The Geography of American Tree Species and Associated Place Names

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ABSTRACT

Place names attached to natural and cultural landscape features may imply valuable information about settlement-era tree distribution and how they were regarded by European settlers. In this study, spatial distribution of tree-related place names was found to be highly consistent with reconstructions of the pre-Columbian distributions of native tree species. Abundance of tree-related place names was correlated with contemporary estimates of major timber species abundance. The findings of this research could be useful in efforts to conserve American forests and restore economically and culturally important species such as the American chestnut (*Castanea dentata*). The results also suggested that previous reconstructions of pre-Columbian species' distributions may not be entirely accurate.

Keywords: Little's range, FIA, GNIS, American chestnut, restoration

A place name is a word or series of words that provides information about natural and cultural features on the surface of the earth (Randall 2001). Because natural features of the American landscape were important to European settlers, they undoubtedly tended to name features in ways that made sense in a landscape context (Matthews 1972). The country was dominated by forests that were as diverse as the rich vocabulary that arose from this woodland variety. For example, Oakdale or Oak Dale, a name used for more than 400 features in the United States, suggests a place located in a broad valley where oaks (*Quercus* spp.) were common on the landscape; Pinegrove or Pine Grove, a name used for nearly 1,500 places in the United States, suggests a place located in or near a stand of pine (*Pinus* spp.) trees. As a result, the names of tree species are inexorably attached to many natural features and human-made landmarks throughout the United States. We are still naming places, so it does not all go back to the pioneers, but the connection of new names with any reality of place seems to grow more tenuous even as the imperatives of culture seem to grow stronger.

Because of the historical association between naming places and natural landscapes, place names may be useful in clarifying our understanding of species' natural distributions and their needs for conservation (Gelling 1987, Aybes and Yalden 1995, Boisseau and Yalden 1998, Guezo 1999, Cox et al. 2002). For example, Cox et al. (2002) found that place names of range-limited native wildlife species showed strong fidelity to their historical ranges and provided important biogeographical information for maintaining or restoring species and habitat components. Despite this potential, the use of place names as a biogeographical tool to study tree distribution is limited (Guezo 1999).

In this study, I examine the spatial association between the natural ranges of tree species and distribution of related place names, analyze relationships between place names and contemporary tree abundance, and discuss the possible application of research findings to the restoration of the American chestnut (*Castanea dentata*).

Methods

The US Geological Survey (USGS) Geographic Names Information System (GNIS) database (USGS 2006a) was downloaded for the contiguous 48 states in the United States. GNIS provides information for all known places, features, and areas in the United States identified by a proper noun. The GNIS information for each place

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Table 1. Abundance, consistency, and composition of tree place names for tree species group 1 (common name associated with one tree species), group 2 (common name associated with several tree species), and group 3 (common name associated with many tree species) in the contiguous 48 states in the United States.

Species	Total counts	No. of states	Consistency (%)*	Natural feature names (%)	Top three feature classes					
					Rank 1		Rank 2		Rank 3	
					Name	%	Name	%	Name	%
Group 1—Common name associated with single tree species										
Beech	1,285	42	93.0	41.2	Stream	21.1	Church	16.1	ppl	13.2
Butternut	105	18	71.4	69.5	Stream	32.4	Lake	12.4	valley	5.7
Chestnut	1,094	38	83.0	47.4	Summit	13.8	Church	13.3	School	13.0
Dogwood	312	32	81.1	45.8	ppl	24.0	Stream	15.4	School	7.4
Pecan	324	29	48.5	52.8	Stream	29.3	ppl	17.3	Park	5.9
Persimmon	215	20	88.4	69.3	Stream	35.8	Dam	7.4	School	6.5
Redwood	293	24	23.2	36.5	Locale	16.0	ppl	12.6	Stream	11.3
Sassafras	112	22	92.0	73.2	Stream	17.0	Summit	17.0	Gap	14.3
Group 2—Common name associated with several tree species										
Buckeye	491	39	57.6	50.7	Stream	20.4	School	11.6	Valley	9.0
Hemlock	314	26	81.2	64.6	Stream	22.0	Locale	9.9	ppl	9.2
Hickory	1,825	39	95.8	34.6	School	15.6	Church	14.5	ppl	14.4
Pinyon	59	8	40.7	79.7	Summit	20.3	Stream	11.9	valley	10.2
Sycamore	798	34	84.1	62.0	Stream	27.7	Valley	11.9	School	9.0
Tupelo	70	12	35.7	51.4	Swamp	21.4	ppl	11.4	Stream	10.0
Walnut	1,887	43	77.4	37.5	Stream	18.2	School	16.5	Church	14.1
Group 3—Common name associated with many tree species										
Birch	1,014	45	70.2	69.0	Stream	27.8	ppl	8.3	Lake	7.3
Maple	2,479	48	92.8	27.1	School	20.4	Cemetery	16.7	ppl	12.8
Oak	13,103	48	94.1	22.7	School	17.2	Church	16.4	ppl	16.4
Pine	10,755	48	79.5	42.5	ppl	13.0	Church	12.5	Stream	12.2

