30th Annual Mapping Contest Maps

Analytical Presentation

SOURLAND CONSERVANCY

SOURLAND REGION LAND PRESERVATION ANALYSIS MAP

PROJECT OVERVIEW

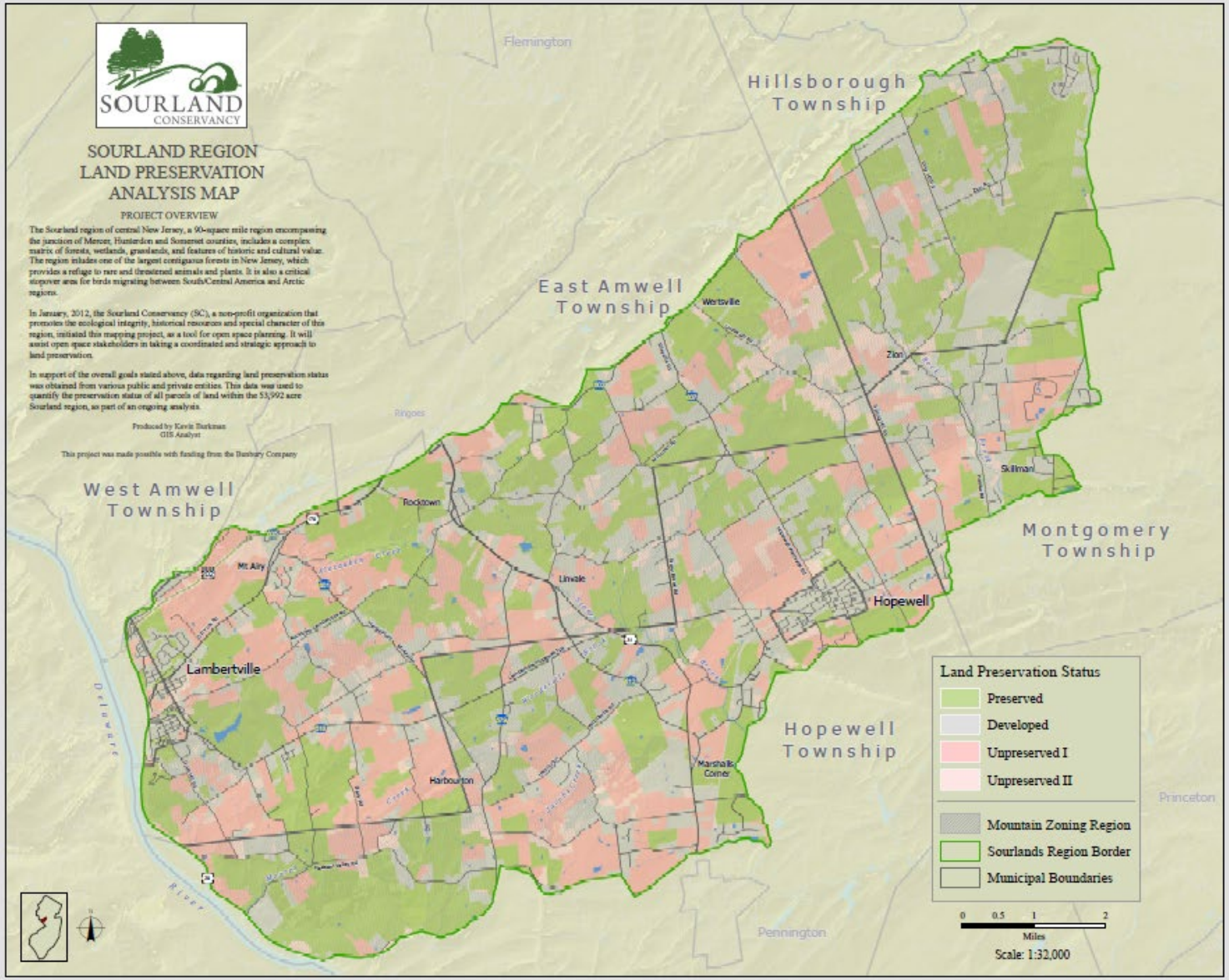
The Sourland region of central New Jersey, a 90-square mile region encompassing the junction of Mercer, Hunterdon and Somerset counties, includes a complex matrix of forests, wetlands, grasslands, and features of historic and cultural value. The region inludes one of the largest contiguous forests in New Jersey, which provides a refuge to rare and threatened animals and plants. It is also a critical stopover area for birds migrating between South/Central America and Arctic regions.

In January, 2012, the Sourland Conservancy (SC), a non-profit organization that promotes the ecological integrity, historical resources and special character of this region, initiated this mapping project, as a tool for open space planning. It will assist open space stakeholders in taking a coordinated and strategic approach to land preservation.

In support of the overall goals stated above, data regarding land preservation status was obtained from various public and private entities. This data was used to quantify the preservation status of all parcels of land within the 53,992 acre Sourland region, as part of an ongoing analysis.

Produced by Kevin Burkman
GIS Analyst

This project was made possible with funding from the Dunbury Company



DATA ANALYSIS

Four preservation status categories were designated for parcels in the Sourland region:

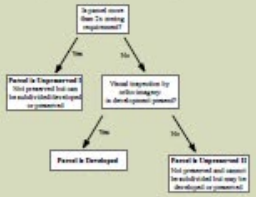
Preserved: Any parcel of land that was identified as a public park/preserve, preserved/owned by preservation organizations, private land with open space easements, and preserved farmland.

Developed: Land that cannot be further developed or preserved, or is considered to be "built-out" (urban, retail, industrial areas). This includes parcels of land that are less than two times the minimum zoning requirement. A visual inspection of the parcel with high resolution aerial imagery was used. If development is observed, the parcel is categorized as "Developed".

Unpreserved I: Land that is currently not preserved but can be subdivided/developed or preserved.

Unpreserved II: Land that is not preserved and cannot be subdivided, due to zoning restrictions, but may be developed or preserved.

Since a parcel cannot be subdivided unless it is at least twice the size of the minimum zoning requirement, the following procedure is used to determine Unpreserved status:



ANALYSIS SUMMARY

NOTE: A detailed data summary/maps of the analysis is found along the bottom main project map.

The analysis found that over 22,000 acres, or 41% of the total Sourland region, have been permanently protected, including 10,000 acres that are accessible to the public, in the form of parks and preserves.

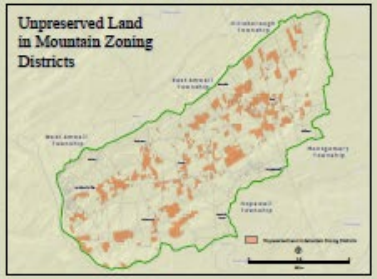
Nearly 15,000 acres, 27% of the region's total area, are found in a developed condition. Most of this category comprised of parcels in sub-divisions and rural/semi-rural parcels. A small portion of the total is part of the dense urban corse of Lambertville and Hopewell Borough.

16,000 acres, some 31% of the Sourland region, is categorized as unpreserved, with a vast majority falling in to Unpreserved I category; this land, found largely in the region's Mountain Zoning Districts, is most vunerable to future development, and contains some of the Sourland's most important environmentally important landscapes.

STRATEGIC PRESERVATION OPPORTUNITIES

The Mountain Zoning Districts comprise 30,077 acres of the Sourland region, or 54% of its total area. The analysis found that there are 7,543 acres of land in the Mountain Zoning District that are unpreserved. These districts, located mostly along the higher elevations of Sourland Mountain, are located at a convergence of critical environmental features, including wetlands, large contiguous forests, limiting geology, characterized by low rates of recharge for bedrock aquifers and low yielding wells, as well as critical habitat for threatened and endangered species.

The findings of this analysis, particularly in the Mountain Zoning Districts, can support municipalities and land conservation organizations in targeting key land parcels for preservation and conservation in the Sourland region. Additionally, the analysis can assist in formulating land use policies and regulations that promote sustainability and resource preservation.



PROJECT DATA SOURCES

Total Preserved Acres: 22,076 (41% of total Sourland region)

Hillsborough Twp.:	4,273 acres (53%)
East Amwell Twp.:	4,327 acres (45%)
Hopewell Twp.:	7,085 acres (39%)
Montgomery Twp.:	1,830 acres (37%)
West Amwell Twp.:	4,451 acres (36%)
Lambertville Boro.:	69 acres (16%)
Delaware Twp.:	0 acres (0%)

(Ranked by % of municipality Preserved land within the Sourland region)

Total Developed Acres: 14,814 (27% of total Sourland region)

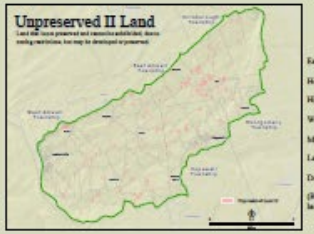
Delaware Twp.:	17 acres (100%)
Lambertville Boro.:	209 acres (59%)
Montgomery Twp.:	1,753 acres (36%)
Hillsborough Twp.:	2,589 acres (32%)
East Amwell Twp.:	2,634 acres (27%)
Hopewell Twp.:	4,878 acres (27%)
West Amwell Twp.:	2,411 acres (19%)

(Ranked by % of municipality Developed land within the Sourland region)

Total Unpreserved I Acres: 13,931 (26% of total Sourland region)

West Amwell Twp.:	4,989 acres (40%)
Hopewell Twp.:	5,131 acres (28%)
Lambertville Boro.:	91 acres (22%)
Montgomery Twp.:	1,053 acres (22%)
East Amwell Twp.:	1,787 acres (18%)
Hillsborough Twp.:	858 acres (11%)
Delaware Twp.:	0 acres (0%)

(Ranked by % of municipality Unpreserved I land within the Sourland region)



Total Unpreserved II Acres: 2,527 (5% of total Sourland region)

East Amwell Twp.:	961 acres (10%)
Hopewell Twp.:	1,011 acres (6%)
Hillsborough Twp.:	367 acres (5%)
West Amwell Twp.:	187 acres (5%)
Montgomery Twp.:	143 acres (3%)
Lambertville Boro.:	0 acres (0%)
Delaware Twp.:	0 acres (0%)

(Ranked by % of municipality Unpreserved II land, within the Sourland region)

2017 Solar Siting Analysis Update

Ryan Gergely
NJDEP Bureau of Energy and Sustainability

Introduction

In October 2012, shortly after the Solar Act was signed into legislation, the NJDEP's Bureau of Energy and Sustainability—then under the name Sustainability and Green Energy (SAGE)—developed the Solar Siting Analysis. The SSA document and supporting mapping application was developed to aid the Department, local communities, and potential developers in planning for solar installations by distinguishing between sites where the Department encourages solar development from those where the Department discourages solar development. As a clean energy source, solar has many environmental benefits associated with it that can unfortunately be lost if solar projects are not properly sited. The SSA document and supplemental mapping product is intended to be used as a guidance tool to evaluate proposed projects based on the land use type in the proposed location, and should not be used to automatically disqualify projects from consideration.

In March 2017, the Bureau of Energy and Sustainability set out to update the 2012 Solar Siting Analysis to reflect the changes that have taken place in the state, as well as changes in solar energy technology and markets during this time.

Data and Methodology

This analysis utilizes Anderson Codes for Land Use/Land Cover in order to determine which areas the Department would encourage and discourage solar installations. The 2012 Solar Siting Analysis utilized the Land Use/Land Cover data from 2007 to determine these areas. This update (2017) utilizes the most current Land Use/Land Cover data available for the State of New Jersey, which was completed in late 2012.

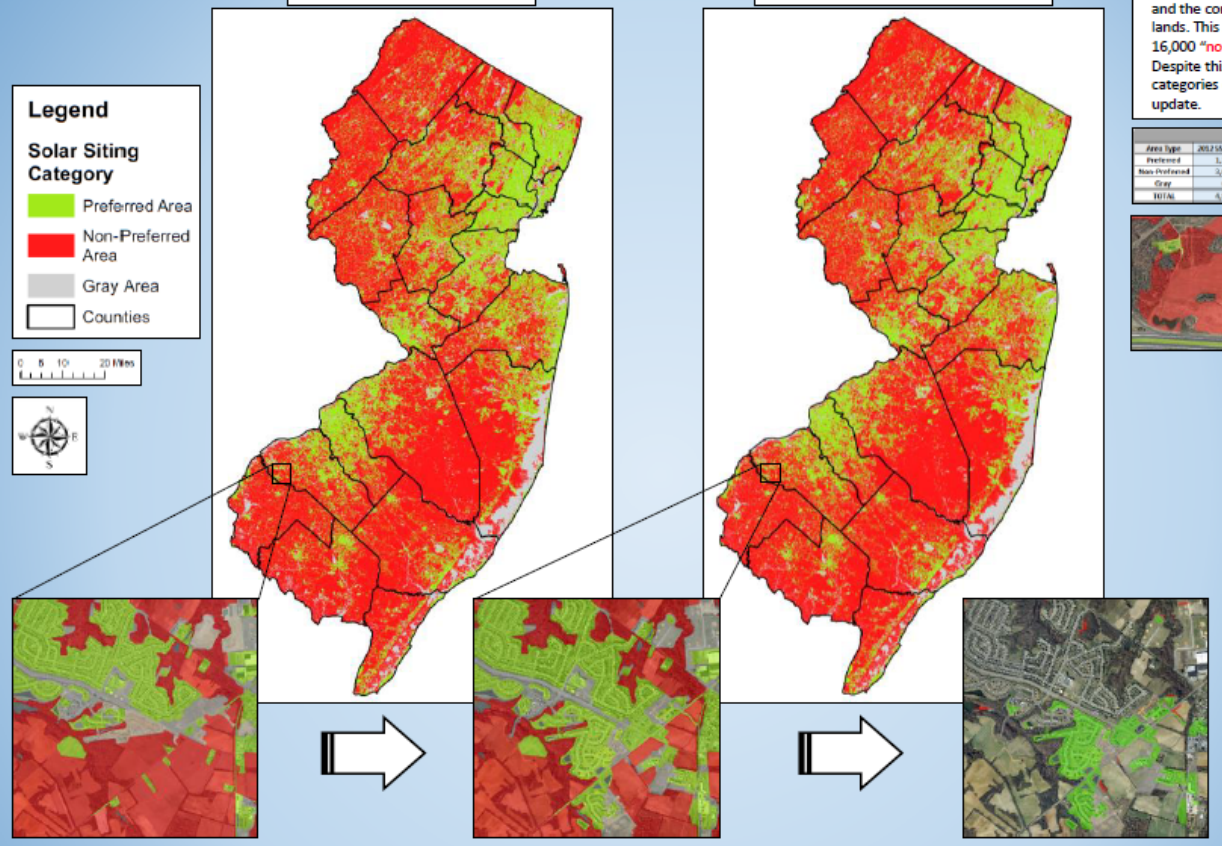
Each Anderson Code in the LU/LC data layer was assigned a category based on the Department's goals and preference for installing solar:

- Preferred Areas—characterized primarily as developed urban lands or barren land;
- Non-Preferred Areas—natural lands, dominated by forests, wetlands, agriculture, and open space that the Department sets out to protect and preserve;
- Gray Areas—water bodies and other land use types that do not fit into the other categories.

Once each Anderson Code was assigned a category for preference, they were integrated into the 2012 LU/LC GIS data layer, which was then clipped to the coastline. The acreage for each resulting polygon was calculated in ArcMap, prior to exporting the attribute table into Microsoft Excel for further analysis. In addition, a spatial overlay was conducted to compare the 2012 SSA GIS layer and the 2017 SSA Update GIS layer in order to identify areas where the siting preference category had changed so that additional analyses of the land use changes could be conducted (seen in the images above and in the top right).

2012 Solar Siting Analysis

2017 Solar Siting Analysis Update



Results

Between 2007 and 2012 (the dates of the LU/LC used for the 2012 SSA and the 2017 SSA Update respectively), there were minor changes to the overall land use in the state (see table below). The amount of "preferred area" for installing solar increased by almost 27,000 acres—mainly due to development and the conversion of forests and/or agricultural lands to urban lands. This same trend can be seen through the loss of roughly 16,000 "non-preferred" acres and roughly 10,000 "gray" acres. Despite this change, the overall percentage of each of these categories did not change from the 2012 analysis to the 2017 update.

Solar Siting Analysis

Area Type	2012 SSA Acreage	2017 SSA Acreage	Acreage Change	2012 % Total	2017 % Total	% Total Change
Preferred	1,328,084.19	1,355,375.11	26,490.72	27%	27%	0%
Non-Preferred	5,605,301.79	5,589,765.26	-15,630.53	61%	61%	0%
Gray	834,891.45	804,917.01	-29,864.44	12%	12%	0%
TOTAL	8,968,860.63	8,970,057.36	1,167.73	100%	100%	0%

This is an example of a site that was undeveloped cropland/bottomland in 2007, and was therefore shown as "Non-Preferred". However, in 2011 the Capital Health Medical Center in Hopewell was constructed, so the classification changed to "Preferred" based on the updated 2012 land use (Commercial/Services).

Discussion and Conclusion

When considering siting solar PV projects, existing impervious surfaces, such as residential and commercial rooftops and paved roadways and parking lots (for elevated solar carport systems), are most desirable since siting solar projects in these locations does not introduce any additional direct land disturbance that might affect ecosystem services. Siting solar in these locations is also in line with the Department's mission to preserve natural lands and open space.

Based on the 2017 SSA Update, roughly 27% of the State of New Jersey can be classified as "preferred" for installing solar, largely a result of urbanized development. While this tool can be used to identify where the "preferred areas" are in the State, there are many other considerations that should be taken into account when evaluating a proposed solar PV installation, including (but not limited to):

- Location and proximity to flood hazard areas;
- Location and proximity to threatened and endangered species;
- Location and proximity to environmental hazards (i.e. landfills, brownfields, and other contaminated sites)

Future land use changes and changes in solar technology will also have to be taken into account in future updates to this analysis. For example, the land use classification for Artificial Lakes (5300) is currently "gray" for the sake of this analysis. However, a new trend in solar technology is "floating solar"—or siting solar installations on floating pontoons on reservoirs and lakes. As these installations become more popular and economically feasible, the classification of Artificial Lakes may have to be adjusted to "preferred areas". Similar changes will also have to be considered as they are discovered and become more prevalent throughout the country and State.

