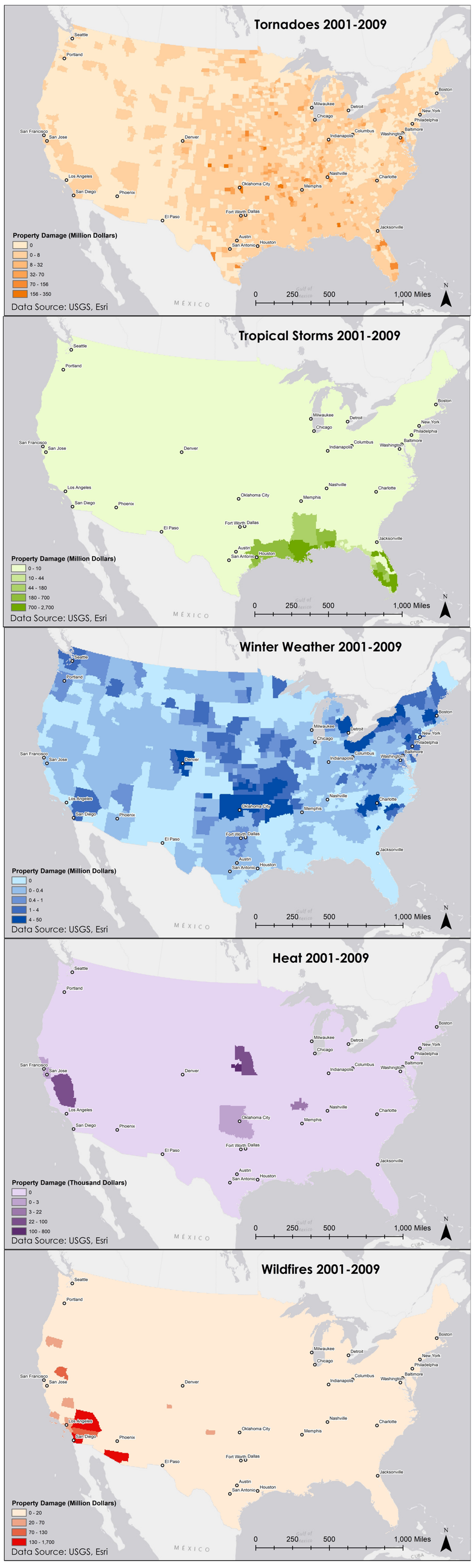
United States Extreme Weather

Property Damage in High Population Areas

Background

The existence of anthropogenic climate change has been well understood by scientists for decades. Recently, modeling software has been developed to attribute extreme weather events to climate change. As the effects of climate change are felt, public interest in extreme weather will increase. This project looks at property damage from 2001-2009 extreme weather events in the continental United States. Specifically, the intersection of high population areas and locations that experienced the most damages from extreme weather are highlighted.

Extreme Weather Rasters



Methodology

Polygon files for tornadoes, tropical storms, winter weather, heat events, and wildfires were analyzed using GIS. First, the files were converted into rasters using the data for property damage. These rasters are shown on the left. Next, the raster calculator tool was used to sum these layers to find the total property damage from extreme weather, Figure 1. In order to analyze this with population data, the raster was then reclassified according to the categories in Table 1.

Old Values ($)	New Values
0-2500000	1
2500000-9000000	2
9000000-25000000	3
25000000-55000000	4
55000000-115000000	5
115000000-300000000	6
300000000-550000000	7
550000000-1600000000	8
1600000000-2800000000	9

Table 1. Total Extreme Weather Damage Reclassify

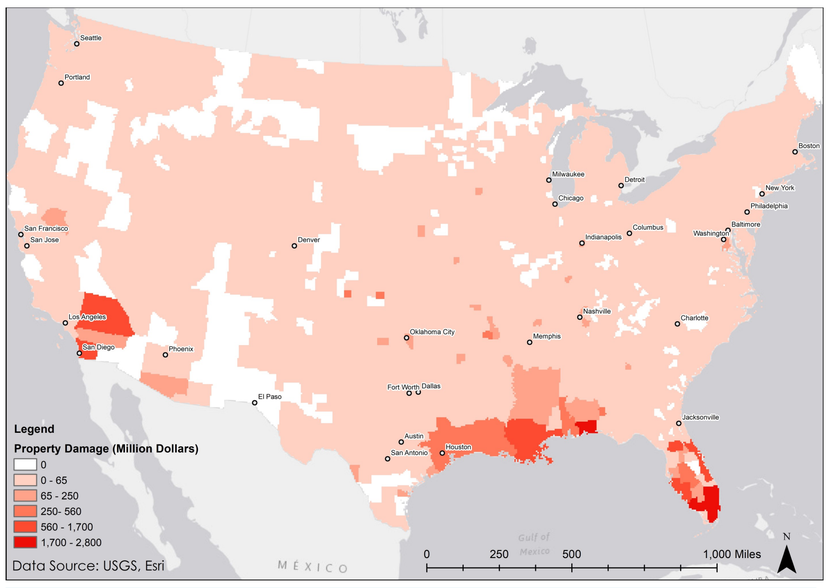
Similarly, a shape file showing census data of High Population Areas (HPA) was converted into a raster file and reclassified according to the categories in Table 2.

