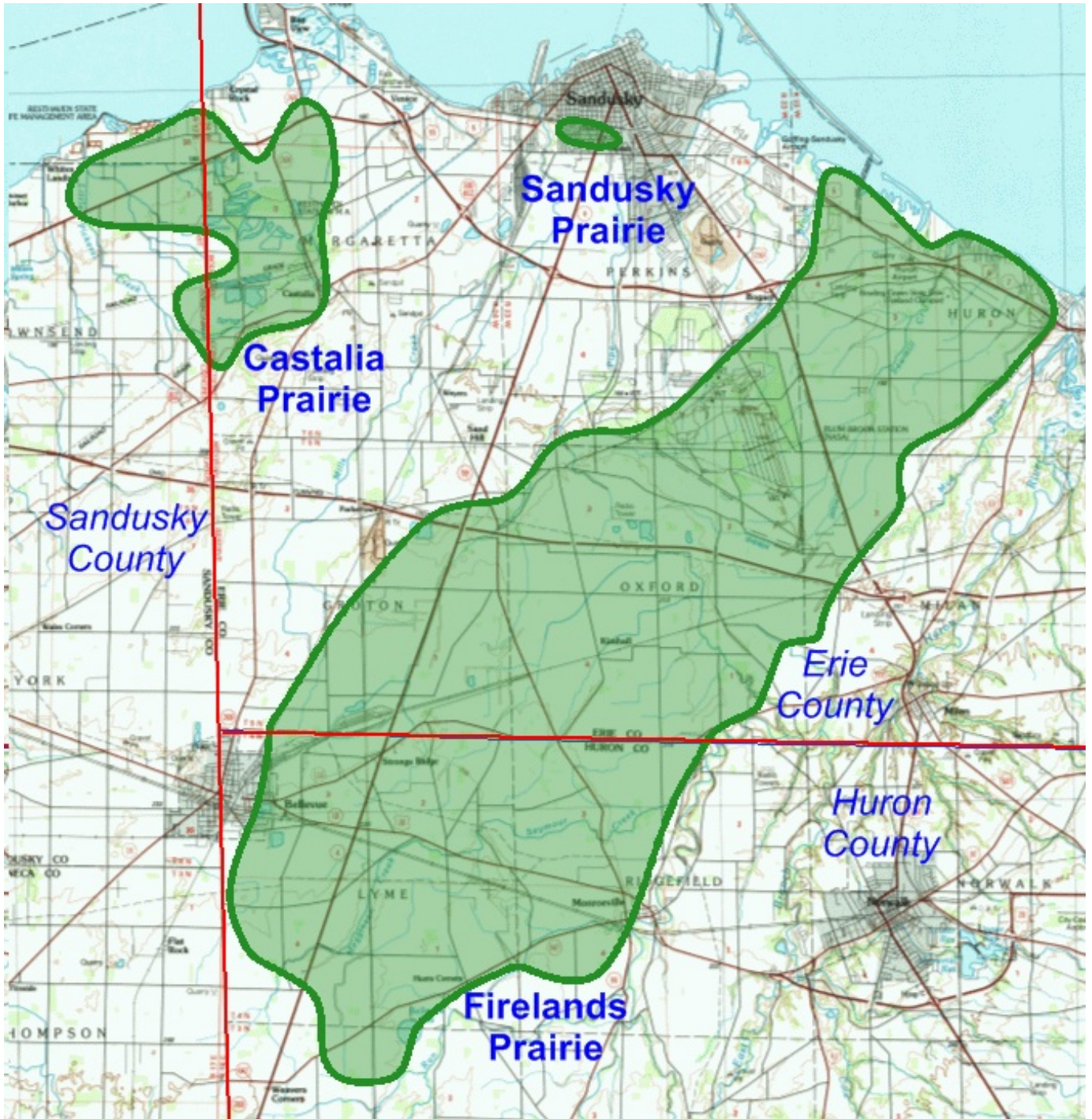


The Prairies of the Original Firelands

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Fig. 1. The prairies of the Firelands, 1809.



