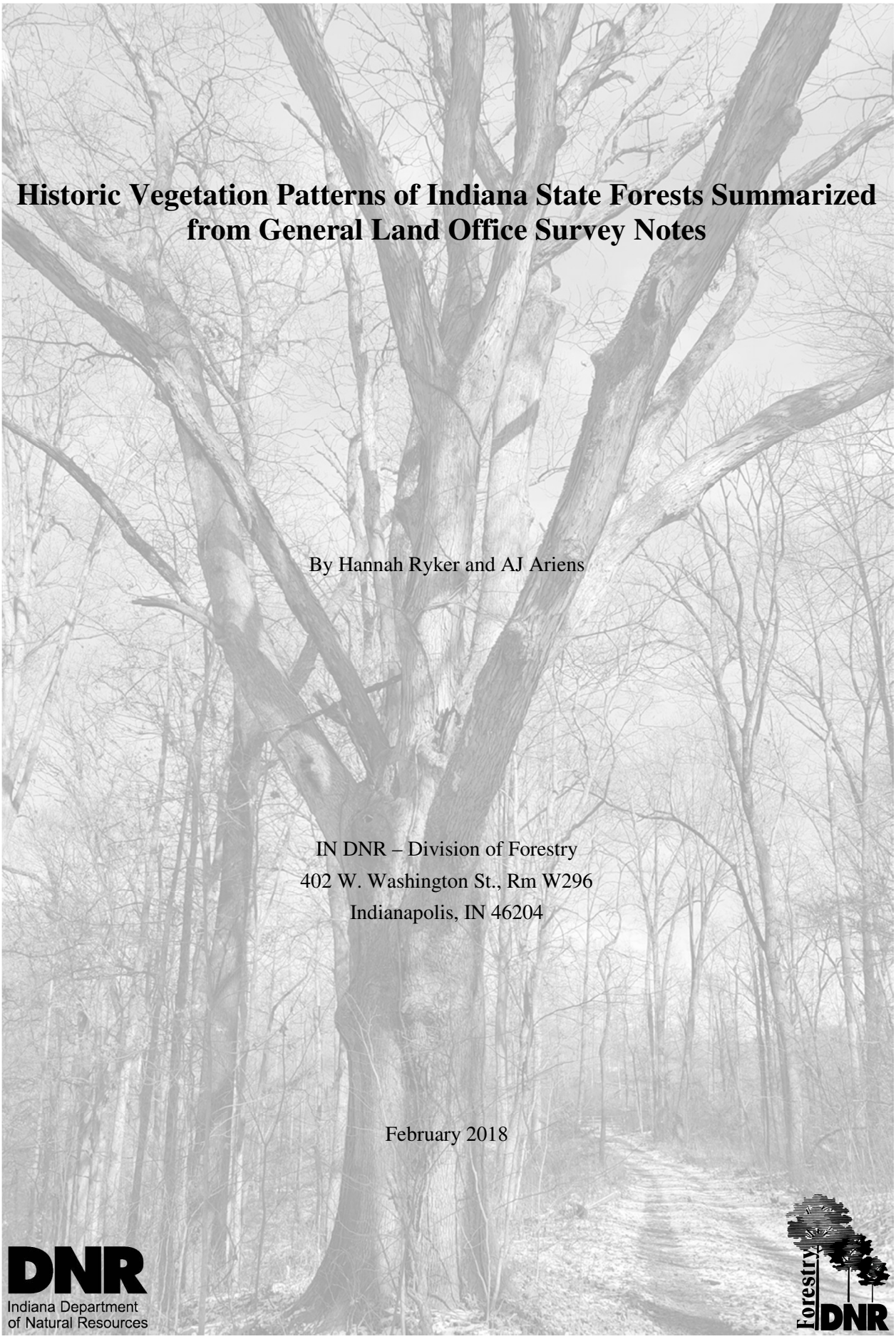

Historic Vegetation Patterns of Indiana State Forests Summarized from General Land Office Survey Notes

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Introduction

Historic vegetative patterns have been documented across the United States based upon information obtained from the General Land Office (GLO) surveyor field notes (Brugam and Patterson 1996; Comer et al 1995; Hanberry et al 2013; Hanson 1981; Jackson 2006; Powell 2013). In Indiana, Alton Lindsey utilized the Public Land Survey (PLS) notes to develop a pre-settlement vegetative map of the State (Lindsey 1966). Although still highly referenced and pertinent today this description focused on broad patterns across the state and not upon the local forest environment. This study focuses on a smaller scale in order to better understand the pre-settlement environment in the areas that one-hundred years later would become part of the Indiana State Forest system (Figure 1).

Predominately located in the southern half of the State, Indiana State Forests cover over 158,000 +/- acres across 24 counties. This research was based on the original Land Survey notes of Indiana between 1804 and 1849 as well as the 1786 survey of Clark's Grant, located on microfilm at the State Archives. From these notes, the species, diameter, and location were recorded for the line and witness trees. Additionally, land descriptions and any features of the land including (but not limited to) streams, swamps, prairies, windfalls, and pigeon roosts were recorded. This information was compiled into Microsoft Excel and mapped in ArcGIS.

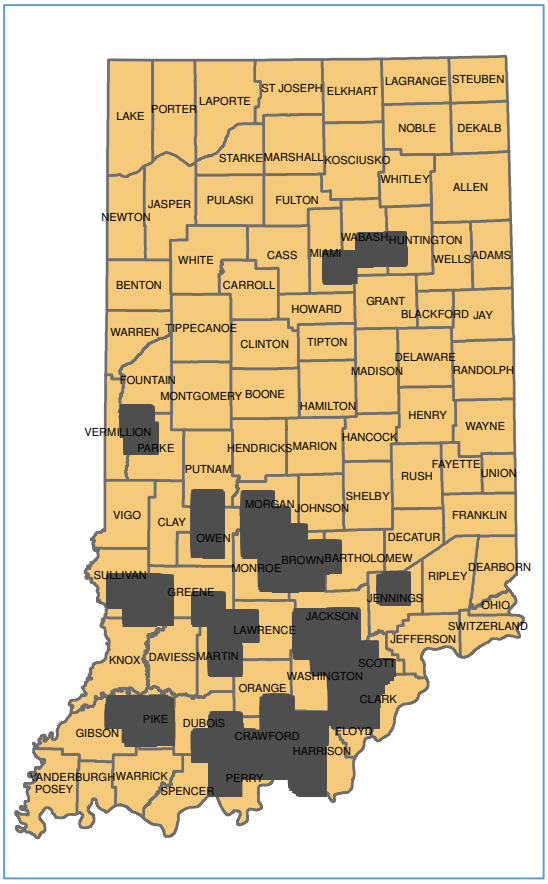


Figure 1: Location of Study Areas

The Rectangular Survey System

Prior to the rectangular survey, most of the land was surveyed using the system of metes and bounds. In this system boundary lines were often based off streams, trees, rocks, or some other topographic landform, which led to numerous overlapping claims and boundary disputes. However, following the Revolutionary War and the cession of the colonies' western lands to the new government of the United States, a new survey system was fashioned to allow the unsettled land, also known as the Public Domain, to be surveyed and allotted or sold (Cazier 1976; White 1991). For example, Virginia ceded the land that makes up modern day Indiana in 1784 (Henderson 1892). However, at that time much of this land was still controlled by the Native Americans living in the area.

The rules for the rectangular survey system originated from the Land Ordinance of 1785. This Ordinance called for the land to be split up into townships that were six square miles each, the location of which was to be based on the cardinal directions. These townships were then divided up into 36 one mile square sections using standard sized chains which were made up of 50 links. This new method of surveying was first implemented in a land tract in eastern Ohio called The Seven Ranges (BLM 2002; Cazier 1976; White 1991). However, because the rectangular system was new and had not been previously tested, there were problems with this first implementation.

Although the Land Ordinance specified how the townships should be surveyed, it did not provide a plan for surveyors to easily locate the townships nor did it provide a plan for how to impose a square grid onto a round earth. Because of these issues, there are seven surveys in Ohio and one in Indiana, east of the Greenville Treaty line known as the Gore of Indiana, that have "no initial point as an origin of both township and range numbers" (Cazier 1976:25). These issues were resolved during the surveying of the lands in Ohio and the south east corner of Indiana, and for the rest of Indiana, an initial point was established by running a north-south line, which became the principal meridian, and an east-west line known as the base line. These lines would be the basis for the location of the townships. Consequently, in Indiana, the line governing the location of the townships was surveyed in 1804 and is called the Second Principal Meridian (BLM 2002; Cazier 1976; White 1991). Additionally, correction lines had to be run at regular intervals so that the square grid would fit onto the surface of the earth. As a result, not all of the townships were a standard size.

In addition to the Second Principal Meridian, the treaty lines in Indiana were also important in the surveying of public lands. These lines were established based on treaties with the native peoples of the area and were meant to be the boundaries between the lands belonging to the United States and the Native American tribes. For example, the Treaty of Greenville signed in 1785 was the first treaty line in the lands that would become Indiana. Once the treaty was signed, the line was surveyed and the land east of the line was sold. Similarly, with other treaties, once the new boundary was established the new lands were surveyed up to the newly established boundary lines.

The General Land Office (GLO) was created in 1812 under the Treasury Department. The Commissioner of the General Land Office had the duty to "superintend, execute, and perform all such acts and things touching or respecting the public lands of the United States, and other lands patented or granted by the United States, as have heretofore been directed by law to be done or performed in the office of the Secretary of State, or the Secretary and Register of the Treasury, and of the Secretary of War" (General Land Office 1890:7). The Commissioner created districts to be run by a surveyor-general. In Indiana, these were the Vincennes, Jeffersonville, Indianapolis, Crawfordsville, Winamac, and Ft. Wayne districts (Henderson 1892). The surveyor-general then hired deputy surveyors and teams of chainmen on a contract basis. These men traveled across the country to survey the lands of the public domain. Based on the Land Ordinance of 1785, these surveyors along with their chainmen were required to take an oath (Cazier 1976). For example, in 1806 deputy surveyor Joseph Larwell witnessed the oaths of his chainmen, including the following oath made by Thomas Piles when surveying Township 1S5E (Figure 2):

Figure 2: Oath by Thomas Piles (Clark Co. T1S5E)

I, Thomas Piles, do solemnly swear in the presence of the almighty God that in all measurements and surveys in which I may be employed as chain carrier, I will faithfully and impartially execute the duties to the best of my skill and judgement, so help me God.
Thomas Piles
Sworn and surveyed before me this 27 Oct 1806.
Joseph H. Larwell

Or the oath given by Joseph Ingenson and witnessed by William Harris while surveying in what would become Sullivan County (Figure 3):

I, Joseph Ingenson, do solemnly swear in the presence of Almighty God that I will faithfully and impartially execute the trust reposed in me as a chainbearer so help me God.
Joseph Ingenson
Sworn and subscribed before me this 3rd day of January in the year of our Lord 1814.
William Harris

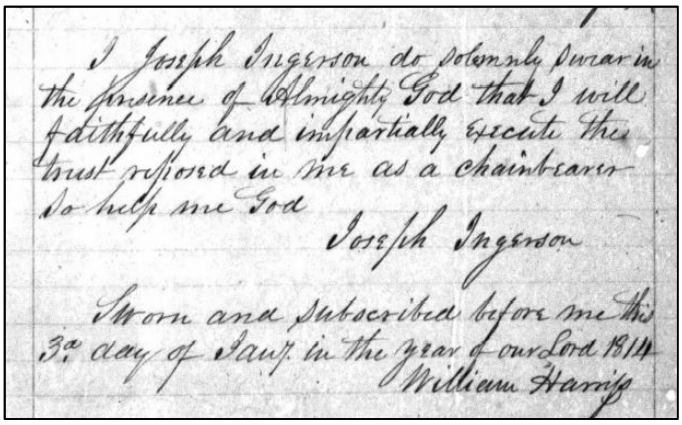


Figure 3: Oath by Joseph Ingenson (Sullivan Co.)

