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Hickory Bluff Current Botanical Environment

Figures (below)

Plat of Hickory Bluff (Topo map) showing Study Area Limits

Amplified (2x) Cross Section Profile of Hickory Bluff showing Zones with tree silhouettes

Introduction

A study of the contemporary Hickory Bluff Botanical Environment was undertaken. At the time of the archaeological investigations, portions of the Hickory Bluff site fronting the St. Jones River were forested in mixed stands of mature hardwoods. Archaeological excavation suggested that this area had remained unplowed. The relatively pristine state of this wooded tract was therefore seen as potentially providing insights into the composition of the local forest environment prior to historic clearing and other landscape modifications. These findings are presented. Also examined in a second section is how the botanical environments on different portions of the site might be reflective of that particular location's land use history.

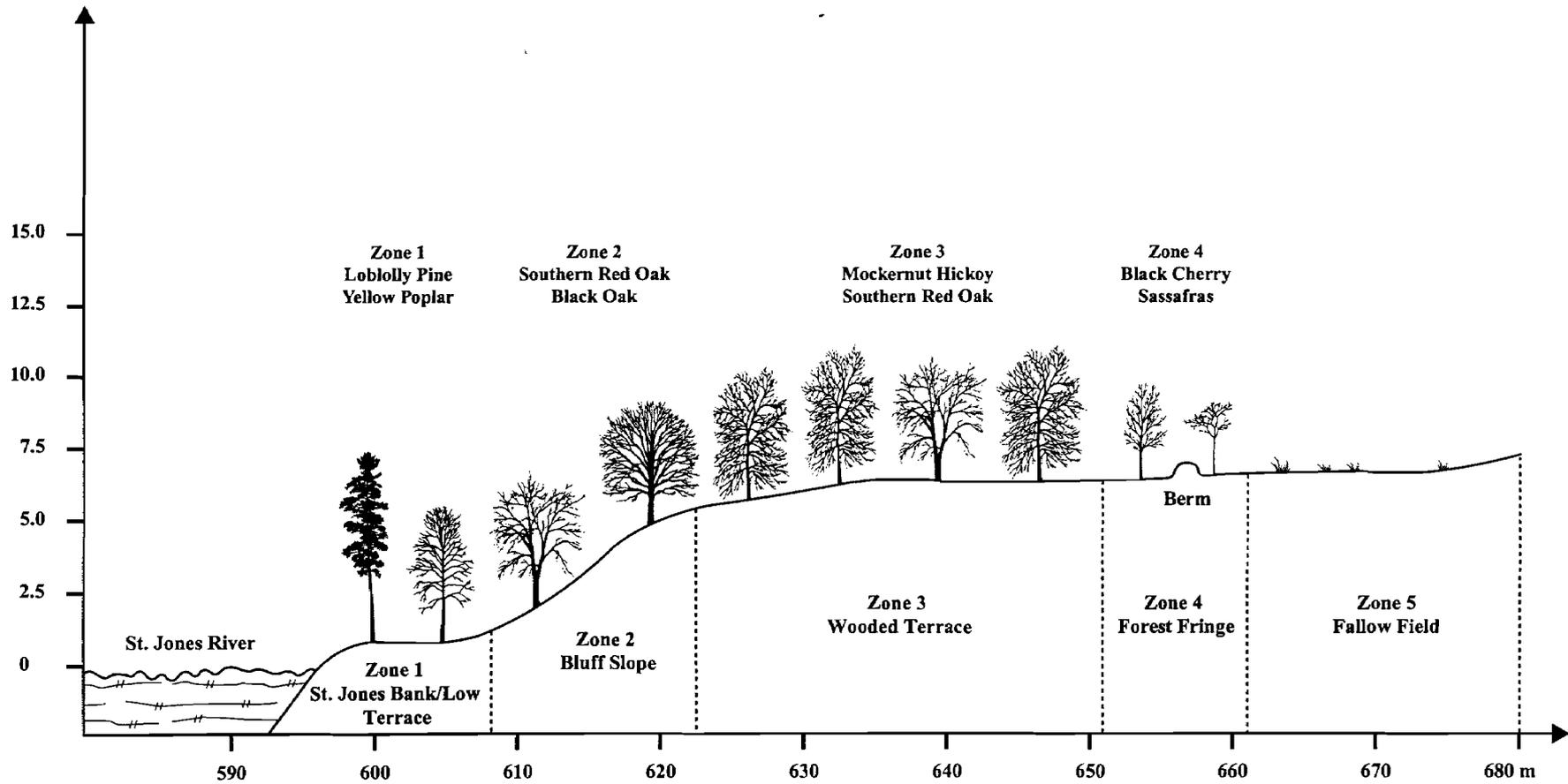
Methods

The northwest quadrant of the Hickory Bluff site was chosen as a study unit for the survey. This parcel was bordered on its west side by the St. Jones River. (Figure )The site access road/parking lot marked the study unit's north end while the abandoned field and recently constructed storm water drainage facility defined its eastern and southern limits. In all, the forested tract encompassed an area measuring approximately 40 by 80 meters.