The unique prairie ecosystems of The Firelands, primarily in present-day Erie and Huron Counties in north-central Ohio near Lake Erie, have been noted since early European settlement in the first quarter of the 19th century, and thereafter.

The political Firelands was the western-most portion of the Connecticut Western Reserve, a width of land west of Pennsylvania extending to the Pacific, granted to Connecticut by King Charles II in 1662. In 1786 Connecticut agreed to dissolve most of its claims to this 120-mile wide swath; but reserved a length of 120 miles in what would later become the State of Ohio.

In 1792, the Connecticut legislature granted 500,000 acres of the western-most portion of the Reserve to Connecticut citizens whose properties had been burned by the British in the Revolutionary War. Hence, the lands were first known as the "Fire Sufferer's Lands," then later, the "Fire Lands," and today, the Firelands. The reference to fire has no historical reference to any actual fires in the so-named lands.

In order for the Firelands to be legally distributed to those who filed claims of British incendiarism, the lands would first have to be surveyed, being divided into townships, etc. Two teams of surveyors were engaged to undertake this difficult, lengthy task. The first surveying team, lead by Seth Pease, was to initially survey, field mark, and map just the southern and western borders of the Western Reserve. Pease began his survey in June of 1806, but failed to start his westward progress from the true western border of Pennsylvania. Pease surveyed both the southern and western borders, but because of an inaccurate starting point, his field work had to be discarded.

In 1808 a surveyor by the name of Maxfield Ludlow ran a corrected southern and western border, after finding and starting from the authentic Pennsylvania border. It was more than a mile east of Pease's erroneous starting point.

Later, surveyor Almon Ruggles began the detailed survey of the entire 500,000 interior acres of the Firelands. Between 1808 and 1809 Ludlow and Ruggles recorded their field notes from their surveys of the Firelands. This prairie study derives primarily from an analysis of those remarkable notes, with detailed references to the exact location of prairie and forest edges (which can today be set within several feet on modern maps). Analysis of recorded tree sizes, species, locations, and incidental notes and comments by Ludlow and Ruggles provide illustrative descriptions of the Firelands in these immediate pre-settlement times.

Text from *The Firelands Pioneer* states,

On November 10, 1862, the late Isaac M. Keeler of Fremont donated to this Society [Firelands Historical Society] what purports to be a "Copy of Mr. Ludlow's Field Book of the South Line of the Firelands." "Copy of Mr. Ludlow's Field Book of the West Line of the Firelands," the "Dividing Line between the Con. Land Company and the Firelands"—the East Line, and part of Ruggles' Field notes of the Firelands Township Boundary Lines. On March 10, 1910, Theodore Williams presented this Society Almon Ruggles' "Survey of the Firelands" dividing the 500,000 acre grant into townships.

Propitiously, these copied field notes were later transcribed for publication in *The Firelands Pioneer* by one "Mrs. R. D. Wickham, an expert copyist, her copies compared and corrected by two expert proof readers of the American Publishing Company and again proof read by the same experts and the editor."

The transcribed surveyors' notes can be digitally accessed here:

https://books.google.com/books?id=pqI-AAAAYAAJ&pg=PA1856-IA5&pg=PA1856-IA5&dq=ruggles,+survey,+firelands&source=bl&ots=U_A11dbszr&sig=HK_Lf77YqQSKXeu6nrQd4WjTNSU&hl=en&sa=X&ei=zLaMVO7GKva_sQTXyoDgAg&ved=0CCwQ6AEwAg#v=onepage&q=ruggles%2C%20survey%2C%20firelands&f=false