Based on Surveyor-General Edward Tiffin's instructions, surveyors began at the "southeast corner of the township and move on in continued progression from east to west and from south to north" (Henderson 1892:10). The lines of each of the 36 sections were measured by the standard chain to be one mile (80 chains). To mark these lines, every half mile (40 chains) or quarter section the surveyor would set a temporary post and make note of two witness trees including the species and diameter in his field notes (survey notes) (Figure 4). These measurements were done at these standard intervals unless the township was irregular. This happened if the township was crossed by a major river or boundary or if it had to be an irregular size due to the correction lines (Henderson 1892). In addition to witness trees, the surveyor marked line trees along the section lines. It is not entirely clear how they chose the line trees considering there seemed to be no set number of line trees that were marked. However, based on the survey notes, there were patterns. For example, frequently surveyors would mark one line tree before the quarter section and one after. Other times they would only mark one line tree or even none. However, it is clear that they did not mark every tree they came across while running the line (survey notes).

After the lines were run, plat maps were made and the field notes were sent to the surveyor-general's office. Copies of the notes were made with one set designated for Survey General, one for the General Land Office in Washington D.C., and one for the local land office.

Much discussion has been given to the bias of the GLO notes (Comer et all 1995; Galatowitsch 1990; Hanberry et al 2012; Liu et al 2011; Rentch 2001; Schulte and Mladenoff

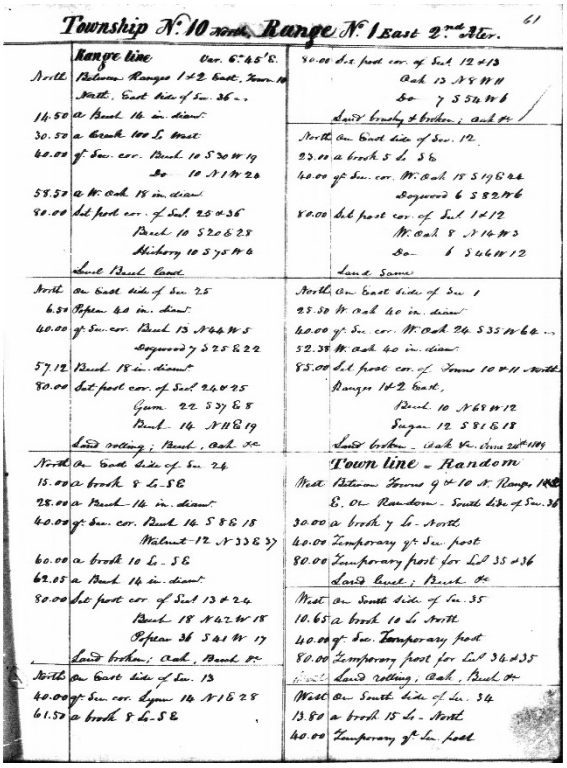
2001). Surveyors' preference for certain tree species or size when designating the witness trees can affect the number recorded of a given species. Smaller diameter trees may have been selected over mature, larger trees since they would be expected to last longer on the landscape. The objective of the PLS was not to record ecological data, but to aid in the dividing and selling of public land. As such, however, data extrapolated from the surveyor notes can be utilized to demonstrate environmental conditions prior to Euro-American settlement of the state (Hoagland et al 2013).

Methodology

The particular areas researched were chosen based on the location of state forest property and included information from all legal townships that contain property belonging to the Indiana Department of Natural Resources - Division of Forestry in the data set (Table 1). The surveys of townships in the following counties were reviewed: Brown, Clark, Crawford, Dubois, Gibson, Greene, Harrison, Jackson, Jennings, Lawrence, Martin, Miami, Monroe, Morgan, Orange, Owen, Parke, Perry, Pike, Putnam, Scott, Sullivan, Wabash, and Washington. It should be noted that additional counties may be included since Townships cross county lines; however, these counties are not included within the list of counties surveyed since no State Forest property lies within the county boundary. While analyzing the data, the townships were grouped based on the property which was located within the township boundary. This was done to equalize the data as some counties only contain one township with State Forest property and other counties contain property from more than one State Forest. Additionally, the properties that adjoin one another such as Yellowwood and Morgan-Monroe State Forests and Clark and Jackson-Washington State Forests were grouped; while other properties, such as the Pike Unit of Ferdinand State Forest, were separated due to the distance that separated the two properties.

Table 1: Research Area

State Forest Property	Counties	Township-Range
Covered Bridge	Parke	16N 8W, 17N 8W
Ferdinand	Crawford, Dubois, Perry	2S 3W, 3S 2W, 3S 3W, 3S 4W, 4S 3W, 4S 2W, 5S 3W
Francis Slocum	Miami	26N 5E
Greene-Sullivan	Greene, Sullivan	6N 7W, 6N 8W, 7N 7W, 7N 8W, 7N 9W
Harrison-Crawford	Crawford, Harrison, Orange	1S 1E, 2S 1E, 2S 2E, 2S 3E, 3S 1E, 3S 2E, 3S 3E, 4S 1E, 4S 2E, 4S 3E, 5S 2E, 5S 3E
Clark/Jackson-Washington	Clark, Jackson, Scott, Washington	Clark Military Grant, 1S 6E, 1S 5E, 1N 5E, 1N 6E, 2N 5E, 2N 6E, 2N 7E, 3N 4E, 3N 5E, 3N 6E, 4N 3E, 4N 4E, 4N 5E, 5N 3E, 5N 4E, 5N 5E
Martin	Greene, Martin, Lawrence	3N 3W, 4N 3W, 5N 2W, 5N 3W, 6N 4W
Owen-Putnam	Owen, Putnam	10N 4W, 11N 4W, 12N 4W
Pike	Gibson, Pike	1S 7W, 1S 8W, 1S 9W, 2S 7W, 2S 8W
Salamonie River	Wabash	27N 7E, 27N 8E
Selmier	Jennings	7N 8E
Yellowwood/Morgan-Monroe	Brown, Monroe, Morgan	8N 1E, 8N 2E, 8N 3E, 9N 1E, 9N 2E, 9N 3E, 9N 4E, 10N 1E, 10N 2E, 10N 1W, 11N 1E, 11N 1W, 12N 1W


Township N. 10 north, Range N. 1 East 2nd Mer. 61

Range line Var. 6°45' E.
North. Between Ranges 1 & 2 East, Town. N
West. East side of Sec. 36 ...
14.50 a Beech 16 in. diam.
30.50 a Beech 100 L. West.
60.00 g. Sec. cor. Beech 10 S 30 W 19
Do 10 N 1 W 26
58.57 a W. Oak 18 in. diam.
80.00 Set post cor. of Sec. 25 & 36
Beech 10 S 20 E 28
Hickory 10 S 75 W 6
Land Beech Land.

North. on East side of Sec. 25
6.50 Poplar 40 in. diam.
60.00 g. Sec. cor. Beech 15 N 44 W 5
Dogwood 7 S 25 E 22
57.12 Beech 18 in. diam.
80.00 Set post cor. of Sec. 24 & 25
Gum 22 S 37 E 8
Beech 14 N 11 E 19
Land rolling; Beech, Oak &c.

North on East side of Sec. 24
15.00 a brook S & SE
28.00 a Beech 14 in. diam.
60.00 g. Sec. cor. Beech 16 S 88 E 18
Walnut 12 N 33 E 37
60.00 a brook 10 L. SE
62.05 a Beech 14 in. diam.
80.00 Set post cor. of Sec 13 & 24
Beech 18 N 42 W 18
Poplar 36 S 41 W 17
Land broken; Oak, Beech &c.

North on East side of Sec. 13
40.00 g. Sec. cor. Lynn 16 N 15 E 28
61.57 a brook S & SE

80.00 Set post cor. of Sec 12 & 13
Oak 13 N 8 W 11
Do 7 S 50 W 6
Land broky & broken; oak &c

North on East side of Sec. 12.
23.00 a brook S & SE
40.00 g. Sec. cor. W. Oak 15 S 19 E 22
Dogwood 6 S 82 W 6
80.00 Set post cor. of Sec 1 & 12
W. Oak 8 N 16 W 3
Do 6 S 46 W 12
Land Same

North on East side of Sec. 1
23.50 W. Oak 40 in. diam.
40.00 g. Sec. cor. W. Oak 24 S 35 W 60 ...
52.38 W. Oak 40 in. diam.
85.00 Set post cor. of Town 10 N 11 North
Ranges 1 & 2 East,
Beech 10 N 68 W 12
Sugar 12 S 81 E 18
Land broken - Oak &c. Since 20th 1844

Town line - Random
West Between Towns 9 & 10 N. Ranges 1 &
E. on Random - South side of Sec. 36
30.00 a brook 9 L. North
40.00 Temporary g. Sec. post
80.00 Temporary post for Cor of Sec 35 & 36
Land Level; Beech &c

West on South side of Sec. 35
10.65 a brook 10 L. North
40.00 g. Sec. Temporary post
80.00 Temporary post for Cor of Sec 34 & 35
West Land rolling; Oak, Beech &c

West on South side of Sec. 34
13.80 a brook 15 L. North
40.00 Temporary g. Sec. post

Although more detailed species descriptions were recorded in the field notes (e.g. w. oak, b. oak, chestnut oak, and Spanish oak), for this analysis, these were grouped into broader species categories since some surveyors specified trees such as white oak and black oak, while others simply listed the general name (oak) or abbreviated species (b. oak). Some of the abbreviations the surveyors used could have stood for more than one tree. For example, "b. oak" could have stood for bur oak or black oak. By using the general names, these trees could be grouped together, allowing for easier analysis of the data; however, grouping species together does restrict what analysis can be completed on the dataset. For example, some environmental interpretations are minimized since different species within a family require distinctive environmental conditions to thrive. Through this grouping process, a list of 35 general tree species was compiled, including: allum, ash, aspen, beech, birch, box elder, box elm, buckeye, cedar, cherry, chestnut, cottonwood, dogwood, elm, gum, hackberry, hawthorn, hickory, ironwood, locust, lynn, mahogany, maple, mulberry, oak, persimmon, pine, poplar, redbud, sassafras, sumac, sycamore, w. thorn, walnut, and willow as well as a unknown group for trees that had information about the diameter or location but whose names were unreadable or missing. For some of the trees, such as w. thorn, there was no information indicating actual species. Additionally, allum was determined to be elm, and box elm is likely another name for box elder. However, since there was no evidence to support this theory and few trees were recorded in each of these groups it was deemed better to leave them in separate categories.

For this analysis, the tree species list was further paired down to include only those species that comprised at least 1% of the dataset: ash, beech, dogwood, elm, gum, hickory, ironwood, maple, oak, poplar, and walnut. The remaining trees were grouped together in a category called "other".

Results

Species Composition

A total of 21,739 trees were recorded within the 76 legal townships and the Clark Military Grant. Across all of the data, oak and beech were the most common species with 6958 oak trees (32.0%) and 5665 beech trees (26.0%) present (Figure 5). Every property included in this study counted either oak or beech as the most common tree in the area at the time that it was surveyed. Beside oak and beech, other common species included: maple (9.3%), hickory (8.8%), poplar (4.1%), gum (3.8%), dogwood (3.4%), ash (3.2%), elm (2.7%), ironwood (1.3%), and walnut (1.0%). As is common today, those areas with more oak had a high number of hickory trees while the distribution of maple paralleled that of beech. The remaining species (aspen,

birch, box elder, buckeye, cedar, cherry, chestnut, cottonwood, hackberry, hawthorn, locust, lynn, mahogany, mulberry, persimmon, pine, redbud, sassafras, sumac, sycamore, willow, and unknown) each contributed less than 1% of the composition and less than 5% collectively.

