

New Jersey Landscape Project

*Wildlife habitat mapping for community
land-use planning and species conservation*

NJDEP Fish and Wildlife

Office of Fish and Wildlife Information Systems

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New Jersey Landscape Project

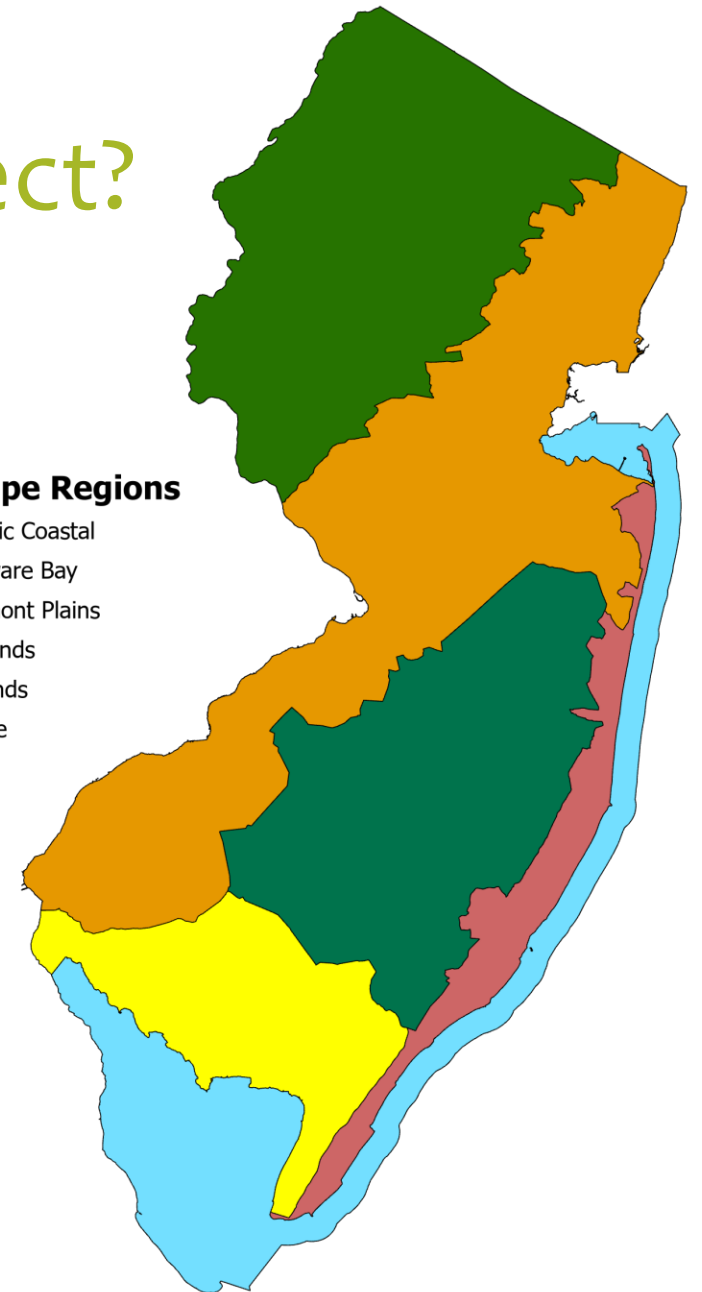
- Landscape-based tool derived from documented species locations, life histories, and land use/land cover (LULC) data
- Designed to identify suitable habitat for endangered, threatened, and special concern species
- Goal of facilitating the conservation and preservation of NJ's biodiversity

What makes the Landscape Project?

