28th Annual Mapping Contest Maps

Analytical Presentation

Truck Safety Analysis Framework for the State of New Jersey

Sponsor: New Jersey Department of Transportation
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New Jersey Institute of Technology

Problems/Issues:

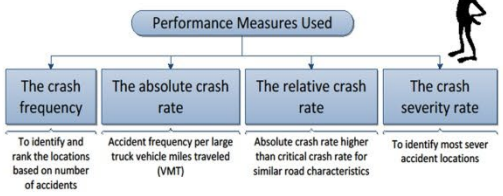
- Between 2006 and 2011 - 49,787 large truck (weighing more than 10,000 lbs.) accidents were reported in New Jersey alone
- Out of 49,787 accidents, 399 were categorized as severe – featuring fatality or incapacitated injury
- Large trucks accounted for about 6.3% of vehicles in total fatal crashes during this period of time in New Jersey
- Large truck crashes cause - fatalities, property damage, and congestion

Research Objective

- Develop effective methodology to identify hazardous location
- Help NJDOT to identify crash prone locations in New Jersey
- Recommend countermeasures required to reduce number and severity of crashes involving large truck

Methodology

- Step 1 – To identify all large truck crashes from NJDOT crash record database and determine crash severity for each record
- Step 2 – To determine large truck percentages based on functional classification of roads
- Step 3 – To divide each route into 0.5 mile segment length
- Step 4 – Calculate average annual daily traffic for each of these 0.5 mile segment s from SLD database of NJDOT
- Step 5 – Determine all large truck accidents occurred on each 0.5 mile segment length
- Step 6 - Calculate crash frequency, absolute crash rate, relative crash rate and crash severity for each 0.5 mile segment
- Step 7 - Rank each of the calculated segments from highest to lowest rank
- Step 8 - Based on the results determine the top 30 segments considered to be hazardous locations
- Step 9 - Recommend solutions to these locations



Analysis

The crash frequency

- Ranked based on crash fatality
- Large truck coded as 1 and other truck coded as 0
- Severity coded as 1 for fatal, 2 for incapacitated injury, 3&4 for other injury and 5 for property damage
- Majority fatal accident occurs on interstates and highways

The absolute crash rate

- Absolute crash rate can be calculated by using the formula below:

$$R = C \times \frac{1{,}000{,}000}{AADT \times SL \times 365 \times P_T}$$

Where:
R = Crash rate (per million VMT);
C = Annual total of large truck crashes;
SL = Section length (mi);
PT = Percentage large trucks
AADT = Average annual daily traffic;

The relative crash rate

- Relative crash rate can be calculated as

$$Rc = Ra + K\sqrt{R_a / M} + 1/(2M)$$

Where:
Rc = Critical crash rate (per million VMT);
Ra = Average crash rate for similar characteristics or roadway types;
M = Million truck vehicle-miles traveled
K = A probability factor based on the desired level of significance

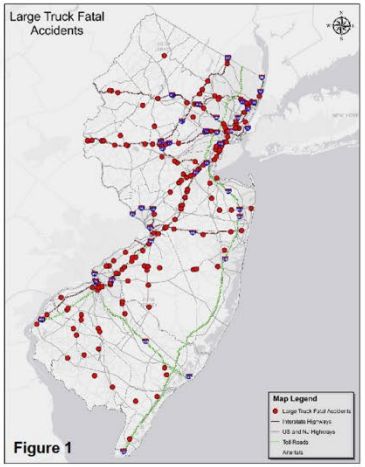


Figure 1

Code	Functional Classification	Avg Crash Rate (Ra)	Critical Crash Rate (Rc)
1	Rural Interstate	1.83	4.79
2	Rural Principal Arterial	1.38	9.88
6	Rural Minor Arterial	1.55	27.21
7	Rural Major Collector	0.9	62.69
11	Urban Interstate	2.66	5.74
12	Urban Freeway/Expressway	1.05	4.75
14	Urban Principal Arterial	5.09	24.27
16	Urban Minor Arterial	3.34	32.73
17	Urban Collector	2.82	42.62

Rank	Route Nos	MP Start	MP End	SEG AADT	FC	Percentage of Trucks	Average Crash Rate
1	561	50.5	51	8382	14	1.59%	211.77
2	140	0.5	1	6072	16	1.73%	183.01
3	40	1.5	2	2977	14	1.59%	177.7
4	535	17	17.5	11434	16	1.73%	149.6
5	27Z	33	33.5	388	14	1.59%	147.63
6	140	0	0.5	5980	16	1.73%	130.32
7	535	17.5	18	11434	16	1.73%	128.6
8	531	1.5	2	12307	16	1.73%	117.15
9	527	53.5	54	10501	16	1.73%	116.71
10	522	8	8.5	8232	16	1.73%	101.74
11	506	10.5	11	10494	16	1.73%	98.91
12	32	0	0.5	23392	14	1.59%	97.92
13	40	10.5	11	15377	14	1.59%	97.22
14	202	11	11.5	35765	14	1.59%	93.07
15	510	12	12.5	11207	14	1.59%	85.14
16	35	58	58.5	715	14	1.59%	80.1
17	549	8.5	9	1489	14	1.59%	78.01
18	514	28.5	29	19227	14	1.59%	77.02
19	23	52.5	53	276	2	4.47%	74.07
20	439	1.5	2	23384	14	1.59%	73.47
21	571	44	44.5	1588	14	1.59%	72.12
22	168	6.5	7	22198	14	1.59%	68.8
23	94	0	0.5	4472	6	2.39%	68.48
24	536S	1.5	2	1485	16	1.73%	68.39
25	28	2	2.5	14323	14	1.59%	67.61
26	31	6	6.5	24145	14	1.59%	65.33
27	206	109	109.5	21974	14	1.59%	62.4
28	514	29.5	30	19227	14	1.59%	60.81
29	551	34	34.5	7190	14	1.59%	56.01

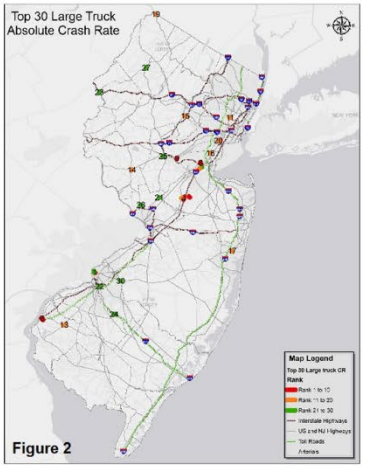


Figure 2

Analysis (Cont.)

The crash severity rate

- Based on accident severity
- Severity weightage - HSIP
- Crash Severity can be calculated as

$$Rs = \frac{[(C_f \times Wt_f) + (C_{Inc} \times Wt_{Inc}) + (C_{Inj} \times Wt_{Inj}) + (C_p \times Wt_p)] \times 1{,}000{,}000}{AADT \times SL \times 365 \times P_T}$$

Where:
R_S = Severity crash rate
C_F = Fatal crashes
C_{Inc} = Incapacitated Injury crashes
C_{Inj} = Other injury crashes
C_P = Property damage only crashes;
Wt_F = Fatal crash weighting;
Wt_{Inc} = Incapacitated crash weighting;
Wt_{Inj} = Other injury crash weighting;
Wt_P = Property damage crash weighting.
AADT = Average annual daily traffic;
SL = Section length (mi);
P_T = Percent of large trucks

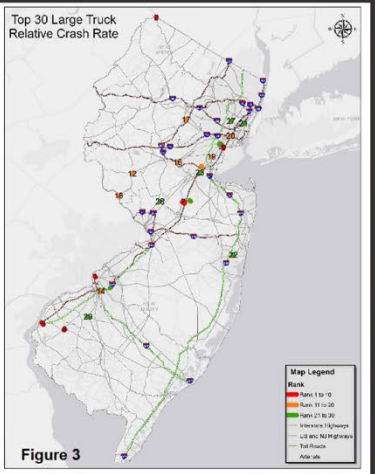


Figure 3

Rank	Route Nos	MP Start	MP End	SEG AADT	FC	% of Trucks	Avg Wt CR	CCR	% Higher Than CCR
1	561	50.5	51	8382	14	1.59%	211.77	24.27	772.58%
2	23	52.5	53	276	2	4.47%	74.07	9.88	649.68%
3	40	1.5	2	2977	14	1.59%	177.7	24.27	632.16%
4	27Z	33	33.5	388	14	1.59%	147.63	24.27	508.29%
5	140	0.5	1	6072	16	1.73%	183.01	32.73	459.14%
6	535	17	17.5	11434	16	1.73%	149.6	32.73	357.09%
7	32	0	0.5	23392	14	1.59%	97.92	24.27	303.45%
8	40	10.5	11	15377	14	1.59%	97.22	24.27	300.58%
9	95	54	54.5	247391	11	5.83%	22.91	5.74	299.16%
10	140	0	0.5	5980	16	1.73%	130.32	32.73	298.16%

Rank	Route Nos	MP Start	MP End	SEG AADT	FC	% of Truck	Wt Avg Severity Rate
1	77	20.5	21	5867	16	1.73%	10392.36
2	550	9	9.5	4179	7	1.35%	7197.21
3	551	5	5.5	6697	16	1.73%	5481.56
4	49	20.5	21	5322	14	1.59%	5321.94
5	77	12.5	13	5387	6	2.39%	4381.22
6	527	18	18.5	13726	7	1.35%	4113.65
7	77	18.5	19	5867	6	2.39%	3842.07
8	70	38	38.5	11746	14	1.59%	3175.93
9	37	4	4.5	35911	14	1.59%	2675.79
10	47	57.5	58	9056	16	1.73%	2594.29

Crash Severity	Weight	
Fatal	WtF	542
Incapacitated	WtInc	29
Other Injury	WtInj	11
PDO	WtP	1

Conclusion

- Based on the results of analysis, NJDOT will be able to identify the crash prone locations
- Study results will help to implement safety policies and counter measures required at the crash prone locations
- Further analysis will determine factors or combination of factors contribute to crash
- Thus reducing the number and severity of large truck crashes

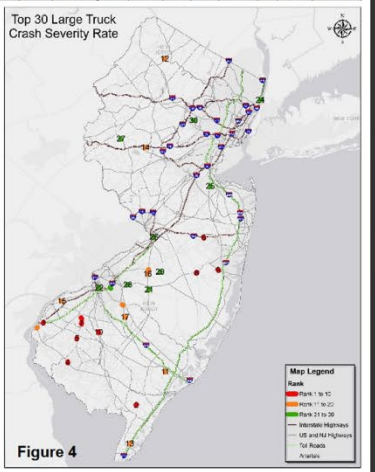


Figure 4

Summer Advisory Reports for Barnegat Bay

Jacqueline Poglodek
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Marine Academy of Technology and Environmental Science

Abstract

Weather conditions can often reach extreme levels, resulting in warnings and advisories. The National Weather Service has declared standards for three summer advisories: Small Craft Advisory, Excessive Heat Warning, and Severe Thunderstorm Warning. Weather Underground weather stations were monitored over the summer of 2014. Additionally, water temperature values from USGS were used to determine certain advisories. With the use of GIS, models and actual examples were visually displayed for each warning. A Small Craft Advisory (SCA) event occurs when frequent gusts reach speeds of gale force (≥ 34 mph – 47 mph), which result in rough waves for small vessels. Several weather stations reported sustained winds faster than 38 mph. While the bay is 64˚F, vessels should be wary of the rough waters, thus needing an SCA report. A Severe Thunderstorm Warning (STW) is issued when the following conditions occur: wind speeds greater than 38 mph, low pressure, and high precipitation rates. With pressure below 30 inches, a severe thunderstorm was likely not to occur. Although precipitation averaged 3.2 inches over Ocean County, only three towns follow the wind criteria. An Excessive Heat Warning (EHW) is issued when there is a heat index of 105˚F for over 3 hours on 2 consecutive days, or a heat index of 115˚F at any time. Over the summer, heat indexes ranged from 110˚F to 105˚F, which is highly dangerous. An excessive heat warning was very likely to have been issued, for all points are located above the trend line. Overall, a simple method to monitor and report an extreme weather pattern is through known advisories. Meteorological conditions must be watched to ensure safety of those near Barnegat Bay.

Introduction

Vessels must pay attention to safety reports before leaving dock. A small craft advisory report "issued by coastal and Great Lakes Weather Forecast Offices (WFO) for areas included in the Coastal Waters Forecast or Nearshore Marine Forecast (NSH) products" ("National Weather" 2014). Different geographic locations have different requirements when issuing a SCA. The definition of a small craft is any "vessel that may be adversely affected by Small Craft Advisory criteria," other considerations would include "the experience of the vessel operator, and the type, overall size, and seaworthiness of the vessel" ("Small Craft" 2014). Small Craft Advisories are issued when winds are expected to reach a speed close to a gale force wind. According to the Beaufort Wind Scale, a Gale wind can be classified by: 7 Moderate Gale (32–38 miles per hour), 8 Fresh Gale (39–46 mph), 9 Strong Gale (47–54 mph) and 10 Storm/Whole Gale (55-63 mph) ("Beaufort Wind" 2014). Single gusts cannot be considered when issuing an advisory. Frequent gusts need to prolong for longer than 2 hours.

Severe thunderstorms can affect a multitude of people. The National Weather Service defines a severe thunderstorm as an event in which the following conditions occur: wind speeds greater than 30 mph, low pressure, and high precipitation rates. Similarly, the NWS issues an excessive heat warning when there is a heat index of 105˚F for over 3 hours on 2 consecutive days, or a heat index of 115˚F at any time.

Advisory reports are critical for boaters and those who reside around the bay. Specific weather patterns that occur affect fishermen, beachgoers, and boaters on a daily basis. Warnings are extreme and can be dangerous if unknown. Therefore, this research will impact society, as those near Barnegat Bay must be aware of the extreme conditions that have occurred and will continue to occur each summer. This study is designed to statistically determine weather advisory reports for Barnegat Bay and visually display the standards.

Figure 1. Barnegat Bay, New Jersey

Methods

- Data was collected from June 1, 2014 to September 30, 2014
- Meteorological parameters were monitored by Weather Underground 15 stations: Brick, Seaside Heights, Harvey Cedars, Ship Bottom, Brigantine, Manahawkin, Barnegat, Forked River, Lanoka Harbor, Bayville, Ocean Gate, Beachwood, Toms River, Seaside Park, and Barnegat Light
- Water temperature was monitored by USGS
- Advisory and warning criteria based on NWS
- Geographic Information Systems: Choropleth and Dot Density maps used to display events
- Graphs were created to depict event data against minimum criteria per advisory

Objective: To display and analyze 2014 events for summer meteorological warnings surrounding Barnegat Bay, New Jersey.

Small Craft Advisory

Analysis

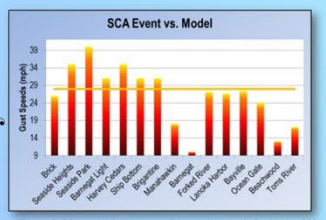

Figure 2. SCA event data compared to minimum wind criteria of 38 mph, with a constant water temperature of 64˚F.

Table 1. Parameters monitored by fifteen weather stations and USGS, including wind gusts (mph), wind direction, and temperature of the bay (˚F).

Station Name	Gust Speed (mph)	Wind Direction	Water Temperature (˚F)
Brick	36	SSW	64
Seaside Heights	35	NE	64
Harvey Cedars	36	NE	64
Ship Bottom	31	NE	64
Brigantine	31	NE	64
Manahawkin	35	ENE	64
Barnegat	39	E	64
Forked River	27	E	64
Lanoka Harbor	26.6	NE	64
Bayville	27.4	ENE	64
Ocean Gate	24	ENE	64
Beachwood	13	ENE	64
Toms River	17	ENE	64
Seaside Park	40	N	64
Barnegat Light	31	NE	64

2014 Event

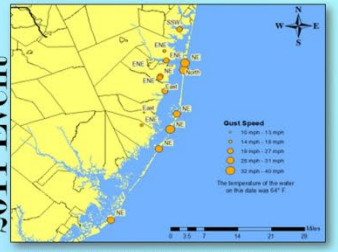

Figure 3. Possible small craft advisory on September 25, 2014.

Severe Thunderstorm Warning

Analysis

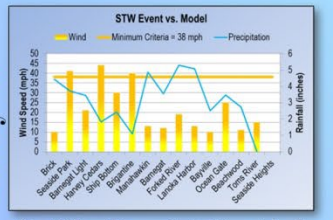

Figure 4. STW event data compared to the minimum wind speed criteria, while also represented with precipitation.

Table 2. Meteorological data collected from fifteen weather stations, including wind speed (mph), pressure (inche), and rainfall rates (inches).

Station Name	Wind Speed (mph)	Pressure (in.)	Precipitation (in.)
Brick	10	29.42	4.43
Seaside Heights			
Harvey Cedars	44	29.76	1.63
Ship Bottom	30	29.76	2.42
Brigantine	40	29.79	1.09
Manahawkin	13	29.74	4.57
Barnegat	17	29.86	3.54
Forked River	19	29.74	5.39
Lanoka Harbor	13	29.8	5.66
Bayville	10	29.81	2.21
Ocean Gate	26	29.84	3.47
Beachwood	11	29.79	2.72
Toms River	16	29.48	0
Seaside Park	41	29.86	3.7
Barnegat Light	21		3.44

2014 Event

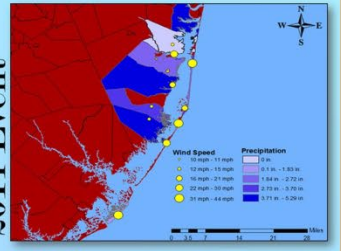

Figure 5. Possible thunderstorm on August 13, 2014.

Excessive Heat Warning

Analysis

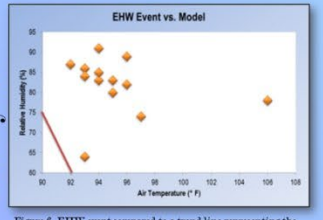

Figure 6. EHW event compared to a trend line representing the minimum values that will result in a high heat index.

Table 3. Data collected from fifteen weather station, including air temperature (˚F), humidity (%), and the calculated heat index (˚F).

Station Name	Air Temperature (˚F)	Humidity (%)	Heat Index (˚F)
Brick	106	76	168
Seaside Heights	92	87	135
Harvey Cedars	93	86	132
Ship Bottom	96	89	151
Brigantine	94	91	143
Manahawkin	94	83	133
Barnegat	93	84	110
Forked River	95	90	134
Lanoka Harbor	96	92	141
Bayville	95	83	137
Ocean Gate	93	84	129
Beachwood	94	85	135
Toms River	97	74	135
Seaside Park			
Barnegat Light			

2014 Event

Figure 7. Possible excessive heat event on June 18, 2014.

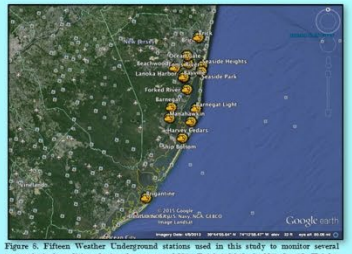

Figure 8. Fifteen Weather Underground stations used in this study to monitor several meteorological conditions during the summer of 2014: Brick (40.045, -74.095), Seaside Heights (39.934, -74.075), Harvey Cedars (39.710, -74.134), Ship Bottom (39.644, -74.179), Brigantine (39.493, -74.367), Manahawkin (39.774, -74.246), Barnegat (39.767, -74.237), Forked River (39.820, -74.153), Lanoka Harbor (39.854, -74.174), Bayville (39.859, -74.127), Ocean Gate (39.947, -74.149), Beachwood (39.976, -74.212), Toms River (39.974, -74.153), Seaside Park (39.911, -74.079), and Barnegat Light (39.761, -74.106).

Discussion

New Jersey is part of the atmospheric circulation of winds from the west towards the east. Properly known as prevailing westerlies, these winds have a high influence on the seasonal weather of New Jersey. The state's latitudinal location, as well as its proximity to the Atlantic Ocean, affects all weather patterns that occur throughout the year, primarily in the summer.

The only advisory that seemed skeptical to occur was the severe thunderstorm warning. This is because only Brigantine, Seaside Park, and Harvey Cedars had sustained wind speeds above the minimum criteria of 30 mph. Additionally, most areas of New Jersey only receive 30 thunderstorms each year, where less occur along the coast than inland ("The Climate"). Although New Jersey is located in a temperate deciduous forest biome, the rain is only moderate. Therefore, the variable precipitation does not enforce severe storms. The most rainfall on one day last summer averaged just 3.7 inches in Ocean County. Dangerous, summer thunderstorms seemed to be lacking during the summer of 2014.

Data showed certainty that an excessive heat warning would have been issued. For example, heat indices ranged from 110˚F to 105˚F, which is highly dangerous. Once the temperatures reached high values, they only increased. In the summer, temperature differences are less between the northern and southern areas of the state ("The Climate"). In the Pine Barrens, the sandy, porous soils leave the surface dry, thus allowing for a wider range of minimum and maximum temperatures ("The Climate"). This is because any precipitation that falls infiltrates directly into the soil. The air remains dry and warm in the summer. However, the heat indices that were calculated were extremes. The Atlantic Ocean's heat capacity influences temperature fluctuations, thus keeping the area less prone to extremes ("The Climate"). A known outlier was amongst the data, for temperature changes are usually gradual in New Jersey. The combination of air temperature and high humidity resulted in dangerous heat indices.

The safety of vessels in the bay heavily relies on wave roughness and sustained winds. Weather stations reported winds faster than 38 mph for a fetch of up to two hours. Water temperature also remained constant at around 64˚F. Ocean breezes keep coastal temperatures cooler while contributing to the roughness of waves ("The Climate"). Sea breezes are most common in the summer, and affect locations up to 40 miles inland under favorable conditions ("The Climate"). The surrounding area of Barnegat Bay must pay attention to variable conditions before heading out on a boat. Vessels should be wary of the rough conditions, thus needing an SCA report.

Conclusion

Small Craft Advisory: Many towns experienced gusts winds faster than 38 mph, and while the bay is 64˚F, vessels should be wary of the rough waters, thus needing an SCA report.

Excessive Heat Warning: Heat indices ranged from 110˚F to 105˚F, which is highly dangerous. An excessive heat warning was very likely to have been issued, for all points are located above the trend line.

Severe Thunderstorm Warning: With pressure below 30 inches, a severe thunderstorm was likely not to occur. Although precipitation averaged 3.2 inches over Ocean County, only three towns follow the sustained wind criteria.

References

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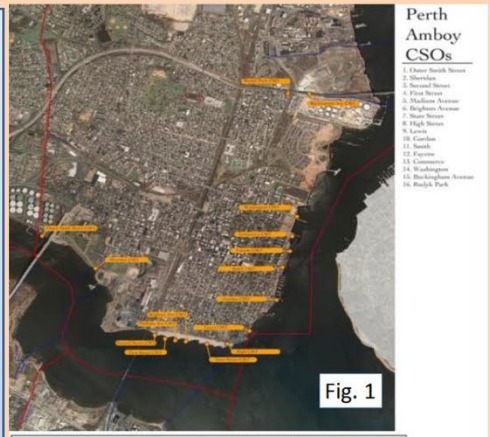
Analyzing combined sewer overflow within Perth Amboy, NJ

By: Brandon Rogers, Rutgers University

Introduction

As part of a joint internship between Rutgers University and the city of Perth Amboy, a study was set to analyze the impacts of combined sewer overflow and how to lessen the effect it has on local water quality. Combined sewer overflow (CSO) is a problem that many older historic cities face, as CSOs mix wastewater from our sewers with the rainwater from grates on our streets. Because of this, large volumes of storm water and wastewater are forced into the same pipes, thus causing them to mix and overflow. The overflow then gets pushed out into the open ocean, negatively impacting water quality. Perth Amboy wishes to improve its water quality by implementing green infrastructure to lower the overall amount of CSO it produces.