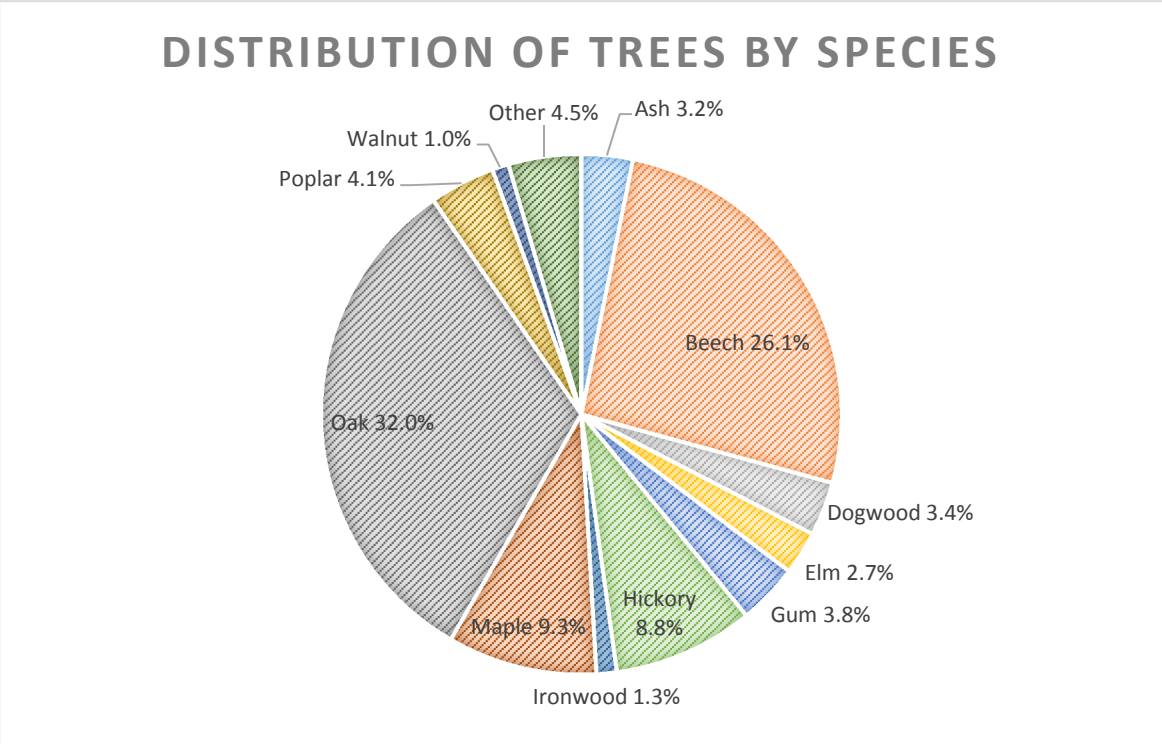


Figure 5: Distribution of tree species from the GLO records.

While each property exhibited species composition unique to the topography and micro climate of the localized region several generalizations can be perceived. For example looking at the distribution of beech and maple trees versus oak and hickory trees at Owen-Putnam State Forest shows that between 1811 and 1820, when the townships were surveyed, the forest composition in these three townships strongly indicated a beech-maple forest that suggests a more mesic landscape supporting shade tolerant species (Figure 6).

Other forest properties that follow a similar distribution pattern include Frances Slocum/Salamonie River, Selmier, and Martin State Forests, although in the case of Martin State Forest the main body of the forest property, along the White River Valley, was in a beech maple stand while the upland portion of the property to the northwest was dominated by oak and hickory (Figure 7).

Survey records covering both Pike and Greene-Sullivan State Forests indicate that these areas were predominately in oak-hickory (Figures 8 and 9). In both of these areas beech-maple was more prevalent along the river valleys and lowlands area while oaks and hickories dominated the drier upland ridges.

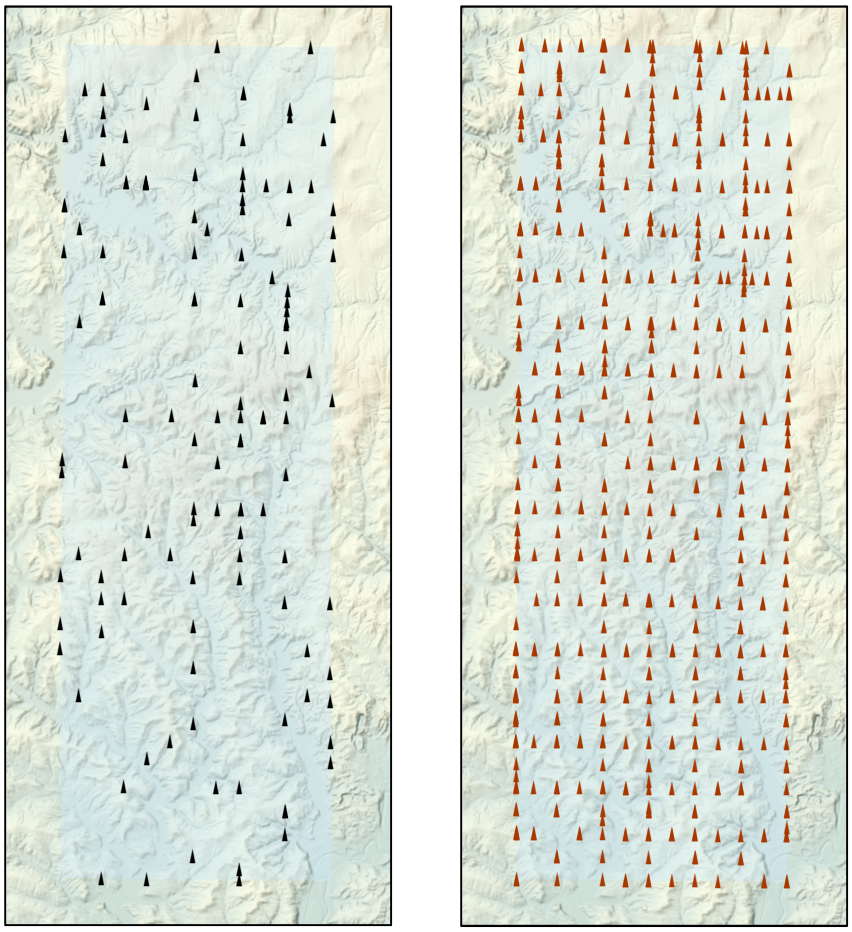


Figure 6: Distribution of oak and hickory (left) and beech and maple (right) trees at Owen-Putnam State Forest.

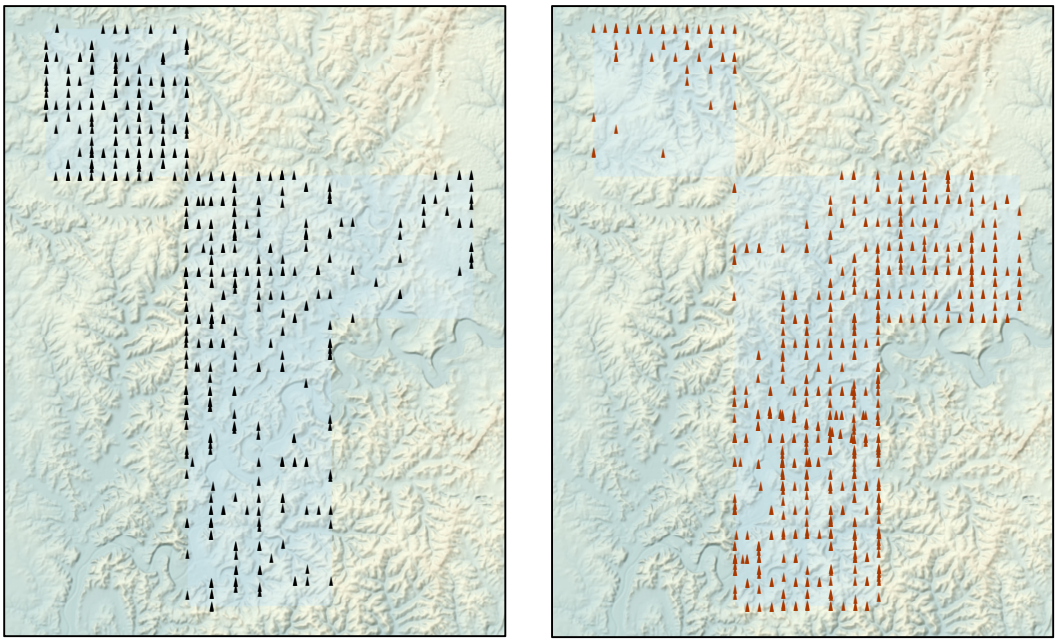


Figure 7: Distribution of oak and hickory (left) and beech and maple (right) trees at Martin State Forest.

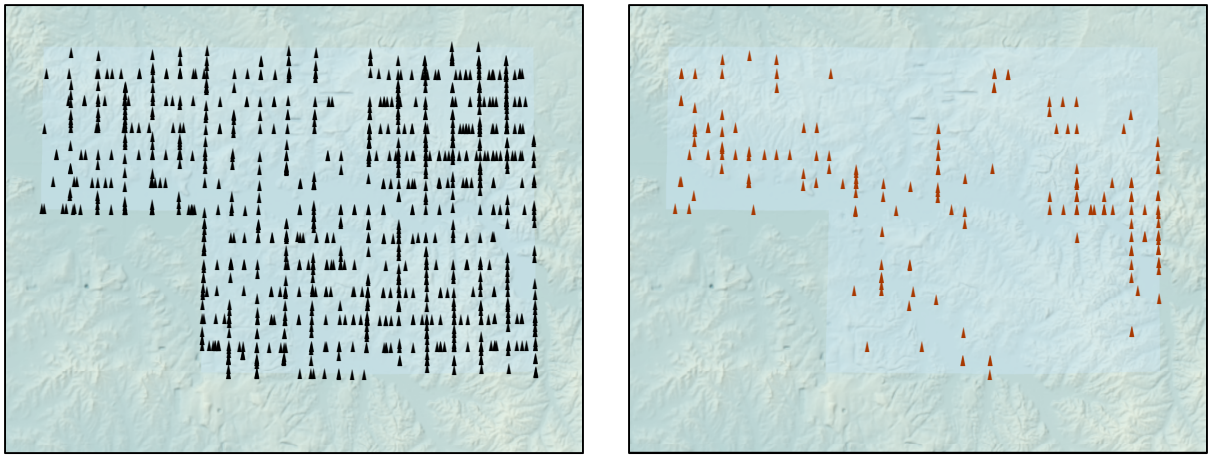


Figure 8: Distribution of oak and hickory (left) and beech and maple (right) trees at Pike State Forest

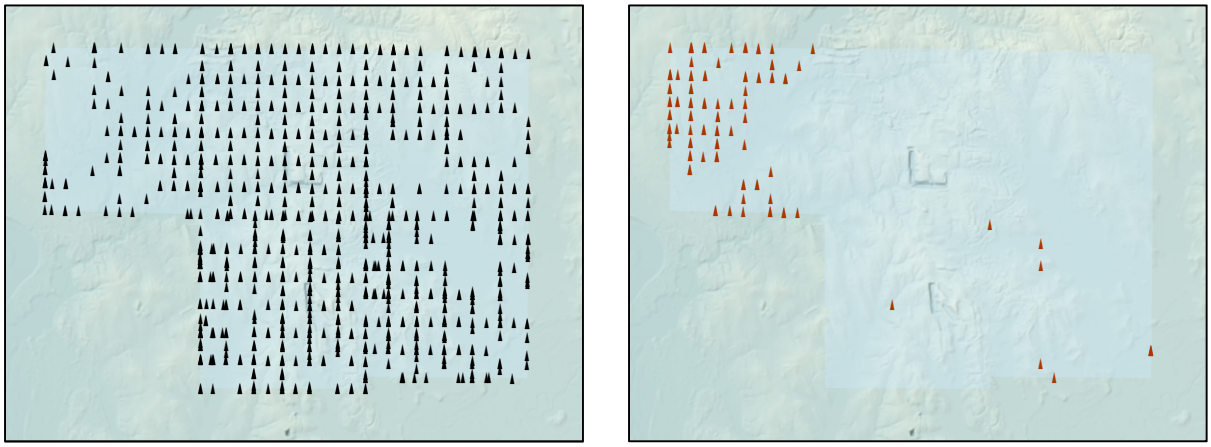


Figure 9: Distribution of oak and hickory (left) and beech and maple (right) trees at Greene-Sullivan State Forest.