- Set of layers that depict habitat for endangered, threatened, and special concern species
 - Based on documented occurrences from Biotics database
- Species occurrences reviewed by expert biologists according to acceptability/reliability protocol
- Species location information combined with NJDEP LULC data
- Supplies data without compromising sensitive species locations
- Available to state, county, municipal, and private agencies, and the public

Landscape Regions

- Atlantic Coastal
- Delaware Bay
- Piedmont Plains
- Pinelands
- Skylands
- Marine



Updates in Version 3.4

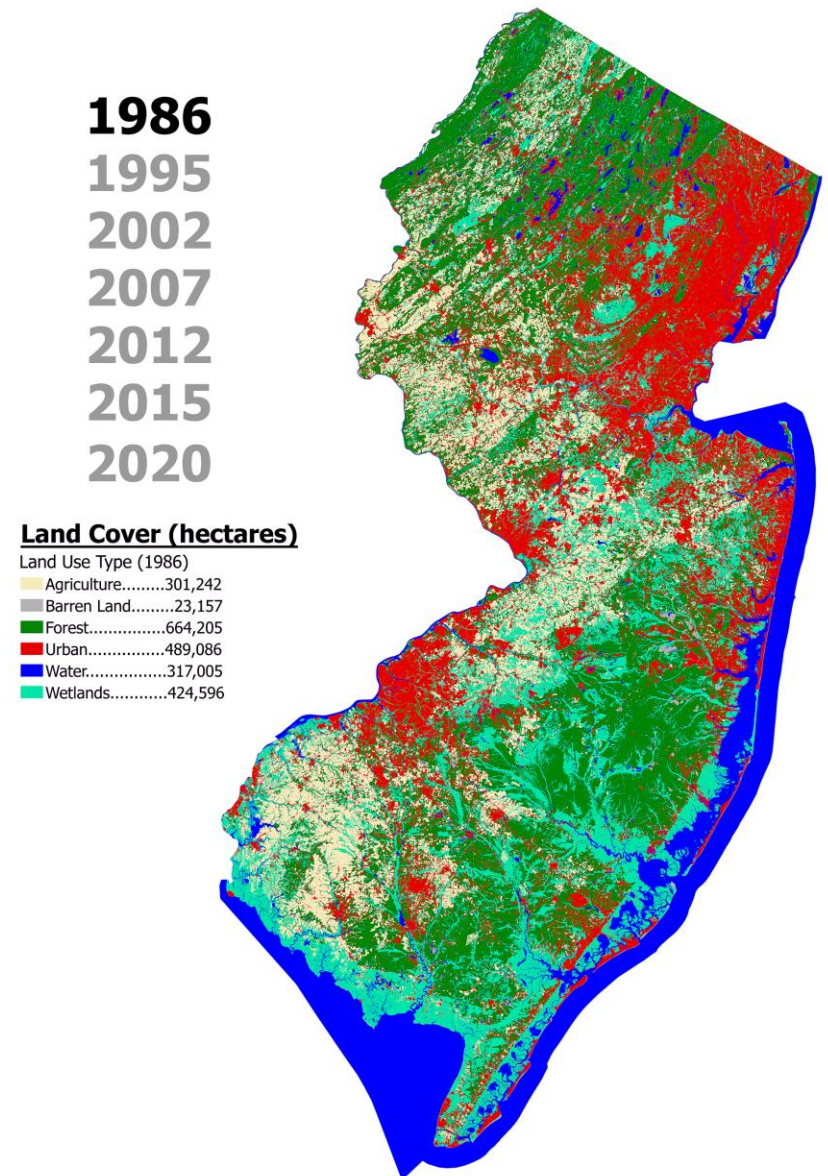
- Habitats reflect most recent land use/land cover data (2020)
- Updated species status in accordance with changes to endangered species and nongame wildlife lists
- Features freshwater fish and other species not previously included (several bats, king rail)
- Thousands of new species occurrence records