The accounting of individual trees was limited to mature specimens and a 36-inch trunk circumference minimum was established for the forest canopy species. A cut-off of 24 inches was used in counting the deciduous fringe species (Black Cherry and Sassafras) as these mature to a smaller size. Occurrence of immature tree specimens, as well as understory and ground cover species was noted but not quantified. The age of representative mature tree specimens was obtained from tree ring counts following the area's clearing for construction. The survey was undertaken by the author with the field work performed during September and October of 1998.

The Hickory Bluff Study Area

## Hickory Bluff Cross-Section: Amplified Gradient Profile Showing Dominant Tree Species by Zone



Vertical Scale: 1 inch = 5 meters (above mean sea level)

Horizontal Scale: 1 inch = 10 meters (easting in site grid)

In addition to the relatively undisturbed state of the Hickory Bluff woods, several other factors made the location an excellent candidate for study. The study area encompassed the range of topographic features that together comprised the St Jones River front (i.e. river bank, bluff slope, high terrace). Furthermore, the mature woods abutted an abandoned field. This not only allowed one to study the composition of the fringe zone (transition from forest to field) but also to observe the colonization of the formerly cleared area by local pioneering species.

The study area consisted of a wide transect extending from the St. Jones River bank, east across the mature woods and into the fallow field. This transect encompassed five distinct topographic and/or environmental zones, each of which was surveyed as individual study units. A descriptive review of the five zones/study units is as follows:

#### The St. Jones Bank and the Low Terrace Zone (Z-1)

This area comprised the St. Jones River bank and the base of the bluff. Also included within the designation was a very low terrace that extended out from the base of the bluff at the north end of study area. This low terrace rises from what is essentially an inter-tidal zone, to an elevation of nearly one-meter at the base of the bluff. The low terrace is separated from the main terrace slope by a minor gully that holds an active spring. Portions of this low-lying landform may have been disturbed during historic times through the transport of borrow material mined from pits evident in the immediate vicinity. This zone varies from just a few meters in width, to as much as ten meters where the low terrace is included.

#### The Bluff Slope Zone (Z-2)

The bluff slope covered an area approximately 20 to 30 meters in width. From the base of the slope to the terrace rim, elevation rises approximately six meters, giving the landform a gradient of approximately 20 percent. With the obvious exception of an old borrow pit excavated into the base of the terrace near the southern limits of the study area, the bluff slope appeared to have remained relatively undisturbed by cultural activity.

#### The Wooded Terrace Zone (Z-3)

The high terrace overlooking the St. Jones was nearly level with an elevation of approximately six meters. The area was forested in mature stands of mixed hardwoods. These stands extended approximately 25-30 meters in (to the east) from the bluff edge.

#### The Forest Fringe Zone (Z-4)

This designation was applied to the eastern fringe of the mature forest. This narrow (ca. 10 meter wide) transition between old growth trees and the open field correlated with a linear earthen berm likely to have functioned as a historic property boundary marker.

#### The Fallow Field Zone (Z-5)

Areas east of the wood line proper lay in an abandoned field. This field had, until relatively recently been an orchard location. Some years prior, the orchard trees had been removed and the area allowed to lay fallow. At the time of the investigations, the field was heavily vegetated by herbaceous growth.

### Findings

#### General Observations

Tree ring counts obtained from representative mature specimens yielded a nearly uniform age determination of 75-80 years for the oak and hickory species on the Wooded Terrace (Z-3). The mature Loblolly pines on the St. Jones River Bank and Low Terrace (Z-1) proved to be circa 50 years of age. On close examination, the downed trees appeared to have been healthy with no evidence of disease, insect infestation or internal rot present in any specimen.

#### Survey Results

Table 1 presents the findings of the tree population survey, with species listed in order of frequency. Presence of understory and ground cover species is noted.