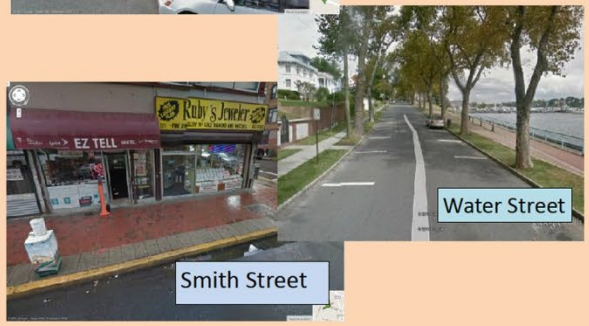
Perth Amboy has 16 total CSO's out of the 200+ within New Jersey



Combined Sewer Overflows Discharging to the Raritan River and Arthur Kill

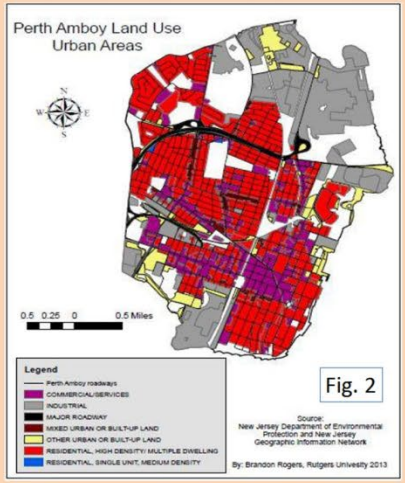
Methodology and Objectives

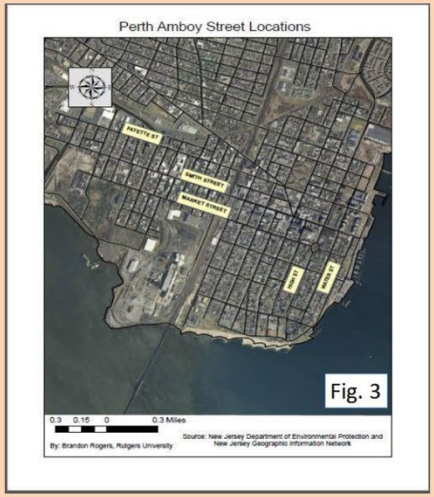
- Identify and survey areas of high traffic, steep slopes, or barren land for redevelopment
- Research the methodology from New York and Philadelphia projects as examples
- Create maps primarily focusing on urban land use
- Create a foundation for future GIS-based mapping in Perth Amboy



Outcomes

Several maps were created with ArcGIS, Fig. 2 and Fig. 3, to visually support the study. Five recommended areas were chosen as potential redevelopment areas for green infrastructure.





Sources: NY/NJ Baykeeper, Google Earth, NJGIN, NJDEP, Perth Amboy Office of Economic and Community Development, and Rutgers University

Historical Earthquake Analysis of New Jersey

Lucy Kosty & Alexa Ornstein

Objective: To detect patterns in historical earthquake occurances and fault lines in relation to New Jersey populations

Abstract

Earthquakes can be weak enough to not be felt, but they can also be strong enough to cause millions of dollars in damage if they reach natural disaster status. The study aimed to do an in-depth analysis of New Jersey's seismic history by observing the changes in the amount and strength of earthquakes over time. The study also set out to determine the overall most seismically active year, fault, and county for New Jersey. By utilizing ArcGIS programs, earthquake, population, and fault data were mapped in order to find patterns and trends within each data set. The earthquake data was broken up into time periods, based on when the earthquake took place. The epicenters were then plotted and represented by a point that indicated its magnitude. Census data was used to observe densely-populated areas in close proximity to New Jersey's earthquakes. Highly-populated urban areas were found to be the most susceptible to earthquake damage. Lastly, a choropleth map identified the most seismically-active county in the state: Morris County. The study also concluded that the Ramapo Faut was the most active fault and the most active small-scale time frame was 2001-2014. The advancement and improvement of earthquake detection technology most likely caused the increase in earthquakes from 1783, the first recorded earthquake, to 2014.

Introduction

The northeastern United States is not often noted for its geological activity; however, throughout history there have been many noteworthy earthquakes that have given scientist further insight into seismic patterns. Unlike the major plate shifts that occur on the west coast, earthquakes in New Jersey occur after a slow accumulation of stress within the Earth's crust, which is then released along fault lines (Dombroski, 2005). There are many fault lines in New Jersey, mostly concentrated in the northern section of the state. The Ramapo Fault, which "separates the Piedmont and Highlands Physiographic Provinces" was one of the first recorded in the state and maintains its notoriety in the field of geology (Dombroski, 2005). The Ramapo fault line, also, was closely monitored because of its close proximity to Indian Point, New York, Nuclear Power Generating Station (Dombroski, 2005). The effects an earthquake can have on human structures can vary: buildings, underground infrastructures, and geological foundations and can all be compromised. Although surface fault lines are merely historical traces of past earthquake events, unmapped faults that exist actively beneath the ground are host possibility for earthquakes miles beneath the surface of the Earth (Dombroski, 2005). Earthquake and fault documentation, which has occurred for over 300 years in the greater New York area, may provide information vital to predicting future seismological activity. "One intensity VI, four intensity V's, and at least three intensity III shocks have also occurred in the New York area over the last 300 years" with time spans ranging from "46 and 101 years" (based on a modified Mercalli scale) (Dombroski, 2005). This indicates that New Jersey is due for an intense earthquake that is yet to be experienced by this generation. The purpose of this study was to analyze historical earthquake occurrences and geological fault lines in conjunction with population data in New Jersey.

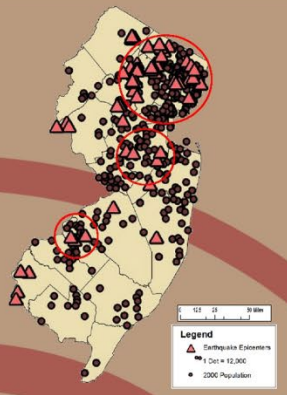


Figure 1. Earthquake epicenters from 1990-2010 overlayed on 2000 census population data. Although populations may have varied, the proximity of densely populated areas to historically active earthquake locations can be seen. Areas with high earthquake to population ratios are noted.

Figure 2. Major fault lines in New Jersey indicate historically active earthquake locations. When overlayed with historical earthquake data, the most active faults are made apparent. The Ramapo fault, well known to New Jersey geology experts, is denoted as being particularly historically active.

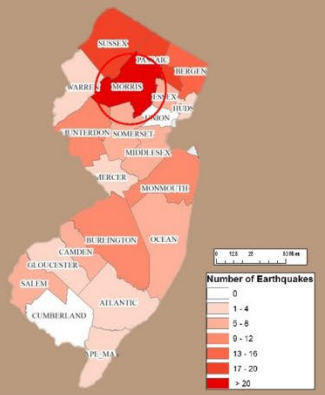


Figure 3. Earthquake occurrence by county was analyzed. The most active county has been Morris, indicated above, with 51 recorded historical earthquakes. This coincides with the dense population of fault lines in the area.

Table 2. A breakdown of historical earthquake occurrences from 1783 to 2014 in New Jersey by county, corresponding to **Figure 3.**

County Name	Number of Recorded Earthquakes
Atlantic	1
Bergen	16
Burlington	9
Camden	5
Cape May	1
Cumberland	0
Essex	8
Gloucester	1
Hudson	4
Hunterdon	10
Mercer	2
Middlesex	5
Monmouth	10
Morris	51
Ocean	8
Passaic	20
Salem	6
Somerset	6
Sussex	20
Union	0
Warren	3

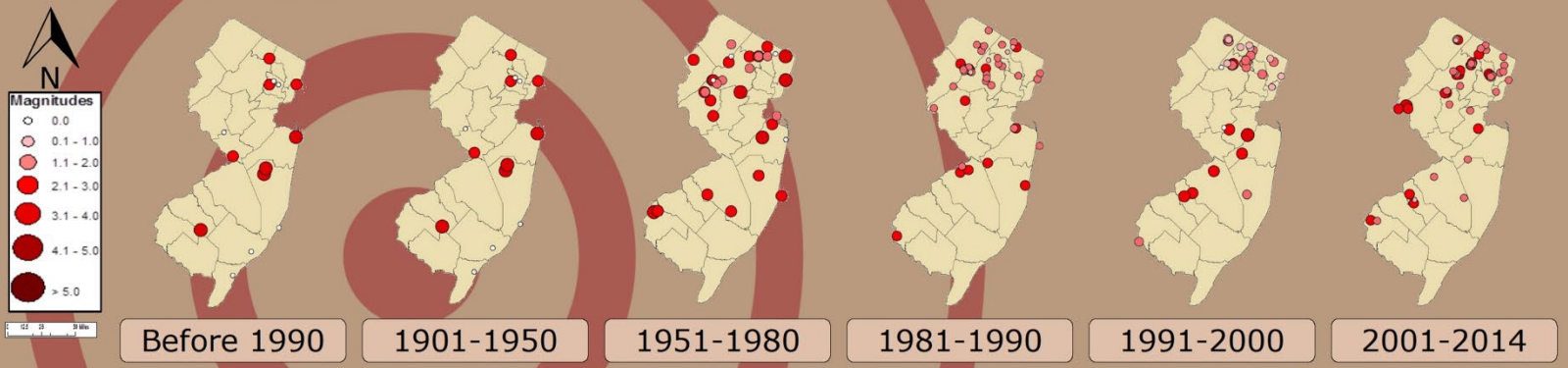


Figure 4. Epicenters of earthquakes in New Jersey broken down by time period and represented by their corresponding magnitudes. Over time, there was a higher detection of earthquakes in southwest New Jersey, and there was a high density of seismic activty in the northeast.

Figure 5. Federal Emergency Management Agency (FEMA) reports that 40% of americans haven't practiced for a natural disaster (Stoll, 2014)/

Data and Methods

The historical analysis started with obtaining earthquake data, fault line data, and population data for the state of New Jersey. All data was found online at the website for the New Jersey Department of Environmental Protection's (NJDEP) Bureau of Geographic Information Systems. Specifically, the earthquake data was provided by the NJDEP's Division of Water Supply and Geoscience. The earthquake data displayed the epicenters of every earthquake that has occurred in New Jersey from 1783 through 2014. The shapefile included attributes such as the county, date, and magnitude of the earthquake. The fault line data provided the locations and names of every fault in the state. The population data was provided by the New Jersey Department of Labor and the United States Census Bureau. The shapefile contained numerous components of the 2000 Census such as the total new jersey population and the number of households in New Jersey. Maps of New Jersey were then produced using ArcGIS and ArcMap programs.

In order to analyze this data, all the earthquake epicenters were split into groups based on when they occurred. There were six time periods in total: before and including before 1900, 1901 to 1950, 1951 to 1980, 1981 to 1990, 1991 to 2000, and 2001 to 2014. Each time period was represented with a map that had a points at the epicenters of every earthquake form that fell within that time span. However, the size of each point on the map was determined by the earthquake's magnitude. The higher the magnitude, the larger the point was. These maps allow the viewers to notice the change, or lack of change, in the amount and strength of New Jersey earthquakes over time. A choropleth map was then created to determine which counties have experienced the most earthquakes. The possible amount of earthquakes was broken down into intervals where each interval was assigned a different shade of red. The lighter shades signified smaller numbers of earthquakes while the darker reds signified larger numbers. Next, a dot density map was made with the 2000 census data and the earthquake epicenters. Using the query builder function in ArcMap, only the earthquakes from 1990 to 2010 were plotted and the New Jersey layer. The dot density map showed how the total population was distributed across the state. Each dot on the map represented 12,000 people, so areas with more dots had higher populations. Lastly, all the fault lines in New Jersey were mapped to find out if more earthquakes took place near the faults than away from them.

Table 1. A scale indicating worldwide earthquake occurrence and damage by earthquake size, based on Richter scale (Dombroski, 2005).

Description	Magnitude	Average Annually
Great	8 and higher	1 per year
Major	7 - 7.9	18
Strong	6 - 6.9	120
Moderate	5 - 5.9	800
Light	4 - 4.9	6,200 (estimate)
Minor	3 - 3.9	49,000 (estimate)
Very Minor	2 - 2.9	1,000 per day
------	1 - 1.9	8,000 per day
Microearthquakes	less than 1	60,000 per day

Discussion and Conclusion

After using ArcGIS mapping to analyze earthquake epicenter data by year, a pattern between location and population can be seen. The most densely populated areas in New Jersey, for example, locations surrounding Morris, Sussex, Passaic, and Bergen counties, have some of the the highest occurrence of earthquakes (**Figures 1 & 2**). The Ramapo fault has remained one of the most historically active; however, an occurrence of earthquakes in the southwestern portions of the state have become more prevalent over time (**Figure 3 & 4**). In addition, over time there has been a higher detection of earthquakes, however this may be highly dependent on available technology and seismic monitoring advancement. The state building codes, although updated, do not require retrofitting existing buildings. Unreinforced masonry structures that are, with is common in New Jersey's densely populated urban areas, are therefore vulnerable to damage. It is proposed that "if an earthquake the size of New York City's 1884 quake (magnitude 5.5) were to occur today, severe damage would result. Fatalities would be likely"(Dombroski, 2005). With an intense earthquake predicted for the near future, it is important to consider building safety codes in correspondence with the consideration for the historical earthquake data analyzed in this project.

References

Dombroski, Daniel R. Jr. (2005). Earthquake Risk in New Jersey. New Jersey Department of Environmental Protection, New Jersey Geological and Water Survey. Retrieved from: http://www.state.nj.us/dep/njgs/enviroed/erisk.htm

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Natural Disaster Preparation saves lives!

Scan the QR Code to learn all about earthquake preparedness! The Red Cross describes how to prepare for an earthquake as well as what you should do during and after the event. Make an emergency plan so that you can stay as safe as possible!

Assessing Health Risks Associated with Air Pollution and Environmental Justice in New Jersey

Carcinogenic Risks

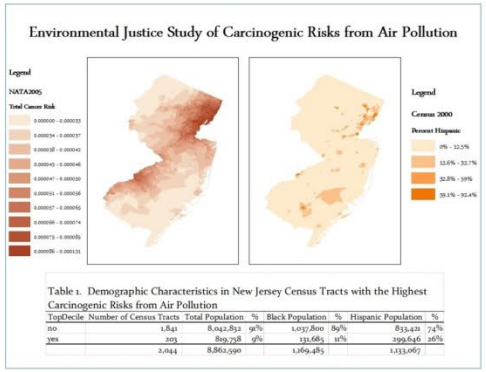


Table 1. Demographic Characteristics in New Jersey Census Tracts with the Highest Carcinogenic Risks from Air Pollution

TopDecile	Number of Census Tracts	Total Population	%	Black Population	%	Hispanic Population	%
no	1,841	8,042,812	91%	1,037,800	89%	853,421	74%
yes	203	819,778	9%	131,685	11%	299,646	26%
	2,044	8,862,590		1,169,485		1,133,067	

Respiratory Risks

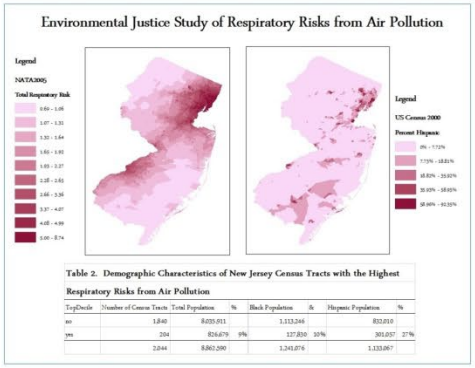


Table 2. Demographic Characteristics of New Jersey Census Tracts with the Highest Respiratory Risks from Air Pollution

TopDecile	Number of Census Tracts	Total Population	%	Black Population	%	Hispanic Population	%
no	1,840	8,035,911		1,113,246		832,010	
yes	204	826,679	9%	127,830	10%	301,057	27%
	2,044	8,862,590		1,241,076		1,133,067	

Neurological Risks

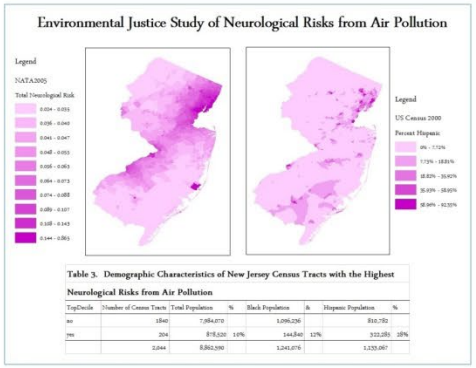


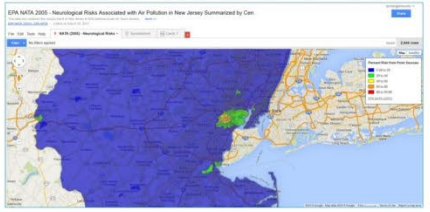
Table 3. Demographic Characteristics of New Jersey Census Tracts with the Highest Neurological Risks from Air Pollution

TopDecile	Number of Census Tracts	Total Population	%	Black Population	%	Hispanic Population	%
no	1840	7,984,670		1,096,236		810,782	
yes	204	878,520	10%	144,840	12%	322,285	28%
	2,044	8,862,590		1,241,076		1,133,067	

Example of NATA estimates

Risks attributed to Formaldehyde

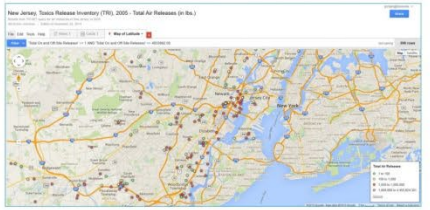
Neurological risks attributed to point sources



Hispanic density in top decile census tracts

TRI Industrial Emissions

Risks attributed to diesel emissions



Data

- EPA **National-Scale Air Toxics Assessment** (NATA) data (2005) was compared across New Jersey census tracts to view areas with the greatest risks for cancer, respiratory disease, or neurological illness associated with air pollution.
- **U.S. Census** data for 2000 were joined with NATA tract data to find the differences in air pollution risks faced by different demographic groups.

Analysis

- NATA and US Census datasets were obtained from EPA, and Census Bureau websites respectively.
- Data were visualized thematically and assessed in ArcGIS using summary statistics tools.
- Data sets from NATA and the US Census were imported into Google Fusion Maps to facilitate access and visualization for a wider audience, by publishing through Google Maps.

Findings

- For all three health risk factors evaluated by NATA, black populations were more likely to reside in tracts in the top decile for highest risks than the total population, but Hispanics were much more likely to reside in tracts with the greatest risk. **26-28% of Hispanics live in census tracts in the top risk decile.**
- Fusion maps illustrate the NATA risk data, and industrial sources.

Additional Resources

- All risk maps shown here, as well as the instructions for how to create your own Google Fusion maps are available online: http://www.drew.edu/ess/about/drews-spatial-data-center/gis-tutorials. These were designed in coordination with the EPA-TRI University Challenge Program.
- Additional information was presented in a Dillard University Deep South Center for Environmental Justice Webinar, a recording can be found on their website: http://dscej.org/index.php?option=com_content&view=category&layout=blog&id=79&Itemid=262.

The U.S. Environmental Protection Agency is issuing a challenge to the academic community. Find new, innovative, and creative ways to use Toxics Release Inventory (TRI) data and related information to promote more informed decision-making and action on the part of communities, manufacturers, and government.

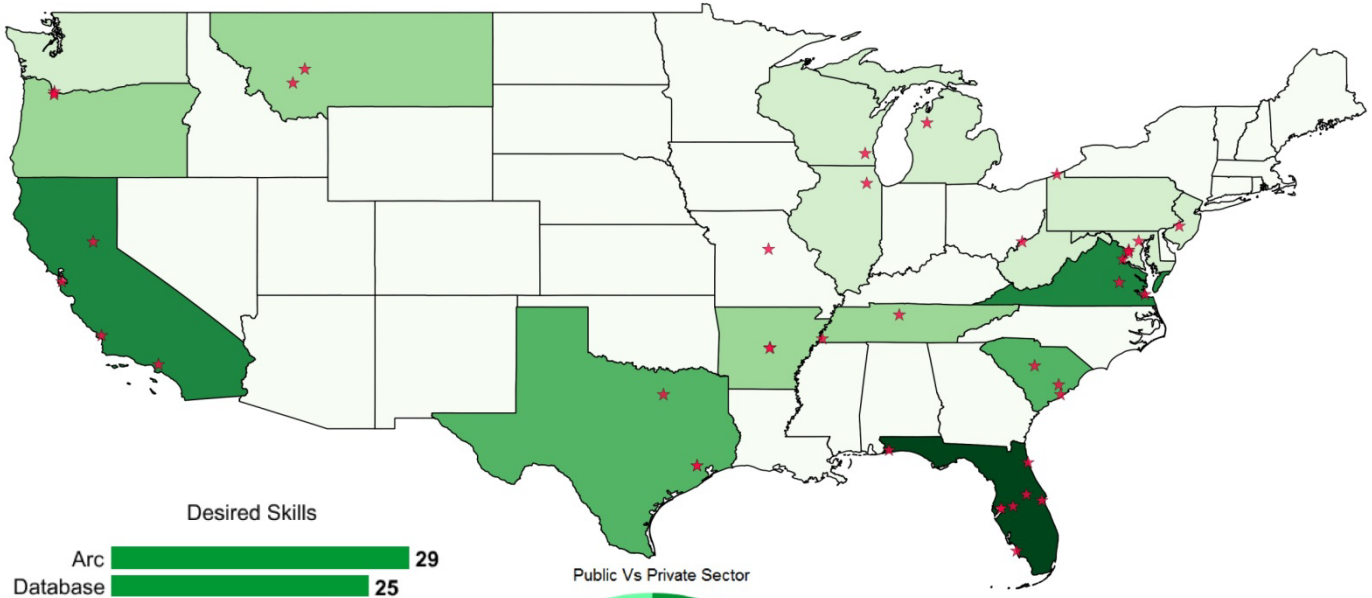
Anyone who is affiliated with an accredited college or university may apply. Proposed projects may range from one semester to multi-year research.

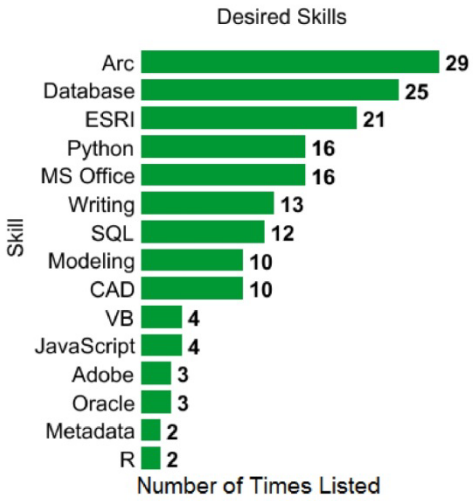
Find out how to apply by visiting www.epa.gov/tri/university

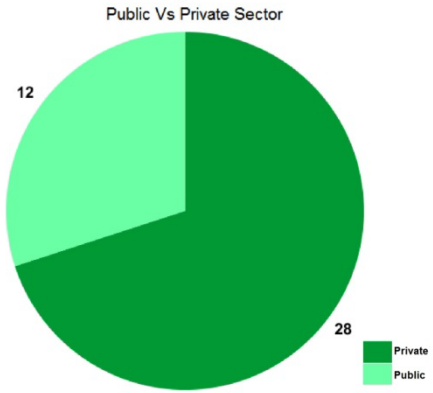
Authors:
Theresa Campbell, ESS
Lisa Jordan, Biology Dept.
Drew University

DREW SPATIAL DATA CENTER

Entry Level GIS Jobs in the USA







Average Salary: $47142.85

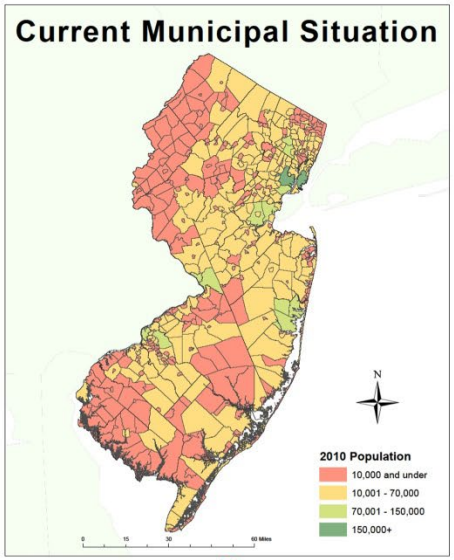
Job postings were gathered from The GIS Jobs Clearinghouse website from January 1st 2015 to March 31st 2015. In order to be included in this map, the posting had to ask for no more than 3 years of experience and have the title of Analyst, Technician, or Specialist. Reposted listings were omitted. 41 listings were posted during the data collection period.