Applying the Solar Siting Analysis

The Solar Siting Analysis can be used to evaluate a site, prior to solar PV installation, in order to identify which sections of the property would be best for siting the solar project. In the hypothetical example below, the SSA was applied to the "proposed site" and indicates which areas would be most preferred for solar—roughly 28% of the property, characterized by industrial rooftop and impervious parking lot locations. The remainder of the property is deemed to be non-preferred (34%) or gray (38%), characterized by mixed forest and wetlands, in addition to artificial lakes and other urban lands.

New Jersey Landscape Project Version 3.3

Saved to V: Drive

life habitat mapping for community use planning and species conservation

SPECIES OCCURRENCE DATA DEVELOPMENT

- Imperiled wildlife occurrence data are stored and managed in the New Jersey **Biotics** database.
- Occurrence data are based on field observations from a variety of sources including surveys carried out by the **Endangered and Nongame Species Program (ENSP)** and reports from the general public.

- All records are evaluated according to an established protocol to ensure reliability.
- **Feature Labels** are assigned to describe the type of occurrence (e.g., nest, den, etc.)

Feature Label	SOA
Hibernaculum	4 kilometer buffer
Non-breeding Sighting	2 kilometer buffer
Maternity Colony	2 kilometer buffer
Breeding Sighting	2 kilometer buffer

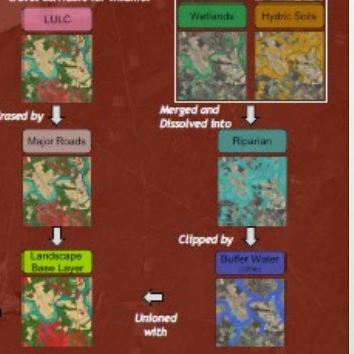
Endana Bat Feature Labels and SOAs

- A **Species Occurrence Area** (SOA) is a polygon applied to each species occurrence location and used to value habitat in the Landscape Project.
- The size of a SOA is based on the average territory/home range size or other life history parameters as reported in peer-reviewed scientific literature or through ENSP research.

SPECIES-BASED HABITAT

LANDSCAPE BASE LAYER DEVELOPMENT

- **NJDEP Land Use/Land Cover (LULC)** is the foundation of the base layer from which wildlife habitat is derived.
- **NJDOT Major Roads** are used to bisect LULC as they can serve as barriers to movement for many species.
- **Riparian Corridors** provide habitat and serve as critical travel corridors for wildlife.



- SOAs are overlaid onto species-specific habitat patches and patches are classified, or "valued," based on the status of the species present as follows:

- The Landscape Project habitat patch mapping approach is designed to capture and represent the habitat needed to support the local population indicated by the individual SOA.

- Below the red circle represents a SOA. Areas depicted in green are LULC polygons that can be valued, while the valued LULC polygons are depicted in blue. a) Limited Extent - LULC polygons that directly intersect the SOA are valued. b) Contiguous Area - LULC polygons are dissolved/combined into contiguous areas and then valued upon intersection with the SOA. c) Cardinal-Proximate - a cardinal set of LULC classes that can be valued is depicted in dark green and dark blue, while a proximate set is depicted in light green and light blue. The cardinal LULC polygons are valued upon intersection with the SOA (dark blue) and the proximate set (light blue) is valued based on adjacency to the valued cardinal set.

FRESHWATER MUSSEL HABITAT

- Using NJDEP Stream Network data, a subset of the USGS 1:24,000 high-resolution National Hydrography Dataset (NHD), water body centerline and stream centerline data are valued exclusively by freshwater mussel species occurrence areas.

Eastern Pondmussel (Threatened)

- In order to form representative "patches" of habitat from the NHD Streams 2002 layer, centerlines were broken at the confluence of two or more streams or the inflow/outflow of a water body. Stretches of stream intersected by a mussel SOA are valued as habitat.

Mussel SOA Intersection stream segments

VERNAL HABITAT

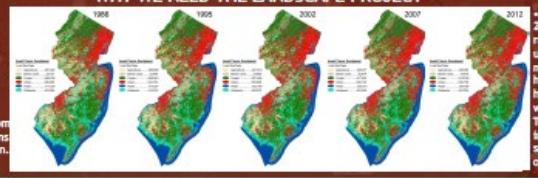
- ENSP partnered with Rutgers University Center for Remote Sensing and Spatial Analysis (CRSSA) to develop a method for mapping potential vernal pools throughout New Jersey.
- "Vernal habitat" includes a vernal pool - or the area of ponding - plus any freshwater wetlands adjacent to the vernal pool.
- All areas mapped as "potential vernal habitat areas" and "vernal habitat areas" are derived from a point location estimated to be the center of an individual vernal pool and include all areas within 300 meters of the point.

WHY WE NEED THE LANDSCAPE PROJECT

Hasse and Lathrop (2010). *Changing Landscapes in the Garden State: Urban Growth and Open Space Loss in NJ 1986 thru 2007:*

- In the 1986-2007 period, urbanization resulted in the loss of ~5,000 acres of wildlife habitat per year.
- Although this rate slowed significantly from 2007-2012, much of the habitat that remains is less suitable due to habitat fragmentation.

http://cgit.rutgers.edu/projects/lpc/



- **NJDEP Land Use/Land Cover 1986 - 2007.** New Jersey's Landscape is rapidly changing. Since 1986, urbanization has resulted in the loss of more than 5,000 hectares of wildlife habitat per year. Moreover, much of the habitat that remains is less suitable for wildlife due to habitat fragmentation. This is especially detrimental to imperiled wildlife, as many of these species require large, contiguous tracts of habitat.

LANDSCAPE PROJECT APPLICATIONS

- Prioritize Conservation Acquisitions
- Environmental Review/Impact Assessment
- Environmental/Natural Resource Inventories
- Regional Conservation Planning
- Land Use Regulation and Management

Visit:
http://www.state.nj.us/dep/fgw/ensp/landscape/index.htm

DATA AVAILABILITY

Report and supplemental documentation

Downloading GIS data from DEP's Bureau of GIS:
http://www.nj.gov/dep/gis/

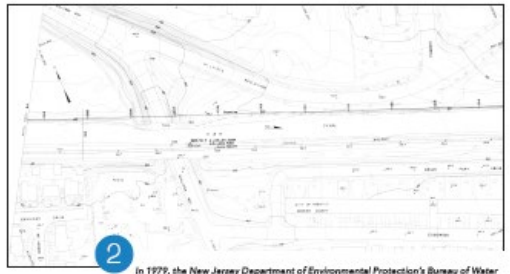
Use DEP's interactive mapping application site:
https://www.nj.gov/dep/gis/

REVITALIZING LEGACY DATA

Along the Delaware & Raritan Canal

1

The Delaware & Raritan Canal is a 60 mile long historic canal connecting the Delaware River and western New Jersey with New Brunswick and the Raritan Bay. The canal cost slightly less than $3,000,000.00 to build, and was completed in 1834. Presently, the canal is designated as a state park, and is operated by the New Jersey Water Supply Authority. On a daily basis, the canal transfers 60,000,000 gallons of water from the Delaware watershed to the Raritan Valley, and supplies almost 1,000,000 people with drinking water.

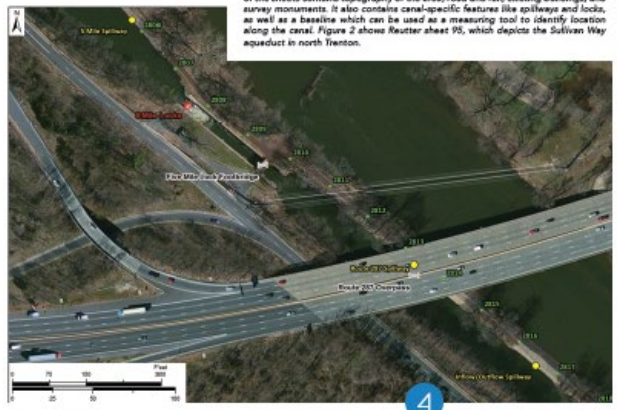


2

In 1979, the New Jersey Department of Environmental Protection's Bureau of Water Facility Operations commissioned a full survey of the Delaware & Raritan Canal to be drawn by John G. Reutter Associates of Camden. The surveys were broken into 1000 foot sections and printed on ledger paper. The full set of Reutter sheets contains 282 pages detailing the entire length of the operational canal. The detail of the sheets contains topography of the area, road and rail, existing buildings, and survey monuments. It also contains canal-specific features like spillways and locks, as well as a baseline which can be used as a measuring tool to identify location along the canal. Figure 2 shows Reutter sheet 90, which depicts the Sullivan Way aqueduct in north Trenton.

The goal of the Reutter sheet project involved a full georeferencing of the data set. Each sheet was digitally laid in its general vicinity within the software, and then pinned to its exact location. Once the sheets were georeferenced, new layers containing the data depicted on the sheets could be created. Figure 3 highlights Reutter sheet 37, which depicts downtown Lambertville. New data layers containing 100ft station numbers, as well as feature layers showing locations of spillways and bridges could easily be created based on the historic surveys.

3



4

After the data from the Reutter sheets was extracted and digitized into its own geospatial layer, the Reutter sheets could be removed, leaving behind a comprehensive layer of canal features. These layers can now be laid over an aerial image, or incorporated into any map. Figure 4 highlights the section of the canal running under Route 287 in Somerset.

5

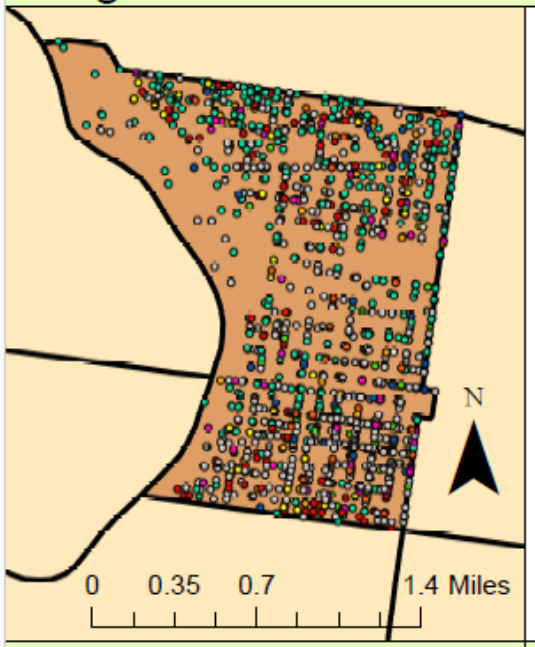
Additionally, the georeferenced Reutter sheets can now be transformed into additional formats. Figure 5 shows Reutter sheet 50 as a KML file. Opening the sheet in Google Earth allows for the sheet to be laid over a 3D rendering of the land in its vicinity. The newly digitized features can also be viewed in Google Earth to give a complete view of the canal section.

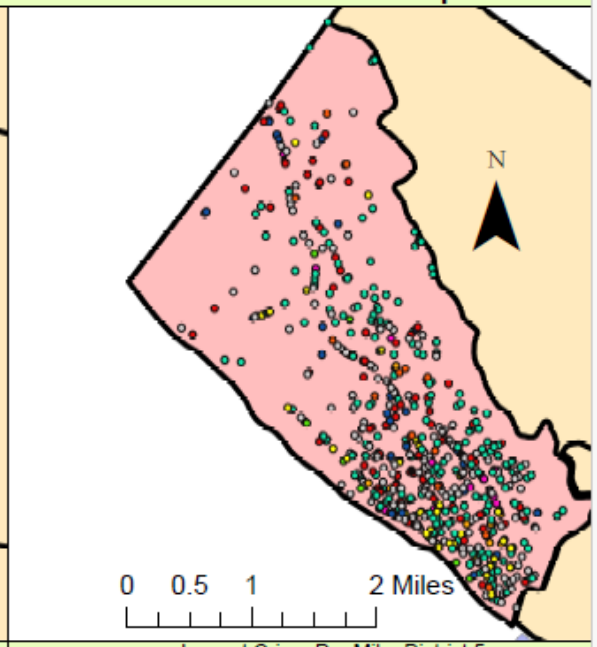
Jared Berger
Geospatial Analyst
New Jersey Water Supply Authority

Map Prepared: April 2017
NJDEP GIS Mapping Contest

Data Sources:
NJWSA; NJDEP; TIGER Line Shapefiles; ESRI; Google

High and Low Crime Districts in Philadelphia



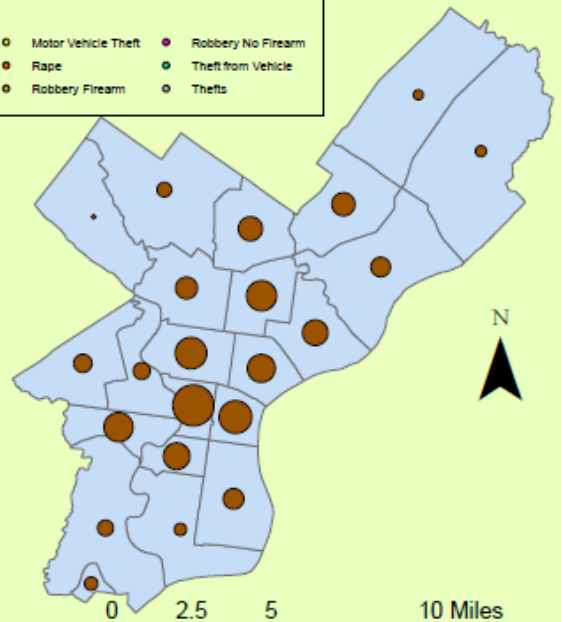


Highest Crime Per Miles: District 9
Number of Crimes Per Square Mile: 1604

Lowest Crime Per Mile: District 5
Number of Crimes Per Square Mile: 145.12

Legend

- Aggravated Assault Firearm
- Aggravated Assault No Firearm
- Burglary Non-Residential
- Burglary Residential
- Homicide - Criminal
- Homicide - Gross Negligence
- Motor Vehicle Theft
- Rape
- Robbery Firearm
- Robbery No Firearm
- Theft from Vehicle
- Thefts



Noah Berkowitz
Rowan Geo Info Systems
2/4/15
Lab1
Professor: Mr.Farrell
Projection: Lambert Conformal Conic
Data From: City of Philadelphia and the Philadelphia Police Department

Water Resource Modeling for Stewardship and Preservation

Ken Fung and Barbara Davis
The Land Conservancy of New Jersey

Abstract

The 2016 Update to Sussex County's Open Space and Recreation Plan, produced by The Land Conservancy of New Jersey, assesses existing public lands and open space to prioritize and implement land stewardship and preservation initiatives. This GIS mapping and modeling project identifies strategic opportunities to enhance the water quality functioning of the land, and offers a targeted, site specific action program. Projects are identified to protect water resources, expand existing parklands, natural areas and trails in the county. The Plan inventories currently protected open space and identifies priority areas for conservation and restoration built upon scientifically based water quality metrics and local priorities for land protection. The mapping analysis offers the County the ability to analyze the properties based on unique water quality and/or water resource attributes.

Summary

There are 16,911 acres of non-preserved lands in Sussex County that are "high priority" per the water resource modeling analysis. Once all properties that are below 1.00 acres in size are removed, there are 14,776 acres potentially available for preservation. Screened further, those properties located within 500 feet of preserved land represents 9,959 acres of high priority lands in Sussex County, in 1,468 properties. Note, this is solely the acreage of the portion of the tax parcel that is identified as "high priority" for water resource protection. The total acreage of these 1,468 tax parcels is 52,159 acres. Many tax parcels have relatively small high priority areas as a percentage of the overall property, or in terms of total high priority acres. If they are important links for river corridors or other masses of high priority areas, then the parcel may become a potential acquisition site, even though their total high priority area or percentage was low. On the other hand if they are not important links, they may fall off the list.
There are many ways to review and use the water resource modeling results. These maps and their underlying datasets provide the basis for local decision makers to assess and prioritize parcels for stewardship, conservation, and protection.

Focus Area 1: Hydrology

1. Stressed Watersheds: Current Utilization
Greater than 85% of Available Water

2. Prime Recharge Areas

3. Wetlands

4. Flood Hazards and Floodprone Areas

5. Forest Area

Focus Area 2: Stream and Aquifer Quality

6. Riparian Areas

7. Karst Topography (Soluble Carbonate Rocks)

8. Public Wellhead Protection Areas

9. Forest Area

10. Surface Water Reservoir Areas

Focus Area 3: Aquatic Ecosystem Functions

Riparian Areas: Definition

11. Headwaters and Riparian Areas

12. Unique and Unusual Aquatic Habitats

12. Aquatic Habitats for Threatened and Endangered Species

13. Wetlands Habitat for Threatened and Endangered Species

Integration

Overall Composite: Hydrology, Streams & Aquifer Quality, and Aquatic Ecosystem Functions* (*Excluding Preserved Lands)

June 2016

Priorities for Land Preservation in Sussex County based on Hydrology with Streams & Aquifer Quality with Aquatic Ecosystems Functions

High to Low Priority

- Composite Score 10 to 12
- Composite Score 8 & 9
- Composite Score 7
- Composite Score 6
- Composite Score 5
- Composite Score 4
- Composite Score 1 to 3
- Preserved Lands
- Municipal Boundaries
- Water Bodies

Map Composite of Hydrology, Streams & Aquifer Quality, and Aquatic Ecosystem Functions (excluding preserved lands) shows the distribution of the composite characteristics by individual groups. Because there were virtually no areas where 11 or 12 of the characteristics were present (less than 18 acres) and to make the mapping clearer, the characteristics are mapped in seven groupings, 1-3, 4, 5, 6, 7, 8-9 and 10-12. Areas with seven characteristics present total 5,158 acres, or 1.50% of the County and those with 8 to 9 another 2,887.12 acres; those with 10-12 total just over 130 acres.

