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The Storied Environment of Bennett Place

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Abstract

The story of Bennett Place is much more complicated than a moment in time when two generals signed a treaty, and this story is embedded in the Bennett Place environment. The narrative is both human and environmental, and so the methods used in the project matched that approach. Sources include both measurements of shortleaf pines and species observations, including both a list of tree species in the woods at Bennett Place compiled as a part of the project and interwoven images and observations of other species from iNaturalist. Other sources include historic census data, newspapers, maps, and other documents. All of these sources are interwoven into a narrative that spans the 19th century agricultural history of the site through the construction of relevant local land use changes, such as the construction of transportation networks and the changing paths of local creeks. Some of these key moments and themes match the growth patterns of shortleaf and loblolly pines on the site, and through this project, some shortleaf pines were identified as witness trees. Bennett Place may be composed of only a singular environment, but there are many intersecting narratives embedded within it. This study of this storied environment matters, not only because it can be used to improve environmental interpretation at Bennett Place, but also because it offers a specific example of regional environmental themes embedded in a specific place.

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Acknowledgements

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Thank you to all!

Before We Begin

Bennett Place is a State Historic Site in Durham, NC. As of Fall 2024, it is a place to visit and hear about the "largest surrender of the Civil War", with some extra information about the yeoman farmer James Bennett and his family. The Bennetts were unremarkable except for the fact that their property was host to a treaty signing at the end of the Civil War, and they only ever owned a couple hundred acres. The site is even smaller than the original property boundaries today, only 33.4 acres. But even for a small piece of land, a history of few days when "great men" descended upon it does not account for its full story. Bennett Place is sometimes mentioned in military history books, but as far as scholarly work about the place, there has only been one published study. This was Arthur Menius's 1981 "Portrait of a Yeoman Farmer", the first work I read while beginning this work.[1] The paper described James Bennett's life as a yeoman farmer, and dealt with many, but not all, of the same sources that I did. That said, this work additionally used observations of biodiversity, tree cores, and more digitized news articles than Menius had access to. And, even where our sources overlapped, our treatment of them was different as my work asks the question "what if instead of the story of these men, we tell the story of the land itself?"

This is a living story, of a landscape bursting with grasses and lizards and trees and fungi. But it is also a historical story, of the plants, animals, and people that inhabited the property from the late 18th to the 21st centuries. And it is an environmental story on a large scale, with legacies of nature and families that connect to the broader environmental histories of North Carolina and the American South, such as transportation or the impact of fertilizers.

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[1] Arthur C Menius, "James Bennitt: Portrait of an Antebellum Yeoman," *The North Carolina Historical Review* 58, no. 4 (1981): 305–26.

Even so, this project cannot be everything at once. For example, the information shared about Black land use perspectives is limited. The official statement from Bennett Place is that James Bennett did not own slaves, but he did participate in the slave economy by "renting" a man named Jake at times and by possibly owning a share of a person.[2] This project does not include Jake's story of land use, in part because very few written records survive describing his life.

Additionally, this project mentions many species in its narrative, but it does not provide a comprehensive index of biodiversity at Bennett Place. Most species data included comes from observations limited to the nature trail at Bennett Place, and most of that data concerns a single species, the shortleaf pine.

Finally, this paper does not include an indigenous land acknowledgement section, and stories of Native land use are generally limited throughout the piece. Currently, Bennett Place itself does not have a published land acknowledgement statement, although it is adjacent to Duke Forest which lists its land as the ancestral home of Tutelo- and Saponi- speaking peoples.[3]

Yet even with these limitations, this work makes a substantial contribution to the present understanding of the environmental history of Bennett Place. It begins with part I, my version of a Bennett Place tour, which is embellished by some exploration of 20th-century newspapers and general reflections of how the land is thought of on the property. Part II explores the site's environmental history beginning with observations of the trees growing in the woods surrounding

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[2] North Carolina Division of State Historic Sites and Properties, "Bennett Place - Jake," Bennett Place - Jake, accessed January 19, 2025, https://historicsites.nc.gov/bennett-place; James Bennitt, "Papers, 1820-1962; (Bulk 1830-1850).," 1820, https://find.library.duke.edu/catalog/DUKE000845041.

[3] "Land Acknowledgement – Duke Forest," accessed January 27, 2024, https://dukeforest.duke.edu/about/land-acknowledgement/.

the nature trail. The data included in Part II is then used to integrate successional periods with periods in the site's history. Part III uses primary historical sources, including census records, tax lists, and property deeds to explore the site's agricultural history. Furthermore, it considers changes to the landscape since the mid-19th century. As the earlier parts focus on the site's early history, Part IV picks up the story in the 20th and 21st centuries to continue exploring environmental themes as the land became a state historic site. Finally, in Part V, I offer my reflections on both how to make this work meaningful at Bennett Place, and why the project is meaningful overall.

There is a beautiful range of biodiversity at Bennett Place, typical for the North Carolina Piedmont. Throughout this work, I highlight these species or species groups and their own historical stories as interludes between chapters.

Part I: Welcome to Bennett Place

Find the spot where Durham's rail line takes a turn west towards Hillsborough, and you will find Bennett Place. This is no coincidence, and the railroad story is one that we will return to. But there is just slightly more to this unassuming place, with visitor facilities, a historic home site, a park-like lawn, a monument and a wooded nature trail. With six features, it may sound like a big place, but with none of these being especially large or remarkable, the place remains very small indeed.

Visitor Facilities

The museum facilities include a visitor center and parking lot, with the visitor center built in 1982.[4] The visitor center could be retitled "Civil War History Museum and Gift Shop" and no one would blink an eye as that is its main purpose, with large panels describing the events of the Civil War. There is not much inside to tell the story of the land, or even many windows to let the light of the outside world come in. I wouldn't expect a visitor center that focuses on the Civil War to have an exhibit that focuses on the environment, but there is one exception: a Witness Tree display.

The witness tree public display is located in the back room of the museum and includes a "cookie" (a lateral cross section) of a post oak tree along with the other displays in the room (fig. 1.1). As of October 2024, these include signs about reunification and memories of the war, a labeled confederate uniform, a calvary exhibit featuring several guns, and more signs about "The Birth of Durham" and Preservation on the site. Maybe it is poetic that a piece of a tree that had a lifetime

[4] NC DNCR and Noth Carolina Civil War Tourism Council, "Guide Book for Staff and Volunteers" (North Carolina Department of Cultural Resources, January 2011).

that spanned a variety of events is displayed in a room amidst such a variety of materials, or maybe it is just a slightly cacophonic space.

Regardless, the tree, the Post Oak, fell in 2016 during Hurricane Matthew. However, since it originally dates to 1860-1862, it was witness to the surrender treaty signed at the end of the Civil War. There is some interpretation of the tree on the site, in that some of the growth years are labeled with pins that correspond to national events, including one for 1961 (the year that Bennett Place became a state historic site). That said, with this 1961 event aside, the witness tree cookie does not tell the story of what happened to the land at Bennett Place. Thus, The Witness Tree display feels more like a part of the world at large than the land that grew the witness tree.

Figure 1.1. Witness Tree Cookie, Kalei Porter, 2024.

There are usually some cars in the parking lot, perhaps a family with young kids using the space as a nature trail or park and a couple who passed middle age years ago and stopped in to see a Civil War site. Maybe even a school bus or two. But more space is usually available than is taken, and this is a well, but not overtrodden piece of land.

Monument and Road

Figure 1.2. Monument, Fence, and House View, Sallie Scharding, 2024.

The Unity monument stands as the tallest feature in the sightline in between the visitors center and the historic campus (fig. 1.2). During my first tour of the property, my guide emphasized the ways that the monument emphasizes unity. For example, none of the materials used to build the Unity Monument were taken from the property itself. Instead, the monument was intentionally constructed out of stone from the North, South, and West. Unity is further memorialized by the two columns, one to represent the North and the other the South.

Yet in part because of this emphasis on unity, erected in 1923, the monument was not received well by many of those who had maintained confederate pride into the 1920s. For example, Mrs. J. Harper Erwin, president of the local “Julian S. Carr” chapter of the United Daughters of the Confederacy, said that “a celebration of the surrender of the confederate forces should not be the

site of so much publicity".[5] Mrs. Erwin's concern was due to plans to engage nationally recognized speakers like Calvin Coolidge. In fact, the plans were well underway; we know from an article published about a possible visit to Mrs. Coolidge's fraternity that President Coolidge had planned the trip, but he was unable to make it.[6]

In the end, there were several speakers and guests at the memorial dedication on November 8,1923 (fig 1.3), but none were as well-known as the president. These speakers included General Bowley to represent the North, ex-confederate soldier Julian Carr, and handful of other speakers.[7] Of local historical interest, Carr's speech did not carry the same magnitude of racial slurs that he included in his Silent Sam speech at UNC, but he still offered the lost cause narrative emphasizing "we lost, but we won".[8] Although some of the "lost cause" interpretation is still able to be found at the site, such as on the engraved plaque of the Unity Monument, contemporary leadership is more interested in taking the interpretation in other directions.

[5] "Daughters of the Confederacy Will Not Participate in Celebration to Be Staged at Bennett Place," *Durham Morning Herald*, September 13, 1923.
[6] "University Now Has a Chapter of Phi Beta Phi," *The Tar Heel*, October 2, 1923.
[7] "Bennett Memorial Unveiled Thursday Afternoon with a Number of Notables Present," *Durham Morning Herald*, November 9, 1923.
[8] Carson Holloway, "An Unlikely Memorial at Bennett Place: 1865 – 2024 – North Carolina Lives and Legacies," accessed October 27, 2024, https://sites.duke.edu/project_002_001_bennett_place_project/summer2023/bennett-place-project-story/.

Figure 1.3 From 1923 Unity Monument Dedication, unknown photographer 1923.[9]

Any view of the Unity Monument is framed by the Old Hillsborough Road, which connects the monument to the historic home site, but in the past it connected many more people to many more places. This stretch of road follows the route that once connected Raleigh to Hillsborough. The story of its movement during the 20th century is a story for a later section, but it's significant to the Bennett Place story at the time of the surrender because it was this road where Johnston and Sherman were marching to meet each other with the intention of negotiating peace.[10] The Bennett House was chosen as the meeting place only because it was the nearest house when the generals met. Meanwhile, the road is part of an even larger regional story going back to the original inhabitants of the North Carolina Piedmont, as this area was crossed by Native American trading paths before Europeans colonized the area. Today, the road looks like a grassy path.

[9] "Unity Monument | Open Durham," accessed October 27, 2024, https://www.opendurham.org/objects/unity-monument.
[10] NC DNCR and Noth Carolina Civil War Tourism Council, "Guide Book for Staff and Volunteers."

Figure 1.4. Movement of Hillsborough Road, Kalei Porter, 2025. Hillsborough Road moved approximately from the red line on the map to its current location. Source(s) for this figure include notes from the 2003 archeological study and an 1887 map.[11] Satellite image © 2025 Airbus, Maxar Technologies, Map data © 2025; from Google Maps.[12]

Although it is unlikely that the Indian Trading Path (shown in pink) passed through Bennett Place directly, it likely did intersect the general neighborhood of Bennett Place, on the Northwest

[11] Kennett Robinson and Kent Schneider, "Bennett Place Ground Penetrating Radar Survey and Archeological Assessment at the Bennett Place State Historic Site" (Durham County, North Carolina: Wake Forest University Archeological Libraries; Southern Region, USDA Forest Service, 2003); L. Johnson and Geo F. Cram, *Map of Durham County, N.C.*, 1887, 1887, https://digitaldurham.duke.edu/images/full/dduma010040010.jpg.

[12] "Bennett Place · 4409 Bennett Memorial Rd, Durham, NC 27705," Bennett Place · 4409 Bennett Memorial Rd, Durham, NC 27705, accessed October 27, 2024,

edge of Durham.[13] Once, the road connected Native communities together, including the Occaneechi who lived in Hillsborough.[14]

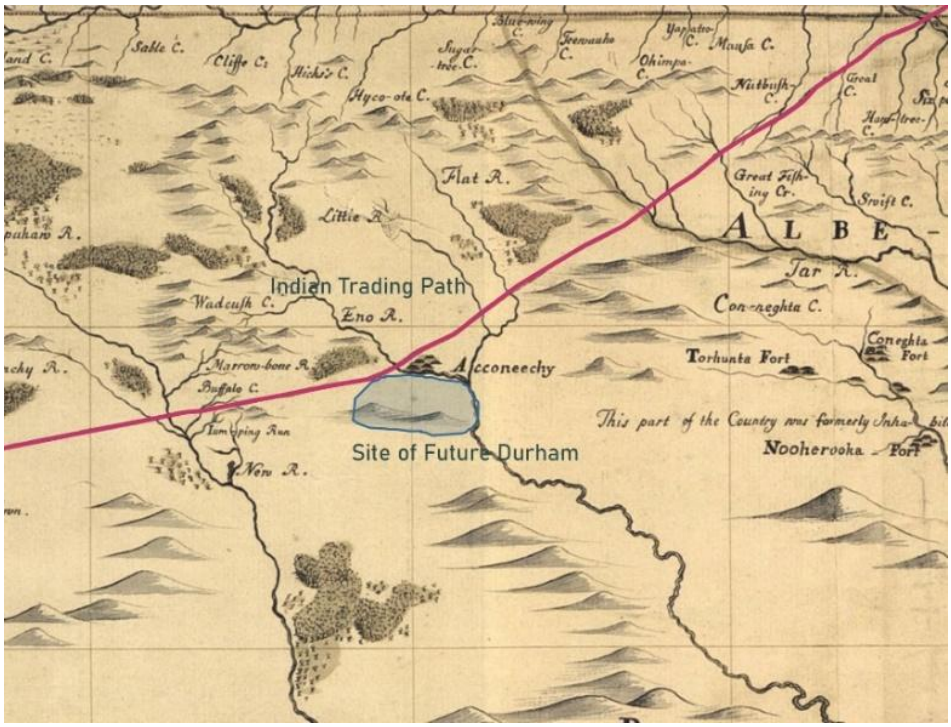


Figure 1.5. Approximate Illustration of the Native Trading Path, Seth Kessler, 2024.

Historic Home Site

Once, some people called this place home. Considering the other periods of its known past, such as acting as a historic site for over a century, it may be a unique place in the brevity of its stint

https://www.google.com/maps/place/Bennett+Place/@36.0293689,-78.9749217,423m/data=!3m1!1e3!4m6!3m5!1s0x89ace0d8ca8b6f01:0xd1d157f90ef3bb13!8m2!3d36.0292635!4d-78.9750957!16zL20vMDZzajB0!5m1!1e4?entry=ttu&g_ep=EgoyMDI0MTAyMy4wIKXMDSoASAFQAw%3D%3D.

[13] Seth Kessler, "Native Americans, North Carolina, and Newspapers:," ArcGIS StoryMaps, September 20, 2024, https://storymaps.arcgis.com/stories/53cd7881aac84af8baa5da389bf369eb.

[14] Gladys Dobbs, "The Indian Trading Path and Colonial Settlement Development in the North Carolina Piedmont" (Chapel Hill, University of North Carolina at Chapel Hill, 2006), 58.

as a home. In reality, we do not know how long a house has stood here, but we know some of what the inhabitants observed. Famously, this was the place where the largest surrender of Confederate troops occurred which effectively ended the Civil War. The furniture inside the house is recreated from period pieces to resemble the interior of the house as drawn in the Harper's illustrations from 1865.

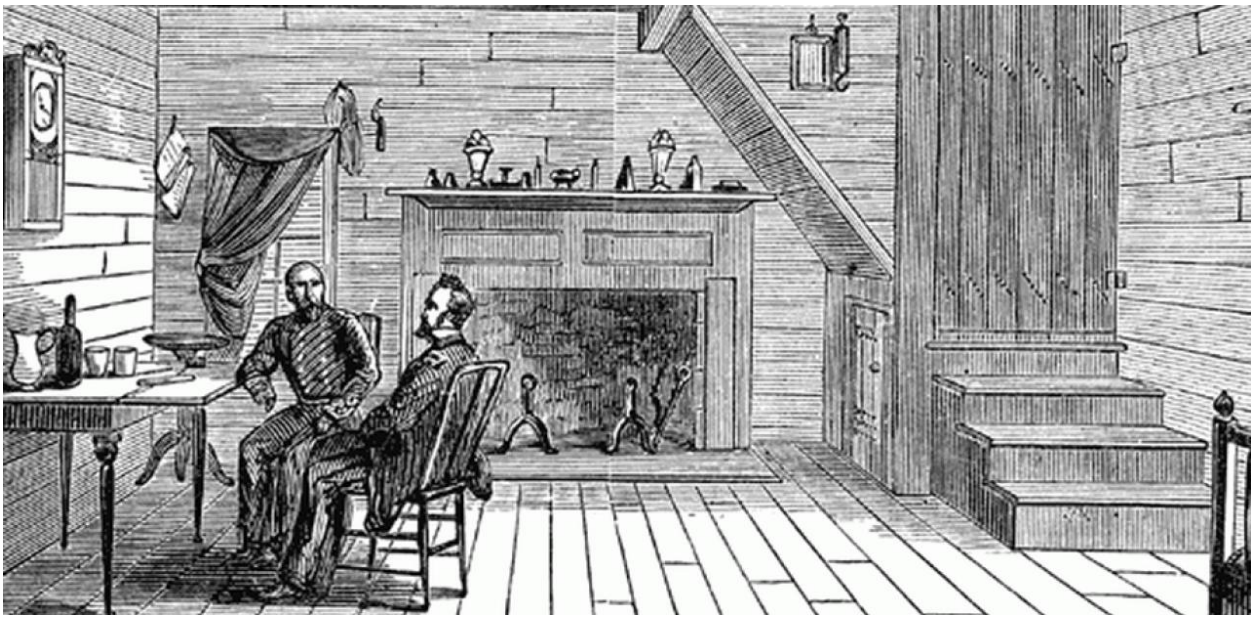


Figure 1.6. Drawing of the meeting of Sherman and Johnston in the Bennitt farmhouse, Harper's Weekly, 1865. [15]

What occurred here in April 1865 is far from the whole story. For decades, the Bennett family lived, worked, and likely even sang here. Then in 1890, Brodie Duke bought the property with the hopes of displaying the home in the World's Columbian Exposition in Chicago.[16] While this didn't work out, the Bennett house did still manage to surprise everyone by disappearing. The

[15] "Bennett Place Surrender | American Battlefield Trust," accessed May 10, 2025, https://www.battlefields.org/learn/articles/bennett-place-surrender.
[16] Holloway, "An Unlikely Memorial at Bennett Place."

original house was burned down under mysterious circumstances, and what is on the property today is a reconstruction from local, period-appropriate materials. The story of the fire is yet another moment that we will return to in Part IV.