Table 1

#### The St. Jones Bank and Low Terrace Zone (Z-1)

Loblolly Pine ( <i>Pinus taeda</i> )	8
Yellow Poplar ( <i>Liriodendron tulipifera</i> )	4
Red Maple ( <i>Acer rubrum</i> )	2
White Oak ( <i>Quercus alba</i> )	2
American Beech ( <i>Fagus grandifolia</i> )	1
Northern Red Oak ( <i>Quercus rubra</i> )	1
Southern Red Oak ( <i>Quercus falcata</i> )	1
Black Oak ( <i>Quercus velutina</i> )	1

Understory: Immature White Oak (*Quercus alba*), Sweet Gum (*Liquidambar styraciflura*) and Baldcypress (*Taxodium distichum*)\*; Arrowwood (*Viburnum dentatum*) and Common Greenbriar (*Smilax rotundifolia*)

\* Mature Baldcypress trees were present in numbers on the opposite St. Jones Bank

#### The Bluff Slope Zone (Z-2)

Southern Red Oak ( <i>Quercus falcata</i> )	6
Black Oak ( <i>Quercus velutina</i> )	5
White Oak ( <i>Quercus alba</i> )	2
Loblolly Pine ( <i>Pinus taeda</i> )	1
Mockernut Hickory ( <i>Carya tomentosa</i> )	1
Northern Red Oak ( <i>Quercus rubra</i> )	1

Understory: Immature White Oak (*Quercus alba*) and Sassafras (*Sassafras albidum*); Flowering Dogwood (*Cornus florida*) American Holly (*Ilex opaca*); Arrowwood (*Viburnum dentatum*) and Common Greenbriar (*Smilax rotundifolia*)

#### The Wooded Terrace Zone (Z-3)

Mockernut Hickory ( <i>Carya tomentosa</i> )	12
Black Oak ( <i>Quercus velutina</i> )	4
Southern Red Oak ( <i>Quercus falcata</i> )	4
Willow Oak ( <i>Quercus phellos</i> )	2
Black Cherry ( <i>Prunus serotina</i> )	2
Northern Red Oak ( <i>Quercus rubra</i> )	1
Yellow Poplar ( <i>Liriodendron tulipifera</i> )	1

Understory: Intermittent ground cover of Honeysuckle

#### The Forest Fringe Zone (Z-4)

Black Cherry ( <i>Prunus serotina</i> )	14
Sassafras ( <i>Sassafras albidum</i> )	14

Understory: Honeysuckle; shrub-sized Sassafras (*Sassafras albidum*); Poison Ivy (*Rhus radicans*)

## The Fallow Field Zone (Z-5)

New growth Black Cherry (*Prunus serotina*) and Sassafras (*Sassafras albidum*); Goldenrod; Blackberry (*Rubus sp.*); Poison Ivy (*Rhus radicans*), Pokeweed Fam. (*Phytolaccaceae*), Smooth Sumac (*Rhus glabra*) and Virginia Creeper (*Parthenocissus quinquefolia*)

In addition to the two fruit bearing species listed above, several other edible plants were noted on the Hickory Bluff site, albeit just outside of the proscribed study area limits. These were Highbush Blueberry (*Vaccinium corymbosum*) and a Red Mulberry (*Morus rubra*).

## Discussion

The survey demonstrated that each of the different zones within the study area hosted distinct tree and plant communities. Not surprisingly, American Beech and Yellow Poplar were present on the St. Jones River Bank and Low Terrace (Z-1) as these species typically thrive in bottomland settings (Neelands 1968:58,90). However, the most abundant mature tree species in the low-lying zone was the Loblolly Pine. In addition to the living specimens, a number of large pine tree stumps were noted in this same area (See Meyer \*\*). Hardwoods present consisted of various species belonging to the Red Oak Group (Black, Northern and Southern Red) with mature White Oaks as well as large numbers of new and intermediate growth White Oaks. The occurrence of Baldcypress was particularly noteworthy. Far southern Delaware is generally recognized as the northern limits of their range (Neelands 1968:8, Sutton and Sutton 1985:365).

The Bluff Slope (Z-2) was marked by a high degree of diversity. Here species characteristic of both the upland and the low-lying zones co-occurred. These included a Loblolly Pine and a Mockernut Hickory specimen, as well as members of the Red Oak Group (Black Oak, Northern and Southern Red Oak). Two mature White Oaks were also present. The understory was also composed of a wide variety of species. However, as with the St. Jones Bank and Low Terrace (Z-1), new and intermediate growth White Oaks accounted for a large percentage of the secondary vegetation.