*Consistency—percentage of place names related to respective species that are located within the species' natural distribution range.
ppl, populated place.

includes latitude, longitude, altitude, feature class (e.g., stream, lake, and populated place), county, state, and so on. Tree-related place names were queried and organized into three major groups: (1) those with distinctive common names (e.g., persimmon [*Diospyros virginiana*]), (2) those that share a common name with a few other species (e.g., sycamore [*Platanus* spp.]), and (3) those that share a common name with a large number of other species. Four genera, birch (*Betula* spp.), maple (*Acer* spp.), oak, and pine, were selected arbitrarily to represent the third group. Only tree species or species groups that had more than 50 associated place names were included in this study. Frequencies of place names were summarized by species, state, and feature class.

The spatial association between species' natural ranges and the distribution of place names was analyzed in ArcGIS 9.0 (ESRI, Inc., Redlands, California). Digital maps of the natural ranges of tree species in North America compiled by Little (1971, 1976, 1977) were downloaded from the USGS (USGS 2006b). If a common name could be associated with more than one species (e.g., hemlock [*Tsuga* spp.] with the four species *Tsuga canadensis*, *Tsuga heterophylla*, *Tsuga caroliniana*, and *Tsuga mertensiana*), the natural ranges of all associated species were merged to represent the composite range for that group. In each case, the spatial distribution of related place names was superimposed on the species' natural distribution, and the percentage of name coordinates located within the natural distribution was calculated.

Regression analysis was applied to examine the relationships between tree abundance and place name abundance for tree species that had over 70% of their related names located within their natural range. American chestnut was not included because of its current absence in the overstory and the resulting lack of Forest Inventory and Analysis (FIA) data. To simplify the analysis, these relationships were examined only in the eastern 37 states because most of the included species have their natural ranges within that region. The US FIA long-term database (USDA 2006) was used to estimate tree abundance. This database records information on the status and trends of America's forests. For this study, county-level information for total number and volume of all live trees for all species on timberland were retrieved using Forest Inventory Mapmaker 2.1 (Miles 2006). The first periodic surveys after 1980 were used to estimate tree abundance. The total number of related place names, total number of trees, and total volume were summarized by state, and simple linear regressions ($y = a + bx$) were applied.

Results

A total number of 36,535 related place names were found with apparent associations with 19 tree species or species groups (Table 1). American beech (*Fagus grandifolia*) had the highest number of associated place names within the first group, followed by American chestnut. Walnut (*Juglans* spp.) and hickory (*Carya* spp.) had the highest numbers of associated place names among the second group. Not surprisingly, names associated with oak and pine had the highest frequency among all the 19 species and species groups and were widely distributed throughout the contiguous 48 states.