Figure 1.7. Homesite Exterior, Seth Kessler, 2024. Demonstrates the layout of the house (far left), dairy (center), kitchen (right), and smoke house (far right) as separate buildings.

Even so, understanding 19th century fear around fire is critical to understanding how the historic home site is laid out, with the kitchen, smoke house, and dairy building as three independent buildings separate from the house. Today, the property includes a teaching kitchen recreated from old images and archeology of the house. Visitors have a chance to touch, view, and imagine the place where the Bennett family prepared their own food, and glimpse a small recreation of what the kitchen garden might have been (Fig. 1.8).

Figure 1.8. Kitchen garden; taken by Kalei Porter 11/5/2024

The Bennett family grew a lot of their food, but they also had to buy food they couldn't produce at home. The extent of this production and these purchases is explored in section III.

Bennett Place as a Park

If not a home, then in a modern sense the Bennett Place Historic Site could easily be mistaken for a park with picnic tables near the parking lot, a reasonably large expanse of grass, and a band stand. Even the nature trail, which fills the space west of the lawn until the property meets the railroad, feels very park-like. It would be easy to think that these features appear to have emerged in the site's recent history, and to a certain extent that's true. But hints from historic images and remaining trees suggest that this may have been an open space even in the 19th century. The lessons from the trees will lead us into our next section of this story.

Biodiversity Feature #1: Bahiagrass (*Paspalum notatum*)

Figure B1. Ground view of Bahiagrass on Old Hillsborough Road, by Kalei Porter November 5, 2024

This image of the Old Hillsborough Road at Bennett Place takes an ant's perspective to highlight the Bahiagrass (*Paspalum notatum*) that rolls over the old road. This Bahiagrass is identifiable by its Y-shaped inflorescence, which produces seeds. It is planted as a durable species in medians, or in this case, road zones.[17] Different varieties of Bahiagrass came to the United States at different times, but as a group, they were not introduced in the United States until 1913 or later.[18] Many species discussed throughout this environmental history of Bennett Place are native to North Carolina, but many are not. Bahiagrass may be a common roadside species today, but it would not have graced the sides of the Old Hillsborough Road when it was in use, let alone the sides of any Indigenous trade routes that may have passed through the landscape.

It is difficult to know the condition of roadside vegetation during the 19th century when Hillsborough Road was in use. We could guess that common native grassy plants of the time, like

[17] "Bahiagrass," accessed November 9, 2024, https://turf.ces.ncsu.edu/grasses/bahiagrass/.
[18] "The Management and Use of Bahiagrass," accessed November 9, 2024, https://extension.uga.edu/publications/detail.html?number=B1362&title=the-management-and-use-of-bahiagrass.

broom sedge or blue stem, may have lived along the roads. Additionally, some stray agricultural plants could have taken root, as crops of the period would have often produced fertile seeds (as opposed to the sterile seeds common to crops today). Yet there may have been not very much vegetation bordering the road at Bennett Place at all as the earliest known photo from 1905 shows very little grass (fig B2, top). This could be because of horse grazing pressures, or general pollution. By about 1920, the combination of the road being moved and fewer horses to eat the grass looks like it allowed broom sedge or a similar species to grow (fig B2, bottom).

Figure B2. Hillsborough Road vegetation from 1905 (top) and 1920 (bottom). Both images are pulled from Open Durham, with the top 1905 image courtesy of Durham County Library, North Carolina Collection, and the bottom 1920 image courtesy of Duke Rare Book and Manuscript Collection, specifically the Wyatt Dixon Collection.[19]

Looking even further back, and on more of a landscape scale than what Bennett Place itself provides, flora along the Native Trading Path likely included more forested species. Oaks, particularly white oaks, post oaks, and live oaks, were often bent in ways that demonstrated continual growth.[20] In either case, the sounds of these older transportation networks would not

[19] "Bennett Place | Open Durham," accessed June 13, 2023, https://www.opendurham.org/buildings/bennett-place.
[20] William McClain, "Oaks as Native American Trail Marker Trees," *International Oaks* 17 (2006).

have been the gentle crunch of Bahiagrass on a dry day, but rather the louder rustle of a young forest's discarded pine needles or an older forest's leftover acorns.

Part II: If You Begin with Nature

Continuing the tour from part I, the last part of Bennett Place to explore are the backwoods, complete with a nature trail. The nature trail is not usually included in the standard Bennett Place tour beyond a cursory hand wave and invitation to explore from guides, but woods compose most of the property's acreage. The woods of Bennett Place are filled with shortleaf pine, white oak, loblolly pine, cedar, sweet gum, black oak, willow oak, American birch, American beech, and some young red maple trees as well (appendix table 2.1). This is a fairly typical blend for the North Carolina Piedmont, but some aspects of the site's history pair with the way the trees grew at Bennett Place. For this reason, it is possible to expand the environmental history of Bennett Place by beginning with the biodiversity of the trees on the property,

To begin with the biodiversity that is present at Bennett Place, I did engage in some methods that would be at home in an ecology or forestry paper. Through this process I was able to identify new witness trees, and otherwise expand the environmental storytelling of Bennett Place. By doing this, I demonstrated how science can be an exciting (rather than fearful) part of history.

Methods

One of the main ways that I used the land itself to inform this site history is by looking into the age of some of the pine trees, and the pattern of succession in the North Carolina Piedmont. Succession describes the pattern of growth and assemblage stages that plants follow as they build

up a community, and in the North Carolina Piedmont, the process is very predictable.[21] To take advantage of this predictable process, I thought through a series of mental questions that are described under "Discovering the Layers of Forest at Bennett Place".

These questions allowed me to create an approximate map of succession on the site. Then, to understand the scale of tree ages present on the property, I selected some individual shortleaf pine trees that were visually similar to the other trees of their size and age class. With the selected trees, I used an incremental bore technique as described in section 4.5 "Increment Boring" of the online textbook *Forest Measurements* to date some specific trees.[22] This meant that I stood on top of the mounded pine needles at the base of the tree, and then used an incremental bore to extract a small piece of the tree (more narrow than a pencil) that allowed me to count the rings. After drying the core for 3-5 days, I mounted them on wooden supports and counted the rings both with the naked eye and using a dissecting scope where appropriate. I would place a mark for every 10 years of growth, and then summed the years at the end to estimate the tree age. Images of this process are included in figures 2.1 and 2.2.

[21] "Forest Succession – Duke Forest," accessed January 19, 2025, https://dukeforest.duke.edu/forest-environment/forest-succession/.
[22] Joan DeYoung, "4.5 Increment Boring," in *Forest Measurements* (Open Oregon Educational Resources, 2016), https://openoregon.pressbooks.pub/forestmeasurements/chapter/4-7-increment-coring/.

Figure 2.1. Image of Tree Core Extraction Process (left) by Paul Manos, 2024, and **Image of Tree Cores Once Extracted and Prepped** (right) by Kalei Porter, 2024.

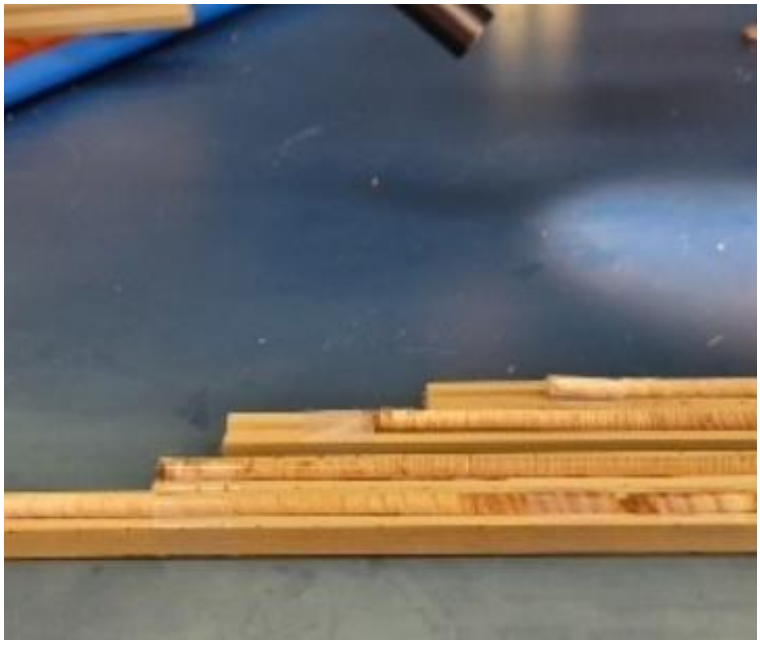


Figure 2.2. Images demonstrating scale of new growth tree rings, Kalei Porter, 2024.

In Figure 2.2, the images are of the same core. The left image shows the fineness of the lines of new growth on a tree that is 119 years old with a nickel for scale, and the right image demonstrates how it is possible to count those fine lines under magnification.

Once I had year estimates for the first group of tree ring data, I returned to the site and measured the diameter at breast height (DBH) for as many other mature shortleaf pine trees as I

was able to access from the main trail. This measurement, DBH, is a standard one for foresters, where it is often assumed that trees of the same species growing under the same conditions in the same place will have a similar DBH. I then mapped the measured trees by DBH to illustrate with specificity the story of the shortleaf pine trees of Bennett Place (fig 2.3). Through this process, I found the trees with the smallest and largest DBH that were easily accessible from the trail, and I returned to Bennett Place to core these trees as well. Thus, I could include approximate years that cover the spectrum of my DBH measurements. The data displayed in figure 2.3, along with the data saved in tables 2.1 and 2.2 in the appendix, were then used to recalibrate the forest succession map (fig 2.5) shared later in this chapter to provide more accurate zones of succession for the purpose of storytelling. Some ages of certain individual trees are also highlighted later, to provide more context.

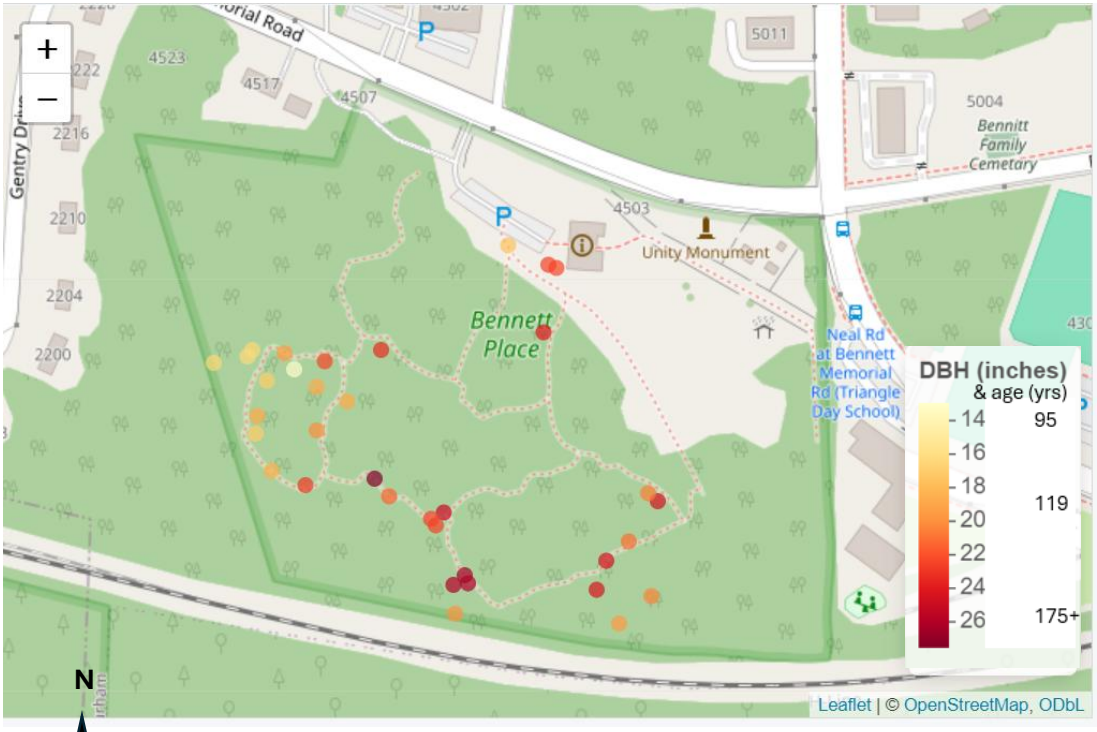


Figure 2.3. Shortleaf Pine Sample from Trail by Diameter at Base Height and Matched to Tree Age, Kalei Porter, 2024. Created using the leaflet package in R. Data in table two in the appendix, including the age of one additional tree (a 25 inch DBH corresponds to a tree that is 164 years old. This information did not fit on the scale).

Discovering the Layers of Forest at Bennett Place

There are multiple ways to gain an understanding of a forest's growth history. The simplest is to examine a grouping of trees (what foresters call a "stand"), and work through some mental questions, something like these outlined in the list below. This list was created in part from information in the textbook *Forest Ecosystems*.[23]

1. Are all of the trees very young? This is the case if the trees are short, or there are no reproductive seeds (like pine seeds or acorns) on the forest floor. That said, because many trees do not produce annual seeds but rather large mast years of seeds, it is possible for mature trees to lack seeds.

2. Are there one or more groupings of trees (even if they are not at their full height) growing underneath a group of much taller trees? These groups separated by the trees' heights are called canopy layers, and if there are at least two seed-producing canopy layers, then the stand is at least two generations old.

   The time between tree generations vary by species, but for the two most common pine species in the Piedmont, it takes 20-25 years for a tree to produce enough seeds to have a real chance of reproduction with pines entering into their reproductive prime at about 20 years (for Shortleaf) and 25 (for Loblolly Pine) respectively.[24] This is interesting because

[23] David A. Perry, *Forest Ecosystems* (Johns Hopkins University Press, 1994), http://archive.org/details/forestecosystems00perr.
[24] James Baker and Gordon Langdon, "Pinus Taeda L.," n.d., 7; Edwin Lawson, "Pinus Echinata Mill.," accessed November 9, 2024, https://www.srs.fs.usda.gov/pubs/misc/ag_654/volume_1/pinus/echinata.htm.

these numbers are historically similar to the number of years that typically separate human generations – including the Bennetts and property owners of our story. However, trees typically live to be much older than people. The oldest trees live in the top layer, with a typical age for Loblolly Pines being 100 (max age 250) and a typical age for Shortleaf Pine being older at 200 (max age 300).[25] By knowing how old the trees at the top could be, you can approximately date a stand. If there are only shade tolerant trees in the highest canopy layer, then you would know that the spot in question has been forested long enough for at least one generation of intolerant trees (like Loblolly and Shortleaf Pine) to live and die, so the forest is at least about 130 years old.

3. If you step far back from the trees, can you see if the tops of the tallest trees are pointy (like a cartoon Christmas tree) or flatter (like an upside-down bowl) (fig 2.4)? If they are flatter, it is because the tree has reached its maximum height, which means that the tree has been growing long enough to reach the maximum distance that water can move from its roots to its leaves.

[25] "Life History and Disturbance Response of Pinus Echinata (Shortleaf Pine)," accessed November 9, 2024, https://www.fs.usda.gov/nrs/atlas/tree/resources/lhdr/lhdr_110.html; "Life History and Disturbance Response of Pinus Taeda (Loblolly Pine)," accessed November 9, 2024, https://www.fs.usda.gov/nrs/atlas/tree/resources/lhdr/lhdr_131.html.

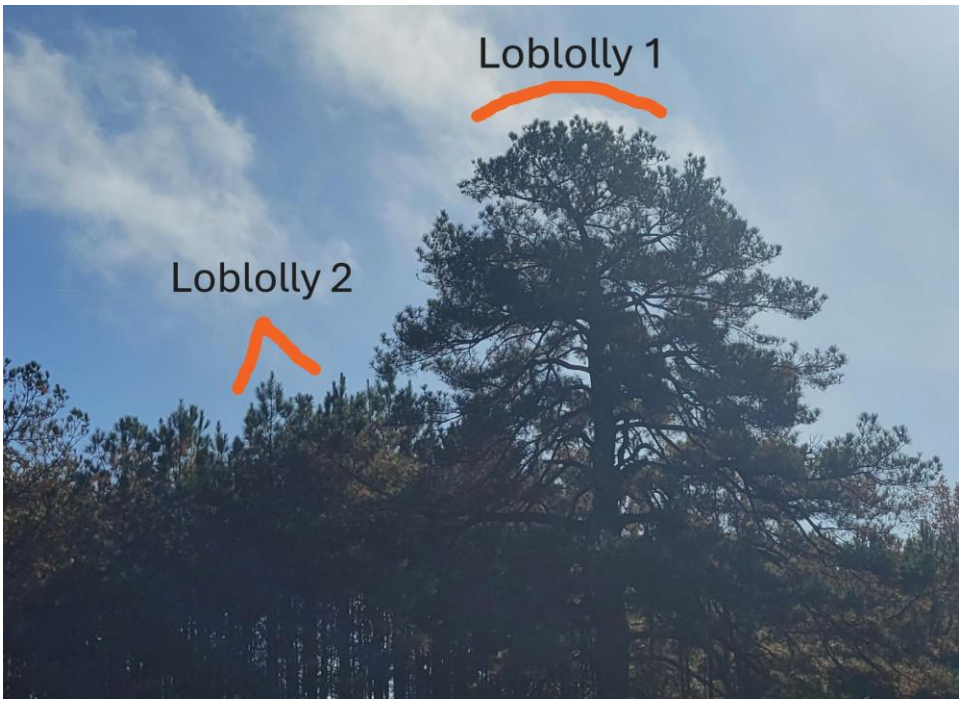


Figure 2.4. A Comparison of Loblolly Tree Growth, Kalei Porter, 2024. Notice the rounded top of Loblolly 1 compared to Loblolly 2. Also, notice the pasture-grown wide branches of Loblolly 1 next to the minimal branches of the stand of younger trees where Loblolly 2 is growing.

4. Can you see sunlight reach the forest floor, or only shadows? If you can see sunlight, then it is likely that something (like lightning, or another natural or manmade cause that lets trees fall) took down some of the trees within the stand to create a gap so that the sun might reach you. This is called a disturbance. Since disturbances are often caused by people, this is a good place to find evidence of historical human-ecological interactions.

5. When you are standing in the forest, are all the trees essentially straight poles with branching only at the top? Or are there some individuals with wider branches closer to the ground than the other trees around them? If the branching is lower to the ground, then it is likely that the trees with more branches are older than the surrounding trees, as these trees grew in full sun before the forest filled in. That said, this is only an educated guess, and it

does happen where some disturbances occasionally allow forest trees to grow lateral branches. Regardless, the difference between a pasture-grown tree's branches (Loblolly 1) and a forest-grown tree's branches (Loblolly 2) can be seen in figure 2.4.