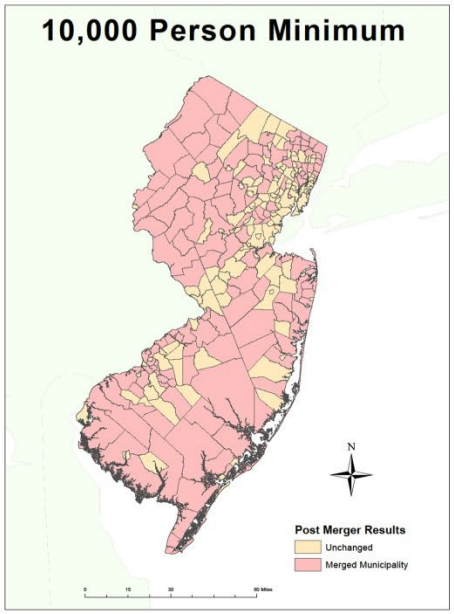
This map serves as a general indicator of what employers are looking for in entry level GIS employees and is not intended to reflect the GIS job market as a whole.

Data Source: TIGER and www.gjc.org
EPSG: 4326
Map Composition: Robert Brown
Date: 4/10/15

Merging New Jersey's Municipalities With GIS

Using Python to Model Geopolitics





Background

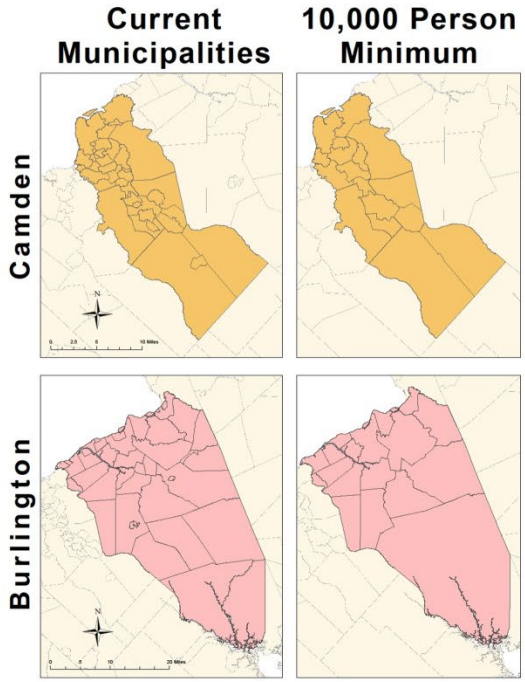
New Jersey has roughly thirty million less people than California, as well as roughly nineteen times less land area. However, New Jersey has eighty-three more municipalities than California. A long history of home rule laws has allowed the most densely populated U.S. state also become one of the most geographically fragmented ones. In other countries (notably Denmark and Japan), municipal consolidation is used to cut down on costs by merging the various services and jobs that each municipality provides. This idea is not new to New Jersey. Princeton Township and Princeton Borough merged into the singular Princeton in 2013 after months of public debate.

The Model

If New Jersey were to enact some sort of state-wide merger policy, it would be useful to see how it would affect the state's political boundaries. Using the premise of a population minimum (i.e. a policy stating that all municipalities must be over a certain population) and the idea that merges would take border lengths into account, a Python tool was constructed. The tool works as follows: 1) The user inputs a list of municipality data files by county 2) The user chooses a population minimum 3) The user chooses the output save location for the new files. The model will then create new municipal polygons based on the population minimum. The tool utilized the ESRI arcpy library, as well as some basic Python techniques.

Results

After the model was run on the entire state with different minimums, it was concluded that GIS methods and computer programming can be effective tools for modeling municipal consolidation. For instance, a minimum of 10,000 produced very different results than a minimum of 20,000. A newer version of this tool is being developed that will address speed concerns, field mapping, and municipality names. The tool was able to successfully eliminate many small municipalities. With a population minimum of 10,000, for instance, the municipality count went from 565 to 279. In the future, similar techniques will be used to explore the idea of modeling the drawing of congressional districts.



Sources:
New Jersey DEP
Rowan Geography Department
NJ Geographic Information Network

Rowan University

Python Code Available On GitHub
User: cfh294
Repository: GIS Tools
Name: NJ Merger Tool

The Department of Geography Environment

Connor Hornibrook
Rowan University
Glassboro, NJ
12 April 2015

Fire Hydrants in Point Pleasant Beach, NJ and Bay Head, NJ

Megan Tumpey and Andrew Pidduck
Marine Academy of Technology and Environmental Science

Objective: create an updated map of fire hydrant locations for use by the Point Pleasant Beach and Bay Head Fire Companies.

Abstract

In Point Pleasant Beach and Bay Head Township, updated maps of fire hydrants were desperately needed. Megan Tumpey and Andrew Pidduck walked through each town recording the coordinates of every fire hydrant and plotting them on new, updated maps for the firefighters to use.

Background

Firefighters are brave, incredible people, but they cannot fight local fires without a water source. Fire hydrants play an integral role in successful firefighting. Knowing where the closest fire hydrant is immediately upon arriving at a fire call increases the chances of successfully putting out the fire. Point Pleasant Beach Fire Company 1, Point Pleasant Beach Fire Company 2, and the Bay Head Fire Company possess maps of fire hydrant locations; however, the maps are old, outdated and therefore essentially useless. Using these maps could be a danger—there was an instance where Point Pleasant Beach Fire Company 1 arrived at a fire, but there was no fire hydrant where the map indicated. The hydrant had been removed, but not recorded. This setback caused more fire damage to the burning that could have been avoided if maps were not outdated. It is necessary that new maps are made so future situations like this can be evaded and deaths, injuries, and property loss can be avoided.

Figure 2. Location of Point Pleasant Beach and Bay Head within New Jersey.

Table

PointPlace

FID	Shape *	Hydrant_Nu	Color__Bod	Color__Top	Color__Kno	Street	Coordinate	y	x	Observatio
158	Point	235	Red	Red	Red	Ocean	18T 0581997 4438330	40.091264	-74.03812	was orange
159	Point	236	Red	Red	Red	Arnold and Ocean	18T 0582053 4438502	40.092808	-74.037442	was green
160	Point	237	Red	Red	Red	Central and Ocean	18T 0582030 4438611	40.093792	-74.037698	was green
161	Point	238	Red	Red	Red	Vetrini	18T 0582145 4438763	40.09515	-74.03633	was orange
162	Point	239	Red	Red	Red	Parkway	18T 0582039 4438691	40.094512	-74.037582	
163	Point	240	Red	Red	Red	Ocean	18T 0582077 4438818	40.095652	-74.03712	was green
164	Point	241	Red	Red	Red	Niblick and Randall	18T 0581939 4438796	40.095468	-74.038742	was orange
165	Point	242	Red	Red	Red	Niblick and Boston	18T 0581791 4438791	40.095437	-74.040478	was orange
166	Point	243	Silver	Silver	Silver	Ocean and Homestead	18T 0582100 4438897	40.096362	-74.03684	was red
167	Point	244	Red	Red	Red	Central and Chicago	18T 0581491 4438538	40.093187	-74.044029	was green
168	Point	245	Red	Black	Red	Central and Cooks	18T 0581210 4438510	40.092962	-74.047329	
169	Point	246	Red	Red	Red	Arnold	18T 0581184 4438375	40.091748	-74.047651	was green
170	Point	247	Red	Red	Red	Cooks Rd. and Osprey	18T 0581149 4438719	40.094851	-74.048018	
171	Point	248	Red	Red	Red	Cooks Ln.	18T 0581233 4438691	40.09459	-74.047036	was green
172	Point	249	Red	Red	Red	Niblick and St. Louis	18T 0581298 4438775	40.095341	-74.046263	was green
173	Point	250	Red	Red	Red	Parkway and Chicago	18T 0581448 4438688	40.094542	-74.044515	was orange
174	Point	251	Red	Red	Red	Niblick and Chicago	18T 0581469 4438786	40.095423	-74.044256	was red
175	Point	252	Red	Red	Red	Arnold and Boston	18T 0581806 4438462	40.092472	-74.040344	was orange
176	Point	253	Red	Red	Red	Central and Boston	18T 0581802 4438582	40.093553	-74.040376	was green
177	Point	254	Red	Red	Red	Parkway and Boston	18T 0581794 4438694	40.094563	-74.040455	was green
178	Point	255	Red	Red	Red	Baltimore and Parkway	18T 0581625 4438688	40.094525	-74.042439	was green
179	Point	256	Red	Red	Red	Central and Baltimore	18T 0581664 4438565	40.093413	-74.041997	was green
180	Point	257	Red	Red	Red	Arnold	18T 0581671 4438441	40.092296	-74.04193	
181	Point	258	Red	Red	Red	Arnold	18T 0581936 4438489	40.092702	-74.038816	was orange
182	Point	259	Red	Red	Red	Arnold and Chicago	18T 0581506 4438434	40.092249	-74.043866	
183	Point	260	Red	Red	Red	Arnold	18T 0581030 4438376	40.091772	-74.049457	
184	Point	261	Red	Red	Red	Rt. 35 North and Arnold	18T 0581125 4438374	40.091745	-74.048343	was orange
185	Point	262	Red	Red	Red	Rt. 35 North and Laurel	18T 0581126 4438261	40.090727	-74.048345	was green, and before that orange
186	Point	263	Red	Red	Red	Rt. 35 North and Trenton	18T 0581144 4438153	40.089752	-74.048148	was green
187	Point	264	Red	Red	Red	Rt. 35 North and Atlantic	18T 0581162 4437963	40.088039	-74.04796	was green
188	Point	265	Red	Red	Red	Atlantic	18T 0581230 4437977	40.088158	-74.047161	was green

(0 out of 203 Selected)

PointPlace

Figure 1. Excerpt from the Microsoft Excel spreadsheet. In addition to the GPS coordinates of each fire hydrant, the colors of the bodies, tops and knobs were recorded, as well as any previous colors visible beneath its peeling paint.

Figure 3. Map of all the fire hydrant locations in Bay Head and Point Pleasant Beach, New Jersey

Acknowledgements

We would like to thank Mr. Kelsey for assisting us when we had questions about the GIS software or GPS. We would also like to thank Kevin Tumpey, a volunteer firefighter who provided insight and background to help us determine how large to make our buffer, and how the fire hydrants and hoses work. We would also like to thank Alice Pidduck for driving us around on some data collection days, and Veronica Pidduck and Kyle Tumpey for helping with data collection.

Figure 4. Andrew Pidduck holds the GPS over a fire hydrant on Washington Ave. in Point Pleasant Beach.

Figure 5. The GPS 72 used to obtain the coordinate locations of the fire hydrants.

Figure 6. The buffers of 800 ft. around each hydrant covered the entire towns.

Methods

On several dates, Megan Tumpey and Andrew Pidduck went to Bay Head, NJ and Point Pleasant Beach, NJ in search of fire hydrants. When a fire hydrant was located, a Garmin™ *GPS 72* was held on the cap of the fire hydrant for about eighty seconds. After this allotted time, the GPS coordinates in Universal Transverse Mercator (UTM) were recorded in a field journal. Along with the coordinates, the street location of the hydrant and the colors of the cap, body, and knob of the hydrant were recorded in the field journal. Megan and Andrew walked down every street in both Bay Head and Point Pleasant Beach, recording every fire hydrant located within the towns' boundaries. Previously visited sites were marked off on a map to ensure that a single hydrant was not recorded twice. Megan and Andrew continued this procedure until every street in each town was observed and every fire hydrant in both Bay Head and Point Pleasant Beach was recorded.

After the coordinates were collected for all the fire hydrants, they were converted from UTM coordinates to decimal degrees so that they could be imported to ArcGIS and converted to usable xy-data. Once the shapefile for the fire hydrants was created, the hydrants were displayed as red dots along the streets of each town. Well-known locations were included as small green dots and labelled to make the map more user-friendly and help to locate a specific hydrant more quickly. A buffer of 800 feet was placed around each fire hydrant to determine whether there are areas or homes that cannot be easily reached by a fire hose connected to the nearest hydrant. Once created, it was found that all areas in Bay Head and Point Pleasant Beach are within an 800ft radius of a hydrant.

The hydrant points were then converted to a KML file using the Converter toolbox "Layer to KML" tool and uploaded to Google Maps for public viewing and use.

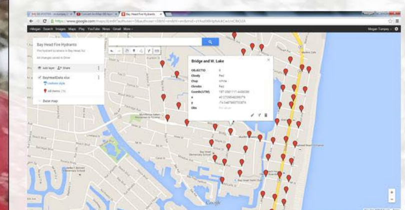


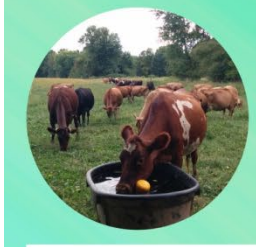
Figure 7: A portion of the hydrant data displayed in Google Maps. To access, use a smart phone to scan here:

Conclusion

The updated maps are accurate and contain helpful reference points and popular locations to help the fire fighters get to the location of a fire as quickly and efficiently as possible. Hopefully these maps will be relevant and useful for many years and will help firefighters arrive at an emergency already knowing where the nearest fire hydrant is to maximize firefighting efficiency. The Google Maps data is accessible to anyone with the link above to view and get directions to.

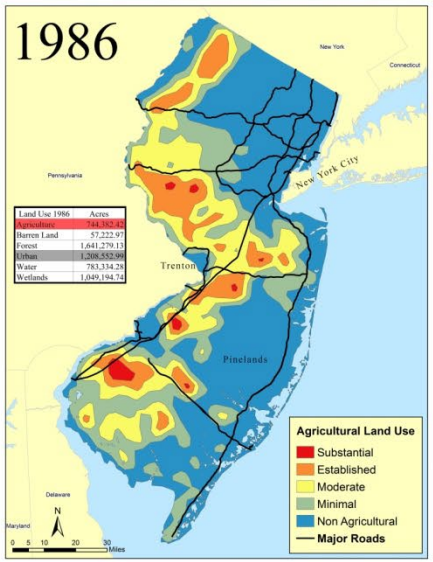
References

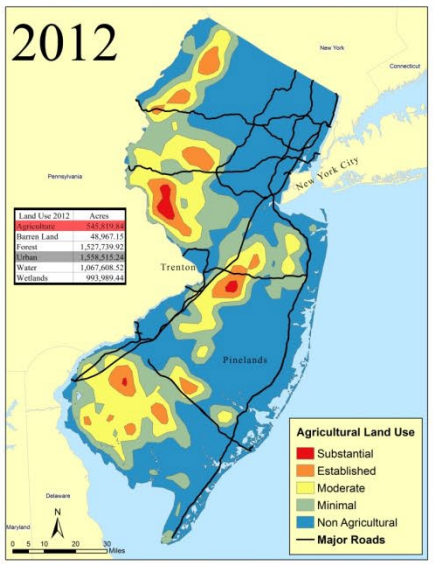
Data sources originated from: New Jersey Department of Transportation and New Jersey Department of Environmental Protection (NJDEP), Water Assessment Team.

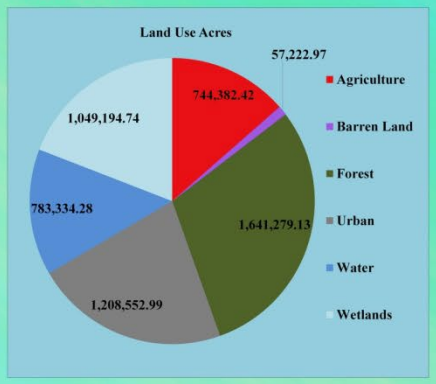


New Jersey Agricultural Land Use Change

Agricultural Land Use

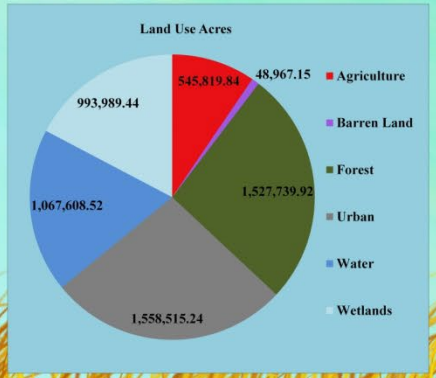




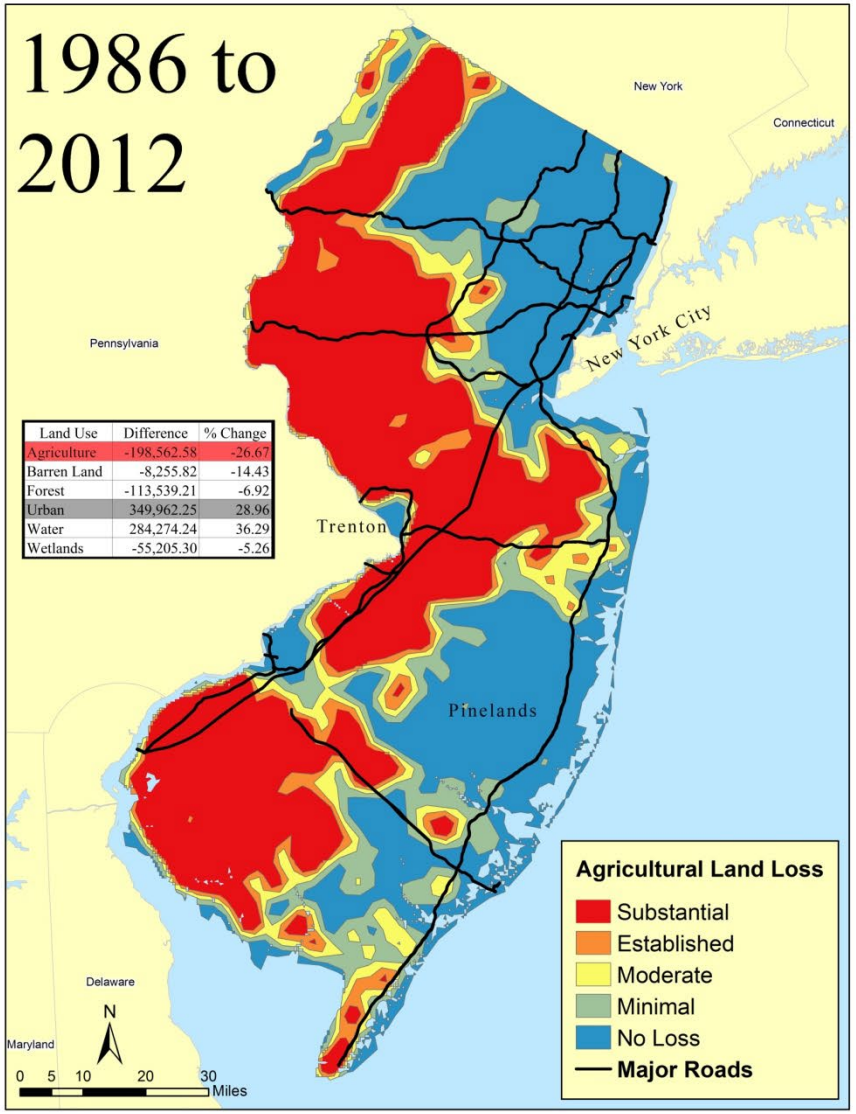


In recent years, New Jersey has gone through a great deal of land reform and development. This study examines the loss of Agricultural land. As seen in the maps to the left, the areas of Agricultural land use have condensed (depicted by the decrease in orange areas). There has been a 26.67% decrease in Agricultural land amounting to 198,562 acres lost.

The map to the right helps illustrate the fragmentation of Agricultural land and the increase in Urban land. These maps were created by running Kernel Density analysis on the Agricultural Land Use data from 1986 and 2012.



Agricultural Land Use **Loss**

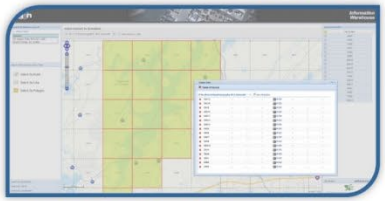


Data: NJDEP, US Census Bureau, Author: Alex Kaufman NJDEP/OIRM/BGIS, Date: 4/16/2015

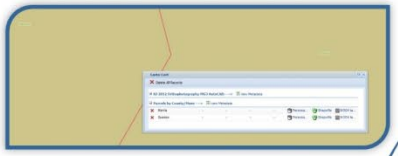
Data Integration

Integrating Digitized Boat Dock Centerlines with Parcel Data and Tax Records for Lake Hopatcong

Data Collection: NJGIN MrSID (2012) Tiles



Data Collection: Morris & Sussex County Parcels



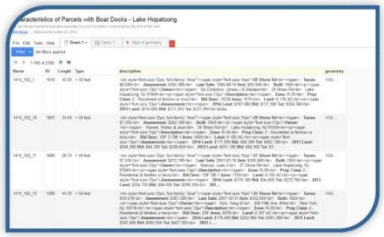
Digitize Lake Hopatcong Boat Dock Center Lines

- Calculate dock lengths
- .shp → .kml
- .kml → Google Fusion Map

Google Fusion Web Map of Docks by Length

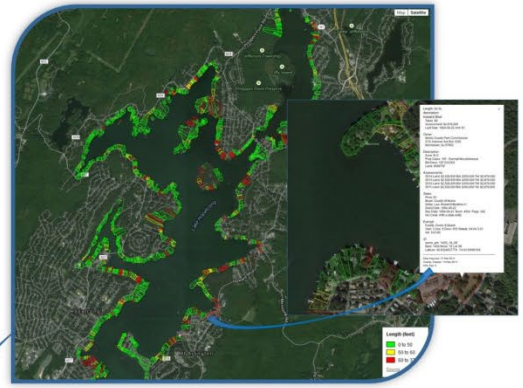
Merge docks with tax records by PamsPin (muni-block-lot)

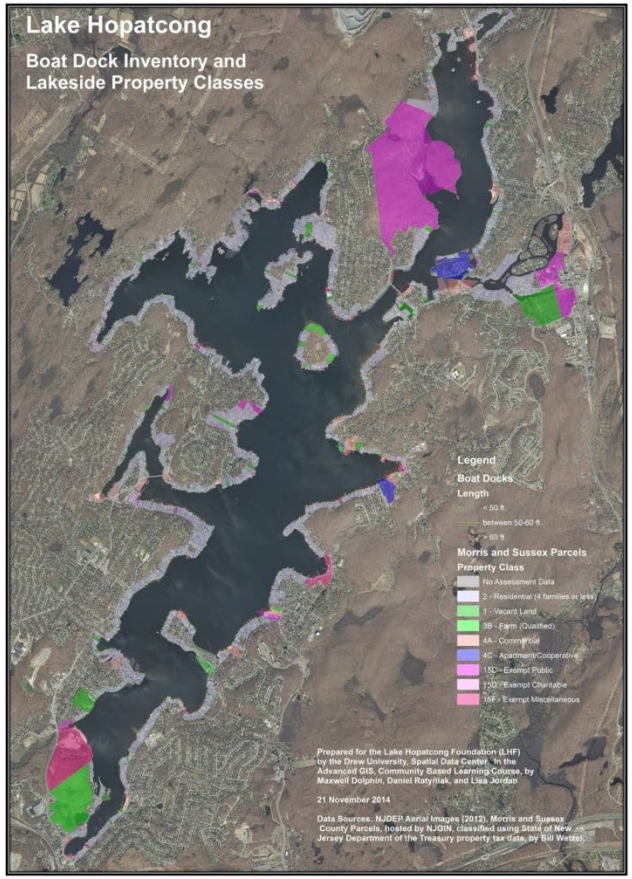
Data Collection: Parcel and Tax Records, enTaxr[nj]



Summarize dock and parcel characteristics by dock length and township

Google Fusion Web Map of Parcels by Max Dock Length





PROJECT SUMMARY:

The Lake Hopatcong Foundation (LHF) partnered with the NJ DEP and Drew University to learn more about the number and lengths of docks along Lake Hopatcong. Donna Macalle-Holly (LHF), Dan Bello (State Parks), and Lisa Jordan (Drew) worked with two Advanced GIS students, Max Dolphin and Dan Ratyniak (Drew) who took on the project to digitize the docks from 2012 aerial images, to create a baseline dataset of lakeside development. ***Docks*** were joined with ***parcel data*** to document ***dock length by location*** (municipality – block – lot).