Western mesophytic, or mixed forests, are generally characterized by a mix of species that dominate the canopy, including white ash, basswood, beech, red elm, black gum, sugar maple, red oak, white oak, tulip poplar, and walnut (Petty and Jackson 1966). The survey records indicate that during the early 19th century the areas of Cover Bridge and Ferdinand State Forests were predominately in a mixed mesophytic forest (Figure 10). While beech, maple, oak, and hickory occurred across Ferdinand State Forest, oak and hickory were more prevalent in the northern and western townships while the remainder of the area suggested a mixed forest type.

Survey records indicate that on the remaining properties (Harrison-Crawford, Clark/Jackson-Washington, and Yellowwood/Morgan-Monroe) multiple forest types existed. For example, while an oak-hickory forest dominated the eastern townships at Harrison-Crawford a western mesophytic forest was more prevalent in the northern township and along the western line of the study (Figure 11). Beech and maple, however, dominated the broader valleys of the Ohio River and Indian Creek.

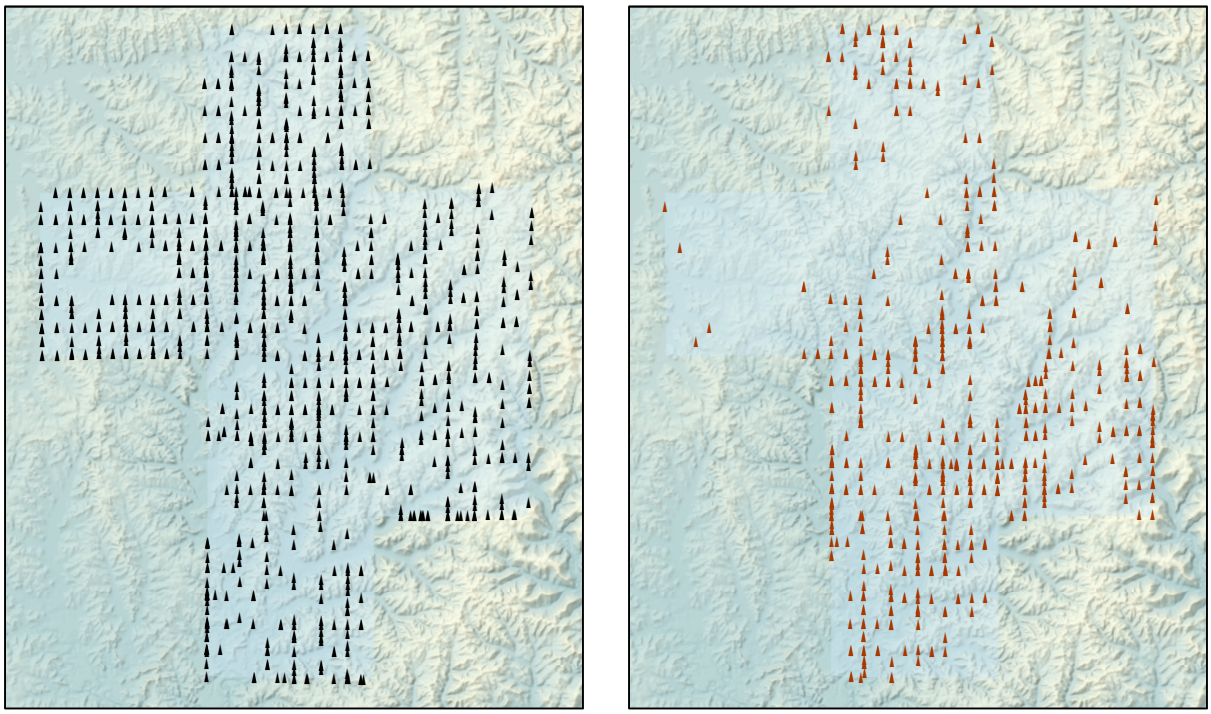


Figure 10: Distribution of oak and hickory (left) and beech and maple (right) trees at Ferdinand State Forest.

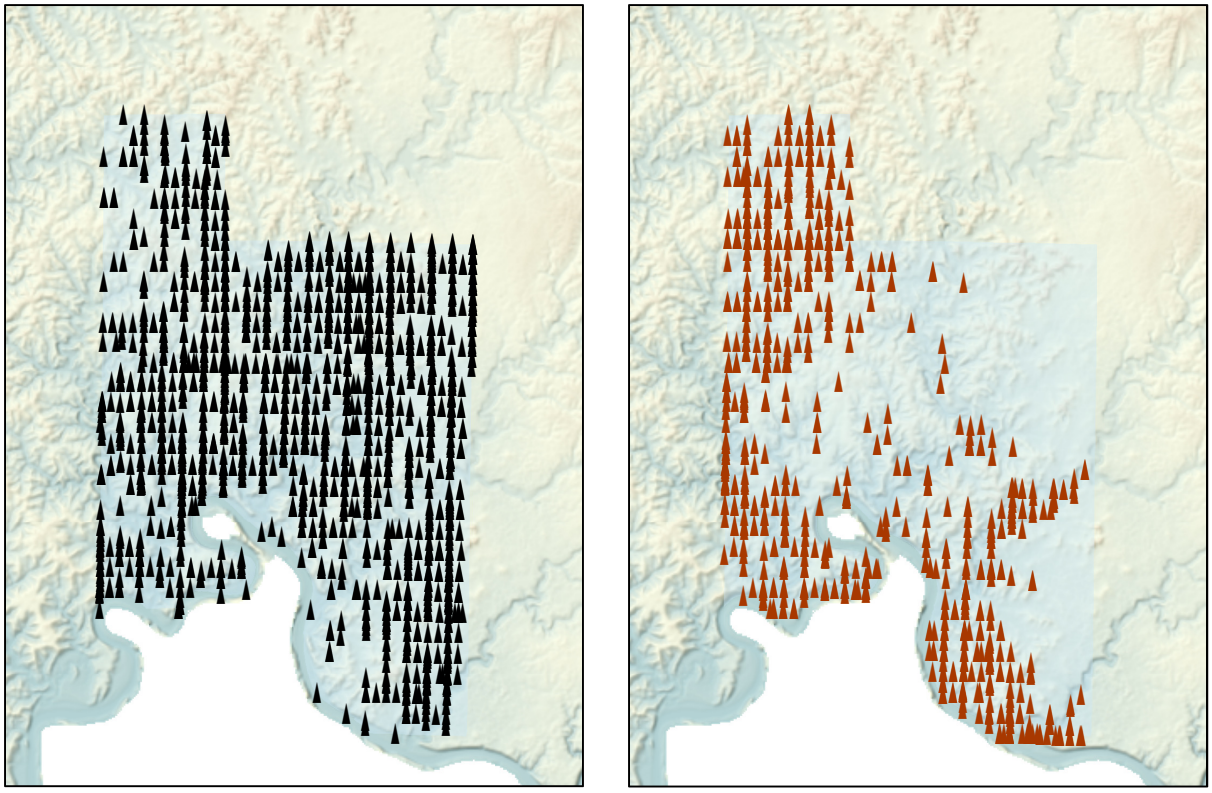


Figure 11: Distribution of oak and hickory (left) and beech and maple (right) at Harrison-Crawford State Forest.

Clark/Jackson-Washington State Forest exhibited greater densities of oaks and hickories to the south, along the Knobstone Escarpment, while beech and maple dominated the northern townships, in the broad plains surrounding the White and Muscatauck River valleys (Figure 12). Whereas at Yellowwood/Morgan-Monroe State Forest survey records indicate that oak and hickory dominated the rugged southeastern area of the project while beech and maple were more prevalent to the northwest, along the White River valley (Figure 13). The central area appears to be a western mesophytic forest.

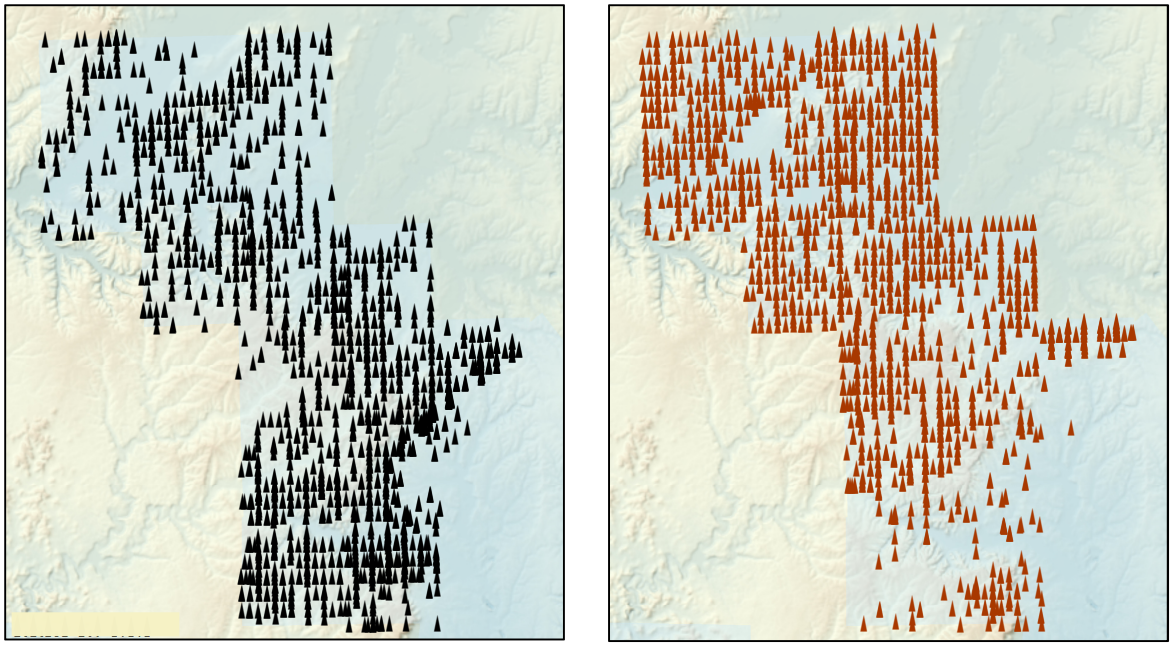


Figure 12: Distribution of oak and hickory (left) and beech and maple (right) at Clark/Jackson-Washington SF.