These were the kinds of questions that I asked myself as I came to understand succession at Bennett Place. Additionally, I looked for what stage(s) shade tolerant trees were in relative to shade intolerant trees. Since shade intolerant trees need full sunlight to grow, their presence indicates some kind of disturbance. Disturbances are inherently interesting to historians, because they show moments where humans substantially altered their environments, such as beginning to farm a piece of land, or halting agricultural production there.[26] These transitions could take a number of forms, and clearing land often involved grueling labor performed by enslaved people.[27] Stands of trees that were abandoned prior to 1900 were probably dominated by Shortleaf Pine, since this species outcompetes Loblolly on poor, unfertilized soils, and so was generally more abundant. After 1930, Loblolly came to dominate the stands, both because more Loblolly seeds were present in the environment from the growing timber production, and because most of these newly abandoned lots at this time were previously fertilized farms so Loblolly was a better competitor.[28]

I use these categories of "tolerant" and "intolerant", but forests are not composed only by trees that are shade tolerant or intolerant. Some trees are of a "medium" shade tolerance. Young trees can grow in the shade, and then these wait for a light gap to grow to full maturity. This is the case for

[26] Norman L. Christensen, "Landscape History and Ecological Change," *Journal of Forest History* 33, no. 3 (July 1, 1989): 120, https://doi.org/10.2307/4005121.
[27] R. L. Hendricks and James Lewis, "A Brief History of African Americans and Forests," *US Forest Service*, International Programs, no. 25, accessed December 16, 2024, https://foresthistory.org/wp-content/uploads/2021/07/A-Brief-History-of-African-Americans-and-Forests.pdf.
[28] Christensen, "Landscape History and Ecological Change," 122.

both the white oaks and the willow oaks found at Bennett Place.[29] Often times, loblolly pine can outcompete the white and willow oaks in the Durham area, but if the white oaks have a head start in the seedling stage, then they might have a chance to become the dominant tree, especially if the trees in a given area predate the fertilizer and logging changes that were put in place in 1930. Thus, stands filled with white oaks have a certain timeless quality because the stands could be a range of ages, including quite mature ages if multiple generations of regeneration have occured. According to studies of charcoal from native village sites that date from periods of native dominance pre- and post- European contact (1400-1750), mature stands were likely more common before European contact and filled with Oak and Hickory trees of varied ages.[30]

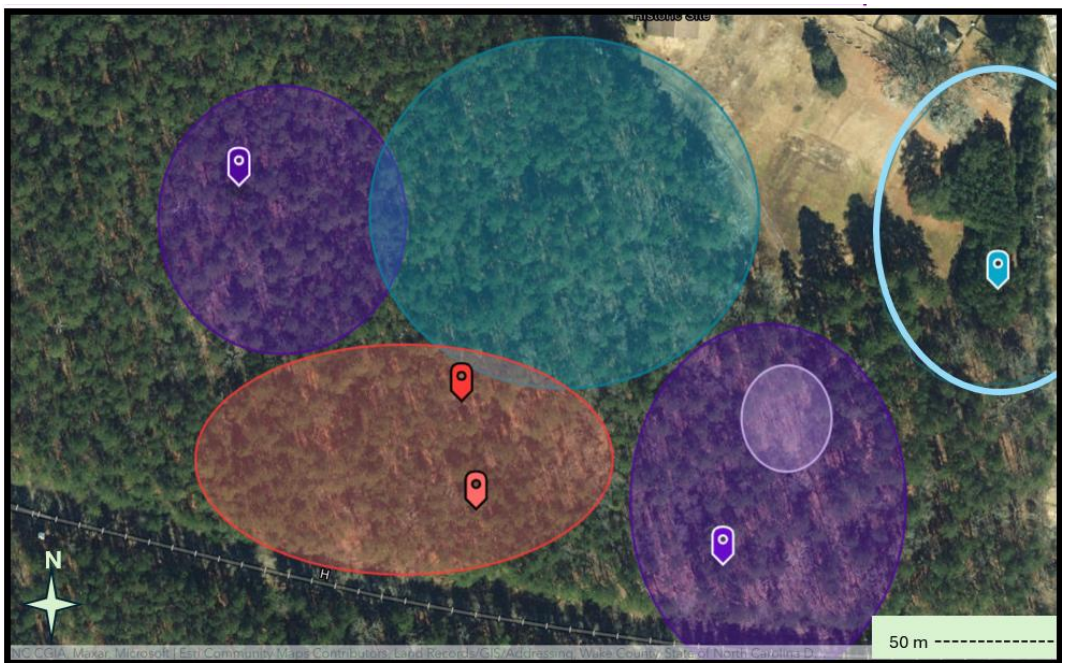
Bennett Place lacks a late-succession mature stand composed of this oak-hickory blend, but there are stands that are in early and mid- successional stages on the property. These are the stands that I highlight in figure 2.5. With only early- and mid- selection stages present, stands were marked according to the dominant shade intolerant tree species, with red denoting areas where shortleaf pines dominate, blue marking areas where loblollies dominate, and purple marking areas where both trees are present.

The trees inside the red circle are likely some of the oldest trees in these woods, as there are several mature shortleaf pines (fig 2.5). Given the number and the density of these pines, it is likely that these trees began growing as a group at some time prior to 1900, before most areas in the

[29] "Quercus Alba L. - White Oak," accessed November 17, 2024, https://www.srs.fs.usda.gov/pubs/misc/ag_654/volume_2/quercus/alba.htm; USDA and NRSC, "Willow Oak - Quercus Phellos L." (United States Department of Agriculture, 2002), https://plants.usda.gov/DocumentLibrary/factsheet/pdf/fs_quph.pdf.
[30] Anna Fuller Graham, "Landscapes of Continuity, Landscapes of Change: A Study on Fuelwood Collection in the North Carolina Piedmont before and during Contact" (M.A., United States -- North Carolina, The University of North Carolina at Chapel Hill, 2018), https://www.proquest.com/docview/2055765571/abstract/87CA361557034B84PQ/1.

Piedmont were heavily fertilized and an increasing number of families began harvesting pines on their land for timber. To confirm the age of the pines in the red circle, and in a search for witness trees, I took a core from a shortleaf pine in the stand. This tree is marked by the north red location tag, and by using the incremental bore technique outlined in the methods section, I was able to learn that it is approximately 160 years old in 2024, with some breakage and very thin years at the end that make it difficult to provide a precise age. This dates the tree to about 1864, making it a young "witness tree" of the famous treaty signing in 1865. However, as this tree was not the largest shortleaf pine within the old woods of the red circle, I cored a second shortleaf pine tree that was wider (had a larger circumference and DBH) and so presumably older. This second tree, marked by the south red location tag, was at least 175 years old, meaning that this individual would have been witness to a tree, not just a sapling. There were some trees that were even older, but I was unable to get a good measurement of them.

Figure 2.5. Forest Succession Map, Kalei Porter, 2024. Red areas are dominated by shortleaf pine, blue areas are dominated by loblolly pine, and purple areas include a mixture of the two trees.



Inside the purple zones of figure 2.5, there is the most variety in the types of trees with sweet gum, loblolly pine, different oak trees, and a few scattered shortleaf pines as well. There are multiple canopy layers, showing the way that generations can blend. While loblolly pine and shortleaf pine are our familiar shade intolerant species, seeing mature hardwood species (like sweetgum, beech, and white oak) growing in the shade gives the area the feeling of permanence and maturity.

Figure 2.6. Canopy View just West of the East Entrance, Kalei Porter, 2024. With the fall colors, it is easy to see the American Beech (mostly orange leaves) and Sweetgum (mostly yellow leaves) growing under the Loblolly pines (green needles).

Nowhere is this more prevalent than the small white circle within the Eastern purple zone where there are no pines growing above the mature White Oak trees. Standing in this area, it is not hard to imagine what the Bennett Place woods could look like during a late-successional stage, with no pine trees except perhaps some saplings in the undergrowth that are unlikely to ever grow into a full tree. Historically, this would have more closely mirrored the woods that the Occaneechi villagers of

the charcoal study collected their firewood in than many of the younger pine areas, but firewood foraging areas would have included oak, hickory, and other areas.[31]

Still in the purple stands, but outside of the white circle, the right purple location tag in Figure 2.5 marks a Shortleaf Pine in this zone that is 119 years old, and the left marks a tree that is 95 years old. Thus, the trees date to 1905 and 1930 respectively. This means that right tree from 1905 falls in the gap between the 1900 and 1930 benchmarks described in Norman Christenson's paper, a time when Shortleaf trees were having a harder time competing because more of the land was fertilized, but shortleaf pine seeds were still present in the seed bank because families were not yet planting so many Loblolly trees for timber that Loblolly seeds completely dominated the seed bank. Purple was chosen to mark this zone, because Loblolly and Shortleaf were both present, although I only found the age of Shortleaf trees.

I marked two separate loblolly zones in blue, with the circle that is shaded older than the unshaded zone that is marked only with an outline and a text label. I left the younger zone unshaded so that the texture of the canopy would be easier to see. The Loblolly pines in that area have only recently reached maturity, so there are many of them growing at a high density. This is visible in the image, since there are no breaks in the green swath of trees, and the texture of the canopy looks finer than in any of the other areas, demonstrating less branching. This growth pattern indicates that the trees were intentionally seeded, but not thinned, a good example of the purposeful but low-maintenance type of groundskeeping that characterizes historic sites.

This is all to say that these stands of trees can share a lot of the Bennett Place story's secrets if you know how to read their hints. In the first "red" stand, mature Shortleaf pines demonstrate the lingering stubborn grip that the 1860s retain on Bennett Place. In the second

[31] Graham.

"purple" stands, it is clear that Bennett Place was no longer bothered by intense human activities like agriculture in the early 20th century, letting the random pine seeds that landed in this area at the time grow to such heights that an entire generation of shade tolerant trees (like the American Beech in Figure 2.6) have since grown to maturity as well. Yet the final stands, the "blue" of young and medium-aged Loblolly pines, demonstrates some element of continued human custodianship of the land, consistent with Bennett Place's transition to a state historic site.

The last visual element that I want to highlight from Figure 2.5 are the light gaps themselves, the little tan flecks visible between trees in the wooded area. Bennett Place fosters a rich undergrowth in these areas, with many blueberries and huckleberries growing along with infant loblolly pines. If the light gap is big enough, the loblollies might become mature trees in the canopy, but in the meantime the berry species are happy to soak up the sun.

Soil as an Environmental Condition of the Site

The soil at Bennett Place is poorly drained. This both motivated some caution within my methodology, and offers a further message of what I could discern the history of Bennett Place to be by starting with only the land.

Even with the interplay of these patterns of succession and history, it must be emphasized that a number of different disturbances and environmental conditions can alter the succession of a place so that it is different from what is typical. Along these lines, it is crucial to understand that even after 1930 Shortleaf Pines can sometimes outcompete Loblolly Pines on poor soils. As this land is poorly drained, especially in the Southwest corner, the possibility of a Shortleaf stand that began its life unusually late was a distinct possibility. This is an additional reason why I decided to core some Shortleaf trees, to have more certainty that the trees express some kind of typical successional pattern.

Figure 2.7. Flooded Trail, Kalei Porter, 2023.

Land that floods in the way shown in figure 2.7 can only be used in certain ways and grow certain crops. In recent history, the land seems to be resisting its designation as a nature trail; as shown by the film on the water in the image on the left, it would rather spend its spring months as a feeder creek breeding amphibians. In Part III, I will use primary sources to consider both what crops might have been used at Bennett Place and how the landscape has changed, including the flow of creeks.

Biodiversity Highlight #2: Eastern Fence Lizards (*Sceloporus undulatus*)

Figure B3. Fence Lizard, Milo Pyne, 2011.

This little fella was spotted on the fence at Bennett Place, a typical home for fence lizards.[32] In his existence is a microcosm of the way that our understanding of the environment is co-created using the ideas and infrastructure of a place in a specific time. By the beginning of the 19th century, western science had begin to standardize the way that species are known as naturalists of various disciplines would formally "describe" species. The first Fence Lizard was formally described in this way in 1801 by Pierre-Andre Latreille, albeit by a different genus name.[33]

That said, the formal description of species is a somewhat arbitrary process that is still debated today. The Fence Lizard was not co-created with the construction of fences across the Eastern States, but was instead evolved to live on pine trees and simply took advantage of fences as newly created habitats to bask in the sun during the summer months. Fence Lizards can still be found scurrying up pine trees, but they are named for fences, probably because their camouflage since our human eyes can spot them more easily against the clean lines of a fence rather than the chaos of a forest.[34]

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[32] Milo Pyne, "Eastern Fence Lizard (Sceloporus Undulatus)," iNaturalist (iNaturalist, September 18, 2018), https://www.inaturalist.org/observations/16655009.
[33] Conrad L Schoch et al., "NCBI Taxonomy: A Comprehensive Update on Curation, Resources and Tools," *Database* 2020 (January 1, 2020): baaa062, https://doi.org/10.1093/database/baaa062.
[34] "Eastern Fence Lizard," National Wildlife Federation, accessed January 7, 2025, https://www.nwf.org/Home/Educational-Resources/Wildlife-Guide/Reptiles/Eastern-Fence-Lizard.

Part III: If You Begin with the Leftover Words of the 19th Century

If we are going to begin with an analysis of documents, then the strongest evidence to discern land use comes from the Agricultural Census of 1850, James Bennett's personal daybook from the 1840s, the 1875 Durham Tax List, maps and property deeds. When paired with other 19th-century sources, it becomes clear that Bennett Place was host to a series of decisions that may have exhausted the land during the 19th century, and that the 19th century in general was a period of landscape-level changes in West Durham.

Methods

We cannot know exactly what was grown on the thirty-three acres of Bennett Place property today, but we can know how James Bennett was using his two hundred acres of land which included the current property from a surviving copy of the 1850 census schedule for Orange County.[35] James Bennett's two hundred acres were likely not included as he purchased the land in multiple tracts. A sketch that likely includes the land of James Bennett's 1846 property is included later in the section (fig 3.3).

That said, I am comfortable assuming that the best evidence we have about how the entirety of the two hundred acres of land were used is a good enough source to describe how the contemporary state historic site's thirty-three acres were used, and the 1850 agricultural census schedule allows us to do this. I accessed digital scans of the agricultural census through the CRL (Census Resource Library) digital delivery system, and then retyped James Bennett's data into an

[35] U.S. Census Bureau, "Agricultural and Manufacturing Census Records of Fifteen Southern States for the Years 1850, 1860, 1870 and 1880" (Census Resource Library, 1850), dds.crl.edu/item/183245.

excel spreadsheet. I then created a second row underneath this table where I divided the output data by the sum of the improved and unimproved acreage (200 acres for James Bennett). I used this combined metric because given the common free-range agricultural practices in the American South during this period, people used their unimproved land as rangeland and thus the unimproved acreage is relevant to my agricultural output per acre metric.[36] Then I sourced Orange County data from Table XI of the report "1850 Census – Statistics of North Carolina" and once again transferred the data to a spreadsheet and calculated the per-acre averages. Finally, I sourced data for the state of North Carolina from the "Total" row of the same summary document that provided the county-level data, and made the same transfers and calculations. Once this was done, I visualized the data through a series of charts, calculated odds ratios where there was a stark enough difference between James Bennett and the benchmark measurements for the data to be meaningful. Sometimes in the description that follows, I will present these odds ratios as percentages. The below description was crafted from this elementary treatment of the data to describe who James Bennett was, and how he used his land. The full data tables are included as tables 3.1, 3.2, and 3.3 in the appendix.

Another source used to craft this section includes James Bennett's personal daybook, which is in the process of being transcribed into a searchable database by the North Carolina Lives and Legacies team, of which I am a member of. At times, I used our transcription, but at times I used an older transcription, which our research group inherited without any knowledge of the creators' methods. Where I used either transcription I will check the relevant pages of the scanned daybook itself.

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[36] Erin Stewart Mauldin, *Unredeemed Land : An Environmental History of Civil War and Emancipation in the Cotton South* (Oxford University Press, 2018), 116, https://find.library.duke.edu/catalog/DUKE009735152.

A note on Improved, Unimproved, and Total Farmland

In 1850, the U.S. Census recorded farmland as either "improved" or "unimproved". Improved land is "cleared and used for grazing, grass, or tillage, or which is now fallow, connected with or belonging to the farm". Unimproved land "may be a woodlot or other land at some distance".[37] James Bennett had more improved land relative to unimproved land than the average of this ratio for either Orange County or the state of North Carolina, but this did not mean that he was wealthier. Even though James Bennett had about 23% more improved land relative to unimproved land than was the average for his county, the average acre in Orange County was worth about 69.5% more than what James Bennett's was. The totals for the state are less helpful in this case, because much of Western North Carolina is mountainous and was additionally not farmed by European/American colonists until a generation or two after Central and Eastern North Carolina. We will return to these data points as we consider them in context of larger themes in Southern Environmental History.

A Sketch of Agricultural Production on James Bennett's Farm

James Bennett was operating with predictable quantities of livestock and farming implementations as other North Carolina farmers in this time period with his per-acre averages falling between the Orange County and state values. James Bennett kept horses, milch cows, other cattle, and swine, but no sheep, donkeys, or mules. He did have slightly fewer animals per acre

[37] United States Census Office, *Twelfth Census of the United States, Taken in the Year 1900: Agriculture Part 1, Farms, Live Stock, and Animal Products*, vol. V (Washington, D. C.: United States Census Office, 1902), 744.

overall than the average per-acre value for his county, but he had slightly more milch cows. The milch cows were busy making butter, because James Bennett produced two to three times as much butter as was common in his county but no cheese.

Figure 3.1. James Bennett's Butter and Cheese Production Compared to County and State Averages, data from the Agricultural Census of 1850.

This lopsided dairy production offers an opportunity for a bit of historical sleuthing. It seems that James Bennett started buying most of his cheese before he even bought the property, when he was still trying to save up enough money to invest in land.[38] He bought his property on February, 18 1846, and seems to have made his first recorded small butter sale (3/4 lb) on August 12, 1846.[39] He seems to have grown this business, and sold 29 3/4 pounds in 1848 (144-145, 130-131), and 9 pounds in 1849 (141, 143, 149).[40]

I only tease out these details, because at first I thought that Bennett may have been in some arrangement with a neighbor to exchange butter for cheese, and I thought that I might break up my data with a quaint anecdote about how Bennett was in a trading partnership with his neighbor. But

[38] Bennitt, "Papers, 1820-1962; (Bulk 1830-1850)."
[39] "Document # 00015456, Book 33" (Mark Chilton Register of Deeds Orange County, February 18, 1846), 482, https://rod.orangecountync.gov/OrangeNCNW/application.asp?resize=true.
[40] Bennitt, "Papers, 1820-1962; (Bulk 1830-1850)." p. 73, 130-131,141,143-145,149.

since all of this butter data seems to have come from the annual summaries of income as opposed to personal accounts, it seems more likely that Bennett was a regular yeoman farmer who specialized for typical reasons to take advantage of economies of scale. Regardless, Bennett's pasture-raised butter was probably an excellent vehicle to carry the flavors of the land, just like 21st century producers of trendy grass-fed butter.[41]

When it comes to cash crops, James Bennett produced a lot of corn, although he produced slightly less per acre of total farmland than farmers in Orange County or North Carolina in general. Still, he had plenty to sell as his corn consistently appears on his "income" lists.[42] However, whereas many Orange County and North Carolina farmers produced tobacco, James Bennett did not. Instead, James Bennett produced almost twice as many oats and four times as many sweet potatoes as might be expected for a farm of his size in Orange County NC, and these also tend to appear on his income lists.