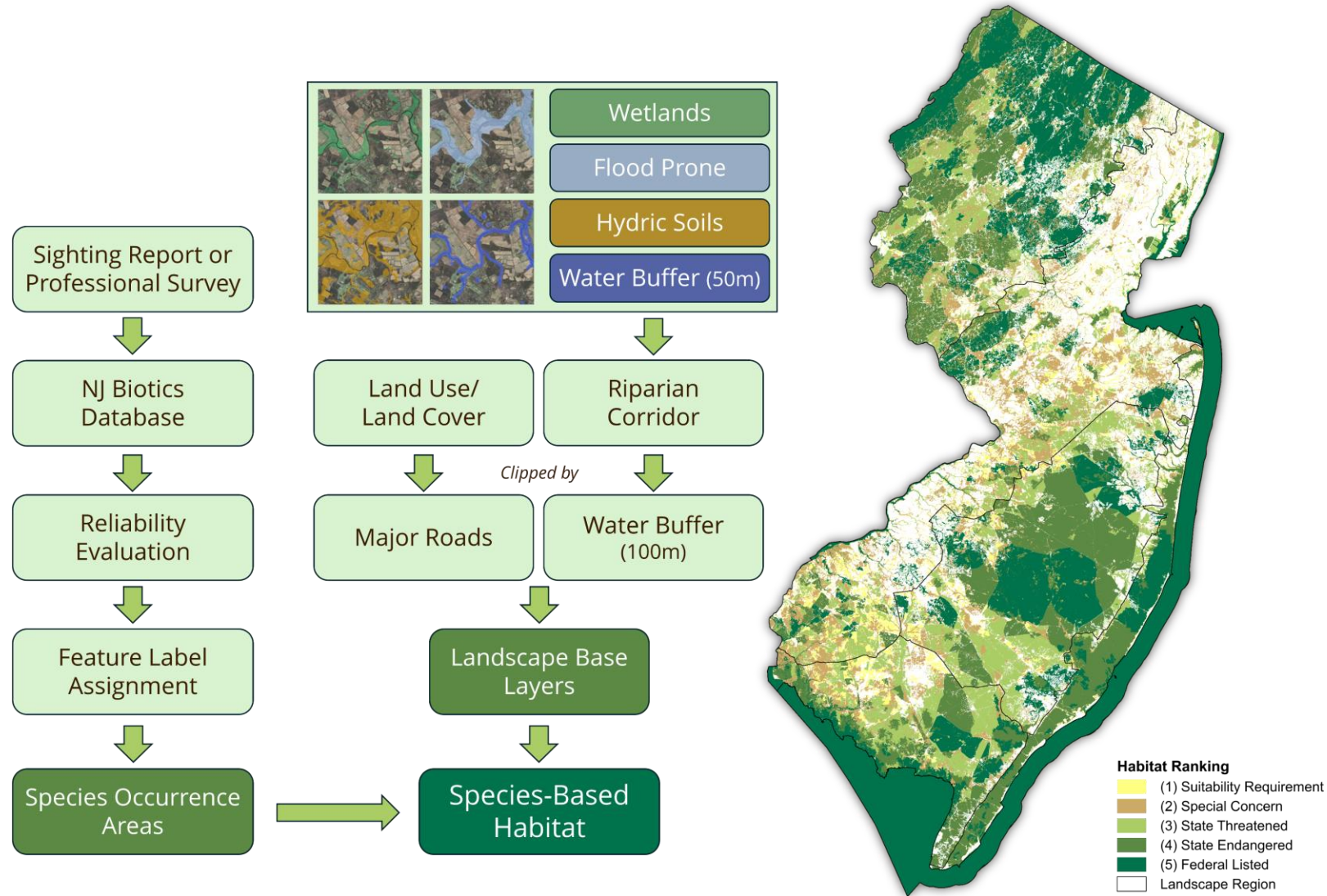
Land Use Change

- 1986-2007: residential development consumed land at nearly 2x rate of population growth
- In more recent years: increases in land development for industry, transportation, major roadways, etc.
- Urban land surpassed forest land as most prominent land type 1995-2007
- Decrease in rate of urbanization since 2007
 - Great Recession, COVID-19, smart growth regional-planning efforts

(Hasse & Lathrop 2008, 2010, 2020; Hasse et al. 2010)