The spatial distribution of place names was consistent with the natural distributions of the species they denote (Figures 1–3). Names containing the word "hickory" had the highest spatial consistency with the natural distribution (96%; Figure 2b), in this case a composite distribution, whereas names containing the word "redwood" (presumed to denote *Sequoia sempervirens*) had the least spatial consistency with the species' natural occurrence (23%; Figure 1h). Six of the eight species in the first group, four of

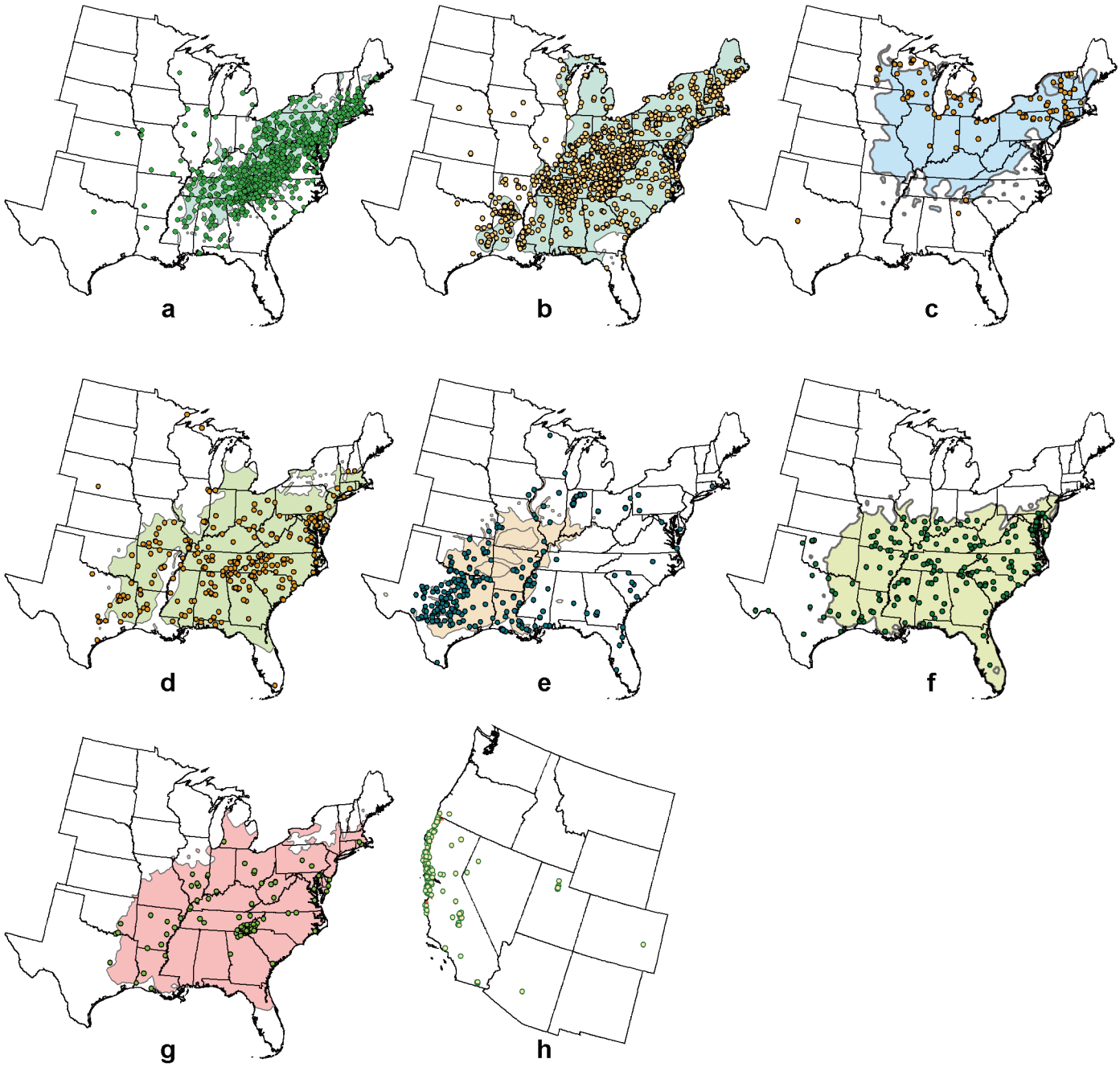

Figure 1. Distributions of tree-related place names and natural ranges for trees in group 1 (common name associated with one tree species) in the contiguous 48 states in the United States: (a) American chestnut (*C. dentata*), (b) American beech (*F. grandifolia*), (c) butternut (*Juglans cinerea*), (d) flowering dogwood (*Cornus florida*), (e) pecan (*C. illinoinensis*), (f) common persimmon (*D. virginiana*), (g) sassafras (*Sassafras albidum*), and (h) redwood (*S. sempervirens*).

the seven species groups in the second group, and all four arbitrarily selected species groups in the third group had over 70% spatial consistency between distribution of place names and related natural distributions. For species included in this study, the lowest spatial consistency occurred with pecan (*Carya illinoinensis*; Figure 1e), tupelo (*Nyssa* spp.; Figure 2c), redwood (Figure 1h), and pinyon (*Pinus* spp.; Figure 2a).