[41] "A Suspiciously Creamy Cuppa: Something Far Odder than Taste Is Driving Demand for Glorious Grass-Fed Butter - Document - Gale In Context: Biography," accessed October 18, 2024, https://go-gale-com.proxy.lib.duke.edu/ps/i.do?p=BIC&u=duke_perkins&id=GALE%7CA377662181&v=2.1&it=r&sid=summon&aty=ip.

[42] Bennitt, "Papers, 1820-1962; (Bulk 1830-1850)."

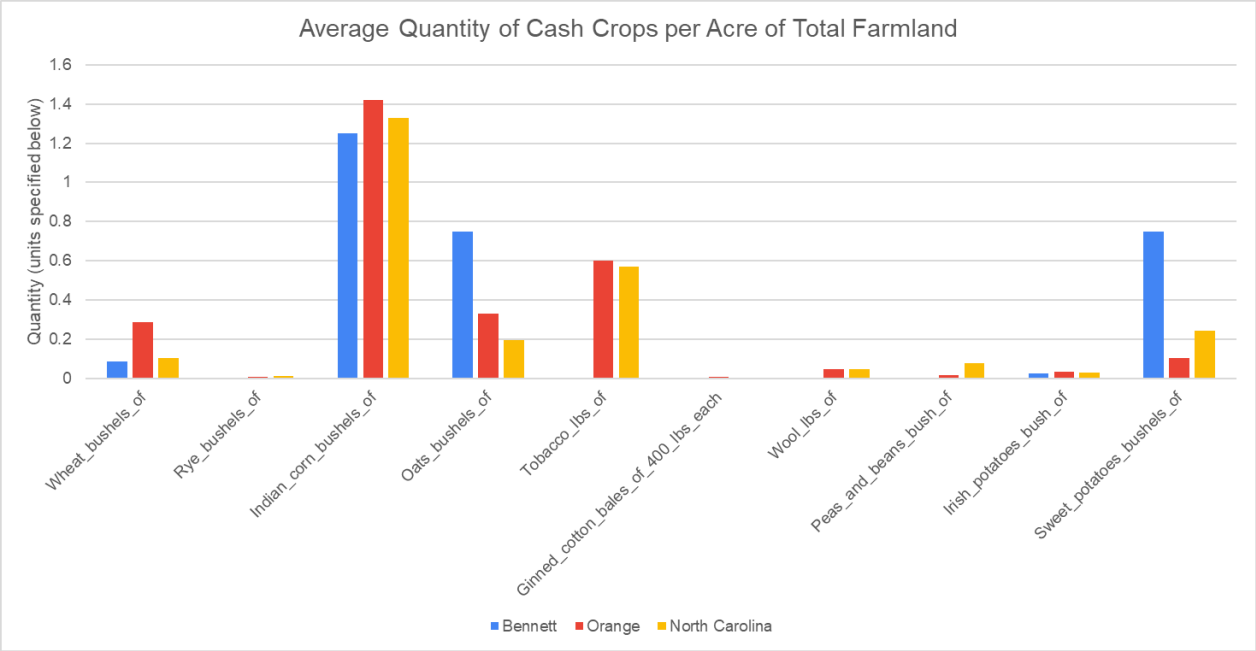

Figure 3.2. Average Quantity of Cash Crops Per Acre of Total Farmland for James Bennett Compared to State and County data. Data from the Agricultural Census of 1850.

But were corn, oats, and sweet potatoes good choices for James Bennett's land? Well, sweet potatoes are generally happy in North Carolina, to the extent that North Carolina is the top producer of sweet potatoes in the United States.[43] They like temperate climates with loamy soil, which Bennett Place has.[44] However, Bennett Place's soil is poorly drained, so oats and corn may not have done as well since these are the preferences of these crops. Still, none of these crops would have been as ecologically harsh as tobacco, as tobacco leaves its soil with less nitrogen, phosphorus and potassium than the others that Bennett chose.[45] James Bennett did not grow tobacco during this period, but there is some evidence that he or his sharecroppers grew cotton on

[43] "What Are the Optimal Planting Conditions for Corn?," April 6, 2021, https://corn.ces.ncsu.edu/2021/04/what-are-the-optimal-planting-conditions-for-corn/.
[44] S.O Perkins et al., *North Carolina Maps: Durham County Soil Map, 1920* (Durham, N.C., 1920), https://web.lib.unc.edu/nc-maps/interactive/MC_036_1920p.php.
[45] Thomas E. Novotny et al., "The Environmental and Health Impacts of Tobacco Agriculture, Cigarette Manufacture and Consumption," *Bulletin of the World Health Organization* 93, no. 12 (October 22, 2015): 877, https://doi.org/10.2471/BLT.15.152744.

the property later in life.[46] Cotton would have carried its own ecological cost, requiring additional phosphorus fertilizers or long rotation cycles.[47]

Production of Less Abundant Crops on James Bennett's farm in 1850

Barley, buckwheat, orchard produce, and wine were all rarely produced in North Carolina in 1850, let alone in Orange County, and not at all on James Bennett's farm. James Bennett's market garden was valued at $0, but this was not unusual for a farm of his size since market gardens were valued at less than half a penny per acre across NC, and no county-wide value was recorded for Orange County.

Hay, hemp, clover seeds, and other grass seeds were also not produced on James Bennett's farm, and rarely if at all in Orange County and North Carolina. Clover in particular may have been a lost opportunity for Bennett, his land, and his cows, because clover is good at restoring nitrogen to the soil and provides good livestock forage.[48] Yet Flax and Flaxseed were both more commonly produced in Orange County and North Carolina, but not on James Bennett's Property. The lack of flax grown on Bennett's property was less of a loss for him or his immediate environment, and more of a loss for the world at large when considered in the context of decreasing flax production and increasing cotton production that would characterize the 19th century, so that flax production by

[46] Menius, "James Bennitt: Portrait of an Antebellum Yeoman," 21.
[47] Mauldin, *Unredeemed Land*.
[48] Lauren St. John and Dan Ogle, "White Clover Plant Guide" (USDA, January 2009), https://plants.usda.gov/DocumentLibrary/plantguide/pdf/pg_trre3.pdf.

1940 had dropped to nearly zero.[49] This is because flax generally uses fewer resources, to the extent that flax is currently being promoted by the UN as a more sustainable textile fiber.[50]

That said, James Bennett was hopping! He produced 3 lbs of hops in 1850. Using a nineteenth century recipe from *Thornton's Southern Gardner*, half a pound of hops produced a half barrel of beer.[51] While this may not sound like a lot, it meant that the amount produced per acre at James Bennett's farm was 34 times higher than the NC average, and 61 times more than the per acre average for Orange County. Hops were simply not popular in Orange County or North Carolina as a state.

Of course, just because James Bennett grew hops does not mean that he was using them for beer production. Hops were also valued for the oil that could be extracted from their seed pods.[52] And, hops were used medicinally at the time, in place of laudanum or to alleviate asthmatic pains or a lack of appetite.[53] Additionally, cloth can be made from the stems of hops.[54] That said, James Bennett was no prohibitionist as he frequently purchased whiskey.[55] Since he never purchased or sold beer, it seems likely that he probably grew hops for home use.

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[49] "Flax Profile," accessed October 20, 2024, https://www.agmrc.org/commodities-products/grains-oilseeds/flax-profile.
[50] "How Can the Flax Plant Be a Solution for Sustainable Development?," UNDP, accessed October 20, 2024, https://www.undp.org/turkiye/news/how-can-flax-plant-be-solution-sustainable-development.
[51] Francis Porcher, *Resources of the Southern Fields and Forests, Medical, Economical, and Agricultural : Being Also a Medical Botany of the Confederate States; with Practical …* (Charleston: Steam-Power Press of Evans and Cogswell, 1863), 279, https://hdl.handle.net/2027/nc01.ark:/13960/t2k65pc8n?urlappend=%3Bseq=7.
[52] Porcher, 75.
[53] Porcher, 275.
[54] Porcher, 276.
[55] Bennitt, "Papers, 1820-1962; (Bulk 1830-1850)."

Does James Bennett deserve accolades for being a rare Orange County producer of hops? Michael Tolman, a historian of hops, said nothing about James Bennett in particular, but he did describe the character of 19th century hops growers.

> "Hop growing required an unusually sophisticated understanding of plant science, drying technology, and market economics… it brought some growers unheard of wealth almost overnight, while other hop farmers slid into ruinous debt just as quickly".[56]

As the 19th century wore on, James Bennett seems to have declined in wealth, but he grew hops on such a small scale that it would be hard to attribute his downfall to hops production.[57] It's more likely that Bennett was an agriculturally curious person, willing to try something he read or heard about on a lark. That, or he enjoyed beer. Regardless, from the land's perspective, hops are very extractive of soil resources.[58]

Beyond 1850 – A Look at the Rest of the 19th Century

Since 1850 was the first agricultural census, there are no good land use records for the preceding decades. Furthermore, since records were lost for some of the later censuses, 1850 really does represent the best snapshot of how the property was used during the 19th century. That said, the 1875 Tax List does provide another glimpse into James Bennett's Property. By 1875, the

[56] Michael A. Tomlan, *Tinged With Gold: Hop Culture in the United States* (Athens: Univ of Georgia Pr, 1992), 5–6.
[57] Menius, "James Bennitt: Portrait of an Antebellum Yeoman."
[58] Porcher, *Resources of the Southern Fields and Forests, Medical, Economical, and Agricultural*, 276.

200 acres listed on the agricultural census had reduced to only 175 acres, with "E C" presumably for "Ellerbe Creek" listed as the location signifier.[59]

Yet, in fitting with the theme of this chapter of using the leftover words of the 19th century to learn about land, there are a couple of additional document types that have been as yet untouched: maps and property details. The map I use in this section is the 1887 Johnson and Cram map, the earliest mostly accurate detailed map of Durham County available, which is georeferenced to the default "hybrid reference layer" and "NC HPO Historic Properties and Districts", and additionally layered with "Environment Surface Water and Label".[60]

After creating this map, I was able to approximate an area that likely contains the acreage that Bennett owned during the late 1840s in figure 3.3, although it is outside the scope of this project to map the exact property lines. Specifically, the black shape outlined (fig 3.3) touches the three creeks listed in the property details (Ellerbe, New Hope, and Eno), runs North and then west of Fish Dam Road, includes the current Bennett Property (outlined in blue), and does not cross more than about five acres of the railroad.[61] That said, the black outline covers 470.26 acres and Bennett's purchase only included 325.9 acres total, and Bennett's purchased property was in two tracks with both tracks being odd shapes (not rectangles). It is very likely that even if the shape outlined in black in figure 3.3 is approximately correct, there were multiple pieces of land cut out of

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[59] "Orange County (N.C.) Tax List Ledger, 1875. / Orange County (N.C.) Tax List Ledger / Duke Digital Repository," Duke Digital Collections, accessed December 15, 2024, https://repository.duke.edu/dc/orangecountytaxlist/octst0010.

[60] Johnson and Cram, "Map of Durham County, N.C."; "NC HPO Historic Property and Districts - Overview," accessed January 8, 2025, https://www.arcgis.com/home/item.html?id=8484f93a3990476f99462d7875ed868c; "Environment Surface Water and Label - Overview," accessed January 8, 2025, https://www.arcgis.com/home/item.html?id=6d188135dc814d4ea254440a3dd844df; "Hybrid Reference Layer - Overview," accessed January 8, 2025, https://www.arcgis.com/home/item.html?id=30d6b8271e1849cd9c3042060001f425.

[61] "Document # 00015456, Book 33"; Arthur C Menius, "The Bennett Place" (North Carolina Department of Cultural Resources, Division of Archives and History, 1979).

the overall shape that were owned by someone else. A table of property chain of title is included in the appendix (table 3.4).

Yet, a number of other configurations are possible. To contextualize the area that includes these possible configurations, I have included an unannotated map (fig 3.4) with an overlay of modern streets and bodies of water.

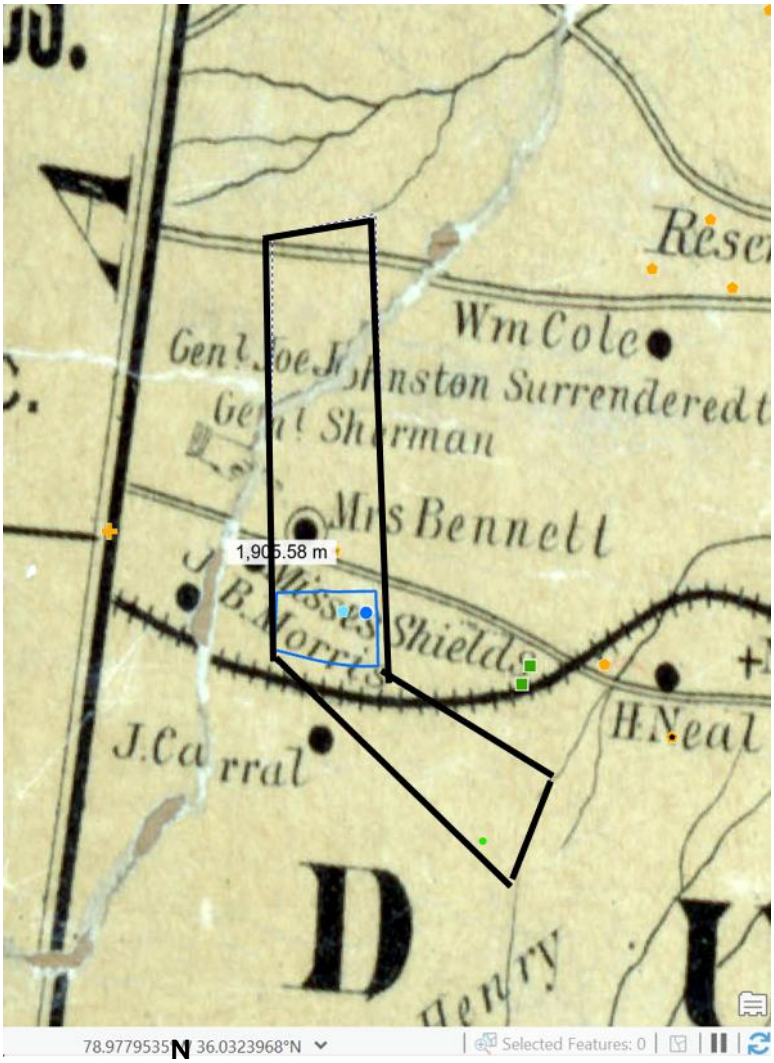

Figure 3.3. 1887 Johnson and Cram Map of Durham with 2024 Bennett Place Property Lines Outlined (blue) and an Area that Likely Contains the Area James Bennett Purchased in Black, Kalei Poter, 2024. The black outline lines up with the creeks and roads mentioned in the 1846 Bennett property deed, but the acreage contained in the black outline is about 44% too large to be the original property boundaries. The original boundaries would have contained additional lines that carved up the space. Stray yellow, green, and blue dots represent other historic places.

Figure 3.4. Area that Roughly Includes the Various Possible Bennett Place Properties with a Modern Street and River Overlay and the Current Property Outlined in Blue, Kalei Porter 2024. Included to provide context.

Nevertheless, in my efforts to make the land itself the agent of this story, what is interesting is less about the exact details about how the property was defined, but more so in how 19th century landowners defined their property using more of the natural world, and less of the constructed world. For example, the earliest known Western-type owner was Jacob Baldwin, who in 1782 owned property "On Ellebys Creek … at a pine running south seventy-five chains to a Red Oak west forty

chains to a white Oak north seventy-five chains to a White Oak east forty chains to the first station".[62] In comparison, the last sale during James Bennett's lifetime mentions 18 acres along Ellerbe Creek, but also the plot's proximity to the railroad and Henry Neal's property line.[63] If streets and geographic coordinates are human constructions, then trees and creeks are something else.

So who constructed this world? Too many people to count, or too many names to remember. Of course, the idea of describing places in terms of their geographic coordinates emerged over time, but the real question is, who constructed the West side of Durham where Bennett Place remains?[64]

There is certainly evidence that landowners of all classes had a role in creating the built environment in this area. Not only were their properties used as reference points to identify the property boundaries of other individuals, but they played a role in creating and maintaining the transportation networks. For example, William Couch was appointed an "Overseer of the Road" for part of Hillsborough Road (the same road preserved at Bennett Place) in 1851.[65] And, as the men like James Bennett sold their land to the state to construct the Raleigh to Hillsborough Railroad, they were expected to supply the labor to build the railroad, which often meant enslaved labor.[66] As

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[62] Menius, "The Bennett Place."
[63] "Bennett to Caroll," in *Book 44* (Orange County Register of Deeds, 1876), 366–67, https://rod.orangecountync.gov/OrangeNCNW/ProcessedImages/2025_01_08_18_32_4370554751_doc_754935.pdf.
[64] "Maps, Wayfinding, and the Discovery of Longitude," The New York Public Library, accessed January 8, 2025, https://www.nypl.org/blog/2021/06/18/maps-wayfinding-and-discovery-longitude.
[65] *William A. Couch Papers, 1783-1920.*, 1783, https://find.library.duke.edu/catalog/DUKE000851693.
[66] Allen W. Trelease, *The North Carolina Railroad, 1849-1871, and the Modernization of North Carolina : Allen W. Trelease*, accessed January 9, 2025, https://www.book2look.com/book/MOAHrUwHkS.

the railroad was constructed between 1850-1855, dating later than the last entries in James Benett's daybook, it is difficult to know what the labor looked like on his lands.

However, we can learn about what railroad construction looked like on the site by reviewing what it was like in general in North Carolina. The most laborious step was "grading" the path, which involved removing trees and overturning hills to relocate the earth from topographic high points to low points to create a level path. It was this laborious step that enslaved people mostly worked on, along with some crews of poor Irishmen. Some of these men worked in a large crews under a contractor, or often, the landowners that contributed land for the railroad would hold the contract and direct their enslaved laborers to work under these conditions. The track for the Raleigh-Charlotte railroad was laid by eighty-five black laborers that were mostly rented slaves. The railroad construction process is part of the storied environment of Bennett Place, with the land reconstructed to shape the rail and hundreds of silenced stories hidden in the construction.[67]

If the laborers and landowners participated in the ongoing construction of the Bennett Place neighborhood throughout the 19th century, then the environment did not remain a fixed relic of a past time. We have already discussed how the forests changed, and even thought about how the species present changed (as species like Bahiagrass were introduced), or even just the way we think about species changed, such as the "fence" lizard that evolved to rest on pines. But the landscape itself also changed. In the final representation of the 1887 map, I have included a layer that shows the modern creeks, rivers, lakes, and watershed.