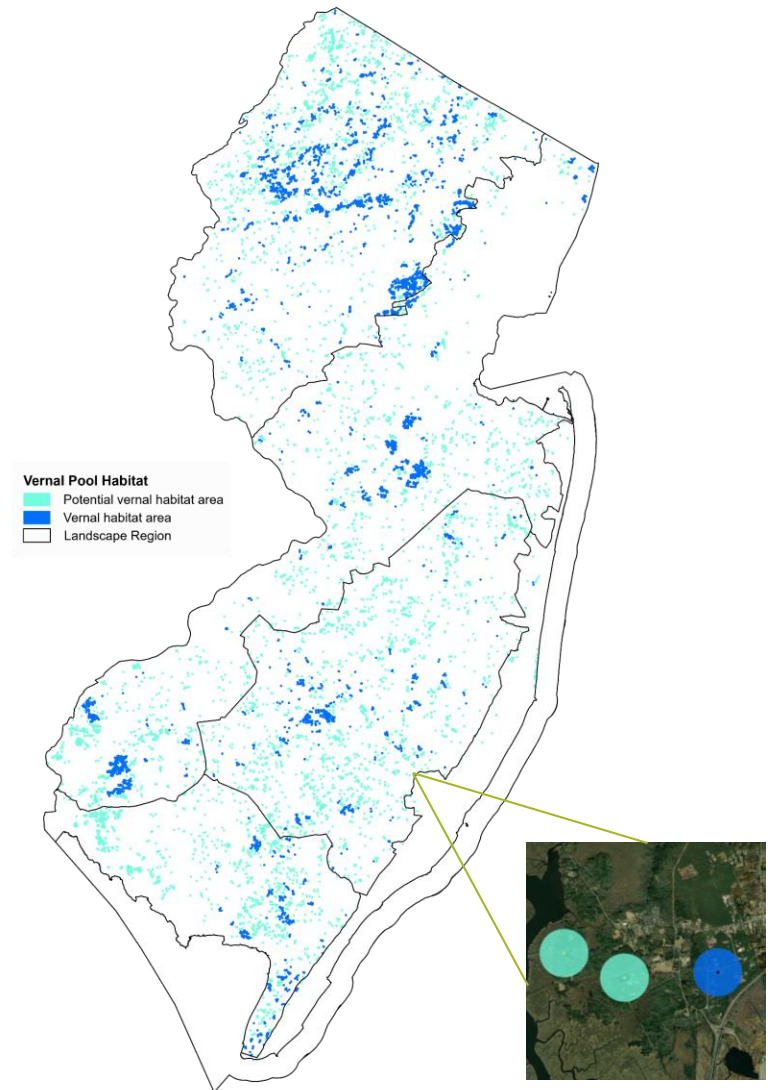
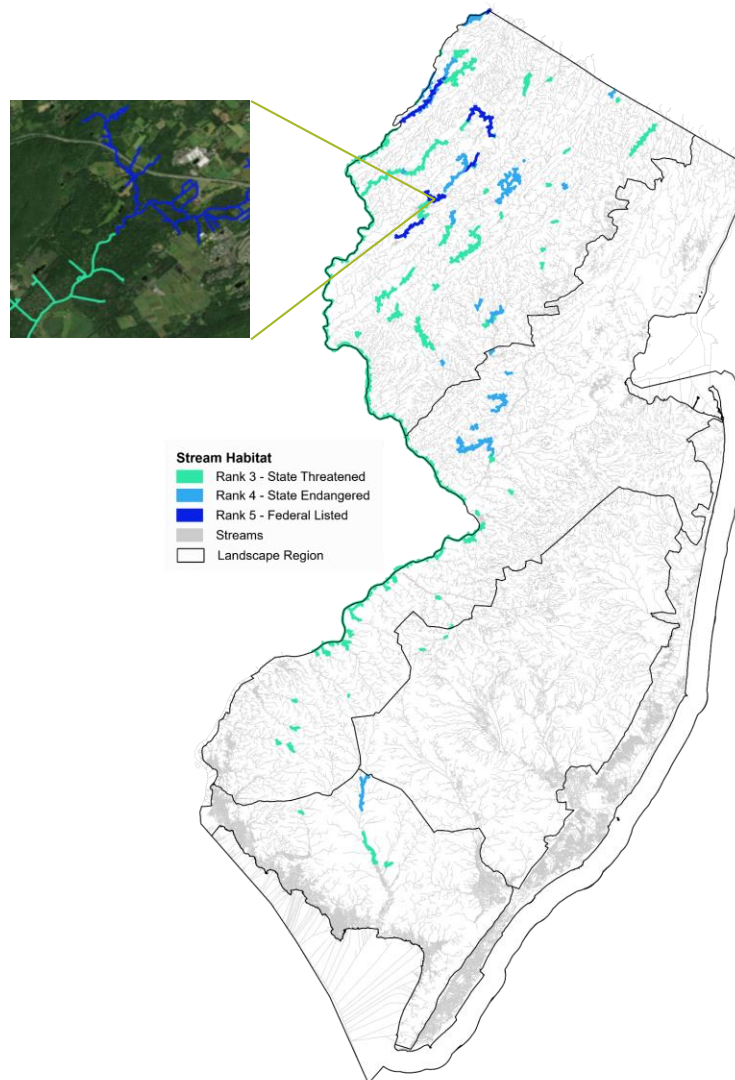