On average, natural features such as streams and summits comprised about 52% of all features associated with tree place names. Streams were in the top three feature types for 16 of the 19 selected species. The most commonly associated feature type was "summit" for American chestnut and pinyon, which typically are found at relatively higher elevations within the general landscape, and the most commonly associated feature type was "swamp" for tupelo, a wetland species. The anthropogenic feature types associated with tree-related place names typically were schools, churches, and populated places.

Seven of the 13 regression models between tree abundance and place name abundance were statistically significant ($P < 0.05$; Table 2). The coefficient of determination was highest for birch, followed by

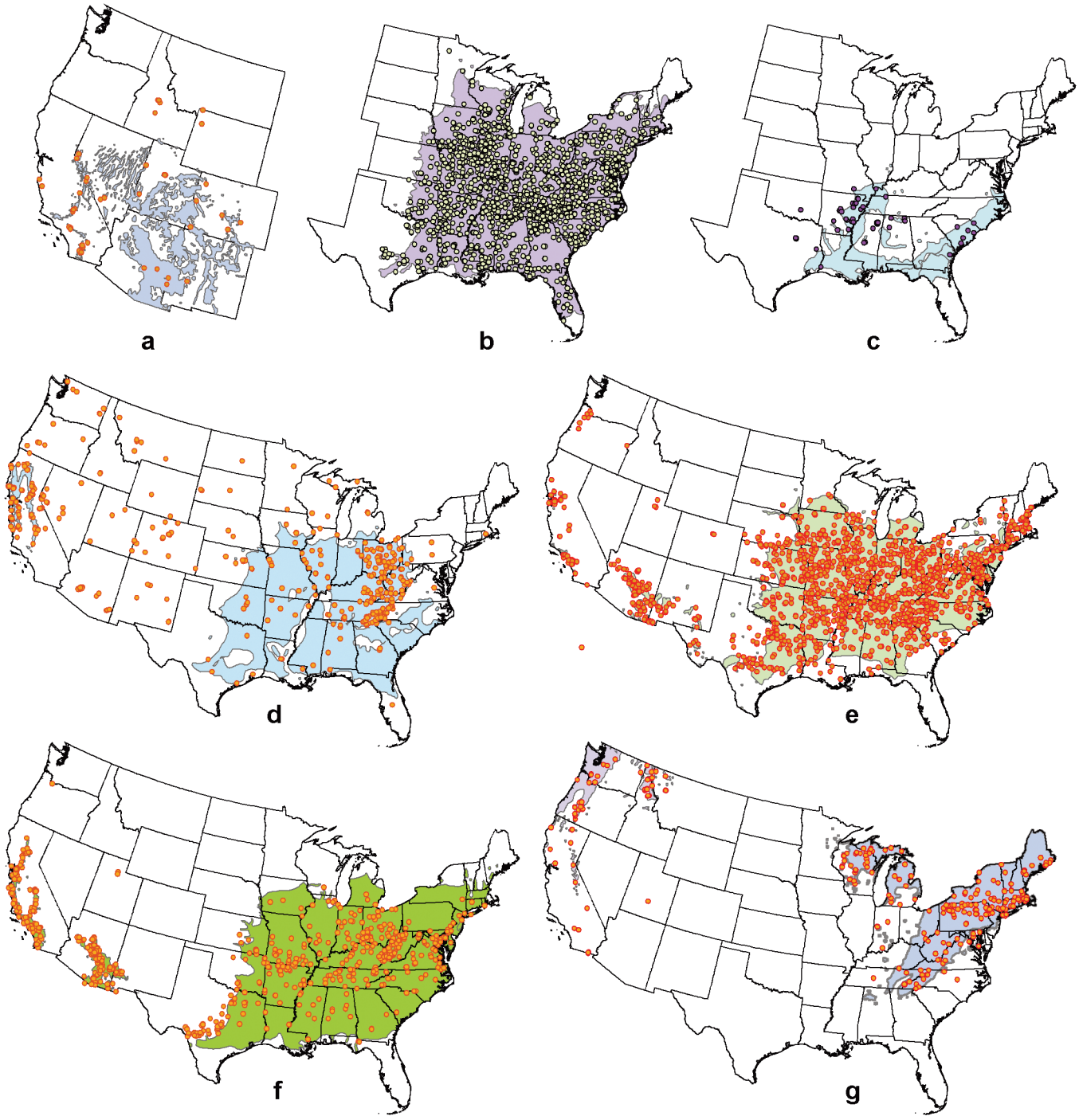

Figure 2. Distributions of tree-related place names and natural ranges for trees in group 2 (common name associated with several tree species) in the contiguous 48 states in the United States: (a) pinyon (*Pinus* spp.), (b) hickory (*Carya* spp.), (c) tupelo (*Nyssa* spp.), (d) buckeye (*Aesculus* spp.), (e) walnut (*Juglans* spp.), (f) sycamore (*Platanus* spp.), and (g) hemlock (*Tsuga* spp.).

pine and oak. In general, the regression models of place name counts against tree number were significant for major timber species such as pine, oak, maple, and hickory. Similar results were found for regressions based on place name counts and total tree volume.

Examples of relationships between the total number of tree-related place names and the total number of live trees on timberlands in the eastern 37 states are plotted in Figure 4 for pine and oak. In general, the number of place names increased as the total number of trees increased in each state. For pines, a higher ratio of the total place names to the total number of trees was observed for the state of Pennsylvania than for other states. For oaks, the highest ratios of total place names to total number of trees were observed for the states of Illinois and Texas.

Application and Discussion

Strong spatial consistency between the distribution of tree-related place names and tree natural range was observed for most of the studied species or species groups. In addition, the abundance of species-related

