31st Annual Mapping Contest Maps

Analytical Presentation

Coastal Vulnerability Assessment: Jersey City, NJ

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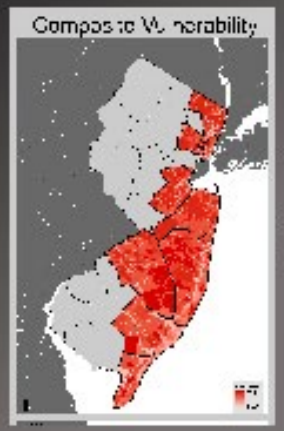
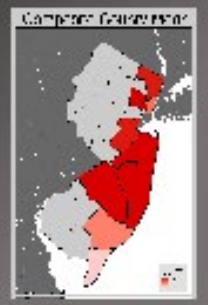
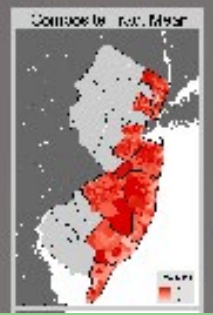






Abstract

This map series represents an approach of measuring coastal vulnerability in New Jersey using raster analysis.

Methods

This composite vulnerability assessment utilizes a social vulnerability index (SOVI), FEMA Flood Insurance Rate Map (FIRM) , and Open Street Map Building Footprints for Jersey City. Using the raster calculator, these inputs were combined to create the composite vulnerability index. Additionally, zonal statistics were calculated by both county and census tract to highlight the variability among different spacial scales and the need for local data in coastal vulnerability assessments.

Results

The results of this assessment show the diverse composition of both social vulnerability and physical exposure to coastal hazards. The results are shown in both 2D and 3D formats.

At Risk of Isolation Metric

Evaluating Transportation Accessibility Throughout Monmouth County

INTRODUCTION

Monmouth County's population is aging. In 2015, around 100,600 of Monmouth County's 629,185 residents were estimated to be at least 65 year old. By 2034 this group is projected to grow to nearly 146,000. While this group made up 16% of the total population in 2015, they are projected to make up 22% by 2034. This increase in the size of the 65 and older population as well as the "greying" of the population overall will have a large effect on the transportation services that municipalities need to provide as traveling can become more difficult and dangerous as someone ages.

In order for the County and its Municipalities to prepare for this growth in the 65 and older population it is important to understand where in the County additional transportation services may be of value. In order to identify areas where residents have fewer transportation options, Monmouth County Division of Planning developed a metric to quantify the risk of isolation. This metric, called At Risk of Isolation Metric, uses six variables that represent the mobility of a location, and therefore represent risk of isolation.

METHODOLOGY

The isolation metric was calculated at the census tract level using six variables; Walk Score, Car Access, Local Bus Service availability, Access Link availability, presence of a municipal shuttle service, and percent of population living alone. Because not all transportation options are equal in terms of how effectively they can move people the variables were weighted. (See Table 1 for weights)

Transportation options, such as being able to walk, having access to transit, or being able to drive were weighted higher, as they provide more on demand service. Options that require scheduling or are infrequent, such as Access Link and Municipal transportation were weighted lower. Living alone was weighted the lowest, as it is itself is not a transportation option necessarily, however it can be an indicator that there may be someone else in the household who can provide transportation. Each variable was calculated for all census tracts in the County that have 65 and older populations. The final scores were calculated by summing the weighted value of all variables and dividing them by the highest hypothetical score.

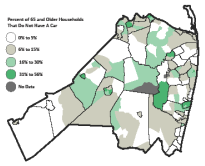
The variables "access Link availability" and "local bus service availability" were calculated by estimating the percentage of the residential area of a census tract that is within the service area of Access Link or bus service. Making this estimation required finding the proportion of residential areas that were located within the service area of either Access Link or Local Bus Service. This proportion was then multiplied by the American Community Survey 5-Year Estimates.

The 2012 LULC data from NJDEP was used to create this proportion. The LULC data has 6 different classifications that can contain residential populations. They are: High Density Residential; Medium Density Residential; Low Density Residential; Rural Residential; Mixed Urban; and Mixed Density Residential. It is assumed that higher density residential areas will contain a larger amount of a population than other residential areas. Therefore, the 5 classes were weighted based upon the NJDEP modified Anderson Systems definitions for each land use classification. Once this proportion was calculated for all census tracts it was then multiplied by the American Community Survey data.

Table 1: Isolation Index Variable Weights

Variable	Weight
Walkscore	4.5
Car Access	2
Access to Local Bus Service	3
Access to Access Link	1.5
Availability of Municipal Shuttle Service	1.5
Living Alone	1

Variables Used

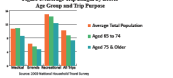


CAR ACCESS

Access to a car was measured by the percentage of census tract households headed by someone 65 or older that do not have access to a vehicle. Having access and being able to drive an automobile enables Monmouth County residents to access almost all services.

Older adults have been known to change driving habits in order to extend driving. A 2011 survey conducted by AAA found that of the 82% of 65 and older people who still drove, 80% avoided some type of driving condition, with 33% avoiding long trips. However, even after taking into account these changes, older drivers still take trips that are comparable to the general population. Data from 2009 National Household Travel Survey shows that the average trip length for those aged 75 and older is only 28% shorter than the total population. (See Figure 1)

Figure 1: Average Trip Length by Driver Age Group and Trip Purpose

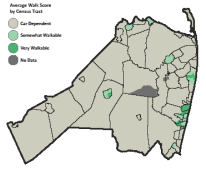


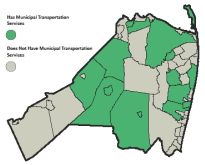
WALKABILITY

Walkable communities are an important factor in leading healthier lives. Studies have shown that walkable, mixed-use neighborhood designs encourages more social interaction compared with car-oriented suburbs, which lead to better health outcomes. In addition, living in walkable neighborhoods enables residents to achieve their daily errands by walking or biking.

Using the website Walkscore.com, an average Walk Score was calculated for every census tract within Monmouth County. Walk Scores are calculated by combining potential walk routes for an address with locations of amenities necessary for daily errands. Scores are between 1 and 100, with 100 being the most walkable, where daily errands require no vehicle, and 0 being car-dependent, where every errand requires a car. The table to the right summarizes these scores.

The vast majority, around 77% of census tracts, are car-dependent. Asbury Park is the only municipality to have all census tracts considered "very walkable". Overall, 5% of the 65 and older population live in "very walkable" census tracts, with another 10% living in "somewhat walkable" census tracts. The remaining 85% live in car-dependent areas.





AVAILABILITY OF MUNICIPAL SHUTTLE SERVICE

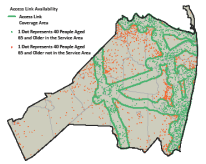
The map to the left displays municipalities that have transportation services for the 65 and older population. These services are typically used to transport people 65 and older to and from Senior Centers. As such, all municipalities listed on this map also have a Senior Center. Occasionally these services will transport older populations to shopping or other recreation locations.

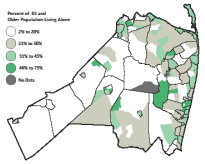
In total, 15 municipalities provide this type of transportation service. These 15 municipalities contain 60% of the County's 65 and older population.

ACCESS LINK AVAILABILITY

Access Link is a paratransit service that shadows the local NJ Transit bus routes. The service provides public transportation to people with disabilities who are unable to use the local bus service according to the Americans with Disabilities Act. Therefore, it is reserved only for pre-approved passengers who have a qualifying disability. The service provides curb to curb transit service from anywhere within 3/4 of a mile of a local bus route. Rides are typically scheduled 1 to 2 days in advance.

Using the same estimation technique described in the methodology section, an estimated 51% of people aged 65 and older were within this 3/4 mile coverage area. The map to the right shows the coverage area, as well as the location of the 65 and older population.





LIVING ALONE

Living alone is measured by the number of people aged 65 and older who are the only resident in their home or apartment. Someone who has a caregiver or family member staying with them part time would still be counted as living alone. Living alone can both increase the negative effects of becoming isolated as well as increase the chance of not having someone to provide transportation.

In addition, those who are living alone are more likely to be financially burdened compared to those who are living with someone. A 2014 Pew Research Center poll found that when asked about finances, only 33% of adults aged 65 and older living alone responded that they live comfortably compared with 49% of older adults who are living with someone. Having reduced finances can make it difficult to pay for gas, car up keep, alternative transportation, or grocery delivery services. The map to the left shows concentrations of where Monmouth County's 65 and older populations are living alone.

LOCAL BUS SERVICE AVAILABILITY

Bus Access was measured by the percentage of the 65 and older population within a census tract that are within 1/4 mile walking distance of a local bus stop. The walking distance was calculated using Network Analyst in ArcMap. The estimations were calculated using the methodology described above. Using this estimation technique it was found that 14% of the County's 65 and older populations are located within walking distance of a local bus route.

The map to the right shows the coverage area of local bus stops within Monmouth County. Local bus routes, in contrast to commuter bus routes, only serve local stores and employment centers located within the County. In addition, they have more consistent schedules.

Final Isolation Metric Scores

RESULTS

The map to the right shows the final scores for all applicable census tracts. The higher the score on the metric, the less risk of isolation the census tract is considered to have. Scores were broken down into 4 categories:

1. Least Risk of Isolation
2. Less Risk of Isolation
3. Moderate Risk of Isolation
4. Highest Risk of Isolation

The "least risk" category contains census tracts that have the highest overall scores. This category also has the highest variable scores for Walk Score, access to bus service, access to Access Link, and municipal shuttle service. However, for the remaining two variables, car access and living alone, it scores lower than the less risk and moderate risk categories. Only 10% of 65 and older populations are located within census tracts that are considered least risk of isolation.

One reason the least risk of isolation category has lower car ownership rates is that dense walkable communities do not require a car to achieve daily errands, therefore fewer households have them. An analysis of all census tracts found a correlation between the variables Walk Score and car access for all census tracts in Monmouth County. The more walkable a census tract is the more likely car ownership will be lower. Additionally, walkable census tracts are also more likely to have access to bus service and Access Link.

The census tract with the least risk of isolation, located in Asbury Park, boasts 99.5% Access Link coverage, 97% bus coverage, an 86 Walk Score, and the presence of a municipal transportation service. However, this tract is lacking in car availability and has a higher than average percent living alone, with 47% having a car available and 53% of the 65 and older population living alone.

Overall, a majority of the population is located in census tracts that are considered moderate risk of isolation (see Figure 2). Residents living here are heavily dependent on driving for getting around. They have the highest level of car access and lowest levels of living alone. In addition, around 55% have no access to Access Link and 94% have no bus access. Around 59% have access to municipal transportation. With high levels of 65 and older headed households with cars, older populations in these tracts will most likely be driving in their older ages. However, being solely dependent on this one form of transportation means it is likely that a large portion of the population will need some alternative form of transportation in the future if they wish to age in place.

CONCLUSIONS

Having many transportation options is essential for successful aging. The results of the isolation metric reveal that a large portion of the County's 65 and older populations are living in areas that are at a moderate to high risk of becoming isolated. Although these areas have now been identified, providing additional services to these areas will be challenging as transit services are most useful and cost effective in dense communities. Therefore classic suburban communities with large lot sizes and non-grid patterned streets are not conducive to effective transit service.

Innovative solutions are needed to ensure that Monmouth County residents can age successfully. One alternative to explore is municipalities subsidizing taxi rides for people 65 and older, something currently being tested in Morris County. In April 2017, Tri-Town Coalition 55+, made up of Chatham Borough, Chatham Township, and Madison, embarked on a pilot program called "Rides for Seniors." These townships partnered with an on demand transportation company called GoGoGrandparent. The coalition will subsidize each one-way trip, up to 15 miles, at a cost of only $3 to the rider. This service is intended to complement the bus transportation service these municipalities already provide.

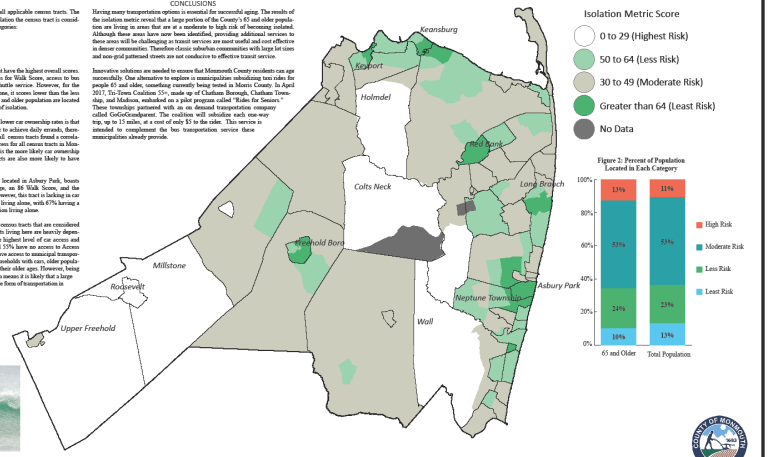
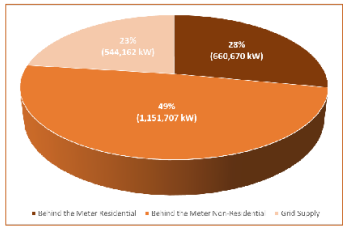


Figure 2: Percent of Population Located in Each Category

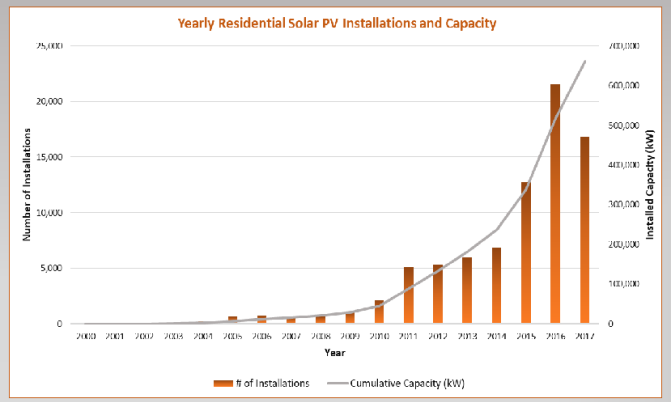
Growth of Residential Solar PV in New Jersey's Municipalities

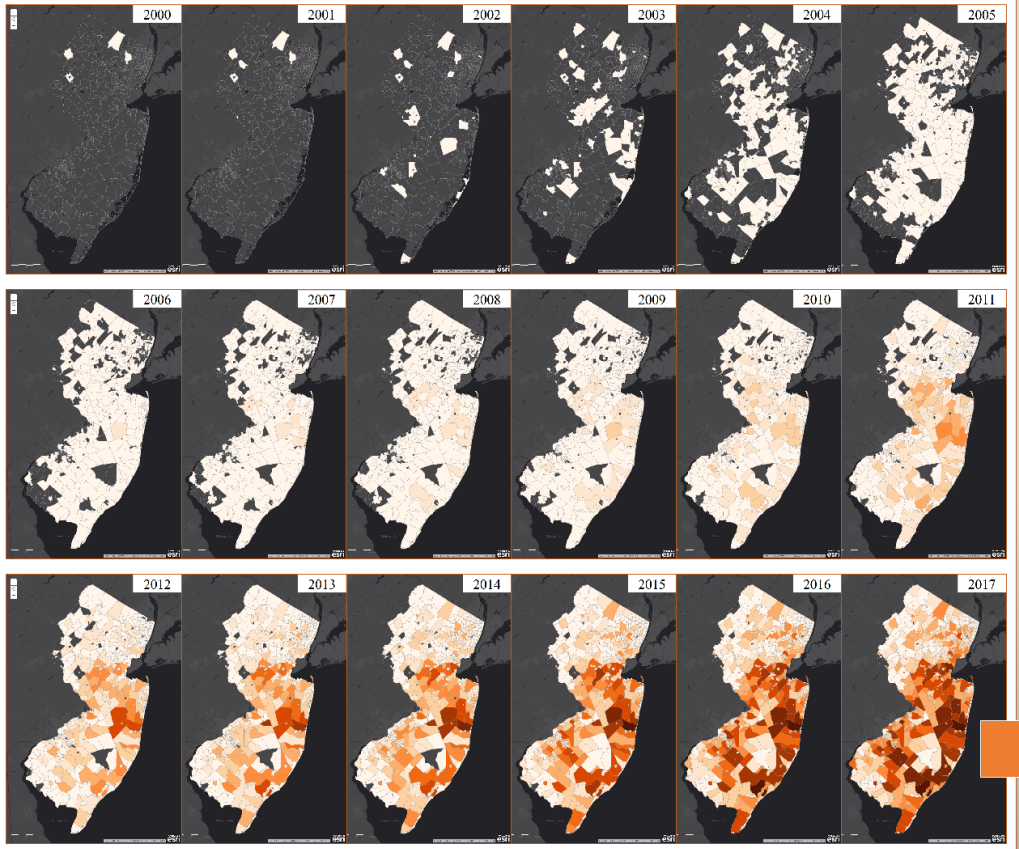
Ryan Gergely
NJDEP Bureau of Energy and Sustainability

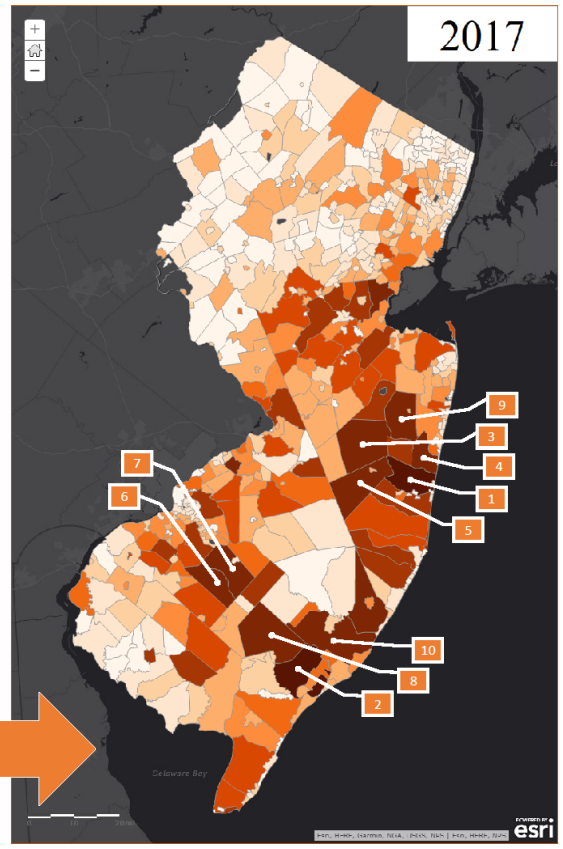
As a result to a strong commitment to renewable solar energy, NJ is currently ranked 5th among the other states with regards to installed solar PV capacity. At the end of 2017, NJ had installed a total of 2,356,540 kW of solar photovoltaic (PV) energy capacity from 86,178 individual projects. The lions share of the these projects (80,417) are attributed to the "Behind the Meter Residential" sector, or traditional residential rooftop solar installations. Despite the high number of installations attributed to this sector, due to the relatively small size of each installation, this sector only accounts for 28% of the total installed solar capacity in the state (see chart to the left).



The growth of residential solar PV was extremely slow prior to 2011-2012, due mostly to the high cost of the technology and the lack of established and effective policies and incentives. However, in 2012 the Solar Act was passed in New Jersey, which increased the requirement for solar in the Renewable Portfolio Standard and provided incentives for certain solar PV installations. It also stabilized the solar market by adjusting the price for SRECs, or Solar Renewable Energy Credits, which are awarded based on the amount of kilowatt hours that are generated by a solar PV system that are sent into the electrical grid. New Jersey also has net metering policies which have been instrumental in facilitating the growth of the residential solar PV sector by allowing homeowners to be credited for excess energy generated by their solar PV systems that gets sent back into the grid. Since 2011-2012, the number of installations and installed capacity of residential solar has grown exponentially, as seen in the chart to the right, and the series of maps below.







Top 10 Municipalities (Residential Solar Installed Capacity)

The table below and center map shows the top 10 municipalities (out of NJ's 565 municipalities) with regards to installed solar PV capacity in the behind the meter residential sector at the end of 2017. These 10 municipalities account for more than 16% of the installed solar PV capacity in the state in the residential sector. The table below also includes the number of residential solar installations in each municipality and the average system size, as well as the percentage of houses with solar based on housing unit estimates from the US Census Bureau (*2012-2016 ACS 5-Year Estimates).