Species-based Habitat Development



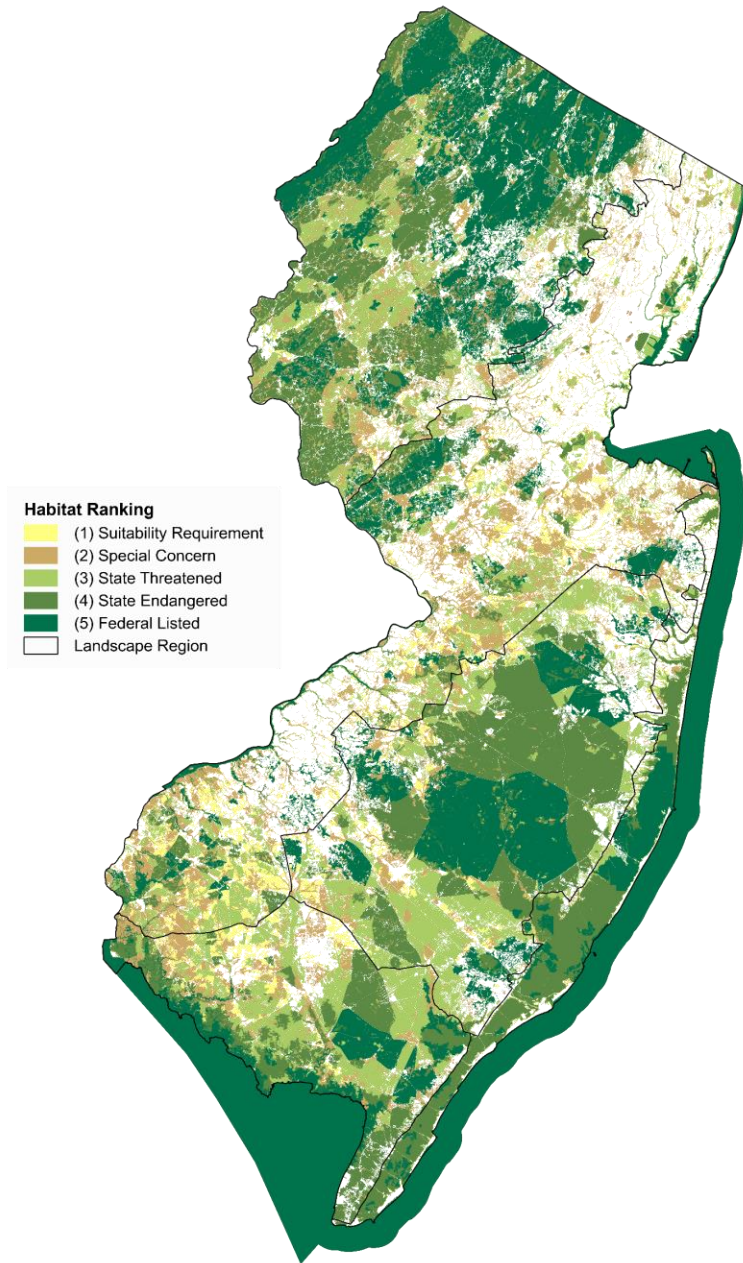
Freshwater and Vernal Habitat

- 2015 NJDEP Stream Network data
- Waterbody and stream centerlines were valued by freshwater fish and mussel species occurrence areas
- Accounts for barriers to movement and lotic/lentic habitats
- Vernal pools- includes area within 300m of an estimated center point location



Habitat Patch Ranking

1. **Suitable Habitat** – patches meet habitat-specific suitability requirements for endangered, threatened, or special concern species, but lack documented occurrences of such species
2. **Special Concern** – patches contain at least one documented occurrence of a *state special concern* species
3. **State Threatened** – patches contain at least one documented occurrence of a *state threatened* species
4. **State Endangered** – patches contain at least one documented occurrence of a *state endangered* species
5. **Federally Listed** – patches contain at least one documented occurrence of a *federally endangered or threatened* species



Appendix V

Land Use Land Cover Selections and Patch Type Justifications

Roseate Tern

BIOPID 188

REGION Statewide

PATCH TYPE Limited Extent

<i>LU20</i>	<i>LABEL 20</i>	<i>LULC TREATMENT</i>	<i>CITATIONS</i>
5412	TIDAL MUD FLAT	Undissolved	<i>1</i>
6111	SALINE MARSHES (LOW MARSH)	Undissolved	<i>1,2</i>
6112	SALINE MARSHES (HIGH MARSH)	Undissolved	<i>1,2</i>
6130	VEGETATED DUNE COMMUNITIES	Undissolved	<i>1</i>
