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BIOGEOGRAPHICAL OBSERVATIONS ON LOUISIANA AND TEXAS RARE AND ENDEMIC PLANTS

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ABSTRACT

Using state rare and endemic plant lists, we document the North American distribution of Louisiana and Texas rare plants and the distribution of Texas endemic plants. Because the Louisiana and Texas rare plant lists have been developed using different criteria, the North American distribution maps of each are distinctly different. Texas endemics are concentrated in the center of the state.

KEY WORDS: Louisiana, Texas, rare plants, endemic plants.

Because of conservation concerns, state agencies such as the Natural Heritage programs, Parks and Wildlife departments, and The Nature Conservancy produce rare and endemic plant lists. However, listed plants generally have not been subjected to biogeographical analysis. In this paper, we examine the Texas rare and endemic plant lists and the Louisiana rare plant list inorder to place listed taxa in a broader biogeographical context. We do not question what is on the lists, nor do we question taxonomic status. We simply use the lists as data.

THE LISTS

The Louisiana rare plant list is produced by the Louisiana Natural Heritage Program. The 2004 edition consists of 368 taxa (Reid 2004) and includes both globally rare (G1-G3/T1-T3) and locally rare taxa (S1-S3) that might not be rare elsewhere but that are rare in Louisiana. The Texas rare plant list is produced by the Texas Parks and Wildlife Department and The Nature Conservancy of Texas. The 2004 edition

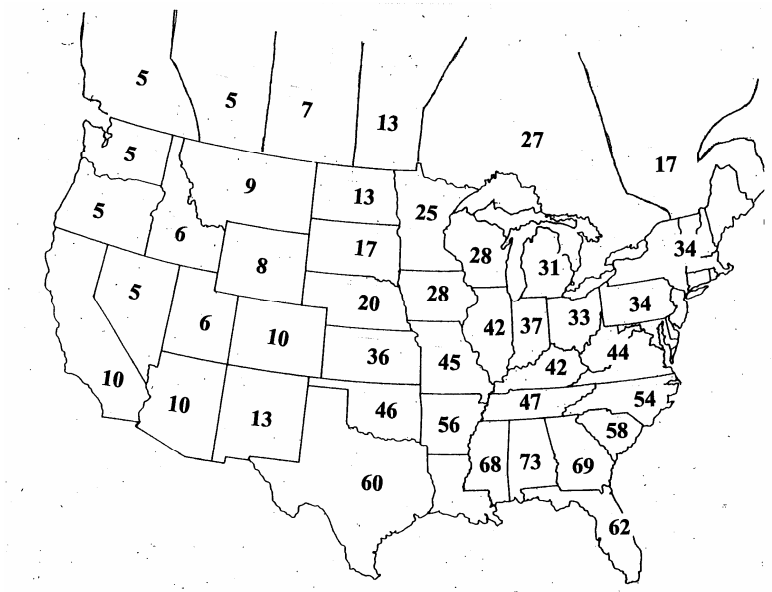

Figure 1. North American distribution (as percentage of total) of taxa on the Louisiana rare plant list.

consists of 454 taxa and includes only G3/T3 and rarer plant taxa (Carr 2004, Poole et al. 2004). The Texas endemic list is produced by the Nature Conservancy of Texas; the 2002 edition consists of 271 taxa (Carr 2002). Sixty-six percent of Texas endemics are listed as rare in Texas, the remaining 34% are G4 or G5 and thus do not classify for inclusion on the rare list (Appendix 1 explains G, S, and T ranks).

METHODS

1. Using Kartesz and Meacham (1999), we determined the North American distribution of taxa on the Louisiana rare plant list.

2. Using Carr (2004) and Kartesz and Meacham (1999), we determined the North American distribution of taxa on the Texas rare plant list.