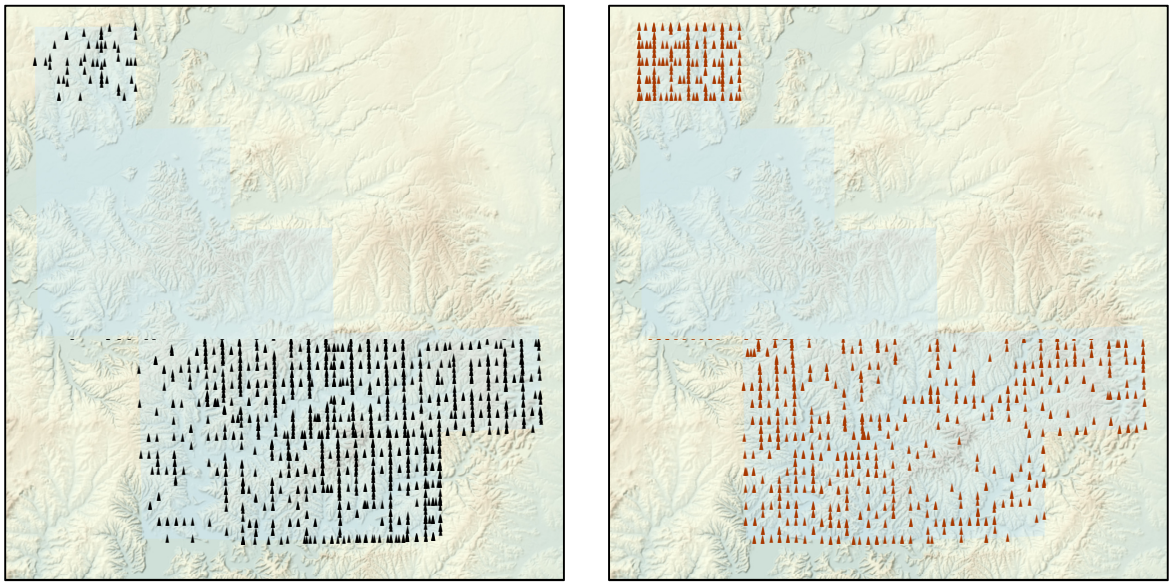


Figure 13: Distribution of oak and hickory (left) and beech and maple (right) at Yellowwood/Morgan-Monroe SF.

Current Forest Trends

A comparison of species based on the GLO records and the Continuing Forest Inventory (CFI) plots can be used to show changes in the forest composition over the previous 200 years. The CFI is an inventory of State Forest properties based on a sample of 3,867 plots located randomly across the system, providing a sampling rate of one plot every 40 acres (Gallion 2015). The plots are reinventoried every 5 years and provide useful data to this study concerning modern tree species and size.

Although the amount of data available for forest composition at the time of the original survey is limited compared to the current data regarding the structure of the state forest properties, based on a comparison of percentages, there are stark differences in forest composition between now and the 1800s. These primarily occur in four species: oak, maple, beech, and hickory. Specifically, with oak, the overall difference across all of the areas studied is a decrease of 22% while the presence of maple increased by 20%. Additionally, today there is an 8% decrease in the amount of beech and a 5% decrease in hickory.

The current composition of the forest properties has changed from what it was when the land was originally surveyed. With the exception of Selmier State Forest, all properties witnessed a decline in oak and hickory, with several properties losing more than 40% of the oak and hickory component (Table 2). Most properties have noticed a rise in beech and maple, with only Owen-Putnam and Selmier noting a decline in these species. Properties such as Ferdinand/Pike and Harrison-Crawford, which had a predominance of oak and hickory, now have significantly more beech and maple (on Ferdinand/Pike oak and hickory declined by 44% while beech and maple increased by 21% and on Harrison-Crawford oak and hickory decreased by 40% while beech and maple also increased by 21%). Additionally, the oak-hickory forest of Greene-Sullivan decreased significantly (73%) and now has more of a mix of both forest types with far less xeric species present. Other forests such as Clark/Jackson-Washington, Yellowwood/Morgan-Monroe, and Martin have transitioned from a mixed forest to one made up of mostly beech and maple.

Table 2: Change in species composition by property.

Property	**% Change in Oak/Hickory**	**% Change in Beech/Maple**
Clark/Jackson-Washington	-19	+14
Yellowwood/Morgan-Monroe	-25	+11
Covered Bridge	-9	No change
Ferdinand/Pike	-44	+21
Francis Slocum/Salamonie	-8	-23
Greene-Sullivan	-73	+3
Harrison-Crawford	-40	+21
Martin	-22	+3
Owen-Putnam	-6	-16
Selmier	+16	-41

Species of Line Trees Compared to Witness Trees

Overall there are more witness trees than line trees in the dataset; however, this is due to the conventions of the rectangular survey system rather than any tree growth pattern. Since some surveyors recorded less line trees than surveyors working in other areas, the difference in the number of line and witness trees on some properties is significantly larger than others. However, no significant difference in species composition was noted when comparing witness tree species to line trees with the exception that all dogwoods and ironwood trees that were identified were designated as witness trees (Figure 14). Ash, oak, and poplar were more frequently designated as line trees while beech, gum, and maple were more commonly noted as witness trees; however, the difference in proportion of the trees was non-significant and suggests that the entire data set can be used as an accurate representation of the forest types present at the time of the GLO surveys. Elm, hickory, and walnut were designated in the same proportion.

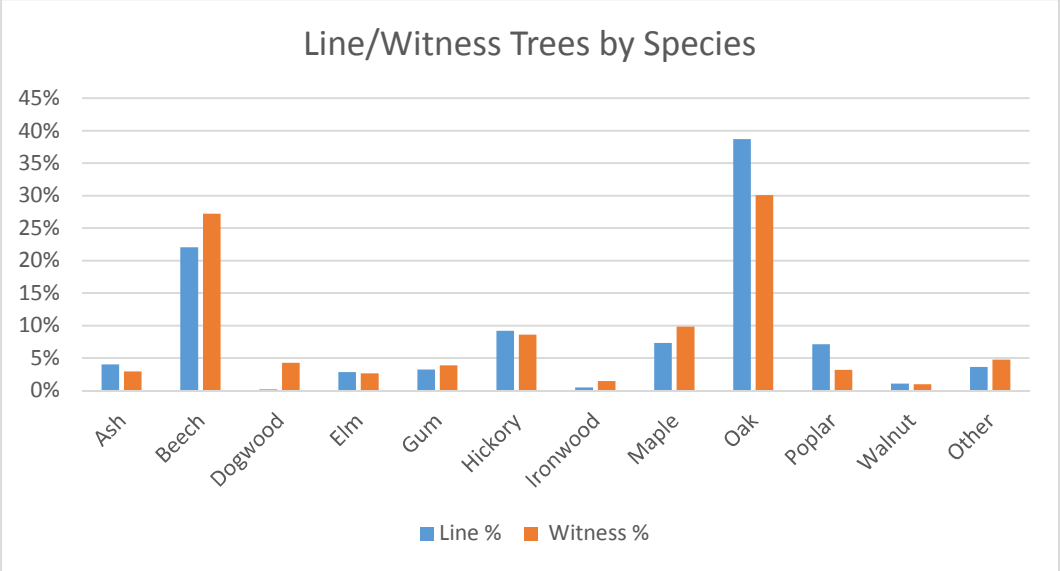


Figure 14: Proportion of line trees compared to witness trees from the GLO records.

Species Diameter

A total of 21,360 trees with dbh (diameter at breast height) were recorded, with 379 trees of the sample either lacking diameter information or having illegible measurements. The diameters ranged from 1 to 115 inches with the majority (60%) of the sample falling within the 10 to 20 inch class range and 76.5% falling within the 6 to 20 inch range (Figure 15). Of the trees with the diameter noted in the GLO survey, the most common dbh class was 12 inches (12%) with the 10 inch class following second (11%). Similar to the overall tree composition, when the diameters were compared by species class, it was noted that the majority of trees were consistently in the 6-20 inch diameter range (Figure 16). The exceptions were dogwood and ironwood trees, with 65% of the ironwood and 98% of the dogwoods falling between 1 to 10 inches dbh. Within the two species, the six inch class was the most common with 26% of both species occurring within this diameter group. This is not unexpected as both species are

understory trees do not reach the size of the other species. The largest tree in the data set was a 115 inch hickory followed by a 114 inch oak and a 100 inch sycamore. Poplars tended to have a much wider range of diameters spanning from 6-40 inches.

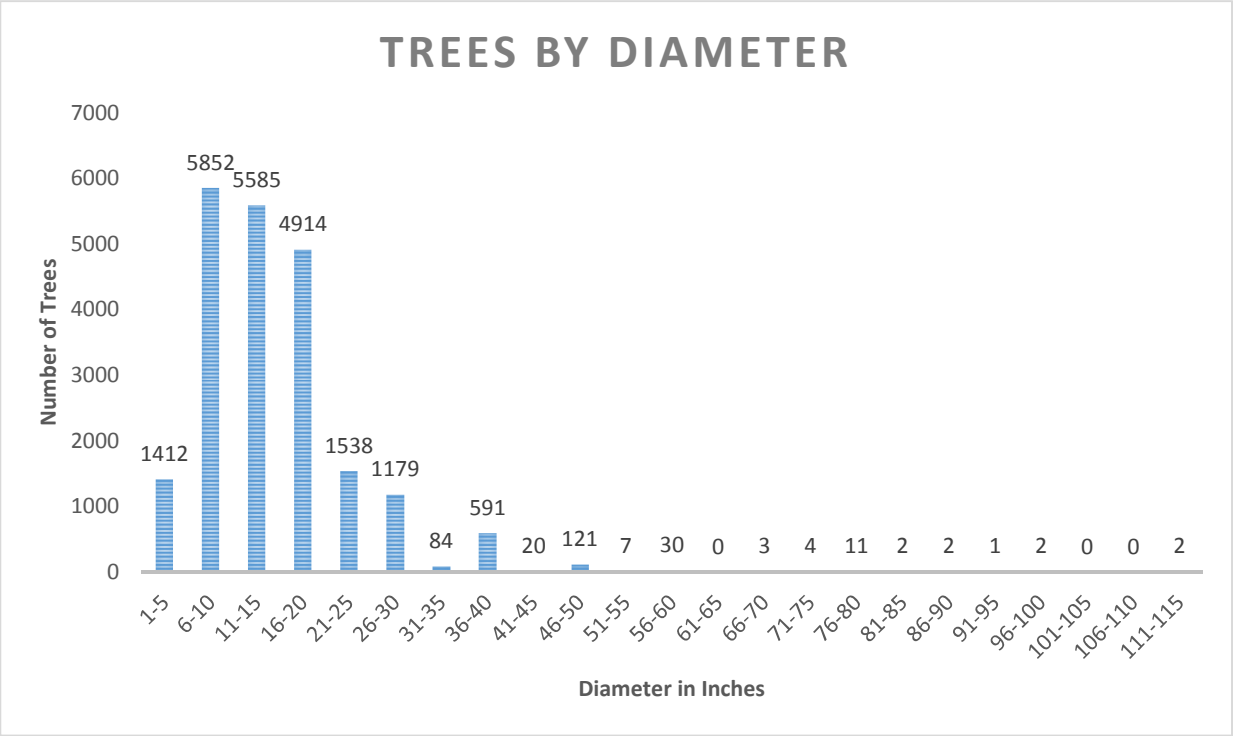


Figure 15: Distribution of tree diameter from the GLO survey notes.