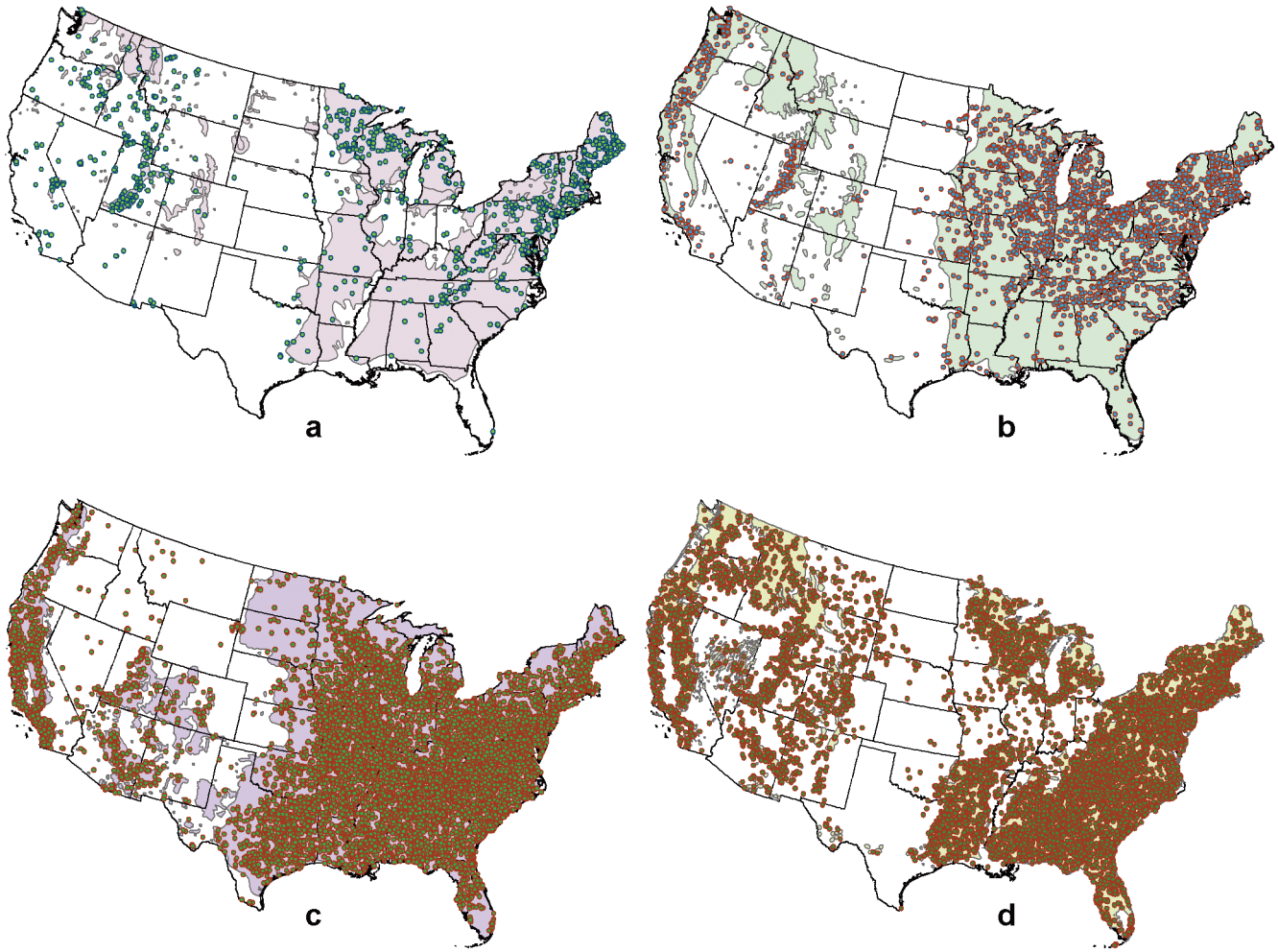

Figure 3. Distributions of tree-related place names and natural ranges for trees in group 3 (common name associated with many tree species) in the contiguous 48 states in the United States: (a) birch (*Betula* spp.), (b) maple (*Acer* spp.), (c) oak (*Quercus* spp.), and (d) pine (*Pinus* spp.).

place names was significantly associated with the abundance of trees for major timber species, at least in the eastern 37 states in the United States. Little's (1971, 1976, 1977) range maps represent a remarkable effort to document the putative pre-Columbian spatial distribution of our native tree species in the United States, but they say nothing about abundance, which typically varies widely over the range of a species. Because the majority of place names reflects long-term usage, the results of this research may partially reveal the aboriginal abundance of tree species on a coarse geographic scale, information that is typically available only qualitatively, if at all. For example, the fact that Pennsylvania has far more place names containing the word "pine" than the current abundance of pine timber (Figure 4) indicates that pines may have been more abundant in Pennsylvania in the past, and, indeed, this is consistent with several studies based on the comparisons of early settlement and modern data (Nowacki and Abrams 1992, Abrams and Ruffner 1995, Bürgi et al. 2000).