3. Using Carr (2004) and Turner et al. (2003), we plotted the distribution of Texas endemics by county.

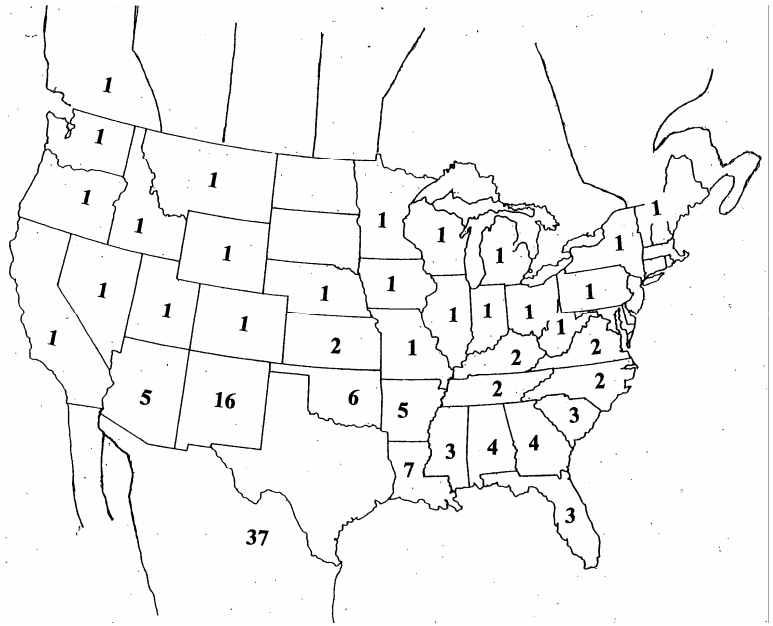

Figure 2. North American distribution (as percentage of total) of taxa on the Texas rare plant list.

RESULTS

Figure 1 shows the North American distribution (as percentage) of taxa on the Louisiana rare plant list. Figure 2 shows the North American distribution (as percentage) of taxa on the Texas rare plant list. Figure 3 shows the distribution of Texas endemics by counties.

DISCUSSION

As Figures 1 and 2 show, there are marked differences between the North American distribution of Louisiana and Texas rare plants. Of the 454 taxa on the Texas rare plant list, 40% are endemics and the remaining 60% occur in one or more other states or countries: 37% in Mexico, 16% in New Mexico, and so on. Of the 368 taxa on the Louisiana rare plant list (Louisiana has few endemics), 60% occur in

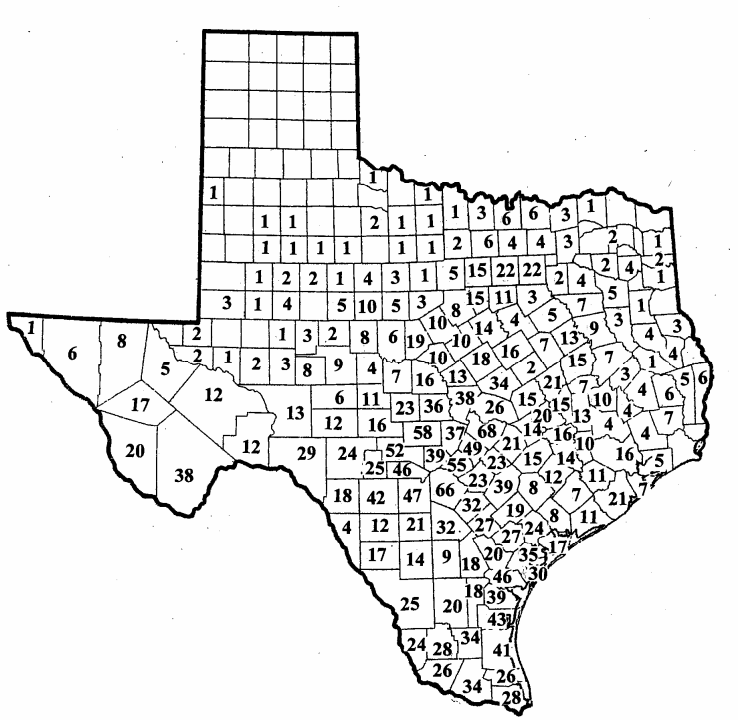

Figure 3. Number of Texas endemics by county. No number means no endemics.