All Three Components

Scores	Acres	Percent	%County
12	0.006	0.00%	0.00%
11	12.80	0.01%	0.00%
10	120.12	0.07%	0.04%
9	610.18	0.35%	0.18%
8	2,276.94	1.30%	0.66%
7	5,157.68	2.94%	1.50%
6	8,733.96	4.98%	2.55%
5	16,490.06	9.41%	4.81%
4	29,023.48	16.56%	8.46%
3	39,983.58	22.81%	11.66%
2	42,473.32	24.23%	12.38%
1	30,428.11	17.36%	8.87%
	175,310.24	100.00%	51.10%

Sussex County

Water Resource Modeling

The 2016 Sussex County Open Space and Recreation Plan Update focuses on water quality and protection of its water resources. Much of the planning documentation in Sussex County, such as the 2015 Wastewater Management Plan and 2014 Strategic Growth Plan Update, recognize protecting and managing water quality and quantity as high priority. Groundwater is the major source of potable water for residents and through municipal surveys, master plans and comments at the public outreach meetings, residents and local officials strongly support the permanent protection and stewardship of their watershed lands.

Question: How are water resource priorities determined?

In determining how best to target prime areas for protection of the resources that affect water quality and water supply, three "focus areas" were identified and mapped:

1. Hydrology
2. Stream and Aquifer Quality
3. Aquatic Ecosystems Functions

For each of these focus areas a set of characteristics was identified to quantify the resource. One or more data sources were identified and, where needed, metrics were developed to define a standard of measurement to determine how the characteristic would be mapped. As an example, one characteristic mapped for Hydrology is prime groundwater recharge areas. The metric for determining these areas are those areas with the highest recharge areas in a subwatershed that, in aggregate, provides 40% of drought-period recharge.

The data and metrics for all characteristics are detailed on this poster. The steps taken to develop the Water Resources Model are:

- Determine the water resource focus areas
- Specify up to five characteristics for each focus area
- Identify the data sources and metrics for each characteristic
- Map the individual characteristics
- Create composite maps for each focus area that give an equal weight to each characteristic using a presence/absence scoring approach)

Modeling included:
i. The first step plots the areas by each possible score – from 1, where only one characteristic is present, to 4 or 5, where all the characteristics are present, assigning a different color to each score. For example, if a specific area of the County as defined by a GIS polygon is identified as meeting the criteria for three of five characteristics within that focus area, the polygon would be given a color associated with a score of three.
ii. The second step, aggregates the detailed scores into two groups to show a) higher and b) lower priority areas by, for example, plotting areas that have 1 to 2 characteristics as lower priority and areas that have 3 to 5 characteristics as higher priority.
iii. Once the mapping for each focus area was completed, additional mapping produced an overall composite map that merged the three focus areas, identifying the areas of highest overall priority for preservation.

Composite Mapping for Focus Area 1: Hydrology

This map plots areas where one, two, three, four or all five Hydrological characteristics are present. It shows very small patches having all five characteristics present, totaling only 58.75 acres, or 0.02% of the entire County. By comparison, those areas having at least one characteristic present total 136,437 acres, or 49.4% of the County.

It also aggregates the scores to differentiate between higher priority and lower priority areas, with higher priority areas having three to five characteristics present and lower priority areas having only one or two characteristics present. This totals 22,078 acres (8.4% of the County) of high priority lands for protecting hydrology.

Scores	Acres	Percent	%County
5	58.75	0.02%	0.02%
4	551.07	0.20%	0.16%
3	22,670.12	8.08%	6.43%
2	111,783.36	40.90%	32.56%
1	136,736.87	50.80%	40.44%
	273,126.16	100.00%	79.62%

Priorities for Land Preservation in Sussex County: Hydrology
Higher Priority: Score 3 to 5
Lower Priority: Score 1 to 2
Municipal Boundaries
Water Bodies

Composite Mapping for Focus Area 2: Stream and Aquifer Quality

This map plots areas where one, two, three or four of the stream and aquifer quality characteristics are present. Four characteristics were found to be present on 2,257 acres, or 0.66% of the County. Almost 69% of the County had at least one characteristic present and 30% had at least two.

It also aggregates the data scores to differentiate between higher priority and lower priority areas, with higher priority areas having either three or four of the characteristics present. There are 23331 acres (7.5% of the County) of high priority lands.

Scores	Acres	Percent	%County
4	2,257.66	0.77%	0.66%
3	23,311.61	7.91%	6.83%
2	104,288.70	35.40%	30.40%
1	164,774.93	55.93%	48.03%
	294,632.71	100.00%	85.89%

Priorities for Land Preservation in Sussex County: Stream & Aquifer Quality
Higher Priority: Score 3 and 4
Lower Priority: Score 1 and 2
Municipal Boundaries
Water Bodies

Composite Mapping for Focus Area 3: Aquatic Ecosystem Functions

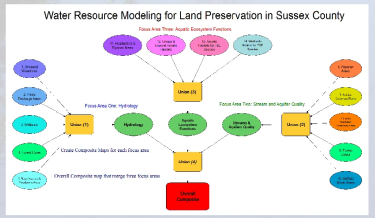
This map plots areas where one, two, three or four of the aquatic ecosystem function characteristics are present. Four characteristics were found to be present on 283 acres or 0.08% of the County. About 27% of the County had at least one characteristic present.

It also splits the data between higher priority and lower priority areas, with the higher priority areas having two to four of the four characteristics in the focus area present. There are 34,536 acres (10% of the County) of higher priority lands.

Scores	Acres	Percent	%County
4	282.96	0.21%	0.08%
3	6,363.30	4.81%	1.85%
2	34,536.37	26.12%	10.07%
1	91,055.78	68.86%	26.54%
	132,238.42	100.00%	38.55%

Priorities for Land Preservation in Sussex County: Aquatic Ecosystem Functions
Higher Priority: Score 2 and 4
Lower Priority: Score 1
Municipal Boundaries
Water Bodies

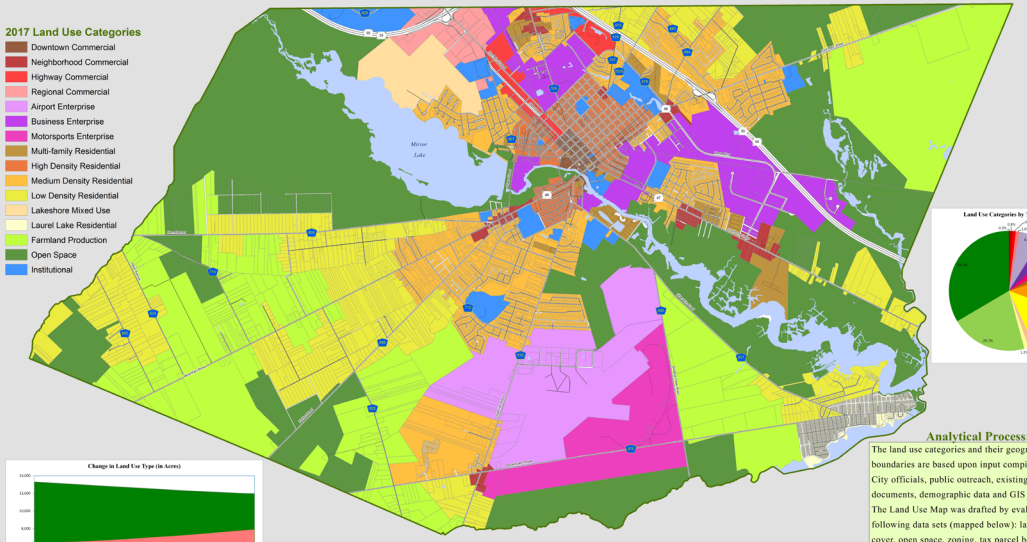
Water Resource Modeling for Land Preservation in Sussex County

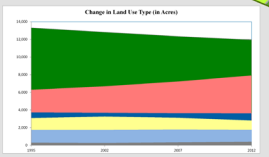


Acknowledgements

2017 City of Millville Land Use Plan Element
Development of Land Use Categories based upon GIS Mapping and Data Analysis

2017 Land Use Categories
- Downtown Commercial
- Neighborhood Commercial
- Highway Commercial
- Regional Commercial
- Airport Enterprise
- Business Enterprise
- Motorsports Enterprise
- Multi-family Residential
- High Density Residential
- Medium Density Residential
- Low Density Residential
- Lakeshore Mixed Use
- Laurel Lake Residential
- Farmland Production
- Open Space
- Institutional

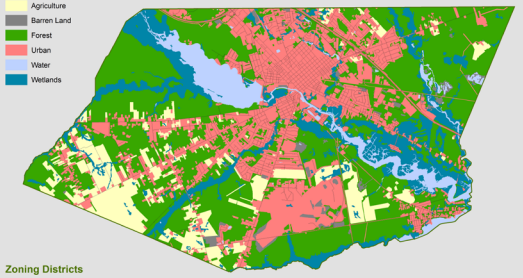




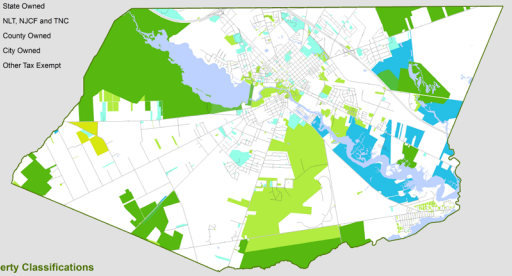
0 2 4
Miles

Analytical Process:
The land use categories and their geographic boundaries are based upon input compiled from City officials, public outreach, existing planning documents, demographic data and GIS analyses. The Land Use Map was drafted by evaluating the following data sets (mapped below): land use/land cover, open space, zoning, tax parcel boundaries, and aerial photography. The datasets were overlaid to determine the proper land use category for each parcel based upon existing conditions, future trends and the goals set forth in the Land Use Plan Element.

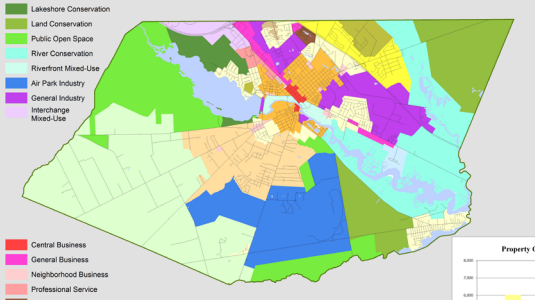
2012 Land Use/Land Cover
- Agriculture
- Barren Land
- Forest
- Urban
- Water
- Wetlands



Public and Non-Profit Owned Land
- State Owned
- NLT, NJCF and TNC
- County Owned
- City Owned
- Other Tax Exempt

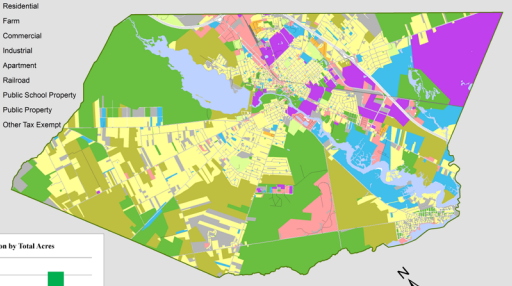


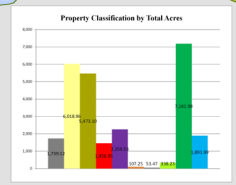
Zoning Districts
- Agricultural Conservation
- Lakeshore Conservation
- Land Conservation
- Public Open Space
- River Conservation
- Riverfront Mixed-Use
- Air Park Industry
- General Industry
- Interchange Mixed-Use



- Central Business
- General Business
- Neighborhood Business
- Professional Service
- Tourism Services
- Office Residential
- Residential 10
- Residential 15
- Residential 20
- Residential 40
- Residential 5
- Residential Mobile Home

Property Classifications
- Vacant
- Residential
- Farm
- Commercial
- Industrial
- Apartment
- Railroad
- Public School Property
- Public Property
- Other Tax Exempt





0 1 2 4
Miles

Date Prepared: January 2017

STATE OF NEW JERSEY
DEPARTMENT OF
COMMUNITY AFFAIRS
LOCAL PLANNING SERVICES

Sources: New Jersey Department of Community Affairs, New Jersey Department of Environmental Protection, New Jersey Department of the Treasury - Division of Taxation, State of New Jersey Office of GIS, City of Millville

Data Integration

Monitoring Sedimentation & Sea Level Rise in the New Jersey Meadowlands

Michael Stepowyj, Saleh Kojak, Brian Wlodawski, Joe Grzyb,
Ildiko Pechmann Ph.d, Francisco Artigas Ph.d
Meadowlands Environmental Research Institute (MERI)

RUTGERS UNIVERSITY | NEWARK
MERI | Meadowlands Environmental Research Institute

Introduction

The purpose of this study was to understand marsh morphodynamics in relation to sea level rise. The Hackensack River Estuary is a low lying area with an average elevation of only a few feet above the 2.5ft (NAVD 88) mean high water tidal mark. Within the remaining 8400 acre wetland areas, exposure to sea level rise poses a threat to the long term survival of the low marsh areas.

A sustainable marsh can be defined as being in a dynamic equilibrium with its environmental factors. The state of equilibrium of a micro-tidal coastal wetland is a result of many factors including sediment availability and sediment settling velocity (Allen, 2000).
Sedimentation rates depend on the pattern and extent of tidal inundation. The remaining area above the intertidal zone can be used to accommodate marsh retreat due to variations in relative sea level rise.

In addition we have implemented Surface Elevation Tables (SETs) to measure the rate of sediment accretion in the marshes, in hopes that the 8400 acres of Meadowlands wetlands are building at a rate that is exceeding rising seas.

This poster highlights tidal inundation coverage and sediment accretion rates in an effort to assess sedimentation at two wetland sites in the New Jersey Meadowlands: Riverbed Wetlands Preserve and Secaucus High School Marsh.

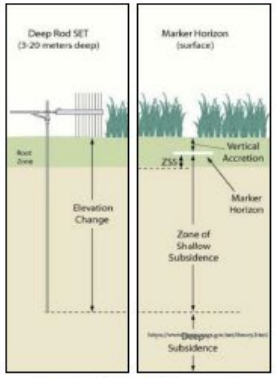
GIS Methods

- Quality 1 LiDAR data was used to create digital elevation models (DEM) for each study area that in turn were used to create the inundation coverage for each site.
- Inundation maps were created for each study area using ArcMap and the study areas' corresponding DEM.

Map of the study sites shown in red From North to South: Secaucus High School Marsh, Riverbed Wetlands Preserve

Surface Elevation Table (SET) Methods

- Three SET benchmark rods were installed and surveyed (2008) to rest on the clay layer below the peat to eliminate compressional movement.
- Feldspar marker horizons are placed at each SET location to measure vertical accretion building up above the marker.
- SET measurements were recorded at four different positions per benchmark rod. One measurement position shown in figure 2.
- These benchmarks help analyze the subsurface dynamics.
- The feldspar horizons measure surficial accumulation.
- Together they explain overall elevation.

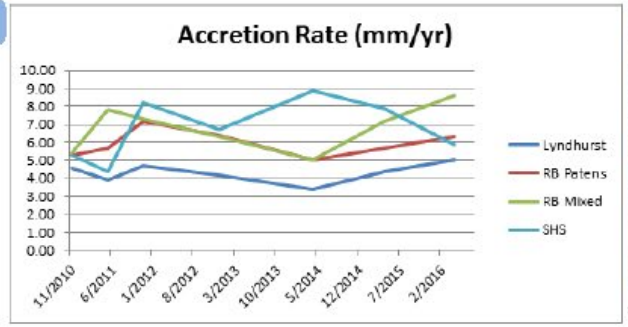


Deep Rod SET and feldspar marker horizon installation diagram

Results

SETs

SET based accretion rates indicate that the marsh surficial buildup is rising at an average rate of approximately 5.0 mm per year.



Left: Accretion being measured above Feldspar horizon, Right: SET measurement being performed by field researcher Joe Grzyb. The plank is used to minimize disruption of the SET Plot area.

The SHS is a 32 acre restored tidal salt marsh (2007).

- Sediment accretion average = 5.5 mm/yr (2.1 times faster) than regional SLR rate
- Percent of area above mean high water = 19%

Areas of Expansion Under a Sea Level Rise Scenario in an Urban Wetlands

Regional sea level rise (SLR) rates = 2.6 mm/year

If SLR > accretion:
Higher elevation areas (not in blue coverage) are important for marsh retreat

Marsh inundation

Riverbend is an undeveloped, 60 acre natural wetland habitat.

- Sediment accretion average = 4.4 mm/yr(1.7 times faster) than regional SLR rate
- Percent of area above mean high water = 28%

Discussion

- Wetlands in the Hackensack Meadowlands district are accreting sediment faster than the regional sea level rise rates (2.6mm/year)
  - Deeper tidal creeks and enhanced waterfowl will lessen sedimentation.
  - Shallower channels coupled with low turbidity in the ebb phase of the tide promotes sedimentation.
- Undeveloped, mature wetlands have more room to accommodate marsh retreat.
  - Available areas for marsh retreat are important part of natural resilience to sea-level rise.

References

Allen JRL. 2000. Morphodynamics of Holocene salt marshes: a review sketch from the Atlantic and Southern North Sea coasts of Europe. Quaternary Science Reviews, 19:1155-1231.

Acknowledgments

This study was funded by EPA Grant ID CD96294800-1

A special thank you goes to Gabrielle Bennett-Meany and Michael Newhouse from NJSEA and Anthony Cullen, Kimberly Plank, Sahil Wadhwa, Megan Litwhiler. and Rajan Tripathee from Rutgers University for their much needed help with the vegetation survey.

Developing a Tidal Marsh Migration Model

(1)

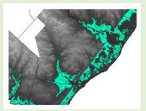
Healthy marshes are extremely valuable for their environmental resources, buffering coastal communities, protecting valuable assets and bringing dollars to coastal communities from eco – tourism and commercial and recreational fishing. Most of the salt water fish rely on tidal marshes, so without this habitat, we would not have most of the fish we eat (2).

Sea level rise will be one of the primary effects of global climate change in New Jersey. Sea level rise can increase the height of storm waves, making more areas vulnerable to storm damage. Sea level rise can inundate low lying areas, causing losses to tidal wetlands, habitat, and agricultural areas. Sea level rise also can cause higher water tables interfering with septic systems and salt water intrusion interfering with drinking water and irrigation water (3).

