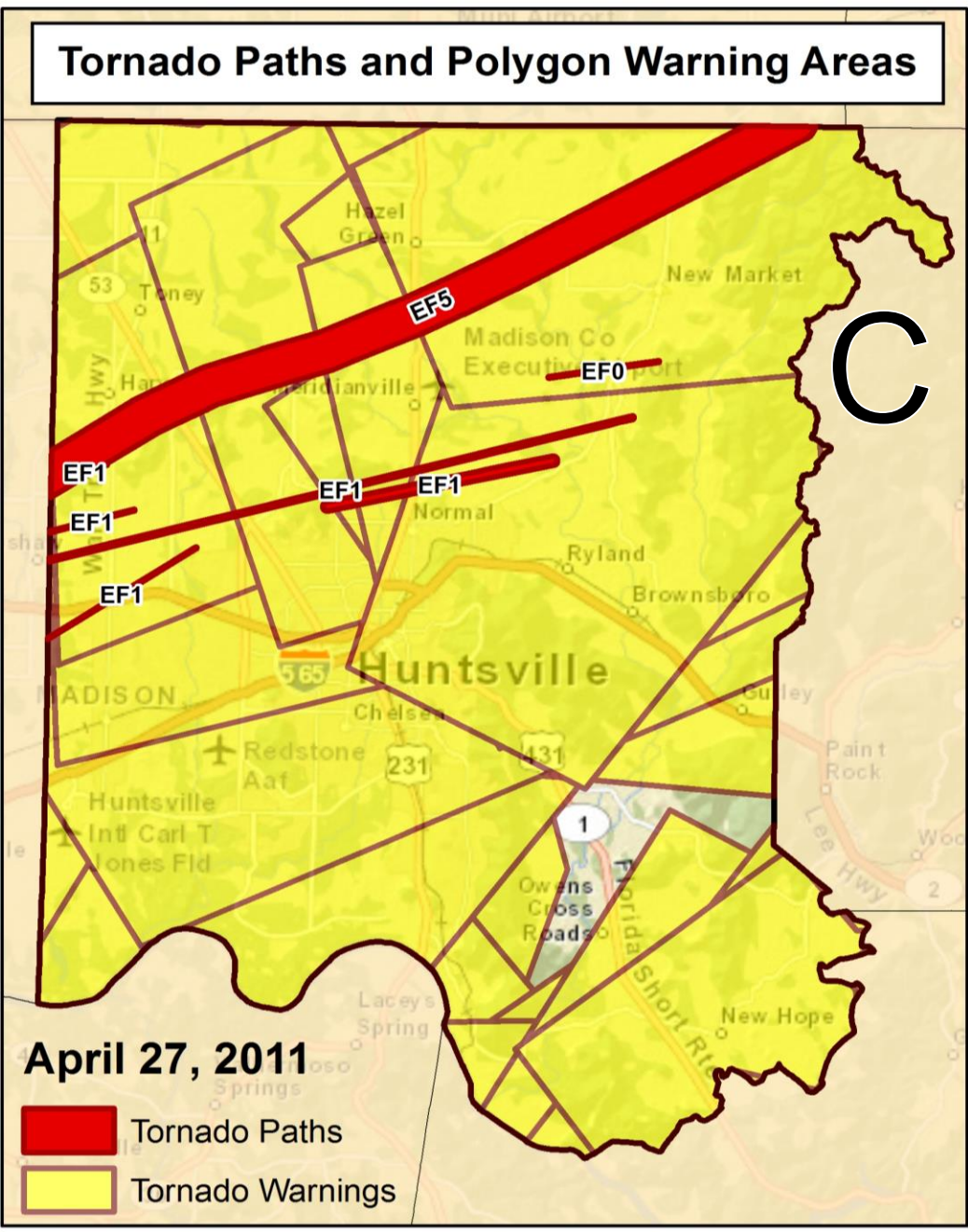
