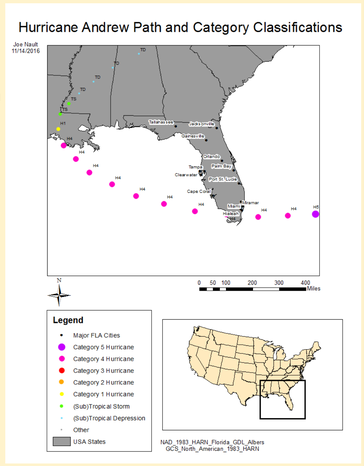
Preparation and Analysis to Protect Against Future Hurricanes in Florida

By: Joe Nault Class: CEE187 12/12/2016 Source: USGS Wesbite/ Floridadisasters.org PCS/GCS: NAD_HARN_Florida_GDL_Albers/ GCS_North_American_1983_HARN

Tufts

Introduction

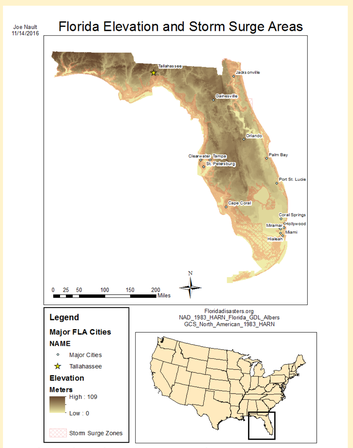
Hurricanes throughout the Atlantic Ocean that make landfall in the U.S. cause on average $1.8 billion dollars each year in damage. Although not recently, most of these hurricanes make landfall in the Southeast region of the country around Florida, Louisiana, Georgia, and South Carolina. The goal of this project is to investigate the correlations between where major cities and essential infrastructure are in Florida, and how we can better protect them from the potential hazards that hurricanes create like flooding, rainfall, and storm surge. This project will use the path of Hurricane Andrew, the fifth costliest hurricane to hit Florida in history, as a guideline to help predict other possible major hurricanes that will hit in the future. By the end, the main objective is to create a system of levees and barriers to shield these essential places in order to reduce damage.



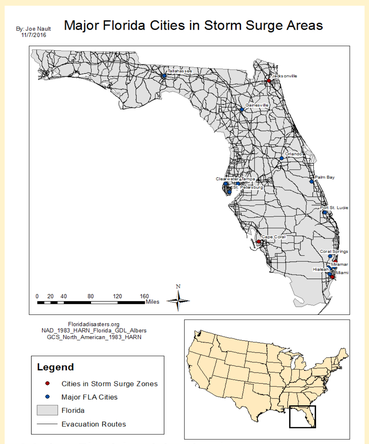
Path map of Hurricane Andrew.