RANK	MUNICIPALITY	CAPACITY (kW)	QUANTITY	AVG SYSTEM SIZE (kW)	HOUSING UNITS*	PERCENT SOLAR
1	TOMS RIVER TWP	20,812.90 kW	2,738 installs	7.6 kW	43,022	6.36%
2	EGG HARBOR TWP	15,187.52 kW	1,714 installs	8.86 kW	15,759	10.88%
3	JACKSON TWP	10,706.23 kW	1,214 installs	8.82 kW	21,359	5.68%
4	BRICK TWP	10,557.87 kW	1,295 installs	8.15 kW	34,336	3.77%
5	MANCHESTER TWP	10,191.81 kW	1,124 installs	9.07 kW	25,953	4.33%
6	MONROE TWP (G)	9,301.17 kW	1,014 installs	9.17 kW	14,412	7.04%
7	WINSLOW TWP (C)	8,941.01 kW	1,039 installs	8.61 kW	15,186	6.84%
8	HAMILTON TWP (A)	7,766.93 kW	896 installs	8.67 kW	10,971	8.17%
9	HOWELL TWP	7,606.79 kW	887 installs	8.58 kW	18,319	4.84%
10	GALLOWAY TWP	7,581.62 kW	930 installs	8.15 kW	14,034	6.63%

Installed Capacity (kW)
- > 10,706 - 20,812
- > 7,063 - 10,706
- > 4,581 - 7,063
- > 2,871 - 4,581
- > 2,148 - 2,871
- > 1,466 - 2,148
- > 895 - 1,466
- > 497 - 895
- > 201 - 497
- 1 - 201
- 0

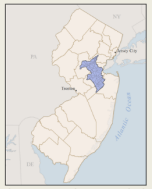
The underlying data utilized to map the residential solar PV installed capacity in each municipality was derived from the monthly solar installation reports published by the New Jersey Board of Public Utilities at: http://www.njcleanenergy.com/renewable-energy/project-activity-reports/project-activity-reports

The data used was published on December 31, 2017, and represents all of the residential solar PV installations from January 1, 2000 to December 31, 2017.

Identifying Open Space Areas for Stream Restoration using a GIS Suitability Analysis

Daryl Krasnuk – Lower Raritan Watershed Partnership

Introduction



The study area is located in the Raritan River Watershed, which is divided into three water management areas: the Upper Raritan, the Lower Raritan, and the Millstone. The focus area for this analysis is the Lower Raritan Watershed Located in central New Jersey in the counties of Middlesex, Monmouth, Somerset and Union.

River ecosystems continue to provide the vital resources essential for the life of the organisms that depend on them. These critical resources have been subject to increasing anthropogenic pressures as the land is altered to suit human needs. Water quality is often highly responsive to modifications in the landscape as natural land cover is converted to land use suitable for human development. The conversion of natural land cover to altered land use types associated with urban development is especially pronounced in densely populated regions such as the Lower Raritan River Watershed.

While there is a strong relationship between increasing urbanization and decreasing water quality, it has been proven that even the most urbanized areas can improve the quality of waters through remediation and restoration. This is promising for watersheds such as the Lower Raritan River where pockets of protected lands are dispersed in an urban landscape. The overall aim of the prioritization is to identify dedicated open space areas that will produce the biggest return on investment. In this case, the primary goal is locate open space areas that are most suitable for stream restoration projects that will ultimately lead to an upgraded stream antidegradation designation (category 2 to category 1) using available resources.

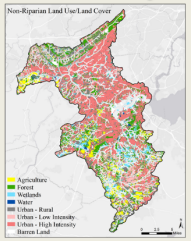
Previous studies prioritized land for many different reasons, but the underlying objective was similar; with limited resources, areas of open space were identified and prioritized according to the degree of anticipated contribution to the particular conservation, restoration or preservation goal. Although the target criteria can vary considerably due to the location and goals of each study, the underlying mechanism involves spatial conceptualization. The influential components in the prioritization are represented in a spatial context and a Geographic Information System (GIS) is well suited to visualize the study area, evaluate the candidate prioritization criteria and perform a targeted prioritization based analysis.

After reviewing prior studies and consulting with experts in Watershed Management a set of questions were developed. The purpose of the questions are to determine which data would provide the needed information to perform the stream restoration prioritization analysis of dedicated open space in the Lower Raritan Watershed.

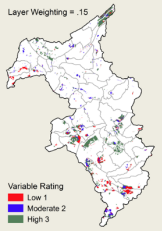
- What is the spatial distribution of land use and land cover (LULC) in the study area?
- What antidegradation designations are applied to streams in the study area and where are they located?
- Where are protected areas located, what type of protection is offered and who owns the parcels?
- Where are the biotic water quality sampling sites located?
- Where are the known contaminated sites & ground water recharge areas?
- Where are the sensitive HUC-14 areas located?
- How much impervious surface cover is there in each sub-watershed?

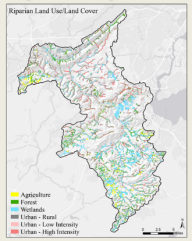
Acknowledgements: Hudson County Division of Planning. Dr. Fenyk, Lower Raritan Watershed Partnership. Dr. Hartman and Dr. Tulloch, Rutgers University.

1. Suitability Analysis Layers

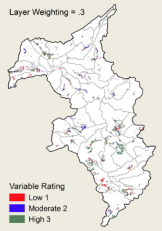


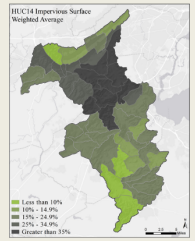
A reclassified land use/land cover dataset offers an overview of the spatial distribution of developed and undeveloped areas as well as habitat connectivity and fragmentation patterns.



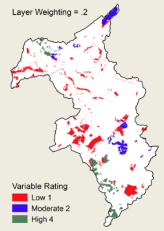


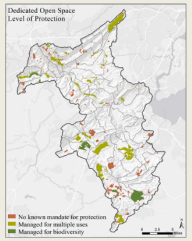
To evaluate the health of riparian areas, all surface water streams were given a bidirectional linear buffer of 300 feet. This zone was then intersected with the reclassified LULC dataset.



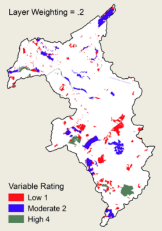


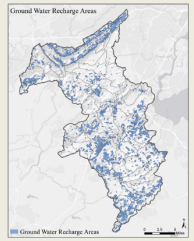
To gauge the potential for stream degradation the impervious surface weighted average for each HUC-14 sub-watershed was estimated using data from the 2012 NJDEP LULC dataset.



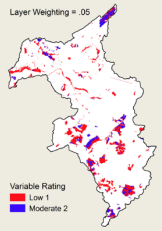


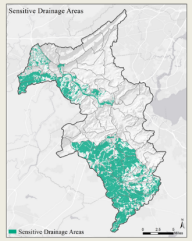
Protected Areas Database of the US and NJDEP Open Space layers were merged to define several categories of open space and rate the level of habitat protection for each area.



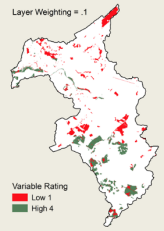


The NJDEP Ground Water Recharge layer identifies undeveloped areas of land that contribute the highest one-third of the recharge volume in the Lower Raritan Watershed.





Areas that drain to water supply intake points, contain existing category 1 water features or those that were identified as providing natural drainage to selected water supply reservoirs.



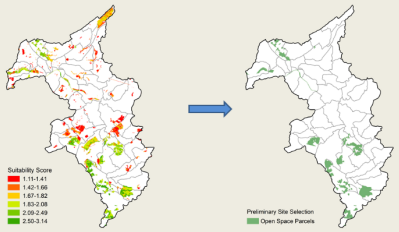
2. Rates and Weights

The unique attributes that contained the information to answer the questions were rated according to the estimated level of importance within each individual raster layer on a scale of 1 to 4. The ratings describe the difference in relative importance among each attribute within the raster layer. A rating of 1 meant that the particular attribute did not contribute any positive value to stream restoration potential while a value of 4 indicated very high stream restoration potential. Next, the relative importance of each raster layer was given a weight. The weights were given as a decimal summing to one. The weighting explains the level of importance that the layer contributes toward finding areas that have the highest potential for stream restoration. For example, LULC that is not located in the riparian zone was given a weight of .15 while LULC located in a riparian zone was given a weight of .30. This means that the input for the LULC in the riparian raster is twice as important as the input for the LULC not in riparian raster. The output was calculated by multiplying the integer value assigned to each raster cell (rating) by each raster dataset (weighting) where the lowest possible score is 1 and the highest possible score is 3.45. The scores in the output ranged from a minimum value of 1.1 and a maximum value of 3.14.

Variable	Rate	Layer	Weight	Total
Agriculture	1	LULC not riparian	0.15	0.15
Wetlands	3			0.45
Upland Forest	3			0.45
Water	1			0.15
Barren Land	1			0.15
Rural	2			0.3
Low/Medium Density	1			0.15
High Density	1			0.15
Riparian Agriculture	1	LULC in riparian	0.3	0.3
Riparian Wetlands	3			0.9
Riparian Upland Forest	3			0.9
Riparian Water	1			0.3
Riparian Barren Land	1			0.3
Riparian Rural	2			0.6
Riparian Low/Medium Density	1			0.3
Riparian High Density	1			0.3
No Protection	1	Protection Type	0.2	0.2
Some Protection	2			0.4
Full Protection	4			0.8
Sensitive HUC14 Yes	4	Sensitive HUC-14	0.1	0.4
Sensitive HUC14 No	1			0.1
GWR Yes	2	GWR Area	0.05	0.1
GWR No	1			0.05
IS < 10	4	HUC-14 IS %	0.2	0.8
IS 10 - 14.9	2			0.4
IS 15 - 19.9	1			0.2
IS 20 - 24.9	1			0.2
IS >25	1			0.2

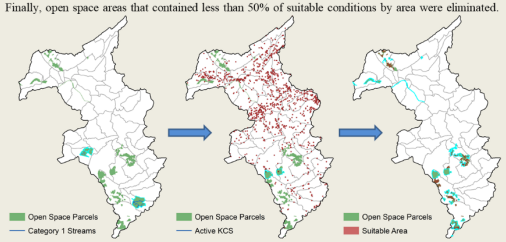
3. Suitability Analysis Output

The suitability analysis produced scores ranging from a minimum value of 1.1 and a maximum value of 3.14. To narrow down the site selection for the next step, the raster cells with a score in the highest quartile were selected and intersected with open space containing at least 10 contiguous acres of land.

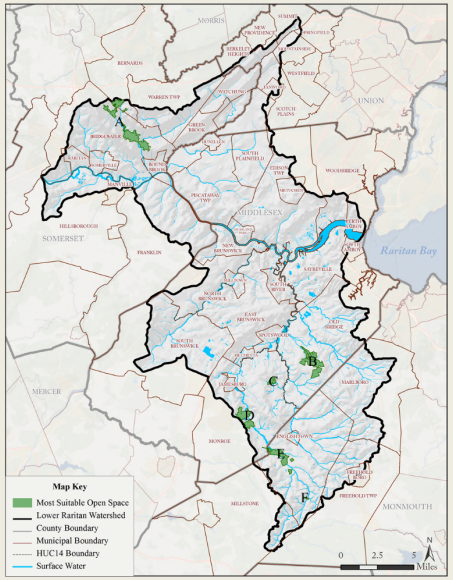


4. Suitability Analysis Refinement

Open Space areas already containing C1 streams were removed from the output. Next, the Known Contaminated Sites (KCS) layer was used to remove areas of open space that contained an active KCS. Finally, open space areas that contained less than 50% of suitable conditions by area were eliminated.

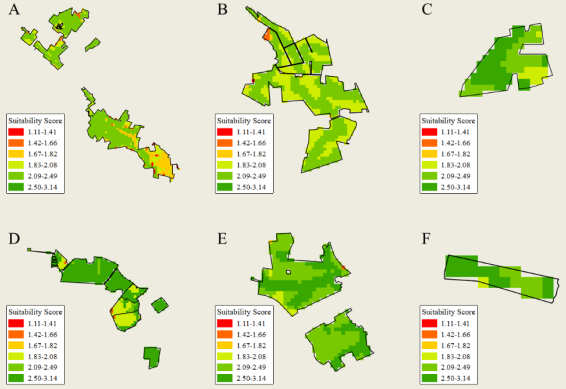


5. Final Output



Discussion

The majority of the parcel area was core habitat and contained natural land cover, primarily upland forest and/or forested wetlands. The immediate area bordering the parcels included a significant area of natural buffering on at least three sides, but generally some part of each area shared an edge with altered habitat. The contiguous open space areas identified in the analysis ranged in size from 20.5 acres to 599.2 acres. An examination of parcel ownership revealed that 94.7% of the lands were held publicly while only 5.3% were held privately. The majority of these areas were part of the Green Acres program. While this study looked at existing sites, and considered the factors within not only the focus area but the impact of other factors within each sub-watershed, additional consideration through the examination of conditions occurring upstream from the potential stream restoration site may provide valuable input. For example, integrating a SWAT analysis to quantify high sediment and pollutant loads that would make stream restoration projects downstream futile.



GIS Data Sources:
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"Ambient Biomonitoring Network (AMNET), New Jersey, Edition 201404." New Jersey Department of Environmental Protection (NJDEP), Office of Information Resources (OIRM), Bureau of Geographic Information Systems (BGIS).
"Critical Sub-Watersheds, Cross Acceptance." New Jersey Department of Environmental Protection (NJDEP), Office of Information Resources (OIRM), Bureau of Geographic Information Systems (BGIS).
"Dedicated Open Space, Cross Acceptance." New Jersey Department of Environmental Protection (NJDEP), Office of Information Resources (OIRM), Bureau of Geographic Information Systems (BGIS).
"Ground Water Recharge Areas, Cross Acceptance." New Jersey Department of Environmental Protection (NJDEP), Office of Information Resources Management (OIRM), Bureau of Geographic Information Systems (BGIS)
"Impervious Surface from Land Use/Land Cover 2012 Update." New Jersey Department of Environmental Protection (NJDEP), Office of Information Resources Management (OIRM), Bureau of Geographic Information Systems (BGIS)
"Known Contaminated Sites List (KCSNJ) for New Jersey." New Jersey Department of Environmental Protection (NJDEP), Office of Information Resources Management (OIRM), Bureau of Geographic Information Systems (BGIS)
"Land Use/Land Cover 2012 Update, Edition 20150217." New Jersey Department of Environmental Protection (NJDEP), Office of Information Resources Management (OIRM), Bureau of Geographic Information Systems (BGIS).
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"NJ Composite of Parcels Data with Joined MOD-IV Attributes 2016, New Jersey State Plane
NAD83, Middlesex and Monmouth County." NJ Office of Information Technology (NJOIT), Office of Geographic Information Systems (OGIS)
"NJDEP 10-meter Digital Elevation Grid." New Jersey Department of Environmental Protection (NJDEP), Office of Information Resources Management (OIRM), Bureau of Geographic Information Systems (BGIS).
U.S. Geological Survey, Gap Analysis Program (GAP). May 2016. Protected Areas Database of the United States (PAD-US), version 1.4 Combined Feature Class.

Sewers Invincible: Camden History Beneath the Streets

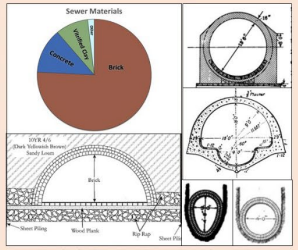
Elizabeth Shikrallah, Christina Servetnick, Cregg Madrigal, and Liza Davis
Municipal Finance & Construction Element, DWQ

Introduction

By the 1850s, American cities were crowded, lacked clean water and adequate waste removal, and suffered from epidemics of cholera and other deadly diseases. To combat this, the city of Camden began building a municipal sewer system in 1863. Designed to carry both sanitary waste and stormwater in a combined system, the sewers were constructed mainly of brick.

Today, 86% of the original sewers are still in service, and many need to be repaired or replaced. Because of its association with improving public health and fostering the growth of cities, sewer infrastructure in Newark, Trenton, and around the world is recognized as historically significant. The MFCE is required to consider impacts during construction on cultural and historical resources, and therefore is developing a historic context report to address questions about the history and status of Camden's sewers while also streamlining the review of sewer repair projects in the city.

Why Mostly Brick Sewers?
In the 19th and into the 20th century, brick was the preferred material for large sewers, while smaller pipes were usually made of vitrified clay, wood, or cast iron. Concrete was also used for large sewers, although it did not begin to replace brick until after the 1900s. Brick sewers were built in many different shapes, but engineers quickly settled on an elliptical or egg-shape as the most efficient design when wastewater volume and velocity varied, as in a combined system. Circular brick sewers were considered stronger and less expensive, but were only more efficient if waste flow was uniform. Sewers in Camden are split evenly between circular and elliptical, but the exact cross-section style is not known.



Examples of Brick Sewer Cross Sections and Material Type Distribution

Who Built the Sewers?

John Ambruster – One of the earliest sewer contractors; once killed a man with an umbrella; awarded a commendation for masonry at the 1876 Centennial International Exhibition.

Daniel L. Pine – Prolific sewer contractor and the first to use concrete in Camden.

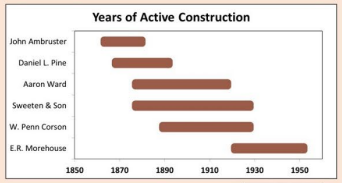
Aaron Ward – Civil War captain, built 19% of Camden's sewers; contract issues caused his financial ruin; he restored his legacy by building the Line Ditch sewer, which was considered an engineering marvel.

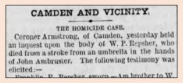
B.F. Sweeten & Son – Built sewers, roads, and bridges; trained many contractors

W. Penn Corson – Contractor, County Sheriff, and owner of the Camden Alphas (Crusaders) basketball team.

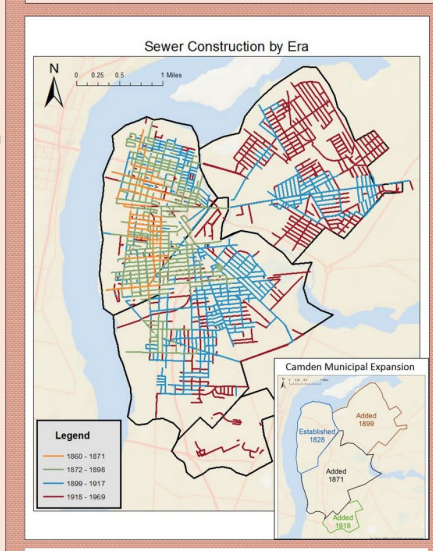
E.R. Morehouse – Built almost as many miles of sewer as Aaron Ward.

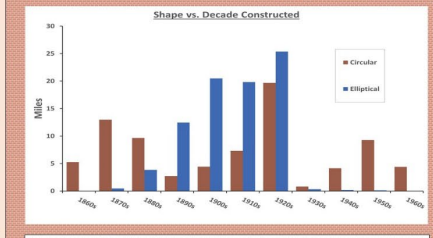

Aaron Ward | E.R. Morehouse | Frank B. Sweeten | W. Penn Corson (Second Row, Far Right)

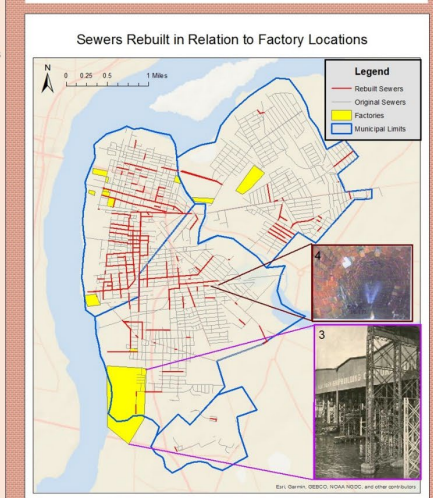



CAMDEN AND VICINITY.
THE HOMICIDE CASE.
Coroner Armstrong, of Camden, yesterday held an inquest upon the body of W. P. Bepsher, who died from a stroke from an umbrella in the hands of John Ambruster. The following testimony was elicited:—

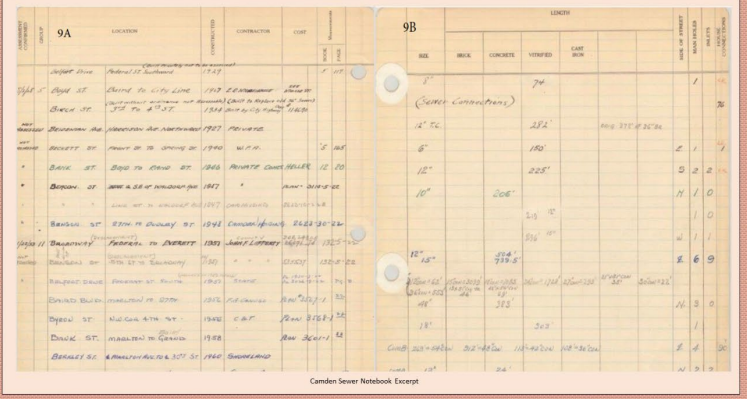

Aaron Ward's Military Service Card





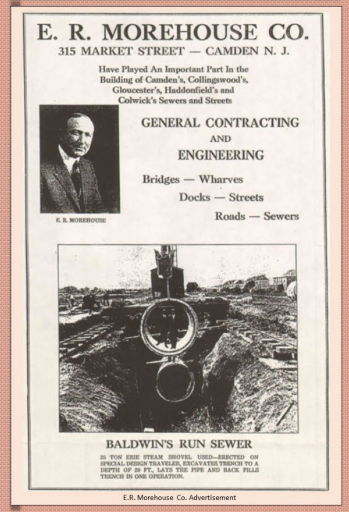


3 New York Shipbuilding Corporation Established 1899
4 Liberty Street - Built by BF Sweeten & Son


Camden Sewer Notebook Excerpt

Data and Methods

Data on changes in Camden's municipal boundaries, sewer construction, and major factory locations were digitized in ArcMap with polygons, polylines, and filled polygons respectively. The sewer layer was joined to an Excel spreadsheet containing data from historic Camden Sewer Notebooks. Overlapping polylines were created for entries of different material types and sizes in the same locations. To account for this overlap, we used length data from the sewer notebooks rather than ArcMap's shapelength. By examining overlaps from different time periods in the ArcMap layer, we created a layer of rehabilitated sewers. When we refer to "all sewers", that includes every digitizable entry in the sewer notebooks.