[67] Trelease.

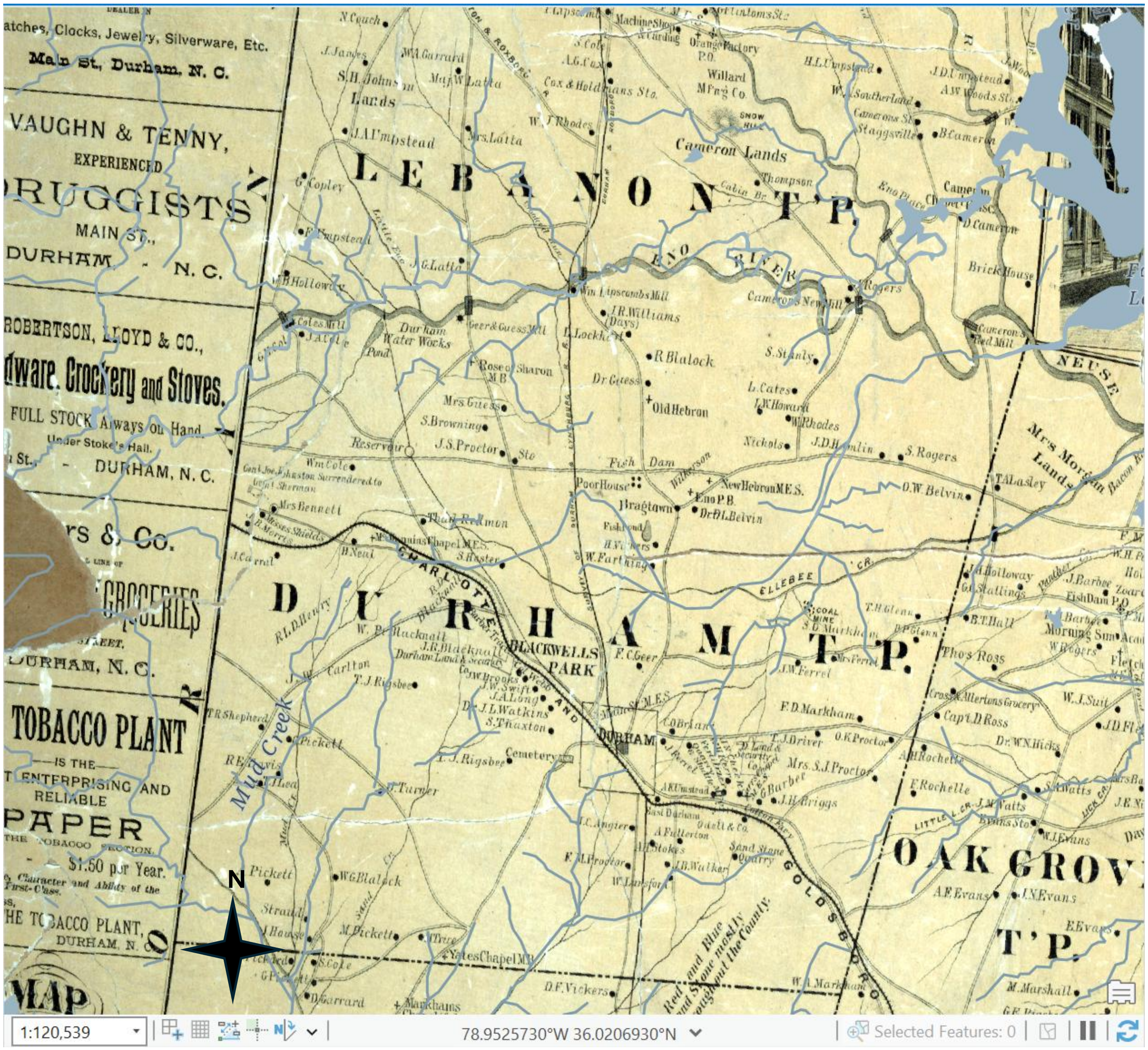

Figure 3.5. 1887 Map with 2024 Waterways overlay shown in a light blue-grey color. Included to demonstrate how the waterways may have changed since the 19th century. Created by Kalei Porter 2025.

I want to be clear that the alignment of the georeferenced 1887 map to the 2024 waterways is imperfect, and is not intended to praise the wise ways of the generations of the 19th century in the ways that their constructed environment impacted watersheds. As shown on this 1887 map, many of the waterways were part of the constructed environment including dams, mills, and reservoirs. That said, I included this map because the waters themselves are a part of the storied environment at Bennett Place. Rivers change course without human input, but these rivers have changed a lot.

Across Durham, there are fewer tributaries to the main creeks. In the direct neighborhood of Bennett Place alone, the many terminal paths of Mud Creek (the tributary of New Hope Creek which Bennett's property touched) have collapsed into a single Mud Creek, and Ellerbe Creek curves and ends suspiciously north of the modern railroad and I-85 infrastructure rather than forking south towards the historic Southern boundary of Bennett Place. These changes are likely human engineered, but the water has its own way of fighting back – like flooding the western part of the nature trail at Bennett Place.

Earlier in this chapter, we considered Bennett's mid-century agriculture, with special attention to his hops crop which performs better on drier land. Yet when we consider the way that water may not have drowned that area when all of the creeks in this area flowed differently, it becomes more plausible that Bennett made more reasonable agricultural choices given the structure of his 19th century environment. What we can learn from both beginning with nature and the words and documents left behind from the 19th century is that human land use is part of a constant cycle of environmental change.

Biodiversity Feature #3: Blueberries (*Vaccinium* spp.)

There are both cultivated and uncultivated varieties of blueberries on Bennett Place property. In total, there are three Blueberry species at Bennett Place, two uncultivated low-bush species, V. tenellum (fig B4, left) and V. pallidum. There is also one highbush species, V. fuscatum, visible from the nature trail and in the garden (fig B4, right). Uncultivated huckleberry plants dominate the light gaps around the pine trees in the forested area.

We have no direct documentation from the Bennett family or anyone else associated with the property surrounding blueberries. That said, the first mention of blueberries in Durham or Orange County newspapers wasn't until 1881, and it was a mention of a Maine farmer successfully growing blueberries commercially.[68] However, there is evidence that people would go pick wild blueberries during the 19th century as a casual activity.[69] It is perfectly reasonable to suppose that people who have visited Bennett Place might have taken part in these activities, even if the varieties present on the site today are not considered to be especially delicious by experts.

Figure B.4. Southern Dwarf Blueberry, (left) Alan Weakly, 2011[70] and **Image of Highbush Variety in the Kitchen Garden** (right), Kalei Porter, 2024.

[68] "Agricultural - Farm Notes," *Orange County Observer*, February 5, 1881, 1 edition.
[69] "Outside of the World," *The Durham Daily Globe*, February 15, 1892, 1 edition.
[70] Alan Weakly, *Southern Dwarf Blueberry*, May 20, 2024, May 20, 2024, https://www.inaturalist.org/observations/217069287.

Part IV: The Rest of the Bennett Place Story

Many themes and stories of the 20th-century environmental moments and struggles are also reflected in the property. Several relate to the creation of the property as a historic monument and eventual state park. In this section, we will pick the story up from where we left off and follow the story of land use through the creation of Bennett Place as a State Historic Site.

Transportation and the Environment in the North Carolina Piedmont

Just as I mentioned in the first section, it is still true that if it wasn't for the Old Hillsborough Road, Bennett Place wouldn't be remembered because the treaty wouldn't have been signed here.

Figure 4.1. Bennett Place Exterior and Hillsborough Road, by Sallie Scharding 2024.

The road was moved in the late 1910s due to resistance to improvement from a single landowner.[71] When the state contacted landowners with property adjacent to the Old Hillsborough Road, they all agreed to give up a small portion of their road for construction except Page Couch. Presumably, this included the Morgan family, the owners of Bennett Place at the time, although I have no record of this correspondence. Rather than force Page Couch's hand, the builders of the new highway opted to build the new road as to not require his approval, causing the road to be moved to its present location.[72]

But even in this story of rearranging roads there is a biological story. Across the world, grasslands are disappearing, forcing wildflowers and grasses to move into the marginal, small grasslands surrounding the road. Several species are able to make this change, but a 2019 study found that it takes over 60 years.[73] This isn't necessarily a grassland, but woody species can grow in these marginal, roadside ecosystems too- but in woody areas, restoration takes more time, up to a century or longer. The early 20th century images from the first biodiversity highlight (fig B2) show something of this process at Bennett Place, but it takes decades.

The theme of transportation and the environment could also be explored through the railroad. During the Nineteenth century construction discussed in Part III, leaders saw the railroad as the path forward to twentieth century industries. In the same way that Page Couch did not grant land to expand the Old Hillsborough Road, when they built the railroad in 1850, the state purchased the right of way from James Bennett.[74] At this time, the NC railroad had a difficult time soothing

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[71] Rachel Frankel, "The Couch Tract of the Durham Division of the Duke Forest: A History of Agricultural Land-Use Patterns 1750-1950" (Duke, 1984), 57.
[72] Frankel, 57.
[73] Alistair G. Auffret and Evelina Lindgren, "Roadside Diversity in Relation to Age and Surrounding Source Habitat: Evidence for Long Time Lags in Valuable Green Infrastructure," *Ecological Solutions and Evidence* 1, no. 1 (July 2020), https://doi.org/10.1002/2688-8319.12005.
[74] "Bennett & Others to R. Road," in *Book 35* (Orange County Register of Deeds, n.d.), 46–47.

contested politicians and fundraising the final amounts. That said, the fundraisers succeeded by taking a natural resources angle, at least in part. Perceiving a need to use natural resources profitably motivated the railroad construction. One of the fundraisers, a Mr. William Boyland, explained that the main industries of the state had remained the same his whole life - tar, pitch, and turpentine, and he wanted to see progress. By 1894, political historian Rufus Barringer remarked that NC had more mills and factories than any other state.[75]

Samuel Morgan and Fertilizer

Before Bennett Place could become a state historic site, someone had to purchase and donate the land. Samuel Morgan as a fertilizer mogul purchased the property for the purpose of turning it into a historic site, and his family donated it on his behalf following his death.[76] Morgan's fertilizer company, Virginia-Carolina Chemicals started in 1881 by processing waste from tobacco farms into fertilizer. Later, in the 20th century, this was a fortune 500 company that mixed sulphuric acids with phosphorous-rich rocks to make super-phosphates, which were processed into many different kinds of fertilizers. These kinds of fertilizers can remain in the ground for decades.[77]

The growth of the fertilizer economy was part of a new world order in many ways. In *An Unredeemed Land*, Mauldin describes the way that the land reacted to the years of the Civil War as a respite from growing cotton, which allowed many Southern states to produce a bumper crop of Cotton. This lead banks and farmers alike to believe that they were only one cotton harvest away

[75] Rufus Barringer, *History of the North Carolina Railroad*, Papers of the North Carolina Historical Society at the University of North Carolina (Raleigh, N.C.: News and Observer Press, 1894).
[76] "Commemorative Landscapes of North Carolina," March 19, 2010, https://docsouth.unc.edu/commland/monument/44/.
[77] Jr Daniel D. Richter, *Understanding Soil Change : Soil Sustainability over Millennia, Centuries, and Decades* (Cambridge ; New York : Cambridge University Press, 2001., 2001), http://find.library.duke.edu/catalog/DUKE003011221.

from a fortune, so farmers would borrow early in the year against their upcoming cotton harvest. Simultaneously, phosphorus-based fertilizers - like the Virginia-Carolina Chemical company were becoming increasingly available, and so farmers would spend their advance on fertilizer. That said, soil science was in its infancy, and so these fertilizers didn't always help already exhausted land, and crop yields dwindled. Often, farmers couldn't pay their advance and pay for even a modest lifestyle, and so they entered into further debt. The banks continued offering loans because they still believed in the profits of cash crops, chasing the glory of the rested land from the 1860s. But this meant that the banks only offered loans on cash crops, which meant cotton in most of the South but may have extended to tobacco in Durham.[78]

With growing pressure from the banks, cash crops (and not subsistence farming) became more normal for many families. With this change in crops came a change in fencing, which we can actually observe at Bennett Place. Notice how sturdy broad planks were used to make the 1860s fence (left) but thinner pieces of wood that could have come from younger trees were used later (right).

[78] Mauldin, *Unredeemed Land*.

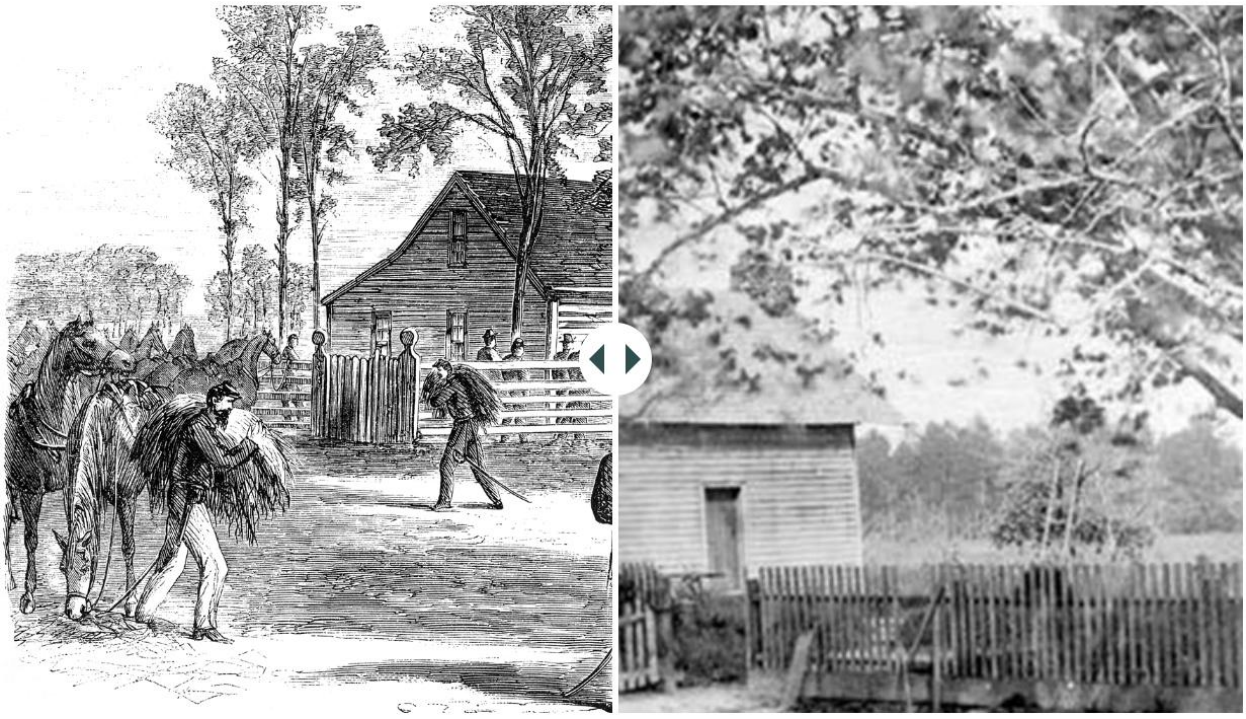

Figure 4.2. A Comparison of the Fence in Front of Bennett Place in 1865 (left), and later in the 19th century (right).[79] Original images from Harper's Weekly and an unknown photographer in the late 19th century.

Before the war, most farmers fenced in their house and garden and let livestock graze free-range on their otherwise unfenced lands. During the war, many fences were destroyed by soldiers on both sides for firewood and other needs. Keep in mind that many soldiers were at Bennett Place in 1865 when the treaty was signed, and they would have needed to cut trees to cook their food. This meant that after the war, wood was scarce, so it was used sparingly. Still, in part due to Northern pressure, most farmers began to fence their livestock into barns and pastures, and left their other property un-fenced.[80]

This all may be true for much of the South, but beyond their fence, to what extent were the Bennetts wrapped up in it? Here we delve into speculation. We know that Bennett was not growing

[79] Kalamakaleimahoehoe Porter, "Bennett Place Forest Trail," ArcGIS StoryMaps, April 22, 2024, https://storymaps.arcgis.com/stories/72b1f5ad10794a909d99618321488e19.
[80] Mauldin, *Unredeemed Land*.

cotton in the 1850s, but by the 1870s someone was growing it on his land.[81] Admittedly, it could have been one of his share croppers, but as this is the story of the land, the leeching of nutrients would have remained the same. We also know that amongst the limited personal papers that survive from the Bennetts, some marketing material from the Atlantic Phosphate Company remains.[82]

Furthermore, we know that as the turn of the century approached, the piece of land that became Bennett Place today was increasingly less used. A recent archeological find of a piece of an early 20th century plow on the site could hint that some agriculture was still done there, but both the contemporary descriptions and the surviving photo from 1905 indicate that it was much abandoned. William Garrett Brown found that "The Bennett House is long since deserted and will soon fall down if it is not restored" in 1904.[83] Could this be a sign that the land was worn out, and the best use that the family could think of for the land was to sell it to those that wanted to create a historic site?

[81] Menius, "James Bennitt: Portrait of an Antebellum Yeoman," 324.
[82] Bennitt, "Papers, 1820-1962; (Bulk 1830-1850)."
[83] William Garrott Brown, *The South at Work: Observations from 1904* (Univ of South Carolina Press, 2014).

Figure 4.3. Photo of Piece of Early 20th Century Plow (left), Bennett Place Staff, 2024 and **Photo of Bennett House Abandoned** (right), unknown photographer, 1905.[84]

The Early History of the State Historic Site

The first person to attempt to memorialize the land was Brodie Duke. He bought the property in 1890 and tried to bring the house to exhibit at the 1893 World's Fair, but he was unable to do so for various reasons.[85] After allowing the property to fall into the state of described above in 1904-1905, Brodie Duke transferred the property to the Duke Land and Improvement Corporation in 1908, who soon sold the property to Samuel Morgan, the fertilizer mogul.[86] Although the property was not converted to a memorial in Morgan's lifetime, when R. O. Everett became involved, the job was finished, albeit with the controversy with some pro-confederate Durham residents described in Part I.

[84] Bennett Place Staff, *Archeological Find*, October 24, 2024, October 24, 2024, https://www.facebook.com/photo.php?fbid=925507372957960&set=pb.100064961161024.-2207520000&type=3; "Bennett Place | Open Durham."
[85] Menius, "The Bennett Place," 3.
[86] Menius, 5.