Without the invaluable saving and archiving of the Firelands surveys field notes over a century ago, little of the work of this Firelands Prairies determination could have been accomplished. The surveys of the interior township sections have been lost, unfortunately. The survey of the Connecticut Western Reserve in NE Ohio was unique. It did not follow the provisions of the Land Ordinance of 1785, of the Continental Congress, which designated townships to be six miles on a side, with 36 one-mile interior sections. Instead, the townships of the Western Reserve were only five miles on a side, with (generally) only four interior sections, 2.5 miles on a side. Unfortunately, Ruggles' completion of the Firelands survey did not include the surveying of the four interior sections. Those surveys occurred later, and can now be nowhere found. Consequently, survey information upon which this study is based occurs only along the borders and corners of the nine 5-mile square townships that had prairies (Sherman, Lyme, Groton, Margaretta, Ridgefield, Oxford, Perkins, Milan, and Huron).

But importantly, two rather consistent notations in the Ludlow and Ruggles surveys allow an extremely accurate determination Firelands prairies borders. The original surveys had two primary purposes: First, establish the township borders and corners by marked "witness trees" or set-in posts and the field survey notes; and, secondly, make generalized notations of apparent land suitability for agriculture, which might guide subsequent sales and purchases of tracts or parcels. The first purpose required the notation of vegetation types growing along the township borders, along with the marking of witness trees or the setting of posts at the township corners. Crucially, prairies were regarded as poor landscapes, of little or no agricultural value. The surveyors consistently noted the exact location of prairies along the township borders.

For example, here are Ruggles' notes as he surveyed the third and fourth miles of the southern border of Lyme Township, beginning at the SE corner and proceeding westward.

Commence the 3rd Mile West

- 2.00 Prairy. Rich high weeds & grass.
- 10.00 Through it to timber, Hickory &c
- 35.00 Prairy, some scattering trees.
- 80.00 Sat a Post in large Prairy.

Commence the 4th Mile West

- 35.00 Upland timber Oak & Hickory.
- 80.00 Sat a Post.

At 2.00 chains, Ruggles left a forest and entered a prairie. At 10.00 chains he entered a forest of hickory and other species. At 35.00 chains, he left the forest and entered prairie once again. At the end of this mile, at 80.00 chains, the line is still in prairie, so a marker post was set there. At 35.00 chains into the fourth mile, the line enters an oak-hickory forest. At the end of that mile, at 80.00 chains, a mile post was set in the forest.

There are 80 chains in a mile. Each chain is 66 feet. With these known lengths, the described vegetation borders can be marked on a modern map accurate to within a few feet. Because of the manual dragging of the chain and imprecise surveying transit equipment of the time, townships were not exactly five miles on a side (further complicated by meridional convergence, caused by the curvature of the earth). Nonetheless, the corners Ludlow and Ruggles marked in the field became the recognized township borders in place today and are clear on modern maps. In the vegetation mapping of this project, measurements proceeded along the township borders from the mapped corners. Consequently, the prairie edges along each of the township borders are accurate to within several feet, just as they were located in 1808 or 1809.

But what about the location of the prairie borders between the township borders, in the interiors of the townships? These are shown on the maps, but how were they derived? How accurate might they be?

Except at the marked prairie borders, in Fig. 4, mostly along the township borders (the blue dots), interior prairie borders were determined from modern vegetation (forests), location of prairie-edge roads (such as Taylor Rd. coursing NE-SW in Perkins Twp, at B), and other landscape clues. Soil colors, after winter or spring plowing, tend to reveal prairie edges, as soils in forests were not as dark as prairie soils. In certain areas, remnant prairie-confined plants, such as *Ratibida pinnata* and *Silphium terebinthinaceum*, have been discovered growing in ditches and fence rows.

Fig. 2. *Ratibida pinnata* in the Firelands.



Fig. 3. *Silphium terebinthinaceum* in the Firelands.



Fig. 4. Prairie borders determined from surveyors' field notes. Blue dots are recorded prairie edges along township borders. Red dots are township corners.