E. R. MOREHOUSE CO.
315 MARKET STREET — CAMDEN N. J.
Have Played An Important Part In the Building of Camden's, Collingswood's, Gloucester's, Haddonfield's and Colwick's Sewers and Streets
GENERAL CONTRACTING AND ENGINEERING
Bridges — Wharves
Docks — Streets
Roads — Sewers
E. R. MOREHOUSE
BALDWIN'S RUN SEWER
25 TON ERIE STEAM SHOVEL USED—ERECTED ON SPECIAL DESIGN TRAVELER, EXCAVATES TRENCH TO A DEPTH OF 30 FT., LAYS THE PIPE AND BACK FILLS TRENCH IN ONE OPERATION.
E.R. Morehouse Co. Advertisement


Brick Sewer Under Kaighn Ave – Built by City of Camden

What Affects Sewer Longevity?

It may be surprising that so many of Camden's early brick sewers are still in service today, over a hundred years after they were built. Sewers were repaired over the years, contributing to their longevity. What other factors affect longevity?

Age - The earlier the construction, the more repairs or replacements were documented.

Size and Shape - 24-36 inch diameter sewers needed the most repairs. While circular sewers made up about half of the total miles of sewers in this size range, they were rebuilt at a much higher rate than the elliptical sewers.

Location - More sewers were repaired in the northwestern parts of Camden. Sewers located in close proximity to factories did not appear to get repaired more frequently than those in residential areas.

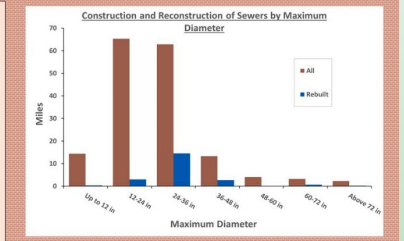
Contractor - Ward and the Sweetens appear to have better track records than their contemporaries, possibly due to construction expertise or materials used.

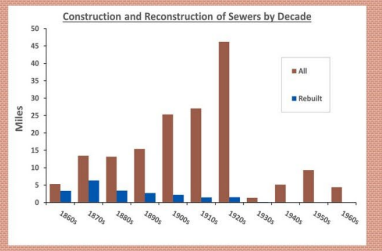
Conclusion

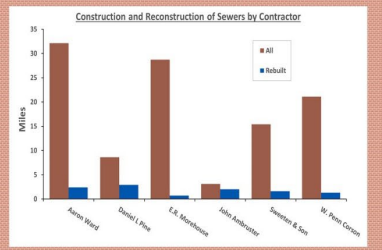
By comparing the sewers that had been repaired or rebuilt within our study's time frame with all the sewers that had been built within the City of Camden, we could isolate some of the conditions that factor into their decay. Age is clearly the most relevant factor, and sewer size is also an issue. Certain contractors may have built more durable sewers as well. However, the data record we had access to was incomplete, and leaves more questions to answer. For instance, is the high rate of repair of 24- 36 inch diameter, circular brick sewers due to material, size, shape, or a combination of the three? As modern repair efforts continue, documentation of the city's sewers by cultural resource specialists will provide new data on raw materials and construction methods used by Camden's builders and help integrate water infrastructure into the history of the city of Camden.


9th Street – Built by Aaron Ward


Wood Sewer Under Kaighn Ave – built by City of Camden







References

Photos From: http://www.dvrbs.com/ WRC/D&B 2001. Sewer Reconstruction Project, Various Locations City Wide, City of Camden, New Jersey.; and Zerbe 2009b. Monitoring report for the Combined Sewers Overflow Project, CSO Site CO5/10.

Halsey, Ashley, III. 2012 Billions needed to upgrade America's leaky water infrastructure. *Washington Post*, January 2, 2012, accessed October 17, 2017.
Marston, Anson.1908 *Sewers and Drains*. American School of Correspondence, Chicago.
Meloni, Martin V. 2000 *The Sanitary City*. Johns Hopkins University Press, Baltimore & London.
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Assessment of Hurricane Ike Damage and Path

Adriana Nowrouzi and Rachael Staino

Introduction

The most recent hurricane season brought over $200 billion in damages to Texas alone. The hurricane season of 2017 is not the only extremely active hurricane season in recent years, the hurricane season during 2008 was extremely costly to the state of Texas as well. Over the course of six weeks, four hurricanes (three of which reached Category 2 strength or greater) affected Texas, from extreme wind gusts exceeding 130 mph to storm surges reaching over 20 feet high. Hurricane Ike was the costliest hurricane to hit Texas before the hurricane season of 2017, with over $37 billion in damages, 84 deaths, and up to 4.5 million customers without electricity or water. Hurricane Ike made landfall in Galveston, Texas, on September 13, 2008, at 2:10 AM.

Sources do not congregate data into one location; instead, it is difficult to discover the public buildings that have been destroyed, including schools, hospitals, police and fire stations, churches, airports, and government buildings. Research into specific locations must be done in order to locate damaged public buildings, as well as homes. The purpose of this project is to compile damage reports within Houston, as well as to clearly show the effect Hurricane Ike impacted Houston, Texas.

Figure 1. Texas was impacted greatly by Hurricane Ike, and Houston was the major city that was hit the hardest. Ike hit the Houston and Galveston area on September 13, 2008, at around 2:10 AM.

Figure 2. Galveston was hit hardest by Hurricane Ike. Restoration efforts from FEMA are still ongoing, ten years later.

Objective: To compile damage reports of Hurricane Ike in Houston, Texas, during September 2008.

Figure 3. Hurricane Ike became an organized storm on September 1, 2008. It reached Category 4 status, and hit Texas as a Category 2 Hurricane. After it hit Arkansas, Ike turned into a tropical depression and hit Ohio as an extratropical storm.

Methods

- For the maps including roads, hospitals, schools, and floodplains, the select by location tool was used to isolate and display only those features that were located within the source layer of the city of Houston, Texas (Figures 6, 7, 8, and 9).
- A polyline graph of Hurricane Ike's track, obtained from NOAA, was overlaid on a layer of the United States and Oceans, both obtained from ArcGIS open source data. Storm track coordinates were obtained from Weather Underground and added as a layer over the polyline. Labels were added to show the dates of Ike's progression (Figures 3).
- The map of Hurricane Ike's high water measurements and evacuation routes exhibits the recorded high water measurements, obtained from NOAA, in accordance with the evacuation routes, obtained from H-GAC (Houston-Galveston Area Council).
- The pie chart of the deaths in Houston depicts the major causes of death from Hurricane Ike in Houston (either indirectly or directly). Data was obtained from Chron News, and compiled into an Excel spreadsheet before being displayed on a pie chart.

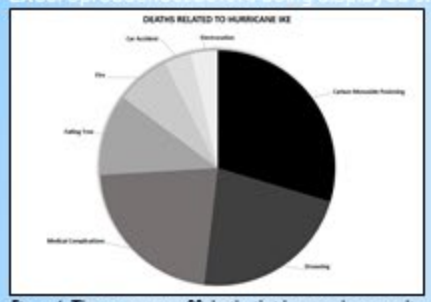

Figure 4. There were over 80 deaths that happened as a result of Hurricane Ike, either directly or indirectly.

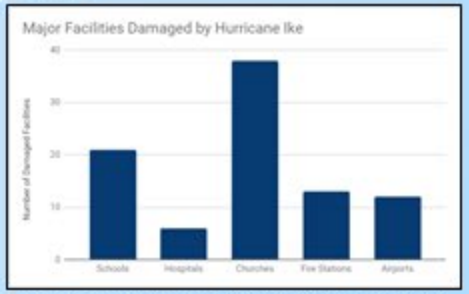

Figure 5. Several public buildings were damaged from Hurricane Ike, including schools, hospitals, churches, fire stations, and airports.

Figure 6. Houston has over 85 hospitals, with over 19,000 beds. Hospitals and roads were damaged from the hurricane, mostly from debris and wind.

Figure 7. High water measurements were recorded during Hurricane Ike. Most value were near the Galveston Bay, where many of the evacuation routes are located.

Figure 8. About 31.2% of schools in Houston were damaged from Hurricane Ike . Schools in the storm surge zone were mostly affected by flooding, and other schools were affected by debris and high winds.

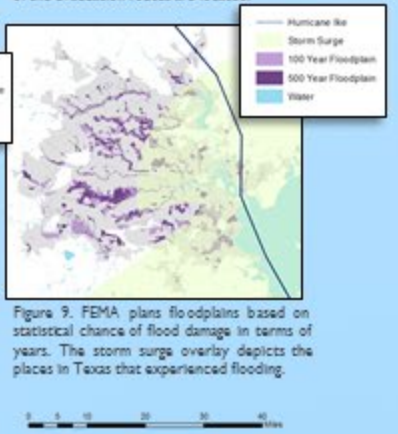

Figure 9. FEMA plans floodplains based on statistical chance of flood damage in terms of years. The storm surge overlay depicts the places in Texas that experienced flooding.

Discussion and Conclusion

Hurricane Ike was a devastating reminder to Houston, Texas that the coastal area of the Galveston Bay is vulnerable to tropical weather. Our maps display the path of Hurricane Ike and the degree of the storm as it traveled along its path leading through the Galveston Bay and Houston. Hurricane Ike brought with it a storm surge that flooded areas of Houston at higher elevations that are typically only flooded every 100 years as well as areas that are typically flooded every 500 years. The magnitude of Hurricane Ike's power was largely underestimated which resulted in significant damages—making it the 3rd costliest storm in U.S. history as of 2008. Our maps also display the high water marks from Hurricane Ike's storm surge along with planned evacuation routes. Some of these planned evacuation routes in used were blocked by flooding, and other important facilities—such as schools—were damaged from the destructive storm.

Sources

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https://www.noaa.gov/
https://www.wunderground.com/hurricane/atlantic/2008/Major-Hurricane-Ike

The Census is Coming!

The 2020 Decennial Census, that is.

Preparations for the Decennial Census starts years before the Census occurs. This poster shows how Burlington County has been and will be assisting to ensure a more accurate count by participating in:
- the Block Boundary Suggestion Project (BBSP) in 2016
- the Local Update of Census Addresses (LUCA) in 2018

2016

What is the Block Boundary Suggestion Project? (BBSP)

The BBSP gives states an opportunity to recommend changes to the linear features used in creating the Census tabulation blocks. Tabulation blocks boundaries are the basis for the data tabulated by the Decennial Census as well as other Census Bureau programs and surveys. They follow visible features (roads & streams) as well as legal or statistical geographic areas or selected area landmarks and nest within all other tabulated census geographic units.

In 2016, Burlington County GIS partnered with the NJ Office of Information Technology, Office of GIS and the NJ State Data Center to review the existing block boundaries and make suggestions.

In total, 51,610 boundaries were reviewed & 4,973 changes were suggested as follows:
- 606 lines recommended to be added
- 1,872 attribute changes recommended
- 2,459 lines recommended for deletion

This map shows the relative number of features reviewed in each town as well as the number of suggestions made in each category.

Burlington County's review was conducted by 4 staff over a period of 6 weeks using versioning in an SDE geodatabase. Versioning allowed everyone to work on it at the same time and eliminated the need to recompile data at the end.

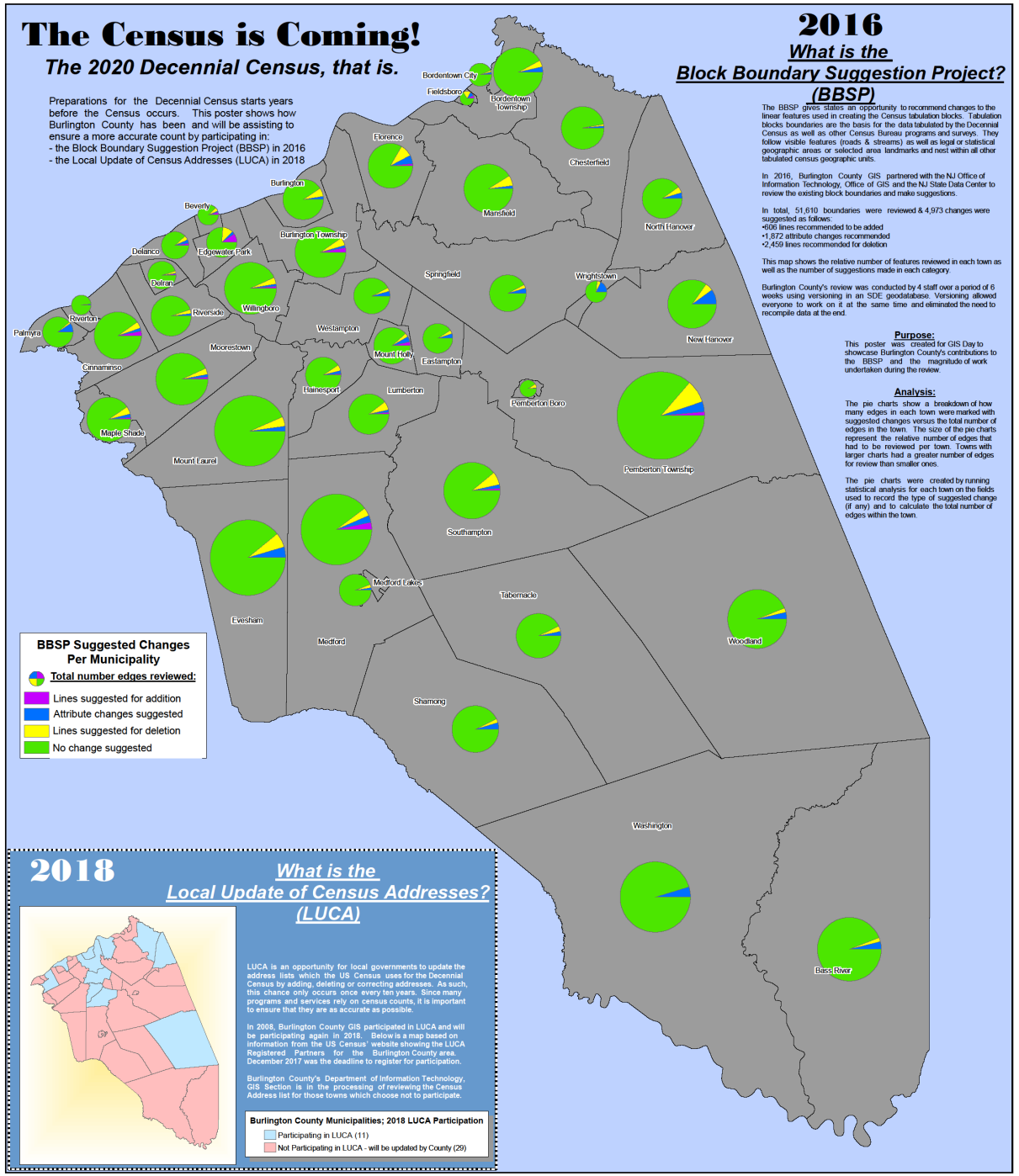
Purpose:

This poster was created for GIS Day to showcase Burlington County's contributions to the BBSP and the magnitude of work undertaken during the review.

Analysis:

The pie charts show a breakdown of how many edges in each town were marked with suggested changes versus the total number of edges in the town. The size of the pie charts represent the relative number of edges that had to be reviewed per town. Towns with larger charts had a greater number of edges for review than smaller ones.

The pie charts were created by running statistical analysis for each town on the fields used to record the type of suggested change (if any) and to calculate the total number of edges within the town.



BBSP Suggested Changes Per Municipality

Total number edges reviewed:

- Lines suggested for addition
- Attribute changes suggested
- Lines suggested for deletion
- No change suggested

2018

What is the Local Update of Census Addresses? (LUCA)

LUCA is an opportunity for local governments to update the address lists which the US Census uses for the Decennial Census by adding, deleting or correcting addresses. As such, this chance only occurs once every ten years. Since many programs and services rely on census counts, it is important to ensure that they are as accurate as possible.

In 2008, Burlington County GIS participated in LUCA and will be participating again in 2018. Below is a map based on information from the US Census' website showing the LUCA Registered Partners for the Burlington County area. December 2017 was the deadline to register for participation.

Burlington County's Department of Information Technology, GIS Section is in the processing of reviewing the Census Address list for those towns which choose not to participate.

Burlington County Municipalities; 2018 LUCA Participation

- Participating in LUCA (11)
- Not Participating in LUCA - will be updated by County (29)

Nature's Network Conservation Design

Introduction: North Atlantic Landscape Conservation Cooperative (LCC) and the Northeast Association of Fish and Wildlife Agencies (NEAFWA) coordinated a team of partners from 13 states, the U.S. Fish and Wildlife Service, nongovernmental organizations, and universities, who worked for more than a year to develop a regional conservation design that provides a foundation for unified conservation action from Maine to Virginia.

Called ***Nature's Network***, the design identifies a network of places that help define the highest conservation priorities in the region and the best opportunities for conserving and connecting intact habitats and ecosystems and supporting imperiled species to help ensure the future of fish and wildlife across the Northeast region. Led by partners from nearly 30 organizations using innovative modeling approaches developed by a network of contributing science partners, *Nature's Network*:

- Reflects scientific consensus from experts across the 13-state conservation community.
- Represents a shared vision for natural resources in the Northeast.
- Offers a practical set of tools that help people working at different scales to contribute to regional conservation goals while also meeting the goals of their individual organizations.

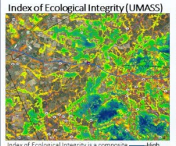
Data: ***Nature's Network Conservation Design*** depicts an interconnected network of lands and waters that, if protected, will support a diversity of fish, wildlife, and natural resources that the people of the Northeast and Mid-Atlantic region depend upon.

- **Terrestrial and Wetland Core-Connector Networks** - Connected network of intact and diverse terrestrial, wetland, and coastal systems that provide habitat for wildlife, and benefits for people, such as access to intact forests and sources of clean water.
- **Aquatic Core Networks** - Connected network of intact and diverse aquatic systems that provide habitat for resident and anadromous fish, as well as other organisms, and benefits for people such as recreation and clean water.
- **Regional Connectivity and Marsh Migration** - Best opportunities to maintain regional connections and connect tidal marshes to adjacent uplands.
- **Imperiled Species** - Providing focus on imperiled species tracked by NatureServe, including the most important habitats for 600 Species of Greatest Conservation Need (SGCN) identified by states, Endangered Species, and many species proposed for listing under the Endangered Species Act.
- **Prioritization Tool** - Interactive planning web application for conservation and restoration.

Tools for different users: More than a map, ***Nature's Network*** offers a suite of decision-support tools representing five conservation approaches. Used together, or individually, these tools offer voluntary guidance to:
Conserve the irreplaceable – The best place to start strategic conservation is to identify a network of connected, intact, and resilient areas encompassing various types of lands and waters representing important habitats for key species. These are priority places for future sustainable human and natural communities in the Northeast.
Make better decisions for the future – Guidance that reflects projections about how land use and environmental changes will affect natural resources over time can help us safeguard today's investments in conservation for future generations.
Maximize limited resources – Conservation agencies and organizations have limited time and money to invest in protecting natural resources that wildlife and people depend upon. Guidance grounded in science and supported through regional collaboration allows more efficient use of limited resources in the face of complex environmental threats.
Support local priorities with regional perspective – Seeing how local conservation efforts fit into the bigger regional picture can help connect local, state and regional priorities. By zooming out, practitioners working at any scale can discover new opportunities that warrant a closer look.
Find opportunities to work together – Sustaining fish, wildlife, and natural resources in the face of increasing threats is beyond the scope of any single agency. With the benefit of consistent regional information, partners can look across state borders for opportunities to work together towards shared conservation goals at scales that matter for wildlife and people.