The **Marsh Migration Index (MMI)** is a predictive spatial tool to provide coastal communities with information with easily accessible information to inform local and regional living shore planning. The MMI is a series of maps representing an analysis that will assist in showing where coastal marshes will retreat in response to rising sea levels. Specifically, the New Jersey MMI presented here is a composite model of geospatial indicators, including Mean Higher High Water Surfaces (V_Datum), Coastal Wetland Buffers, Land Use/ Land Cover Types, Slopes, Soil Drainage (SSURGO), and LiDAR Elevation Models that, together, classify a range of conditions that would be compatible or not compatible for marsh re-establishment inland of increasing surface water heights. MMI is a planning tool only and does not impact regulatory decisions, nor is MMI appropriate for making site-specific design decisions.

Index Layer Development

INDEX GRID - Distances from Tidal Wetlands



Reselect Tidal Wetlands from LULC

Generated 3 Buffer extents from Tidal Wetlands

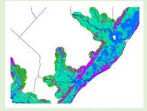
Merge Buffers and Convert to a Raster (Analysis Extent)

Distance	Rank	GIS Rank
No Data	No Data	0
6,000 Feet	Distant	1
3,000 Feet	Intermediate	2
1,000 Feet	Proximate	3

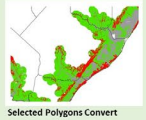
Raster is Reclassified for MMI Calculation

INDEX GRID - Land Use/ Land Cover 2012

Source is Land Use/ Land Cover NJDEP



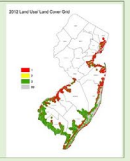
Clip LULC to 6,000 foot Buffer



Selected Polygons Convert to a Raster

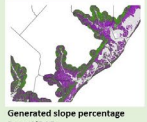
LU/LC Type	Rank	GIS Rank
Water	No Data	0
Urban	Unlikely Compatible	1
Barren	Somewhat Compatible	2
Wetland, Forest, Agriculture	Compatible	3

Raster is Reclassified for MMI Calculation



INDEX GRID - Slope

Source is LiDAR NJDEP



Generated slope percentage From LiDAR

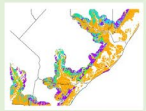
Selected Polygons Convert to a Raster

Slope %	Rank	GIS Rank
No Data	No Data	0
> 5.88	Steep	1
1.4 - 5.88	Moderate	2
0 - 1.4	Flat	3

Raster is Reclassified for MMI Calculation

INDEX GRID - Soils Drainage

Source is SSURGO Soils Layer (NRCS)



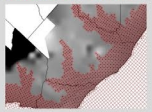
Map Units in Selected Drainage Classes are Extracted

Selected Polygons Converted to Raster

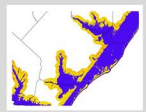
Soil Drainage	Rank	GIS Rank
No Data	No Data	0
Well Drained	Well Drained	1
Moderately Drained	Moderately Drained	2
Poorly Drained	Poorly Drained	3

Raster is Reclassified for MMI Calculation

INDEX GRID ZERO VALUE - Future Water Layer (Mean Higher High Water increased 3.3 feet)



Generate Surface for MHHW added 3.3 feet in Raster Calculator



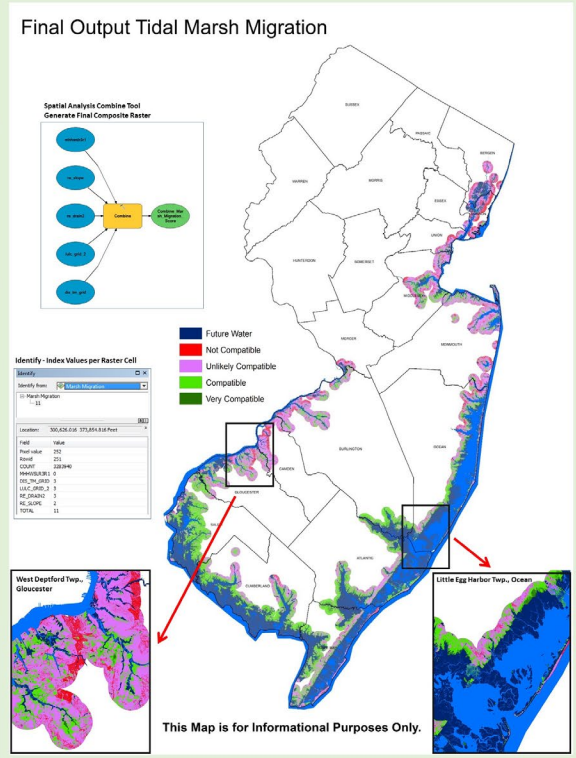
Subtract MHHW Surfaces with LiDAR Bare Earth Elevation Model

Generated Depth Grid Raster

MHHW	Rank	GIS Rank
No Data	No Data	0
MHHW	MHHW	0

Raster is Reclassified for MMI Calculation

Final Output Tidal Marsh Migration



Spatial Analysis Method (4)

This raster analysis was performed within an area between the estimated Year 2100 sea level rise of 3.3 feet over Mean Higher High Water (MHHW) to a landward extent of 6,000 feet from the edge of the Tidal Wetlands within New Jersey. The cell resolution of the rasters in this analysis are 10'x10'. Additionally a snapping function was used in the development of the rasters to insure they were aligned to the NJDEP Base LiDAR layer. Soil drainage, Slope, Land Use/ Land Cover, Distance from Tidal Wetlands were classified into four categories. The MHHW was classified into two categories. The higher the number, the more likely the cell is to have the characteristics to allow marsh migration. These five layers were combined in spatial analysis to create a composite final raster. A total index value was then calculated in raster calculator.

The final model output resulted in scores ranging from zero to twelve, with twelve having the most potential for future marsh migration. The final model total values were classified into five ranges. Cells receiving a score of zero due to MHHW or LULC water (future water level) are completely unsuitable for marsh migration. Cells receiving a score of 0.1 – 4 are Not Compatible; 4.1 – 7 are Unlikely Compatible; 7.1 – 10 are Compatible and 10.1 – 12 Very Compatible for marsh migration.

Map Development: Dave DuMont, NJDEP OCLUP (1)

Model Protocol: Delaware Coastal Management Program (DNRREC DCMP)

References:

1) Photos Credit – Steve Jacobus, NJDEP OCLUP
2) EPA. 2004.National Coastal Report II.EPA, Office of Research and Development, Office of Water
3) Delaware Coastal Program-http://www.dnrec.delaware.gov/coastal/Pages/SeaLevelRiseAdaptation.aspx
4) Delaware Coastal Management Program (DNREC DCMP)

APRIL 2017
NEW JERSEY COASTAL MANAGEMENT PROGRAM

Urbanization and Ground Water Recharge in the Raritan River Watershed

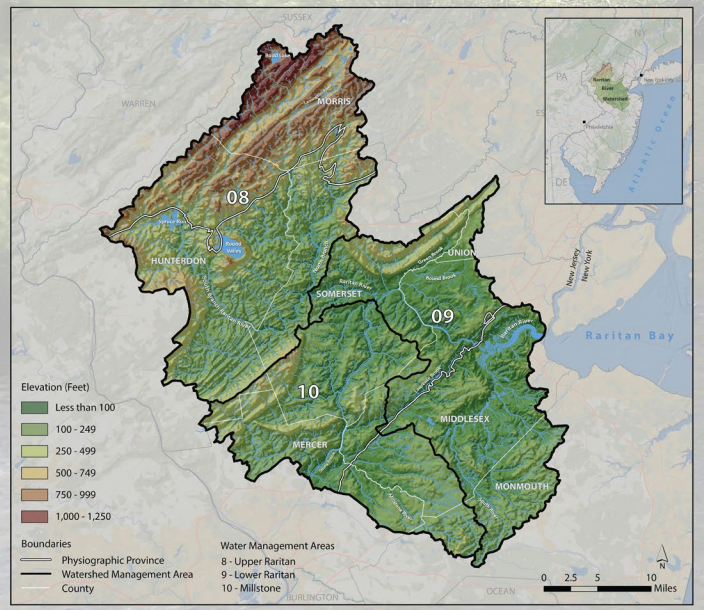
Daryl Krasnuk, Rutgers University, The State University of New Jersey

Abstract

Assessing watershed health through change in groundwater recharge is an alternative method of watershed health assessment. The objective of this study was to determine the spatiotemporal relationship between changes in groundwater recharge and changes in land use/land cover (LULC). Impervious surface, urban land, barren land, agricultural land, forest and wetlands were calculated in 1995 and again in 2012 for comparison. A geographical information system was used to determine the spatial variation and trend analysis of the change in land uses as well as change in groundwater recharge in the watershed. A more in depth analysis was developed using the statistical program, R. Multiple linear regression (MLR) and boosted tree regression (BRT) were used to determine more insight of predictors (change in land uses) to response variable (change in groundwater recharge).

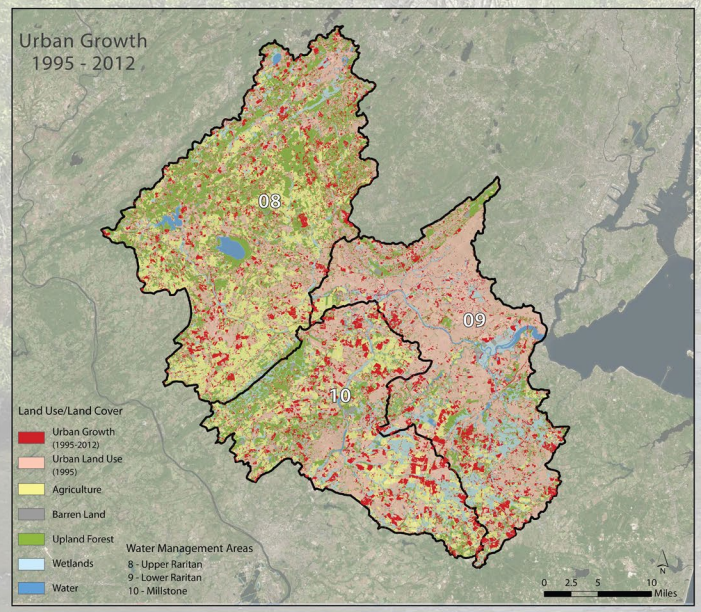
Raritan River Watershed Geography

The Raritan River Watershed (RRW) is situated in central and northern New Jersey covering 1,105 square miles making it the largest watershed located entirely in New Jersey. The RRW is located entirely or partially in seven counties: Hunterdon, Mercer, Middlesex, Monmouth, Morris, Somerset and Union. The watershed is divided into three water management areas (WMA): the Upper Raritan (WMA 08), Lower Raritan (WMA 09), and Millstone (WMA 10). The RRW is further divided into 139 (HUC-14) smaller subbasins.[1]



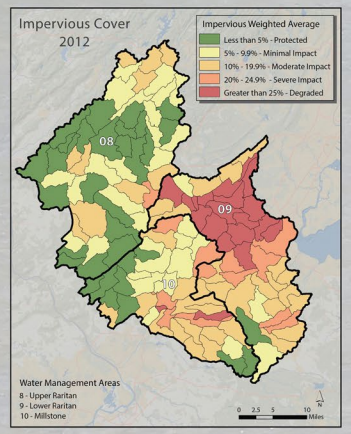
Urban Growth (1995 - 2012)

In 1995, the Raritan Watershed had 255,447 acres of urban land. In 2012, there were 307,515 acres of urban land. Over a span of 17 years, urban land use grew by about 20%. Consequently, wetlands and forest land cover have declined. Urban growth leads to the development of new roads, shopping centers, and commercial areas that are often associated with increases in impervious surfaces leading to less infiltration, more runoff increasing pollutant transfer rate and volume.[2]



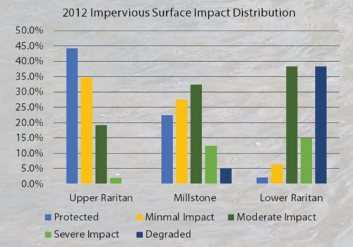
Population Growth and Impervious Surfaces

Population has increased by almost 26% from 1990 to 2010 in the Raritan River Watershed. Lower population densities usually result in disconnected impervious surfaces (lower %) and higher population densities usually result in connected impervious surface areas (higher %). Using 2012 data, the impact of impervious surfaces on watershed health for each HUC-14 was estimated by calculating the weighted average of impervious surface area.[3]



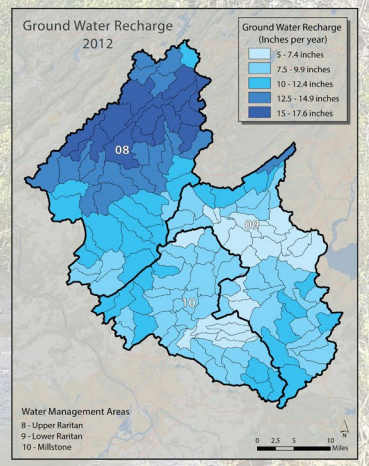
Population	1990 Population	2000 Population	2010 Population	Total Change
Raritan Watershed	1,040,996	1,213,862	1,307,003	266,007
Upper Raritan	174,516	212,375	223,002	48,485
Lower Raritan	684,472	764,792	819,136	134,663
Millstone	182,007	236,694	264,865	82,858

Impervious Surface	1995 Percent IS	2002 Percent IS	2012 Percent IS	Change in Percentage
Raritan Watershed	11.2%	12.1%	12.9%	1.7%
Upper Raritan	5.7%	6.3%	6.6%	0.9%
Lower Raritan	19.9%	21.2%	22.4%	2.5%
Millstone	9.4%	10.4%	11.5%	2.1%



Ground Water Recharge

Groundwater recharge (GWR) was estimated for each HUC-14 using the New Jersey Geological Survey's Groundwater Recharge Methodology Version 6.1. The map below was generated using 2012 LULC NJJDEP data. LULC data for 1995 and 2012 were used for the change analysis.



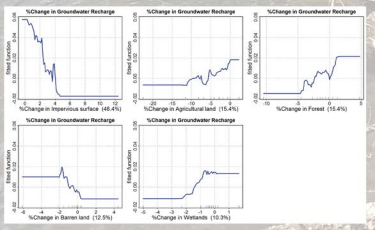
Results

An optimized MLR model revealed that all variables except change in urban land were significant predictors of change in GWR. The wide range in imperviousness among urban land use types ranging from rural urban to high density urban removed urban land as a reliable predictor. However, urban development has an indirect role in GWR through the loss of natural land cover types and an increase in impervious surfaces and barren land.

	Full Model		*Optimized Model*	
Predictors	**β-value**	**p-value**	**β-value**	**p-value**
Intercept	0.008	0.135	0.010	0.059
Change in Impervious surface	-0.014	0.000***	-0.014	0.000***
Change in Barren land	-1.342	0.049**	-0.626	0.003**
Change in Forest	-0.311	0.638	0.413	0.001***
Change in Agricultural land	-0.531	0.411	0.183	0.018**
Change in Wetlands	-0.130	0.840	0.528	0.041**
Change in Urban land	-0.714	0.266		

** indicates 5 % level of significance, *** depicts 1 % level of significance

The BRT model used in this study determined that the most important predictor in GWR change was change in impervious surface (-), followed by change in agricultural land (+), forest (+), barren land (-), and wetlands (+).



The partial dependence plots generated by the BRT model show the relative influence of the predictor variable on GWR response while keeping all other predictor variables average (in parentheses below the x-axis of each graph). The fitted function on the *y*-axis is the relative logit contribution of the variable.[2]

GIS Data Sources:
New Jersey Department of Environmental Protection, US Census Bureau, New Jersey Office of Information Technology, SSURGO, Center for Remote Sensing and Spatial Analysis, ESRI

Acknowledgements:
Subhasis Giri, Richard Lathrop & John Bognar

CRSSA RUTGERS

References:

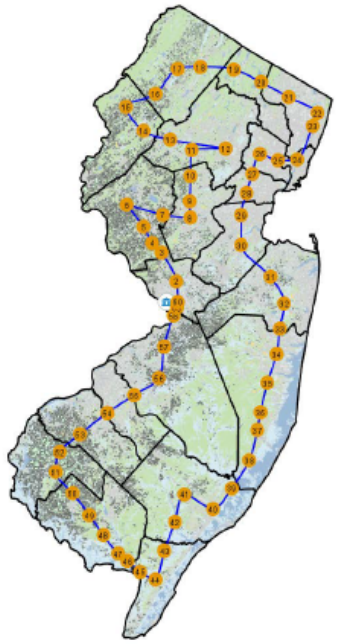
1. Giri, Krasnuk, Lathrop, Malone, Herb. 2017. "State of the Raritan Report, Volume 1." Sustainable Raritan River Initiative Rutgers, The State University of New Jersey, New Brunswick, NJ 08901. http://raritan.rutgers.edu/
2. Giri, Krasnuk, Lathrop, Zhang. 2017. "Spatial Variation, Trend Analysis, and Relationship of Watershed Health Indicators in the Raritan River Watershed: A Case Study." Rutgers University, New Brunswick, NJ 08901.
3. Arnold & Gibbons (1996). "Impervious Surface Coverage: The Emergence of a Key Environmental Indicator." Journal of the American Planning Association, 62:2, 243-258

Instructional Presentation

How To Create a Data Visualization Video Using ArcGIS Pro

Introduction

With the release of ArcGIS Pro this past year, ESRI has changed the way we look at, interpret, and share geographic data. By utilizing the Microsoft Office based Ribbon Toolbar, the application is a fresh start from the toolbar based user interface of ArcGIS for Desktop. It incorporates new features such as tasks, a tab based system has replaced data frames, and a project based data management system. Among these features, the Animation Ribbon allows users to create, view, and share videos in formats that are easily displayed through various mediums.



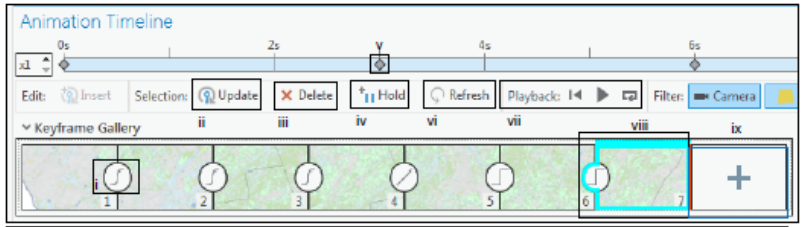
I. Getting Started

In order to create an Animation, GIS users must go to the "Animation" tools under the View Ribbon and click "Add." This will activate the Animation Ribbon and all of the tools necessary to create your video. The following steps are ways to setup and customize your own ArcGIS Pro animated video.