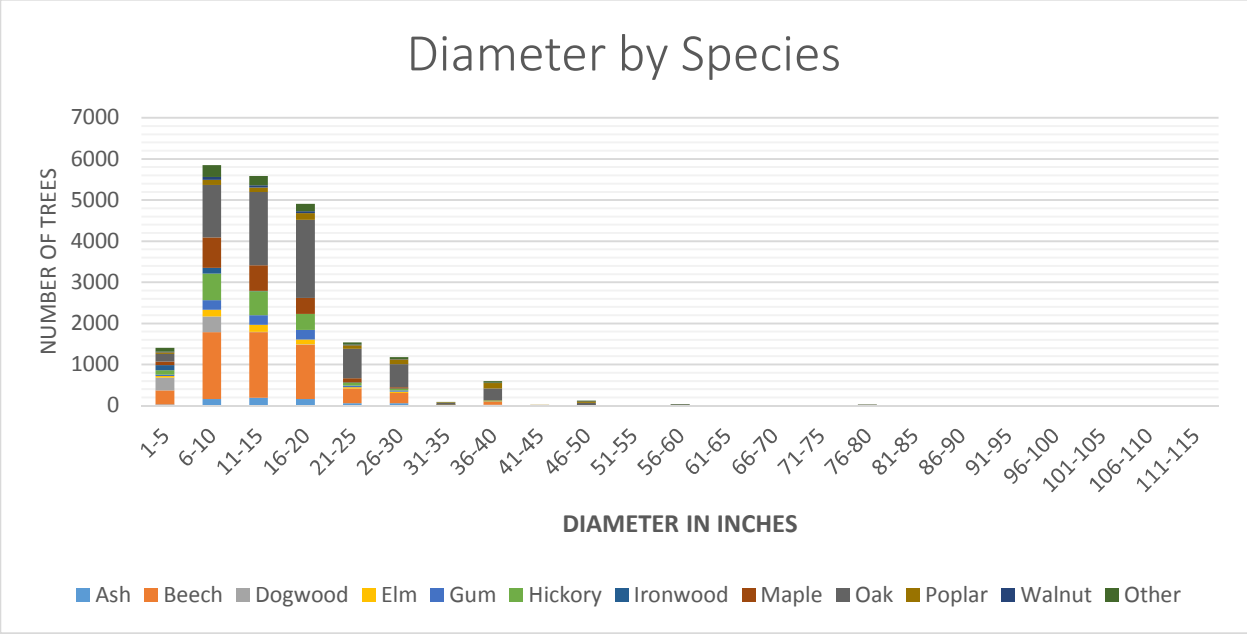


Figure 16: Distribution of tree diameter by species from the GLO survey notes.

Diameter of Line Trees Compared to Witness Trees

There was some difference in the diameter size of line trees versus those of witness trees. Over all, witness trees tended to be smaller with the largest number of witness trees (32%) falling in the six to ten inch diameter range (Figure 17). Meanwhile, the largest number of line trees (34%) fell in the sixteen to twenty inch range. This is likely due to the fact that witness trees were required to be in a fixed spot near the section corner or quarter section. Therefore, the surveyor had to use the trees available on that spot. This could mean smaller trees were recorded more often. However, line trees could fall anywhere on the line so there could have been some bias toward choosing trees with larger diameters on the part of the surveyor. Therefore, this difference in the surveyor's ability to choose witness trees versus line trees could have caused the difference in size between the two categories of trees.

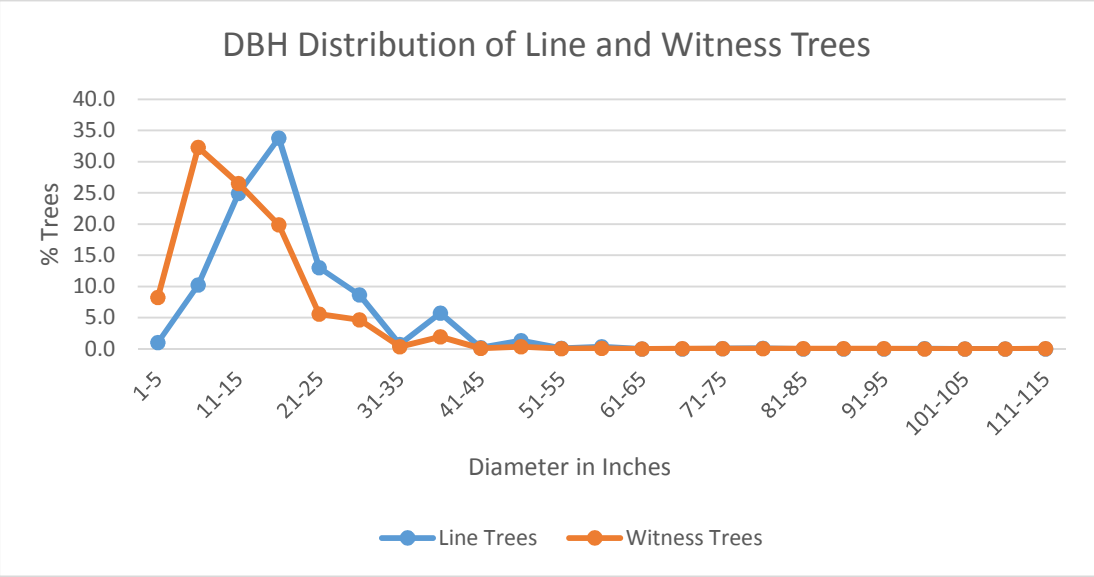


Figure 17: Diameter of trees comparted to witness trees from the GLO records.

Unique Features

Several unique areas were noted in the GLO survey notes that help to construct the environmental conditions present within the state prior to settlement. Surveyors would note when they entered and left windfalls, barrens, swamps, or other areas that appeared noteworthy. For example, in 1807 deputy surveyor Alexander Enos made note of a large area in Township 2N7W, on the modern day border of Clark and Scott Counties, in which the trees had been destroyed by pigeons roosting. Entire sections were present where trees were stripped of all their leaves and where the excrement from the birds killed all of the vegetation on the forest floor.

In other areas fire and wind created large expanses devoid of trees. Clark, Ferdinand, and Harrison-Crawford State Forests all had places where the trees had been destroyed by fire; however, Martin State Forest had the largest recorded burned area of the townships included in this study (Figure 18). Primarily concentrated in the southeast and northwest corners, this fire extended diagonally across several sections of Township 3N3W. Based upon the surveyor notes

the fire appears to have been contained to the ridge tops since no fires were reported in bottoms between the clusters. Although the fire could have occurred naturally it is also possible that the area was deliberately burned by Native American populations living in the nearby river valley. Native American use of fire has been well documented within the Midwest and repeated burning of the landform helped to shape the forests that were encountered by the Land Office surveyors (Comer et al 1995; Delcourt et al 1999; Rentch 2001).

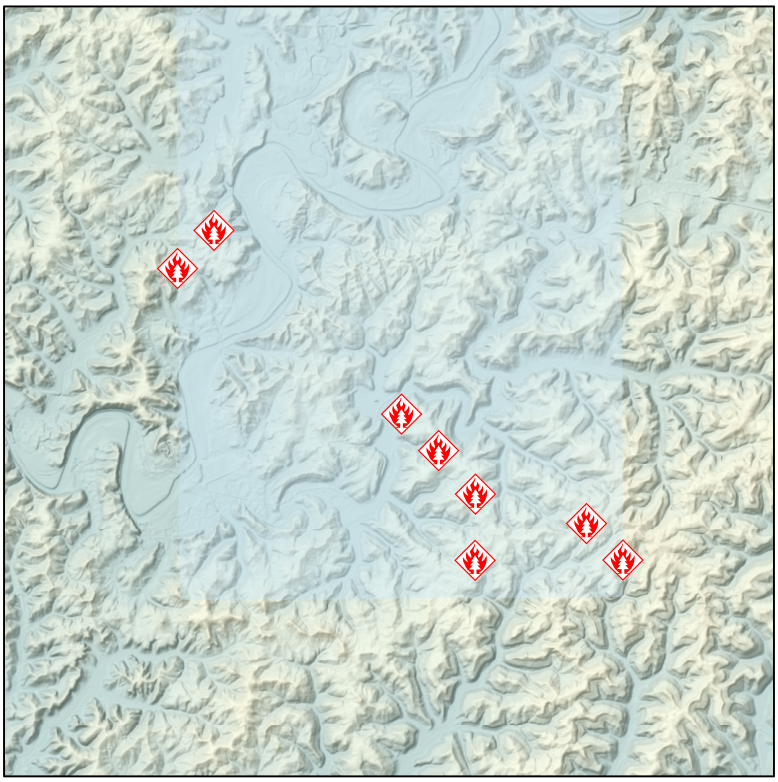


Figure 18: Distribution of fire in Martin County from the GLO records.

Further analysis of species in a region may also be utilized to identify areas of previous disturbance that the GLO records did not note. For instance, although no fires were reported by the surveyors in the Yellowwood/Morgan-Monroe area, the higher percentage of sassafras on this property (27% of all recorded sassafras was on Yellowwood/Morgan-Monroe – over 10% higher than any other property) likely indicates that the area had been subject to fires but had sufficient time to reforest prior to the land survey. Sassafras is considered a pioneer species and typically occurs on disturbed sites (Weeks et al 2005). Intolerant of shade, the presence of sassafras in the forest composition suggests that the forest canopy had been opened enough to receive ample sunlight for the sassafras to grow, such as the case of when a fire sweeps across an area. The majority of the sassafras in the dataset fell between 4 and 10 inch dbh.

Another interesting feature found in the survey notes was a large area in Morgan County in which the trees had been felled by wind (Figure 19). After locating these areas on a map, there was a clearly delineated line that covered around eight miles: starting in the northeast corner of Township 12N1W and ending in the northeast corner of Township 11N1W. This line crosses

multiple types of land forms and has a two mile gap in between the beginning and end of the line of felled trees. Based on these characteristics, this line of felled trees was likely the result of a tornado that occurred before the area was surveyed. Additionally, just south of this area there was a 3 mile path of wind-felled trees that also could have been the work of a tornado.

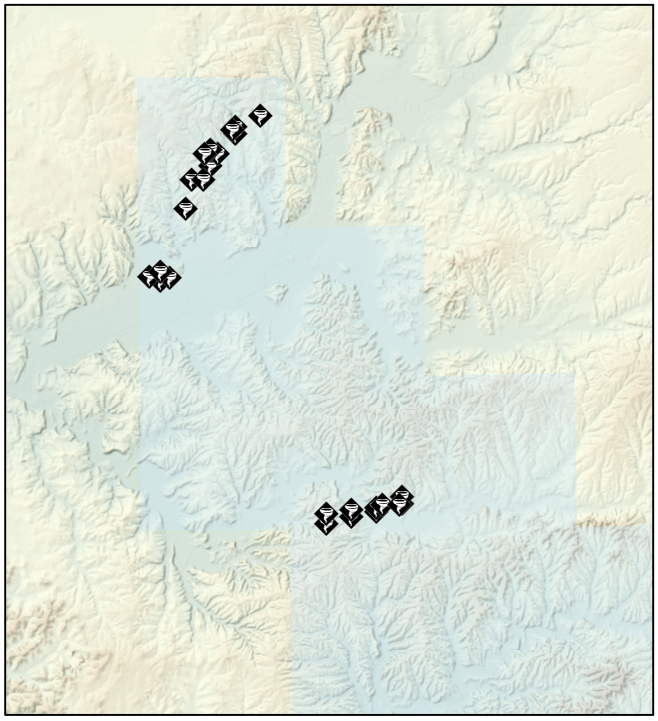


Figure 19: Wind disturbance in Morgan County from the GLO records.

Almendinger's 2010 study utilizes the PLS records to reconstruct natural disturbance patterns and fire history and indicates that surveyors were less likely to note stand wide disturbances such as wind or fire that prevented the presence of a witness tree if the disturbance occurred prior to 5 to 15 years before the survey (Almendinger 2010). By this time trees would have repopulated the area and trees, albeit small, would have been available to testify to the post. In Indiana, small diameter trees (under 10 in dbh) were frequently used and supports Almendinger's claims. Therefore, it is likely that areas where windfalls and fire were reported had likely occurred within 15 years of the survey. This data can be further utilized to help identify frequency of disturbances that would regenerate the existing forests in Indiana.

