that yielded bark, a bit of timber, and cordwood. In the records from Hemlock Hollow, we see the consequence as repeated harvests turned a diverse old-growth forest into a woodland of sprout chestnut and hemlock. It was the resilience of hemlock and the care of the woodlot owners that enabled hemlock to persist through those years of use and emerge as the final dominant species long after the farm was sold and chestnut declined. And it was hemlock that made the whole tannery operation work and ultimately allowed John Sanderson, his family, and farm to thrive. □

David Foster is an ecologist and faculty member at Harvard University and author of several books on New England's forests. He has served as the director of the Harvard Forest's 3,750-acre ecological laboratory and classroom in central Massachusetts since 1990. David is also the principal investigator for the Harvard Forest Long Term Ecological Research program. This excerpt is reprinted with permission of Yale University Press.

NOTES

1. "Some reminiscences and recollections of School District No. 10, Petersham, MA," unpubl., Harvard Forest Archives, Petersham, MA.
2. Mann Family Genealogy, unpubl., Harvard Forest Archives, Petersham, MA.
3. Hugh M. Raup, "The View from John Sanderson's Farm: A Perspective for the Use of the Land," *Forest History* 10:1 (April 1966): 7.
4. *Ibid.*, 2–11; and Brian Donahue, "A New View from John Sanderson's Farm: A Perspective on New England Environmental History and Conservation," *Environmental History* 12:1 (January 2007): 9–34.