Many of interior prairie borders have been aligned with the geographic orientations the surveyors noted in the field notes. Often, not only would the entrance or exit of a prairie be noted, but also the direction of the prairie border would be indicated. For example, in the second mile of the western border of Margaretta township, Ludlow made this entry:

53.50 Enter a very large Prairy Bears N. E.

This indicates the SE border of the Castalia prairie (Fig. 5), at G; and comports with the topography there, with the Castalia limestone ridge coursing to the northeast.

At the third blue-dot prairie border (coursing northward), Ludlow made this notation:

- 40.00 Enter the same large Prairy in another mile.
- 50.00. The Prairy appears to be 5 Miles E & W very wet.

Hence, the generalized east and west borders of this, the large, wet Castalia prairie could be estimated. The estimation matches the dark soil borders of the site.

Fig. 5. Determined prairie borders of the Castalia Prairie.



In Fig. 4, the western, NE-SW prairie border in Groton Twp., A, is obviously interpolated between the two known prairie edge sites on the eastern and western borders, but is located in reference to the presence or absence of modern forests of large oak trees. There are a few of these to the west of the line, none to the east.

The western border of this, the great Firelands Prairie in 1809-09, from the blue prairie edge dot south of Bellevue, NE from segments A and B, to the shore of Lake Erie, is very accurate. In Groton Twp. along segment A, soils to the west of this line are not nearly as dark as those to the east. Along segment B, in Perkins Twp., this entire prairie border is essentially the location of Taylor Rd, which was noted in Ruggles' field notes as an "Indian path, NE - SW." The green forest area NW of the letter B, inside NASA Plum Brook Station, is known to have been an elm-ash swamp forest. And mixed-mesophytic forests and oak-hickory forests were along the more southern west sides of Taylor Rd.

It has been noted elsewhere that game trails commonly followed prairie-forest borders, as here.

The eastern border of the Firelands Prairie is a bit more indistinct, but is near the indicated delineation, for the following reasons.

In the SE, along segment F, in Ridgefield Twp., this border is revealed by the rather dense, conventional forest noted along the forested eastern and southern borders. For most of this length, the deep, vertical-walled Huron River valley clearly terminates the prairie.

The SE corner of Oxford Twp. was indicated to be oaks.

In Milan Twp., along segment E, oaks, too, were noted, often claiming that they were "thin."

Continuing into Huron Twp., border segment C, the eastern Firelands Prairie border continues along the oak-forest edge of Mud Brook, which the prairie follows into Huron, near Lake Erie. The entire Mud Brook valley was said to be thin oaks.

Interestingly, the N-S road directly under the letter C is Rye Beach Road. Many 20th century Huron residents erroneously attribute the name of this road to a beach formerly located at its north terminus on Lake Erie (since eroded away). It is presumed that during Prohibition illegal spirits, primarily Canadian rye whisky, were surreptitiously landed and traded-for at this beach. But the road had the name long before Prohibition. It noted the prairie wild rye grasses that grew naturally on the beach, *Elymus canadensis* and *E. virginicus*. Before settlement, and before it was eroded away, most of the NE edge of the Firelands Prairie terminated in a beach prairie on Lake Erie, at the western edge of modern Huron.

In the present-day city of Sandusky, just north of the Perkins Township northern border, was said to be a "small prairie," indicated here with the letter "I," Its actual size or shape is unknown, merely its generalized location.

Not only are the locations and species of witness-tree oaks at the township corners revealed in the Firelands surveyors' field notes, but their indicated sizes tell of an important ecological factor.

A total of 47 oaks are listed as witness trees in the corners of the Firelands prairie townships: 7 red oaks, 11 black oaks, and 29 white oaks. No other oak species were listed as recorded witness trees.

The recorded sizes of these trees is noteworthy. The average diameter of the red oaks were 25.7 inches, with a median of 18 inches. Red oaks varied from the smallest at 16 inches in diameter, to a single specimen of 40 inches. Two specimens were 36 inches in diameter.

The average diameter of the 11 black oaks was 18.7 inches, with the median at 20 inches in diameter. Sizes ranged from a single specimen at 8 inches to two specimens at 30 inches.