Additionally there were multiple large areas that the surveyors called "barrens" where there were few to no trees. In most cases, the surveyors still found line and witness trees to record including one barren in Harrison County that spanned three townships; however, there was one instance in Dubois County where nine sections in the middle of the township had at least one line where no trees were recorded. Surveyors also recorded areas with few trees, such as a large area in Greene-Sullivan State Forest, which abutted an area that was documented as missing trees and/or barrens.

Although external forces such as wind, fire, and birds cleared some of the forests prior to the survey of the land, other more natural features were noted. For example, there were several instances in which the surveyors encountered prairies. These occurred in Morgan, Parke, and Pike counties; however, the majority of the prairie land noted by the surveyors was in Greene and Sullivan Counties (Figure 20). In this area more than ten instances of prairie were recorded in every township that was included in this data set.

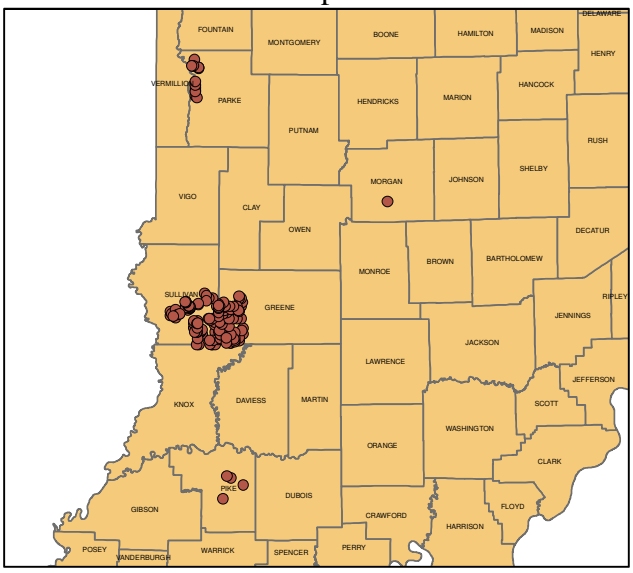


Figure 20: Distribution of prairies from the GLO records.

Discussion

Detail notes taken by the GLO surveyors have allowed the authors to recreate property level landscape descriptions for the Indiana State Forest system. Analyzing the distribution of tree species across a specific area may be used as tool in forest management. By understanding the species composition present prior to widespread landscape changes of the 19th century forest managers may be able to reconstruct vegetation patterns based upon the descriptions of the GLO surveyors.

Clark/Jackson-Washington

Because both Clark State Forest and Jackson-Washington State Forest terminate within a mile of one another and co-occupy at least one legal township the properties were combined as a single study unit. Both properties are located along the Knobstone Escarpment of the Highland Rim Natural Region, a narrow band of steeply sloped ridges that rises nearly 600 feet above the surrounding landscape to the east. Clark State Forest, the system's oldest property, was established in 1903 and currently covers over 25,000 acres in Clark, Scott, and Washington Counties. Jackson-Washington State Forest was established in 1931 and today covers nearly 18,000 acres in Jackson and Washington Counties.

GLO records indicate that while beech and oak occur in similar densities the distribution of the species differed significantly within the study area. Very little beech was recorded within the properties, with the majority lying in the townships outside of the State Forests, particularly in the broad valleys that abut the Escarpment. In contrast, little oak occurred in the broad valleys of the Scottsburg Lowland but was concentrated within the steeper sloped ridges where Clark and Jackson-Washington State Forests reside. Other species present within the State Forest properties included ash, cherry, chestnut (although no chestnut was noted in Jackson County), dogwood, elm, gum, hickory, ironwood, poplar, sycamore, and walnut. A single hackberry was noted within Jackson-Washington State Forest; however, a series of these trees clearly follow the White River northwest of the property. Several pine were also noted within Clark State Forest, however, all were restricted to a small area in the southeast quarter of Township 2 North, Range 6 East.

The GLO records describe much of the area around Jackson-Washington State Forest as wet, swamps, or ponds, particularly along the Muscatatuck River valley. Some swamp and wet

land was also noted south of Clark State Forest. Several barrens were designated in the surveyor's field notes, the majority of which resided in Scott County as well as numerous areas that were classified as good wheat land in Jackson County. Several areas of tree fall/wind fall were also notes as well as an area of timber burned by fire and an area of timber destroyed by pigeon roosts. The fire area was noted in three adjacent sections and may likely cover an area equivalent to a section (640 acres), whereas the pigeon roosts were identified within a one by two mile area.

Covered Bridge

Covered Bridge State Forest is a recent acquisition, opened in 2009, in Parke County. This 300 acre property is located within the Entrenched Valley Section of the Central Till Plain Natural Region. Located in the uplands along Sugar Creek, the property was impacted by all of Indiana's glaciers.

Due to its small size only four species were recorded from the GLO survey notes within Covered Bridge State Forest: ash, beech, maple, and oak. However, species composition within the two townships that make up the study area is diverse and also include box elder, buckeye, cherry, cottonwood, dogwood, elm, gum, hackberry, hickory, ironwood, locust, mahogany, mulberry, pine, poplar sassafras, sycamore, w. thorn, walnut, and willow. While beech is more prevalent on the eastern side of the study area, oak dominates the western half, nearer the Wabash River, indicating that a mixed mesophytic forest was likely present at the property at the time of settlement.

The surveyors encountered a variety of habitats around Covered Bridge State Forest. Prairies were the most frequently describe environment, particularly on the western edge of the study area. The landforms were also described as wet and a few swamps were noted. In addition, at least one barren was also identified, as well as a bank of coal.

Ferdinand

Started in 1933 with 900 acres of land, Ferdinand State Forest has grown to over 8,000 acres in Dubois, Perry, and Crawford Counties. The property lies on the western edge of the Crawford Upland Section of the Shawnee Hills Natural Region. Although the property resides predominately in the uplands, this deeply dissected area contains numerous river and stream valleys.

Although beech is present, particularly on the southern end of the property, oak is the dominate tree species in the GLO records on Ferdinand State Forest. Beech was more commonly reported in the valleys that dissect the area around the southern end of the property. A single cherry and walnut tree were identified within the property as well as ash, dogwood, gum, hickory, maple, and poplar.

The GLO surveyor's notes indicate that a large barren (roughly one and a half miles wide and four miles long) was present in the uplands west of Ferdinand State Forest. Several quarries and a possible mill seat were also recorded in their notes, as well as an area killed by fire.

Greene-Sullivan

Greene-Sullivan State Forest was developed in 1936 from reclaimed coal mine land that was donated to the State. Covering over 9000 acres today, this unique property lies within the Glaciated Section of the Southwestern Lowlands Natural Region. Shaped by the Illinoin Glacier

this region has low topographic relief and once supported lowland forests, wet prairies, marshes, and black ash swamps.

Based upon the GLO records species composition in the Greene-Sullivan State Forest was primarily oak and hickory. No beech trees and only a single maple tree was recorded on the property, although beech and maple were identified within the study area west of the State Forest. Species composition was also limited with a single elm and gum tree recorded on the property. Unique to this area, however, were the numerous references to prairies. At least eighteen individual references were made on the property alone, and much of the area east of Greene-Sullivan was designated as a wet prairie or swamp. The field notes indicate that prairies often extend across section lines and continue on for a half mile or more.

The area around Greene-Sullivan State Forest contained a mixed of prairie and swamp land. The wet prairie, marshes, and swamps tend to lie east of the property and in the far western township. Barrens and areas with few trees were also noted, particularly in the northeastern corner and northern edge of the study area.

Harrison-Crawford

Harrison-Crawford State Forest was created in 1932 when the State purchased 3000 acres of land in western Harrison County. Today the property encompasses over 24,000 acres in Harrison, Crawford, and Orange Counties. Predominately located within the Escarpment Section of the Shawnee Hills Natural Region, Harrison-Crawford State Forest stretches between the Mitchell Karst Plain Section of the Highland Rim Natural Region to the east and the Crawford Upland Section of the Shawnee Hills Natural Region to the west. The Escarpment is dominated by limestone cliffs that form a narrow band of ridges from the Ohio River north.

Although beech and maple are present on the western and southern townships, very little beech or maple was identified within the State Forest property. When this area was surveyed between 1805 and 1806 oak dominated the landscape with a diverse mix of minor species present: ash, cedar, dogwood, elm, gum, hickory, ironwood, locust, maple, mulberry, poplar, sassafras, sycamore, and walnut. Those portions of the study area outside that reside within the Crawford Upland Section and the southern end of the Escarpment Section (nearer the Ohio River) contain a mix of beech, maple, oak, and hickory and could be classified as a mixed mesophytic forest.

The GLO notes indicate that numerous barrens were present on the landscape around Harrison-Crawford State Forest. The surveyors also noted several sinkholes, caves, and limestone deposits. Furthermore, several areas where timber was destroyed by windfall or fire were recorded. One area of fire appears to have encompassed several sections of upland ridges outside of denoted barrens.

Martin

Martin State Forest was established in 1931 in the Crawford Upland of the Shawnee Hills Natural Region, an area of varied topographic relief containing vertical sandstone cliffs and canyons. Today the Forest covers over 8000 acres of deeply dissected uplands in east central Martin County and southeastern Greene County. The end of the furthest extent of the earlier glaciers occurred over the northern portion of the property in Greene County.

The species composition of Martin State Forest is dominated by the landscape and previous glacial activities. Although beech was the prevalent species on the property in Martin County, very few beech was noted in the GLO records for the glaciated Combs Unit in Greene

County. Beech was also more prevalent in the river valleys whereas oak dominated the upland ridges. Other species recorded within the property included ash, cherry, chestnut, dogwood, elm, gum, hickory, ironwood, maple, poplar, sassafras, and walnut. Cherry, chestnut, and sassafras were only recorded within Martin County.

Several barrens and swamps were noted by the GLO surveyors in the area surrounding Martin State Forest, as well as a single meadow in the area north of the Combs Unit in Greene County. Also interesting to note was a large area near the southern end of the property that had fire damage or trees killed by fire. These fires stretched across an entire township and indicates that a large fire occurred in the late 1700s in this area.

Owen-Putnam

Owen-Putnam State Forest was established in 1948, with the majority of the property purchased in the 1950s and 60s. Today Owen-Putnam State Forest covers over 6,000 acres that stretches across the Escarpment and the Crawford Upland Sections of the Shawnee Hills Natural Region. Although the Wisconsin Glacier stopped just north of Owen-Putnam State Forest the entire property was covered by earlier glaciers.

Beech and maple comprise the majority of the species identified in the GLO records across the entire state forest property. Species diversity declined significantly in this beech dominated forest with dogwood, elm, gum, hickory, ironwood, poplar, and oak the only other species identified in the land records on the State Forest. Ash, cherry, hackberry, mulberry, sassafras, sycamore, and walnut were present in low percentages within the townships; however, several of these species were only denoted by a single tree.

The few landscape descriptions given for the area surrounding Owen-Putnam State Forest primarily included wet land and swamp. A single barren was noted on the northern end of the property and several areas of fallen timber was also recorded, one patch of which covered an area nearly one-half mile long.

Pike

Pike State Forest is situated along the southern glacial line within the Driftless Section of the Southwestern Lowlands Natural Region and in the Southern Bottomlands Natural Region. The Driftless Section covers the unglaciated southern portion of the Southwestern Lowlands. The Southern Bottomlands, whose climate is more aligned to the Gulf of Mexico than to the Great Lakes, encompasses the river valleys of the Ohio and Wabash Rivers and their major tributaries in southwestern Indiana. Pike State Forest was organized in 1934 and today covers over 4,000 acres across the central portion of Pike County. Nearly half of the property resides within the Patoka River valley, which runs east-to-west across the study area.