By William Smith, NJDEP

II. Animation Timeline & Keyframe Gallery

ArcGIS Pro utilizes a series of keyframes that are easily designated by the ArcGIS Pro user. Clicking the "Add Keyframe" button will create a keyframe at the current extent of the map window. By panning to other locations, the ArcGIS Pro user can chain together a series of keyframes points to automatically move from one area of interest to the next along a fixed path. Keyframes are one of the components that affect the speed of the camera. The number of keyframes between two locations can impact the speed of the camera's movement. Other tools are used to update, delete, pause, and play the animation.



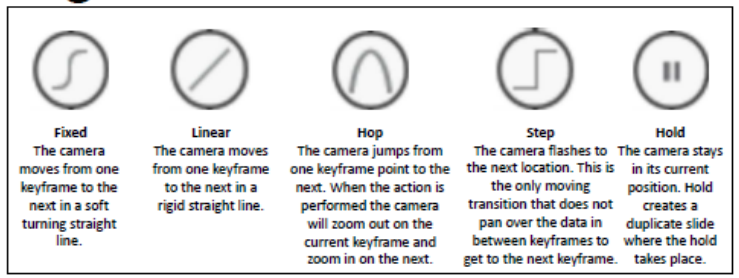
i. Transition Properties – Select how the camera moves from location to location and the layer's properties.
ii. Update Tool – Updates the selected keyframe(s) to the current viewing extent. Only usable when keyframe(s) are selected.
iii. Delete – Deletes selected keyframe(s). Only usable when keyframe(s) are selected.
iv. Hold – Keeps the camera stationed at the keyframe. Adds an additional keyframe. Only usable when keyframe(s) are selected.
v. Timeline Marker – Place of each keyframe within the animation timeline.
vi. Refresh – Update the properties on selected keyframe(s). Only usable when keyframe(s) are selected.
vii. Playback Tools - Restart Animation, Play, and Loop Animation.
viii. Selected Frame - Some tools are only available through selecting frames. The animation can also use the selected frame as a new starting point for the animation. To deselect, click the blank space above the Keyframe Gallery.
ix. Add Keyframe – Click to add a keyframe based upon your current map viewing extent.

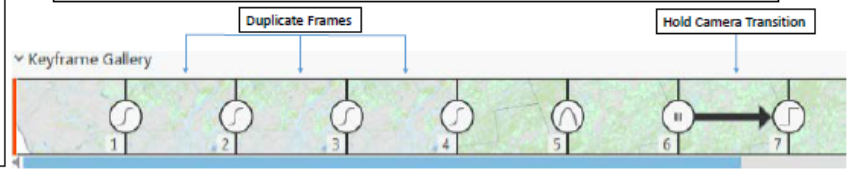
III.a. Transitions

ArcGIS Pro users also have a variety of transition types to customize how the camera moves and the layer's properties. These include the Fixed, Linear, Hop, Step, and Hold transitions. All five types are given their own symbol (See Right).

To stop at a particular keyframe for a particular period of time, either use the Hold camera transition and adjust the Key Length (See Below), or create duplicate keyframes of the same area. Without these two methods, the animation would be in constant transition from keyframe to keyframe for the entire video.

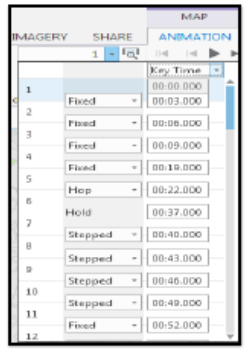
Based on these transition types, navigating from area of interest to the next is fully in the hands of the video creator (See Right).





III.b. Key Length & Key Time

A means of controlling the progression through the areas of interest is animating based on Key Length or Key Time. The main distinction between the two options is Key Length describes the time of the transition in respect to the keyframes; while Key Time describes the time of the transition in respect to the overall timeline of the animation (See Right). Based on these properties, the animation will move slowly or swiftly to the end. Both options are found in the same drop menu down in the "Edit" section on the Animation Ribbon.

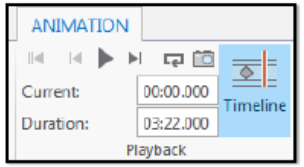


IV. Overlay

The Overlay section of the Animation Ribbon contains dynamic features that can be added to customize the overall presentation. This includes a title, description, images, map time, viewpoint (coordinates of keyframe), watermarks, and copyright logo; among other features (See Right). These elements can be displayed on consecutive or individual keyframes, and can provide additional information for a presentation.

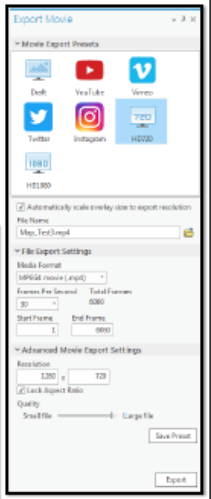
V. Playback

The Playback section of the Animation Ribbon contains tools to check the final animation before exporting to video (See Right). A way to end the video in the same location it started is by copying and pasting the first keyframe to the end of the Keyframe Gallery. This is also one of the few menus that allows you to see the full length of the video and toggle the Animation Timeline on your map display.



VI. Export to Video

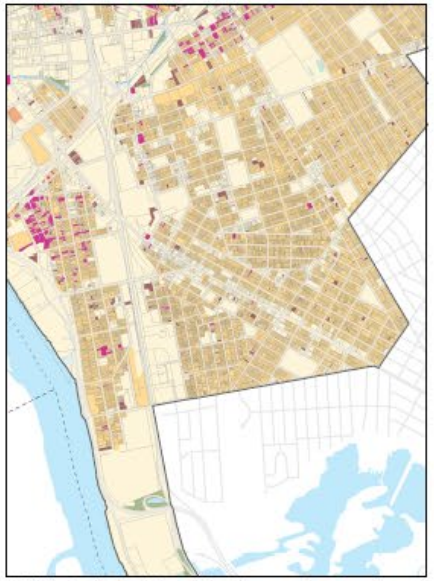
After the video is designed to your liking, you can export it as different file types, and share it through various mediums. The file size and speed of the export may vary depending upon the length of the animation, specified resolution, quality preference, and frames per second. To do this, go to the "Export" section, click "Movie," and then the export window will appear (See Right).



Suitability for Vacant Lot Conversion to Community Gardens

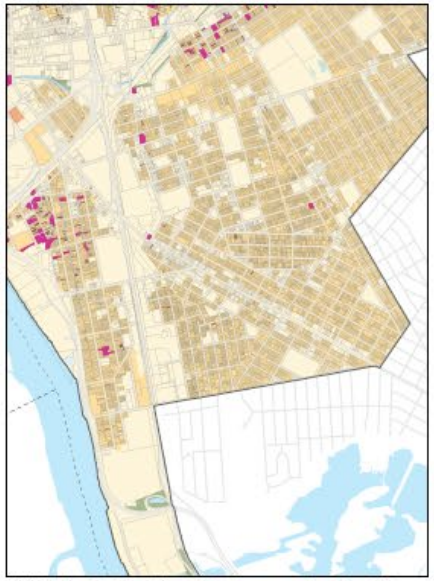
Selection Option A

City owned vacant lots



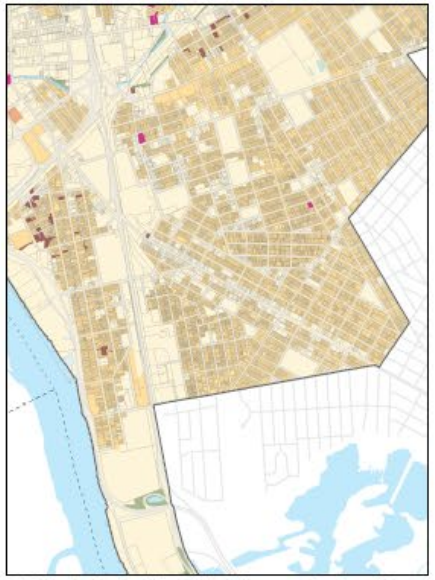
Suitable lots based on this criteria are displayed in magenta, selected from all vacant lots in Trenton, displayed in muted purple.

City owned vacant lots larger than 6000 sq. ft.



Suitable lots based on this criteria are displayed in magenta, selected from all city owned vacant lots in Trenton, displayed in muted purple.

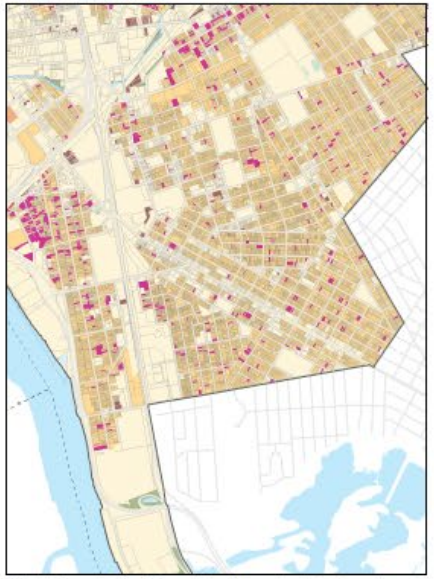
City owned vacant lots larger than 6000 sq. ft. within food deserts



Suitable lots based on this criteria are displayed in magenta, selected from all city owned vacant lots larger than 6000 sq. ft. in Trenton, displayed in muted purple.

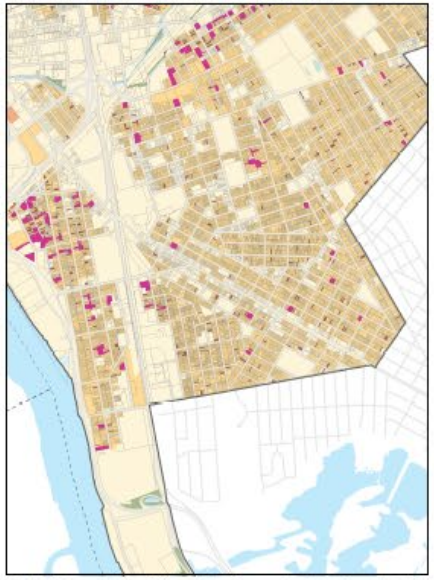
Selection Option B

All residential vacant lots



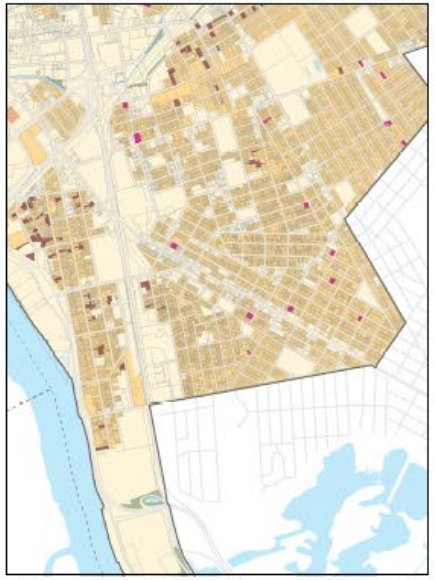
Suitable lots based on this criteria are displayed in magenta, selected from all vacant lots in Trenton, displayed in muted purple.

Residential vacant lots greater in size than 6000 sq. ft.

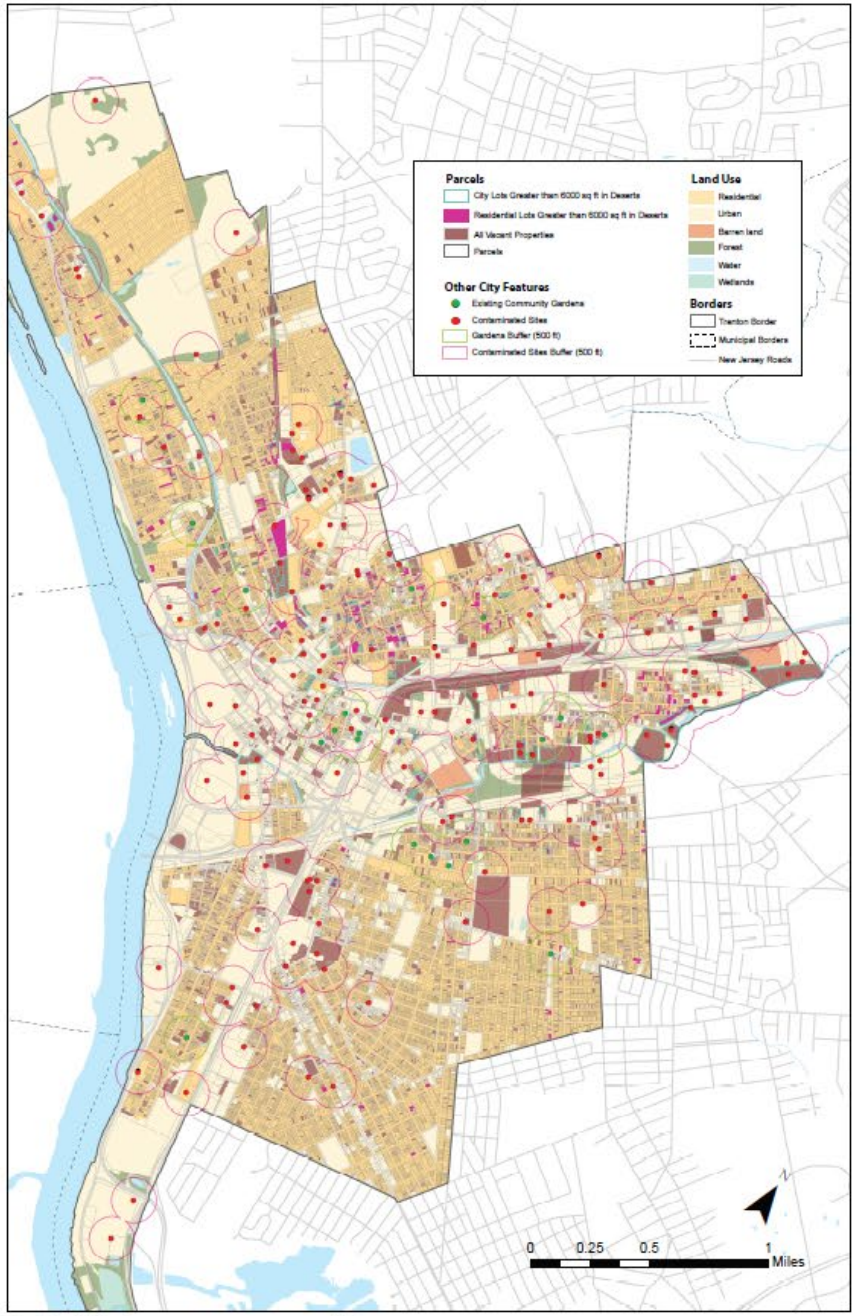


Suitable lots based on this criteria are displayed in magenta, selected from all residential vacant lots in Trenton, displayed in muted purple.

Residential vacant lots larger than 6000 sq. ft. within food deserts



Suitable lots based on this criteria are displayed in magenta, selected from all residential vacant lots larger than 6000 sq. ft. in Trenton, displayed in muted purple.



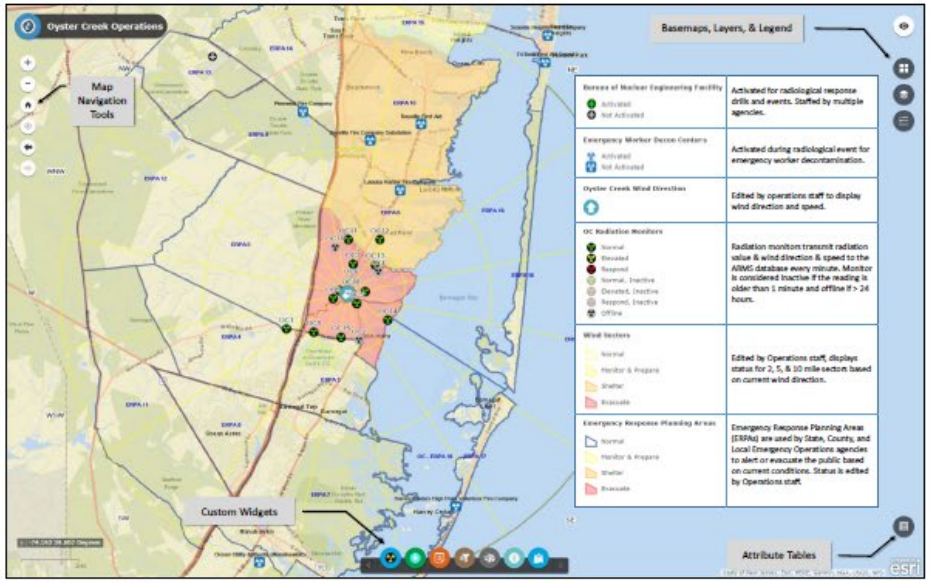
Map designed by Vinny Viera

Projected in NAD 1983 NJ State Plane

Data Sources:
NJ DOT, NJ DEP, NJ DEP Bureau of GIS, NJ DEP Site Remediation Program, PA GeoSpatial Data Clearing House, Trenton Neighborhood Restoration Campaign, U.S. Census Bureau, Isles, inc.

NJDEP Radiological Communications and Assessment Portal (RadCAP)

RadCAP Operations Web Application



The Bureau of Nuclear Engineering (BNE) provides radiation protection for individuals in New Jersey through establishing, implementing and enforcing radiation protection measures and standards as applicable to the nuclear power industry. RadCAP provides a common operating picture in response to a radiological incident or drill for the Oyster Creek and Salem Nuclear Generating stations. This system replaced a paper-based workflow for designating evacuation areas during a nuclear release and brings additional command and control (C2) capabilities to the Regional Operations Intelligence Center (ROIC). The radiation monitor information supports quarterly exercises involving up to three hundred people. User privileges are role based and managed in NJDEP's AGO Organization. Only Operations staff have edit rights for the datasets in the application. An Operations Dashboard provides real-time situational awareness of the radiological incident or drill for viewers without edit rights.