Data

Name	Data Type	Source	GCS	PCS	Datum	Important Attributes	Notes
Evacuation Routes	Shapefile Feature Class	Florida Disasters website	GCS_ North_American_ 1983_HARN	NAD_1983 _HARN_ Florida_ GDL_Albers	D_ North_ American_ 1983_HARN	PM: Greenwich AU: Degree WKID: 3087 Authority: EPSG	Understand how people are supposed to move in disaster situations
Storm Surge Areas	Feature Service Feature Class	Florida Disasters website	GCS_ North_ American_ 1983_HARN	NAD_1983 _HARN_ Florida_ GDL_Albers	D_ North_ American_ 1983_HARN	PM: Greenwich AU: Degree WKID: 3087 Authority: EPSG	See areas that flood and what affect they have in the areas
Hurricane Andrew Path	Feature Service Feature Class	Florida Disasters website	GCS_North_American _1983_HARN	NAD_1983 _HARN_ Florida_ GDL_Albers	D_North_ American _1983_ HARN	PM: Greenwich AU: Degree WKID: 3087 Authority: EPSG	One of the possible hurricanes I want to track
Certified Power Plants	Feature Service Feature Class	Florida Disasters website	GCS_North_American _1983_HARN	NAD_1983 _HARN_ Florida_ GDL_Albers	D_North_ American _1983_ HARN	PM: Greenwich AU: Degree WKID: 3087 Authority: EPSG	Interesting to see where the power plants and how a hurricane would affect power outages
Major Florida Hospitals	Point File Feature Class	Florida Wildlife Website	GCS_North_American _1983_HARN	NAD_1983 _HARN_ Florida_ GDL_Albers	D_North_ American _1983_ HARN	PM: Greenwich AU: Degree WKID: 3087 Authority: EPSG	Essential infrastructure that need protection during a storm
Biomedical Waste Facilities	Shapefile	Floridadisasters.org	GCS_North_American _1983_HARN	NAD_1983 _HARN_ Florida_ GDL_Albers	D_North_ American _1983_ HARN	PM: Greenwich AU: Degree WKID: 3087 Authority: EPSG	Essential facilities that need protection during storms
Inundation Areas	Shapefile Feature Class	Florida Disasters website	GCS_North_American _1983_HARN	NAD_1983 _HARN_ Florida_ GDL_Albers	D_North_ American _1983_ HARN	PM: Greenwich AU: Degree WKID: 3087 Authority: EPSG	Identify where the most susceptible flood zones in fla. are
FLA Elevation	File System Raster	FGDL Metadata Explorer	GCS_North_American _1983_HARN	NAD_1983 _HARN_ Florida_ GDL_Albers	D_North_ American _1983_ HARN	PM: Greenwich AU: Degree WKID: 3087 Authority: EPSG	Understand the basic elevation of FLA



Florida Elevation with Storm Surge Areas



Major Florida cities in danger areas.

Methodology

Hurricane Andrew Path Map
- Show where Hurricane Andrew made landfall

Areas of Concern Map
- Understand where the danger areas are on Florida's coast due to storm surge and inundation

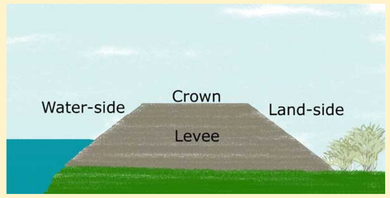
Storm Surge and Elevation
- Show how elevation affects those certain areas

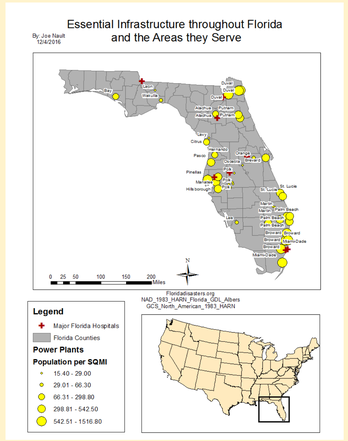
Major Cities in storm surge areas
- Emphasizes what places are in danger

Power Plants and Hospitals Map
- Show essential infrastructure also in need of protection

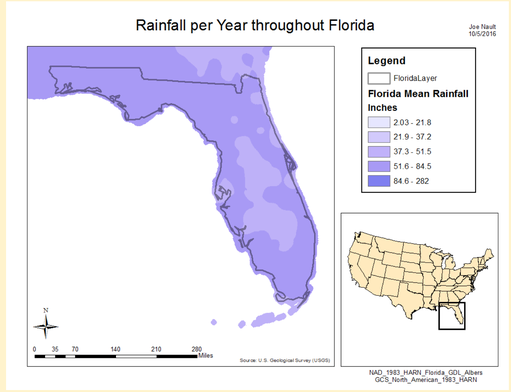
Florida Precipitation
- Show the annual Florida precipitation values