Mockernut Hickory dominated the Wooded Terrace (Z-3). Immature Mockernut trees also comprised what little understory was present. Also noted within this zone were intermediate growth Shagbark and Pignut Hickories, other examples of which were absent from the study area. Four species of the Red Oak Group were also present (Black, Northern Red, Southern Red and Willow). Interestingly, while White Oak was prevalent elsewhere in the study area, it was absent from the Wooded Terrace (Z-3). The preponderance of Mockernut and the absence of White Oak are likely due to the soil conditions on the landform. Mockernut Hickory thrives on drier soils found on hills and ridges (Neelands 1968:46) while White Oak grows best on deeper, more loamy soils (Neelands 1968:102) and often favors bottomland settings and swamp margins.

A nearly straight row of mature Black Cherry and Sassafras trees defined the Forest Fringe (Z-4). Black Cherry, in particular, is a specialized fringe species intolerant of competition. These trees can only establish themselves in areas that have been completely cleared, but then succumb when the slower growing forest canopy species shade them out (Neelands 1968:88). The mature Cherry and Sassafras specimens clearly marked the original field boundary. With time, however, the wood line extended outwards as the oak and hickory trees matured and their crowns expanded over and beyond the fringe species.

At the start of the Hickory Bluff excavations in December of 1997, the Fallow Field (Z-5) was heavily overgrown and appeared to have been left untended for approximately 10 - 15 years. The area was heavily vegetated in Black Cherry and Sassafras saplings, Blackberry brambles, Goldenrod and Poison Ivy. Smooth Sumac Pokeweed and Virginia Creeper were also present.

It is interesting to note that pines were present only along the St. Jones Bank and Low Terrace (Z-1). This can be seen as the pines having been relegated to the landform margins by the dominant hardwood species. The presence of new and intermediate growth as well as mature oak trees, amid mature as well as dead pines, demonstrated that this forest zone was actively moving towards a climax state. By contrast, the Wooded Terrace (Z-4) essentially was already in a climax state where the dominant hardwoods monopolize the forest canopy, crowding out other species and suppressing the understory. The community make up of the Fallow Field (Z-5) was also informative. Interestingly, despite the presence of mature Loblollies in the study area, new growth pines were completely absent while herbaceous fringe/ pioneer species dominated. Normally, while Loblolly thrives in a variety of sites, it is so adept at colonizing open areas that it is often called "old field pine" (Neelands 1968:16).

#### Implications for Prehistoric Local Environments and Resource Base

Key to this study is a corollary between past botanical environments and the present-day conditions. Previous paleo-environmental studies for Delaware suggest that the oak dominated forest was in place by 5800 B.P. (Newby, Webb and Webb 1994:35). A synthesis of local pollen data indicates that the forests of Central Delaware were comprised of oak, pine and hickory following ca. 6000 B.P. (Kellogg and Custer 1994:96). These findings generally agree with other regional studies (Kellogg and Custer 1994:96). By and large therefore, mid and short range fluctuations in temperature and moisture aside, the regional forest cover during the later Holocene was likely similar to that of the present day. Observations presented in this study can, therefore, be seen as broadly reflective of the local botanical environments during the bulk of the Hickory Bluff occupations.

Several observations concerning the present-day Hickory Bluff plant and tree communities can readily be made. The most obvious is the presence of edible mast bearing trees. Certain hickory species are widely recognized as having been a prehistoric food source. Mockernut Hickory, which dominated the Wooded Terrace (Z-3), yields a relatively large nut with a sweet edible meat (Sutton and Sutton 1985:430). Also an important food source would have been acorns of the White Oaks. In contrast to the fruits of the Red Oak Group which are bitter, White Oak acorns are sweet (Neelands 1968:92), allowing them to be consumed with minimum processing. New and intermediate growth White Oaks were present in numbers along the lower-lying zones, suggesting that this species was poised to become the dominate hardwoods as this part of the forest moved toward a climax state.

In addition to the mast bearing trees, a number of edible fleshy fruit yielding species were prevalent in the study area. Black Cherry in particular, occurred in large numbers. Mature Black Cherry dominated the Forest Fringe (Z-4). Also present along the Fallow Field (Z-5) were dense growths of Blackberry.