In addition, distribution of place names may help rectify our understanding of a species' natural distribution at the fringes of its range. Little's maps (Little 1971, 1976, 1977) were compiled from herbarium specimens and other anecdotal information. When specimens or records were lacking for a given species in a given area, that area might be excluded from the distribution map event although the species might have been present. For example, in Figures 1e and 2f, there are dense concentrations of names containing "pecan" and "sycamore" in Texas occurring to the west of these species' natural distributions. Although it is possible that the use of the names had nothing to do with the local, natural vegetation, it is plausible that the natural ranges of both species ex-

Table 2. Regression coefficients (*a*, *b*) and coefficient of determination (r^2) for regression models of number of tree place names against total number of live trees on timberlands by state and by species in the eastern 37 states in the United States (only states with at least one related place name were used).

Species	*a**	*b*	r^2
Beech (n = 34)	—	—	0.02
Birch (n = 34)	9.2	0.06	0.79
Butternut (n = 16)	—	—	0.02
Dogwood (n = 28)	—	—	0.04
Hemlock (n = 20)	7.5	0.04	0.27
Hickory (n = 33)	43.7	0.16	0.22
Maple (n = 37)	34.6	0.02	0.23
Oak (n = 37)	144.2	0.23	0.46
Persimmon (n = 19)	—	—	0.04
Pine (n = 37)	111.0	0.12	0.66
Sassafras (n = 21)	—	—	0.03
Sycamore (n = 29)	—	—	0
Walnut (n = 36)	32.4	2.19	0.32

*Regression coefficients are not listed if regression model is not significant ($P > 0.05$).