According to the GLO records, oak and hickory were the most commonly recorded trees within Pike State Forest. Beech, while present, tended to concentrate on the eastern end of the property. Several other species were identified including ash, dogwood, elm, gum, maple, mulberry, poplar, and sassafras, although mulberry and sassafras were each documented by a single tree. While oak was the dominate species on the property and clearly dominated the uplands in the study area, fewer oaks were recorded within the broad river valley.

The environment around Pike State Forest was described by the surveyors primarily as two distinct types. The river valleys were often noted as wet, swamps, or marshes while the surrounding uplands were denoted as prairies. Some areas were marked as having few trees or barrens. Numerous notes were made about good wheat ground in this study area.

Salamonie River

Established in 1939, Salamonie River State Forest is located along the banks of the Salamonie River, south of its convergence with the Wabash River, in Wabash County. The 850 acre property is situated within the Bluffton Till Plain Section of the Central Till Plain Natural Region. The Section was shaped by the last glacial period, which retreated 10,000 to 16,000 years ago, and was one of the last areas in Indiana to be covered by ice. The retreat of the Ontario-Erie Lobe of the Wisconsinan glacier left a series of moraines that gives the ground a level to gently rolling appearance and covered in deep, fertile glacial soils.

Beech comprised the majority of the sample size within Salamonie River State Forest, however, oak was also present, particularly in the uplands east of the property. Other species recorded on the State Forest included buckeye, elm, hackberry, ironwood, maple, mulberry, sycamore, and walnut. Although most of these species were represented by a single record, this is primarily the result of the smaller size of the property. With the exception of mulberry, which was the only recorded tree in the study area, the remainder of these species occurred scattered across the townships; however, hackberry, sycamore, and walnut were primarily restricted to the river valleys. Ash, box elder, cherry, cottonwood, dogwood, gum, hickory, and poplar also occurred within the study area.

The GLO surveyor described much of the land around Salamonie River State Forest as a swamp or wet. The surveyor also noted several roads and a Native American sugar camp within the study area.

Francis Slocum

Francis Slocum State Forest is situated on the banks of the Mississinewa River southeast of its confluence with the Wabash River. The nearly 500 acre property is located within east central Miami County and follows a similar history as Salamonie River State Forest. Both properties are located within the Bluffton Till Plain Section of the Central Till Plain Natural Region.

Beech comprised the majority of the sample from the GLO records for Francis Slocum State Forest and the area north of the Mississinewa River; however a mixed beech-maple and oak-hickory forest was documented south of the river. Other species present within the property included ash, buckeye, elm, hackberry, poplar, sycamore, and walnut. Although buckeye, hackberry, sycamore, and walnut occurred primarily along the river, the remaining species were distributed throughout the study area. Cherry, cottonwood, ironwood, and a single mulberry were also recorded within the study area.

Like Salamonie River State Forest, much of the area around Francis Slocum State Forest was described as wet or a swamp. Several roads and trails were noted as well as a mill south near Pipe Creek.

Selmier

Selmier State Forest is comprised of 355 acres in central Jennings County. The property is located within the glaciated Muscatatuck Flats and Canyon Section, a predominately level to gently undulating upland plains that is dissected by moderately deep and steep sided valleys. The Muscatatuck River forms the eastern edge of the property, which was established in 1944.

Aside from a single sassafras, beech was the only species identified within Selmier State Forest. Elm, gum, hackberry, hickory, maple, oak, and poplar were also documented within the

township, but these species occurred in low numbers, indicating that in 1806 the area was primarily covered by a beech forest.

The surveyors described the area north of Selmier State Forest as wet and flat. The GLO records also indicate a trace, or old road, in the study area.

Yellowwood/Morgan-Monroe

Similar to Clark and Jackson-Washington State Forests, Morgan-Monroe and Yellowwood State Forests were combined for this study due to their overlap within the Townships. Both properties reside within the Brown County Hills Section of the Highland Rim Natural Region, an area of deep valleys and steeply sloped ridges with long, narrow summits that were formed by deep erosion of the shale, siltstone, and sandstone bedrock. Although glaciers advanced over the northern portions of both properties, the south half of the State Forests are unglaciated. Morgan-Monroe State Forest began in 1929 and today encompasses over 24,000 acres in Monroe and Morgan Counties. Yellowwood State Forest began as a federal land project that was leased to the State in 1938 and officially acquired by the State in 1947.

While oak and beech are the two dominate species that comprise the GLO records in Yellowwood/Morgan-Monroe State Forest, oak is clearly more prevalent in the rugged uplands in the southern portions of the property. Beech density increases in the glaciated sections to the north and nearer to the river valley. Other species present within Yellowwood/Morgan-Monroe State Forest include ash, buckeye, dogwood, elm, gum, hackberry, hickory, ironwood, maple, mulberry, poplar, sassafras, sycamore, and walnut. Sassafras predominately occurs on the ridges near broad valleys at Morgan-Monroe State Forest and may be indicative of Native American burning of the area prior to European settlement. Several species, such as buckeye, hackberry, mulberry and sycamore are present on the property but occur in greater density in the nearby White River valley and its tributaries. Several additional species are present in the White River valley that do not appear on the State Forest: box elder, cherry, cottonwood, locust, redbud, w. thorn, and willow. Dogwood is scattered across the property and indicates that at least small openings had formed in the canopy allowing enough sunlight to penetrate the forest floor to promote the growth of this species. It is interesting to note that no chestnut was recorded within any townships within the Yellowwood/Morgan-Monroe study area.

The GLO surveyors notes several areas around Morgan-Monroe and Yellowwood State Forests that were classified as wet, bayou, or swamp. A single prairie and several savannahs were recorded as well as numerous gullies in the southeastern portion of the study. Two large areas of windfalls were recorded, likely the result of a tornado(s) that cut through the area. The surveyors also noted a quarry and a corn field within the study area.

Conclusion

When one begins a discourse on the early settlement period in Indiana, passages of how explorers could ride through the endless forests on horseback and never have a branch touch their heads often springs into mind. What is less remembered are those descriptions where the travelers made little progress due to impenetrable briars or areas where trees were stripped of all vegetation due to massive pigeon colonies. This study is an attempt to sketch specific landscape descriptions on a smaller scale then the vast forests of Indiana. To see the early settlement landscape of the state as the surveyors saw it, with its diverse microhabitats and unique features.

The GLO records indicate that diverse habitats were present within the area that encompasses the State Forest system during the early part of the 19th century. While oak and beech were clearly the dominate trees identified by the GLO surveyors, species composition depended largely upon the geographic landscape. Comparison of the GLO records to modern inventories indicate that a shift has occurred within the past two hundred years with a significant decline in oak and rise in maple in the forest composition.

Today's forest managers can utilize this information to guide management plans. By understanding how forest regimes developed managers can plan activities to reconstruct habitats. Activities such as prescribed burns, which can be utilized to promote oak-hickory forests, can be concentrated in areas where two hundred years ago oak and hickory dominated the landscape rather than in those areas more predisposed to other forest types.

Additional research into diameter classes and species composition based upon landforms may lead to broaden our understanding of the environmental dynamics of today's State Forest properties. Further work is required to advance our understanding of the vegetation patterns governing the landscape in the early 19th century.

Appendix:

Surveyors of State Forest Property

Township	Deputy Surveyors	Year
1N5E	Jacob Fowler, Joseph H. Larwell	1807
1N6E	Jacob Fowler	1805-1807
1S1E	Silas Bent, William Harris	1805, 1807
1S5E	Joseph H. Larwell	1806
1S6E	Jacob Fowler	1806
1S7W	Stephen Benton	1805
1S8W	A. Stone, E. W. Tupper	1805
1S9W	H. Bradley	1805
2N5E	Jacob Fowler, Joseph H Larwell	1806, 1807
2N6E	Jacob Fowler	1806-1807
2N7E	Alexander Enos	1807
2S1E	Silas Bent	1805
2S2E	Silas Bent	1805
2S3E	Unknown	1805-1806
2S3W	Levi Barber	1804-1805
2S7W	Stephen Benton	1804-1805
2S8W	S. Smith, A. Stone, E.W. Tupper	1805
3N4E	Alexander Enos	1807
3N5E	Jacob Fowler, Joseph H. Larwell	1807
3N6E	Jacob Fowler	1806-1807
3N3W	Levi Barber	1804-1805
3S1E	Silas Bent	1805
3S2E	Silas Bent	1805
3S3E	Unknown	1805-1806
3S2W	Stephen Benton, A. Stone, E.W. Tupper	1804-1805
3S3W	Levi Barber	1804-1805
3S4W	Nahum Bent, David Sandford	1804-1805
4N3E	William Harris, Arthur Henrie	1806-1807
4N3E (Island)	A.E. Van Ness	1847
4N4E	William Harris	1806-1807
4N5E	Jacob Fowler, Joseph H. Larwell,	1806-1807
4N3W	Levi Barber, Arthur Henrie	1807
4S1E	Silas Bent	1805
4S2E	Unknown	Unknown
4S3E	Joseph H. Larwell	1806
4S2W	Stephen Benton, Arthur Henrie, A. Stone, E. W. Tupper	1805
4S3W	Levi Barber, Elias Rector	1804-1805
5N3E	William Harris, Arthur Henrie	1807, 1811
5N4E	William Harris, Arthur Henrie	1807, 181?
5N5E	Jacob Fowler, Arthur Henrie, Joseph H. Larwell	1807, 1815; 1806
5N2W	Arthur Henrie	1816
5N3W	Arthur Henrie	Unknown
5S2E	Silas Bent	Unknown

5S3E	Unknown	Unknown
5S3W	Elias Rector	1805
6N4W	Arthur Henrie, Alex Holmes	1811
6N7W	Alex Holmes, Daniel Sullivan	1811
6N8W	Robert Buntin, William Harris, Daniel Sullivan	1807, 1811
7N8E	William Harris, B.F. Morris	1806-1807
7N7W	Arthur Henrie, Alex Holmes, Daniel Sullivan	1814, 1811
7N8W	William Harris	1811, 1814
7N9W	William Harris	1811, 1814
8N1E	Arthur Henrie, Alex Holmes	1811, 1814, 1815
8N2E	James Hedges, Arthur Henrie, Alex Holmes	1819-1820; 1815
8N3E	James Hedges, Arthur Henrie, Alex Holmes, John McDonald	1819
9N1E	James Hedges, Arthur Henrie, James Holmes	1819-1820; 1811, 1815
9N2E	James Hedges, Alex Holmes, John McDonald	1819-1820
9N3E	James Hedges, John McDonald	1819-1820
9N4E	A.C. Looker, John McDonald	1819
10N1E	Thomas Brown, John McDonald	1819
10N2E	James Hedges, John McDonald	1819-1820
10N1W	Thomas Brown, William Harris, Alex Holmes, James Holmes	1818-1819, 1811
10N4W	Alex Holmes, James Holmes	1811, 1820; 1814
11N1E	Thomas Brown, John McDonald	1819
11N1W	Thomas Brown, William Harris, A.E. Van Ness	1819; 1848
11N4W	Alex Holmes, James Holmes	1811, 1814
12N1W	Thomas Brown, William Harris	1819
12N4W	John Collett, William Harris, James Holmes, John McDonald	1819; 1811; 1815
16N8W	Basil Bently, William Harris, William Polke	1823; 1819; 1819
17N8W	William Polke	1820
17N8W (Island)	A.E. Van Ness	1848
26N5E	Channey Carter, John Mullett	1839; 1846
26N5E (south of reserve line and boundary of reserve N25)	A.E. Van Ness	1847; 1849
27N7E	Channey Carter, David Hillis, John McDonald; Josiah F. Polk	1839; 1827; 1820; 1823
27N7E (Meanders of Wabash)	John Hendricks	1828
27N8E	Channey Carter, John McDonald; Josiah F. Polk	1839; 1820; 1823
Clark's Grant	William Clark and Company	1786

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