Texas, 68% in Mississippi, 56% in Arkansas, and so on. The North American distribution of Louisiana rare plants is much wider than that of Texas rare plants. This is, of course, because 82% of the Louisiana list are G4-G5/S1-S3 and about 90% of all taxa on this list are at the edge of their range; only about 20% of Texas taxa are edge of range.

The biogeographic pattern of Texas endemics shows the highest incidence of endemism in the central portion of the state, including the Texas Coastal Bend region and along the Mexican border, with virtually no endemics occurring along the northern, western, and eastern borders (this pattern is also evident in the TAMU [2005] "Texas Endemism" map). This distribution pattern is interesting given

that we know that there are about 100 endemics in the West Gulf Coastal Plain (MacRoberts et al. 2002). Only 28% of these appear on the Texas endemic list. The remaining 72% have a two or more state range: southeastern Oklahoma, southern Arkansas, and/or western Louisiana. The high incidence of Texas endemics along the Mexican border is probably explained, a least in part, by the fact that northern Mexico has not been as thoroughly collected as southern Texas, and many seeming Texas endemics will be found to occur in Mexico as well.

The Texas endemic list is largely artificial and artifactual, or as Carr (2002:1) has written, the list "has no biological significance, since political boundaries do not correspond to biotic and abiotic forces that effect plant distribution." Aside from the Gulf of Mexico, there is no natural ecological boundary between Texas and adjacent regions. The Red, Rio Grande, and Sabine rivers present little or no obstacle to plant dispersal. Further, while Texas is made up of many ecoregions, none is restricted to Texas with the possible exception of the Edwards Plateau and the Coastal Bend depending on how these regions are defined. Does the Edwards Plateau include the Stockton Plateau, does it cross the Rio Grande and thus is not restricted to Texas, or does it only extend to the Pecos River and not enter Mexico? And is there any ecological uniqueness to the Coastal Bend?

While the Edwards Plateau is often said to be a region of high plant endemism, its endemism has not been thoroughly studied (Amos and Rowell 1988). However, on the basis of a preliminary survey using Carr (2002) and Turner et al. (2003) and a map of the Edwards Plateau that excludes the Stockton Plateau and Mexico, we found that the region had 28 endemics (e.g., *Carex edwardsiana, Tradescantia pedicellata*) and 23 near-endemics (e.g., *Euphorbia roemeriana, Galactia texana*) (see MacRoberts et al. 2002, Zollner et al. 2005 for terminology and studies of local endemism), or about two percent of the native flora. But all Texas endemics occurring in the Edwards Plateau are not endemic to that region. Kerr County, in the center of the Edwards Plateau, illustrates this. It has 52 Texas endemics of which 35 (67%) are Edwards Plateau endemics or near-endemics while 17 (32%) are not (e.g., *Lesquerella densiflora*, *Salvia engelmannii*). This

situation also characterizes the Coastal Bend region.

Clearly, studies of endemism in all regions of Texas are indicated, but these should be based on ecologically meaningful boundaries.

ACKNOWLEDGMENTS

The authors thank Bill Carr, The Nature Conservancy of Texas, Chris Reid, Louisiana Natural Heritage Program, and Jason Singhurst, Texas Parks and Wildlife, for their comments on the paper.

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APPENDIX 1. Each taxon is assigned a global rank and a state rank. Global ranks are given by NatureServe; state ranks by each state's Natural Heritage Program. G1 = Critically imperiled globally, 5 or fewer known extant populations. G2 = Imperiled globally, 6 to 20 known extant populations. G3 = Either very rare and local throughout its range or found locally (even abundantly at some locations) in restricted range (e.g., a single physiographic region) or because of other factors making it vulnerable to extinction throughout its range, 21-100 known extant populations. G4 = Secure globally although it may be rare on periphery of range, 101-1000 extant populations. G5 = Demonstrably secure globally although it may be rare on periphery of range, 1001 or more known extant populations. T ranks follow the same pattern except they refer to subspecies and varieties. S ranks refer to state ranks and follow the same pattern as G and T ranks but refer to taxa within states. Thus, a taxon could be G5T5S2 (as is *Houstonia purpurea* var. *calycosa* in Louisiana), meaning that the taxon is secure globally but rare locally.