6240	HERBACEOUS WETLANDS	Undissolved	<i>1</i>
7100	BEACHES	Undissolved	<i>1</i>
7440	DISTURBED TIDAL WETLANDS	Undissolved	<i>1</i>

Appendix V

Land Use - Land Cover Selection and Patch Type Rationale

Roseate terns are a colonial species that utilizes coastal habitats for nesting. In New Jersey, they can nest on sandy substrates of beaches and on wrack in marsh wetlands (though they will use additional habitats, such as rocky shores, which are not available to them in NJ) and will use mudflats for roosting (Gochfeld et al. 1998, Nisbet 1981).

Patch type Limited Extent is selected because it represents all habitat used by the individuals that make up a particular SOA by only valuing patches that intersect with that SOA (versus creating contiguous patches). This creates a realistic depiction of the colonies habitat needs and eliminates the chance of overvaluing areas not important to the breeding birds. Although roseate terns are infrequent nesters in the state, the habitats they would occur in are surveyed regularly and colonies are easily delineated when observed. It is therefore satisfactory to capture the breeding birds' habitat without overvaluing areas of the state. The nesting and foraging habitats of this species are mapped and modeled separately, so this patch type need only value the breeding habitat. Patch type Limited Extent is the best option for this since it will only identify habitats valued by this species.