Update Status of ERPAs & Wind Sectors

Add / Edit Significant Events

Update Wind Direction & Speed

Update Status of BNE Facility & EWDCs

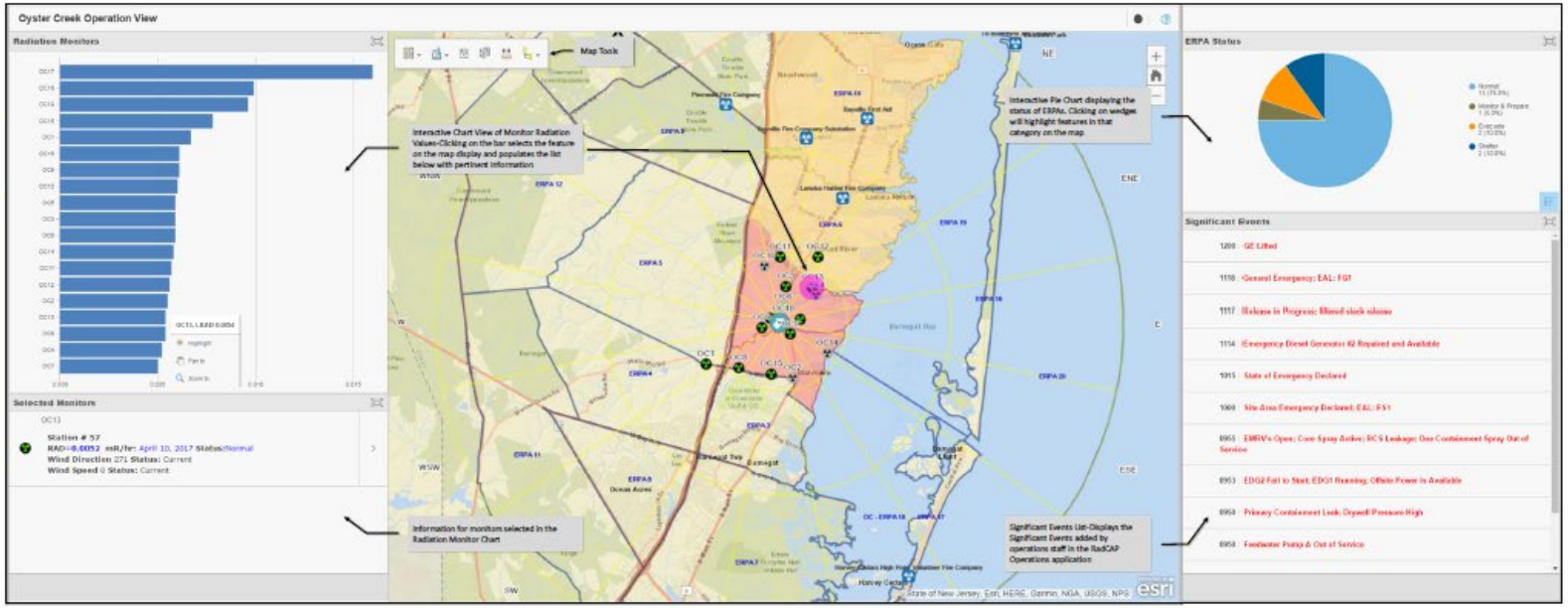
Add Data from ArcGIS Online, REST, or Local (SHP,CSV, or GPX)

RadCAP General Information Dashboard

Operations Staff manage event using RadCAP Web Application built with Web App Builder

Information Products for Staff, State, County, & Local Officials for Situational Awareness and Decision Making

Map Production: Ed Apalinski NJDEP BGIS, 4/2017
For more information visit Bureau of Nuclear Engineering web page
https://www.nj.gov/dep/rpp/bne/



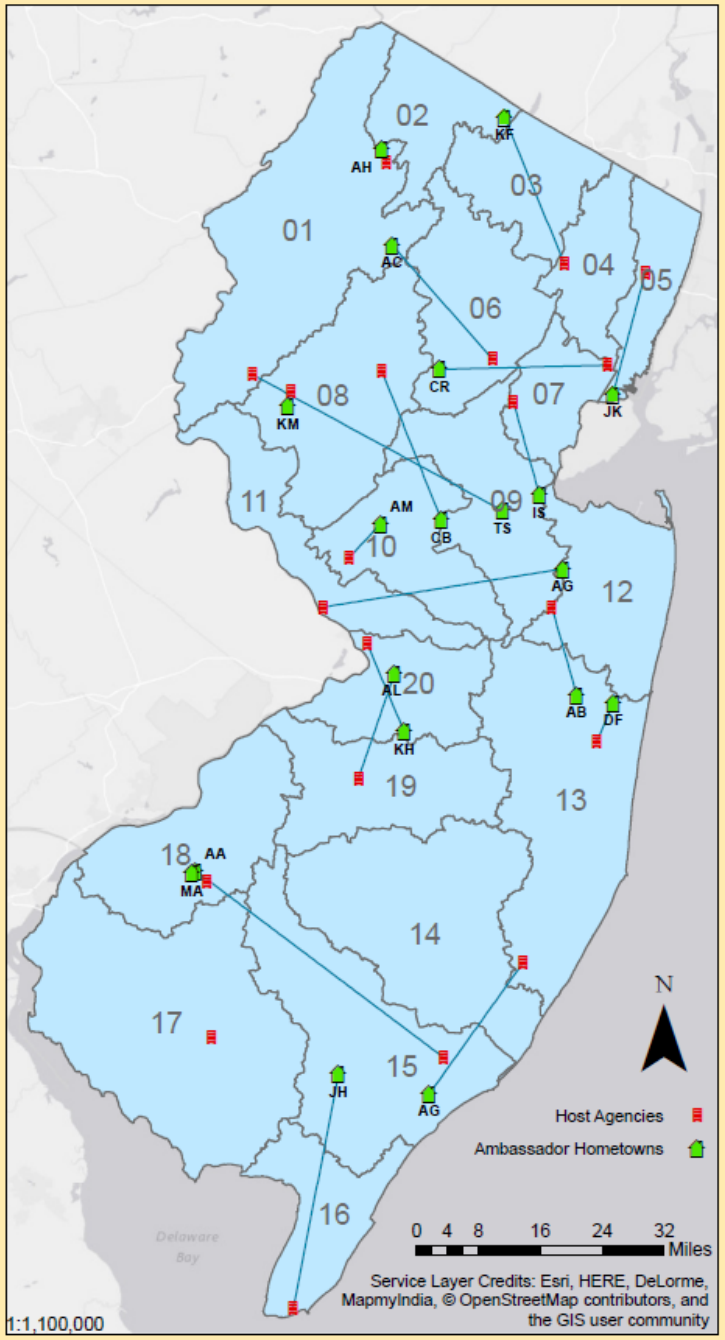
Small Format

NJ Watershed Ambassador's Distance to Host Agencies

INITIALS	AMBASSADOR_NAME	WMA	HOMETOWN
TS	Taran Sayal	1	East Brunswick
AH	Amanda Hayes	2	Lafayette
KF	Kathleen Fitzgerald	3	West Milford
CR	Carolyn Rubinfeld	4	Basking Ridge
JK	Jason Kopacz	5	Bayonne
AC	Alex Cavagrotti	6	Hopatcong
IS	Ismail Sukkar	7	Sayreville
CB	Carmela Buono	8	Kendall Park
KM	Katee Meckeler	9	Clinton
AM	Anna Marshall	10	Skillman
AG	Andrew Garcia	11	Marlboro
AB	Alexis Bowman	12	Lakewood
DF	Danielle Fadeski	13	Brick
AG	Aysia Gandy	14	Linwood
AA	Ashley Aversa	15	Sewell
JH	Jim Hansen	16	Estell Manor
	Vacant	17	
MA	Marissa Appolonia	18	Sewell
AL	Amy Loesser	19	Chesterfield
KH	Katie Harrison	20	Wrightstown

AMBASSADOR_NAME	WMA	HOST_AGENCY_NAME	DISTANCE_MILES
Taran Sayal	1	Musconetcong Watershed Association	26.84
Amanda Hayes	2	Sussex County Municipal Utilities Authority	1.78
Kathleen Fitzgerald	3	Passaic County Planning Department	20.39
Carolyn Rubinfeld	4	Passaic Valley Sewerage Commission	21.73
Jason Kopacz	5	Hackensack Riverkeeper	16.21
Alex Cavagrotti	6	Great Swamp Outdoor Education Center	19.62
Ismail Sukkar	7	Union County Parks & Recreation	12.50
Carmela Buono	8	Raritan Headwaters Association	20.76
Katee Meckeler	9	NJ Water Supply Authority	1.86
Anna Marshall	10	Stony Brook Millstone Watershed Association	6.11
Andrew Garcia	11	Delaware River Basin Commission	31.39
Alexis Bowman	12	Monmouth County Planning Board	11.85
Danielle Fadeski	13	Barnegat Bay Partnership	5.55
Aysia Gandy	14	Jacques Cousteau National Estuarine Research Reserve	20.79
Ashley Aversa	15	Atlantic County Utilities Authority	40.02
Jim Hansen	16	Nature Center of Cape May	20.94
Vacant	17	Cumberland County Improvement Authority	
Marissa Appolonia	18	Gloucester Soil Conservation District	2.17
Amy Loesser	19	Pinelands Preservation Alliance	14.39
Katie Harrison	20	Tulpehaking Nature Center	12.30

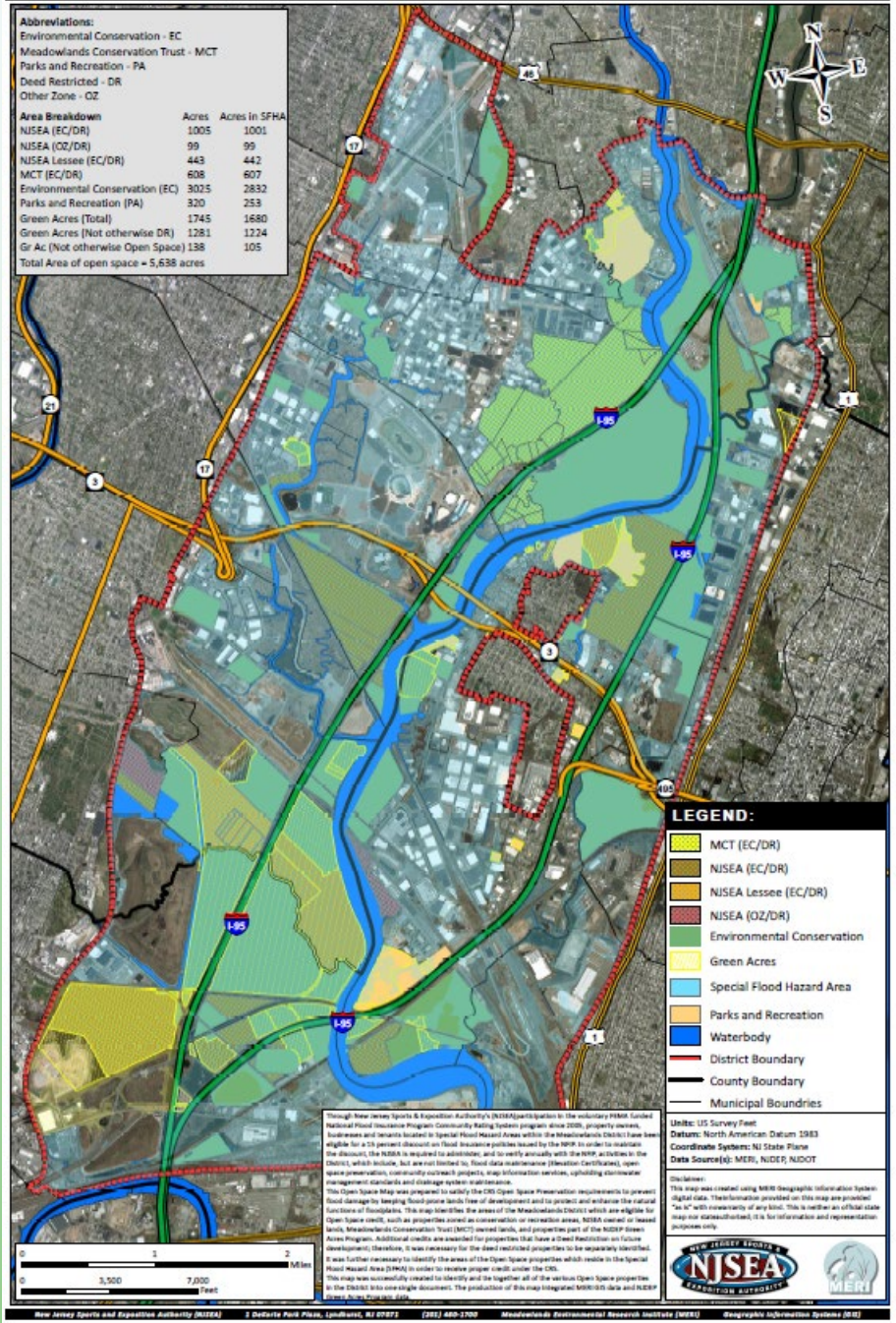
This map shows the raw distance that each New Jersey Watershed Ambassador lives in relation to their host agency that serves as their main office.



Delaware River Basin Commission
DELAWARE • NEW JERSEY
PENNSYLVANIA • NEW YORK
UNITED STATES OF AMERICA

Andrew Garcia
Watershed Ambassador
WMA 11 - DRBC

OPEN SPACE MAP WITH SFHA



Medford Lakes, New Jersey

Twenty-One Lakes and Other Points of Interest

Scenes of Medford Lakes

- Points of Interest
- Local Roads
- Regional Roads
- Lakes
- Schools
- Borough Property
- Country Club
- Medford Lakes Boundary

Medford Lakes Facts:

The Borough of Medford Lakes is located in Burlington County, and is surrounded on all sides by the Township of Medford.

The borough lies completely within the New Jersey Pinelands region, and is approximately 1.3 sq. miles in area.

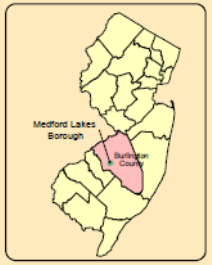
The borough had an estimated population of 4,146 in 2010 (U.S. Census Bureau).

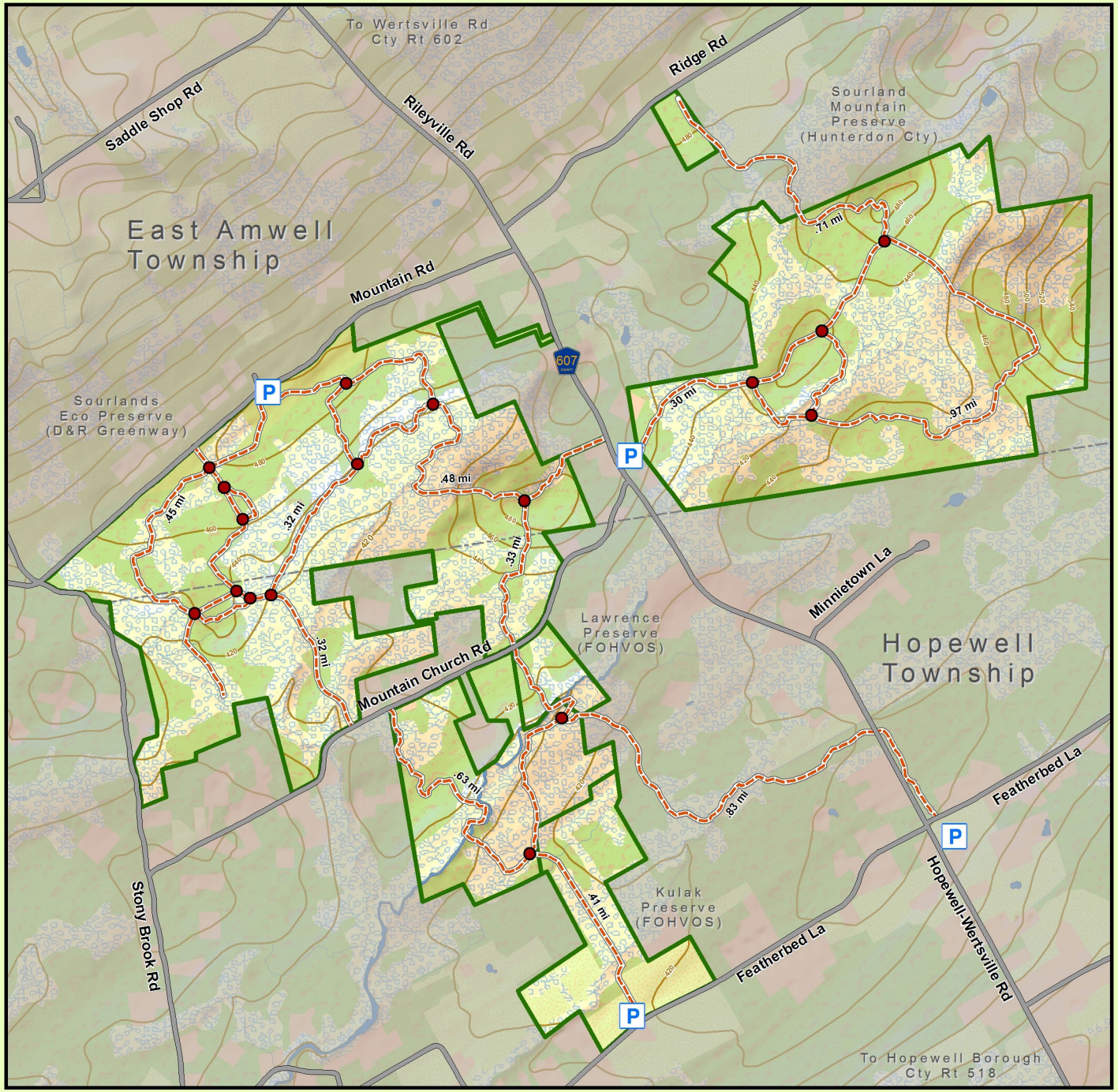
Stokes Rd
The Neeta School
Public Works Department
Fire Department
Medford Lakes Colony
Borough Hall & Police Dept
Township of Medford
Dixontown Rd
Tabernacle Rd
Lower Mirror Lake
Middle Mirror Lake
Upper Mirror Lake
Ballinger Lake
Algonquin Lake
Lower Aetna Lake
Medford Lakes Country Club
Lake Mishe-Mokwa
Wagush Lake
Siquitise Lake
Kawasea Lake
Mushkodosa Lake
Meeshaway Lake
Upper Aetna Lake
Wauwauskashe Lake
Migazee Lake
Wabassi Lake
Ashsheekan Lake
The Nokomis School
Peshekee Lake
Sioux Lake
Mikonok Lake
Meseha Lake
Tuckerton Rd
N
0 750 1,500 3,000 Feet

Cartography: Paul Caris, NJDEP, DoIT-BGIS (2017)

Data Sources: Road Centerlines, Burlington County, Muncipal and County Boundaries, NJ-OGIS

Additional information gathered from Medford Lakes municipal tax maps and town street map.