Fire at Bennett Place

On October 12, 1921, James Bennett's original house burned to the ground.[87] At the time, the fire was understood to be of "undeterminable origin", but since, historians have questioned its origins behind closed doors. Could it have been a cigarette, an act of random vagrancy, a lightning strike, or a nefarious undertaking by those that did not want to memorialize a confederate surrender?

Perhaps viewing the question through an environmental history lens might provide new evidence. It must be said that the dilapidated building that was the Bennett House in the early 20th century had the look of kindling (fig 4.3), and the fall of 1921 in Durham was a relatively dry time. According to the National Centers for Environmental Information, precipitation in September was about 35% below average and precipitation in October was about 50% below average, but neither month is an especially strong outlier in the oscillating rhythm of Durham weather since 1895.[88] Furthermore, just two days before on October 9-10 were local fire prevention days, when fire chiefs educated school children and other community members on what causes fires.[89] Could these instructions have given an ill-meaning individual the idea to start the fire? If so, then the motivation might have been to stop the memorialization of the New South, or could even have been related to the United Daughters of the Confederacy concurrent fundraising efforts and meetings.[90] Yet

[87] "The Bennett House," *Durham Morning Herald*, October 16, 1921.
[88] Milwaukee Journal Sentinel, "Durham County, North Carolina Weather Data," Wisconsin Journal Sentinel, accessed January 9, 2025, https://data.jsonline.com/weather-data/durham-county/37063/1921-10-01/?syear=1895&eyear=2024.
[89] "Fire Prevention Days Will Be Observed Today and Tomorrow," *Durham Morning Herald*, no. 1921/10/09 (October 9, 1921): 5.
[90] "Confederate Veterans Reunion Deficit Is Wiped Out Through Efforts of Durham Daughters," October 16, 1921.

speculation aside, what more was I able to learn about the characteristics of the fire, based on on-site observations?

It seems unlikely that the fire was caused by lightning, even though there is an old Loblolly pine tree on the edge of Bennett Place's lawn that has a large lightning scar that could date to 1921, although I was unable to confirm this. But more importantly, according to the Durham Morning Herald the week of 10/8-10/12 was full of fair weather.[91] Even so, I can confirm that none of the three oldest shortleaf trees showed any signs of burn damage from the tree core work described in Part II, when the tree cores were compared to images of known fire-scarred trees.[92] Thus, it is unlikely that the fire touched the South side of the property, or if it did, then the fire couldn't have been hot enough to damage the trees, as lightning fires burn very hot.[93]

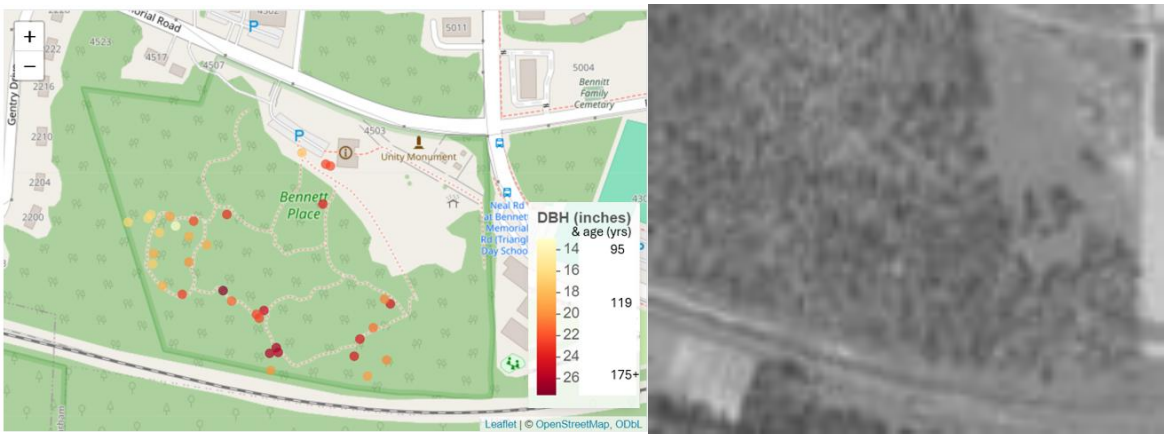

Figure 4.4. Map of Shortleaf Pines by Size and Age Along Bennett Place Trail, Kalei Porter, 2024 (left), and **USDA Aerial Photograph of the Property, 1940** (right). North is at the top of the page.

[91] "Durham Morning Herald," 1921, https://newspapers.digitalnc.org/search/pages/results/?proxtext=&proxdistance=5&ortext=&andtext=&phrasetext=&city=&county=Durham&date1=1921-01-01&date2=1921-12-31&language=&frequency=&sequence=1&rows=&page=13&sort=date.
[92] Peter M. Brown, "Dendrochronology, Fire Regimes," in *Encyclopedia of Scientific Dating Methods*, ed. W. Jack Rink and Jeroen Thompson (Dordrecht: Springer Netherlands, 2013), 1–4, https://doi.org/10.1007/978-94-007-6326-5_76-4.
[93] NOAA US Department of Commerce, "How Hot Is Lightning?" (NOAA's National Weather Service), accessed January 9, 2025, https://www.weather.gov/safety/lightning-temperature.

It is possible that the fire burned the area from the homesite and the North edge of the woods, as I was unable to analyze the loblolly pines at the same level as the shortleaf pines. The best two forms of evidence that the fire only covered the Northeast side of the property is the empty space that roughly matches on both the shortleaf map (fig. 4.4, left) and this 1940 aerial photo from the USDA (fig 4.4, right).[94] It is entirely plausible that the fire burned in the area that is unforested in the 1940 photo, and perhaps burned more lightly on the west side of the property, creating the light gaps seen in the aerial photo. This could even explain the growth of the generation of shortleaf pines that are about 100 years old on the west side (fig 4.4, left). Of course, the burn pattern that I have proposed is far from certain, but if it is correct, then it could have been caused by cigarettes or some other human cause. Whether this burn was intentional or not remains a question lost to history.

The Creation of the Site as a Historic Site, and Part of the State Parks System

Once the site became a historic site, this story starts to look more like what we learned about in Part II. At first, Bennett Place is primarily a field that hosts a monument. On the back of the property, succession continues, with many of the oak and other hardwood trees growing up underneath the pines. As Bahiagrass becomes naturalized to the Southern United States, it continues to grow on the property. A new generation becomes invested in Bennett Place, and the fence, kitchen, house, and smokehouse are restored. Some number of years after the property was last farmed, the state brings Bennett Place into the state park system in 1961 and the lawn is

[94] U. S. Department of Agriculture, *Durham County 1940 - Historical Aerial Photos*, 1940, 1940, https://guides.lib.unc.edu/aerials/durham1940#table.

mowed once again.[95] In 1965, Vice President Hubert Humphrey visited for the centennial of the Civil War, meaning that someone from the oval office finally found their way to Bennett Place (fig 4.5).

Figure 4.5. Vice President Humphrey, Rueben Everett, and Gov Dan Moore, unknown photographer, 1965[96]

Even as Bennett Place seemed to take shape in the 1960s, it was in the 1980s that Bennett Place builds its visitor center, and soon plants the row of trees on the Eastern side of the property.[97] Archeology digs into the earth, and locating the dairy and the Old Hillsborough Road, which are then worked into the interpretation.[98]

Meanwhile, many trees surrounding the nature trail would have reached maturity and began to drop acorns – but this time, there are no free-ranging animals to feed. Instead, the acorns are

[95] Lynette Parker, "The Bennett Place an Unlikely Place for Surrender," *The Carolina Times*, no. 1983/04/30 (April 30, 1983): 23.
[96] Holloway, "An Unlikely Memorial at Bennett Place."
[97] Parker, "The Bennett Place an Unlikely Place for Surrender."
[98] Robinson and Schneider, "Bennett Place Ground Penetrating Radar Survey and Archeological Assessment at the Bennett Place State Historic Site."

crunched under the feet of visitors, on the new nature trails. The trails were created, but not included in the standard tour, at least as of 2011.[99] Some people used them though, even if they were a bit flooded at times or rough around the edges. Hurricane Mathew hit the property in 2016 and the witness tree was included in the indoor visitor center display, meaning that our story has officially caught up to its beginning. Yet there are more ways that Bennett Place could build on its storied environment, and in Part V, we will consider these.

[99] NC DNCR and Noth Carolina Civil War Tourism Council, "Guide Book for Staff and Volunteers."

Biodiversity Highlight #4: Fungi (*Many species*)

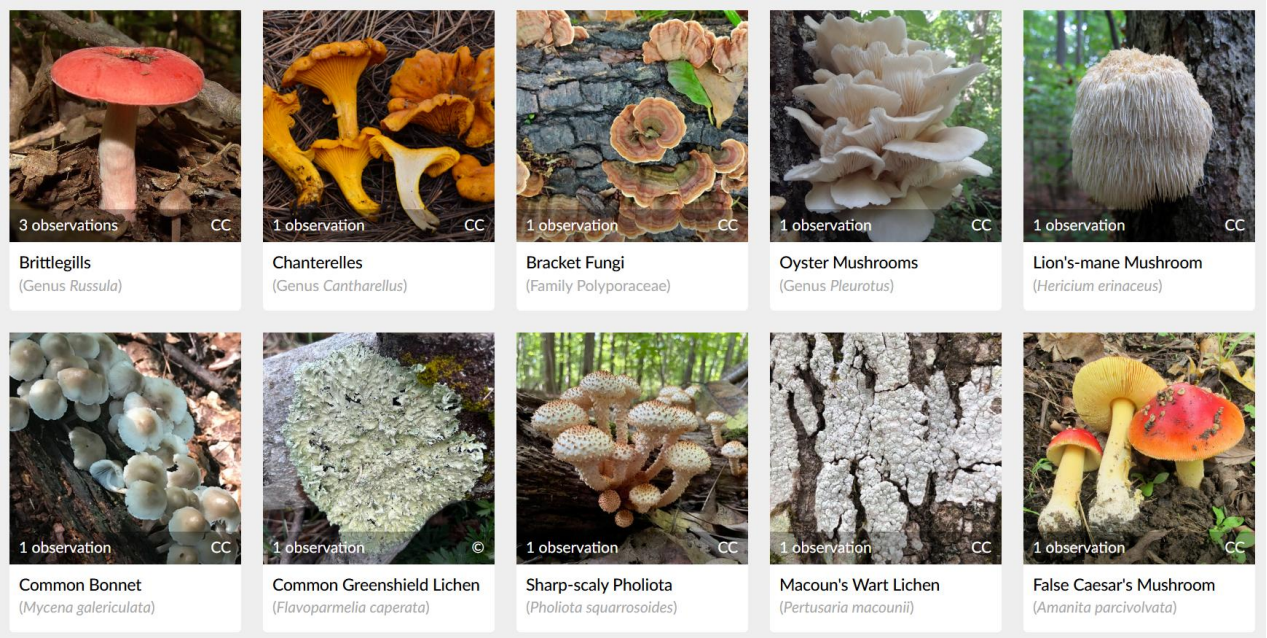

Figure B5. An image gallery of fungi observations at Bennett Place, created using filters on iNaturalist.[100]

All of these fungi pictured were observed and photographed at Bennett Place, along with the not-pictured flame trumpet and countless other species. For all of the oak and pine trees discussed in this work to grow in the way they do at Bennett Place, the proper fungal partners must be living on the property.[101]

Agriculturalists of the 1860s had some knowledge of mushrooms, and how they grow. In *Resources of the Southern Fields and Forests, Medical, Economical, and Agricultural*, Francis Porcher recommends that "the noxious kind grows in the woods or on the margin of woods, while the true mushroom springs up chiefly in open pastures" but that "wild mushrooms from old pastures are generally considered more delicate in flavor" while cultivated mushrooms were less

[100] "Fungi Observations," iNaturalist, accessed January 9, 2025, https://www.inaturalist.org/observations?nelat=36.0302429&nelng=-78.9725728&swlat=36.027402&swlng=-78.9774&view=species&iconic_taxa=Fungi.
[101] Perry, *Forest Ecosystems*, 231.

risky.[102] Yet modern foragers offer different advice, to look for forested areas that include some dead and dying trees to find forest types such as the oyster mushrooms pictured above.[103] Many types of managed forests, including the fellow early-succession "unimproved fields" of the Old South or contemporary clear-cut timber operations, do not lend themselves well to fostering fungi diversity.[104] Yet as Bennett Place has been a historic site for over one hundred years now, the mostly hands-off management its woods combined with the slow death that is rolling through its first generation of trees creates an positive environment to foster the biodiversity of fungi.

[102] Porcher, *Resources of the Southern Fields and Forests, Medical, Economical, and Agricultural*, 595–96.
[103] Louise Robles, "12 Mushrooms in North Carolina (Pictures)," *Wildlife Informer* (blog), May 15, 2023, https://wildlifeinformer.com/mushrooms-in-north-carolina/.
[104] Clémentine Lepinay et al., "Successional Development of Wood-Inhabiting Fungi Associated with Dominant Tree Species in a Natural Temperate Floodplain Forest," *Fungal Ecology*, Fungal community structure, development and function in decomposing wood, 59 (October 1, 2022): 101116, https://doi.org/10.1016/j.funeco.2021.101116.

Part V: Recommendations and Conclusion

Beyond fungi and the other aspects of Bennett Place's biodiversity that I have highlighted, how can Bennett Place inspire naturalist curiosity as a historic site? This property includes a wide lawn with a clear view of the sky, short nature trails, and a beautiful garden. Even though some guests use the nature trails, including a preschool nature school group that I met on site multiple times during 2023-2024, the property under-utilizes its space as a place with short nature trails and a gathering space on the lawn. Opportunities should be created to engage the public with differing levels of interest in nature. For visitors with less curiosity in the natural world, this might be as simple as increasing the level of attention paid to the gardens and signage, but there also may be opportunities for individuals with more interest in the natural world to participate in targeted programing.

Recommendations for General Programing

Through volunteering with Bennett Place, I believe that the leadership is already taking the property in the right direction. When I first visited Bennett Place in the fall of 2022, the garden looked abandoned, and there were few signs or tour integrations that featured the site's natural history. More recently, not only was 2024 peppered with conversations about these topics with the staff, but the garden looks at least remembered. Some of the weeds have been removed, and there are recognizable plants growing there, such as the blueberry bush featured earlier. There are still no signs in that area, but occasionally they will commit to written word on agricultural and

environmental topics, like their okra coffee spotlight from December 31, 2024.[105] They have additionally added this sign on Climate Change to the nature trail area of the property (fig 5.1).

For these reasons, my primary recommendation is to keep taking similar steps in formalizing interpretation of environmental history at the site. As I have now identified a stand of witness trees, they could consider a sign in the nature trail area indicating the presence of these shortleaf pines, along with any information that the site feels fit to share about the trees. This could include their transition from being the omnipresent pine tree to falling in popularity to loblolly pines because of changes in the seed bank (resulting from the rise in local logging) and overall fertilizer use. But my recommendation also includes a more intentional representation of the garden. In contrast to the teaching kitchen at Bennett Place, the garden is fenced off (fig 1.8). In the book *Gardens & landscapes in historic building conservation,* Harney asks "what is the threshold at which we enter and know we are in a garden?" and I think that the lack of an entrance to the Bennett Place garden is something the site might consider, even though the garden space is very small.[106] Especially with all of the knowledge from the agricultural census of 1850 that details which plants were grown at Bennett Place during the mid-nineteenth century, visiting the garden could be an immersive experience.

From witness trees to the garden, around the country, several historic sites are incorporating these types of materials into their interpretation, such as at the Elizabeth Cady

[105] "Bennett Place," Facebook, accessed January 10, 2025, https://www.facebook.com/bennett.place.
[106] Marion Harney, *Gardens and Landscapes in Historic Building Conservation* (Newark, UNITED KINGDOM: John Wiley & Sons, Incorporated, 2014), 3, http://ebookcentral.proquest.com/lib/duke/detail.action?docID=1658806.

Stanton site.[107] What is less commonly discussed is the potential for citizen science at state historic sites, yet as I will describe, there is real potential there.

Fig 5.1. New, as 2024, Climate Change Sign. Image by Kalei Porter January 16, 2025.

Recommendation for Targeted Programing for Nature Enthusiasts: Citizen Science

Because Public History sites have a constant need to attract new visitors with different kinds of programing, sites like Bennett Place that include facilities that help people experience nature could offer programs with natural curiosity as its primary focus, but ones that still teach history. Moreover, just as there is a need of museums to incorporate technology and provide ever more interactive engagement in their exhibits, historic sites have a need to provide experiential learning to the public.[108] Citizen Science could offer a way to succeed with both.

[107] "Plant Profile: Horse Chestnut at Women's Rights National Historical Park (U.S. National Park Service)," accessed January 19, 2025, https://www.nps.gov/articles/000/wori-horse-chestnut-plant-profile.htm.
[108] Sonia Capece and Camelia Chivăran, "The Sensorial Dimension of the Contemporary Museum between Design and Emerging Technologies," *IOP Conference Series: Materials Science and Engineering* 949, no. 1 (November 1, 2020): 012067, https://doi.org/10.1088/1757-899X/949/1/012067.

Citizen science encompasses scientific endeavors that are voluntarily conducted and/or shaped by the public.[109] The most popular citizen science platform is iNaturalist, and some self-directed Bennett Place visitors have already contributed images and species identifications from the property. Several of the biodiversity features in this project were even created using creative commons images contributed to iNaturalist. However, I believe that there is a greater opportunity to implement citizen science programming beyond this casual use of iNaturalist.

Many citizen science programs use mobile applications as the main means of public interaction. These applications often allow for the public to volunteer for citizen science projects on-demand and contribute to crowd-sourced data collections. Some groups have taken the time to consolidate citizen science projects on websites like scistarter.org and citizenscience.gov. Many citizen science apps have a land-based focus; for example sixty-six online projects on SciStarter relate to ecology, earth science, or agriculture.[110] I skimmed these projects and those that were recommended by the US Federal government on their site citizenscience.gov during the Spring of 2023, and then tried out ten apps that seemed promising.

[109] U. S. General Services Administration, "CitizenScience.Gov," accessed February 3, 2023, https://www.citizenscience.gov/.
[110] "SciStarter," SciStarter, accessed March 19, 2023, https://scistarter.org/.

Figure 5.2. Ten Promising Land-Based Citizen Science Apps, and a bite-size description.

- Project Noah, "wildlife photography meets citizen science".
- iNaturalist, find and share biodiversity data.
- seek (by iNaturalist), image recognition of plants and animals.
- eBird, bird sightings and data.
- Rockd, track progress through geologic rock record (UW Macrostrat Lab 2023).
- LandPKS, Land potential and change over time. Land potential is " soil identification, land cover and soil health monitoring, land management and farm record keeping, and more".
- Center for Earth Observation and Modeling , global geo-referenced photos and satellites.
- Budburst, find and observe plants (including pollinator interactions and life cycles).
- S'COOL, Cloud observation project.
- myFOSSIL, "social paleontology"- a community of amateur and professional paleontologists.