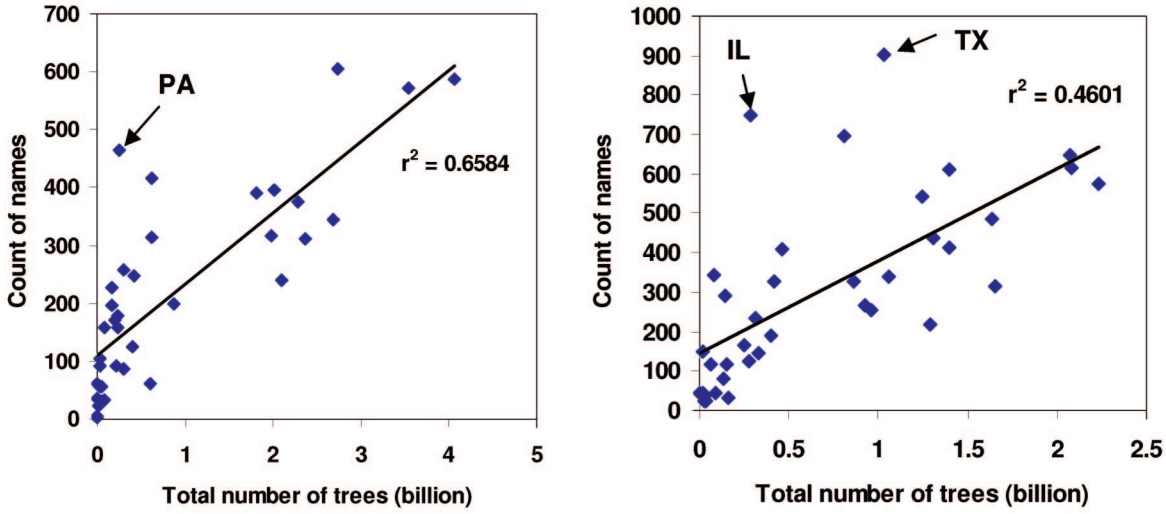

Figure 4. Relationships between total number of live trees on timberlands and total number of tree-related place names by state for pine (left) and oak (right) in the eastern 37 states in the United States.