Table 1. Summary of Dock Lengths

Dock Classification:	Number	Percent
All Docks	2,183	100%
Docks less than 50 ft.	1,706	78%
Docks between 50 and 60 ft.	201	9%
Docks more than 60 ft.	276	13%

Table 2. Summary of Lakeside Parcels by Dock Length

Parcel Characteristics:	Number
All Lakeside Parcels:	2,056
Parcels with docks less than 50 ft.	845
Parcels with docks between 50 and 60 ft.	132
Parcels with docks more than 60 ft.	159
Parcels with no docks	920

DREW SPATIAL DATA CENTER

Lake Hopatcong is the largest freshwater lake in New Jersey at 9 miles in length, with 38 miles of shoreline and 2,658 acres of water cover (NJDEP 2011). Sitting on the border between Morris County and Sussex County, it encompasses four municipalities: the Borough of Hopatcong, the Borough of Mount Arlington, Jefferson Township, and Roxbury Township (NJDEP 2011) (Figure 1). In the 1750s, the Musconetcong River was dammed, creating Lake Hopatcong (NJDEP 2011). Lake Hopatcong is utilized for a variety of recreational activities, including boating and fishing. Source: NJDEP. "Lake Hopatcong Water Level Management Plan: 2011" *Lake Hopatcong Water Lever Management Plan*. (2011) 1-44

Development of
GIS Visual Map Templates for Cancer-Related Randomized Controlled Trials

By: Sandra Herrera-Perez and Kelly Szaniawski

Base Line Map Methodology

In developing the "Base Line Map" as part of the RCT Template Series created, the general parameters focused upon in this map include: age (to decrease consent-related conflicts), gender (for sex-related cancer preferences), and linguistically isolated households (to decrease lack of miscommunication due to language barriers). The linguistically isolated households were represented as a choropleth map sorted by counties (the counties shapefile was joined in with the table storing the Linguistic House data that found online and compiled into an Excel Spreadsheet). Gender and age was combined in shapefile compiled from a Census data from 2000 through selection of age groups of male and females, ages 20 to 64, through the Dot Density Feature. Hospitals, displayed as points, were used for health record accessibility.

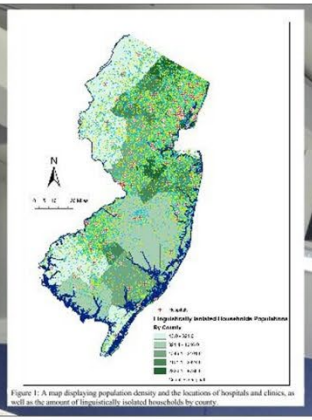


Figure 1: A map displaying population density and the locations of hospitals and clinics, as well as the amount of linguistically isolated households by county.

Melanoma Map Methodology:

In developing the "Melanoma Map" as part of the RCT Template Series created, the general parameters focused upon in this map include: Melanoma cases, UV exposure (by county), and clinical trial recruitment sites. The melanoma cases, found online through the National Cancer Institute and compiled into Excel, were joined with the counties shapefile and presented as a choropleth map. UV exposure was presented through the Dot Density feature after being joined to the county shapefile.

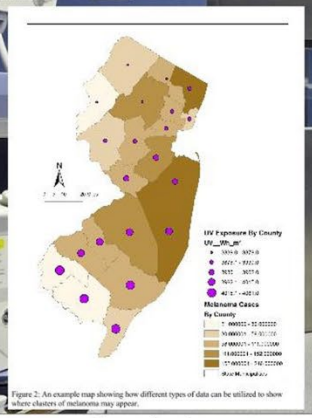


Figure 2: An example map showing how different types of data can be utilized to show where clusters of melanoma may appear.

Top Three States for Breast and Prostate Cancer and Melanoma

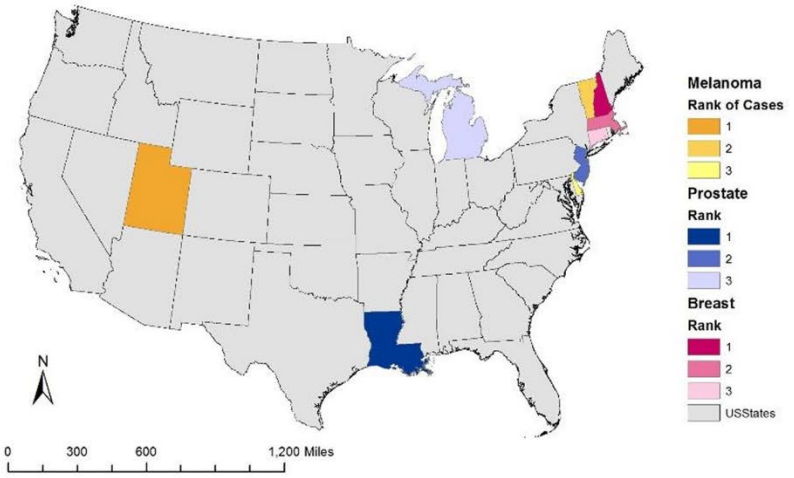


Figure 3: A map displaying the states with the highest incidences of melanoma, breast cancer, and prostate cancer. Information such as this can be utilized by clinicians interested in conducting randomized control trials for a potential treatment.

Introduction

Randomized Controlled Trials are a major component of studies that determine the effectiveness of a certain treatment, especially those in regard to finding cures for various diseases. Randomized controlled trials (RCTs) are defined as, "studies that measure an intervention's effect by randomly assigning individuals (or groups of individuals) to an intervention group or a control group" (Random Controlled Trials (RTCs)). In developing RTCs, especially with regard to human patients, selection criteria must be established in order to preserve the integrity and internal validity of the study. A common flaw found in many selection criteria of RCTs is, "the exclusion of certain patient populations may lead to impaired generalizability of results" (Spall et al. 2007). Poorly conducted RCTs neglect to include certain groups of patients such as women, children, and the elderly, which do not provide a complete representation of the population. Well-conducted RCTs provide clinicians with evidence that supports the success of the treatment applied in the RCTs. Factors that may hinder the success of a randomized control trial include, "limited patient access to trial centers, selection bias, lack of patient consent to enrollment, and physician resistance to randomization of patients due to treatment preferences."

In an effort to increase the success of randomized control trials, Geographic Information Systems (GIS) has been utilized to assist clinicians with a visual template in conjunction with factors that are commonly used in the selection criteria (i.e. age, patient population, medical center distance for ease of access). The templates constructed utilized a wide range of parameters that are related to the selection criteria of three of the top ten major cancers (breast, prostate, and melanoma) in order to increase the effectiveness of randomized controlled trials, and therefore, beneficially impact the Medical Field.

Conclusion

Through the use of the GIS software, it is possible to create map templates that would display groups of patients based on sex, age, and other features that would allow clinicians to create a more representative group for RTCs. By having information readily available regarding different types of patients, it is possible to expedite the process of choosing patients for the RTCs. While RTCs should, in essence, be random, it is often necessary to exclude certain groups of patients for traits that would not be appropriate for certain trials, such as excluding females from a prostate cancer trial. To avoid patient bias in regards to poorly justified reasons for excluding patients, the maps also include common unjustified traits, such as age, sex, and linguistic barriers. The utilization of maps such as these would benefit clinicians seeking to create RTCs that are more representative of populations.

Breast Cancer Map Methodology

The general parameters focused upon in this map include: breast cancer cases, and clinical trial recruitment sites. The breast cancer cases were found online through the National Cancer Institute and compiled into Excel and joined with the counties shapefile and presented as a choropleth map along with hospital sites.

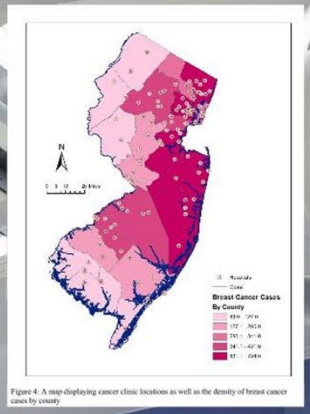


Figure 4: A map displaying cancer clinic locations as well as the density of breast cancer cases by county

Prostate Cancer Methodology

The general parameters focused upon in this map include: prostate cancer cases, and clinical trial recruitment sites. The prostate cancer cases were found online through the National Cancer Institute and compiled into Excel and joined with the counties shapefile and presented as a choropleth map along with hospital sites.

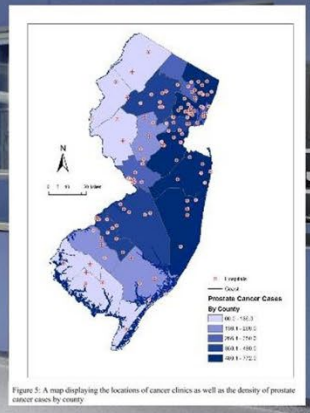


Figure 5: A map displaying the locations of cancer clinics as well as the density of prostate cancer cases by county

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West, A. (Director) (2007, March 1). Randomized Controlled Trials. *Evidence Based Behavioral Practice Course*. Lecture conducted from National Library of Medicine.

Data From

State Cancer Profiles. (n.d.). Retrieved April 4, 2015.

Comprehensive Cancer Information. (n.d.). Retrieved April 4, 2015.

Taylor Donovan, Taylor Furbish, and Brittany Thiel
Marine Academy of Technology and Environmental Science
16 April 2015

High Crime, Low Lights? Or Low Crime, High Lights: A Study in Bradley Beach, New Jersey

Is the presence or absence of streetlights related to the amount of crimes committed in Bradley Beach, New Jersey?

Abstract

Crime and crime rates are highly studied areas in today's day and time. Some of the most highly studied aspects of criminal offenses are the reasons behind them, along with what catalyzes the felonies. Are there certain circumstances in which crimes are committed? The purpose of this study was to determine if there is a relationship between the presence or absence of streetlights and the amount of crime committed in specific areas. Locations of streetlights in Bradley Beach, New Jersey were collected and recorded using GPS, and then digitized in order to be displayed on a map. Crime reports were collected (from November 2013 to December 2014) and streets were distinguished based upon the number of crimes committed there over the one year period. The two layers were overlaid to determine if a correlation existed between the presence of streetlights and the number of crimes committed. Overall, it was determined that there is a relationship between streetlight and crime—but not the relationship that was expected. The map suggests that with more streetlights present, more crime is committed; this may be due to the fact that the areas densely populated with streetlights are areas occupied by popular community attractions, and therefore receive more visitors than any other areas in the township.

Introduction

For years, people throughout the world have been trying to decipher the stimuli of crime. What causes higher crime rates in certain areas and lower crime rates in others? Why do certain crimes happen more prolifically in certain locations? There is a general public opinion that areas with more light experience less crime, but such generalizations are not necessarily true ("The City Dark' In Context" 2012). Nevertheless, crime is actually the reason that streetlights were implemented in the first place ("The City Dark' In Context" 2012). Many studies have been conducted concerning this difficult issue; some results confirm the belief that streetlights reduce crime, some results negate that belief, and other results are inconclusive. In general, there are two backings to the belief that streetlights reduce crime: that "improved lighting leads to increased surveillance of potential offenders ... [and] increased community investment in the area" (Farrington 2002). This study focuses on whether or not there *really* is a correlation between crime rate and presence of street lights.

Table 1: Number of crimes and number of streetlights per street in Bradley Beach, NJ.

Street	Number of Crimes	Number of Streetlights
2nd Ave.	2	21
3rd Ave.	5	17
4th Ave.	9	16
5th Ave.	3	16
Atlantic Ave.	0	10
Beach Ave.	3	14
Bradley Blvd.	0	16
Brinley Ave.	9	14
Burlington Ave.	0	12
Central Ave.	1	20
Cliff Ave.	0	4
Evergreen Ave.	7	11
Fletcher Lake Ave.	2	15
Hammond Ave.	2	15
Kent Ave.	0	1
Lake Terrace Ave.	3	17
Lareine Ave.	15	12
Madison Ave.	1	25
Main St.	82	80
McCabe Ave.	27	5
Monmouth Ave.	0	15
Newark Ave.	4	13
Ocean Ave.	37	20
Ocean Park Ave.	13	7
Pacific Ave.	0	6
Park Place Ave.	14	13

Figure 1: Aerial footage of Bradley Beach. Overlay displays each streetlight in Bradley Beach, along with the approximated area illuminated by each light.

Figure 2: Aerial footage of Bradley Beach. Overlay categorizes each street by the number of criminal offenses.

Figure 3: Aerial footage of Bradley Beach. Bottom layer displays each street color coded based upon the number of crimes committed there. Top layer displays each streetlight in Bradley Beach, along with the approximated area illuminated by each light.

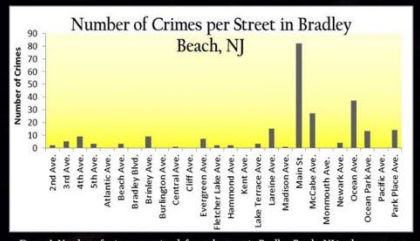

Figure 1. Number of crimes committed for each street in Bradley Beach, NJ in the past year.

Figure 2. Number of streetlights for each street in Bradley Beach, NJ.

Data & Methods

- Data obtained for map:
  - World imagery
  - Bradley Beach crime data from Ted Bianchi, DSgt.
  - GPS coordinates of streetlights
  - Streets in Bradley Beach, NJ
- World imagery used as the base layer
- Crime data per street used to display crimes in Bradley Beach
- Streetlights were used to determine if there was a correlation between them and crime rate
- Streets in Bradley Beach used to create chloropleth map of crimes committed
- Streetlights and streets were digitized, so they could be displayed on the map
- Buffers used to show approximate light that would be emitted from the streetlights
- Chloropleth map used to display the quantity of crimes committed on a specific street

Figure 4: GPS unit used to collect coordinate locations of streetlights in Bradley Beach, NJ.

Conclusion

In general, it seems that the existence of streetlights affects the number of crimes committed on a particular street. As the number of streetlights on a road increases, so does the number of crimes. Our findings disproved our hypothesis; however, the trend could be due to the fact that more streetlights are found where there is a presence of businesses and restaurants, which are the places that are most commonly robbed. Hence, the number of streetlights per street displays a relationship with the number of crimes that were committed on those same streets. However, the study was conducted in a town with a population of 4,276 people, which could have potentially skewed the data.

Acknowledgements

We would like to thank Ted Bianchi, DSgt. of the Bradley Beach Police Department, for providing us with the crime statistics necessary for this study. We would also like to thank the Marine Academy of Technology and Environmental Science for providing us with this opportunity, as well as the materials needed to conduct this research. Finally, we would like to thank Mr. Jason Kelsey for providing us with insight and advice throughout the course of this study.

References

Farrington, D., & Welsh, B. (2002, August 1). Effects of improved street lighting on crime: A systematic review. Retrieved January 21, 2015.

'The City Dark' In Context. (2012, July 5). Retrieved January 21, 2015.

Terrapin Terrain

Courtney Tierney

Figure 4. Terrapin hatchling from an LBI nest

Figure 5. Caution sign on Bayview Avenue Long Beach Island, New Jersey

Figure 1. Map of Ocean County, Nerw Jersey highlighting the study area in High Bar Harbor Long Beach Island, New Jersey

Data collected by trained researchers and volunteers who sighted terrapins or terrapin nests over the summer of 2014

Figure 2. Terrapin nests from 10 June 2014 through 15 July 2014 in High Bar Harbor Long Beach Island, New Jersey.

Figure 3. Roads in High Bar Harbor Long Beach Island, New Jersey within 50 feet of the nests plotted in Figure 2.

Figure 6. Terrapin eggs in a nest

Figure 7. A terrapin trying to cross a busy road

Introduction:

Northern Diamondback Terrapin (*Malaclemys terrapin terrapin*) eggs need to be kept in certain conditions to be viable. With coastal development rising, nesting females cannot always find the right location for their nest. Declines in populations are a result of this along with road mortalities ("Diamondback Terrapin"). Cars or people can unsuspectingly crush a nest laid in a driveway. Females searching for a suitable location may need to travel far distances. With the large population and amount of habitat loss, this leads to the females crossing roads. In this study, the locations of terrapin nests and terrapin sightings were analyzed to determine the amount of nests/sightings that were within 50 feet of a paved roadway.

Methods:

- Professionals and volunteers report terrapin sightings and found nests
- Enter nest UTM GPS coordinates into XY plotter in ArcMap (change to UTMs)
- Create new layer points on top of plotted points
- Create 50 ft buffer around points
- Clip roads to buffer

Acknowledgments:

I would like to thank all of the volunteers who took the time to record this data along with Sarah Moss and Kathy Lacey for organizing the volunteers and handling the nests. I would like to thank Dr. Wnek for providing me with this dat and Mr. Kelsey for the opportunity to create this study.

References:

"Diamondback Terrapin Threats." *Arkive.org*. Wildscreen, n.d. Web. 20 Jan. 2014.

Measuring Tree Loss Due to Parkway Construction

Zach Zega and Monica Chang
Marine Academy of Technology and Environmental Science
23 January 2014

Objective

To analyze areas of tree loss near the Garden State Parkway

Figure 1: 2010 land cover.

Figure 2: 2013 land cover.

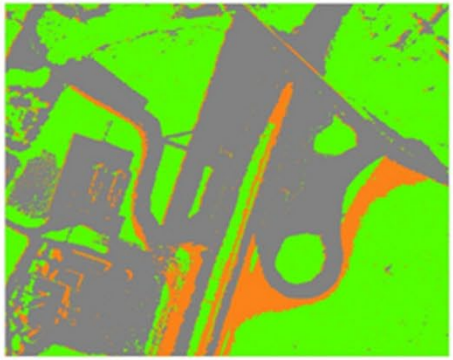

Figure 3: 2013 orange highlighted is area of tree loss.

Abstract

Since LIDAR data is an effective tool, it can be used to analyze large areas of land. Vegetation loss in certain areas is a problem because deforestation leads to biodiversity loss, aridity, and damage to animal habitats. In 2013, construction was started on Interchange 89 on the Garden State Parkway to widen the shoulder, make a new lane, and change the interchange. Maps were created to analyze areas of tree loss near Interchange 89 on the Garden State Parkway due to the construction. It was concluded that large areas of trees were lost, impacting the area environmentally.

Introduction

Vegetation loss is a prevalent environmental concern in the United States and globally. Land clearing for human uses such as agriculture, development, urbanization and also timber is a major cause for deforestation and vegetation loss. Vegetation loss is a problem because deforestation leads to biodiversity loss, aridity, and damage to animal habitats. Because healthy forests also orb carbon emissions that are caused by human civilization, a lack of forests can lead to more carbon and greenhouse gasses entering the atmosphere, thus causing global warming. By using ArcMap, a program for analyzing GIS data and shapefiles, ortho-imagery, and LIDAR data, vegetation loss can be mapped over a period of time.

The study area of this project is the Garden State Parkway, near Interchange 89. The Garden State Parkway was built in 1947. The building and subsequent maintenance of the Garden State Parkway required many trees to be cut down. This project explores and analyzes the area of tree loss from 2010-2013. Every time construction is done on the GSP, the New Jersey Turnpike Authority releases an Environmental Impact Statement. Our data can be used to support the New Jersey Turnpike Authority's Environmental Impact Statement.

Figure 4: 2010 orthoimage obtained from the USDA

Figure 5: 2013 orthoimage obtained from the USDA

Methods

1. Obtained a 2010 image of GSP Interchange 89 from the US Department of Agriculture
2. Obtained a 2013 image of GSP Interchange 89 from the US Department of Agriculture
3. Orthoimages were inserted into ArcMap
4. Unsupervised image classification was performed on both 2010 and 2013 images using the Image Classification Tool Bar
5. Landcovers on the classification rasters were reclassified using the Reclassify tool in ArcToolbox
6. Class 1 was made to represent trees in both land classification rasters
7. Class 2 was made to represent every other landcover type in both land classification rasters
8. The 2013 classification raster was subtracted from the 2010 classification raster using the raster subtract tool in ArcToolbox to obtain a map where the area of tree loss is highlighted in orange.

Conclusion

Our maps show that after the construction of Interchange 89 on the Garden State Parkway, there were significant amounts of tree loss. In the future we will be using LIDAR data to calculate the total tree area lost.

Acknowledgements

We would like to thank the Marine Academy of Technology and Environmental Science for providing us with the opportunity and the equipment to do this project. We would also like to thank Mr. Kelsey for teaching us the skills used in this project.

References

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United States Department of Agriculture (2013). 2013 National Ag. Imagery Program Mosaic [Data File]. Retrieved from http://datagateway.nrcs.usda.gov

Heavy Metal Gradients in the Hackensack River Estuary: A Baseline for Improving Ecosystem Health

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New Jersey Meadowlands Commission (NJSEA),
Meadowlands Environmental Research Institute (MERI)

Abstract:

Sediments in the Lower Hackensack River tidal creeks were sampled to assess the Post Superstorm Sandy contaminant baselines for chromium and mercury to aid in future ecosystem health monitoring. Of the creeks sampled, this research focused on West Riser Ditch, East Riser Ditch, and Peach Island Creek East. Sediment samples at West and East Riser Ditches showed a negative concentration gradient from the tide gates moving inland. Peach Island Creek East showed consistently higher metal concentrations than the other sampled creeks for both metals and showed a concentration gradient that was positive from the tide gate moving inland. Aerial imagery from 1930 to 2012 was used to identify a spatial relationship between land use over time and tidal creek ecosystem health.

Methodology:

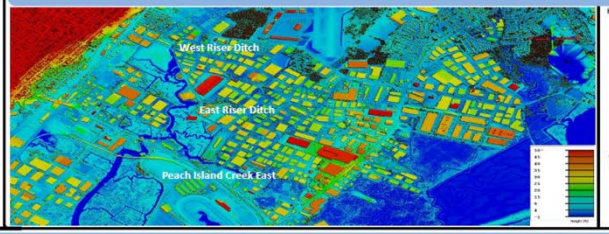
Fifty three samples collected inland of each tide gate were lab analyzed for chromium and mercury concentrations. The 'Spline with Barriers' Spatial Analyst tool was used to interpolate the sample point metal concentrations throughout each of the creek bodies along the Hackensack River and helps visualize potential concentration gradients. Sample points were quantified and symbolized based on NJDEP Marine/Estuarine Sediment Screening Guidelines (refer to NJDEP Sediment Guidelines table). Sample points whose Hg and Cr concentrations were higher than the Low Effects Range (ER-L) threshold are symbolized as red hazard triangles. Comparing aerial imagery from 1930 and 2012 using remote sensing techniques revealed changes in land use surrounding Peach Island Creek East that have implications on ecosystem health.

NJDEP Sediment Guidelines

Metals	Effects Range - Low (ER-L)[1] (mg/kg, dry weight)	Effects Range - Medium (ER-M)[1] (mg/kg, dry weight)
Arsenic	8.2	70
Cadmium	1.2	9.6
Chromium	81	370
Copper	34	270
Lead	47	218
Mercury	0.15	0.71
Nickel	21	52
Silver	1.0	3.7
Zinc	150	410

Long et al., 1995

Post Superstorm Sandy Sediment Sampling Site Locations

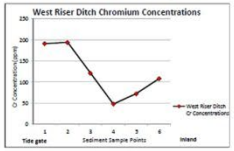


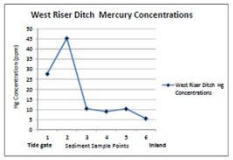
Carlstadt, NJ

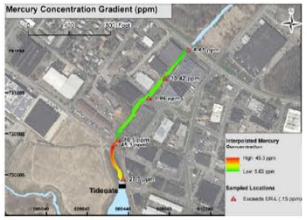
Results:

A. Lower Hackensack River Tidal Creek Chromium and Mercury Concentration Gradients

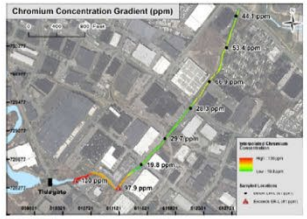
West Riser Ditch

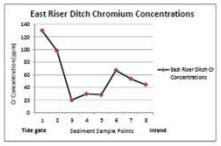


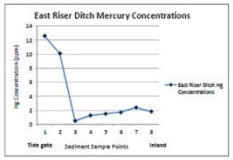


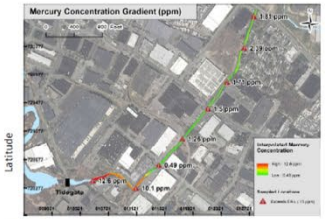


East Riser Ditch

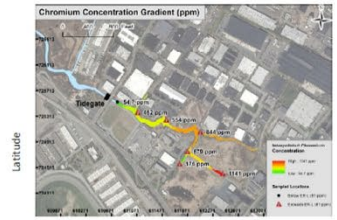


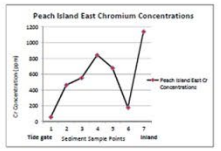


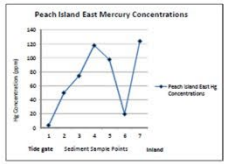


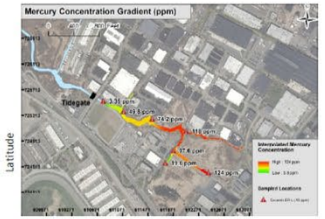


Peach Island Creek East



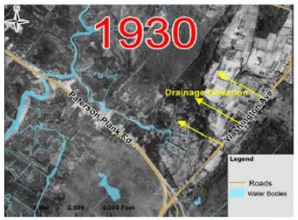






B. Peach Island Creek East: Land Use Over Time in a Geographic Context

Data shows that Peach Island Creek East sediments had significantly higher concentrations of chromium and mercury. Aerial imagery from 1930 to 2012 highlights the changing landscape surrounding Peach Island East's ecosystem and the relationship between creek ecosystem health and land use over time.