Literature Citations

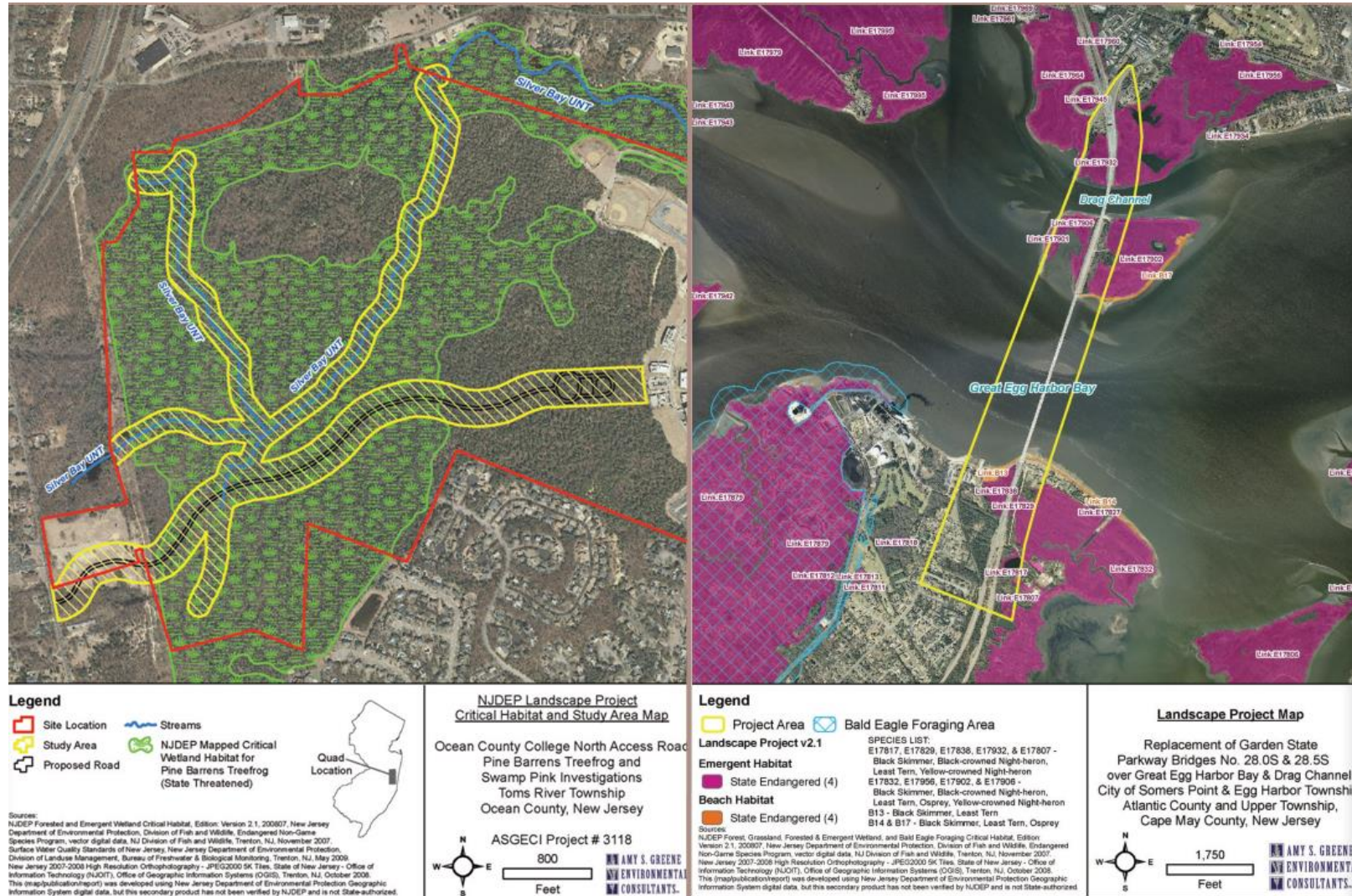
1. Gochfeld, M., J.Burger and I.C. Nisbet. 1998. Roseate Tern (*Sterna dougallii*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved 24 May 2010 from the Birds of North America Online: <http://bna.birds.cornell.edu/bna/species/370>
[doi:10.2173/bna.370](https://doi.org/10.2173/bna.370)
2. Nisbet, I. C. T. 1981. Biological characteristics of the Roseate Tern (*Sterna dougallii*). Report 50181-084-9. U.S. Fish Wildlife Service, Newton Corner, MA.