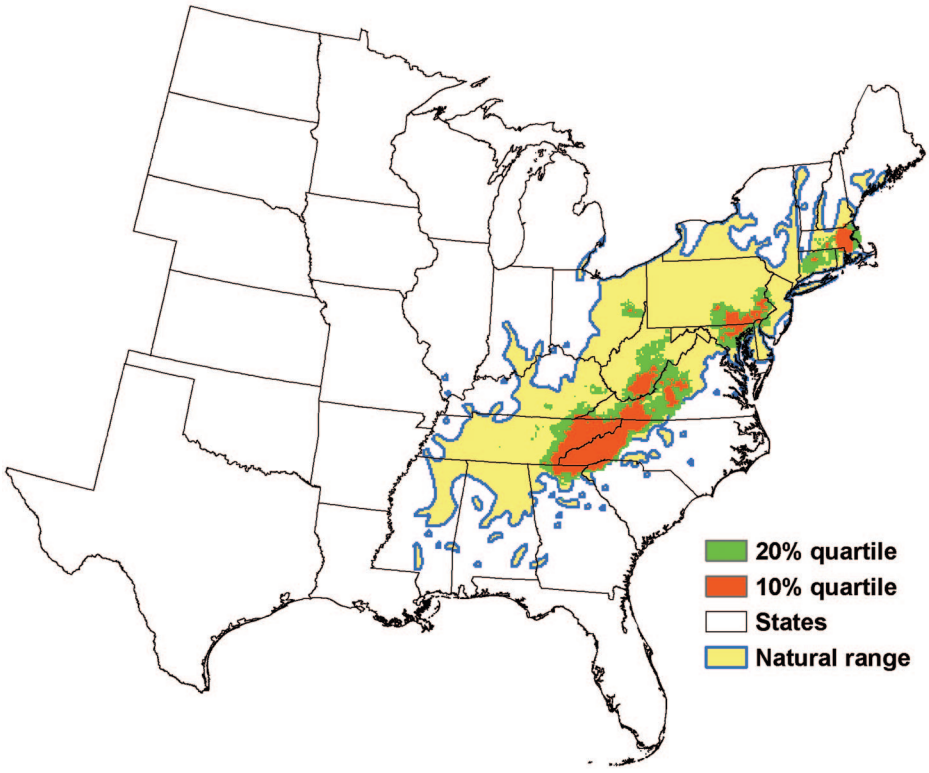

Figure 5. Spatial distribution of density of American chestnut-related place names (top 10 and 20% quartile) and the natural range of American chestnut.

tended farther west than records suggest. Another example is the distribution of American chestnut in New England. According to Little (1977), the northern part of Litechfield County, Connecticut, and the southern part of Berkshire County, Massachusetts, are outside of the American chestnut's natural range. However, there are four places named Chestnut Hill and one place named Eastern Chestnut Hill north of Little's distribution map in the aforementioned area. In addition, local residents recall that American chestnut occurred on the mountainsides around and south of Pittsfield, Massachusetts (E. Bailes, The American Chestnut Foundation [TACF] Growers, forum communication, June 17, 2006). Similarly, there is concordance between the location of some disjunct populations of chestnut and the occurrence of the name, particularly on the Piedmont and at the western edge of the range. However, some names do not coincide neatly with known distributions, suggesting a mapping error. Other names have no native population counterpart, suggesting that the species may have existed there but was not documented.

Care must be used when using place names as an indicator of tree abundance and distribution range. For most of the regression models in this study, tree abundance explained less than 50% of the variance of place name abundance. Although place names often reflect the local natural vegetation characteristic of a regional landscape, other factors related to cultural, political, religious, and linguistic affiliations also had an influence in the naming process (Waldman 2000, Randall 2001).

A possible application of tree place name in forestry is the allocation of American chestnut restoration. The American chestnut was one of the most important trees in Appalachian forests, then reigning over 200 million ac of woodlands in the eastern United States (MacDonald 1978). It was eliminated from the overstory by chestnut blight (*Cryphonectria parasitica*) during the early 20th century. Interest in restoring the species has renewed as the TACF has progressed with its program of breeding a blight-resistant replacement. With limited time and resources, selection of proper restoration locations is important. As shown in this article, chestnut-related place names have a strong fidelity to the known natural range of the species. Based on the relationship between place name abundance and tree abundance for other timber species, the

abundance of chestnut-related place names also may have a strong relation to local abundance of this tree. This may be particularly true for the American chestnut because it was important to local cultures and economies (Davis 2006). Thus, the distribution of place names containing "chestnut" is a reasonable guide for targeting restoration efforts both on the question of where the species was most abundant (suggesting greatest ecological importance) and on the question of where the species was most important to the local populace (suggesting greatest cultural importance). Areas with densities in the top 10% quartile were concentrated in the southern Appalachians, southeastern West Virginia, southeastern Pennsylvania, and eastern Massachusetts (Figure 5). Of course, any restoration efforts ultimately will be constrained by resources, ownership limitations, and current forest conditions, but Figure 5 could be the basis of a logical rationale for targeting efforts.

Because of the complex relation of place names to species distributions, many factors may interact to explain what appears on maps and atlases. For example, the abundance of faunal place names might be related to topographical diversity (Cox et al. 2002). In other words, landscapes with higher concentrations of name-worthy landmarks might have a higher abundance of place names. Other factors such as misspellings and language difficulties also can affect the interpretation of place name distribution. For example, the American Indian word *Wanaque* means "lands of sassafras" and the Indian name for pecan is *paccan* or *pakan*. Thus, one must be careful to include words in searches of names with species origins. Also, common names are not necessarily consistent throughout the range of a species. For example, tupelo (a name of Creek Indian origin) also is called cottongum, sour gum, swamp tupelo, tupelo-gum, or water-gum (Little 1979). Because of time and knowledge limitations, these variants were not considered in this study, which might have led to underestimations of abundance and distribution. Nevertheless, this study serves to show that place names can be a useful biogeographical tool with application to the conservation and restoration of American forests.

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