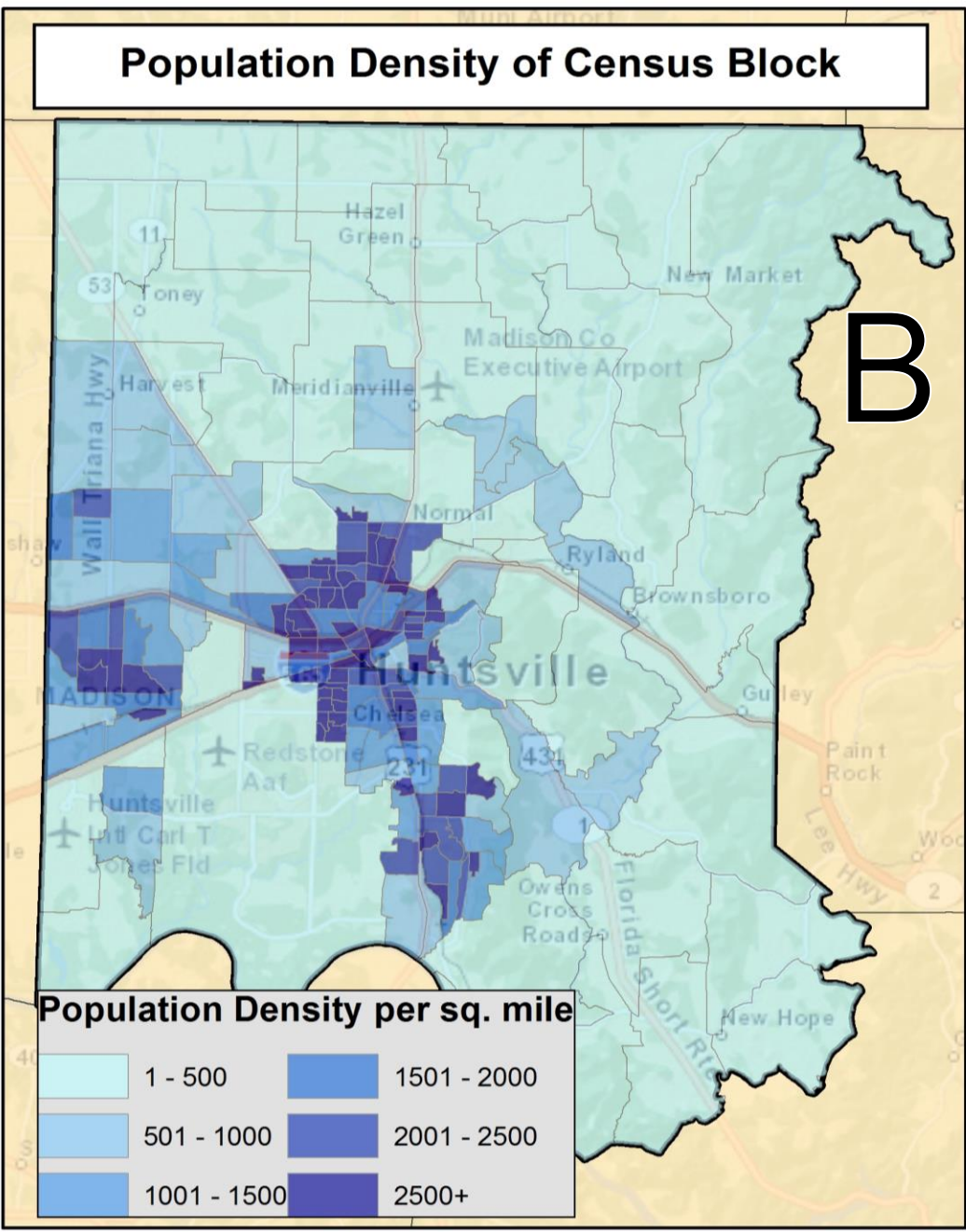