Old Values	New Values
0	1
0-2500	2
2500-3500	3
3500-5000	4
5000-6000	5
6000-7500	6

Table 2. HPA Reclassify

Finally, the raster calculator tool was used to multiply the reclassified extreme weather layer with the reclassified HPA layer. Extreme weather damage in high population areas is shown in Figure 2.

Figure 1. Total Extreme Weather Property Damage (2001-2009)



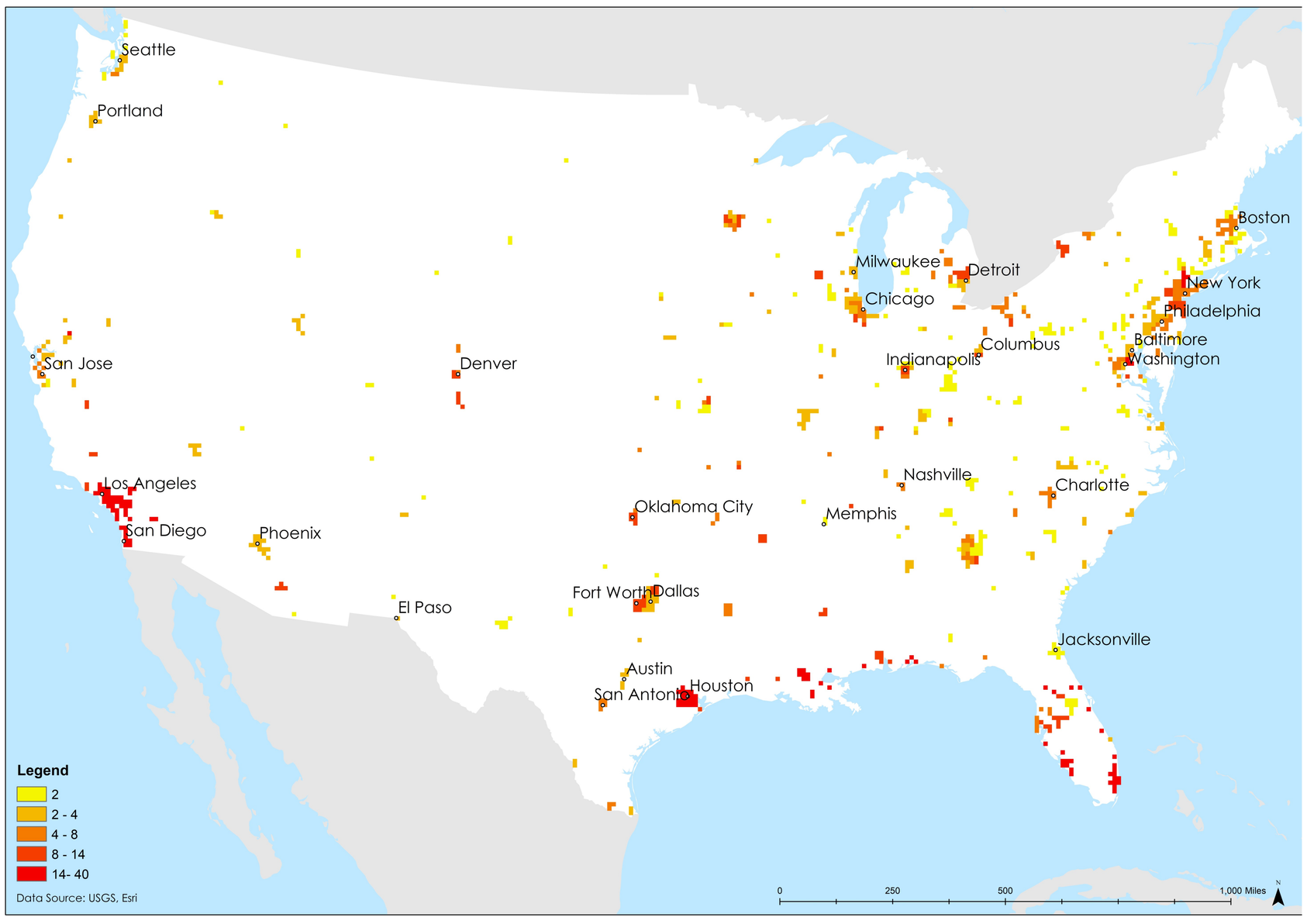
Results

Figure 2 shows the results of this analysis. The scale indicates the extent of property damage caused by tornadoes, tropical storms, winter weather, heat events, and wildfires multiplied by the population density for these highly populated areas. All areas highlighted on this map are high risk locations for extreme weather. Areas in red are where the most people are most strongly effected by extreme weather, according to property damage.

As more recent extreme weather data becomes available, it would be interesting to see if the total property damage is increasing due to climate change. Highlighting areas where the effects of extreme weather are felt most strongly would be useful to determine where to target efforts to combat climate change. If people realize how much money is lost, they will be more willing to support climate change initiatives.

Additionally, future analysis can be done looking at other metrics for extreme weather, other than property damage, such as crop damage or injuries and fatalities.

Figure 2. Extreme Weather Damage in High Population Areas



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Coordinate System/Projection:

NAD 1983 Contiguous USA Albers

Sources: USGS, U.S. Census Bureau

"Pinning Extreme Weather on Climate Change Is Now Routine and Reliable Science." *Nature*, vol. 560, no. 5, 30 July 2018.

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