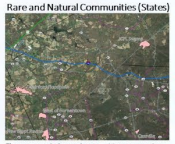
Terrestrial and Wetland Core-Connector Network

Index of Ecological Integrity (UMASS)



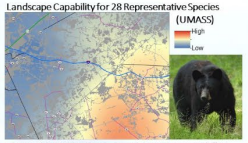
Index of Ecological Integrity is a composite of individual metrics that include various measures of intactness and resiliency. High / Low

Rare and Natural Communities (States)



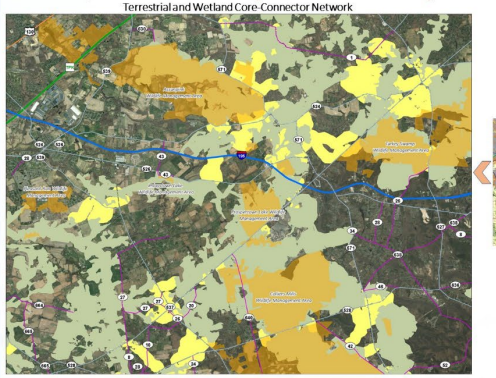
These state-ranked natural communities support unique biodiversity regardless of their landscape context. Shown above, are New Jersey Natural Heritage Priority Sites.

Landscape Capability for 28 Representative Species (UMASS)



Habitat capability models are based on known habitats associations and effects from stressors as well as field data where available. The example above depicts the Landscape Capability for Black Bear.

Terrestrial and Wetland Core-Connector Network



Core-Connector Network
core
connector
Wildlife Management Areas
wmas

The **Terrestrial and Wetland Core-Connector Network** demonstrates a network of intact, connected ecosystems resilient under changing conditions and climate. **Core areas** contain important or unique features, including intact, resilient examples of every major ecosystem type in the Northeast and Mid-Atlantic. Core areas contain widespread ecosystems (such as hardwood forests), rare natural communities (such as bogs), and important habitat for a variety of fish, wildlife, and plants. By design, they encompass approximately 25% of the landscape of the region (the top 25% of each large watershed (HUC 6)). Core areas are linked together by a network of **connectors**. If protected, the connectors will foster the movement of animals and plants between core areas and across the landscape into the future. In the example above, the Terrestrial and Wetland Core-Connector Network reveals important connections between a set of Wildlife Management Areas in Central New Jersey.

Local Connectedness (TNC)

Local Connectedness is defined by the number of barriers and the degree of fragmentation within a landscape. A highly permeable landscape promotes resilience by facilitating range shifts and the reorganization of communities.

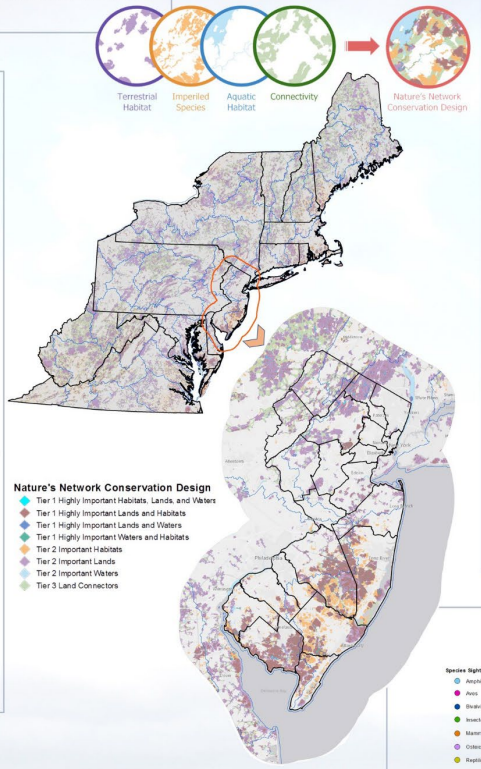
Resiliency (TNC)

Far Above Average
Above
Slightly Above Average
Slightly Below Below
Far Below Average
Developed

Resilient terrestrial sites display diversity in landforms, elevation, wetland diversity, and connectedness.

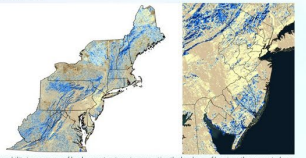
Landscape Diversity (TNC)

Landscape diversity refers to the number of microhabitats and climatic gradients available within a given area and is measured by counting the variety of landforms, the elevation range, and the wetland density.



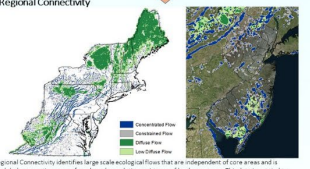
Regional Connectivity and Marsh Migration

Permeability



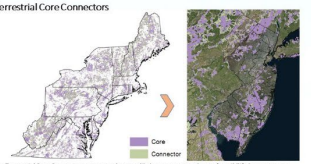
Permeability is a measure of landscape structure, incorporating the hardness of barriers, the connectedness of natural cover, and the arrangement of land uses.

Regional Connectivity



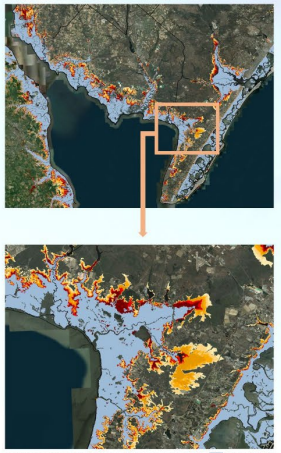
Regional Connectivity identifies large scale ecological flows that are independent of core areas and is modeled as a continuous surface, based on relative resistance of landcover types. This data is not tied to any particular species and describes the way in which the landscape itself is conducive to ecological flows, like species movement.

Terrestrial Core Connectors



The Terrestrial Core Connectors represent the most likely movement pathways for wildlife between core areas. These connectors are context dependent, relying on where the cores are, and are built to move through and connect similar kinds of habitat.

Marsh Migration Zones based on analysis by NOAA

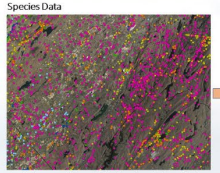


The Marsh Migration Zone data addresses the issue of connectivity in marsh habitat to adjacent uplands and need for marshes to move in response to sea level rise. Marsh migration zones were mapped by identifying undeveloped areas adjacent to existing tidal marshes within zones of potential sea level rise (NOAA).

Initial Condition (CCAP)
4 ft SLR
5 ft SLR
6 ft SLR
7 ft SLR
8 ft SLR

Imperiled Species

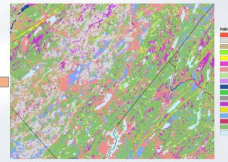
Species Data



Species Occurrence Data provided by NatureServe for the northeast states.

Spatial Join

Habitat Classes



This Habitat Classes layer is a combination of DSL Land data, Water Distance data, and HUC6 Terrestrial Core – Connector data to create a combined data set with 9040 habitat classes.

Habitat Associations

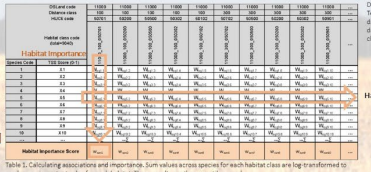
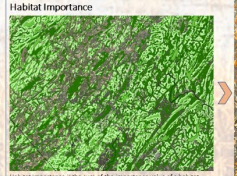


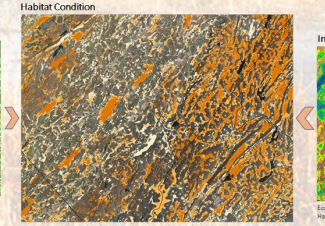
Table 1. Calculating associations and importance. Sum values across species for each habitat class are log-transformed to produce an important value for each habitat. These results are then quantile scored.

Habitat Importance



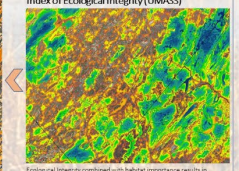
Habitat importance is the sum of the importance value of a habitat class for 600 SGCN. This importance score for each habitat is plotted to each mapped habitat class to create a map of relative importance to each habitat class for SGCN.

Habitat Condition



Habitat Condition is a map of relative condition of the top 1/3 of the most important habitats. It can be used to identify sites with potential for protection or restoration.

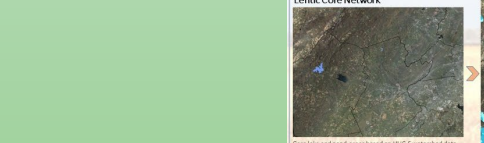
Index of Ecological Integrity (UMASS)



Ecological Integrity combined with habitat importance results in Habitat Condition data.

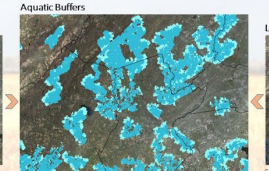
Aquatic Core Networks

Lentic Core Network



Core lake and pond areas based on HUC 6 watershed data.

Aquatic Buffers

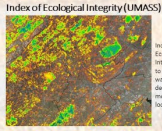


The Aquatic Buffers data shows upslope/upstream areas that have a large effect on the integrity of the aquatic core areas.

Lotic Core Network

Core river and stream areas based on HUC 6 watershed data.

Index of Ecological Integrity (UMASS)



Index of Ecological Integrity scaled to HUC 6 watersheds to determine the most integral locations.

Common Loon Habitat

The Common Loon is the representative species for lakes and ponds. Data for the Common Loon habitat was utilized to determine the top 5% of habitat.

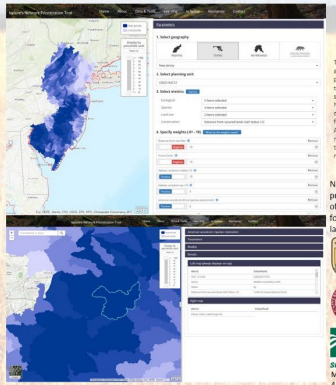
Eastern Brook Trout Habitat

The Eastern Brook Trout is the representative species for cold headwater streams. Data for the Eastern Brook Trout habitat was utilized to determine the top 5% of habitat.

Anadromous Fish Habitat

The top 5% of watersheds for river herring and American shad (TNC) Watersheds with Atlantic sturgeon, short-nosed sturgeon, and salter (sea-run) brook trout (Trout Unlimited) Priority Atlantic salmon rearing habitat in Maine (USFWS / NOAA).

Prioritization Tool



The purpose of the restoration tool is to identify areas of degraded habitat having high restoration potential, which if restored would contribute to the network of connected, intact, and resilient sites for biodiversity conservation mapped by Nature's Network. The tool allows users to display a series of prioritization maps developed for a set of pre-defined "scenarios" (e.g., American woodcock: forest management and riparian restoration (pictured above)), and create their own scenarios using a catalog of nearly 400 metrics.

Nature's Network data and analysis was provided by the fish and wildlife agencies of the 13 Northeast states and the following partner organizations in landscape conservation design:

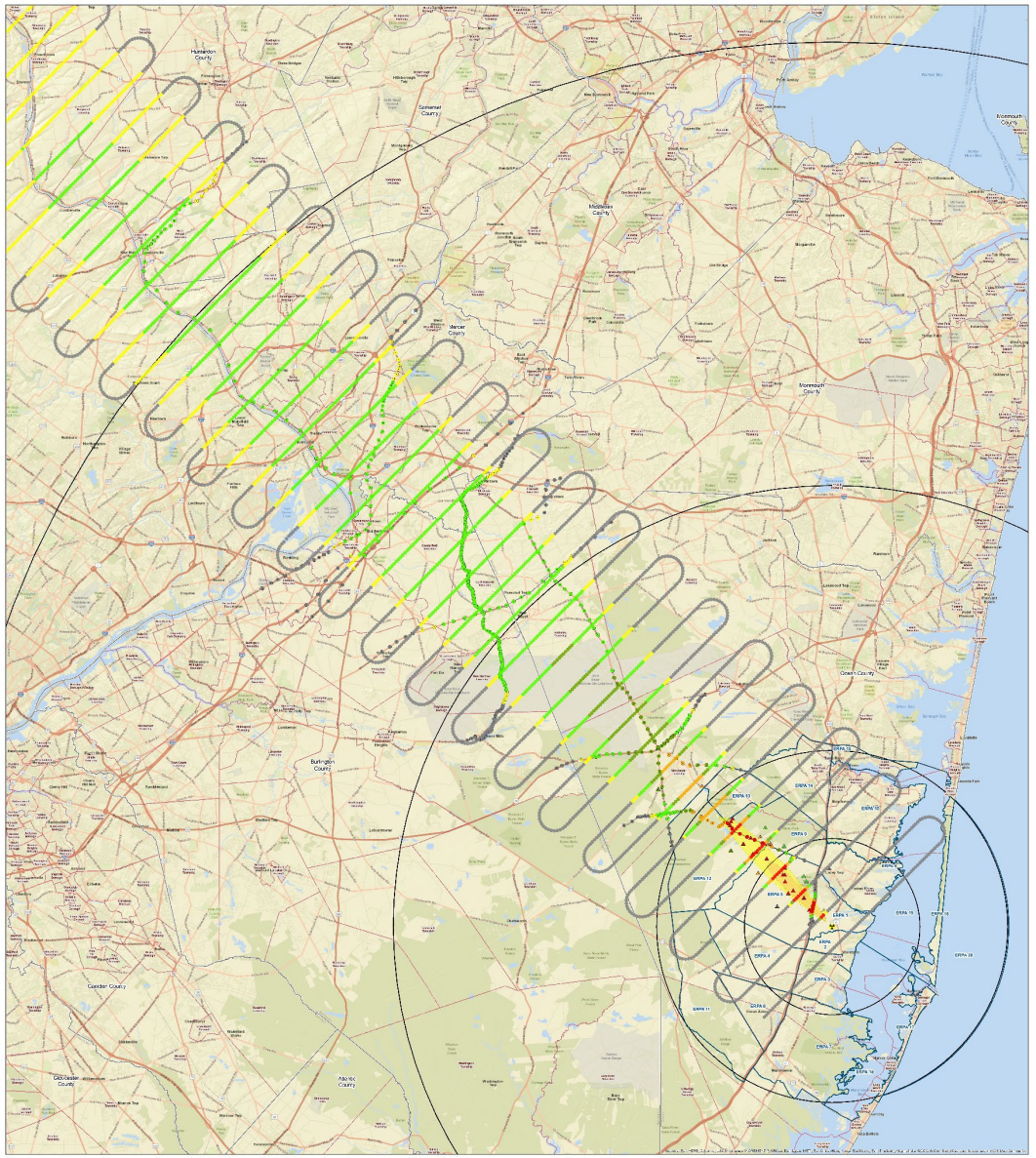
North Atlantic LCC
North Atlantic Landscape Conservation Cooperative
The Nature Conservancy
Fish and Wildlife
USGS science for a changing world

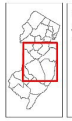
Map prepared by E. Melendez and P. Woerner 4/19/2018

Data Integration

FINDER for NATIONAL BANKS

Exercise Ground Exposure Map Oyster Creek Exercise





Legend

AMS B200 Ground Exposure
Exposure Rate at 1 meter above ground
- < 50 uR/hr
- > 50 uR/hr
- > 100 uR/hr
- > 500 uR/hr
- > 1,000 uR/hr
- > 2,000 uR/hr

Deposition Traversals
- 0 - 50 uR/hr
- >50 - 100 uR/hr
- >100 - 500 uR/hr
- >500 - 1000 uR/hr
- >1000 - 2000 uR/hr
- >2000 uR/hr

Soil Sample Locations
- 0 - 50 uR/hr
- >50 - 100 uR/hr
- >100 - 500 uR/hr
- >500 - 1000 uR/hr
- >1000 - 2000 uR/hr
- >2000 uR/hr

EPA Intermediate Phase Relocation
- > 2.0 rem - May exceed first year relocation PAG
- > 0.5 rem - May exceed the second-year relocation PAG

Release Point

Distance From Release Point
5,10,25, & 50 mile

ERPAs
Emergency Response Planning Areas

Counties

Municipalities

Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere
Projection: Mercator Auxiliary Sphere
Datum: WGS 1984
Units: Meter

Map produced for use during NJ Oyster Creek Ingestion Pathway Exercise 9/27/2017. Map access and use by authorization of NJDEP Bureau of Nuclear Engineering and for this purpose only.

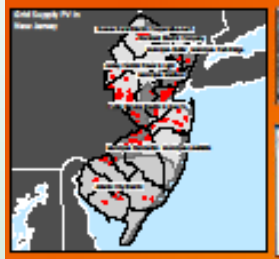
Map produced by the Bureau of Geographic Information System of the NJDEP at Trenton, NJ. Data Sources used in map generation: NJDEP, NARAC, ESRI World Street Map

New Jersey department of environmental protection

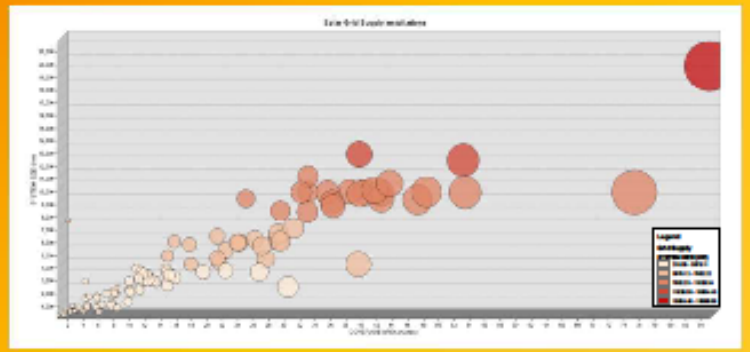
Spatiotemporal Analysis of Grid Supply Photovoltaics in New Jersey

Anthony Bevacqua, Ryan Gergely, Erin Hill
New Jersey Department of Environmental Protection
Bureau of Energy and Sustainability, Office of Policy and Economic Analysis

Spatial Distribution of Grid Supply Installations



With this information, we can now easily analyze the location, coverage, and system size of these projects.



Abstract

Understanding where renewable energy projects are located is important for successful management and promotion of clean energy. This research determines the spatial distribution of Grid Supply Solar Photovoltaic Systems in New Jersey, investigates system efficiency over time, and uses LiDAR to examine an installed Grid Supply PV System.

Methods

The methods of this study include data processing and geocoding of PV System point locations from data made available by the NJ BPU Solar Report, oblique imagery based digitization of over 100 systems, and an analysis of equipment efficiency based on system acreage and capacity.

This research also uses LiDAR data from the USGS Post Sandy 2014 collection to create a digital surface model of the Tinton Falls Grid Supply System. From this data, elevation, slope, and aspect were calculated. This is useful information in understanding system design.

Results and Discussion

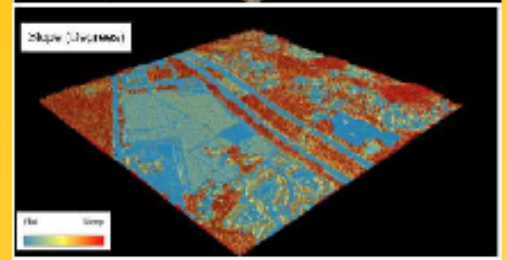
The results of this work yield a new data set made available in the NJDEP BGIS Dropdown Menu. Using this information we can more accurately track where these projects are, what type of land use is around them, how the acreage, capacity, and efficiency of these projects changes over time. Using the LiDAR data we can better analyze a successfully installed projects to have a more complete understanding of system design requirements such shading, set backs, and angle of PV panels.

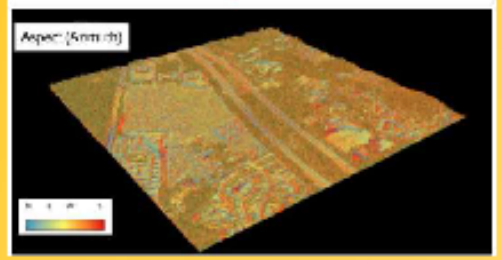
Next Steps

In future, more comprehensive analyses, this information can be used in conjunction with other resources, such as the NJDEP Solar Siting Analysis, to site and calculate potential for further renewable energy development in New Jersey.

USGS science for a changing world

Using LiDAR to Examine Grid Supply PV





Adoption of Smokefree Parks Policies through Sustainable Jersey Certification

Introduction:
Sustainable Jersey and Smokefree Parks

Of the 445 cities, townships and boroughs in the state of New Jersey, 200 have been credited in the Sustainable Jersey certification program for demonstrating their commitment to actions toward sustainability in their communities. Financial incentives are connected to the certification process, with over $4.2 million in grants distributed across the state.