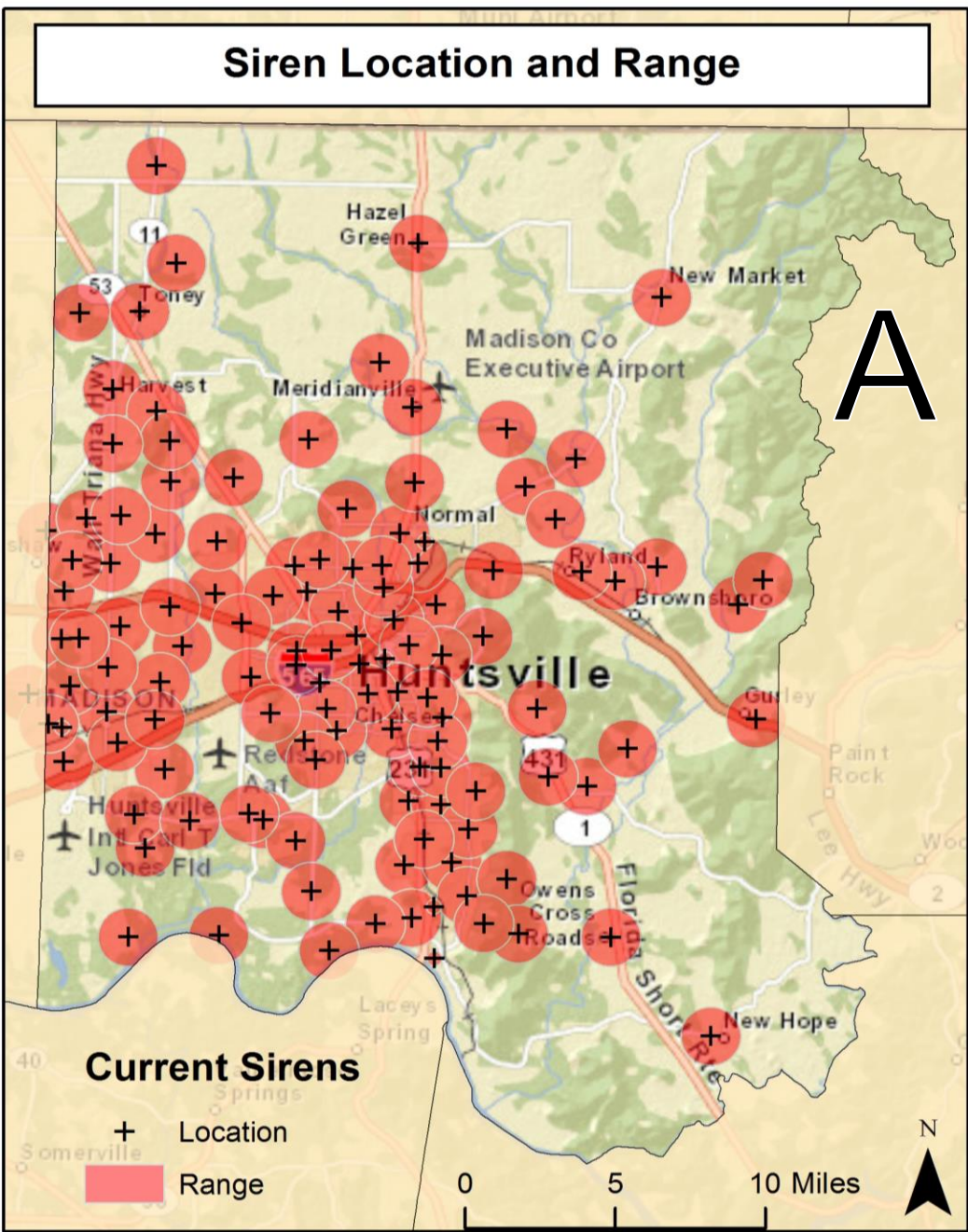