After exploring these applications, there were three that I felt still offered substantial programming potential for historic sites. I have written more about what this might look like below.

Using Seek and iNaturalist. I envision people downloading Seek, and then downloading and making iNaturalist accounts, so that iNaturalist can run in the background. If people only want to observe and learn about their environment and not share data with the larger community, then they could skip using iNaturalist since Seek can function as a standalone app. One type of program that could use these apps to support environmental history would be to allow people to roam the forest and use their phones to identify species. People could be sent out with a guide created by the site that describes which species are native and which are invasive. This is a great opportunity to discuss environmental change and the Columbian exchange. The fence lizard and fungi stories that I shared in the biodiversity features throughout this project could even be used as proof-of-concept

for Bennett Place. As with much of my work throughout this piece, I hope that bringing in these new methods and topics could motivate visitors to engage with historic narratives.

Using Budburst. Budburst allows people to identify and submit observations of plant species, but then it goes beyond that to explore the way the environment is changing. The annual reproduction and lifecycles of plants (their phenology) are shifting with changing temperature. Addressing this topic requires that people understand the way that things were historically is not necessarily the way things are presently. This is inherently historical thinking that could work to uplift public environmental history and very little would need to be done besides unleashing people on the Bennett Place grounds with this app downloaded.

Using S'COOL. S'COOL is a great option to engage with our abiotic natural surroundings by forcing people to take time to exist in nature and observe the sky. At Bennett Place, the best place to do this would be to send people onto the lawn with the app. Perhaps there could be a sign describing what the sky would have looked like for James Bennett (for example, no airplane entrails). People could take a moment to truly observe their outdoor surroundings, note the sky, and subtly learn about historical change.

Using these three modern apps in this way would provide a new type of programming for Bennett Place that is novel enough to attract previous visitors to return. Furthermore, the short-term nature of these suggestions could help overcome the difficulty of including diverse participants in long-term projects that results from a lacking ability to pay people for these long-term commitments. With these three apps as the basis, additional steps to include marginalized people could be taken, such as co-creating the implementation procedure and enforcing codes of

conduct and data management practices. I would recommend consulting Benyei at al. to learn more.[111]

Reflections

On April 20th 2024, I volunteered at Bennett Place to share some of the research I put together at an Earth Day event. I was proud that this was the first event ever organized at Bennett Place that did not feature the Civil War as its primary focus. In this section I do not dare to share the experiences or questions of event attendees, since these were just regular people attending an Earth Day event at a historic site; they were not research subjects. Instead, I will share my own experience.

I, along with the Lives and Legacies team and Bennett Place, organized an event that was advertised on Duke's calendar and on Bennett Place's. At the event, we passed out zines with a much-simplified version of this project, encouraged the use of Budburst, and shared samples from Duke's herbarium to show how the timing of when plants flower has shifted over time to accompany the citizen science app Budburst. I talked to many more interested people about the samples than I did about the citizen science app. Then, I offered a verbal tour that was the earliest version of what this paper would become.

Hopefully, reading this paper was something like that tour. The tour had a certain advantage, being grounded in a physical place as opposed to the linear format of paragraphs and pages that follow one another. The chronology of environmental history at Bennett Place is full of

[111] Petra Benyei et al., "Challenges, Strategies, and Impacts of Doing Citizen Science with Marginalised and Indigenous Communities: Reflections from Project Coordinators," *Citizen Science: Theory and Practice* 8, no. 1 (May 15, 2023), https://doi.org/10.5334/cstp.514.

species, themes, and people that loop back upon themselves. Not only do trees follow a certain successional growth pattern given their environmental conditions, but people do too. People attempt to maximize output from land use just like trees attempt to maximize growth and reproduction from sunlight. Sometimes, the land is fallow or the buildings burn, and sometimes a new group comes to dominance whether it is a fertilizer empire or a type of fence or a late-succession tree species or the government, come to manage the property as a historic site. Endings might be opportunities for fungi to grow, or there might only be the ashes of a home left behind. Sometimes, the "endings" of people's stories are the beginnings of new environmental stories. As time progresses, it is doubtless that more stories will embed themselves into the environment of Bennett Place.

Why this Project Matters

As of January 2025, there has only been one peer-reviewed paper that was primarily about Bennett Place, the 1981 work *James Bennett: Portrait of an Antebellum Yeoman* by Arthur Menius.[112] This, along with the on-site interpretation at Bennett Place, was an excellent starting point for my work. However, despite using some of the same sources, neither the Menius paper nor any other work had really described the environment of Bennett Place. Now, this work joins other local environmental histories connecting people to biodiversity and place, such as *The Duke Forest at 75: A Resource for All Seasons*.[113]

[112] Menius, "James Bennitt: Portrait of an Antebellum Yeoman."
[113] Ida Phillips Lynch, *The Duke Forest at 75: A Resource for All Seasons* (Durham, N.C.: The Office of Duke Forest, 2006).

Environmental history has an established place at many public history sites, but as a field, there is still room for that place to grow.[114] Projects like this, that connect large environmental history themes to a single physical space, can help increase the presence of environmental themes in public history. For example, connecting the kind of sweeping societal changes of fertilizers, fences, and agriculture from Erin Mauldin's *An Unredeemed Land* to a single family's fence, or the ability to visit and revisit themes of transportation, labor, and the environment, as Mark Fiege did in the *Iron Horses* chapter of his book *A Republic of Nature*.[115]

If this work made any small contribution towards closing the gap between environmental history and public history, then I hope it made an even larger contribution in closing the gap between those that study the science of plants and the history of people. There are certainly some strong narratives of places and trees that have come before this, such as *Looking for Longleaf*, but this work went proportionally a little further into quantitative methods than seems typical for environmental history.[116] Yet in this merger, I hope that I have highlighted methods that may be new to some historians, and paths of narrative creation that may be unfamiliar to scientists. I dedicated so much space in this final chapter to a description of possibilities for citizen science, because I hope that the general public could be involved at this intersection of topics.

Ultimately, this work matters because stories matter. This narrative lacks a single beginning, middle, and end, but it has at least a half dozen of each. Yet that is as it should be; famed

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[114] Gregory E. Smoak, "Every History Has a Nature: Thoughts on Doing Public Environmental History," *The Public Historian* 44, no. 3 (August 1, 2022): 9–23, https://doi.org/10.1525/tph.2022.44.3.9.
[115] Mauldin, *Unredeemed Land*; "The Republic of Nature: An Environmental History of the United States (Weyerhaeuser Environmental Books): Fiege, Mark, Cronon, William: 9780295993294: Amazon.Com: Books," accessed January 12, 2025, https://www.amazon.com/Republic-Nature-Environmental-History-Weyerhaeuser/dp/0295993294.
[116] Lawrence S. Earley, *Looking for Longleaf: The Fall and Rise of an American Forest*, Reprint edition (The University of North Carolina Press, 2004).

environmental historian William Cronon calls for "A Place for Stories", plural, for a reason.[117] We only have one environment and one Bennett Place, but many stories.

Appendix

Table 2.1

Latitude	Longitude	Species Mix at Point
36.027976	-78.976433	Shortleaf, White Oak, Loblolly
36.027944	-78.976344	Cedar, Loblolly, Sweet Gum
36.027933	-78.976225	Black Oak, Loblolly
36.027824	-78.976102	Loblolly, White Oak
36.027853	-78.975994	White Oak
36.027776	-78.975929	Shortleaf, White Oak
36.02769	-78.976058	Willow Oak, White Oak
36.027599	-78.975914	Loblolly, Shortleaf, White Oak
36.02749	-78.975892	Shortleaf, White Oak
36.027404	-78.975798	Willow Oak, Loblolly, Sweet Gum
36.027389	-78.975558	Loblolly, Sweet Gum
36.027324	-78.975474	Loblolly, Sweet Gum
36.027513	-78.975419	Loblolly, Willow Oak, Sweet Gum
36.02749	-78.975275	Loblolly, Sweet Gum, White Oak
36.027445	-78.975207	Loblolly, Sweet Gum, White Oak
36.027496	-78.975216	Willow Oak, Loblolly, Shortleaf
36.027544	-78.975005	Willow Oak, White Oak
36.027539	-78.975038	Willow Oak, Shortleaf, Sweet Gum, White Oak
36.027596	-78.974891	Willow Oak
36.027669	-78.974829	Willow Oak, Loblolly, Shortleaf, Sweet Gum

[117] William Cronon, "A Place for Stories: Nature, History, and Narrative," *The Journal of American History* 78, no. 4 (1992): 1347–76, https://doi.org/10.2307/2079346.

36.027943	-78.97439	American Birch, Loblolly, Sweet Gum
36.027651	-78.974778	Loblolly, Shortleaf, Sweet Gum
36.027707	-78.974684	Sweet Gum, White Oak
36.027743	-78.974551	White Oak
36.02776	-78.974563	White Oak
36.027857	-78.974447	Loblolly, Willow Oak, White Oak
36.027955	-78.974445	Willow Oak, White Oak
36.027939	-78.974527	Loblolly, Willow Oak, Shortleaf, Sweet Gum
36.027974	-78.974577	Loblolly, Willow Oak, Shortleaf
36.027974	-78.97466	Loblolly, Willow Oak, Sweet Gum
36.028014	-78.974747	Willow Oak, Loblolly, Sweet Gum
36.028054	-78.974784	Loblolly, Willow Oak, Sweet Gum
36.028079	-78.974882	Loblolly, Willow Oak, Sweet Gum
36.028142	-78.974942	Loblolly, Willow Oak, Sweet Gum
36.028165	-78.975024	Loblolly, Willow Oak
36.028177	-78.975098	Loblolly, White Oak
36.028235	-78.975181	Loblolly, Willow Oak, Sweet Gum
36.028263	-78.975273	Juvenile Red Maple, Loblolly, Willow Oak
36.028344	-78.975246	Loblolly, Willow Oak, Sweetgum
36.028596	-78.97591	Loblolly, Willow Oak
36.028503	-78.975873	Loblolly, Sweetgum
36.028423	-78.975838	Loblolly, White Oak
36.028402	-78.975747	Loblolly, Sweetgum, White Oak
36.028434	-78.975623	Loblolly, Sweetgum, White Oak
36.028423	-78.975547	Loblolly, White Oak
36.028415	-78.975416	Loblolly, Willow Oak, Sweet Gum
36.028451	-78.975326	Loblolly, Willow Oak
36.028538	-78.975301	Loblolly

36.028603	-78.975346	Loblolly, Willow Oak, Sweet Gum
36.028702	-78.975319	Willow Oak, Shortleaf
36.028816	-78.975314	Willow Oak, Shortleaf
36.028818	-78.975371	Loblolly, Willow Oak, Shortleaf, Sweetgum
36.028603	-78.976684	Loblolly, Sweet Gum
36.028487	-78.976629	Loblolly, Sweet Gum
36.028439	-78.976665	American Beech, Loblolly, Shortleaf, White Oak
36.028391	-78.976852	Loblolly, White Oak
36.028372	-78.976893	Loblolly, Willow Oak, Sweet Gum
36.028269	-78.976884	Loblolly, Shortleaf, Sweet Gum
36.02818	-78.97682	Loblolly, Willow Oak, Sweet Gum
36.028026	-78.976883	Loblolly, Willow Oak, Shortleaf
36.028033	-78.977024	Shortleaf, Sweet Gum

Table 2.2

Please note that the first tree is 175+ years old because the center of the core was stuck in the tree and I could not read the last years of growth, but it is at least 175 years old. I attempted to measure the age of the tree with the largest DBH, but all of the cores came out fragmented.

Latitude	Longitude	DBH (inches)	Age
36.02746	-78.975926	26	175+
36.02794	-78.976359	21.5	
36.02751	-78.975849	26.4	
36.02779	-78.97605	22.6	
36.02867	-78.976787	22.4	
36.02873	-78.976413	23.4	
36.02929	-78.975563	17.7	
36.02853	-78.976839	18.8	

36.0273	-78.975913	19.9	
36.02759	-78.974906	24.5	
36.02743	-78.974972	24.4	
36.02726	-78.974822	19.6	119
36.0274	-78.974605	20.4	
36.0277	-78.97476	21.2	
36.02791	-78.97456	24.5	
36.02796	-78.974628	20.7	
36.02882	-78.975322	23.9	
36.02917	-78.975238	22.3	
36.02919	-78.975297	22.6	
36.02845	-78.97664	18.8	
36.02829	-78.976844	20.1	
36.028	-78.976913	22.9	
36.02808	-78.977142	18.5	
36.02828	-78.977247	17.2	
36.02857	-78.977173	17.2	
36.02838	-78.977242	18.8	
36.02866	-78.977522	16.6	
36.0287	-78.977297	16.4	
36.02873	-78.977266	16.6	
36.02872	-78.977051	19.6	
36.02863	-78.976986	13	95
36.02803	-78.976453	27.5	
36.02782	-78.97608	22.6	
36.027851	-78.975991	25	164
36.02747	-78.975831	26.4	

Table 3.1

	James Bennett	Acre Avg Bennett	Orange County	Acre Avg Orange	North Carolina	Acre Avg NC
Acres Improved	100	n/a	140587	n/a	5453975	n/a

Acres Unimproved	100	n/a	183056	n/a	15543008	n/a
Cash Value Farm	400	2	1097624	3.39	67891766	3.23
Value of Farming Implements	50	0.25	103186	0.32	3931532	0.187
Horses	1	0.005	3391	0.0105	148693	0.0071
Asses and Mules	0	0	312	0.000964	25250	0.0012
Milch Cows	3	0.015	3769	0.0117	221790	0.0106
Working Oxen	0	0	347	0.0011	37309	0.0018
Other Cattle	4	0.02	7355	0.0227	434402	0.0207
Sheep	0	0	11535	0.035	595249	0.028
Swine	17	0.085	29507	0.091	1812813	0.086
Value of Livestock	180	0.9	338912	1.047	17717647	0.843
Wheat Bushels	17	0.085	93338	0.288	2130102	0.101
Rye Bushels	0	0	1761	0.0054	229563	0.0109
Indian Corn Bushels	250	1.25	459088	1.418	27941051	1.331
Oats Bushels	150	0.75	106340	0.328	4052078	0.193
Rice (lbs)	0	0	-	-	5465808	0.2603
Tobacco (lbs)	0	0	194275	0.6	11984786	0.5707
Ginned Cotton (bales of 400 lbs)	0	0	2305	0.0071	73845	0.0035
Wool (lbs)	0	0	14906	0.046	970738	0.046
Peas and Beans (bush)	0	0	5094	0.0157	1584252	0.0755
Irish Potatoes (bush)	0	0	10730	0.033	620318	0.0295

Sweet Potatoes (bushels)	0	0	33693	-	5095709	0.2427
Barley (bushels)	0	0	-	-	2735	0.0001
Buckwheat (bushels)	0	0	20	6.18E-05	16704	0.0008
Value of Orchard Produces	0	0	-	-	-	0.0016
Wine (gallons)	5	0.025	-	-	-	0.0005
Value of Produce of Market Gardens	150	0	106010	0.327	4146290	0.197
Butter (lbs)	0	0	873	0.0027	95921	0.0046
Cheese (lbs)	0	0	1845	0.0057	145653	0.0069
Hay (tons)	0	0	-	2.74E-05	576	0.0001
Clover Seed (bushels)	0	0	-	-	1275	0.0019
Other Grass Seeds (bushels)	0	0	-	-	9246	0.197
Hops (lbs)	0	0	-	-	36	0.028

Table 3.2

Improved to:Unimproved Ratio		
Name	Ratio1 (improved simplified)	Ratio2 (unimproved simplified)
Bennett	1	1
Orange	1.302083407	1
North Carolina	2.849849513	1

Table 3.3

Hops Ratios	
Name	Hops (ratio)
Bennett	1
Orange	60.6830625
North Carolina	34.06389195

Table 3.4 – Bennett Property Chain of Ownership. Created from Arthur Menius's 1979 work, and verified with deeds from the Orange County Register of Deeds where possible. Some information that is unknown was left blank.

Year	Property Owner	Details
1782	Jacob Baldwin	300 acres "On Ellebys Creek … at a pine running south seventy-five chains to a R[ed] Oak west forty chains to a w[hite] Oak north seventy- five chains to a W[hite] Oak east forty chains to the first station." It is unknown if Jacob Baldwin enslaved people. (Unknown transfer to next owner)
	Isaac and Amey Henderson and George James of Rowan County	Exact same 300 acres that Jacob Baldwin owned.
1792	Benjamin Carroll	Did not directly own enslaved people, and he did not augment property holdings. "Benjamin Carrol's will tends to indicate that he engaged in agricultural pursuits, mentioning horses, cows, hogs, and sheep"- no evidence that he built James Bennett's house.
1829	Charles Carrol	He only had 80 acres while his father maintained 220. At this time, the property was "beginning at a pine stump Benjamin Carols Corner, running West along Anderson Rhodes line 160 poles to a White Oak on Shubs line, thence South, along the said line to a black jack, thence East 160 [poles] to a Persimmon on Aquilla Rhodes line, thence North along the said line 80 poles to the first station."
1830s	Charles Carrol	Acquired 297.5 acres of adjoining property in addition to his first 80 acres.
1844	Willis B. Dillard	Purchased two tracts 189 acres came from the Carroll property, the second 236.9 acres.
1846	James Bennitt	Purchased the 189 acre tract and 135.9 acres of the second one. His first sale was to the railroad in 1850, but there were several others. He only had 189 acres in 1860- the rest was sold first to Alan Carrell (50 acres, Ellibee's Creek, 1847), then to Cadwaller Jones (82.8 acres, northernmost land along the Eno River, 1865). Later sales included 18 acres between the railroad and Ellerbe Creek to A.J. Carroll (1876), and 12.3 additional acres along Ellerbe Creek.
1878	Nancy Bennitt	
	James Lorenzo Bennitt & Roberta Shields	In the 1880s a visitor found a grandson and granddaughter of James Bennitt living in a a "plain, old fashioned, unpretending structure" with a "green yard" and "the same old fence".

1889	Roberta Shields (and husband Ira W. Shields)	
1890	Brodie L. Duke	Takes possession of the 35 acre tract. 1893 tried to show it at World's fair, but there were no takers. 1903: Quote by William Garrett Brown: "The Bennett House is long since deserted, and will soon fall down if it is not restored. Barring some action by the National Government, the best chance for its preservation is that some sportsman or club may preserve the land about it." 1905: House in disrepair
1908	Duke Land and Improvement Coorporation	Bennett Place was lot 38 in this deal.
?	Samuel Tate Morgan (until 1920)	
1920	Sallie F. Morgan (Samuel Tate's wife)	On 12 October 1921, the building burned to the ground.
1923	Morgan/Bennett Place Memorial Commission	3.5 acres transferred from Morgan family; Monument erected
1925	Bennett Place memorial Commission	Remaining 27.3 acres transferred
1973	State of NC	Commission abolished because of the death of Everett.