The most common witness tree oak species was the white oak, with 29 specimens. The average diameter of these was 21.7 inches, with a median of 20 inches. The largest white oak was a single tree at 36 inches; the smallest at 12 inches.

The infrequency of large, mature oaks of all three species should be noted. Only six oaks were 30 inches or greater in diameter. The vast majority were in the 12 to 24 inch diameter range.

This indicates that the oak groves and forests surrounding the Firelands and Castalia prairies in 1808-09 were relatively young, with few mature or aged oaks. The author is familiar with the numerous old-growth oaks (of several species) at Spiegel Grove, the historic homestead of President Rutherford B. Hayes 30 miles to the west in Fremont, Ohio. These ancient presettlement oaks were on the edge of the great Black Swamp, and the Hayes's conserved these giant trees when they developed Spiegel Grove in the 19th century. The mature oaks there are typically three and four feet in diameter, with only a few of smaller diameters.

Comparison between the large Spiegel Grove old-growth oaks to the young prairie-edge oaks in the Firelands indicates that they were still young when surveyed in 1808-09. The absence of large, 4-ft diameter oaks, and the preponderance of 20 - 24 inch oaks clearly indicates natural oak forest ecological succession had not yet occurred to maturity. The Firelands prairie-edge oaks were almost universally young and immature.

The exact age of the oaks would have best been determined by increment borings. Such data, however, are understandably absent. The age of the oaks in question can be only estimated. One authority claims that white oaks have a "growth factor" of 5.0, where the age of a white oak can be estimated by multiplying its diameter times 5.0. Red oaks are claimed to have a growth factor of 4.0.

If these factors are accurate (they may be too high in the fertile Firelands soils — the local oaks may have grown faster), a typical 20-inch white oak would have been 100 years old; a 20-inch black oak 80 years old.

In the 1960s a number of local black oaks were planted at the Engineering Building of NASA's Plum Brook Station in the heart of the Firelands Prairie. Today, about 50 years later, they are about 24 inches in diameter.

Therefore, at the time of the surveys, the generalized age of the Firelands prairie-edge oaks were from 50 to 100 years old. That is significant. It indicates that in a previous century or two there were few or no oaks along the prairie edges; that the prairies were actually larger in the 18th and 17th centuries. Clearly, at the time of the survey in 1808-09, the prairies of the Firelands were being invaded by young oaks, at least on the prairie edges.

Why, then, was this ecological transformation, from open prairie to oak savanna or oak forest underway in the early years of the 19th century; and why had it not occurred in any previous century? Why hadn't the prairies of the Firelands been overtaken by oaks? In 1808-09, this was clearly underway along most of the prairie borders, with large adjacent areas the surveyors' noted to be "oak openings," or "thin oaks."

Contrary to unexamined belief, eastern tallgrass prairies, as in the cases in the Firelands, are never self-sustaining climax communities. Without disturbance, eastern tallgrass prairies universally succeed to first woody shrubs, then to forest, as contemporary prairie managers discover.

The author has the rewarding task of slowly restoring up to 3000 acres of native Firelands tallgrass prairie at NASA's Plum Brook Station in Erie County. Half of the 10 square miles of the Station are located on the original Firelands Prairie, and virtually all of the prairie grass and forb species are found in remnant populations across the prairie-portion of the Station. Seeds are collected from these genetic resources, and planted in former prairie meadows, which are burned by prescribed fires each spring. Wonderfully, large expanses of original Firelands Prairie are being restored.

But notably, roughleaf dogwood brush (*Cornus drummondii*) invaded and shaded out former open herbaceous meadows. As with all other Ohio tallgrass prairies where herbaceous meadows were allowed to succeed without appropriate disturbance, either mowing or prescribed fire, the herbaceous vegetation in ten to thirty years would succeed first to shrub-dominated species, then to forest.