Using Geographic Information Systems to Assess Tornado Sirens in Madison County

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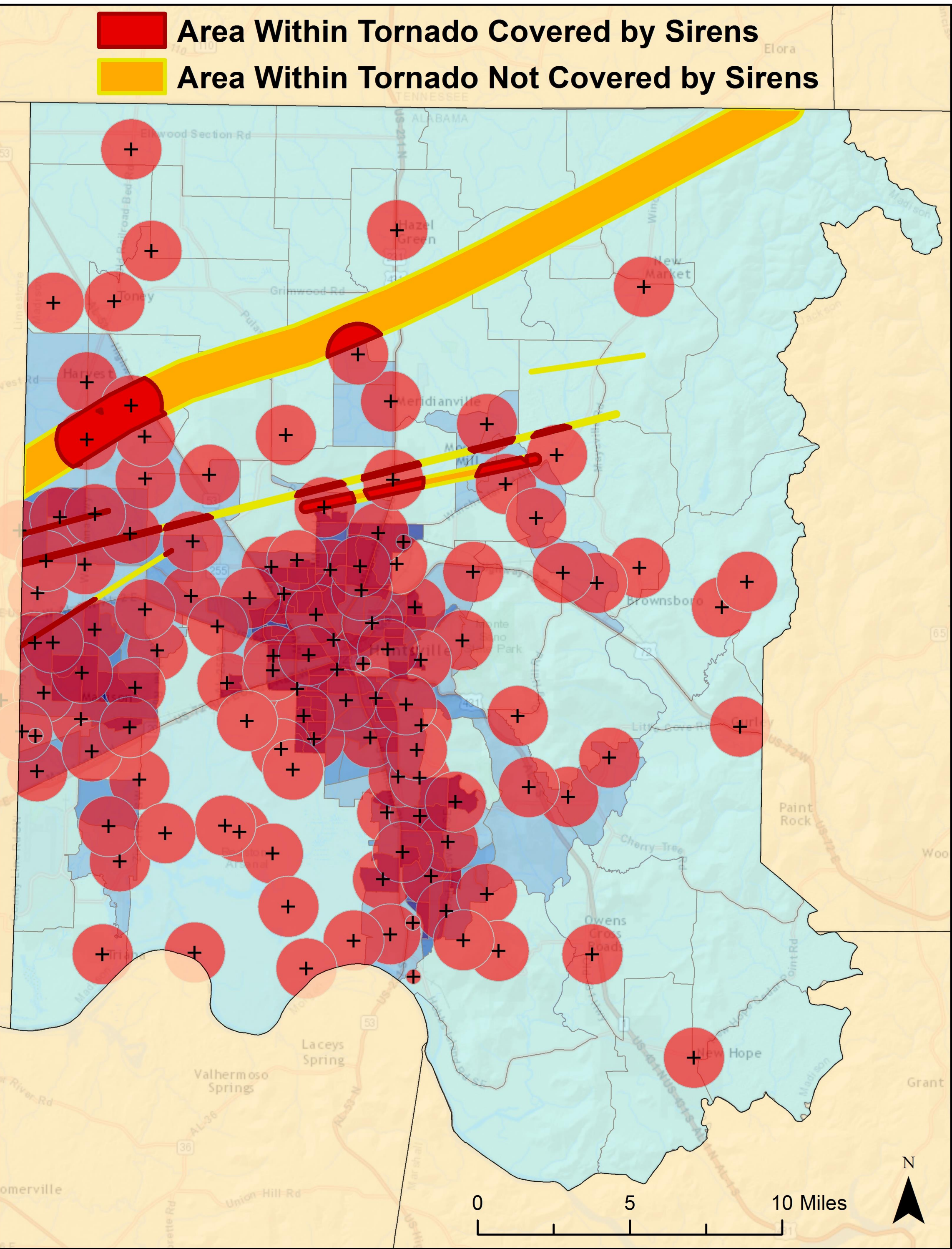


Overview

Outdoor Tornado Sirens are a quick and effective tool to warn a population of the imminent threat of a tornado in the area. About 75% of Madison county is covered by sirens, as seen in Map A to the left. Siren locations are selected based on population density (Map B) and proximity of large public areas such as schools, shopping centers, or recreational facilities. However, sirens have a limited range so there are some populations who must depend on other forms of communication to receive severe weather alerts.

GIS Layers

Key Findings



Tornado	EF rating	Area of Tornado (Mi ²)	Percentage of Area in tornado path and within range of a Siren	Estimated Percentage of Population in tornado path and within range of a Siren
Magnolia Springs-Harvest-Monrovia	EF 1	0.47	100%	100%
Monrovia-Deposit	EF 1	6.49	60	77
Buckhorn High School	EF 0	0.60	0	0
Moore's Mill- Winchester Rd	EF 1	6.40	70	73
Orvil Smith Rd- Harvest	EF 1	0.18	20	21
Phil Campbell (AL Segment)	EF 5	97.00	16	38
Madison-Monrovia-Browns ferry-Jeff	EF 1	0.72	53	70
Total		111.86 mi²	22%	50%

This analysis used GIS software to layer data from siren location, population density, and tornado tracks. Using census block group data and the assumption of uniform density within a group, a rough estimate for population density and population total within the tornado and those also within the range of a siren can be identified. The lowest numbers for population within siren range was the Phil Campbell tornado. This long EF 5 tornado had a very wide path through a more rural area of the county. Although a large percentage of the population was out of range of a siren, Map C shows the tornado warnings, so populations within the path most likely received some form of warning, just not from a siren.

Impact

The AAS promotes research across science and engineering fields to find new and unique ways to solve problems. Using GIS to integrate data that is difficult to represent spatially such as population information allows for a deeper understanding of who receives weather warnings and their main source of those warnings. Identifying areas where non-siren warnings such as television and weather radios are depended upon helps both researchers and decision makers. Before an event, areas that may need more sirens or other communication possibilities receive attention. During an event, it gives forecasters and decision makers detailed information about those they are serving and allows them to make better, safer, and more effective communication when severe weather strikes.

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