Sources

"A Suspiciously Creamy Cuppa: Something Far Odder than Taste Is Driving Demand for Glorious Grass-Fed Butter - Document - Gale In Context: Biography." Accessed October 18, 2024. https://go-gale-com.proxy.lib.duke.edu/ps/i.do?p=BIC&u=duke_perkins&id=GALE%7CA377662181&v=2.1&it=r&sid=summon&aty=ip.

Auffret, Alistair G., and Evelina Lindgren. "Roadside Diversity in Relation to Age and Surrounding Source Habitat: Evidence for Long Time Lags in Valuable Green Infrastructure." *Ecological Solutions and Evidence* 1, no. 1 (July 2020). https://doi.org/10.1002/2688-8319.12005.

"Bahiagrass." Accessed November 9, 2024. https://turf.ces.ncsu.edu/grasses/bahiagrass/.

Baker, James, and Gordon Langdon. "Pinus Taeda L.," n.d.

Barringer, Rufus. *History of the North Carolina Railroad*. Papers of the North Carolina Historical Society at the University of North Carolina. Raleigh, N.C.: News and Observer Press, 1894.

"Bennett & Others to R. Road." In *Book 35*, 46–47. Orange County Register of Deeds, n.d.

"Bennett Place | Open Durham." Accessed June 13, 2023. https://www.opendurham.org/buildings/bennett-place.

Bennett Place · 4409 Bennett Memorial Rd, Durham, NC 27705. "Bennett Place · 4409 Bennett Memorial Rd, Durham, NC 27705." Accessed October 27, 2024. https://www.google.com/maps/place/Bennett+Place/@36.0293689,-78.9749217,423m/data=!3m1!1e3!4m6!3m5!1s0x89ace0d8ca8b6f01:0xd1d157f90ef3bb13!8m2!3d36.0292635!4d-78.9750957!16zL20vMDZzajB0!5m1!1e4?entry=ttu&g_ep=EgoyMDI0MTAyMy4wIKXMDSoASAFQAw%3D%3D.

Bennett Place Staff. *Archeological Find*. October 24, 2024. https://www.facebook.com/photo.php?fbid=925507372957960&set=pb.100064961161024.-2207520000&type=3.

"Bennett Place Surrender | American Battlefield Trust." Accessed May 10, 2025. https://www.battlefields.org/learn/articles/bennett-place-surrender.

"Bennett to Caroll." In *Book 44*, 366–67. Orange County Register of Deeds, 1876. https://rod.orangecountync.gov/OrangeNCNW/ProcessedImages/2025_01_08_18_32_4370554751_doc_754935.pdf.

Bennitt, James. "Papers, 1820-1962; (Bulk 1830-1850).," 1820. https://find.library.duke.edu/catalog/DUKE000845041.

Benyei, Petra, Artemis Skarlatidou, Dimitris Argyriou, Rick Hall, Ida Theilade, Nerea Turreira-García, Danielle Latreche, et al. "Challenges, Strategies, and Impacts of Doing Citizen Science with Marginalised and Indigenous Communities: Reflections from Project Coordinators." *Citizen Science: Theory and Practice* 8, no. 1 (May 15, 2023). https://doi.org/10.5334/cstp.514.

Brown, Peter M. "Dendrochronology, Fire Regimes." In *Encyclopedia of Scientific Dating Methods*, edited by W. Jack Rink and Jeroen Thompson, 1–4. Dordrecht: Springer Netherlands, 2013. https://doi.org/10.1007/978-94-007-6326-5_76-4.

Brown, William Garrott. *The South at Work: Observations from 1904*. Univ of South Carolina Press, 2014.

Capece, Sonia, and Camelia Chivăran. "The Sensorial Dimension of the Contemporary Museum between Design and Emerging Technologies." *IOP Conference Series: Materials Science and Engineering* 949, no. 1 (November 1, 2020): 012067. https://doi.org/10.1088/1757-899X/949/1/012067.

Christensen, Norman L. “Landscape History and Ecological Change.” *Journal of Forest History* 33, no. 3 (July 1, 1989): 116–25. https://doi.org/10.2307/4005121.
“Commemorative Landscapes of North Carolina,” March 19, 2010. https://docsouth.unc.edu/commland/monument/44/.
“Confederate Veterans Reunion Deficit Is Wiped Out Through Efforts of Durham Daughters.” October 16, 1921.
Cronon, William. “A Place for Stories: Nature, History, and Narrative.” *The Journal of American History* 78, no. 4 (1992): 1347–76. https://doi.org/10.2307/2079346.
Daniel D. Richter, Jr. *Understanding Soil Change : Soil Sustainability over Millennia, Centuries, and Decades*. Cambridge ; New York : Cambridge University Press, 2001., 2001. http://find.library.duke.edu/catalog/DUKE003011221.
DeYoung, Joan. “4.5 Increment Boring.” In *Forest Measurements*. Open Oregon Educational Resources, 2016. https://openoregon.pressbooks.pub/forestmeasurements/chapter/4-7-increment-coring/.
Dobbs, Gladys. “The Indian Trading Path and Colonial Settlement Development in the North Carolina Piedmont.” University of North Carolina at Chapel Hill, 2006.
“Document # 00015456, Book 33.” Mark Chilton Register of Deeds Orange County, February 18, 1846. https://rod.orangecountync.gov/OrangeNCNW/application.asp?resize=true.
Duke Digital Collections. “Orange County (N.C.) Tax List Ledger, 1875. / Orange County (N.C.) Tax List Ledger / Duke Digital Repository.” Accessed December 15, 2024. https://repository.duke.edu/dc/orangecountytaxlist/octst0010.
Durham Morning Herald. “Bennett Memorial Unveiled Thursday Afternoon with a Number of Notables Present.” November 9, 1923.
Durham Morning Herald. “Daughters of the Confederacy Will Not Participate in Celebration to Be Staged at Bennett Place.” September 13, 1923.
“Durham Morning Herald,” 1921. https://newspapers.digitalnc.org/search/pages/results/?proxtext=&proxdistance=5&ortext=&andtext=&phrasetext=&city=&county=Durham&date1=1921-01-01&date2=1921-12-31&language=&frequency=&sequence=1&rows=&page=13&sort=date.
Durham Morning Herald. “The Bennett House.” October 16, 1921.
Earley, Lawrence S. *Looking for Longleaf: The Fall and Rise of an American Forest*. Reprint edition. The University of North Carolina Press, 2004.
“Environment Surface Water and Label - Overview.” Accessed January 8, 2025. https://www.arcgis.com/home/item.html?id=6d188135dc814d4ea254440a3dd844df.
Facebook. “Bennett Place.” Accessed January 10, 2025. https://www.facebook.com/bennett.place.
“Fire Prevention Days Will Be Observed Today and Tomorrow.” *Durham Morning Herald*, no. 1921/10/09 (October 9, 1921): 5.
“Flax Profile.” Accessed October 20, 2024. https://www.agmrc.org/commodities-products/grains-oilseeds/flax-profile.
“Forest Succession – Duke Forest.” Accessed January 19, 2025. https://dukeforest.duke.edu/forest-environment/forest-succession/.
Frankel, Rachel. “The Couch Tract of the Durham Division of the Duke Forest: A History of Agricultural Land-Use Patterns 1750-1950.” Duke, 1984.
Graham, Anna Fuller. “Landscapes of Continuity, Landscapes of Change: A Study on Fuelwood Collection in the North Carolina Piedmont before and during Contact.” M.A., The University of North Carolina at Chapel Hill, 2018. https://www.proquest.com/docview/2055765571/abstract/87CA361557034B84PQ/1.

Harney, Marion. *Gardens and Landscapes in Historic Building Conservation*. Newark, UNITED KINGDOM: John Wiley & Sons, Incorporated, 2014. http://ebookcentral.proquest.com/lib/duke/detail.action?docID=1658806.

Hendricks, R. L., and James Lewis. "A Brief History of African Americans and Forests." *US Forest Service*, International Programs, no. 25. Accessed December 16, 2024. https://foresthistory.org/wp-content/uploads/2021/07/A-Brief-History-of-African-Americans-and-Forests.pdf.

Holloway, Carson. "An Unlikely Memorial at Bennett Place: 1865 – 2024 – North Carolina Lives and Legacies." Accessed October 27, 2024. https://sites.duke.edu/project_002_001_bennett_place_project/summer2023/bennett-place-project-story/.

"Hybrid Reference Layer - Overview." Accessed January 8, 2025. https://www.arcgis.com/home/item.html?id=30d6b8271e1849cd9c3042060001f425.

iNaturalist. "Fungi Observations." Accessed January 9, 2025. https://www.inaturalist.org/observations?nelat=36.0302429&nelng=-78.9725728&swlat=36.027402&swlng=-78.9774&view=species&iconic_taxa=Fungi.

Johnson, L., and Geo F. Cram. "Map of Durham County, N.C." 1887. https://digitaldurham.duke.edu/images/full/dduma010040010.jpg.

Kessler, Seth. "Native Americans, North Carolina, and Newspapers:" ArcGIS StoryMaps, September 20, 2024. https://storymaps.arcgis.com/stories/53cd7881aac84af8baa5da389bf369eb.

"Land Acknowledgement – Duke Forest." Accessed January 27, 2024. https://dukeforest.duke.edu/about/land-acknowledgement/.

Lawson, Edwin. "Pinus Echinata Mill." Accessed November 9, 2024. https://www.srs.fs.usda.gov/pubs/misc/ag_654/volume_1/pinus/echinata.htm.

Lepinay, Clémentine, Vojtěch Tláskal, Tomáš Vrška, Vendula Brabcová, and Petr Baldrian. "Successional Development of Wood-Inhabiting Fungi Associated with Dominant Tree Species in a Natural Temperate Floodplain Forest." *Fungal Ecology*, Fungal community structure, development and function in decomposing wood, 59 (October 1, 2022): 101116. https://doi.org/10.1016/j.funeco.2021.101116.

"Life History and Disturbance Response of Pinus Echinata (Shortleaf Pine)." Accessed November 9, 2024. https://www.fs.usda.gov/nrs/atlas/tree/resources/lhdr/lhdr_110.html.

"Life History and Disturbance Response of Pinus Taeda (Loblolly Pine)." Accessed November 9, 2024. https://www.fs.usda.gov/nrs/atlas/tree/resources/lhdr/lhdr_131.html.

Lynch, Ida Phillips. *The Duke Forest at 75: A Resource for All Seasons*. Durham, N.C.: The Office of Duke Forest, 2006.

Mauldin, Erin Stewart. *Unredeemed Land : An Environmental History of Civil War and Emancipation in the Cotton South*. Oxford University Press, 2018. https://find.library.duke.edu/catalog/DUKE009735152.

McClain, William. "Oaks as Native American Trail Marker Trees." *International Oaks* 17 (2006).

Menius, Arthur C. "James Bennitt: Portrait of an Antebellum Yeoman." *The North Carolina Historical Review* 58, no. 4 (1981): 305–26.

———. "The Bennett Place." North Carolina Department of Cultural Resources, Division of Archives and History, 1979.

Milwaukee Journal Sentinel. "Durham County, North Carolina Weather Data." Wisconsin Journal Sentinel. Accessed January 9, 2025. https://data.jsonline.com/weather-data/durham-county/37063/1921-10-01/?syear=1895&eyear=2024.

National Wildlife Federation. “Eastern Fence Lizard.” Accessed January 7, 2025. https://www.nwf.org/Home/Educational-Resources/Wildlife-Guide/Reptiles/Eastern-Fence-Lizard.
NC DNCR, and Noth Carolina Civil War Tourism Council. “Guide Book for Staff and Volunteers.” North Carolina Department of Cultural Resources, January 2011.
“NC HPO Historic Property and Districts - Overview.” Accessed January 8, 2025. https://www.arcgis.com/home/item.html?id=8484f93a3990476f99462d7875ed868c.
North Carolina Division of State Historic Sites and Properties. “Bennett Place - Jake.” Bennett Place - Jake. Accessed January 19, 2025. https://historicsites.nc.gov/bennett-place.
Novotny, Thomas E., Stella Aguinaga Bialous, Lindsay Burt, Clifton Curtis, Vera Luiza da Costa, Silvae Usman Iqtidar, Yuchen Liu, Sameer Pujari, and Edouard Tursan d’Espaignet. “The Environmental and Health Impacts of Tobacco Agriculture, Cigarette Manufacture and Consumption.” *Bulletin of the World Health Organization* 93, no. 12 (October 22, 2015): 877. https://doi.org/10.2471/BLT.15.152744.
Orange County Observer. “Agricultural - Farm Notes.” February 5, 1881, 1 edition.
Parker, Lynette. “The Bennett Place an Unlikely Place for Surrender.” *The Carolina Times*, no. 1983/04/30 (April 30, 1983): 23.
Perkins, S.O, R.E. Devereux, L.L. Brinkley, S.F. Davidson, and W.A. Davis. “North Carolina Maps: Durham County Soil Map, 1920.” Durham, N.C., 1920. https://web.lib.unc.edu/nc-maps/interactive/MC_036_1920p.php.
Perry, David A. *Forest Ecosystems*. Johns Hopkins University Press, 1994. http://archive.org/details/forestecosystems00perr.
“Plant Profile: Horse Chestnut at Women’s Rights National Historical Park (U.S. National Park Service).” Accessed January 19, 2025. https://www.nps.gov/articles/000/wori-horse-chestnut-plant-profile.htm.
Porcher, Francis. *Resources of the Southern Fields and Forests, Medical, Economical, and Agricultural : Being Also a Medical Botany of the Confederate States; with Practical ...* Charleston: Steam-Power Press of Evans and Cogswell, 1863. https://hdl.handle.net/2027/nc01.ark:/13960/t2k65pc8n?urlappend=%3Bseq=7.
Porter, Kalamakaleimahoehoe. “Bennett Place Forest Trail.” ArcGIS StoryMaps, April 22, 2024. https://storymaps.arcgis.com/stories/72b1f5ad10794a909d99618321488e19.
Pyne, Milo. “Eastern Fence Lizard (Sceloporus Undulatus).” iNaturalist. iNaturalist, September 18, 2018. https://www.inaturalist.org/observations/16655009.
“Quercus Alba L. - White Oak.” Accessed November 17, 2024. https://www.srs.fs.usda.gov/pubs/misc/ag_654/volume_2/quercus/alba.htm.
Robinson, Kennett, and Kent Schneider. “Bennett Place Ground Penetrating Radar Survey and Archeological Assessment at the Bennett Place State Historic Site.” Durham County, North Carolina: Wake Forest University Archeological Libraries; Southern Region, USDA Forest Service, 2003.
Robles, Louise. “12 Mushrooms in North Carolina (Pictures).” *Wildlife Informer* (blog), May 15, 2023. https://wildlifeinformer.com/mushrooms-in-north-carolina/.
Schoch, Conrad L, Stacy Ciufo, Mikhail Domrachev, Carol L Hotton, Sivakumar Kannan, Rogneda Khovanskaya, Detlef Leipe, et al. “NCBI Taxonomy: A Comprehensive Update on Curation, Resources and Tools.” *Database* 2020 (January 1, 2020): baaa062. https://doi.org/10.1093/database/baaa062.
SciStarter. “SciStarter.” Accessed March 19, 2023. https://scistarter.org/.

Smoak, Gregory E. “Every History Has a Nature: Thoughts on Doing Public Environmental History.” *The Public Historian* 44, no. 3 (August 1, 2022): 9–23. https://doi.org/10.1525/tph.2022.44.3.9.

St. John, Lauren, and Dan Ogle. “White Clover Plant Guide.” USDA, January 2009. https://plants.usda.gov/DocumentLibrary/plantguide/pdf/pg_trre3.pdf.

The Durham Daily Globe. “Outside of the World.” February 15, 1892, 1 edition.

“The Management and Use of Bahiagrass.” Accessed November 9, 2024. https://extension.uga.edu/publications/detail.html?number=B1362&title=the-management-and-use-of-bahiagrass.

The New York Public Library. “Maps, Wayfinding, and the Discovery of Longitude.” Accessed January 8, 2025. https://www.nypl.org/blog/2021/06/18/maps-wayfinding-and-discovery-longitude.

“The Republic of Nature: An Environmental History of the United States (Weyerhaeuser Environmental Books): Fiege, Mark, Cronon, William: 9780295993294: Amazon.Com: Books.” Accessed January 12, 2025. https://www.amazon.com/Republic-Nature-Environmental-History-Weyerhaeuser/dp/0295993294.

The Tar Heel. “University Now Has a Chapter of Phi Beta Phi.” October 2, 1923.

Tomlan, Michael A. *Tinged With Gold: Hop Culture in the United States*. Athens: Univ of Georgia Pr, 1992.

Trelease, Allen W. *The North Carolina Railroad, 1849-1871, and the Modernization of North Carolina : Allen W. Trelease*. Accessed January 9, 2025. https://www.book2look.com/book/MOAHrUwHkS.

U. S. Department of Agriculture. *Durham County 1940 - Historical Aerial Photos*. 1940. https://guides.lib.unc.edu/aerials/durham1940#table.

U. S. General Services Administration. “CitizenScience.Gov.” Accessed February 3, 2023. https://www.citizenscience.gov/.

UNDP. “How Can the Flax Plant Be a Solution for Sustainable Development?” Accessed October 20, 2024. https://www.undp.org/turkiye/news/how-can-flax-plant-be-solution-sustainable-development.

United States Census Office. *Twelfth Census of the United States, Taken in the Year 1900: Agriculture Part 1, Farms, Live Stock, and Animal Products*. Vol. V. Washington, D. C.: United States Census Office, 1902.

“Unity Monument | Open Durham.” Accessed October 27, 2024. https://www.opendurham.org/objects/unity-monument.

U.S. Census Bureau. “Agricultural and Manufacturing Census Records of Fifteen Southern States for the Years 1850, 1860, 1870 and 1880.” Census Resource Library, 1850. dds.crl.edu/item/183245.

US Department of Commerce, NOAA. “How Hot Is Lightning?” NOAA’s National Weather Service. Accessed January 9, 2025. https://www.weather.gov/safety/lightning-temperature.

USDA, and NRSC. “Willow Oak - Quercus Phellos L.” United States Department of Agriculture, 2002. https://plants.usda.gov/DocumentLibrary/factsheet/pdf/fs_quph.pdf.

Weakly, Alan. *Southern Dwarf Blueberry*. May 20, 2024. https://www.inaturalist.org/observations/217069287.

“What Are the Optimal Planting Conditions for Corn?,” April 6, 2021. https://corn.ces.ncsu.edu/2021/04/what-are-the-optimal-planting-conditions-for-corn/.

William A. Couch Papers, 1783-1920., 1783. https://find.library.duke.edu/catalog/DUKE000851693.