Sourland Ridge Preserves

East Amwell & Hopewell Twps, NJ

Administered by
The D&R Greenway,
Hopewell Valley Friends of Open Space,
Hunterdon County Division of Parks & Recreation

Legend

- Trail Junctions
- Parking
- Trails
- Preserve Boundaries
- Township Boundary
- Streams
- Elevation Contour Lines
- Fields/Grasslands
- Forest
- Developed
- Wetlands
- Lakes/Ponds

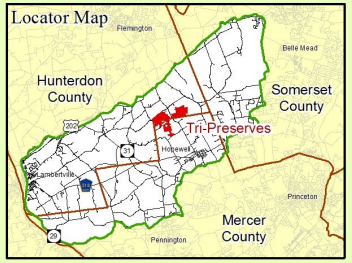
Entrance/Parking:

- Intersection of Featherbed La and Hopewell-Wertsville Rd
- Hopewell-Wertsville Rd
- Featherbed Ln
- Mountain Rd

Labels on trails represent distances between trail junctions & road crossings

Map Scale: 1:16,700

0 400 800 1,600
Feet



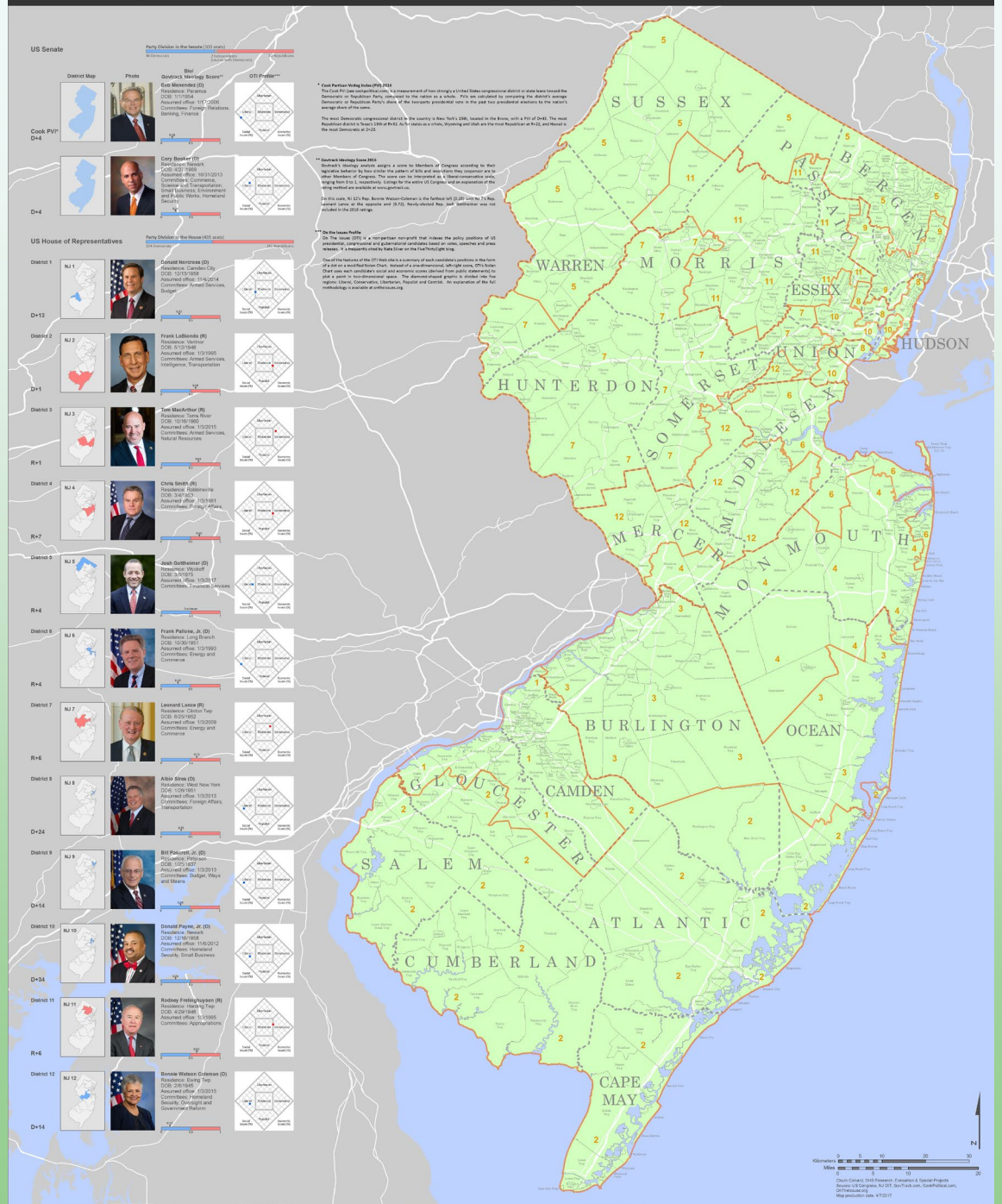
SOURLAND CONSERVANCY

Produced by Kevin Burkman, GIS Analyst for the Sourland Conservancy December 2015

Data Sources:
New Jersey Geographic Information Network
The D&R Greenway
Hopewell Valley Friends of Open Space
Hunterdon County Division of Parks & Recreation

Software Integration

New Jersey's Delegation to the 115th Congress (2017-2019)



Enhancing Architectural Survey

A Home Brew / Street View Mashup in Coastal Cumberland County

In the wake of Superstorm Sandy in 2012, the need for rapid architectural survey assessment and multi-agency coordination became vital to streamlining recovery efforts through the historic preservation review process. After a multi-year cooperative survey with FEMA, which was enhanced with GPS and geo-referenced digital photography, the NJ Historic Preservation Office (NJHPO) began looking for new survey techniques to build upon the FEMA experience. Having played with GoPro cameras for capturing architectural still images, staff wanted to evaluate how wide angle video could be leveraged for rapid architectural survey. Simultaneously, we determined that Cumberland County, among the most rural of New Jersey's 21 counties, was not well represented in the statewide architectural inventory. Due to the likely impacts of future sea level rise and storm events, HPO focused on the coastal region of the county along the Delaware Bay, which was targeted to an area within ½ mile of the Sandy storm surge, using a target property list based on statewide tax data.

Map Drawn By:
New Jersey Historic Preservation Office, April 2017
Kinney Clark, Data collection, Cartography
Anne Chidley, Justyna Csolak, Data Processing

Software Used in the Workflow:

DNRGPS: GPS data conversion

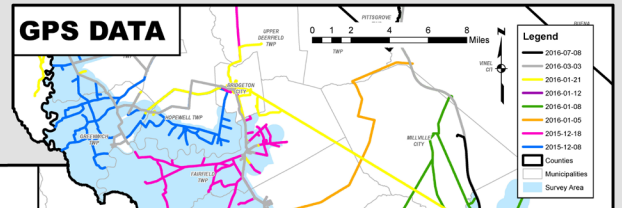
MS PRO PHOTO TOOLS: Photo metadata editor to adjust timestamps

GPIC SYNC: Synchronize GPS data with images to geotag images

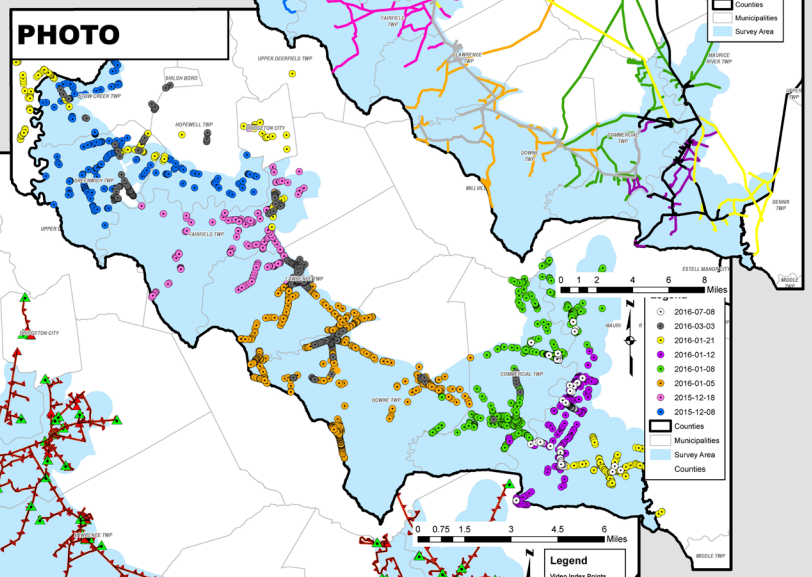
TIMECALCULATOR.NET: Online tool to calculate time offsets for video index

MPLAYER: Command line video player invoked from batch file

GPS DATA

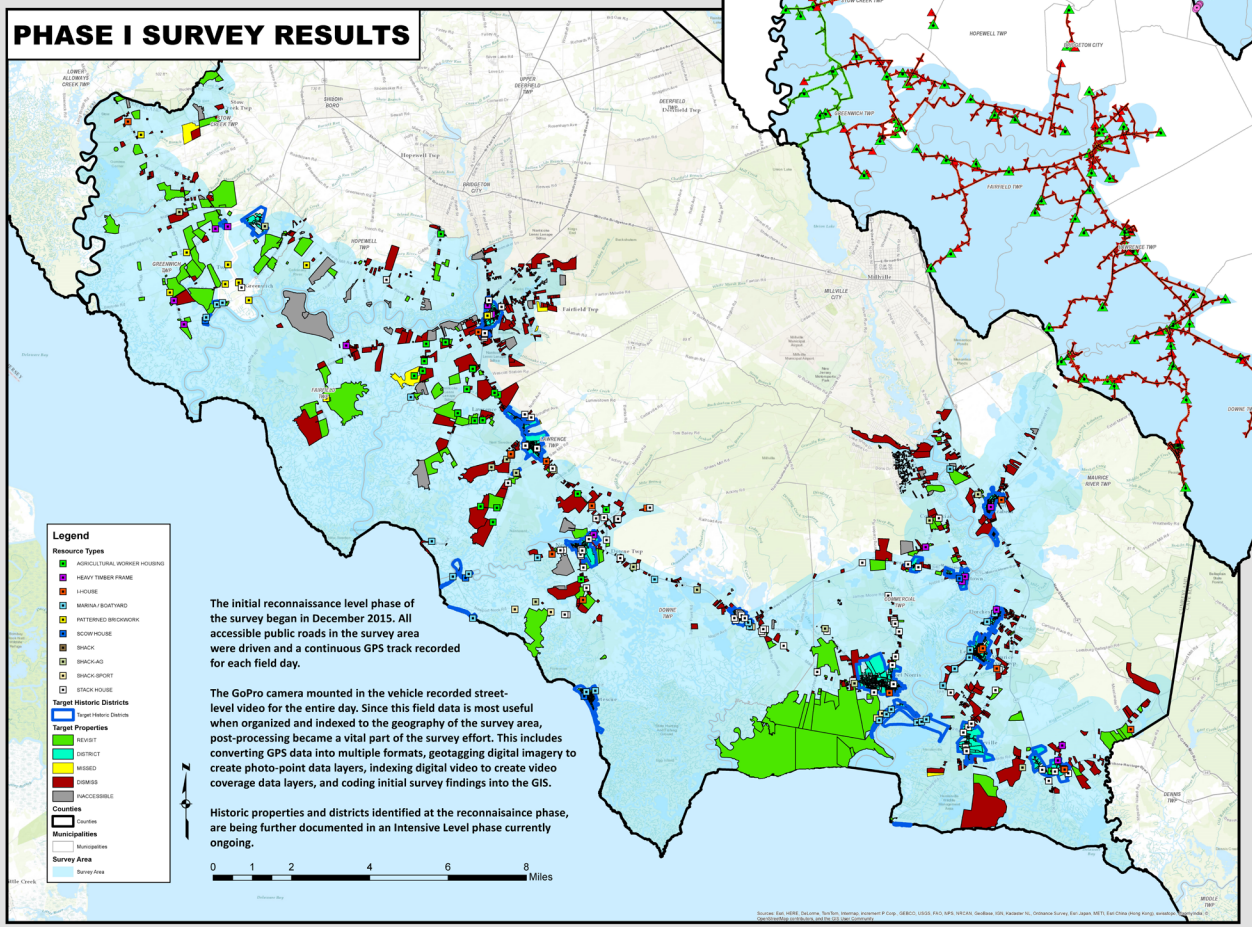


PHOTO



VIDEO INDEX

PHASE I SURVEY RESULTS



The initial reconnaissance level phase of the survey began in December 2015. All accessible public roads in the survey area were driven and a continuous GPS track recorded for each field day.

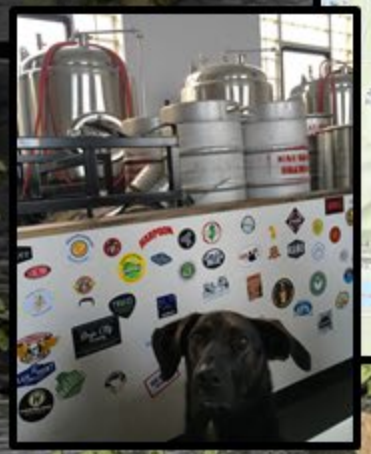
The GoPro camera mounted in the vehicle recorded street-level video for the entire day. Since this field data is most useful when organized and indexed to the geography of the survey area, post-processing became a vital part of the survey effort. This includes converting GPS data into multiple formats, geotagging digital imagery to create photo-point data layers, indexing digital video to create video coverage data layers, and coding initial survey findings into the GIS.

Historic properties and districts identified at the reconnaisaince phase, are being further documented in an Intensive Level phase currently ongoing.

Video Indexing & Linking

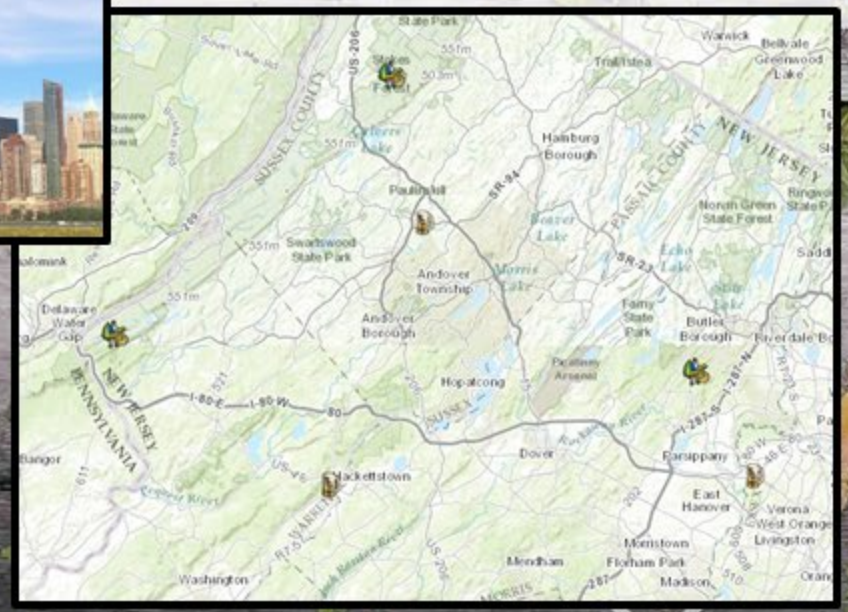
The video coverage has particular value in reviewing field results. The initial thought was to augment traditional still photography with additional context, but the combination of GPS and video has proven to be a rich enhancement of the suite of survey products, particularly in rural Cumberland County where there is little Google Street-View coverage. Additionally, digital still photos can be extracted from the video when needed. HPO is also experimenting with overlaying animated maps into the video frame to further enhance the utility of the video data. This effort relied on a variety of software tools and techniques to achieve all of the post-processing steps. HPO will next look to automate some of these tasks to improve the GIS workflow for managing large datasets of field collected imagery.

