The objective of this project is to perform a study to see the severity of water stress within the continental United States. Water stress is when the human demand for water is greater than the available natural resources. Water is used throughout our entire civilization for agricultural, domestic, and industrial processes. Water availability is a major limiting factor for all of these systems. For example, petroleum production and farming in West Texas are both greatly limited by their ability to transport water to their facilities. The large demand of water throughout the United States results in these stresses. This study will be over the forty-eight states in the continental United States.

The data used for this project came from two different sources. The first data set, the Degree of Water Stress, is data for the world that shows the water stress by ecoregion on a scale from no stress to high stress. In between that there are levels of moderate stress and low stress. This model was found in the Living Atlas and was developed by The Nature Conservatory for to be published in the Atlas of Global Conservation. To develop these levels, The Nature Conservatory used the WaterGAP model developed by the University of Kassel in Germany. This WaterGAP model uses factors such as precipitation and the location of reservoirs and lakes to calculate the amount of runoff in a certain ecoregion. Once that was developed, this runoff was compared to water use in each ecoregion. Water use can be classified into agricultural, industrial, and domestic sectors. The two values discussed above were combined to calculate a ratio that showed the amount of available water. One drawback from this dataset is that the water stress calculation does not take into account other water sources such a groundwater and reuse. It still gives a good idea of how the surface water resources are relative to their need.
The second data set used was a cartographic boundary file developed by the United States Census Bureau. This set gave the boundaries for each state with a resolution level of twenty meters. Once these two data sets were loaded into GIS, they had to be placed into the same projected coordinate system. They were both projected into the WGS 1984 Web Mercator Auxiliary Sphere since that is the coordinate system that the base topographic map was in. The intersection between the two files provides the final base map that is at the end of this paper. This layout shows each state partitioned into each level of stress. The remainder of this term project will be determining the percent of each state that is in each category of water stress. This can be used to compare the states based on their average water stress. Further analysis will happen in regards to what could be causing these ecoregions to be stressed. The initial data provides the name and information related to description of features and climate in that area. This can be further studied to find common characteristics between each type of ecoregion.