Levee System map
- Shows the placement and solution to my objective

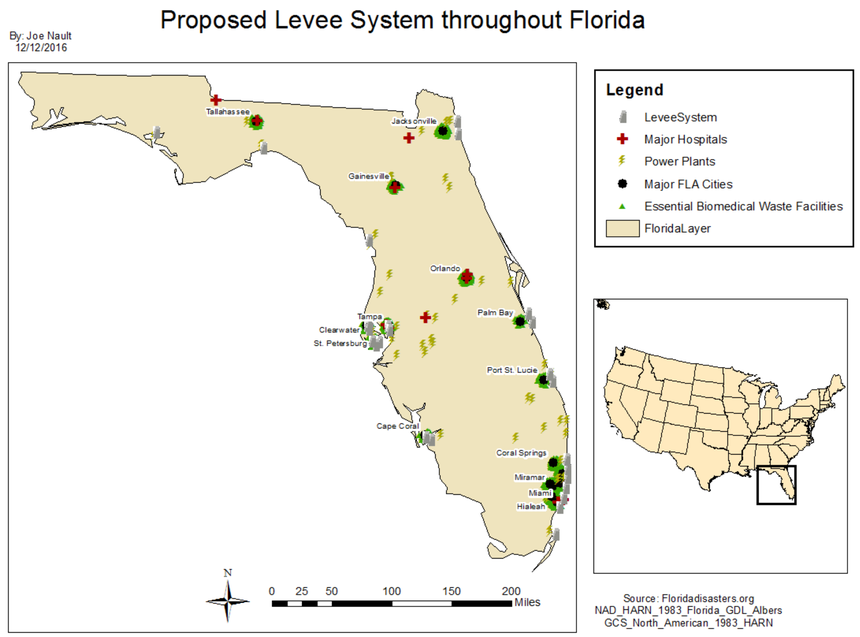




Essential infrastructure in Florida.



Annual Precipitation In Florida

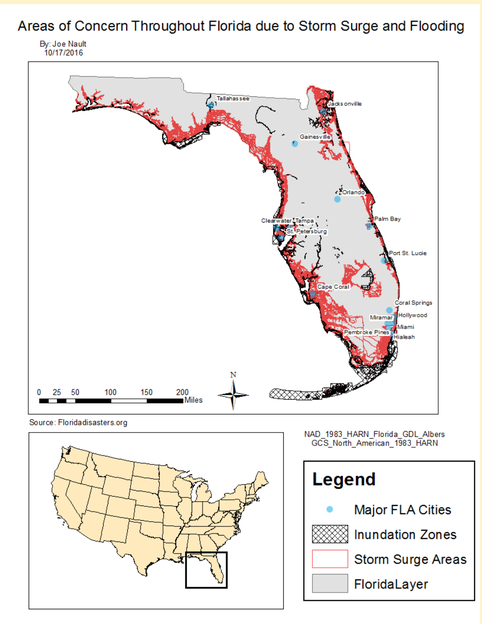


Discussion/ Conclusion

The end result of the project gives people an idea of one way to start thinking of new and innovative ways to prevent catastrophic damage due to hurricanes. The over-arcing theme or goal was to hopefully prevent or even give people enough time to escape from potential disasters like hurricanes Andrew and Katrina. The solution created during this project certainly won't be the perfect solution for all future hurricanes that make landfall in the Florida area, but it will hopefully create discussion as to how we can become better prepared for these events.

The biggest limitation in the research is the fact that it is impossible to plan and prepare for everything. Most of the ideas, even like this one, sound great as an idea and look great when built, however, the reality is one can never be prepared for absolutely everything. Humankind has been fighting mother nature for as long as we've been living and mother nature has won almost every time. With that being said, structure ideas like this one will always help to protect and allow people more time to get to safety.

The best part of this topic is the endless potential for future study. As said before, none of the solutions are perfect, and it will be a never ending battle to stay one ahead of potential hurricanes that will come in the future. One area that would definitely be interesting to study more is why the hurricanes follow the paths that they do, and how we could protect these areas from losing power. If we could understand and predict even more accurately where these hurricanes will make landfall, it could be the difference between people surviving and loss of life. Protecting power lines and preventing power outages have always been another large problem with major storms, and figuring out a way to eliminate that hazard would allow for more safety after these storms.



Areas of Concern in Florida.

Citations:

1. How do Hurricanes form [Hurricane Picture from Space]. (n.d.). Retrieved December 12, 2016, from http://spaceplace.nasa.gov/hurricanes/en/
2. Levee Failure [Basic Levee Diagram]. (n.d.). Retrieved December 12, 2016, from http://www.riverpartners.org/resources/riparian-ecology/veg-levees/levee-failure/