- Little to no development near creeks
- Mosquito ditched wetlands environment is dominant

- Land used for waste processing facilities and automobile junkyards

- Warehouses and light industrial facilities
- Development of sports complex

- Development steadies from 1980's-present
- Superfund Sites and additional warehouses

Discussion:

After using the interpolation tools within ArcGIS, mercury and chromium sediment concentrations reveal a pattern. West Riser and East Riser Ditches showed a strong negative concentration gradient from the tide gate moving inland. This gradient is found in both chromium and mercury. Conversely, Peach Island Creek East sediment concentrations showed a positive gradient from the tide gate moving inland. Peach Island East also had metal concentrations significantly higher than West or East Riser Ditch. This area was a prime example of how land use can impact ecosystem health over time.

Acknowledgments and References

We would like to thank additional Meadowlands Environmental Research Institute staff: Saleh Kojak, Dom Elefante, Joe Gryzb, and Yefim Levinsky for project support, sampling, and chemical analysis of the sediments used in this spatial report.

Where, oh where, has that pesky bear gone?

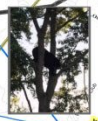
In the springs of 2013 & 2014, Burlington County had an unusual vacationer; an adult black bear. No one knows if it was the same bear both years but they both created quite a stir.

Nicknamed, the "Mount Laurel Bear", the bear that visited in 2014 caused multiple school lockdowns and news articles in papers and on television.

This map chronicles the movement of the 2014 "Mount Laurel Bear" as he traveled across Burlington County for 8 days in the month of June. The sightings shown here were obtained from alerts sent by police departments, townships and schools.

N

0 0.5 1 2 3 4 Miles



Florence
Mansfield
Willingboro
Delran
Westampton
Springfield
Eastampton
Moorestown
Hainesport
Mt Holly
Pemberton Twp
Mt Laurel
Lumberton
Southampton
Medford Lakes
Evesham
Medford

June 20, morning
June 19, 7:50 pm
June 19, afternoon
June 18, 9:16 pm
June 18, 7:14 pm
June 18, 5:09 pm
June 18, 3:00 pm
June 18, 11:46am
June 18, 9:46 am
June 17, 8:30 pm
June 16, 9:01 pm
June 17, 7:25 am
June 17, 12:59 pm
June 16, 9:25 am
June 17, 1:45 pm
June 17, 10:15 am
June 17, 12:39 pm
June 16, 6:30 am
June 15, 8:30 am
June 14, 7:50 pm
June 14, 10:10 am
June 13, 8:42 pm
June 13, 12:23 am
June 12, 9:06 pm

Legend

Bear Sightings in 2014 by date

- June 12
- June 13
- June 14
- June 15
- June 16
- June 17
- June 18
- June 19
- June 20

Major Roads

- Interstate
- US Route
- State Route
- County Route (500 series)
- County Route (600 series)
- County Route (700 series)

Local Roads

- Municipal Boundaries

NJ Department of Environmental Protection
Division of Fish and Wildlife

Know the Bear Facts - Black Bears in New Jersey

Bear Safety Tips

Black bears by nature tend to be wary of humans and avoid people. However, if you encounter a black bear in your neighborhood or outdoors while hiking or camping, follow these common-sense safety tips.

- Never feed or approach a bear!
- Remain calm.
- Make the bear aware of your presence by speaking in an assertive voice, singing, clapping your hands, or making other noises.
- Make sure the bear has an escape route.
- If a bear enters your home, provide it with an escape route by propping all doors open.
- Avoid direct eye contact, which may be perceived by a bear as a challenge. Never run from a bear. Instead, slowly back away.
- To scare the bear away, make loud noises by yelling, banging pots and pans or using an airhorn. Make yourself look as big as possible by waving your arms. If you are with someone else, stand close together with your arms raised above your head.
- The bear may utter a series of huffs, make popping jaw sounds by snapping its jaws and swat the ground. These are warning signs that you are too close. Slowly back away, avoid direct eye contact and do not run.
- If a bear stands on its hind legs or moves closer, it may be trying to get a better view or detect scents in the air. It is usually not a threatening behavior.
- Black bears will sometimes "bluff charge" when cornered, threatened or attempting to steal food. Stand your ground, avoid direct eye contact, then slowly back away and do not run.
- If the bear does not leave, move to a secure area.
- Immediately notify the DEP's 24-hour, toll-free hotline at 1-877-WARN DEP (1-877-927-6337).
- Families who live in areas with high black bear populations should have a "Bear Plan" in place for children, with whistles, air horns and an escape route.
- Black bear attacks are extremely rare. If a black bear does attack, fight back!

Ocean Regional Planning Utilizing Participatory GIS (pGIS) to develop Ocean Recreation Use Data for New Jersey

Ocean health depends on all aspects of its ecosystem including human interactions. These aspects must be examined and considered both individually and cumulatively in order to understand and manage ocean health. This pGIS process captured and compiled recreational use information for ocean planning efforts to reduce marine use conflicts, maximize use efficiency, and support environmental protection(4).

Marine planning or ocean planning is a comprehensive, integrated, science and ecosystem-based approach to address conservation, economic activity and sustainable use of ocean \and coastal resources. The Coastal Management Program participates in the coordination of ocean planning and resource issues with adjacent states and the federal government(2).

A technique called **Participatory GIS (pGIS)** (1) is proving very useful for mapping and collecting data on recreational use. PGIS session where held in New Jersey where stakeholders created GIS data from their knowledge of recreation categories on projected, live GIS maps with editing light pens. Stakeholders included recreational & charter fishers; boaters; paddlers; life guards; surfers; divers; wildlife enthusiasts; ecotourism business owners; local, state & federal government representatives; non-profit organizations; and local citizens.

pGIS Data Capture Process

pGIS Equipment needed:
- Digital Projector
- Ebeam (i.e. digital projection board)
- Laptop with GIS software
- Needed data preloaded into an .mxd

pGIS Workshop Process:
- Facilitator reads and posts the use definition
- Participants draw the general use area
  - Does the use happen throughout the study area?
  - Is it restricted by depth, distance, time of year?
- Participants draw the dominant use area
  - Where is this use happening most often?
  - Where does this use occur on a regular basis?
  - Is this use driven by specific variables (e.g. access)
- Participants are asked to record any supplemental use
  - Has this use pattern changed in recent years?
  - Is this use seasonally restricted, is it sporadic?
  - What drives the use patterns?
- Note takers record what is being said
- GIS lead will zoom out for final review
- GIS lead will save, export and prepare for the next use

Data collection at pGIS Workshops

Mid-Atlantic Human Use Categories for Ocean Planning

Boating for Hire (Charter) Uses

Use name	Includes	Appropriate Mapping Scale Min	Max
Charter fishing	Charter activity related to fishing led by charter vessels	1:250,000	1:500,000
Charter diving/snorkeling	Charter activity related to recreational dive or snorkel charters	1:100,000	1:250,000
Charter party cruises	Charter activity for cruises	1:250,000	1:500,000
Charter wildlife viewing	Charter activity focused on wildlife viewing	1:250,000	1:500,000
Charter scenic viewing	Charter activity focused on scenic or natural area viewing, photography, historic perspective	1:250,000	1:500,000
Charter transport	Charter activity related to transport services, ferry boats, etc.	1:250,000	1:500,000

Recreational Fishing/Hunting Use

Use name	Includes	Appropriate Mapping Scale Min	Max
Recreational kayak and non-motorized vessel fishing	Any fishing activities from private non-motorized vessels	1:50,000	1:100,000
Recreational dive fishing	Recreational SCUBA and free-dive fishing	1:25,000	1:50,000
Recreational fishing from motorized vessels	Any fishing activities from private motorized vessels, including tournaments	1:250,000	1:500,000
Recreational shore fishing	Recreational fishing from beaches, piers	1:50,000	1:100,000
Recreational Shellfish Harvesting	Any take of clams or oysters	1:50,000	1:100,000
Recreational Waterfowl Hunting	Any take of waterfowl	1:50,000	1:100,000

General Recreational Use – Non-consumptive

Use name	Includes	Appropriate Mapping Scale Min	Max
Motorized boating	Personal watercraft, outboard motors, private motorized vehicles	1:100,000	1:500,000
Paddling	Kayaking, canoeing, rowing, paddle-boarding, outrigger paddling	1:50,000	1:100,000
Sailing	Sailboats, sweepstakes sailing, racing, regattas	1:250,000	1:500,000
Scuba/snorkelling/fishing	Scuba diving, enhanced diving, snorkeling, free diving	1:75,000	1:150,000
Shore Use	Barrier island visitation	1:25,000	1:50,000
Surface water sports	Surfing, wind-surfing, kite-surfing	1:25,000	1:50,000
Swimming	Short and long distance surface swimming any distance from shore	1:25,000	1:50,000
Other			

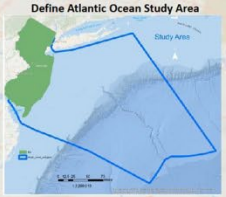
Cultural Use

Use name	Includes	Appropriate Mapping Scale Min	Max
Historic/cultural	Ocean areas or views with inherent cultural: traditional, archaeological, religious, spiritual, tribal or historic value	1:250,000	1:500,000
Scenic/natural views	Ocean areas or views that provide unique opportunities for photography, historic perspective, visual experience, etc.	1:250,000	1:500,000
Other			

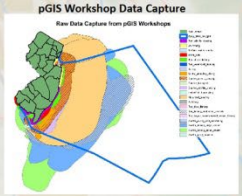
(2)

Capture pGIS Data → **Development of Analysis Grid, Data Integration and Validation** → **Final Applications**

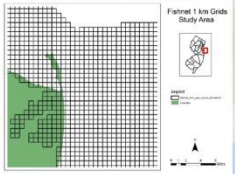
Define Atlantic Ocean Study Area



pGIS Workshop Data Capture

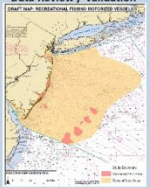


Convert Study Area to Analysis Raster

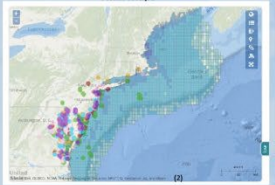


Data Integrated into Analysis Grid

Data Review / Validation



Final Maps

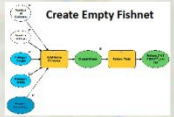


Post Processing Steps with NOAA Model Builder (3)

1) Catalog workshop data, 2) Organize workshop notes, 3) Clip data to study area, 4) Clean and edit data, 5) Create an analysis "fishnet",6) Prepare data for analysis, 7) Spatial join analysis, 8) Threshold data, 9) Review all patterns, 10) Create draft maps for review, 11) Finalize maps

pGIS Data Clip to Study Area

Create Empty Fishnet



Merge Data

Spatial Join Data into Analysis Grid

Split Use level – General and High Use

Threshold Data

Stakeholder Feedback and Finalization of the Data:

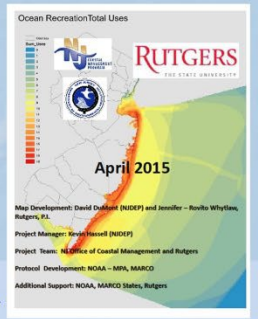
Once the data has been post processed and quality controlled, draft maps are developed and shared with the identified stakeholder groups from the workshops. Stakeholder final comments are received either through text or through hand drawn changes on the maps. These comments are captured in the edits and the final data set is produced.

Final Data Use:

- Data will be stored and used by NJDEP personnel
- Data will be submitted to MARCO for inclusion in the regional recreational use data set (includes VA,MD, DE and NJ)
- Future development within the NJ DEP Coastal Atlas

References:

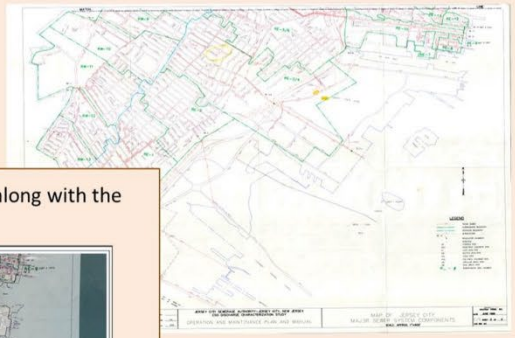
1) Definition PGIS Method: http://en.wikipedia.org/wiki/Participatory_GIS
2) Mid Atlantic Ocean Data Portal – www.midatlanticocean.org
3) NOAA – National Marine Protected Areas Center: www.mpa.gov
4) A Brief Overview of Mid-Atlantic Ocean: Characteristics, Trends and, Challenges - MARPA
5) Maryland Department of Natural resources: http://dnr.maryland.gov/ccs/coastalatlas
6) Virginia Dept. of Env. Quality : http://www.deq.state.va.us/Programs/CoastalZoneManagement/CZMIssuesInitiatives/OceanPlanning/VirginiaOceanPlanning.aspx



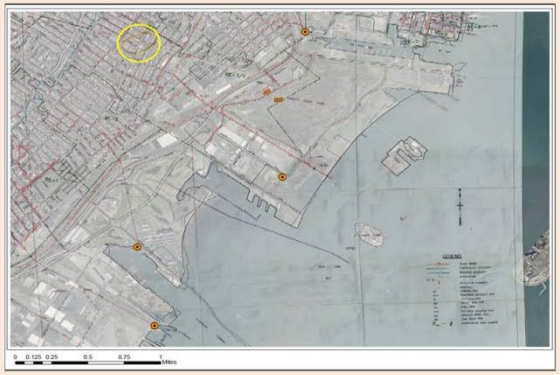
Jersey City Sewage Force Main Leak

In November 2014, a sewage leak from a 54 inch pipe in Jersey City was reported to NJDEP. This pressure sewer line carries untreated sewage from the East side pump station to the West side pump station. Based on the preliminary reports, the location of the leak was determined using the 2012 imagery and roads layer.

A paper map of Jersey City's major sewer system components was scanned and georeferenced.

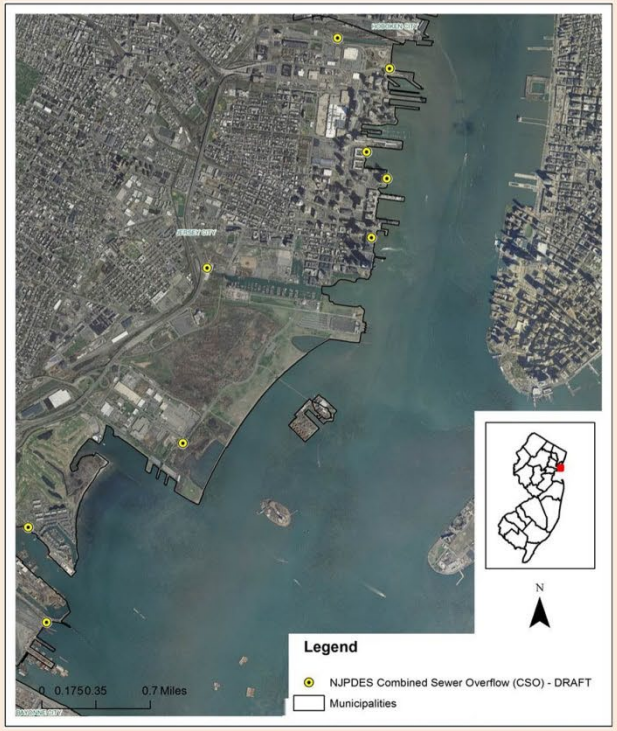


The scanned map was overlaid with the imagery along with the outfall locations.



NJDEP/OIRM/BGIS
April 16, 2015

To make the repairs, the Jersey City Municipal Utilities Authorities must discharge the untreated sewage into the Hudson river. NJDEP needed to know which discharge points - Jersey City's Combined Sewer Overflows (CSO) the sewage would flow out. A map was created showing those CSO locations to help the department to take necessary steps as well as issue various advisories and warnings.



Dnyanada Bhide

Impact of Watercraft to Environmentally Sensitive Areas in Barnegat Bay

Recreation boating and Submerged Aquatic Vegetation

Recreational boating is a popular pastime in Barnegat Bay. Done responsibly, boating in the deeper waters of the bay has little long term impact to the marine environment. However, boating in shallow water is another story.

Boats may stir up the bottom, suspending sediments which limit light penetration and deplete oxygen. Seagrass meadows and shellfish beds are especially sensitive. Motorboat propellers and personal watercraft (PWC) jet wash can easily slice the seagrass blades and gouge the bottom uprooting the seagrass. Boaters too close to shore can disturb nesting, feeding, and roosting waterbirds. Excessive boat wakes also contribute to shoreline erosion, especially of salt marsh islands and in narrow tidal creeks.

Boaters and PWC should ride in main channels and avoid riding in shallow water. When it is necessary to ride in shallow water, watercraft should be kept at an idle speed.

As part of the Barnegat Bay 10 Point Action Plan, Environmentally Sensitive Areas (ESAs) were delineated with special use restrictions to reduce the negative impacts from motorized water craft. These ESAs protect shallow water areas that contain extensive seagrass meadows and salt marsh islands that are home to colonies of nesting seabirds.

The Rutgers Center for Remote Sensing & Spatial Analysis, with funding from the New Jersey Department of Environmental Protection (NJDEP), is assessing the effectiveness of the ESAs in protecting the bay's sensitive habitats. This map depicts the ESAs and evidence of motorboat and PWC scarring as mapped through visual photointerpretation of aerial imagery acquired in 2009 and 2012.

For more information about this project please refer to the following resources:

-NJDEP Barnegat Bay - Comprehensive Plan of Action Item #10: Reduce Water Craft Impacts: http://www.nj.gov/dep/barnegatbay/plan-watercraft.htm

-NJ Sea Grant Consortium, 'Be a Better Boater': http://njseagrant.org/extension/be-a-better-boater/

-NJBoating.org: NJ Pumpouts, Boat Ramps, and more: http://njboating.org/

Map created by: Eden Buenaventura, CRSSA
Acknowledgments: Richard Lathrop, Rutgers CRSSA; Thomas Belton and Arianne Guidicelli, NJDEP.

Data Sources: Boat Scars: Grant F. Walton Center for Remote Sensing and Spatial Analysis (CRSSA, S. Haag, M. Clappi), Rutgers University; Pumpout Stations and Boat Ramps: NJ Sea Grant Consortium (M. Danko), NJ Department of Environmental Protection - Division of Fish & Wildlife; Intracoastal Waterway: NOAA Nautical Charts; Sedge Island Marine Conservation Zone: graphical boundary by CRSSA; Environmentally Sensitive Areas: NJDEP, CRSSA, Rutgers Institute of Marine and Coastal Sciences; Submerged Aquatic Vegetation: CRSSA; Topobathy DEM: U.S. Geological Survey; Original basemap imagery: NJOIT - Office of GIS (2012 imagery further modified by E. Buenaventura); Software: Esri

Legend

- 2009 Boat scars
- 2012 Boat scars
- Boat Ramp
- Pumpout Station
- Intracoastal Waterway
- Channel
- Sedge Island Marine Conservation Zone
- Environmentally Sensitive Areas
- Barnegat Bay Graphical Boundary

Submerged Aquatic Vegetation

- Sparse
- Moderate
- Dense

USGS Topobathy DEM

Z value (meters)

High: 11.2192

Low: -10.8524

N
W E
S

Miles

0 2.5 5 10

RUTGERS
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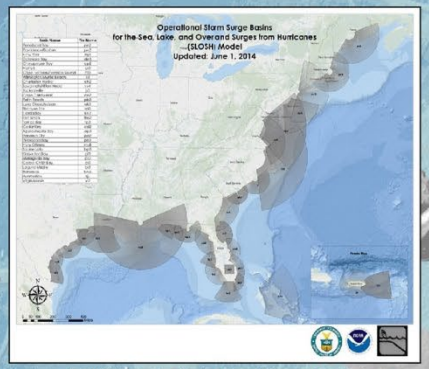
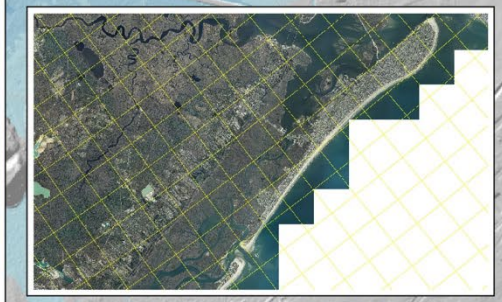
Grant F. Walton
CRSSA
Center for Remote Sensing & Spatial Analysis

Instructional Presentation

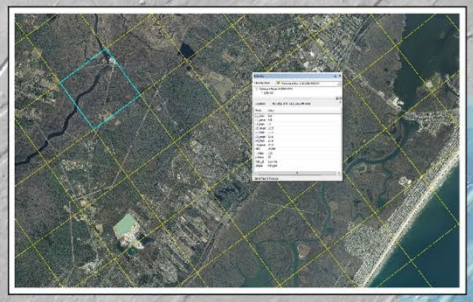
Generating Storm Surge Depth Grids from NOAA SLOSH Model Outputs



NOAA has developed hurricane innundation models for 32 basins located primarily in the Gulf and Atlantic coastal regions. Outputs from two basin models, Delaware Bay and New York, were used to generate storm surge models for New Jersey.

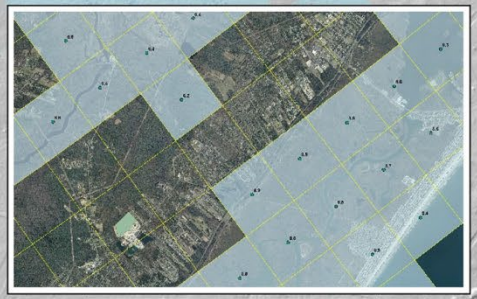


Model outputs include two types: Maximum Envelopes Of Water (MEOWs), and Maximum of the MEOWs (MOM). The MOM outputs are used to generate the storm surge depth grids. The model outputs are actually fishnet grids as shown by this portion of the Delaware Bay MOM data in Cape May County.

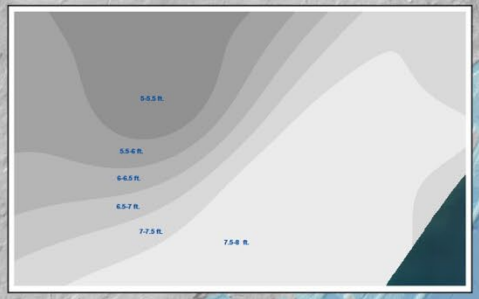


Each cell in the Delaware Bay MOM fishnet includes projected water elevation values for category 1- 4 hurricanes at both mean and high tide conditions, as hown for the highlighted cell. Cells with no modeled elevation heights are given a value of 99.9.

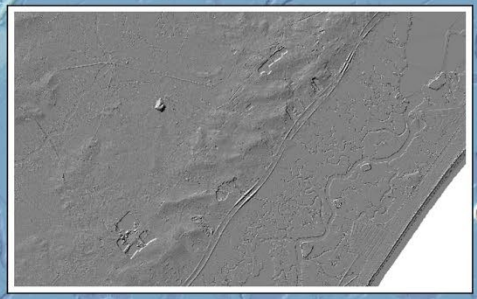
The first step in generating a surge depth grid is to select grid cells having valid projected elevation values for the category storm and tide conditions being modeled. The cells selected here are for a category 1 hurricane at high tide.