While a variety of food bearing plant and tree species were identified within the Hickory Bluff study area, other species present on site may have had important raw material value. Baldcypress in particular may have comprised a valuable prehistoric resource. Wood of the Baldcypress is exceptionally resistant to decay (Neelands 1968:8) and would therefore have been ideally suited for the construction of dugout canoes, fish weirs or for other uses that required extensive ground and/or water contact. While Baldcypress is extremely durable, Yellow Poplar bends readily (Neelands 1968:58) making it well suited in the construction of tensioned-domed shelters.

In summation, several inferences concerning the subsistence potential of the local environment can be made from the present-day tree and plant communities. Firstly, conditions along the Wooded Terrace (Z-3) and Bluff Slope (Z-2) seem to strongly favor the growth of Mockernut Hickory and White Oak respectively; both of which produce sweet nut meat and are widely recognized as having contributed to prehistoric diets. Secondly, the Fallow Field (Z-5) seems to favor the natural propagation of at least two edible fleshy fruit bearing species. Areas bordering the site that may have been open during prehistoric times as a result of natural occurrences such as fires and storms, or by cultural action, would likely have hosted similar populations.

The Botanical Environment study demonstrated a marked fertility of the Hickory Bluff environs as reflected in forest growth. This is seen not only in the progressed climax state of Hickory Bluff woods, but also the apparent rapid rate at which this condition was achieved. Tree ring counts on the mature hardwoods on the Wooded Terrace (Z-3) registered 75-80 years. In one exceptional example, a trunk circumference of 112 inches was recorded on a Black Oak, despite this specimen being only 52 years of age.

What is perhaps most striking about the Hickory Bluff environs is the sheer diversity of tree and plant species present within such a limited area. These not only include species

that yield edible fruits but also those that could have provided useful raw materials. In a broad sense, the co-occurrence of such a wide range of potentially economically important tree and plant species could very well have been a contributing factor in the site being repeatedly selected for occupation during prehistoric times.

Another observation is that, although central Delaware is generally thought of as part of the geographic North, the Hickory Bluff environs exhibit a distinctively southern ecological character. Prevalent on Hickory Bluff are numerous tree species common to southeastern forests. Of these species present on Hickory Bluff, the Willow Oaks, Southern Red Oaks and in particular, the Loblolly Pines stand very near the northernmost limits of their natural ranges (Sutton and Sutton 1985:414,358; Neelands 1968:100). The occurrence of Baldcypress, north of its generally recognized range (Neelands 1968:8), only reinforces this southern ecological character of the Hickory Bluff setting.

## Land Use Implications

Historic land use is probably the greatest single factor affecting the condition of archaeological contexts. In many cases, the plant/tree communities can serve as signature markers of land use history. On Hickory Bluff, the plant/tree communities of each the five analyzed zones, are reflective in varying degrees of that particular area's land use. An additional, well-defined example of this phenomenon was observed on the southern end of the site, just outside the proscribed study area. Here forest cover was characterized by gnarled and stooped Black Cherry trees interspersed by new growth hardwoods (McKnight 1998). This condition represents a typical stage of forest succession where the pioneering species are giving way to the slower growing, but ultimately dominant ones. Soil profiles show this part of the site had been plowed. This area represents formerly open land that had been allowed to go fallow, perhaps 25-30 years prior. Also present was a single large, mature Black Oak. Individual mature trees are often left standing in pasture areas to provide shade for livestock. It is important to note that this tree, which bordered the main excavation area (Block A) in that part of the site, was relatively short with a massive trunk diameter and expansive crown. This configuration indicates that the tree had matured in an open setting. By contrast trees maturing in a forest setting, such as those on the main part of the site, grow tall and lean as they are in competition and must either find their place within the canopy, or perish.

It is interesting to note that the area of mature forest in the center of the site is bounded by a straight-line earthen berm that defined a wedge-shaped parcel (See Figure \*\*). This feature very likely represents a historic boundary marker. Given the lack of evidence for plowing, and the prominent nature of the berm, historic use of this parcel as a wood lot, seems likely. Historic wood lots consisted of small, managed forest properties in which trees were selectively taken on an as-needed basis. However, tree ring counts indicated that the area had been uniformly timbered during the early part of the twentieth century.