Among the many actions that municipalities can take to earn points toward certification, signing a resolution to declare public parks as smokefree counts as a policy to promote local health and wellness. We compare data initially collected in 2014 to 2018 findings to explore changes in adoption of smokefree parks programming.

Data Collection

To explore the characteristics of participation in Sustainable Jersey and Smokefree parks policies, we identified a variety of useful data sets.

- Sustainable Jersey: maintains accessible spatial data on municipal participation in certification, by action items
- NJ GASP (Global Advisors on Smokefree Policy): identified all municipalities that have smokefree parks policies
- US Census Bureau: information on population and demographic characteristics of New Jersey municipalities are distributed through American Factfinder, as county sub-divisions.

Authors:
Lisa Jordan and Mitchell Fry, Drew University

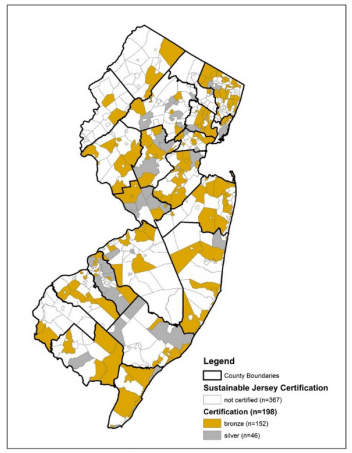


Figure 1. Sustainable Jersey Certification, by Municipality (2018)

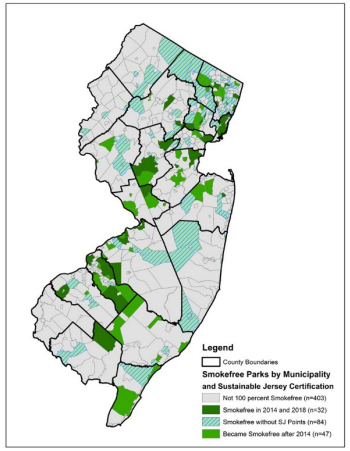


Figure 2. Smokefree Parks Policy by Municipality and Sustainable Jersey Certification, 2014-2018

Table 1. Access to Smokefree Parks by Municipal Policy and Age Groups

Smokefree Parks Status	Number of Municipalities	Children, Ages 0-4	Children, Ages 5-9	Children, Ages 10-14	Ages, 15-19	Total, Ages 0-19	Percent
No Smokefree Parks Policy	403	295,572	308,256	325,051	327,734	1,256,613	56%
Smokefree Parks Policy	162	232,977	242,716	249,128	251,230	976,050	44%
Total:	565	528,549	550,972	574,178	578,964	2,232,663	

Results:
Involvement in Sustainable Jersey

Figure 1 illustrates the municipalities across the state that participate in Sustainable Jersey certification. Most municipalities have not been certified (n = 367); however, a sizable number have certification (n = 198).

Of those certified, 152 municipalities have achieved bronze status, and 46 have been awarded silver status.

Figure 2 shows the municipalities that have smokefree parks policies, by Sustainable Jersey certification. In 2014, 32 municipalities declared smokefree parks in their Sustainable Jersey application. By 2018, an additional 48 municipalities included smokefree parks in their applications. However, an additional 84 municipalities include smokefree parks policies on the books, but do not take advantage of the points toward Sustainable Jersey certification.

Conclusions:
Toward Improving Public Health and Access to Smokefree Environments

Table 1 combines information from Figure 2 with demographic data from the U.S. Census American Community Survey. We find that despite significant progress most children in New Jersey still live in municipalities without smokefree parks policies.

With debates about legalization of marijuana on the table, now is an important time for local governments to design policies that help reduce childhood exposure to smoking environments.

Analysis of Coastal Erosion on Developed vs. Protected Beaches in Ocean County, New Jersey

Suzie Kuhne & Alaina Perdon

Abstract

The physical makeup of New Jersey's coastline has been altered throughout the years both by weather events and human encroachment. Beaches themselves are losing width and sand volume as the shoreline recedes due to erosion. Developed areas inland of the beach are at risk due to dune erosion, loss of dune height and sand volume. Mitigation efforts, such as dredging ocean sediments onto the beach, have been attempted to reduce the harmful effects of coastal erosion in areas such as Ortley Beach. The purpose of this study is to analyze variations in shoreline position and dune height from 2002 to 2017 in Lavallette, Island Beach, Ship Bottom, and Holgate, New Jersey in order to determine the severity of coastal erosion in Ocean County and gauge the efficacy of beach replenishment efforts.

Introduction

New Jersey's coastline spans 127 miles along the Atlantic Ocean, and includes some of the most popular beaches in the country ("NJ Beach Links"). As well as being among the most popular tourist destinations, this coast is also considered the most developed and densely populated in the United States. Heavy development extends from Sea Bright to Seaside Park in northern Ocean County; whereas Long Beach Island in the south boasts 10.8 miles of untouched beach within the Edwin B. Forsythe National Wildlife Refuge ("NJ Shoreline Protection"). Approximately 26% of New Jersey's coast is considered critically eroded, in both developed and undeveloped areas, as a result of anthropogenic and natural effects ("State of the Beach", 2015). Beach erosion, the loss of sand, can be catalyzed by sea level rise, storm surges, harsh winds, or overdevelopment. Beach erosion can take the form of shoreline reduction, wearing away of sand at the waterline creating a narrower beach, or dune erosion, the reduction of dune height which in turn makes the beach more susceptible to erosion ("Beach Erosion", 2016). Hurricane Sandy, which made landfall in New Jersey in October 2012, significantly accelerated coastal erosion. Some areas experienced vertical dune erosion of two to six meters, and others lost up to 70 m^3 of sand from their beaches ("Assess Coastal Impacts", 2016). Since Sandy, actions have been taken to restore New Jersey's shoreline and dunes to protect residents' homes from further destruction. Dredges are used in beach replenishment projects to remove sediment from the bottom of the ocean and pump it onto the beach to expand beach sizes and replenish the dunes (NOAA, 2013). In May 2017, dredging in Ortley Beach commenced, greatly expanding the beach size. Sediment from this dredging drifted up the beach to Lavallette via longshore transport.

Methods

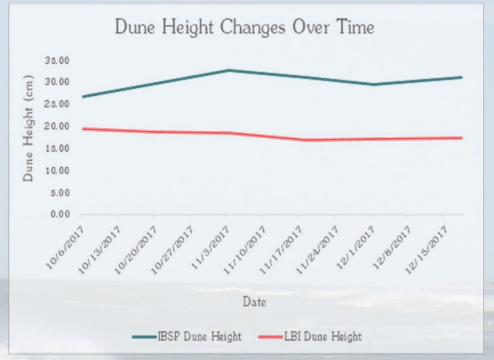
Data Collection

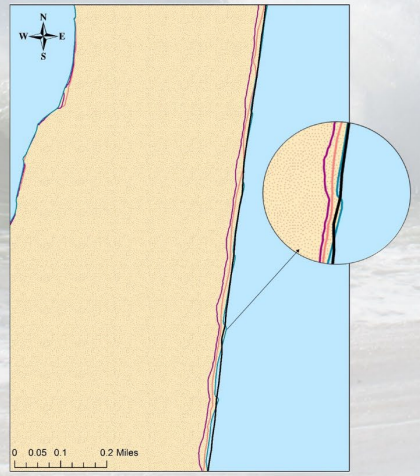
- Shoreline data, in the form of outlines of the state of New Jersey, from 2002, 2007, and 2012 were obtained from the State of New Jersey Department of Environmental Protection Bureau of GIS online database
- Shoreline data for the current year was collected manually by walking the shoreline in selected locations with a Garmin GPS unit, plotting and recording GPS data points along the way
- Dune height data from 2002, 2007, and 2012 were obtained from…
- Current dune height data was collected manually using a rangefinder, measuring the distance from the top of the dune to a set location, the toe of the dune to a set location, and using Pythagorean theorem to calculate dune height.

Map-Making

- GPS points compiled in an Excel document were imported to ArcMap and converted to a shapefile. The editor tool was used to connect the points on a line, forming a shoreline.
- Data obtained from the NJGIS website, including a shapefile of the state of New Jersey and its surrounding water bodies was added, color scheme adjusted, north arrow and scale bar added, and the map exported.

Study sites in Ocean County, New Jersey



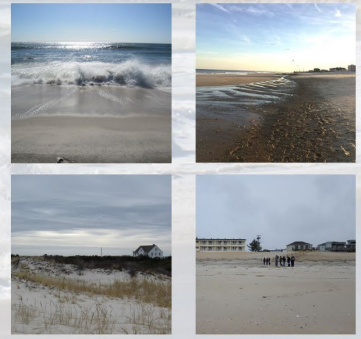


Shoreline Changes in Lavallette, New Jersey

Shoreline Changes in Holgate, New Jersey

Discussion & Conclusion

Significant shoreline changes were observed in both Holgate and Lavallette, though the alterations were dramatically different. In Lavallette, where dredging projects following Hurricane Sandy are ongoing, beach width has been increased and the shoreline is farther east than it was in 2012. In Holgate, however, the land is protected; therefore, dredging is not permitted. Here, the shoreline has significantly receded since 2012, and the ocean and bay nearly converge at several sites. In general, dune height increased 5.53 cm in Island Beach State Park but decreased 2.7 cm in Ship Bottom, with fluctuations based on weather events. This is so because Island Beach State Park, like Holgate, is a protected beach, therefore there is no development on the dunes, unlike Ship Bottom, where residential development and tourist traffic threaten dunes.



Left to right: Holgate, Lavallette, Island Beach, Ship Bottom

Acknowledgements

Thank you to Mr. Kelsey of the Marine Academy of Technology and Environmental Science for providing us with the knowledge and equipment needed to carry out this study, as well as to the State of New Jersey's GIS Department for providing data from previous years and Danny Schreiber for providing dune height data.

References

Assess Coastal Impacts of Hurricane Sandy and Accuracy of Pre-Storm Forecasts. (2016, December 05). Retrieved January 18, 2018 from https://coastal.er.usgs.gov/sandy-storm-impact-vulnerability/research/coastal-impacts.html

Coastal Change Hazards. (2016, December 06). Retrieved January 18, 2018 from https://coastal.er.usgs.gov/hurricanes/coastal-change/beach-erosion.php

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NJ Shoreline Protection and Vulnerability (n.d.). Retrieved January 18, 2018 from https://stockton.edu/coastal-research-center/njbpn/protection-vulnerability.html

NOAA. (2013, September 06). What is dredging? Retrieved January 18, 2018, from https://oceanservice.noaa.gov/facts/dredging.html

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Evaluating Elevation: Beneficial Use of Dredged Material to Enhance Salt Marsh Pilot Projects in Avalon Boro, NJ

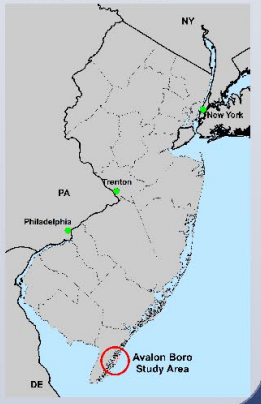
Metthea Yepsen
NJDEP Division of Science, Research & Environmental Health

Project Overview

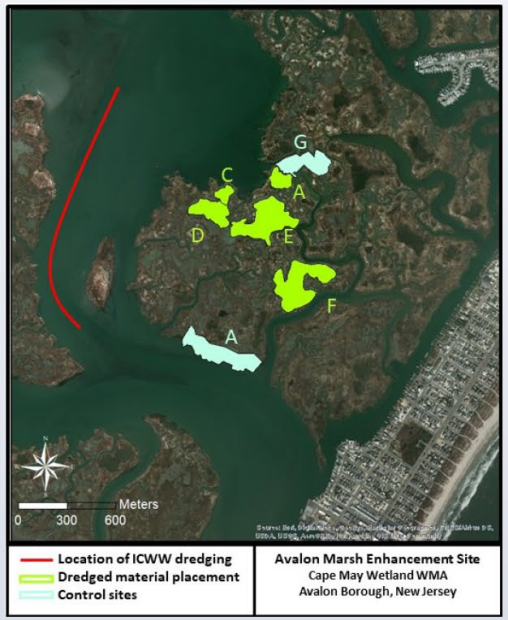
After Super Storm Sandy, there was an increased understanding of the importance of salt marshes, and as a result greater effort is being directed to enhancing their resiliency. While salt marshes are drowning from lack of sediment or shrinking in area due to erosion, navigation channels in New Jersey are clogged with sediment and traditional methods of disposing of dredged material are no longer viable. In 2013, the New Jersey Department of Environmental Protection and partners initiated pilot projects to test the theory that the application of dredged sediment on existing, but degraded or vulnerable, salt marshes would improve ecological function and help them to persist into the future.

Data Analysis and Results

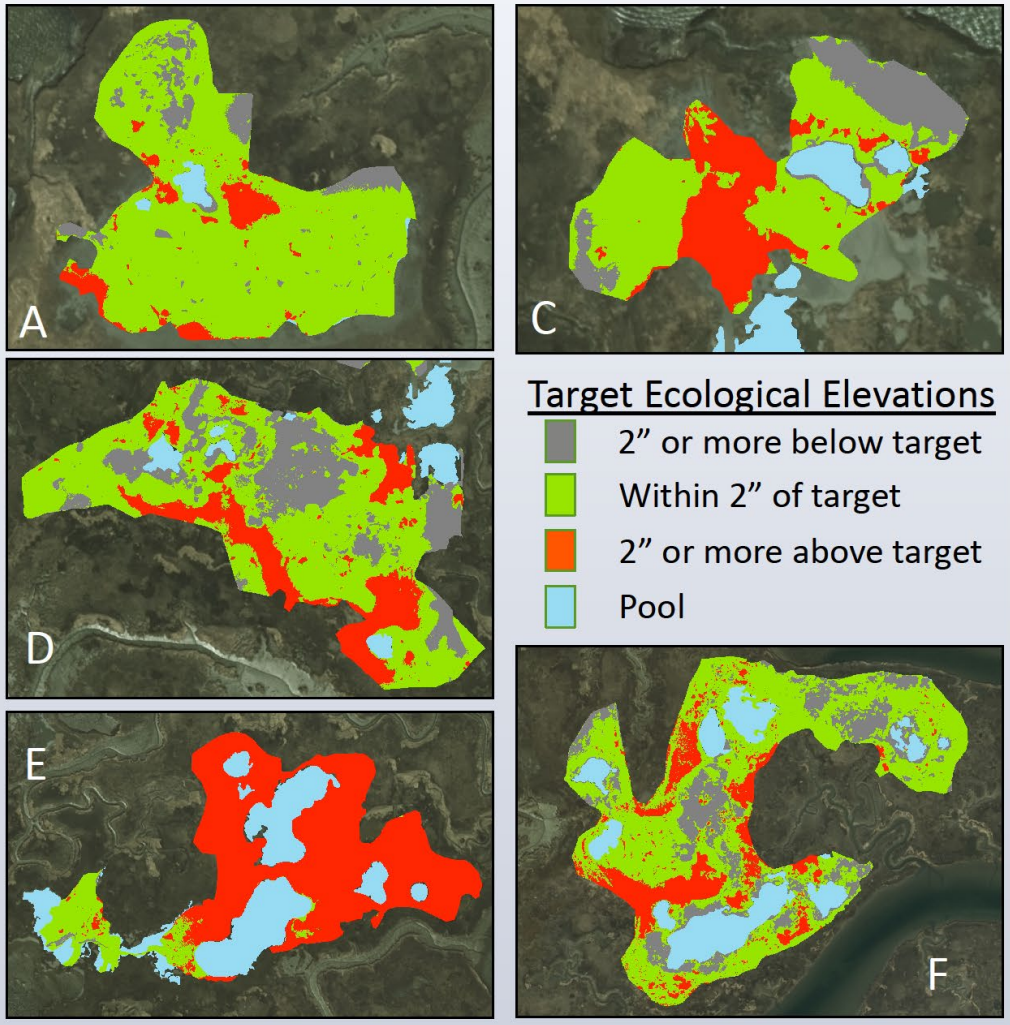
One of the success criteria for this project was to sustain an increase in elevation that provides ideal tidal flooding and flushing for native salt marsh species. Ecological target elevations for each enhancement area were determined based on tidal datums and local elevation of target plant communities. This analysis used ArcMap 10.4 to compare the ecological target elevations to the elevation at the sites in June 2017, 2.5 years after sediment was placed on the site. The results of the analyses show that while the majority of the area of the enhancement sites are near target elevations, there are areas outside the target elevation and other areas where pools have remained or reformed, preventing revegetation.



The maps below depict the elevation of marsh enhancement areas relative to their ecological target elevations two and a half years after dredged material was placed to improve the marsh's resiliency to sea level rise and increase the vegetative cover and vigor.



Placement Area	Target placement elevation (NAVD88 feet)	Target ecological elevation (NAVD88 feet)
A	3.00	2.50
C	2.61	2.11
D	3.00	2.50
E	2.39	1.89
F	3.00	2.50



Data Sources and Acknowledgements

This project was funded by USACE and a grant from the National Fish and Wildlife Foundation. Data layers on the map include: Ground-Based LiDAR imagery collected by USACE-ERDIC and processed by Princeton Hydro and GreenVest; dredged material project extent delineated in the field by GreenVest; 2015 background imagery ArcGIS Image Service

Instructional Presentation

Exploring Food Access in Morris County
Interfaith Food Pantry Utilization and the Changing Needs of Elderly and Working Poor Populations

Morris County Interfaith Food Pantry

The Interfaith Food Pantry (IFP) was established in 1994, serving food insecure populations across Morris County. Since then, it has grown to distributing 15,000 pounds of food to Morris County residents of all municipalities each week.[1] Many of the clients are categorized as the Asset Limited, Income Constrained, Employed (ALICE), more commonly known as the "working poor."

Serving Clients over Time

The figure below shows the numbers of IFP clients over time by municipality. IFP residents largely reside in Morristown, which comprised 28 percent of all IFP clients in 2014. Morristown (28%), Dover (17%), and Parsippany-Troy Hills (6%) clients comprise over half of all IFP clients. Clearly, an increase of clients in townships along the I-80 corridor is visible. The southern and northeastern portion of the county have fewer clients. The southern portion of the county is more sparsely populated, but in the northeast area, there is a higher population density.

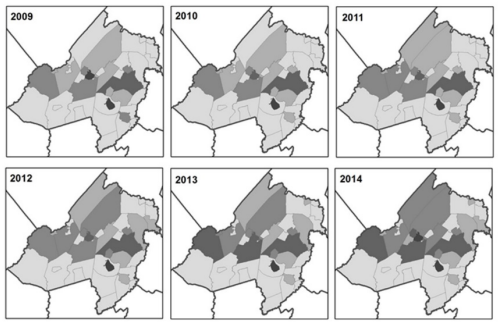
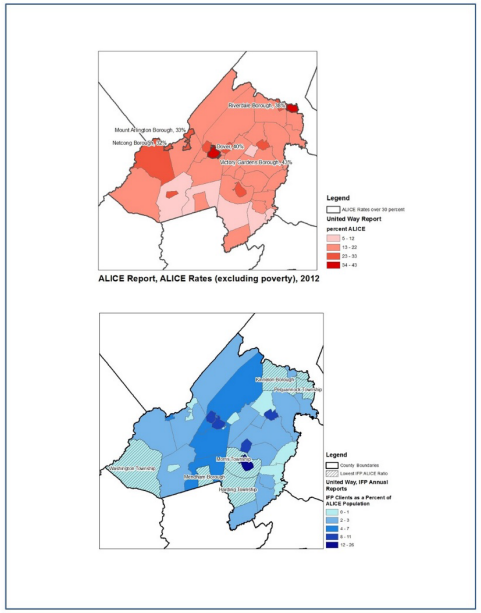


Table 1. ALICE New Jersey Summary Measures for Morris County for 2012 and 2014

Measure:	2012 Value:	2014 Value:
Population	497,999	499,727
Number of Households	179,876	179,654
Median Household Income	$95,294 (state average $69,667)	$100,579 (state average $71,919)
Unemployment Rate	7.1% (state average 9.5%)	5.7% (state average 7.5%)
Gini Coefficient	0.45 (state average 0.47)	0.45 (state average 0.47)
Poverty	7,979 Households (4%)	9,705 Households (5%)
ALICE	38,175 Households (21%)	38,292 Households (20%)

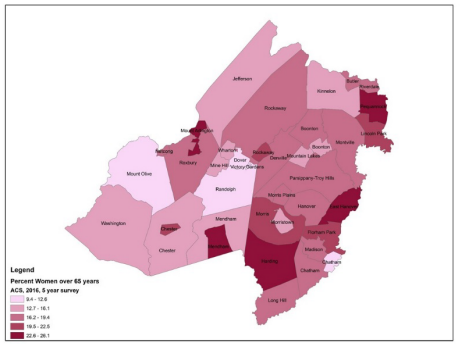
Needs of ALICE: Asset Limited Income Constrained Employed

Table 1 outlines some important changes that have been taking place over time. Though Morris County has experienced increases in median household income and decreases in unemployment, the number of households in poverty and classified as ALICE have increased.