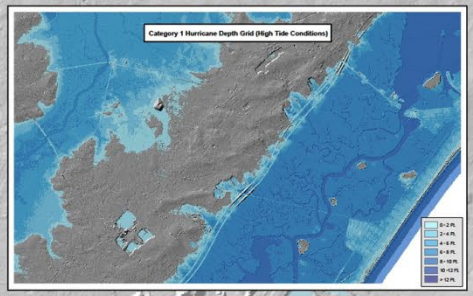
Centroids are generated for each selected cell. These are valued with the projected water elevation values for the modeled storm type and tide level.

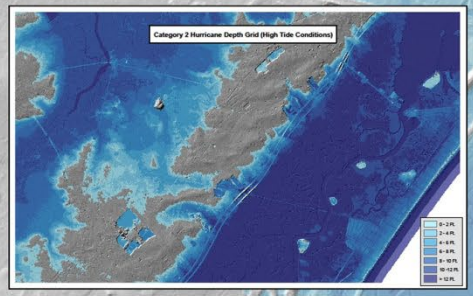


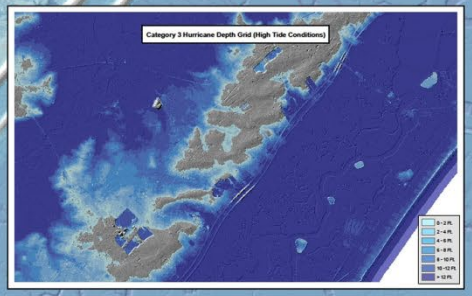
A water elevation surface is then interpolated from the centroid points using a spline algorithm. Cell values in the surface are referenced to a zero elevation sea level. This display symbolizes these water elevation values in generalized .5 foot increments.

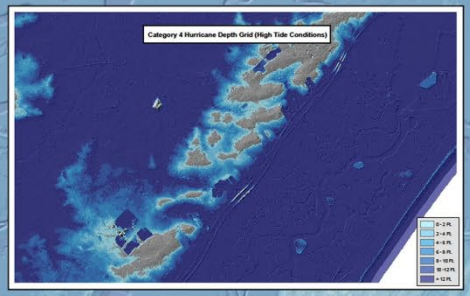


The final step in generating the depth grid uses a bare earth DEM and the water elevation surface. A conditional statement is used to calculate water depths above ground level only for cells where the water surface elevation is higher than the bare earth elevation









Final outputs are storm surge depth grids showing the projected extent of the storm surge for each cagtegory and the calculated depths of water above ground level. These layers can then be used to highlight resources at risk for the various storm levels and serve as valuable input in developing coastal resiliency plans.

John Tyrawski, NJDEP/BGIS
04/10/2015

Monmouth County Mental Health and Addiction Services Finder Applications

Introduction

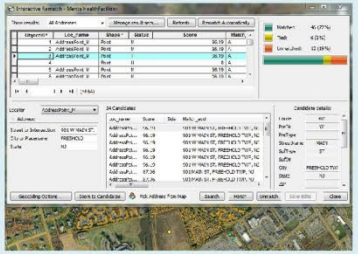
- Approximately one in five adults experience mental illness in a given year.[1]
- Approximately 21.4% of youths ages 13 to 18 experience a severe mental disorder in a given year.[1]
- An estimated 9.2% of persons aged 12 years or older needed treatment for an illicit drug or alcohol abuse problem in 2012.[2]

The Monmouth County Division of Mental Health and Addiction Services provides pamphlets about the various service providers at public events and meetings, but unless an individual is specifically looking the information at the time they encounter it, they rarely glance at it.

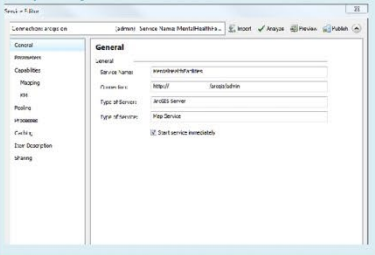
Because our population is increasingly becoming more technologically astute and seeking web-based information, two web mapping applications were created to help residents navigate mental health and addiction services in the County.

The applications are available 24/7 which allows an individual to be proactive in obtaining information at any time of day. The applications include links to service providers' websites where more detailed information about accessing services can be obtained.

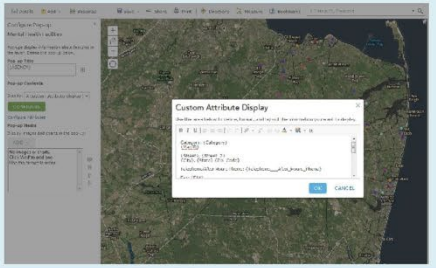
1) Geocoded addresses from spreadsheet of facilities provided by the Division of Mental Health and Addiction Services



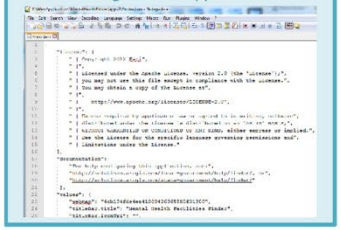
2) Created a map service, added to ArcGIS Online Organizational account, and shared publicly



3) Created an ArcGIS Online web map and configure pop-ups



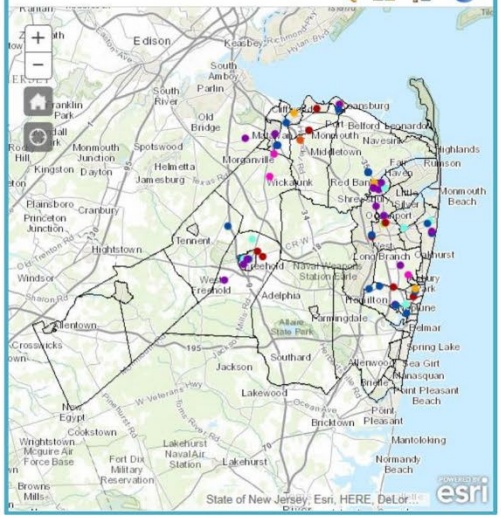
4) Downloaded Esri's Finder template and configured the application



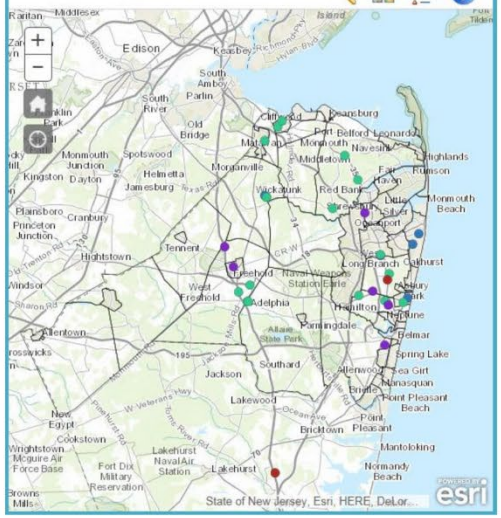
5) Applications were embedded on the Monmouth County website. They can be accessed using the following methods:

- Using the search box
- Clicking on the "How Do I?" tab and select "Locate Addiction Services Resources" or "Locate Mental Health Facilities."
- From the Human Services webpage, clicking on the "Addiction Services" tab or the "Mental Health" tab on the right side of the page. A link to each of the finder applications is included at the bottom of the webpage.

Mental Health Facilities Finder

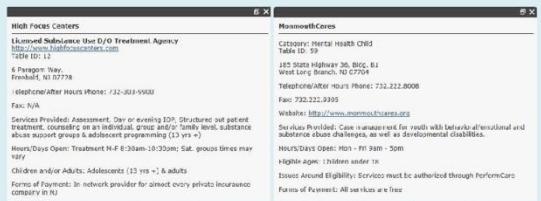


Addiction Services Finder



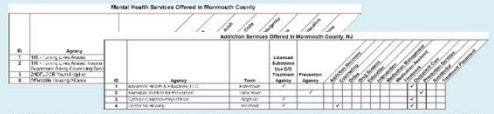
Application Features

Search by agency, city, or service



Pop-up boxes display contact and location information, services provided, eligibility requirements, and payment methods.

Legend of facility/service categories



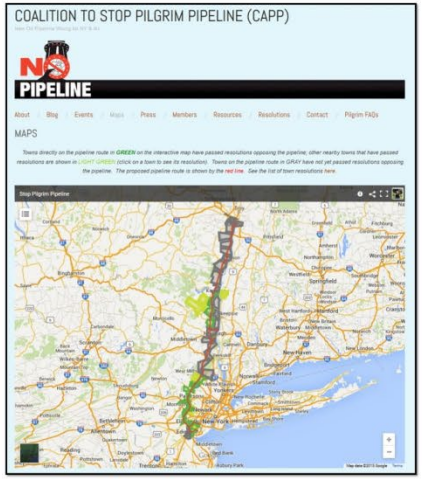
Links to summary a table of the facilities, municipalities, and general service categories is provided below the application for quick reference.

Acknowledgements:
Monmouth County Division of Mental Health and Addiction Services, Monmouth County Department of Public Information and Tourism.

Prepared by:
Ann-Marie Falkowski, Monmouth County Division of Planning
March, 2015

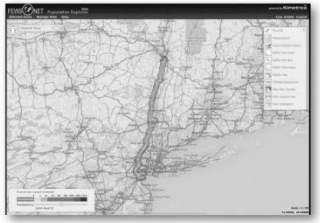
Sources:
[1]National Alliance on Mental Illness, *Mental Health by the Numbers*. Retrieved March 26, 2015, from http://www.nami.org/learn-more/mental-health-by-the-numbers
[2]Substance Abuse and Mental Health Services Administration, *Results from the 2012 National Survey on Drug Use and Health: Summary of National Findings*, NSDUH Series H-46, HHS Publication No. (SMA) 13-4795. Rockville, MD: Substance Abuse and Mental Health Services Administration, 2013.

LOCATION



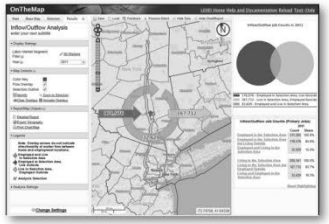
- CAPP uses the familiar ***Google Maps*** interface, allowing concerned citizens easy access to information about proposed ***locations*** for the pipeline as well as town and municipal ***resolutions*** opposing the pipeline.
- Community organizers can then ***create, share and edit*** their own local maps highlighting concerns held by individuals, schools, property owners, and businesses.

AFFECTED POPULATIONS



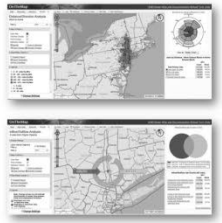
USAID Population Explorer:

- www.populationexplorer.com
- Enables spatial query of demographic information
- **0.5 million** people live within 1 mile of the proposed pipeline (26% under 18, 6% under 5 years old), 1.03 million live within 2 miles, 1.50 million live within 3 miles



US Census - OnTheMap:

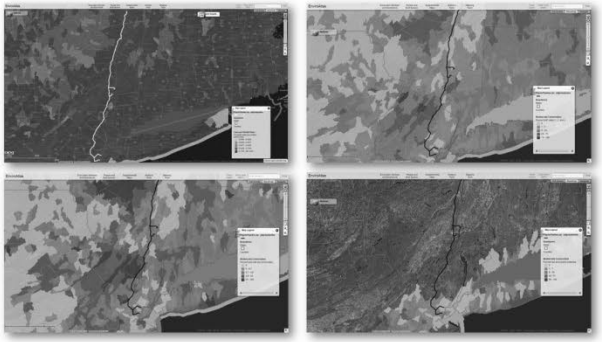
- http://onthemap.ces.census.gov/
- Enables spatial query of employment information
- **>175K** travel to work within 1 mile of the proposed pipeline
- Workers are employed mostly in retail, health and social services, and professional, scientific, technical services



- ~50K workers travel over 25 miles to work within 1 mile of the proposed pipeline (upper map shows the footprint of affected populations)
- **>700K** work within 3 miles of the pipeline

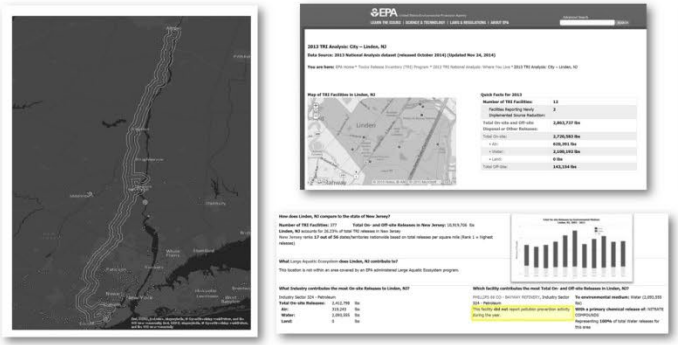
HOW TO HARNESS ONLINE GIS TOOLS FOR COMMUNITY ORGANIZING

Construction of the proposed ***Pilgrim Pipeline*** would transport crude oil from Albany, New York to Linden, New Jersey, and return refined products back to Albany. But how might this new construction affect nearby populations and ecosystems? Using online Geographic Information Systems (GIS) to assist community organizers, we begin to survey the potential impact.



EPA EnviroAtlas:

- http://enviroatlas.epa.gov/
- ***Human Health:*** Domestic water use of water supplies in pipeline areas is very high, suggesting widespread risk from leaks.
- ***Wildlife Health:*** Percent land with IUCN status or USGS GAP Status is high in most pipeline regions. Rare ecosystem protections apply in several areas.



EPA Toxics Release Inventory:

- http://epa.gov/tri (EPA TRI.NET)
- 42 TRI sites in NY and NJ fall within 1 mile of the proposed pipeline. 2013 Toxic Weighted Pounds emitted from these sites totaled to over 2 billion.
- Increased capacity at refineries is tied to increases in toxic emissions, which can be monitored by the TRI.

EPA EJ View:

- http://epamap14.epa.gov/ejmap/entry.html
- Quantifies the demographic, health, social, and environmental attributes of a spatial query
- 157 New Jersey schools are located within 1 mile of the proposed pipeline, approximately 212 in NY and NJ combined, 9 hospitals, 125 places of worship

RISKS TO HEALTH

COMPOUNDING HAZARDS

DREW SPATIAL DATA CENTER

Authors: Lisa Jordan, Cassandra Worthington, Patrice Carrington, Nadia Imanishimwe, and Devyn Lopez, Drew University

An ArcGIS Explorer Add-In for Reviewing and Approving Institutional Controls in the NJDEP Site Remediation Program

Introduction

In the process of remediating contaminated sites, there may be a point where the removal of the remaining contamination becomes technically impracticable or cost prohibitive. At this point New Jersey environmental regulations allow for the use of institutional controls (ICs).

Institutional controls are non-engineered instruments, such as administrative and legal controls, that help minimize the potential for human exposure to contamination and/or protect the integrity of the remedy. There are two types of institutional controls currently in use in New Jersey: Classification Exception Areas (CEA) for groundwater contamination and Deed Notice Areas (DNA) for soil contamination.

Institutional controls provide notice to the public that contaminants remain in the soil or groundwater at levels exceeding the New Jersey Department of Environmental Protection's (NJDEP) standards. The presence of an IC in an area indicates that precautions are necessary in order to protect the local population.

The Site Remediation Program (SRP) has created a system for handling institutional controls that are being proposed under the Licensed Site Remediation Professional (LSRP) Program. LSRPs are private site remediation professionals that have demonstrated education and experience sufficient to qualify them to independently conduct site remediations and issue response action outcomes in compliance with applicable New Jersey statutes and regulations. The LSRP program was established in 2009 to expedite the remediation of contaminated sites.

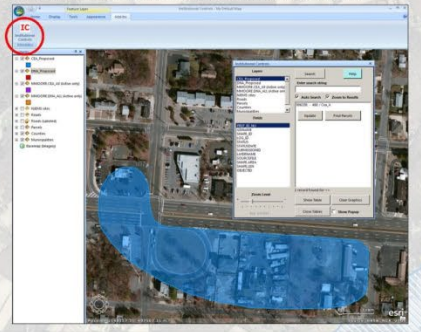
The SRP system for handling institutional controls consists of the following steps:

- The LSRP maps the area of the IC and emails a GIS shapefile or a CAD drawing of the IC to SRP.
- An email crawler is activated nightly which processes the email and stores the attached files in a directory on the NJDEP network.
- The ICs are then added to the appropriate GIS layer depending upon whether they are a CEA or a DNA. In addition, information from the email, such as the LSRP's name and address, is stored in an Microsoft Access database.
- Each proposed IC is then reviewed by the person in the NJDEP handling the case and the IC is either approved or rejected.
- Approved ICs are then transferred to the GIS layers containing the active CEAs and DNAs. Rejected ICs are deleted from the proposed IC layers.

The Application

The Institutional Control (IC) application was developed to facilitate the review of ICs. The application was designed to be simple to use, useable with only a minimum amount of familiarity with GIS, and, as much as possible, self-contained. The reviewer uses the IC application to view a map of the proposed IC, link it to a particular subject item in the New Jersey Environmental Management System (NJEMS), and record whether or not the IC is acceptable.

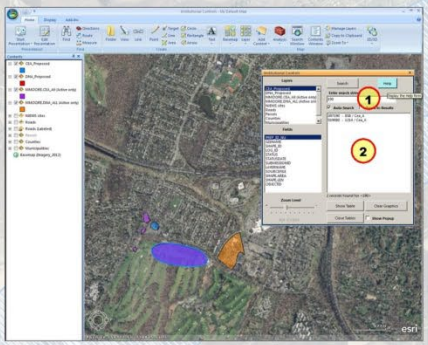
The Institutional Control (IC) application was created as an add-in for ArcGIS Explorer using Microsoft Visual Basic Express and ESRI's software development kit. ArcGIS Explorer is a free GIS viewer that allows one to view GIS information on a desktop computer. It has limited capabilities; in particular it does not allow the editing of GIS layers. Because of this restriction, the IC application uses a Microsoft Access database to store information entered by the reviewer.



Running the Application (1)

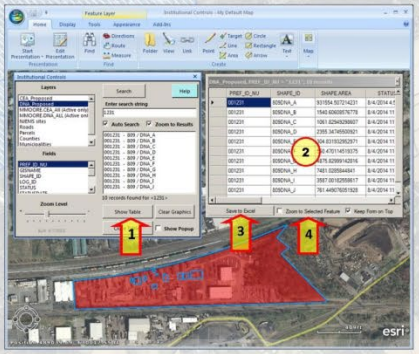
The IC application allows the reviewer to select features by typing the search criteria in the search box (1). The search results are displayed in the search results box (2). Individual results can also be selected in the search results box.

Search results are highlighted with a blue outline for polygons and checkered flags for points. If you have the "Zoom to Results" checkbox checked, the display will shift to show the results



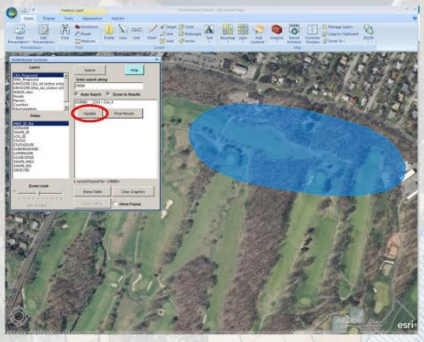
Running the Application (2)

Search results can also be saved to a table by clicking on the "Show Table" button (1). Once a table has been created (2), you can sort the rows, rearrange and resize the columns, and save the table to an Excel spreadsheet (3) for further manipulation and printing. You can also select individual features from the table by checking the "Zoom to Selected Feature" checkbox (4) and clicking on a row in the table.

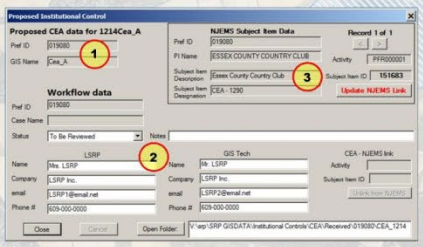


Updating the Status of an IC (1)

The "Update" button appears when a single proposed IC is selected.

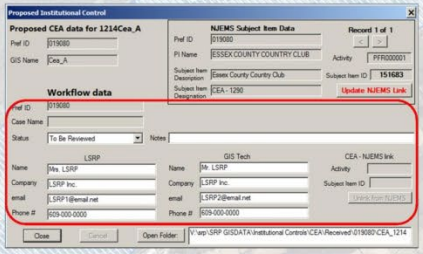


When you click on the Update button, a new window appears. This window contains information from the GIS layer (1), an Access database (2), and from NJEMS, the New Jersey Environmental Management System (3).

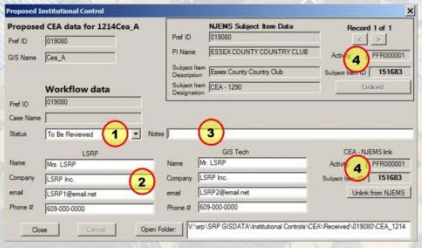


Updating the Status of an IC (2)

Because ArcGIS Explorer does not allow for editing the attributes of a layer, an Access database is used to store information on the status of a proposed IC. This information (the "Workflow data") can be edited by the reviewer, and is used to update the final IC layers (MMOORE.CEA_ALL and MMOORE.DNA_ALL) once the IC is approved. The update of the final IC layers is conducted on a regular basis, normally once a day.

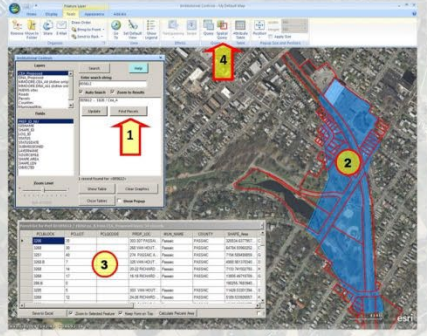


The reviewer can update the status (1) and contact information (2), provide comments (3), and link the IC to a particular NJEMS subject item (4). Note again that the information entered into this form is not stored in the GIS layer. Instead, it is stored in the Access database.

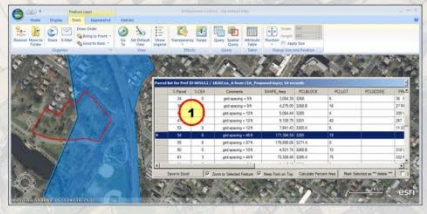


Parcels

Once a single IC is selected, the "Find Parcels" button (1) will appear. When the Find Parcels button is clicked, the application identifies all the parcels that intersect the selected IC (2, outlined in red) and stores them in a table (3). The "Find Parcels" function is the similar to conducting a spatial query under the <Tools> menu (4).

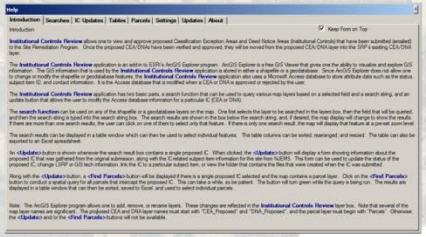


Parcels can be sorted, "zoomed to" one-by-one, and an estimation of the percentage of the parcel that is inside the IC can be calculated (1). The parcel table, along with any other table created in



Application Help

The application has a help screen which provides information on conducting searches, updating the status of IC's, creating tables, and displaying parcel information.