Story Map



NJ Hikes & Beer Flights

New Jersey area hikes and craft brewery pairings



http://bit.ly/HikesAndFlights

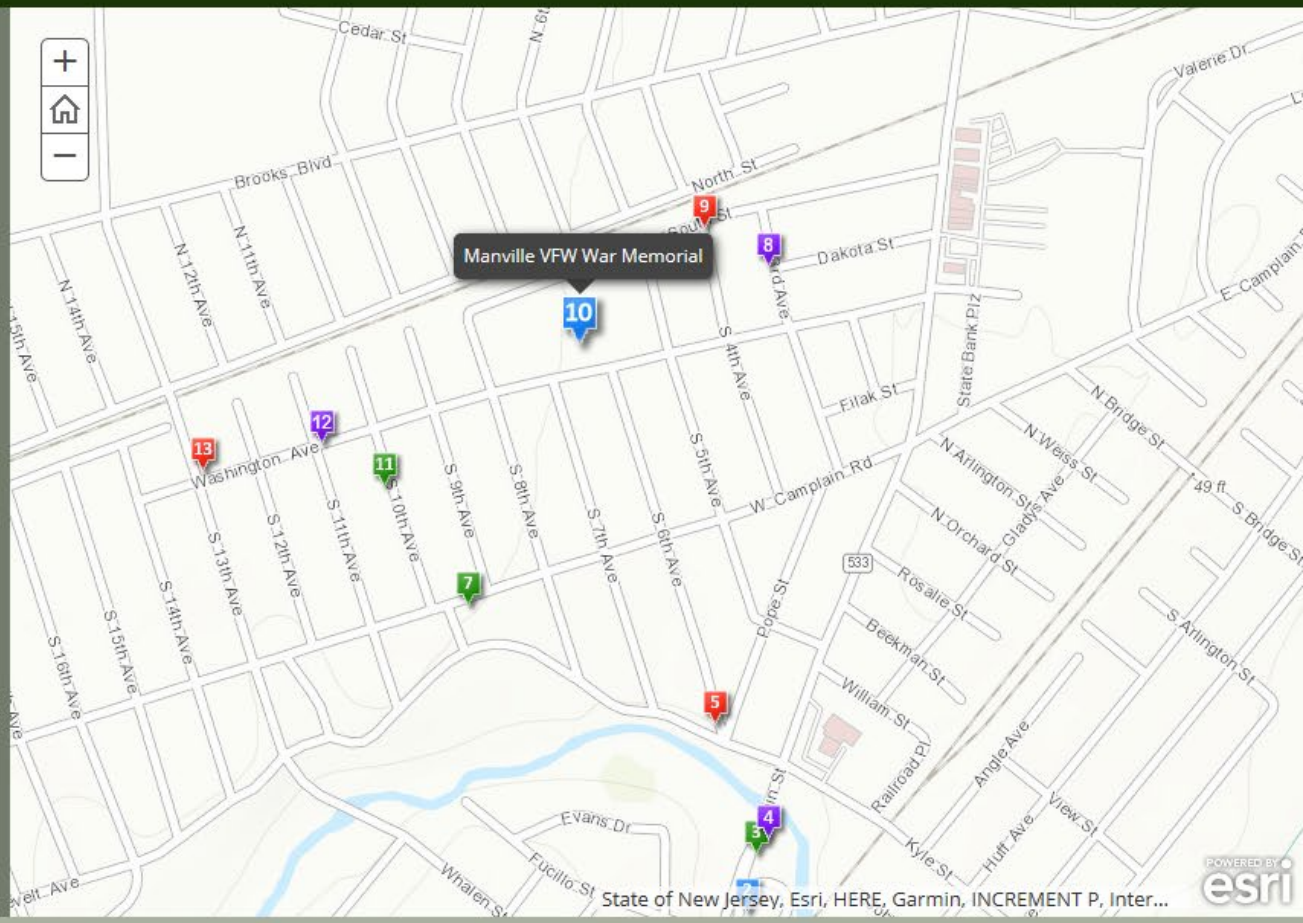
Manville Memorials

ESRI Story Maps

Manville's citizens have a long and proud tradition of military and civil service. This story map guides users on a tour of the many memorials honoring the history of Manville and those who have served their community and country.

Manville VFW War Memorial

Erected in 1954 by the Thomas J. Kavanaugh VFW Post 2290, this memorial honors those who fought in World War II, the Korean War, and the Vietnam War (HMDB.org, 2014).




olution Army
nt Marker


8 Manville Fire Co. 1 Memorial


9 Manville First Aid & Rescue Squad Plaque


10 Manville VFW War Memorial


11 Johns Manville World War II Memorial


12 Continental Army Encampment


13 Camplain Fire Company Memorial


14 North End Fire Company #3 Memorial


15 Town Hall World War II Memorial


16 Washington's Route from Princeton


17 Derrick Van V
Mai

NJ Private Well Testing Act Data Summary (Sep. 2002 to Apr. 2014)

New Jersey Department of Environmental Protection

Click a tab for more information then click a location on the map for data.

Background | Counties | Municipalities | Grids | Arsenic | Fecal coliform or E. coli | Gross Alpha | Iron | Manganese | Mercury | Nitrate | pH | Volatile Organic Compounds (VOCs)

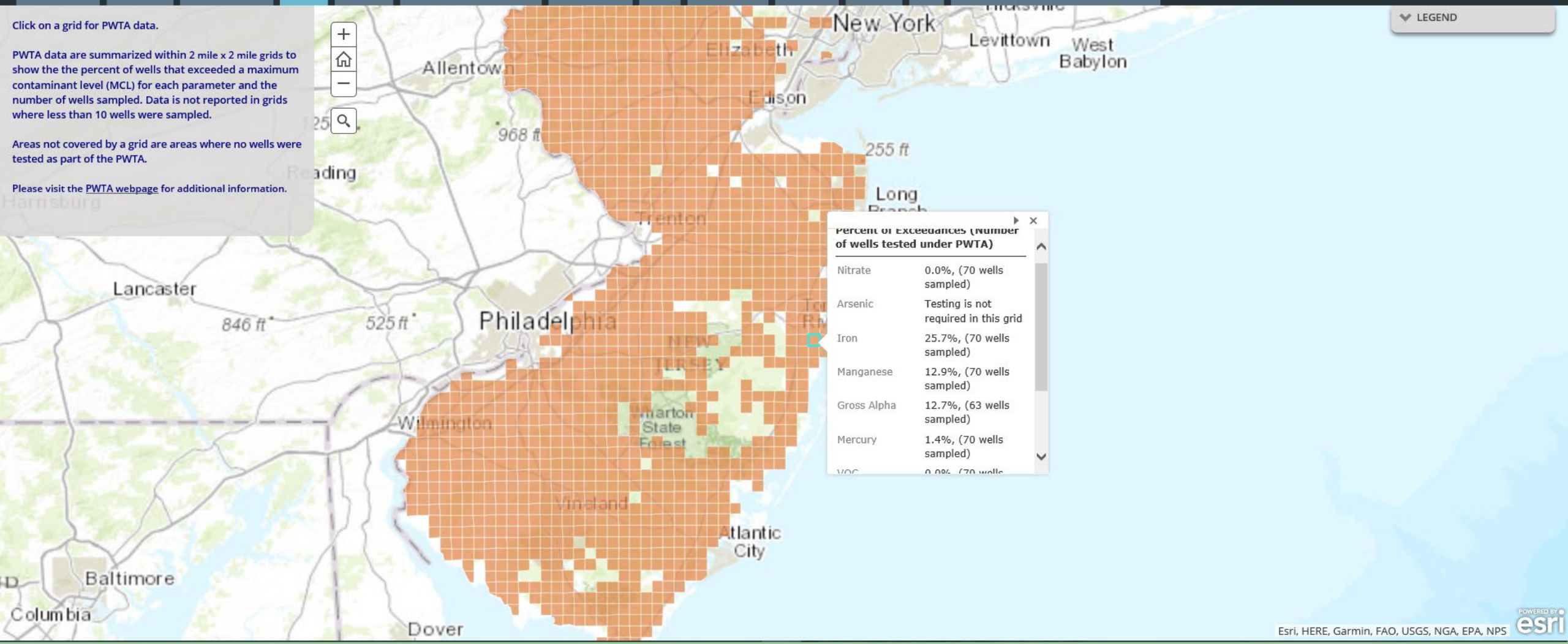
Click on a grid for PWTA data.

PWTA data are summarized within 2 mile x 2 mile grids to show the the percent of wells that exceeded a maximum contaminant level (MCL) for each parameter and the number of wells sampled. Data is not reported in grids where less than 10 wells were sampled.

Areas not covered by a grid are areas where no wells were tested as part of the PWTA.

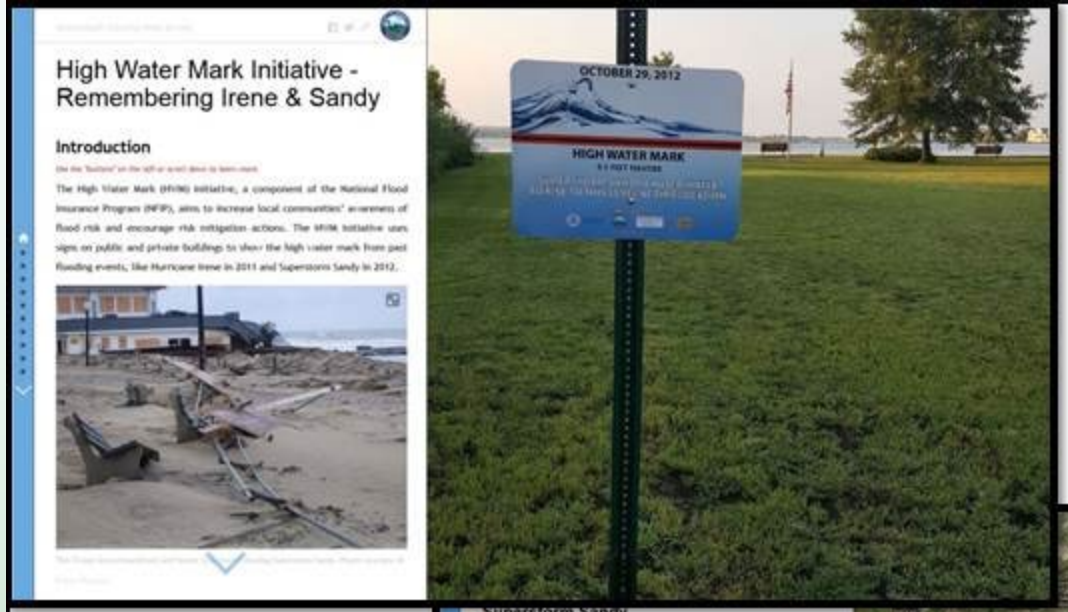
Please visit the PWTA webpage for additional information.

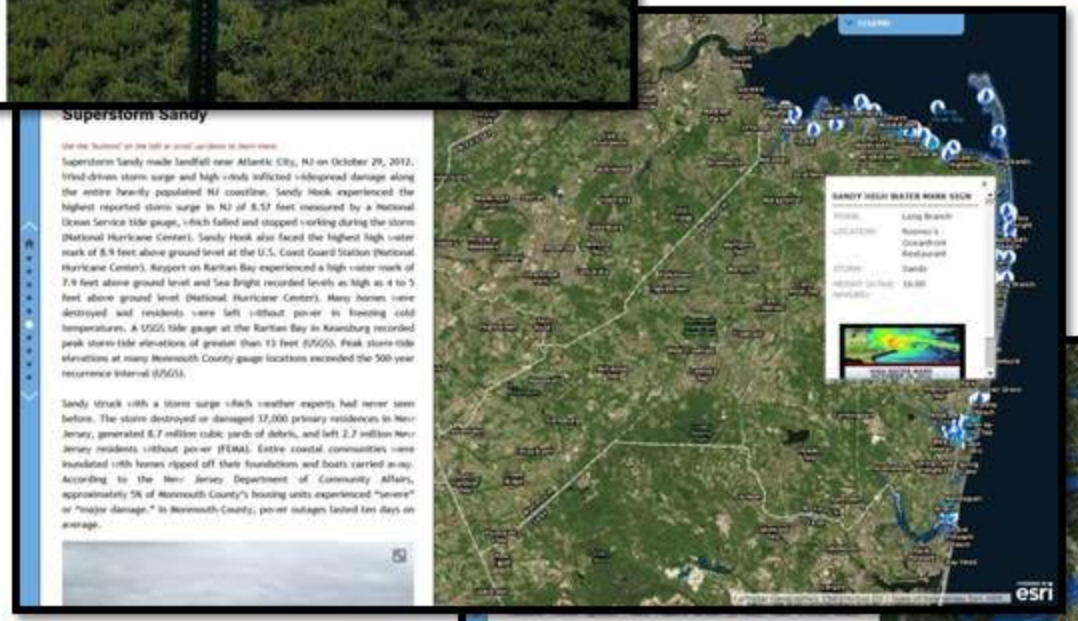
LEGEND

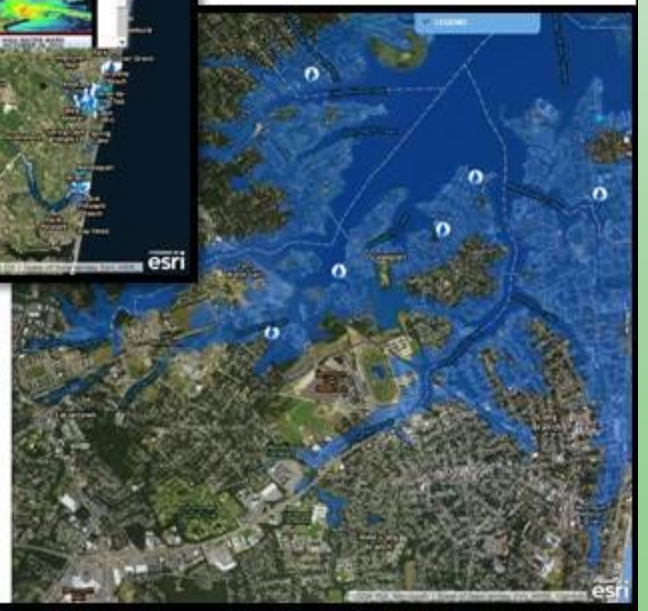


Percent of Exceedances (Number of wells tested under PWTA)

Nitrate	0.0%, (70 wells sampled)
Arsenic	Testing is not required in this grid
Iron	25.7%, (70 wells sampled)
Manganese	12.9%, (70 wells sampled)
Gross Alpha	12.7%, (63 wells sampled)
Mercury	1.4%, (70 wells sampled)







http://arcg.is/2nazRCl

MONMOUTH UNIVERSITY
Urban Coast Institute

FEMA

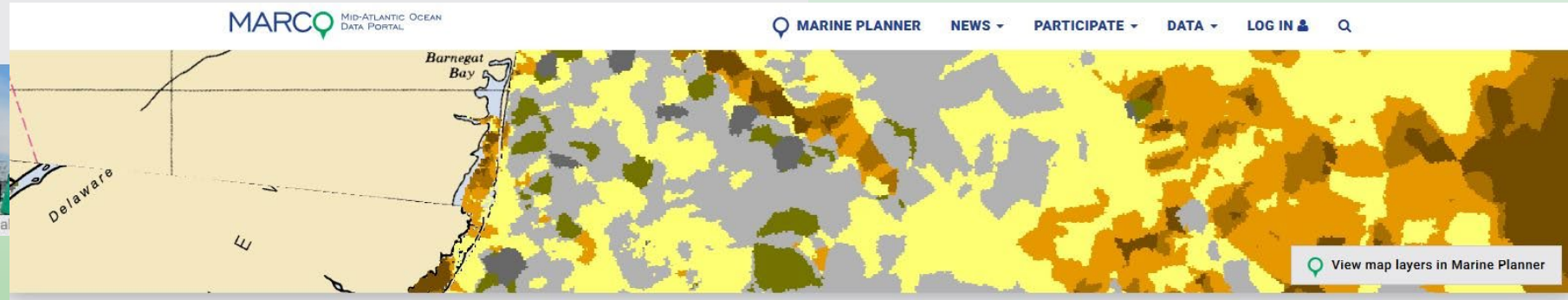
Sea Grant
NJ Sea Grant Consortium

Survey Shows Where Boaters Go and How They Spend Time, Money

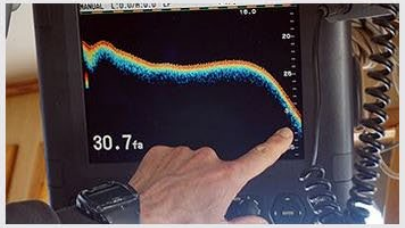
It was an expensive day of fishing for Mike Sabolewski. Things started off well enough – on the way to his boat slip in Belmar, N.J., he plunked down $20 for bait, $15 for ice and $12 for beverages.

He navigated his 19-foot Pursuit, the *Tanner James*, out of the Shark River Inlet and headed a few miles north, just offshore of Long Branch. That's when he heard "a pop and a lot of metal." Sabolewski steered the boat back at a crawl's pace before the engine died in the river. He contacted Sea Tow, a sort of AAA for boaters (and at $140 per year for unlimited tows, he said, "well worth it"), for help getting back to the marina.

Mike Sa



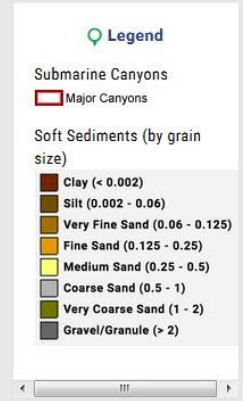
9:43 a.m. | 25 miles Northwest of Manasquan Inlet, New Jersey



After displaying a flat plain for two hours, the depth sounder shows a sudden roller coaster-like drop off. The *Christian and Alexa* is crossing over a depression leading to the Hudson Canyon. Moments later the line will spike back up again.

The captains are ideally looking for a flat but slightly jagged line that is typical of a pebbly sea floor. Scallops like those conditions because they can take refuge in the naturally occurring seams, Kenny said.

Technology has made their work more efficient and



Provide feedback

Identifying Natural and Cultural Resources along the New Jersey Pilgrim Pipeline Corridor

A story map

Pilgrim Pipeline Holdings, LLC has proposed a 178 mile bi-directional pipeline between Albany, NY and Linden, NJ. The maps included here are designed to explore the natural, cultural, and human resources potentially impacted by pipeline construction for the New Jersey portion of the pipeline corridor. The + and - buttons in the left corner of the map allow you to zoom in and out, and you may use your mouse or touch screen to pan across the pipeline territory. The tabs above correspond to natural and cultural resources, as well as infrastructure, of concern.

Numerous private and public properties are affected by pipeline construction. This map illustrates properties within a 100 and 500 foot buffer of the proposed pipeline. The statewide composite of New Jersey parcels is maintained by the NJ Office of Information Technology (NJOIT), Office of Geographic Information Systems (OGIS). The metadata and parcel data without buffers can be found here.

Our analysis used GIS to identify parcels located within 100 and 500 feet of the proposed Pilgrim Pipeline. The proposed pipeline center lines for both New York and New Jersey are available from the Coalition against the Pilgrim Pipeline (CAPP) website: https://stoppilgrimpipeline.com/.

About the authors: this story map was prepared by students and faculty at Drew University, in Madison, New Jersey, through support of the Spatial Data Center.

DREW SPATIAL DATA CENTER

CAPP COALITION AGAINST PILGRIM PIPELINES

New Jersey Pilgrim Pipeline Route - 100 Foot Buffer

New Jersey Pilgrim Pipeline Route - 500 Foot Buffer

New Jersey Composite Parcels - Parcels (zoom to town to view)