Needs of New Jersey Elders: Findings from the Elder Index

In addition to the working poor, elderly population in New Jersey are experiencing increasing strains in their income due to rising health care costs and rising costs of living, particularly housing costs. According to "Living below the Line: Measuring Economic Insecurity among New Jersey's Retired Seniors," a report by the New Jersey Department of Human Services, 58 percent of New Jersey senior women, and 71 percent of single elder women lack secure income. The image below explore the distributions of elderly female populations in Morris County.

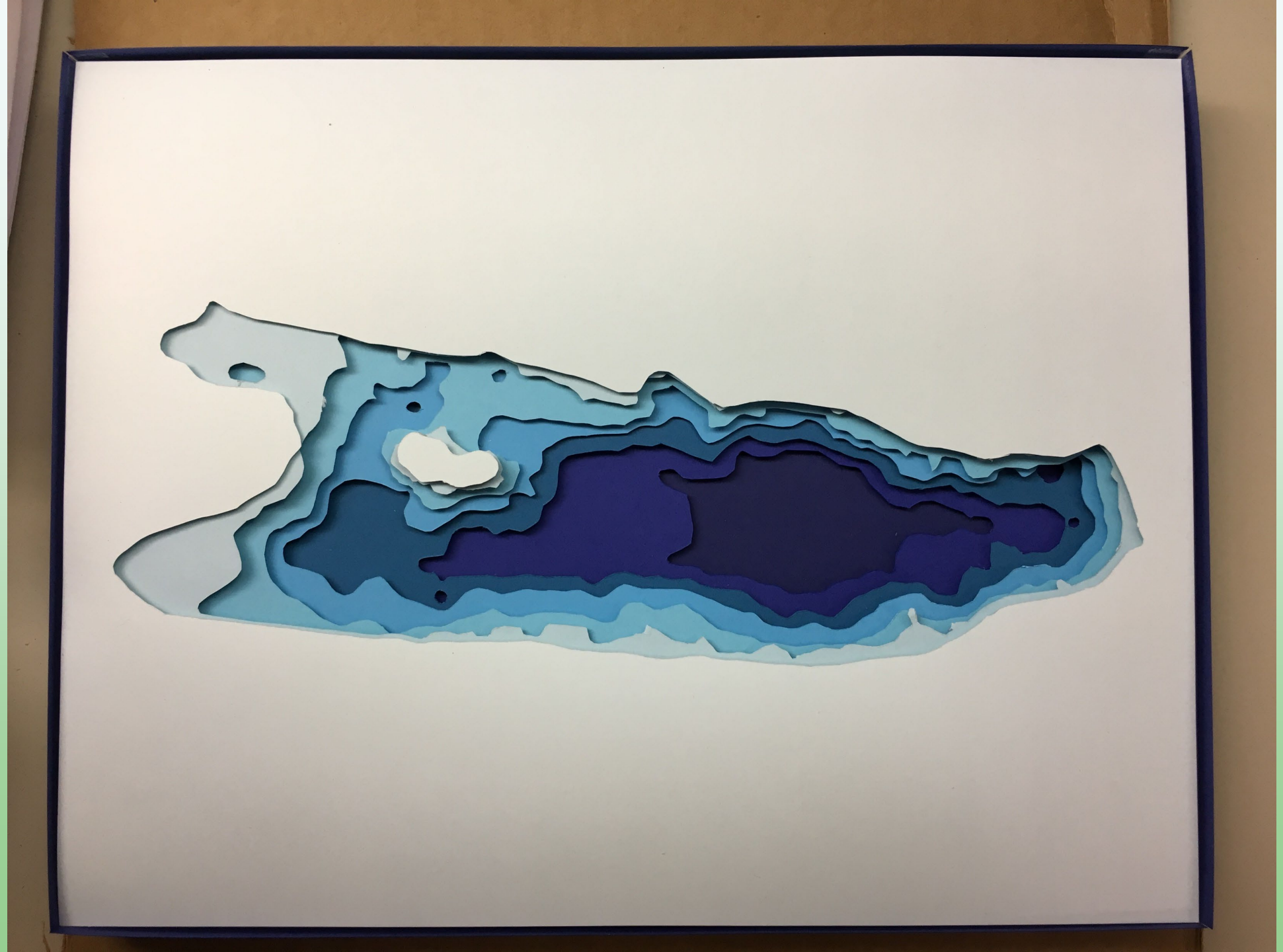


Conclusions

As the Morris County Interfaith Food Pantry works to diminish the gap between food needs and food access, both the working poor and elderly populations at greatest insecurity require often completing and different spatial distributions that need to be weighed and considered in response.

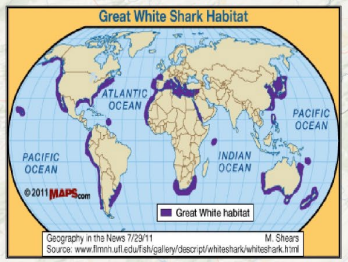
Prepared by Lisa Jordan, Jael Estrada(Class '19), Raza Hasanovic (Class '18), Tony Albano (Class '18), Drew University

Most Unique

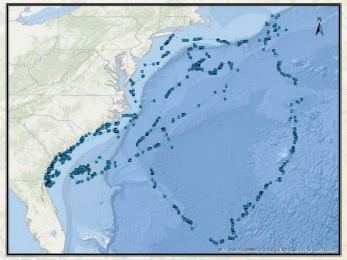


Jersey Shore Tourist Mary Lee

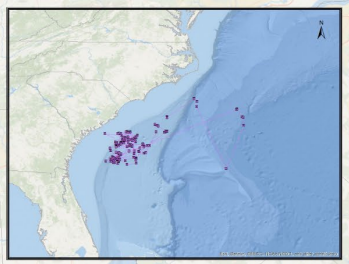
16.5 Ft, 3,500 Lb Female Great White Shark



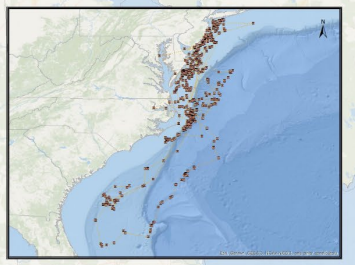
2013 GPS Data



2014 GPS Data



2015 GPS Data



Mary Lee Enters the Fray

Initial Tagging of Mary Lee by Ocearch in 2013

Chic GPS Transmitter

Changing public perception

Ocearch Tagging of a 12 ft, 1300 lb Male Great White Hilton in March 2017

Yes, New Jersey does have a migratory seal population!

Harvey Cedars Beach

Barnegat Bay

Lavalette

Unidentified South Jersey Beach

0 5 10 20 30 40 50 Nautical Miles

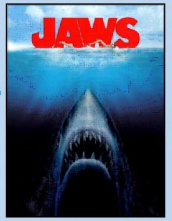
Will Hilton be the next Jersey Shore Cast Member?

Great White Shark's Much Maligned Reputation

1916 Shark Attack Headlines

Record Great White Shark Caught

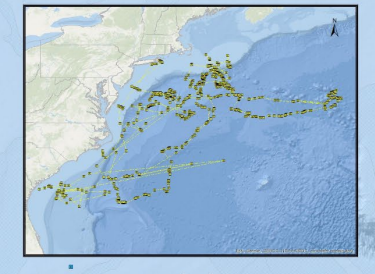
It's no longer safe to swim in the ocean



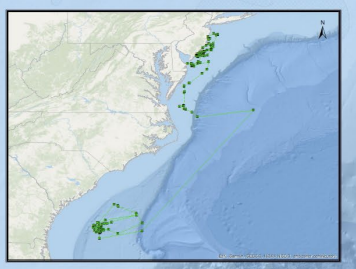
You're gonna need a bigger boat!

Frank Mundus Famous Shark Hunter

2016 GPS Data



2017 GPS Data



Legend

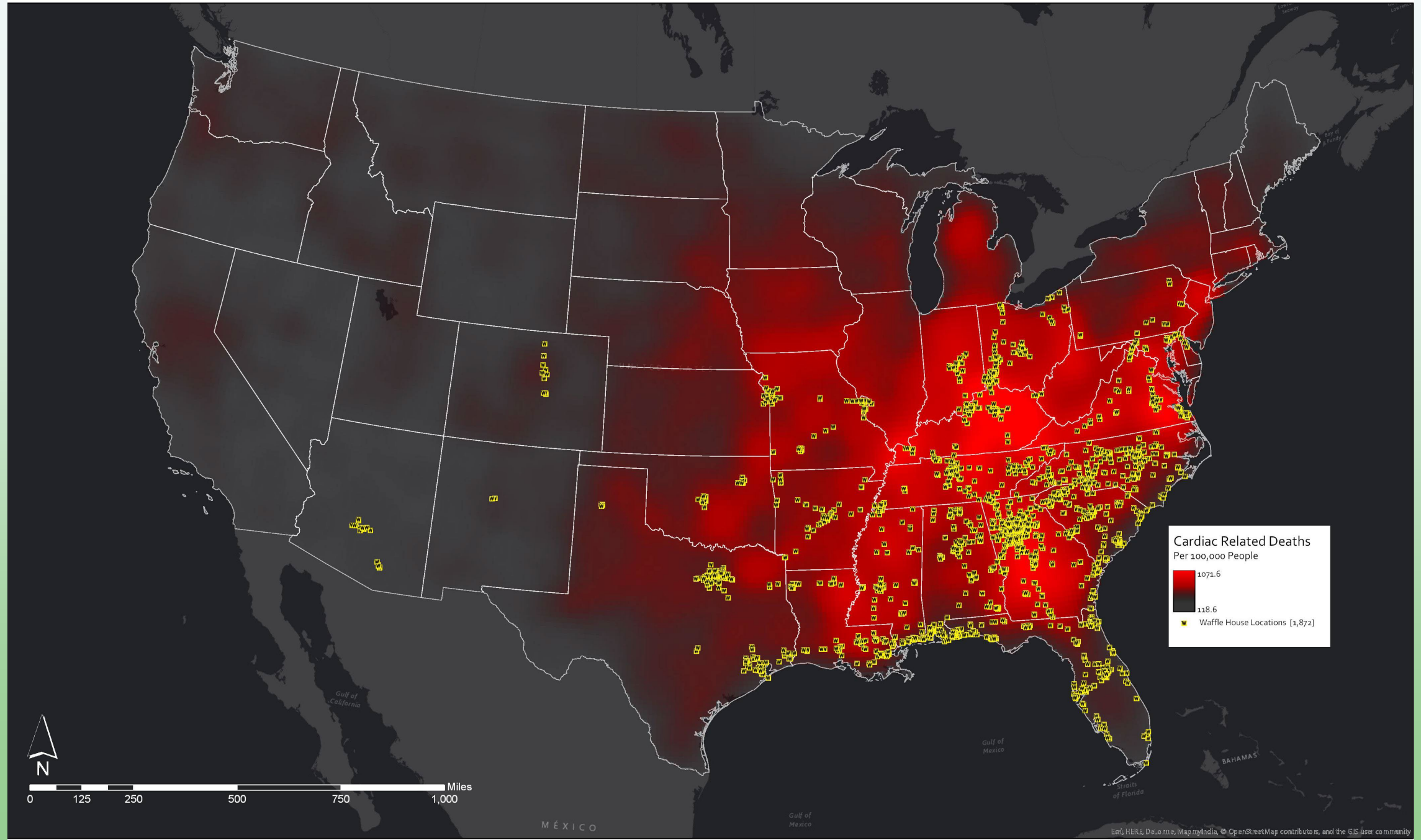
- 1916 Jersey Shore Shark Attacks
- 2013 Mary Lee GPS Data
- 2014 Mary Lee GPS Data
- 2015 Mary Lee GPS Data
- 2016 Mary Lee GPS Data
- 2017 Mary Lee GPS Data
- Sport Ocean Fishing Grounds
- United States Boundary
- World_Ocean_Base

Mary Lee GPS Data Provided by OCEARCH™ www.ocearch.org

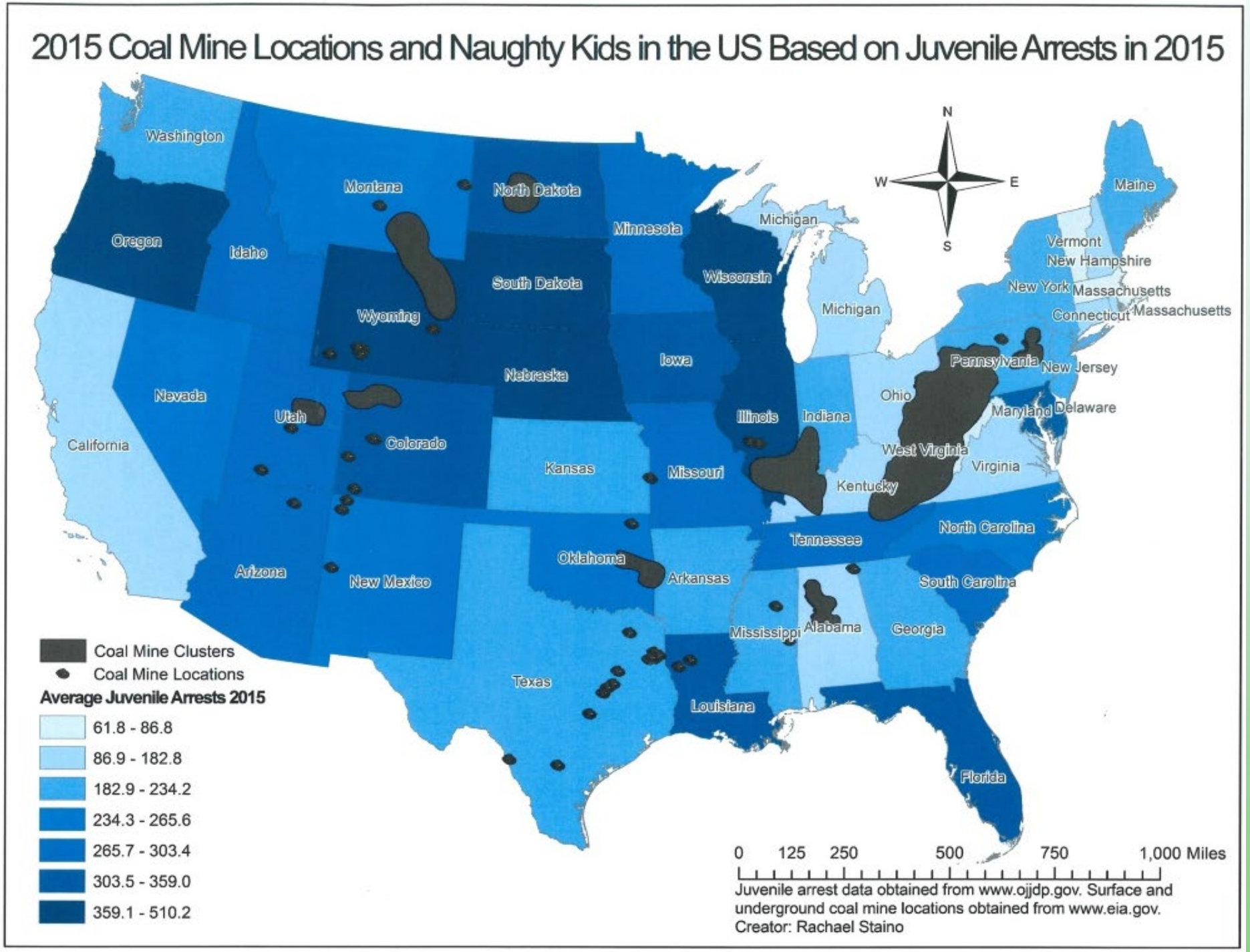
Map Created by Joe Stefanoni, SRP GIS Unit April 2018

Small Format

Cardiac Related Deaths During 2013 in the Contiguous USA Compared to Waffle House Locations



2015 Coal Mine Locations and Naughty Kids in the US Based on Juvenile Arrests in 2015



Software Integration

Utilizing Drone Technology to Capture NJ Coastal Aerial Imagery

An **Unmanned Aircraft System (UAS)**, or called a **Drone**, is an aircraft without a human pilot onboard. The UAS is controlled from an operator on the ground. **Drone Applications** include Recreational Use, First Person View, Aerial Photography and Videography, Infrastructure Inspections, Surveying and Mapping, Swarm Intelligence, Science and Research, Search and Rescue, Security and Surveillance, Precision Agriculture, Cargo Systems, Construction, Mining and Aggregates. (9)

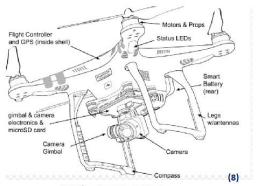
Coastal Management's Drone Specifications: DJI Phantom 4 Pro: Weight 1388 g; Max Speed 45 mph; Flight Time 28 mins; Camera 4k, 60 fps; Obstacle Avoid –Yes; Return Home – Yes. (8)

Done Aerial Photography is extremely valuable for coastal and environmental resource management, monitoring and mapping. Aerial photograph that will be acquired from drone monitoring will fill some aerial photography data gaps. Drone aerial photography can be taken within **Tide Stages** and **Leaf On Periods**. Drones can reach areas that are not readily or easily accessible to large scale aerial photo capture projects. **Current Drone Coastal Management Projects** include monitoring the following: 1) Living Shoreline Projects, 2) Shoreline Erosion, 3) Marsh Health, 4) Sea Level Change, 5) Dredge Material Beneficial Use, 6) Coastal Post Storm Assessment, 7) Intertidal and Subtidal Areas. **Future Drone Coastal Management Projects** will utilize data process outputs of 3D Textured Mesh for Visualization, Volumetric Measurements, Change Detection for Built and Natural Environments and Identification of Plant Species.

Drone Systems

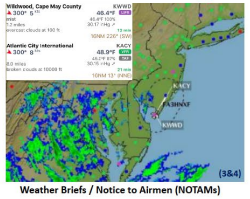
Transmitter with I phone

DJI Go Software Flight Control Interface

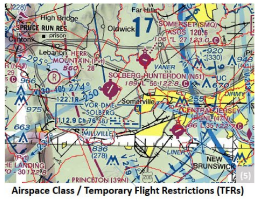


DJI Phantom Basic Parts

Flight Mission Planning



Weather Briefs / Notice to Airmen (NOTAMs)



Airspace Class / Temporary Flight Restrictions (TFRs)

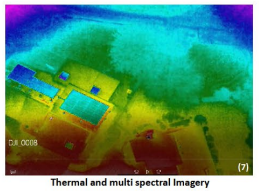
Post Process Data Software

Post Project Flight Path and Image X,Y Positions

Future Application Examples

Map Pilot for DJI Autonomous flight programing

3D Visualization



Thermal and multi spectral Imagery

CURRENT DRONE IMAGERY PROJECTS

Marsh Health Monitoring - Little Egg Harbor Twp., Ocean

Drone Oblique Image

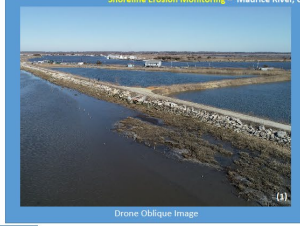
Drone Nadir Image

Ecological and Living Shoreline Project Monitoring – Stone Harbor, Cape May Ring Island and Atlantic City Gardner's Basin, Atlantic

Drone Oblique Image

Drone Nadir Image

Shoreline Erosion Monitoring – Maurice River, Cumberland and Upper Township, Cape May



Drone Oblique Image

Drone Nadir Image

Flying under the FAA's Small UAS Rule (Part 107) (5)

- Fly for recreational or commercial use
- Register your drone
- Get a Remote Pilot Certificate from the FAA
- Fly a drone under 55 lbs.
- Fly within visual-line-of-sight*
- Don't fly near other aircraft or over people*
- Don't fly in controlled airspace near airports without FAA permission*
- Fly only during daylight or civil twilight, at or below 400 feet*

* These rules are subject to waiver.