In summation, present on Hickory Bluff were three fully distinct plant/tree communities, consisting of mature hardwood forest, immature mixed forest with an isolated mature hardwood, and recently abandoned agricultural land. The makeup of each of these communities is clearly reflective of that specific location's land use history. The abandoned agricultural field was overgrown with pioneering plant species. On the southern end of the site, tree size, age and other population characteristics strongly suggest that this area had been in pasture before being allowed to begin to revert to forest, perhaps 30 years prior. The core of the site lay in mature forest and appeared to have remained unplowed. An apparent earthen boundary berm enclosed the wooded parcel. Given the apparent lack of plowing, an historic use of this area as a wood lot is likely.

As a final thought on land use, more than a few persons involved with the project have commented on the seemingly special character of the Hickory Bluff location. Remarks often centered on the majestic nature of the mature trees that lent the site an open, park-like atmosphere. Throughout the project, many individuals, from one-time visitors to

long-standing staff members, left Hickory Bluff with a marked impression of the locale. Hickory Bluff is situated in an ecologically rich area, and much has been said about the setting in terms of being an attractive location for prehistoric peoples. Conversely, it is possible the prehistoric use of the site may actually have left a lasting positive ecological imprint. To elaborate, Hickory Bluff was intermittently occupied for much of the last 3000 years. During these occupations, plant and animal remains and human waste would have been continually introduced to the local forest environment, enriching the soil. Use of fire and trampling would have cleared out the understory and other secondary growth. Lesser trees in the vicinity would have been selected out, either by the site inhabitants directly, or by natural agents, and then subsequently removed to be used for fuel and raw material. Minor forest clearing may also have been practiced to open areas for habitation or for other purposes, again selecting out some trees and making more light available to the remaining ones. Together these factors may have functioned to enhance the genetic stock of the local tree population. It is deemed possible that the effects of this could persist through the present day. It is possible that this is precisely what allowed the Hickory Bluff woods to fully regenerate in 75 years—to move quickly towards a climax state—to exhibit some of the rapid growth rates demonstrated by the tree ring counts, and to have allowed certain tree species not only to exist, but to thrive along the northern limits of their normal range.

In essence, what is being suggested, is that the Hickory Bluff forest might hold within it, a distant echo of the human past. A long and sad chapter in human history is our negative interaction with the natural environment. Old World history, particularly along the Mediterranean basin, is rife with examples of ancient forest environments that had been overexploited and degraded to the point where the trees never returned. While the idea that prehistoric Native American land use practices could be reflected positively in contemporary local forest ecology is speculative, the concept could, and should be held as a powerful reminder of our own gross misuse of the forest and the negative consequences that this misuse has left us with.

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## Appendix 1 List of Hickory Bluff Species

American Beech (*Fagus grandifolia*)  
American Holly (*Ilex opaca*)  
Bald Cypress (*Taxodium distichum*)  
Black Cherry (*Prunus serotina*)  
Black Oak (*Quercus velutina*)  
Flowering Dogwood (*Cornus florida*)  
Loblolly Pine (*Pinus taeda*)  
Mockernut Hickory (*Carya tomentosa*)  
Northern Red Oak (*Quercus rubra*)  
Sassafras (*Sassafras albidum*)  
Southern Red Oak (*Quercus falcata*)  
Sweetgum (*Liquidambar styraciflura*)  
Red Maple (*Acer rubrum*)  
Red Mullberry (*Morus rubra*)  
White Oak (*Quercus alba*)  
Willow Oak (*Quercus phellos*)  
Yellow Poplar (*Liriodendron tulipifera*)

Arrowwood\* (*Viburnum dentatum*)  
Blackberry (*Rubus allegheniensis*)  
Goldenrod  
Highbush Blueberry (*Vaccinium corymbosum*)  
Poison Ivy (*Rhus radicans*)  
Common Greenbriar (*Smilax rotundifolia*)  
Smooth Sumac (*Rhus glabra*)  
Virginia Creeper (*Parthenocissus quinquefolia*)

\* non-native

## Appendix 2 Maximum Trunk Circumferences

Tree ring counts 75-80 years unless otherwise noted

Zone 1 St. Jones Bank and Low Terrace and Zone 2 Terrace Slope

Loblolly Pine	80 inches*
Yellow Poplar	132 inches
Northern Red Oak	72 inches
Southern Red Oak	72 inches
White Oak	66 inches
Mockernut Hickory	44 inches

\*50 years of age

Zone 3 The Wooded Terrace

Mockernut Hickory	52 inches
Black Oak	112 inches*
Southern Red Oak	65 inches
Northern Red Oak	96 inches
Black Cherry	52 inches

\* 52 years of age