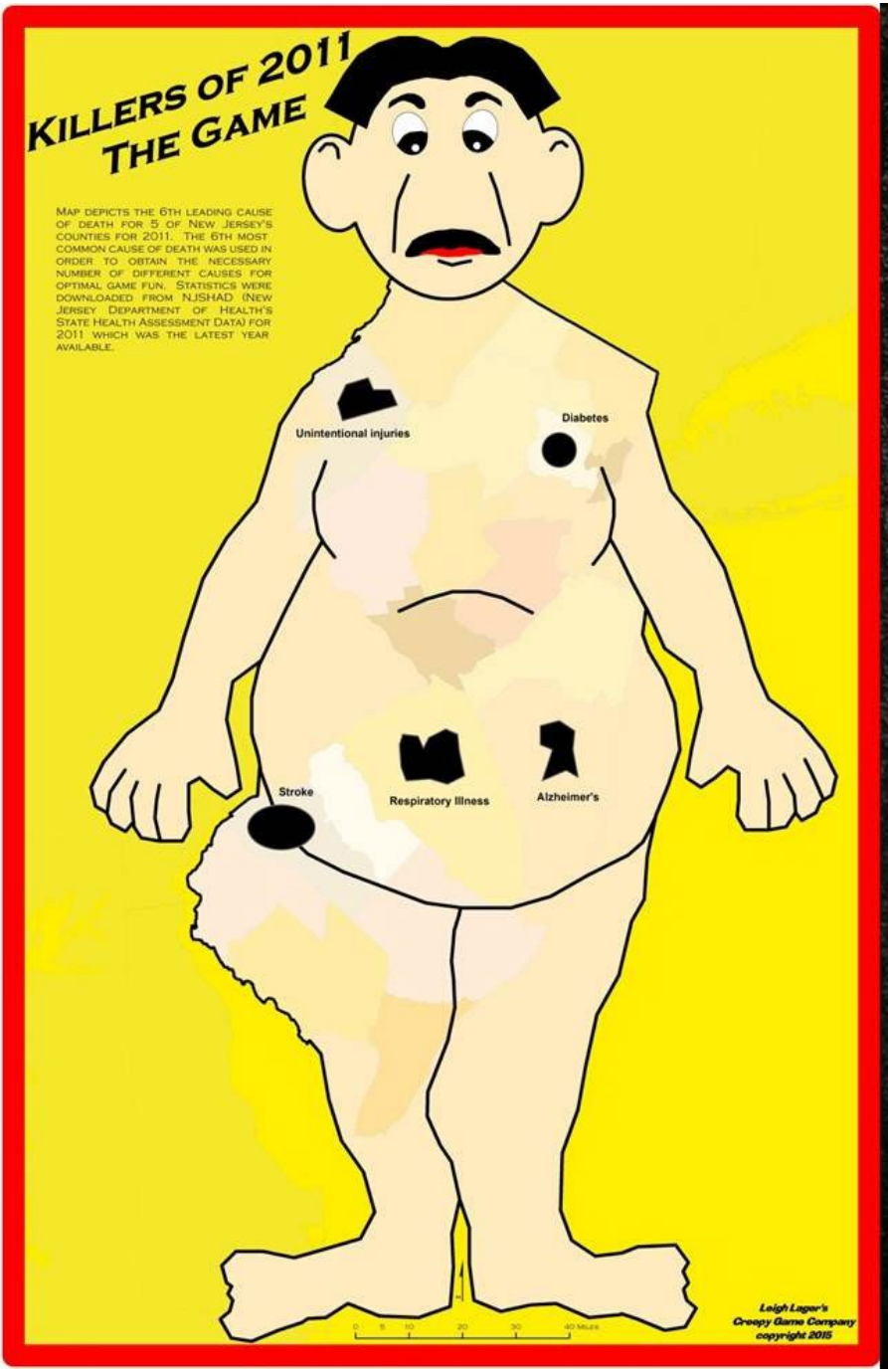
Ghosts

A final note about ArcGIS Explorer and the IC application: Occasionally "ghost" shapes appear on maps. These seem to be related to ICs which have recently been removed from the proposed layers. The identify tool does not work on them, and they appear or vanish at different map scales. They are also not seen on every computer, and they are only viewable for a short period of time. The figure on the left shows an approved CEA (in purple) that was transferred to the active layer (CEA_All) on a recent morning. The figure on the right (taken at a slightly greater map scale) shows the ghost CEA (in blue). Note that the identity tool only found the active CEA, even though both the proposed and active layers were turned on for both images. Note also that for this IC, when the ghost appeared, the active CEA disappeared. This ghost was only viewable for a day.

If you see a ghost, do not panic. They are benign creatures and can be safely ignored until they pass on to their final destination.

David Froehlich, NJDEP Site Remediation Program, GIS Unit

Most Unique


KILLERS OF 2011
THE GAME
MAP DEPICTS THE 6TH LEADING CAUSE OF DEATH FOR 5 OF NEW JERSEY'S COUNTIES FOR 2011. THE 6TH MOST COMMON CAUSE OF DEATH WAS USED IN ORDER TO OBTAIN THE NECESSARY NUMBER OF DIFFERENT CAUSES FOR OPTIMAL GAME FUN. STATISTICS WERE DOWNLOADED FROM NJSHAD (NEW JERSEY DEPARTMENT OF HEALTH'S STATE HEALTH ASSESSMENT DATA) FOR 2011 WHICH WAS THE LATEST YEAR AVAILABLE.
Unintentional injuries
Diabetes
Stroke
Respiratory Illness
Alzheimer's
0 5 10 20 30 40 MILES
Leigh Lager's
Creepy Game Company
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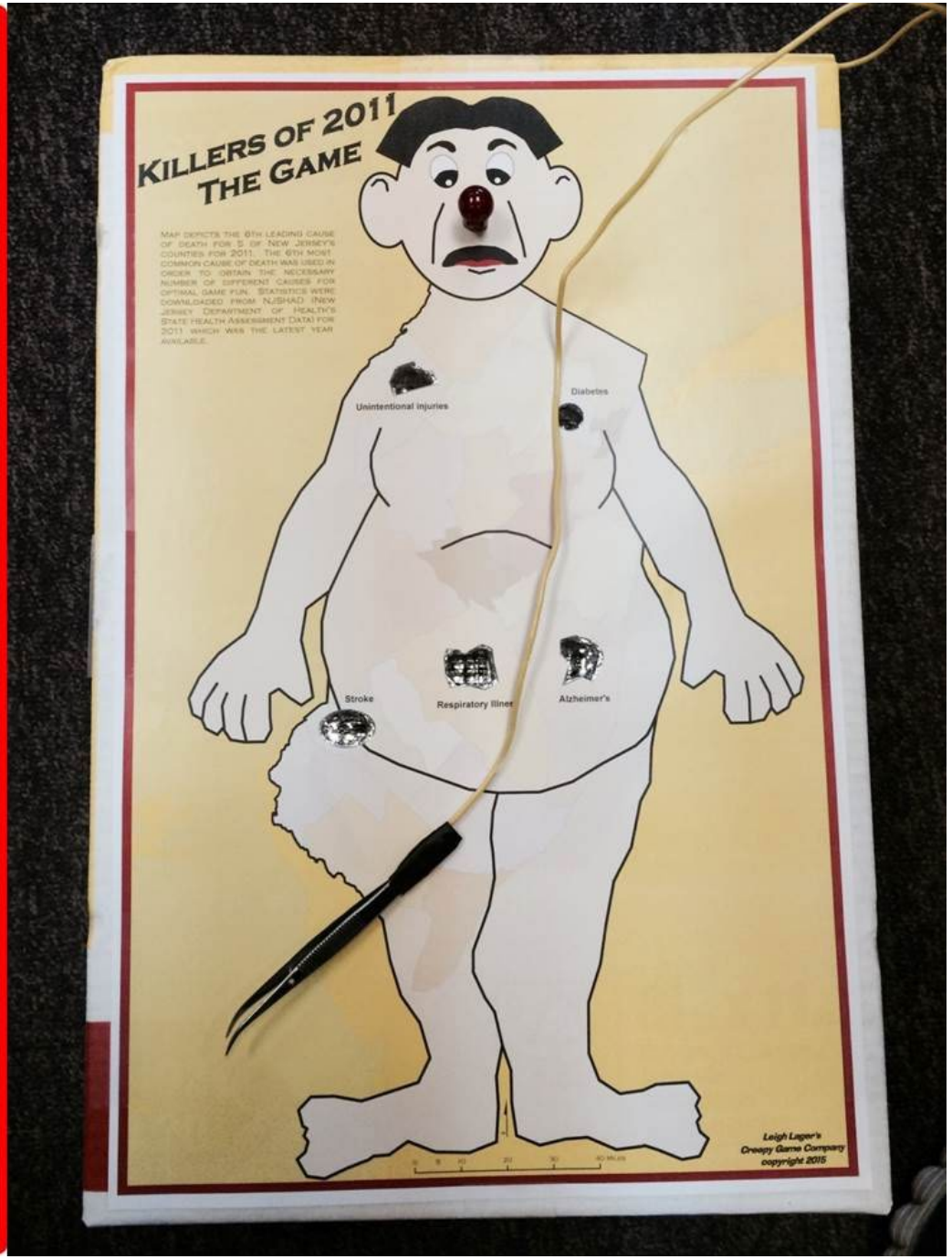
KILLERS OF 2011
THE GAME
Unintentional injuries
Diabetes
Stroke
Respiratory Illnes
Alzheimer's
Leigh Lager's
Creepy Game Company
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UFO Sightings in the United States

Abstract

In this study, the number of UFO sightings in the United States (1998-2015) as given by the National UFO Reporing Center (NUFORC) is visualized in a map containing the population density found in the United States in 2015. In a second map, the number of UFO sightings in the US (1998-2015) as given by NUFORC is visualized in a map containing the leaf area index found in the US in 2015. These maps were created to see if a relation exists between the number of UFO sightings and area population/leaf canopy.

Introduction

UFO sightings have been reported for much of the country's history. NUFORC is an organization that dedicates itself to collecting and disseminating objective data of UFO sighting events. Their website is constantly updated by the most current UFO sightings. Anyone can follow the database to find specific accounts and descriptions of individual UFO sighting events.

NASA Earth Observations (NEO) is used to study Earth from space using NASA satellites. The leaf area index for example, describes the area entirely covered by one layer of leaves as identified by satellites.

Data

The number of UFO sightings is taken from the NUFORC database of reports in the US by state. The data illustrated includes the US UFO sightings from 1998-2015. Reports are typically made by contacting the numbers and addresses provided in the main page. The US population density and leaf area index datasets are obtained from NEO which provide data easily mapped in ArcMap.

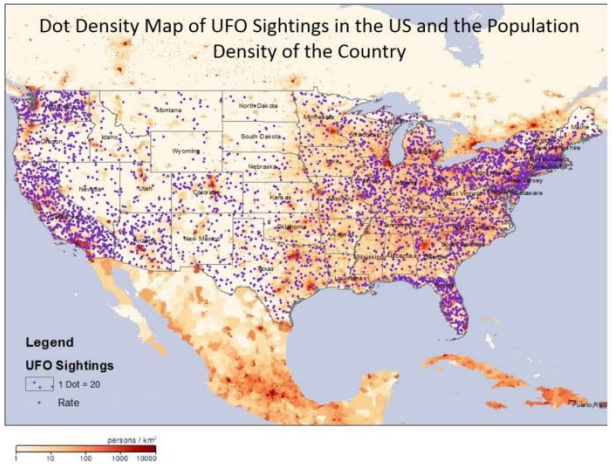


Figure 1. The map shows the density of people living in a specific region of the country and the density of UFO sightings (purple dots) attributed to the area. The scattered red dots indicate cities where large human populations are found.

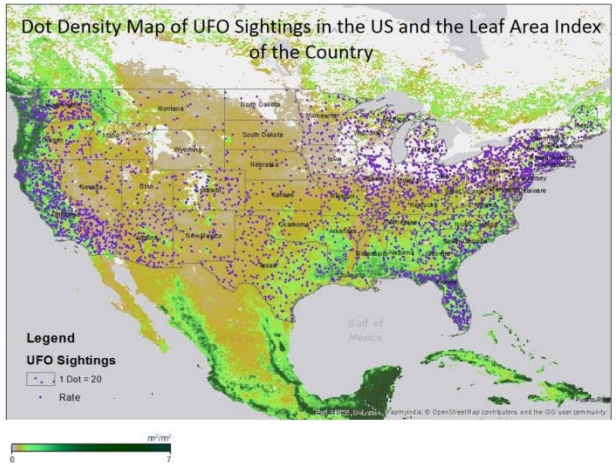


Figure 2. The map shows the layers of leaf canopies and the density of UFO sightings (purple dots) attributed to the area. The darkest greens indicate a dense forest canopy.

Results

States in the middle of the country have less reports of UFO sightings than the west and eastern parts of the country. Coasts tend to have larger populations and higher leaf area.

New Jersey ranked **15th** in sightings with 1,798 reports. Florida, Washington, and Texas were the top three, with 5,130, 5,011, and 4,369 sightings respectively.

Conclusions

Most UFO sightings are reported from the western and eastern coasts of the country. This might be due to the fact that more people live in these areas so more people report seeing them. However, that the number of sightings tends to be more concentrated in areas with higher leaf indexes is a bit harder to explain. One factor to consider is that data for leaf area index is taken from 2015 datasets. This along with population, may obscure more specific patterns related to UFO sightings.

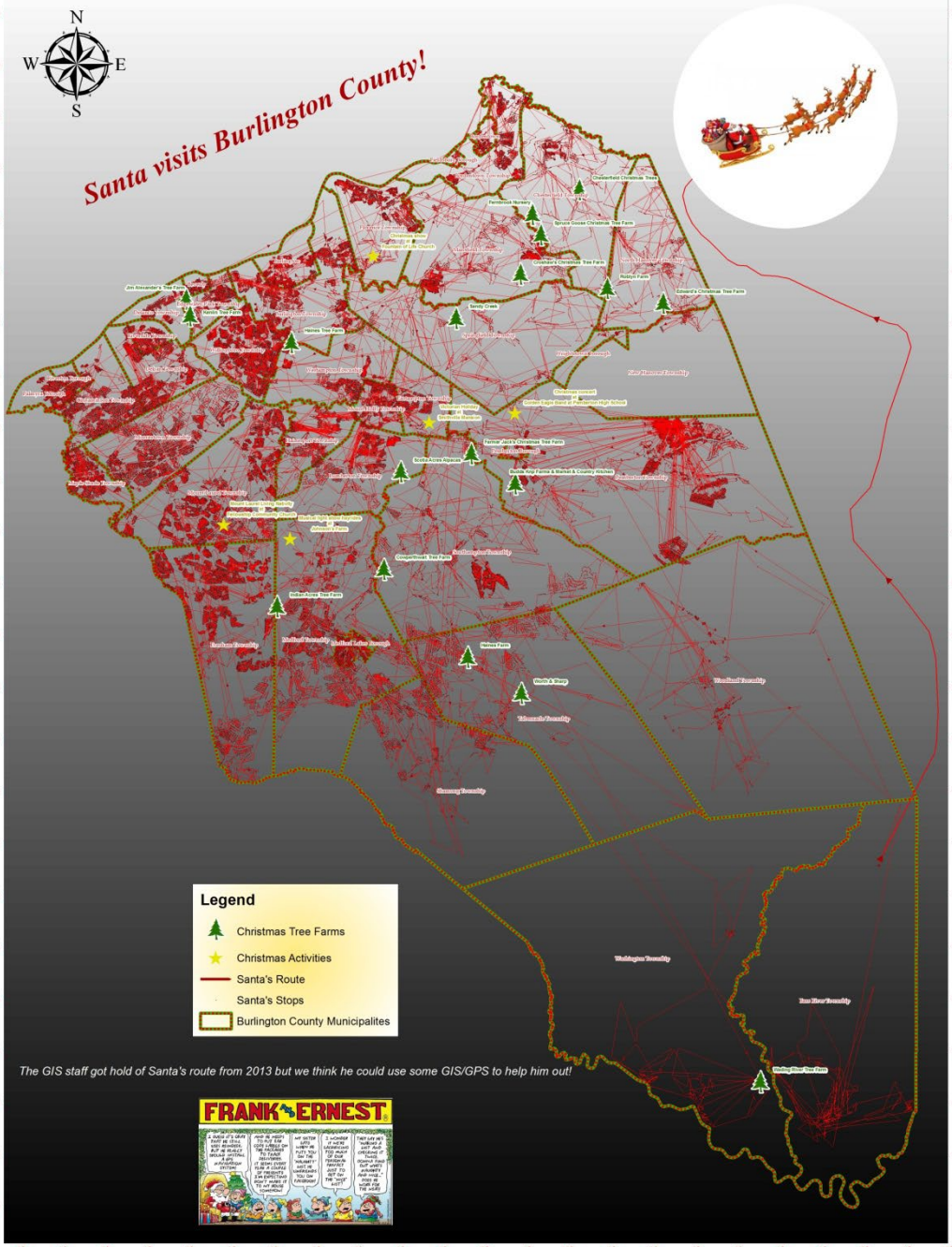
Bibliography

NASA Earth Observations (NEO). Land. Leaf Area Index February 2015. http://neo.sci.gsfc.nasa.gov/view.php?datasetId=MOD15A2_M_LAI

NASA Earth Observations (NEO). Life. Population Density. February 2015. http://neo.sci.gsfc.nasa.gov/view.php?datasetId=SEDAC_POP

National UFO Reporing Center (NUFORC) Database. Report Index by State. http://nuforc.org/webreports/ndxloc.html

Astrid Castillo


N
W
E
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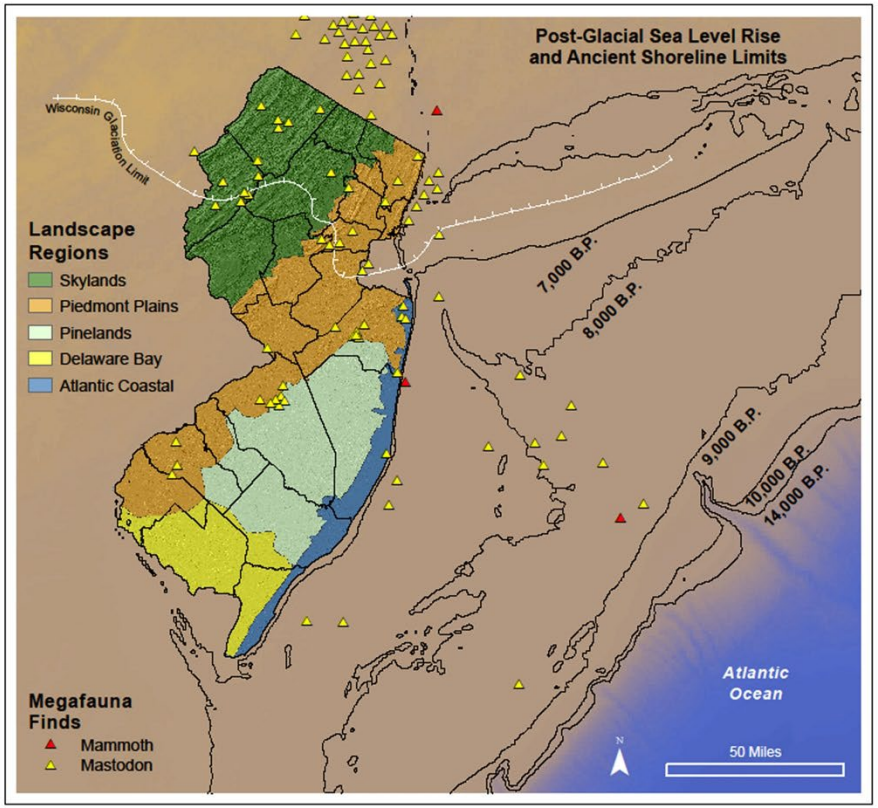
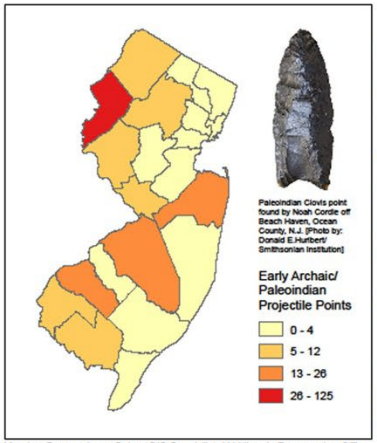
Santa visits Burlington County!
Legend
Christmas Tree Farms
Christmas Activities
Santa's Route
Santa's Stops
Burlington County Municipalites
The GIS staff got hold of Santa's route from 2013 but we think he could use some GIS/GPS to help him out!
FRANK ERNEST

Small Format

Rethinking the New Jersey Landscape and Human Settlement 14,000 to 7,000 Years Before Present





Map by: Gregory Luna Golya, GIS Specialist, NJ Historic Preservation Office

14,000 years ago the Atlantic coast was located 90+ miles to the east of its current location.

By 7,000 years ago, sea level rise resulting from warming patterns and glacial melt pushed the shoreline close to its current location.

East of the shoreline transgression, the submerged continental shelf area had been occupied by Paleoindian (14,000-10,000 BP) and Early Archaic (10,000-8,000 BP) peoples.

Evidence for a large portion of the region's earliest human activity lies under the Atlantic Ocean.

Accordingly, Paleoindian and Early Archaic sites found in New Jersey reflect inland components of early human settlement-subsistence systems.

Likewise, early human settlement systems did not stop at the western state border as evident from large percentages of Pennsylvania jasper at Paleoindian and Early Archaic sites in New Jersey.

While early sites in New Jersey were recorded in the piedmont, highlands, and ridge and valley regions, recent excavations on the Outer Coastal Plain found early human presence at water filled depressions or periglacial features. These depressions acted as watering holes for fauna and humans on the inland plains especially for areas located away from major drainage systems.

Archaeologists are gaining a better understanding of Paleoindian and Early Archaic settlement by contextualizing the New Jersey portion of the settlement systems within the broader ancient landscape that inlcudes submerged lands and resource areas beyond modern state boundaries.

Data Sources: Paleoindian Database of the Americas (PIDBA), http://pidba.utk.edu/; Amante, C. and B.W. Eakins, 2009. ETOPO1 1 Arc-Minute Global Relief Model, National Geophysical Data Center, NOAA; NJ DEP Landscape Project 3.1, County Boundaries, NJ DEP, Bonfiglio and Cresson, 1982, Geomorphology and Pinelands Prehistory, History, Culture, and Archaeology of the Pine Barrens, edited byJohn W. Sinton.; Kraft, Herbert, 1973, The Plenge Site: A Paleo-Indian Occupation Site in New Jersey, pp. 56-117.