Drone Flight Safety

- Continuous Risk Assessments
- Aeronautical Decision Making
- Situational Awareness
- Flight Crew Management

Web Posting of Drone Projects on NJ Coastal Atlas

Poster Development: Dave DuMont, NJDEP OCLUP

References:
1) Drone Field Photos - Steve Jacobus, NJDEP OCLUP
2) Drone Field Photos - Dave DuMont, NJDEP OCLUP
3) 1800 WX Brief
4) Aero Weather
5) Federal Aviation Administration
6) Map Pilot for DJI
7) Eric Gakstatter – GPS Mapping
8) DJI
9) www.dronenodes.com

APRIL 2018

NEW JERSEY COASTAL MANAGEMENT PROGRAM

Freshwater Wetland Restoration / Mitigation resulting from Enforcement Actions between 2003 and 2017

Andrew Edelhauser & Robert Clark, NJDEP Bureau of Coastal and Land Use Enforcement

Background

One of the Bureau of Coastal and Land Use Enforcement (CLUE) responsibilities is enforcing the regulatory program established under the Freshwater Wetlands Protection Act that became effective on July 1, 1988. The intent of the Act is to "preserve the purity and integrity of freshwater wetlands from unnecessary and undesirable disturbance." CLUE personnel respond to reports or complaints of possible land use violations received from municipal and county officials, private citizens, and other public and private organizations. CLUE also conducts permit compliance inspections of project sites with Land Use permits to ensure compliance with their conditions, requirements, and limitations. If violations are found, the size, scope, and circumstances are documented and the Bureau issues enforcement actions, such as Notices of Violation and Administrative Orders, to compel compliance.

Data and Methodology

The purpose of this map is to identify freshwater wetlands that have been restored or mitigated as a result of enforcement actions between 2003 and 2017. Following the discovery of a violation, CLUE personnel record all inspection information into a Compliance Evaluation activity screen in NJEMS (New Jersey Environmental Management System) including an inspection attribute for "Area Filled or Disturbed – fw wetland" to reflect the size of disturbance that has occurred.

Once a site comes into compliance, a second attribute is entered into an Enforcement Action activity screen that documents the area that has been restored or otherwise mitigated. The types of mitigation are:

- Restored – Illegally Filled or Degraded Wetlands returned to preexisting topography and planted with native trees and shrubs.
- Land Donated – Land that is permanently preserved, sometimes at another location.
- Deed Restricted – Land that is permanently protected by a conservation easement.
- Mitigated – Land is restored or created at another site, which may include a Mitigation Bank.
- Contribution to the Mitigation Fund – Monetary donation to Wetland Mitigation Fund that is used by the Mitigation Council to fund a mitigation project.

A Web Intelligence report was created to compile specific site information including responsible party, site location by State Plane coordinates (stored in Masterfile), mitigation type, and total area mitigated during a fifteen-year period from 2003 to 2017. The report was exported as an Excel spreadsheet and opened in ArcGIS Pro. An XY Event Layer was created for each type of mitigation using the State Plane coordinates. The XY Event Layers were then exported as feature classes for each category. The symbology of the feature classes was set to graduated symbols to reflect the size of the mitigation type.
Symbols were manually grouped into eight size categories for all feature classes except Contribution to Mitigation Fund, which was grouped into six categories. For display purposes, the "Disperse Markers' tool was used to spread out clusters of points.

Site 1

Agricultural property in Montgomery Township, Somerset County where the property owner illegally cleared 0.4 acres of a wooded freshwater wetland to create a pond. The wetland was documented breeding habitat for the State-threatened Barred Owl (Strix varia).

The freshwater wetland was restored by backfilling the illegal pond to reestablish the natural topography and planting native trees and shrubs.

Why Protect Wetlands?

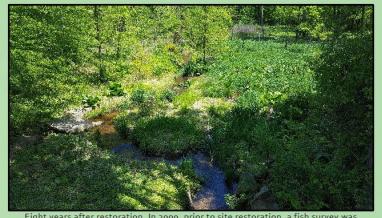
Until the 1970's wetlands were viewed as wastelands and were often used as dumps, filled for development, or drained for agriculture. The U.S. Fish and Wildlife Service estimated that by the mid 1970's, 20 percent of New Jersey's wetlands had been destroyed, with losses as high as 72 percent in Hunterdon County and 50 percent in parts of the Passaic River basin. Freshwater wetlands play a vital role in the social, economic, and environmental health of our nation in the following ways:

- Water Quality protection – Wetlands protect drinking water by filtering out chemicals, pollutants, and sediments that would otherwise clog and contaminate our waters.
- Water Storage – Wetlands provide natural flood protection by soaking up runoff from heavy rain and snow melts and recharge groundwater during times of drought.
- Wildlife Habitat – Wetlands provide essential breeding, spawning, nesting, and wintering habitats for a major portion of the State's fish and wildlife, including migrating birds, endangered species, and commercially and recreationally important wildlife.
- Wetlands provide high quality open space for recreation and tourism.

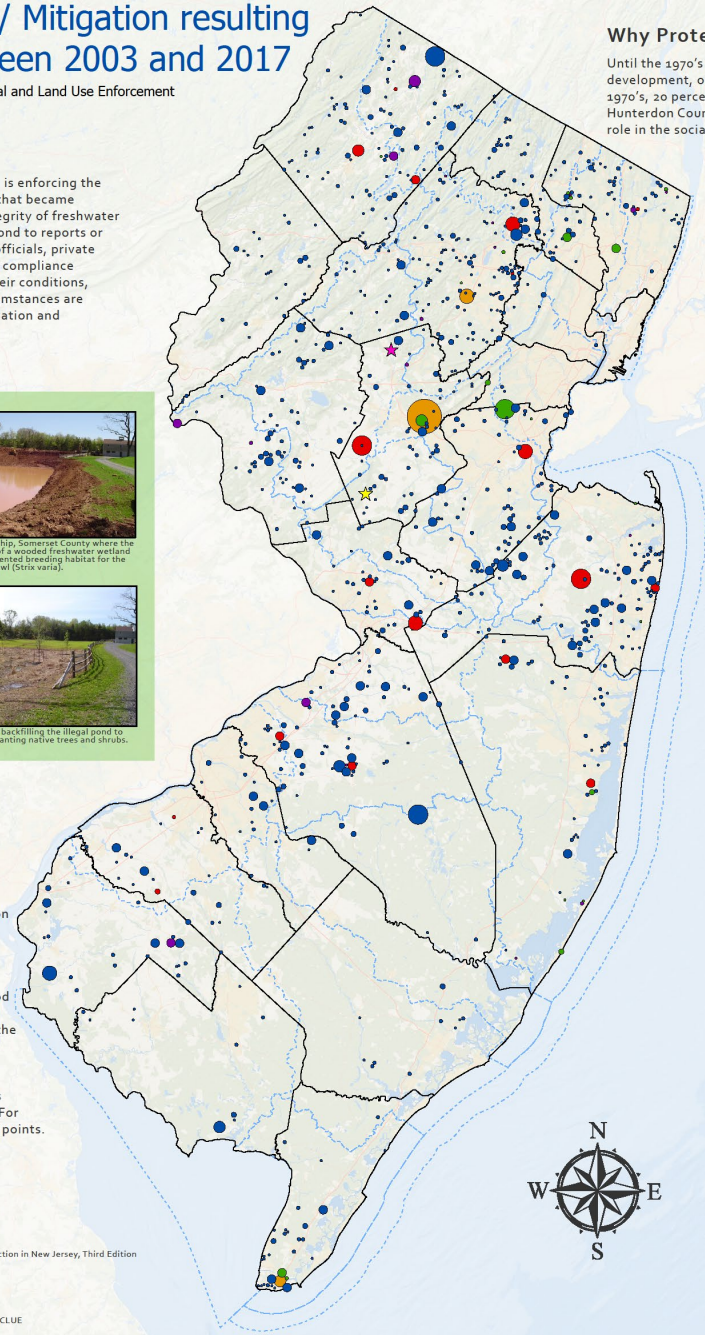
Site 2

Site in Bernardsville, Somerset County where property owner illegally cleared 1.1 acres of a freshwater wetland and channelized over 500 feet of a Category One stream. The wetland was classified as exceptional resource value as it was documented habitat for the State-threatened Wood Turtle (Glyptemys insculpta) and was associated with a trout production watercourse.

Post restoration photograph. Restoration included planting native trees, shrubs, and herbaceous plugs throughout the wetland area and modifying the stream channel to create more sinuosity, create aquatic habitat, and stabilize the stream banks.



Eight years after restoration. In 2009, prior to site restoration, a fish survey was conducted with the assistance of New Jersey Division of Fish and Wildlife, Bureau of Freshwater Fisheries to document the quantity of Brown Trout (Salmo trutta). A follow-up survey was conducted and 2013 and found a 185% increase in the number of Brown Trout using the restored stream channel.



Restoration/Mitigation Type

Area Restored	• 0 - 0.1 Acre • 0.1 - 0.5 Acre • 0.5 - 1 Acre • 1 - 5 Acres • 5 - 10 Acres • 10 - 20 Acres • 20 - 40 Acres • 191 Acres	Area Restored - 325 Acres
Area of Land Donation		Area Donated - 206 Acres
Area Deed Restricted		Area Deed Restricted - 130 Acres
Area Mitigated		Area Mitigated - 20 Acres
		Total - 681 Acres
Contribution to Mitigation Fund	• $500 - $4,000 • $4,001 - $21,000 • $21,001 - $45,000 • $45,001 - $200,000 • $200,001 - $360,000 • $360,001 - $450,000	Total - $1,345,900

Watershed Management Areas

0 5 10 20 30 40 Miles

References

Basemap - Esri, Garmin, GEBCO, NOAA NGDC, and other contributors
Association of New Jersey Environmental Commissioners, Freshwater Wetlands Protection in New Jersey, Third Edition
NJDEP Division of Land Use Regulation - http://www.nj.gov/dep/landuse/
Photos Credit: Robert Clark & Michael Palmquist, NJDEP CLUE

Special Acknowledgments: Elizabeth Dragon, Bureau Chief, NJDEP CLUE
Barbara Baus, Section Chief, NJDEP CLUE
Pete Keledy, Supervising Environmental Specialist, NJDEP CLUE
Map Production: Andrew Edelhauser & Robert Clark, NJ DEP CLUE 4/2018

Story Map

A story map

An Overview of Camden's Brownfield Sites and FY17 Remediation Funding

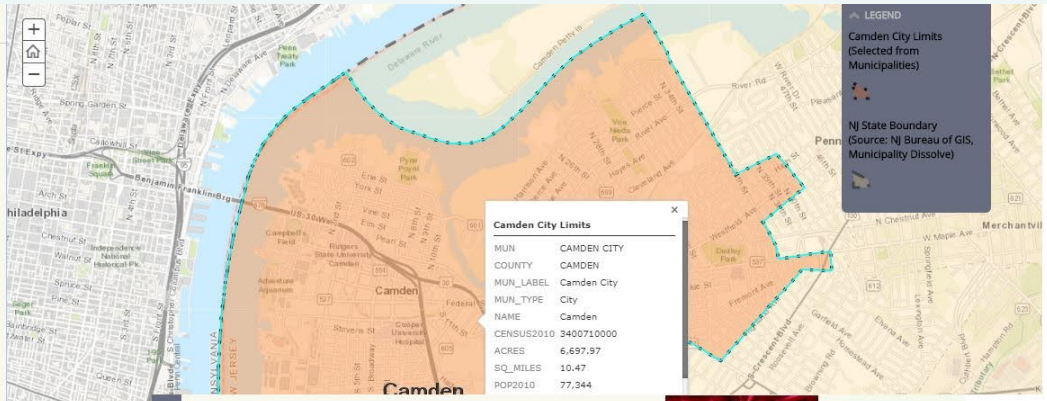
A History of Camden and Site Overview by: Veronica Armstead-Williams, M.S. City and Regional Planning Candidate

Disclaimer: This is for academic purposes; the views and opinions expressed in this report are those of the author do not reflect the official policy or position of Temple University nor those of any government agency.

"In a dream I saw a city invincible" - Walt Whitman

Camden, NJ, where Walt Whitman spent his final years, has struggled as one of the poorest and most dangerous cities in the United States for the past several decades, but in recent years the possibly "invincible" city has begun to show signs of growth and redevelopment.

EPA Brownfield Grants provide funding to local governments for cleanup, assessment,



A story map

Edit ×

An Overview of Camden's Brownfield Sites and FY17 Remediation Funding

Fix issues in your story ×

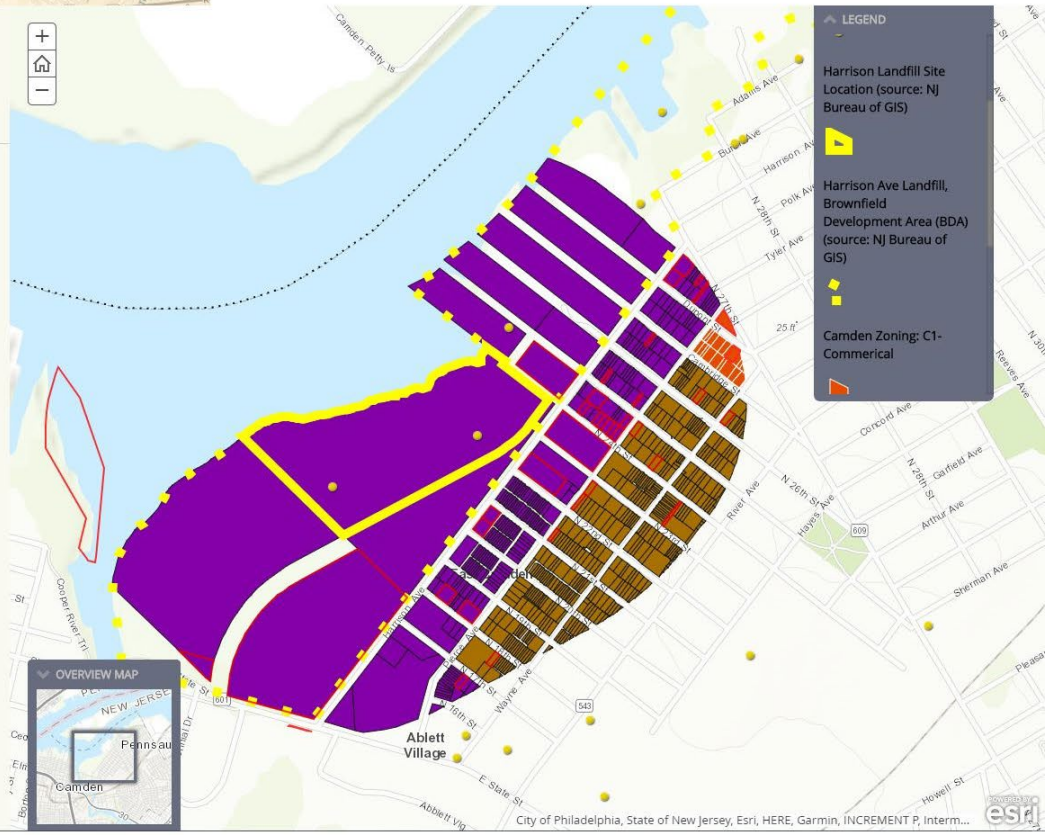
PCB containers found during site visit

Current Status:

720 total parcels within a 0.25 mile radius include the following designations:

- 39 vacant
- 3 church and parsonage
- 12 city owned
- 2 community buildings
- office building
- recreation center

Several acres of the landfill have already been cleaned and redeveloped into the Salvation Army Ray and Joan Kroc Community Center of Camden.



WSM23
“NJDEP Solar Siting Analysis Story Map”

New Jersey Landscape Project Version 3.3

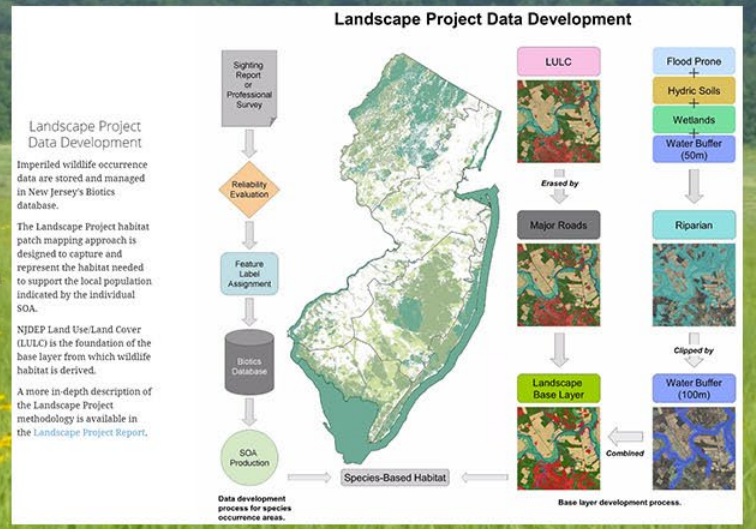
New Jersey's Changing Landscape.

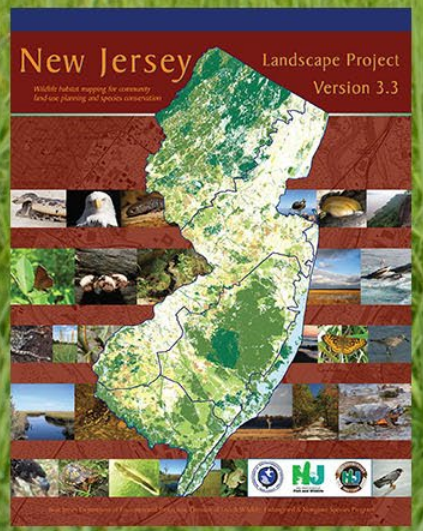
The Landscape Project is a pro-active, ecosystem-level approach for the long-term protection of imperiled species and their important habitats in New Jersey.

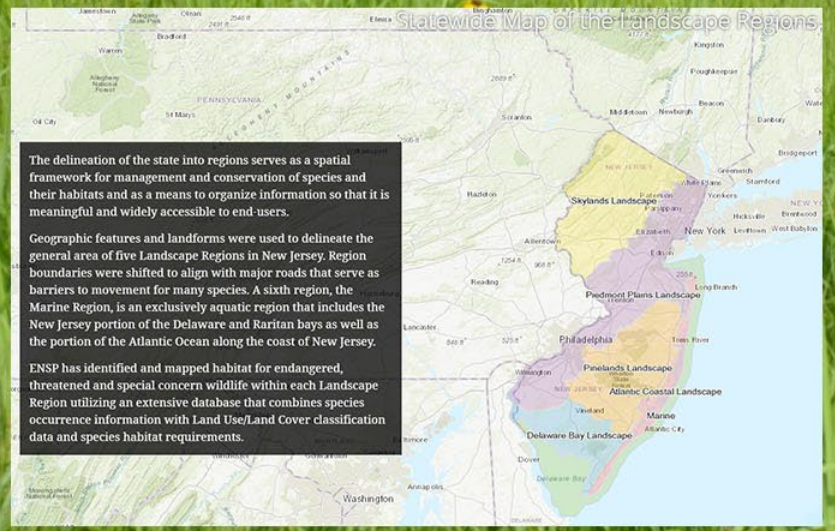
For a more detailed description of the Landscape Project's purpose and methodology the Landscape Project Report is available for download here.

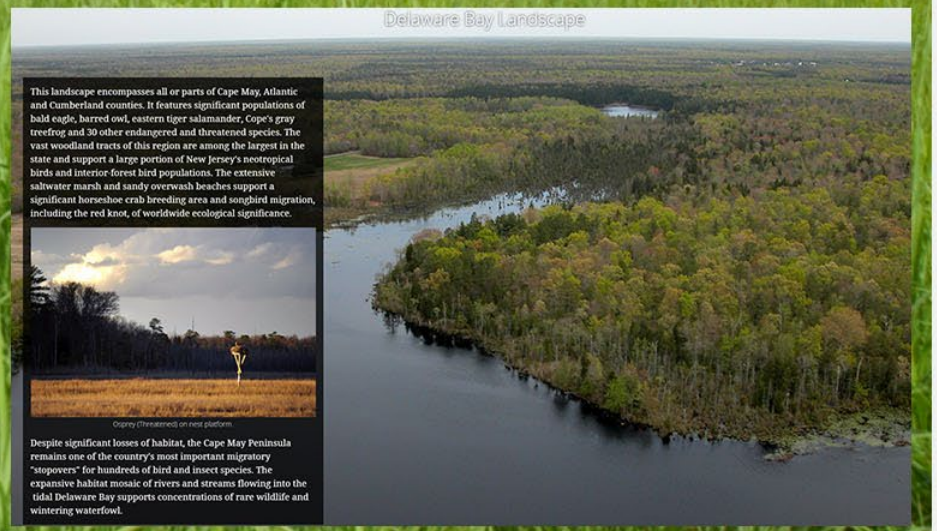
Some pages contain maps or graphic elements that may take a moment to load. Please be patient.

NEW JERSEY DIVISION OF Fish and Wildlife





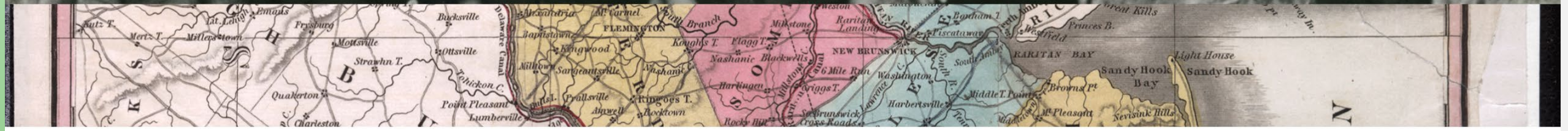




URL: gis.sussex.nj.us/agriculture_storymap

Piscataway Landscape of Memories

An interview with Eugene Smalley 1881-1976



In 1974, the Piscataway Bicentennial Commission conducted an interview with Eugene Smalley, then 93 years old, as part of a project to collect oral histories from some of the township's then oldest living residents.