The evidence is clear: Eastern tallgrass prairies, particularly those in moist regions such as Ohio, can be maintained only by frequent and persistent disturbances that suppress woody plant invasion. In the case of the Firelands prairies, that disturbance was almost universally anthropogenic fire.

A local historical compendium, *The Firelands Pioneer* (in several massive volumes) records settlers' personal accounts of their pioneer experiences in the first third of the 19th century. From these, there are numerous accounts of annual spring prairie and forest fires set by local Native Americans. These fires were not infrequent nor accidental or incidental. In fact, they were deliberately set each spring so as to specifically retard woody plant invasion of the prairies and open up oak forests and savannas; and to herd game animals by smoke and fire to propitious killing points.

It is an ecological error to believe that edaphic (soil) or other factors maintained eastern tallgrass prairies. There was only one agent capable of this, and that was annual fires deliberately set by Native Americans over long periods of time. The Firelands has numerous detailed accounts of these fires from the first quarter of the 19th century.

The necessity of frequent anthropogenic fires to maintain eastern tallgrass prairies in humid and moist Ohio, compared to less frequent fires in the young prairie-edge oaks of the Firelands, points in only one direction: Firelands prairies several hundred years before survey and settlement were significantly larger, before the young oaks captured the prairie edges.

And the only factor that could have allowed this is frequent, landscape-scale fires set by humans. The evidence, therefore, is that Native American populations were larger in previous centuries, and larger, more expansive prairie fires were conducted, keeping out the invading oaks. At the time of survey, oaks were invading the borders of the Firelands prairies.

The best explanation for this is that a Native American population decline would have occurred in the 17th and 18th centuries with the appearance of French traders in the Great

Lakes. They would have brought with them not only trade goods, but also pathogenic microbes they were adapted to, but for which Native Americans of all cultures would have never had any immunological experience or competency. Tuberculosis, whooping cough, influenza, and other maladies that Europeans had been selected for over several millennia could proliferate in immunologically-naive North American human populations.

The small, invading prairie-edge oaks appear to be proxy evidence for Old World pathogens in vulnerable New World humans, resulting in their population decline in a century or two before European development in northern Ohio.

The oaks at the edges of the Firelands prairies were fire-adapted and fire-controlled. With frequent, uninterrupted annual prairie fires in earlier centuries, invading sapling oaks were suppressed. But with reduced human populations and less frequent or massive landscape prairie fires, oaks could begin to invade the borders of the prairies — as the survey notes indicate.

One other question remains. We are certain of the origin of Ohio's major tallgrass prairies, including those of the Firelands: the 4000-year Xerothermic Interval from 8000 to 4000 years before present (BP). For that period, it was too dry for forest to predominate on Ohio uplands.

We can also now account for the persistence of Ohio's major tallgrass prairies following the Xerothermic, to the present day, under amply-moist conditions — persistent annual anthropogenic fires, as described and now known in the Firelands.

But why, then, wasn't much of the rest of Ohio retained in prairie for the last four millennia, as was the case in Illinois and Iowa? Here's the unanswered great remaining question: Why did Native Americans of numerous cultures and times in the last four thousand years focus their annual burns on only three large prairie areas in Ohio, the Firelands Prairies in northern Ohio, the Sandusky Plains prairie region in north-central Ohio, and the Darby Plains prairie region between Columbus and Springfield? It is a mystery why ancient human-set fires failed to hold in abeyance forest incursion across much or most of the rest of upland Ohio. (The question likewise applies to Indiana — but not to Illinois or Iowa.)

The absence of an ecological answer to that larger question, however, does not thwart an accurate understanding of the locations and composition of the historic tallgrass prairies of the Firelands afforded now by this analysis of the original surveyors' field notes, in confirmation with contemporary locations of prairie plants and remnants.

The Firelands Prairie was the eastern-most landscape-scale tallgrass prairie in the United States (if not North America) — a notable natural ecosystem — whose boundaries in 1809 are now rather accurately discerned.

- January 2015