Little Jack Frost Get Lost:A Comparision of January Temperatures 1900 - 2014

Created by: Taylor Furbish

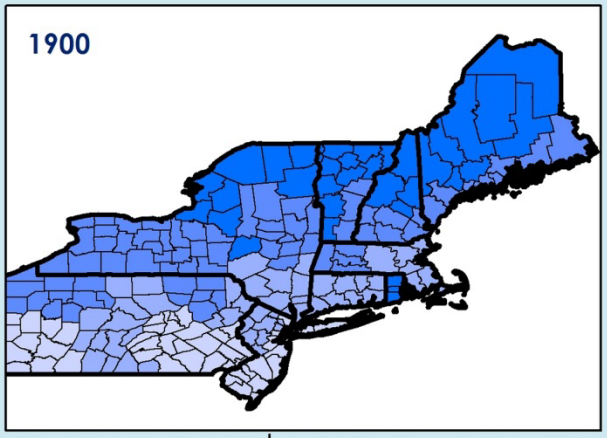
These maps display the average January temperatures in the Northeast states, with each state divided by county into regions. (Temperature data from NOAA)

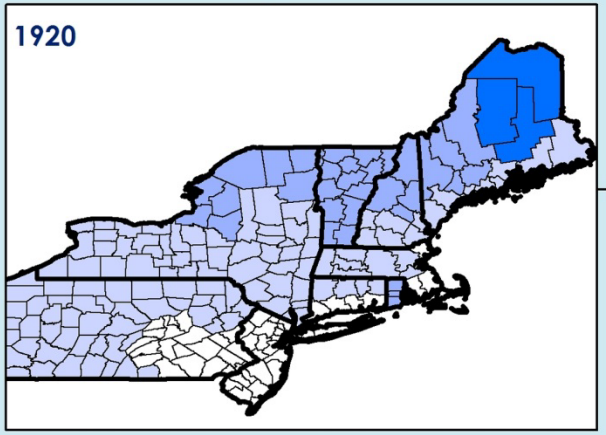
Average Temperature per Region (°F)

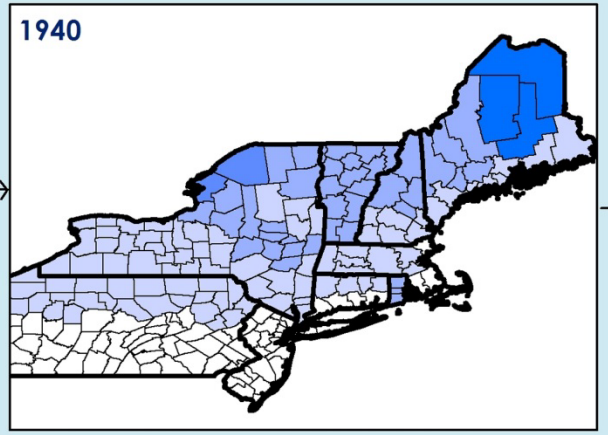
- 0 - 7
- 7.01 - 14
- 14.01 - 21
- 21.01 - 28
- 28.01 - 35

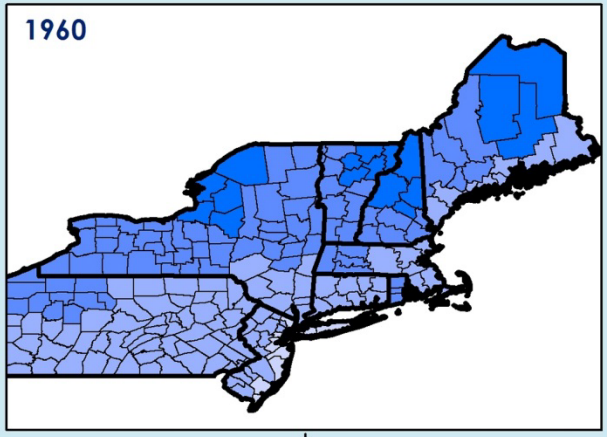
N

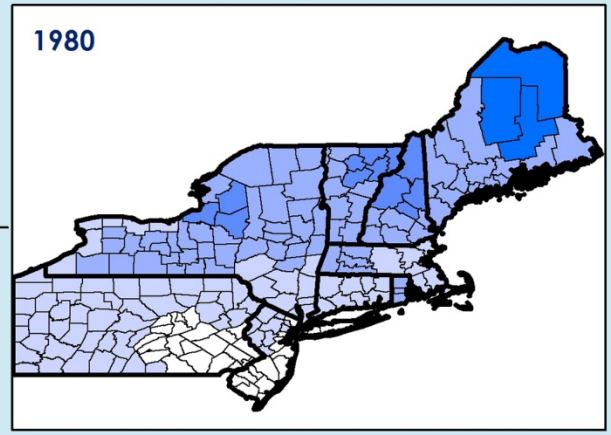
0 150 300 600 Miles

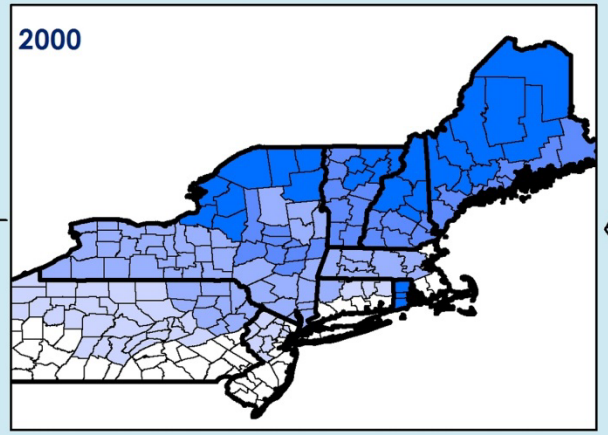


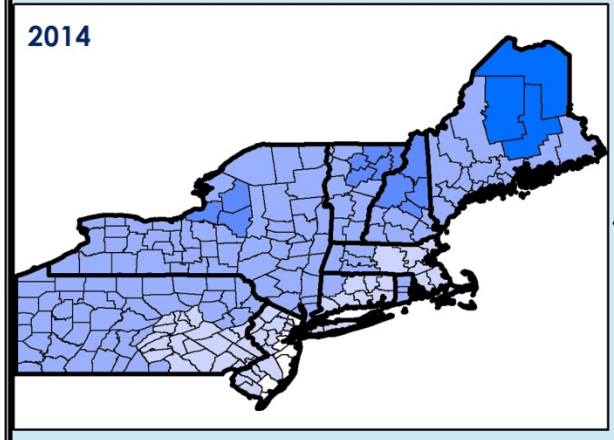












Jersey Fresh in Mercer County

Community Farmers Markets

Community Farmers Markets are seasonal markets where consumers can buy produce and other agricultural products directly from New Jersey farmers.

Roadside Markets

Retail establishments dedicated to selling New Jersey produce and other local products during the Garden State's growing season.

Certified Organic Farms

Contd...

Roadside Markets

Aunt Molly Farm
110 Aunt Molly Road,Hopewell,NJ-08525
(609) 333-0526,

Bobs Buzzy Bees
706 Groveville-Allentown Rd.,Yardville,NJ-08620
(609) 585-4359,Honey

C & E Produce
3855 Crosswicks-Hamilton Square Rd.,Robbinsville,NJ-08691
(609) 581-9198,

Cedarville Farms
31 Cedarville Rd.,Hightstown,NJ-08520

Corner-Copia
299 Princeton-Hightstown Rd.,East Windsor,NJ-08520

Oasis Garden Center and Farm Market
87 Federal City Road,Lawrenceville,NJ-08648
www.oasisgardencenternj.com,609-818-1140

Peterson's Nursery & Garden Market
3730 Lawrenceville Rd. (Rt. 206),Princeton,NJ-08540
(609) 924-5770

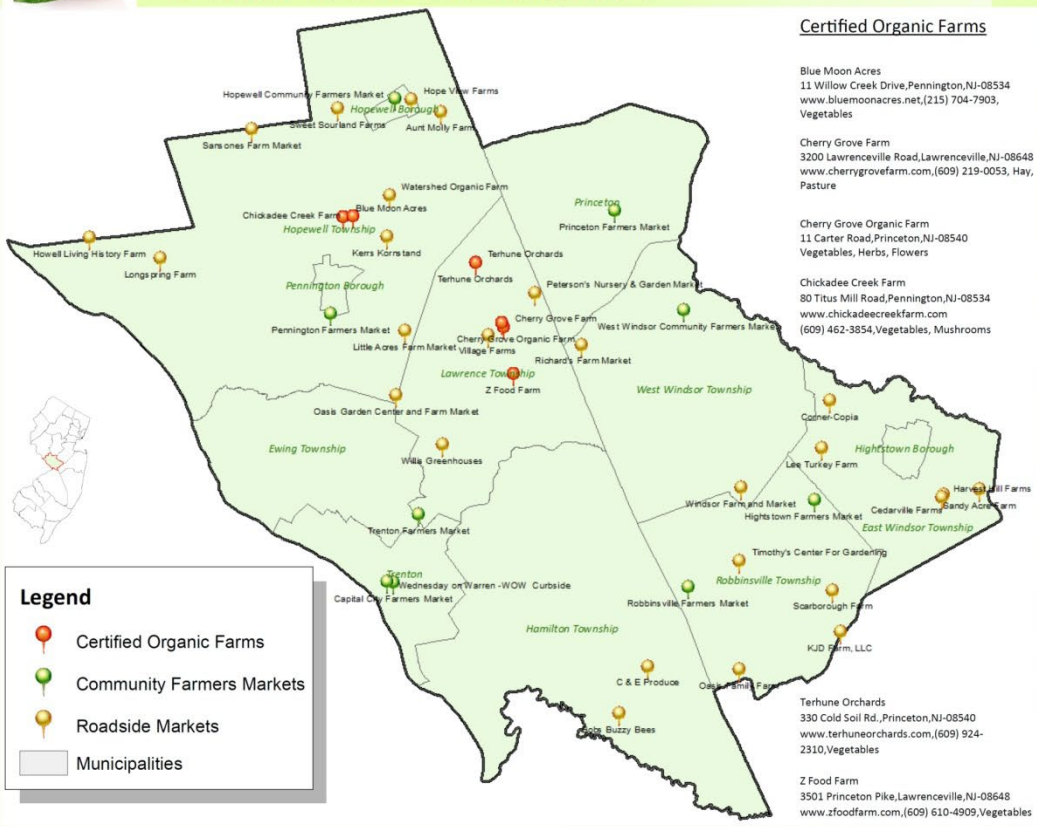
Richard's Farm Market
700 Nassau Park Blvd.,Princeton,NJ-08540
(609) 716-0069

Sandy Acre Farm
93 Disbrow Hill Rd.,Hightstown,NJ-08520
(609) 448-2168 or (609) 394-9119

Sansones Farm Market

Mercer Fresh !

Locally Grown Produce Markets in Mercer County



Certified Organic Farms

Blue Moon Acres
11 Willow Creek Drive,Pennington,NJ-08534
www.bluemoonacres.net,(215) 704-7903,
Vegetables

Cherry Grove Farm
3200 Lawrenceville Road,Lawrenceville,NJ-08648
www.cherrygrovefarm.com,(609) 219-0053, Hay, Pasture

Cherry Grove Organic Farm
11 Carter Road,Princeton,NJ-08540
Vegetables, Herbs, Flowers

Chickadee Creek Farm
80 Titus Mill Road,Pennington,NJ-08534
www.chickadeecreekfarm.com
(609) 462-3854,Vegetables, Mushrooms

Terhune Orchards
330 Cold Soil Rd.,Princeton,NJ-08540
www.terhuneorchards.com,(609) 924-2310,Vegetables

Z Food Farm
3501 Princeton Pike,Lawrenceville,NJ-08648
www.zfoodfarm.com,(609) 610-4909,Vegetables

Community Farmers Markets

Capital City Farmers Market
165 East Front Street,Trenton,NJ-08608
www.destinationtrenton.com,(609) 396-4329/ Amanda Donald

Hightstown Farmers Market
Memorial Park,Hightstown,NJ-08520
www.hightstownfarmersmarket.org,(609) 220-8529

Hopewell Community Farmers Market
17 Railroad Avenue,Hopewell,NJ-08525
www.highlandmarket.com,(908) 996-3362/ Ben Avila

Pennington Farmers Market
101 Rt. 31 South,Pennington,NJ-08534
www.penningtonfarmersmarket.com,(609) 737-0867/ Joann Held,Rosedale Mills

Princeton Farmers Market
55 Witherspoon Street Princeton,Hinds Plaza,Princeton,NJ-08542
www.princetonfarmersmarket.com,(609) 924-8431/ Jack Morrison or Sherri Petonic

Robbinsville Farmers Market
Rt. 526 & Hwy 33,Robbinsville (Washington Town Center),NJ-08691

Trenton Farmers Market
960 Spruce Street,Trenton,NJ-08648
www.thetrentonfarmersmarket.com,(609) 695-2998 - Marcia & Jack Ball,

Wednesday on Warren -WOW
South Warren St,Trenton (Curbside between East State & LaFayette St),NJ-08608
www.destinationtrenton.com,(609) 396/4329/ Amanda Donald,

West Windsor Community Farmers Market
Vaughn Dr,West Windsor (Vaughn Drive commuter parking lot),NJ-08540
www.westwindsorfarmersmarket.org,(609) 933-4452 / Chris Cirkus

Continued...

JERSEY FRESH™ As Fresh As Fresh Gets Mercer County

Software Integration

The city of Camden
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PYNE POYNT
CRAMER HILL PAVONIA
BIEDEMAN
ROSEDALE
DUDLEY
MARTON
STOCKTON
LANNING SQUARE
BERGEN SQUARE
PARKSIDE
GATEWAY
CENTRAL WATERFRONT
LIBERTY PARK
WHITMAN PARK
WATERFRONT SOUTH
CENTERVILLE
MORGAN VILLAGE
FAIRVIEW
DELAWARE RIVER
COOPER RIVER
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Harleigh Cemetery
Evergreen Cemetery
New Camden Cemetery
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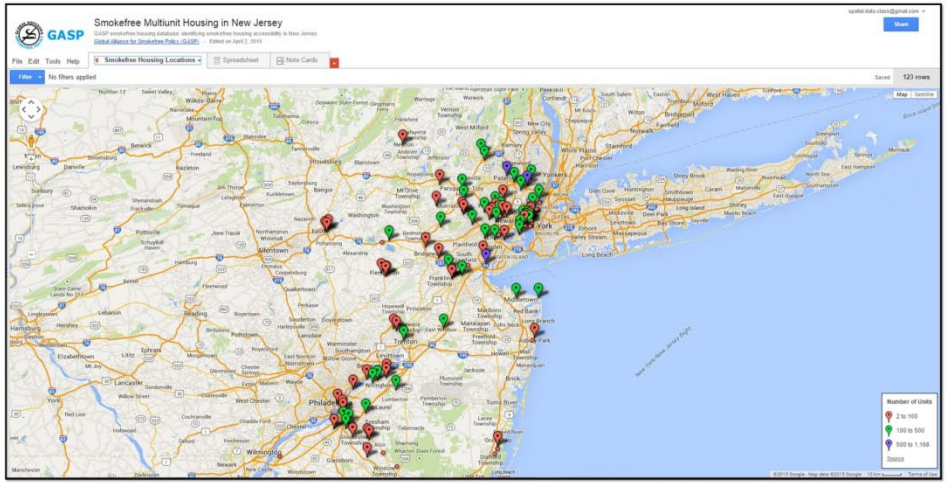
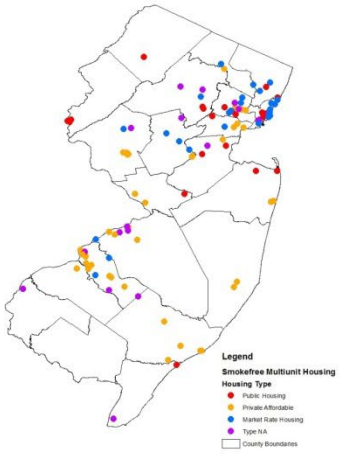
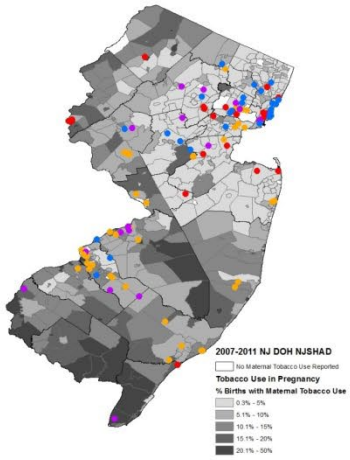
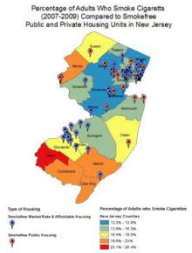
Legend
Transportation
Interstate Hwy
U.S. & N.J. Hwy
Main Road
Residential
PATCO
River Line
Features
River/Water
Cemetery
Park
School
Districts
Downtown
Health Science
Waterfront
Street index located on reverse side.

Using GIS to Promote *Smokefree* Homes and *Smokefree* Parks for *Healthier* Communities

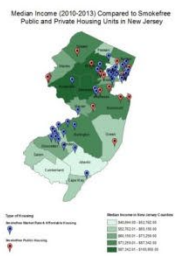








Thematic map displaying the smoking rates in New Jersey compared with the Smokefree Multi-unit housing in New Jersey



Thematic Map displaying the Median Income of New Jersey with the Smokefree Multi-unit Housing in New Jersey

- Top left: Google Fusion Map of smokefree multiunit housing, updates are ongoing as more information about smokefree housing options are collected.
- Top right: ArcGIS visualizations of smokefree housing by housing type (e.g. public housing, private affordable, or market rate housing), one of the maps overlays smokefree housing on maternal smoking rates by municipality.
- Bottom right: ArcGIS and ArcGIS online maps of smokefree parks policies by New Jersey municipality, whether e-cigarettes are included in policies, and eligibility for Sustainable Jersey points.

Authors: Kathleen O'Neill, Senior, Environmental Studies (smokefree multiunit housing maps), Elena McKeown, Senior, Environmental Studies, (smokefree parks), Lisa Jordan, Assistant Professor, Biology (poster layout, NJSHAD map), Drew University

Acknowledgements: We would like thank GASP for their helpful guidance and assistance throughout the project, particularly GASP's Executive Director Karen Blumenfeld Esq. and Program and Policy Attorney Cara Murphy, Esq. For the full tri-fold on smokefree housing and more information on smokefree parks, please visit www.njgasp.org.

- Drew University students, Kathleen O'Neill and Elena McKeown partnered with Global Advisors for Smokefree Policy (GASP) as part of their Community Based Learning (CBL) coursework in Advanced GIS at Drew University.
- ArcGIS, ArcGIS Online, Batch Geo and Google Fusion maps were created to visualize GASP databases on smokefree housing and smokefree parks policies in New Jersey.
- Google Fusion, a free Google Drive App, includes geocoding functionality, and provides an intuitive spreadsheet interface with easy permission-sharing features, which makes updating databases simpler for non-GIS users, who maintain databases after volunteer students complete their work.

SMOKEFREE HOUSING

For Multi-unit Residential Property Managers, Owners and Developers, Housing Industry Professionals, Tenants and Policy Makers

Learn about Smokefree Policies for Multi-unit Housing

Global Advisors on Smokefree Policy (GASP) is a 35-year old nonprofit resource center dedicated to promoting smokefree air and tobacco-free lives.

Our Tobacco Control Policy & Legal Resource Center offers informational materials and technical assistance on emerging trends in tobacco control, including economic and health benefits of smokefree multi-unit housing.

GASP

7 Cedar Street, Suite A
Summit, NJ 07901
Ph: (908) 273-9368
Fax: (908) 273-9222
Email: info@njgasp.org
www.njgasp.org

GASP is funded by the New Jersey Department of Health, the U.S. Centers for Disease Control and private donations.

This brochure is not intended as, nor to be construed, or used, as legal advice, and should not be used to replace the advice of your legal counsel.

Benefits of Smokefree Housing

Economics – Reduce Operating Costs

- Lower rehab costs for smokefree units: Carpeting, floors, fixtures, countertops and appliances are not damaged from smoking burns and odors, nicotine stains.
- Faster turnover time to re-rent: apply one coat of paint vs. need to wash, prime and paint walls from nicotine stain, odors.
- Less wear 'n' tear on ventilation systems.
- Discount on property casualty insurance.
- Lower fire risk reduces property damage.
- Earn points for HUD and "Green" building funding; receive tax credits, incentives.
- Learn more at njgasp.org/housing.htm

High Market Demand

- 80+% of adult New Jerseyans don't smoke; 70% of smokers want to quit.
- Fewer units vacated from SHS seepage.

Ensure Safety

- Smoking is the leading cause of elderly and multifamily residence fire deaths.
- National Fire Prevention Association recommends no smoking during portable oxygen use in any portion of a residence, to reduce the risk of explosions and fires.

Protect Health

- Protect family members and pets. SHS is especially hazardous for infants, children, the elderly, and people with chronic diseases, cancer, or breathing disabilities.
- Protect visiting social service workers and building maintenance workers from SHS.

Limit Liability

- Help avoid potential legal liability from nonsmoking residents' exposure to SHS.
- Tenants with pre-existing physical conditions aggravated by SHS may file complaints under the Fair Housing Act.

HUD Strongly Encourages Smokefree Housing Policies

- In 2009 and 2010, The U.S. Department of Housing and Urban Development (HUD) issued policy notices strongly encouraging Public Housing Authorities (PHAs) to implement non-smoking policies in some or all of their public housing units.
- PHAs can create a 100% smokefree "house rule" or model lease policy. PHAs across the nation are participating. Contact GASP for customized technical assistance.

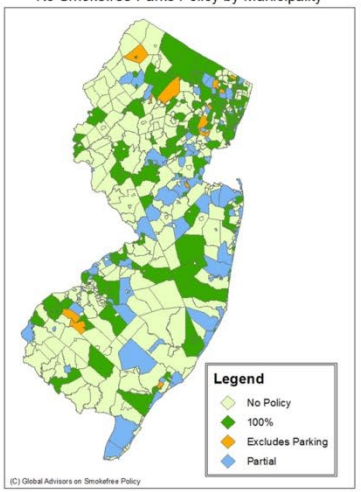
Support for Smokefree Policies

- National Apartment Association's January 2011 *UNITS* magazine: "Clouds of cigarette smoke" are "What's Out" for apartment living. *UNITS*' December 2007 issue says *"Fortunately, what is in the best interest of resident health is also in the best interest of community owners' bottom lines."*
- *Apartment Insight* magazine's July/August 2009 issue: *"The trend towards smokefree apartments is expected to spread across the nation, driven by consumer demand."*
- U.S. Surgeon General's *Call to Action to Promote Healthy Homes* protects residents.

How to Establish a Smokefree Policy in Multi-Unit Housing

- Landlords and property managers can create a 100% smokefree lease amendment, "house rule" or model lease policy. Call GASP for more details.
- Select an implementation date, and notify tenants (example, 30 days) in writing; include an acknowledgement of the new policy to be signed by the tenant and all occupants of the units. A phase-in period may be instituted for existing leases.
- Establish an outdoor smoking-permitted area on your property, at least 50 feet from the building, to prevent SHS from migrating indoors through doors, windows, outdoor intake vents, and provide receptacles.
- Post no-smoking signs at entrances, hallways, common areas and outdoor areas to inform tenants, visitors and workers about the smokefree policy.
- When advertising vacancies, list the smokefree policy as an amenity, promoting a "Going Green" step for the building. Nonsmokers and smokers are all welcome. It is only the behavior of smoking that is to be prohibited under the smokefree policy.
- Offer information on smoking cessation programs to residents. The NJ State Department of Health offers free and low-cost quit services. Go to our website njgasp.org/quit_tobacco.htm to learn more.
- For enforcement: use same warning and notice methods for other rules and policies, check during routine inspections, require tenants to pay for rehabilitating their unit into a rentable condition, free of SHS.

NJ Smokefree Parks Policy by Municipality



GLOBAL ADVISORS SMOKEFREE POLICY GASP

DREW SPATIAL DATA CENTER

LOCATING A SHIPWRECK IN NORMANDY BEACH

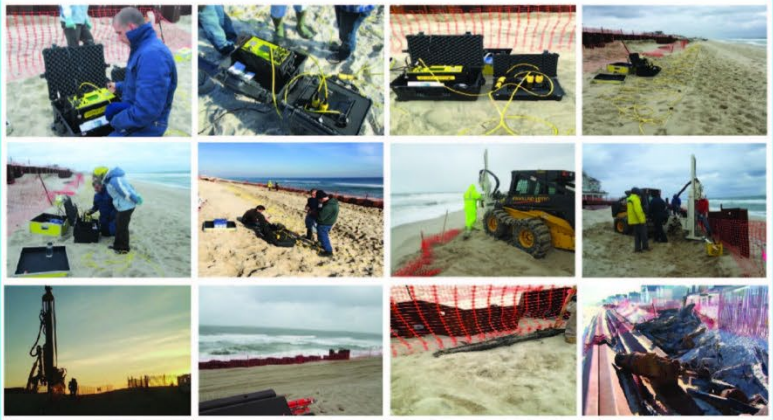
Map Prepared by New Jersey Geological And Water Survey
New Jersey Department of Environmental Protection
Ted Pallis, Mike Gagliano, Michelle Kuhn

Overview

In the fall of 2014 construction workers uncovered a piece of history buried deep beneath the sand in Normandy Beach section of Brick, which could be from a 19th-century shipwreck. Workers discovered the pieces while driving 45 foot steel pilings into the sand, as part of the construction of a sea wall. They hit something and broke the top of the piling. Shipwreck experts said the pieces could be from the Ayrshire, a ship that ran aground off Squan Beach, during a fierce storm back in January 1850 and was never seen again. Others believe it could be the R. G. Magill (c. 1872), a 75-foot-long schooner built in Bridgeton. Divers familiar with the area have even speculated that the remains could belong to the Cadet (c. 1842) or the Patricia Henry (c. 1843). A key piece of evidence found by the workers, which could help identify the ship, was a barrel-shaped object called a windlass, which was used on sailing vessels for almost 300 years. It's an object located on the bow of the boat. It was used to raise the anchor or pull in heavy lines.

Methods

The New Jersey Geological and Water Survey was called in to use its geophysical equipment to locate the buried ship before work could continue on the sea wall. An anomaly was found and mapped utilizing Electrical Resistivity Tomography (ERT) along a 267 foot line, along with a geoprobe to ground truth. (ERT) is an advanced geophysical technique for imaging sub-surface structures by measuring resistivity distribution from equipment used at the surface. An electric current is injected into the ground through two electrodes and the resulting potential (voltage loss) is measured between two other electrodes. Resistivity values are then calculated and modeled using software to produce an image of the resistivity distribution. The applications of ERT include fault investigation, ground water table investigation, soil moisture content determination, buried structures, and many others. Along with using resistivity to find the anomaly, a geoprobe was used to core every five feet on either side of the resistivity line. A point was recorded If resistance was encountered. Analysis of the resistivity and the geoprobe information gave an accurate location of the ship. Work on the seawall resumed after the ships location was mapped. ArcGIS 10.2, Adobe Illustrator CS6 and Earthimager software were used to make this map.



Photos of buried ship study area. (Top to bottom) (a), (b), (c), (d), (e), (f). Resistivity equipment. (g) and (h) Geoprobe. (i) Drill. (j) Sheet piling wall. (k) Wood from ship. (l) Windlass.