Board Game to Boardwalk

A story map presentation by Kerri Smith

Web Map Application

Mapping Application for African American Places, Culture & History

About

STOUTSBURG SOURLAND AFRICAN AMERICAN MUSEUM

The *Stoutsburg Sourland African American Museum Mapping Application for African American Places, Culture and History* allows users to locate scores of African American sites of interest, from Maine to Virginia.

Simply click on any point; a pop-up box will appear, displaying information about that point of interest.

Three map tools, positioned above, make it easy to navigate around the map, and find sites in categories and regions you desire. These include:

Legend: Displays the categories and symbology of the points of interest.

Regional Bookmarks: Zooms map extent into a specific geographic region.

Query: Search for sites of interest using keywords ("Douglass", "abolition", "AME", "Underground Railroad", "Trenton", etc.).

Note: Some of the sites featured in the map are not accessible to the public; please respect private property rights.

Data Sources: Points of interest and their associated data were obtained through various agencies and organizations. Please consult the webpages, included for each point of interest, for further source information.

Mapping application produced by Kevin Berkman, GIS Analyst, 2018.

Point of Interest

Site: New Lincoln School

Description: Erected in 1923, the fourth/final school building constructed exclusively for the education of African-American children in Trenton. The school initially served both elementary and middle school students.

Region: Mercer County, NJ

Address: 400 N Montgomery St, Trenton, NJ 08618

Website for Point of Interest

Google Map Directions

Zoom to

Union Baptist Church
Our Lady of the Divine Shepherd
St Paul AME Zion Church (Former site)
Bellevue Avenue Colored School
Carver Center
Spring St
St Monica's Episcopal Church (Fomer site)
YWCA
Mt Zion AME Church (Former site)
Trenton
Assunpink Creek
Junior High

Historic Places

Schools

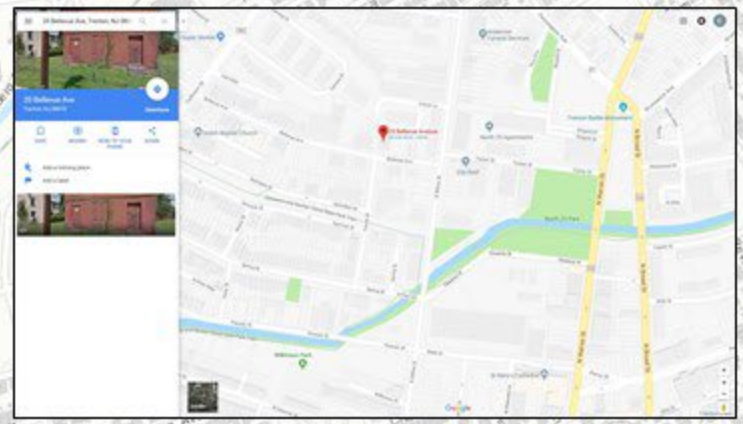
Around 1832, the Trenton Board of Education established the city's first public school for its African-American children. The school was held in Jackson Hall, a building on Hanover Street that served as a meeting place for the city's Black residents. By the 1850s, the student population numbered around 60 children, and the building's condition had deteriorated to the point that it was commonly known as "Nightmare Hall." In 1855, this early schoolhouse was razed, and the new Higbee Street School opened on present-day Bellevue Avenue (then called Higbee Street) two years later. The growth of the African-American population necessitated construction of the Bellevue Avenue School in 1883 and the New Lincoln School in 1923. In the mid-20th century, Trenton's public schools became a focal point for the Civil Rights movement in the city.

Higbee Street School (John T. Nixon School)
20 Bellevue Avenue
The Higbee Street School was the first educational institution specifically constructed for the free public education of African-American students in Trenton and among the earliest such schools built in New Jersey. The Trenton School Board built five Greek Revival-style schools in 1856, employing design concepts promoted by contemporary education reformers. As such, the Higbee Street School is distinguished among the state's few surviving schools for Black children because of its progressive design. In 1872, the student population outgrew the facility and moved into temporary quarters while the new Ringgold Street School (no longer extant) was under construction.

Higbee Street School, c.1920

Bellevue Avenue Colored School

Bellevue Avenue Colored School (Lincoln School)
81 Bellevue Avenue
By 1883, the city's Black student population had outgrown the Ringgold Street School, and a new building was erected on Bellevue Avenue. Notably, the school was built after the New Jersey Legislature passed the School Desegregation Act of 1881, which gave Black parents the option of enrolling their children in previously White-only schools. The construction of the two-room Bellevue Avenue school only two years after passage of the act reflected the reality of a segregated school system for African-American children in Trenton. The school was expanded in 1888 and renamed Lincoln School in 1891. In 1923, the building was replaced by the "new" Lincoln School at Brunswick Avenue and Montgomery Street. By 1928, the population of the Lincoln School was overflowing, and some students were moved back into the Old Lincoln School. The school continued in use as a facility for Black children until the public schools were desegregated. The building was acquired by the King David Lodge in 1949. The Lodge, which is affiliated with the Prince Hall Freemasons, was formed in 1875 and met during the early 20th century at the first Shiloh Baptist Church building on Belvidere Avenue. Thus, the building continues to serve the African-American community as a Masonic lodge.



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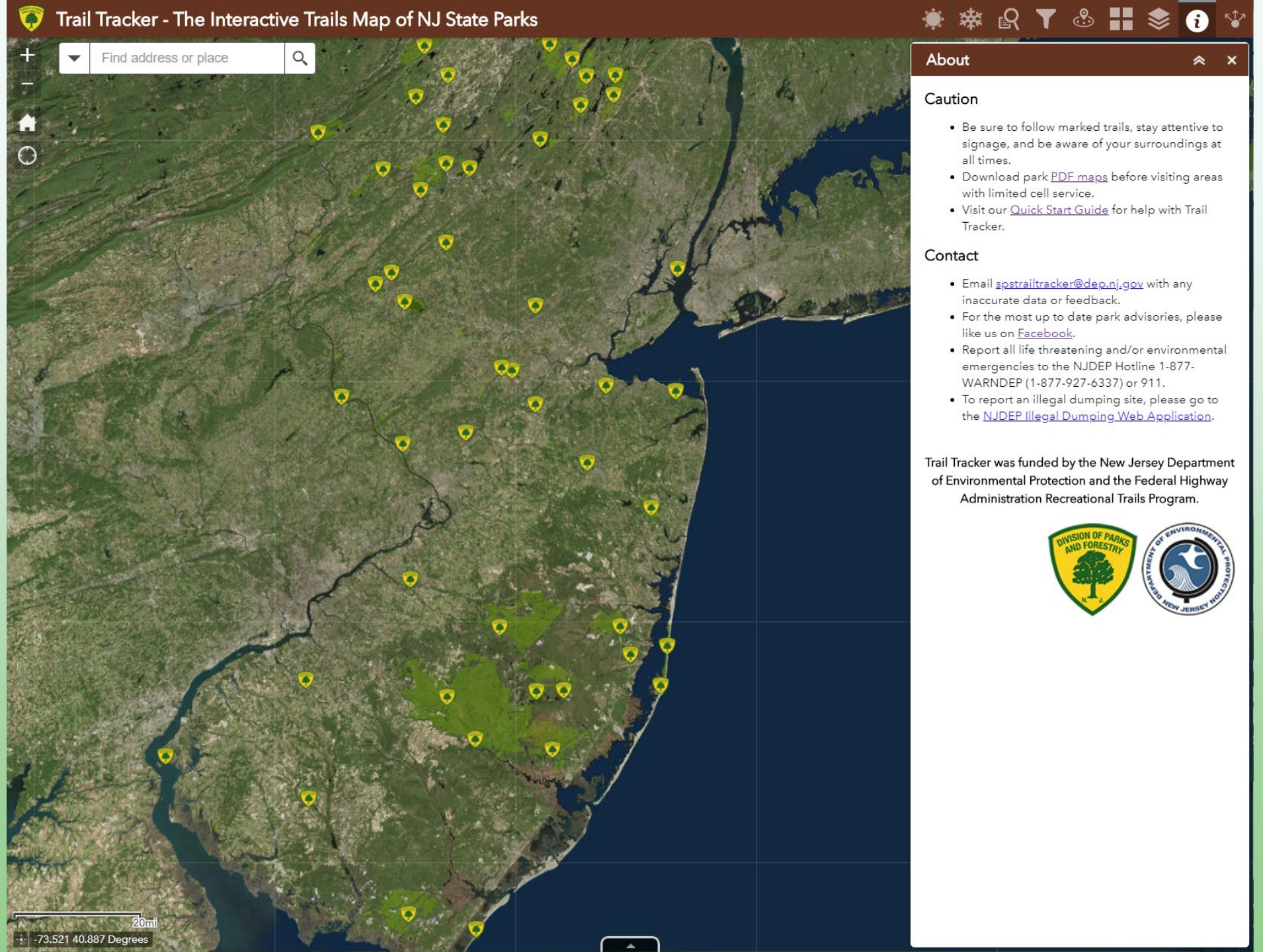
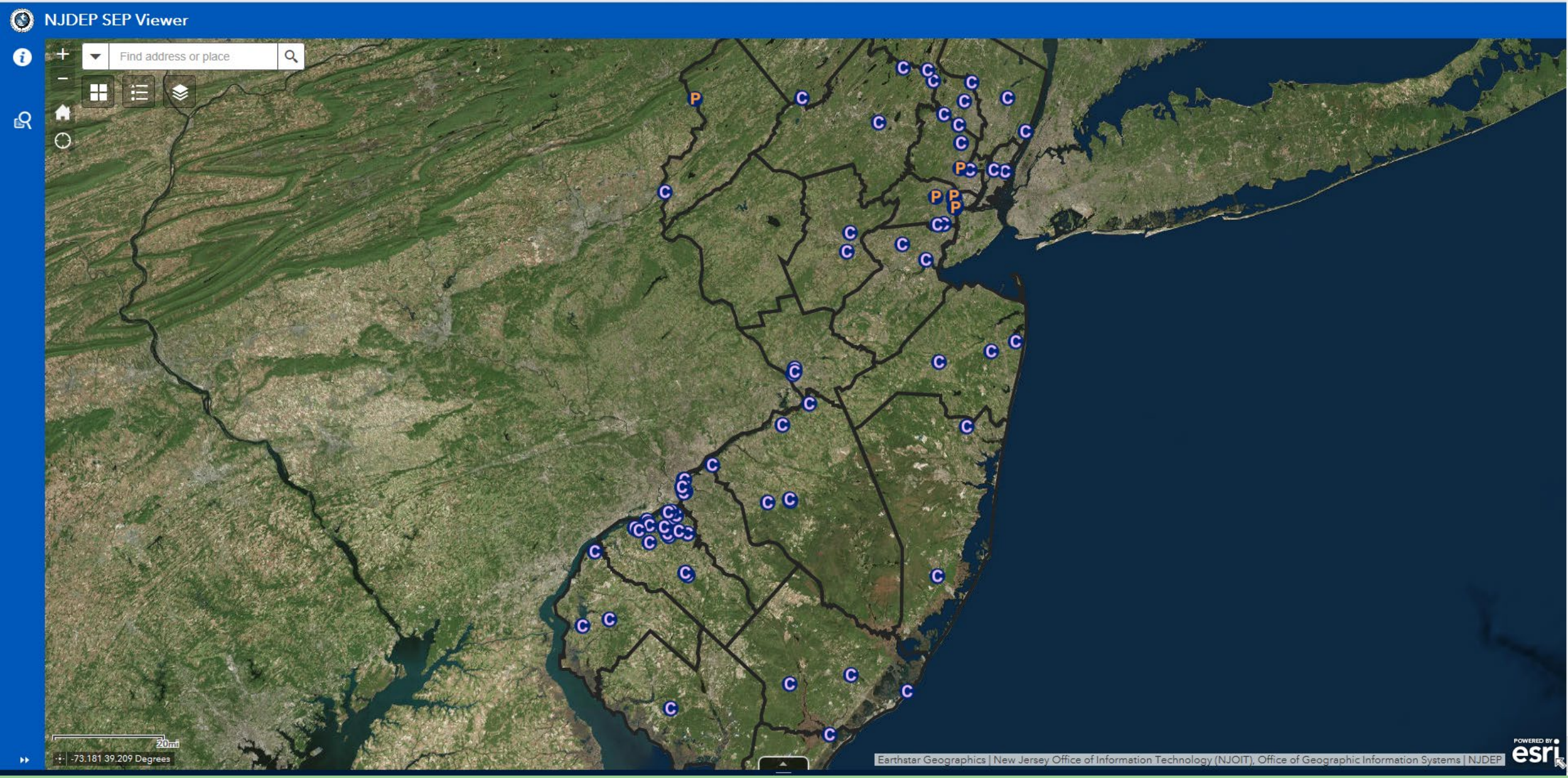
Bucks County, PA, Mercer County, NJ, State of New Jersey, Esri, HERE, Garmin, INCREMENT P, Intermap, USGS, METI/NASA, EPA, USDA


Trail Tracker - The Interactive Trails Map of NJ State Parks
Find address or place
About
Caution
Be sure to follow marked trails, stay attentive to signage, and be aware of your surroundings at all times.
Download park PDF maps before visiting areas with limited cell service.
Visit our Quick Start Guide for help with Trail Tracker.
Contact
Email spstrailtracker@dep.nj.gov with any inaccurate data or feedback.
For the most up to date park advisories, please like us on Facebook.
Report all life threatening and/or environmental emergencies to the NJDEP Hotline 1-877-WARNDEP (1-877-927-6337) or 911.
To report an illegal dumping site, please go to the NJDEP Illegal Dumping Web Application.
Trail Tracker was funded by the New Jersey Department of Environmental Protection and the Federal Highway Administration Recreational Trails Program.
DIVISION OF PARKS AND FORESTRY
DEPARTMENT OF ENVIRONMENTAL PROTECTION NEW JERSEY
20mi
-73.521 40.887 Degrees


NJDEP SEP Viewer
Find address or place
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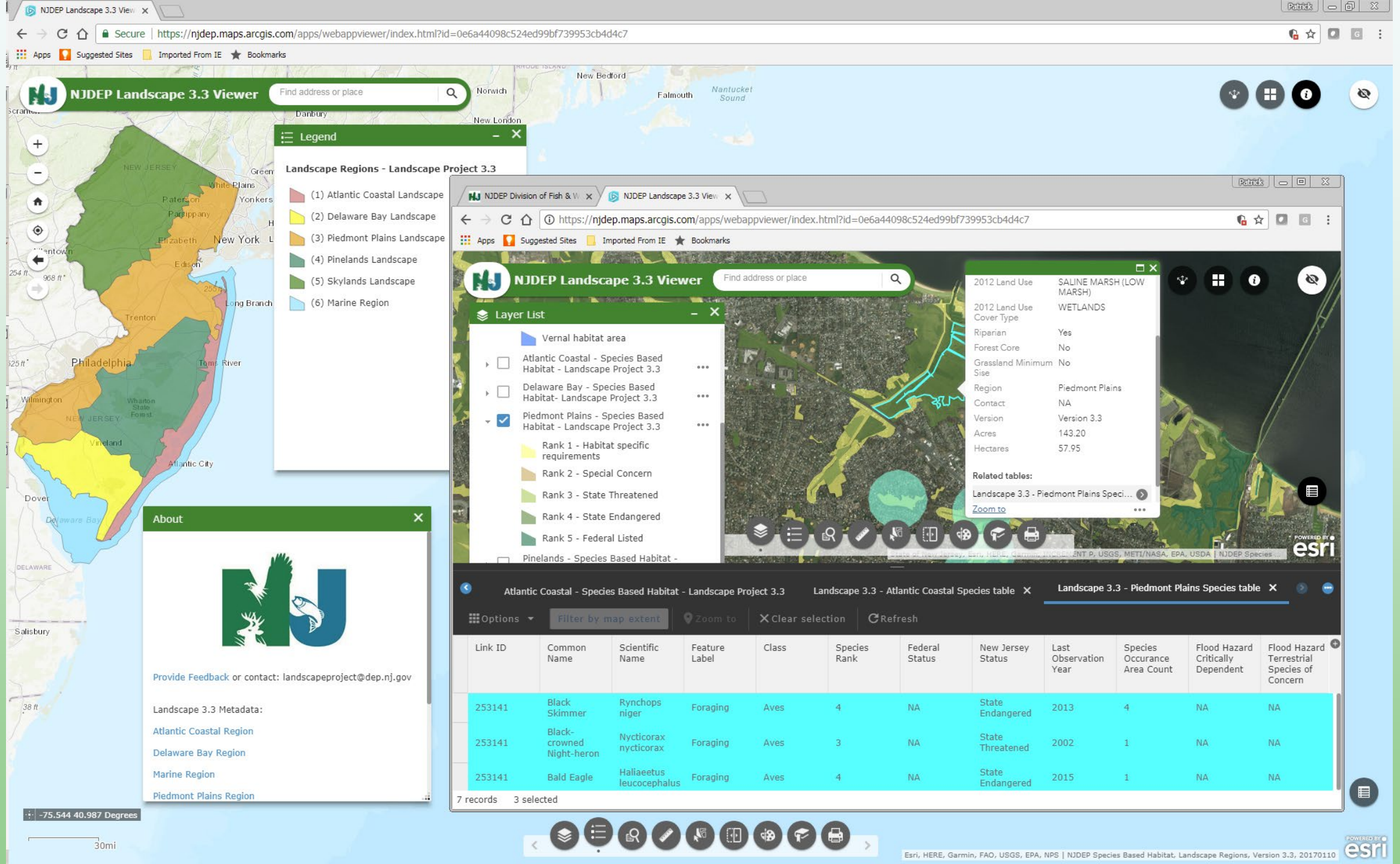
Earthstar Geographics | New Jersey Office of Information Technology (NJOIT), Office of Geographic Information Systems | NJDEP
POWERED BY esri


NJDEP Landscape 3.3 Viewer
Find address or place
Legend
Landscape Regions - Landscape Project 3.3
(1) Atlantic Coastal Landscape
(2) Delaware Bay Landscape
(3) Piedmont Plains Landscape
(4) Pinelands Landscape
(5) Skylands Landscape
(6) Marine Region
About
Provide Feedback or contact: landscapeproject@dep.nj.gov
Landscape 3.3 Metadata:
Atlantic Coastal Region
Delaware Bay Region
Marine Region
Piedmont Plains Region
Layer List
Vernal habitat area
Atlantic Coastal - Species Based Habitat - Landscape Project 3.3
Delaware Bay - Species Based Habitat- Landscape Project 3.3
Piedmont Plains - Species Based Habitat - Landscape Project 3.3
Rank 1 - Habitat specific requirements
Rank 2 - Special Concern
Rank 3 - State Threatened
Rank 4 - State Endangered
Rank 5 - Federal Listed
2012 Land Use SALINE MARSH (LOW MARSH)
2012 Land Use Cover Type WETLANDS
Riparian Yes
Forest Core No
Grassland Minimum Sise No
Region Piedmont Plains
Contact NA
Version Version 3.3
Acres 143.20
Hectares 57.95
Related tables:
Landscape 3.3 - Piedmont Plains Speci...
Zoom to
Atlantic Coastal - Species Based Habitat - Landscape Project 3.3
Landscape 3.3 - Atlantic Coastal Species table
Landscape 3.3 - Piedmont Plains Species table
Options
Filter by map extent
Zoom to
Clear selection
Refresh
Link ID | Common Name | Scientific Name | Feature Label | Class | Species Rank | Federal Status | New Jersey Status | Last Observation Year | Species Occurance Area Count | Flood Hazard Critically Dependent | Flood Hazard Terrestrial Species of Concern
253141 | Black Skimmer | Rynchops niger | Foraging | Aves | 4 | NA | State Endangered | 2013 | 4 | NA | NA
253141 | Black-crowned Night-heron | Nycticorax nycticorax | Foraging | Aves | 3 | NA | State Threatened | 2002 | 1 | NA | NA
253141 | Bald Eagle | Haliaeetus leucocephalus | Foraging | Aves | 4 | NA | State Endangered | 2015 | 1 | NA | NA
7 records 3 selected
-75.544 40.987 Degrees
30mi
Esri, HERE, Garmin, FAO, USGS, EPA, NPS | NJDEP Species Based Habitat, Landscape Regions, Version 3.3, 20170110