Purpose & Applications

- Aids planning, protection, and land management programs of NGOs and private landowners
- Enables state, county, municipal, and private agencies to identify important habitats
- Informs land use decisions that balance development and habitat protection
- Guides stewardship of conserved areas
- Prioritize conservation acquisitions

Project Review/Environmental Impact Assessment

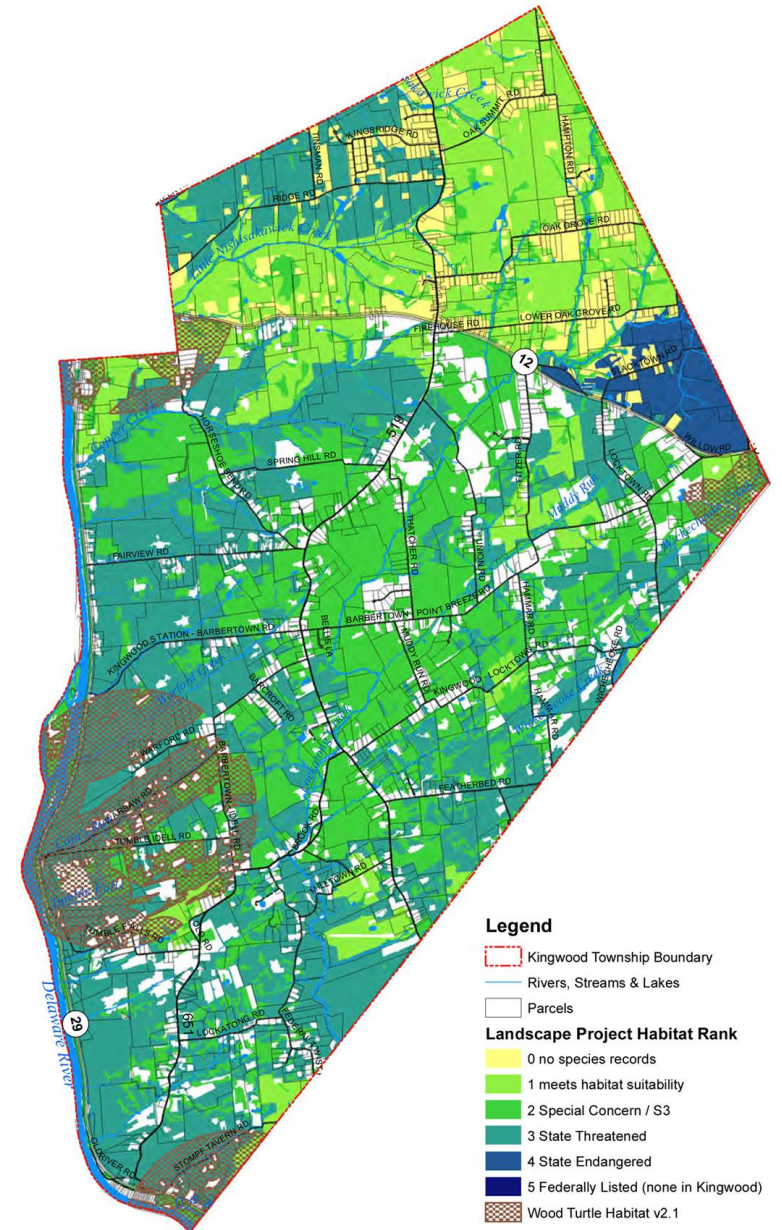


Left) Landscape Project data used to show the extent of Pine Barrens Treefrog habitat to determine if a proposed new access road for the Ocean County College campus would impact this species.

Right) Landscape Project data used to help conduct a habitat assessment for a proposed Garden State Parkway bridge replacement project over Great Egg Harbor Bay and Drag Channel in Atlantic and Cape May counties. The map shows areas of suitable habitat capable of supporting State and Federal listed threatened and endangered species within the project area, including Black Skimmer, Black-crowned Night-heron, Yellow-crowned Night-heron, and Least Tern.

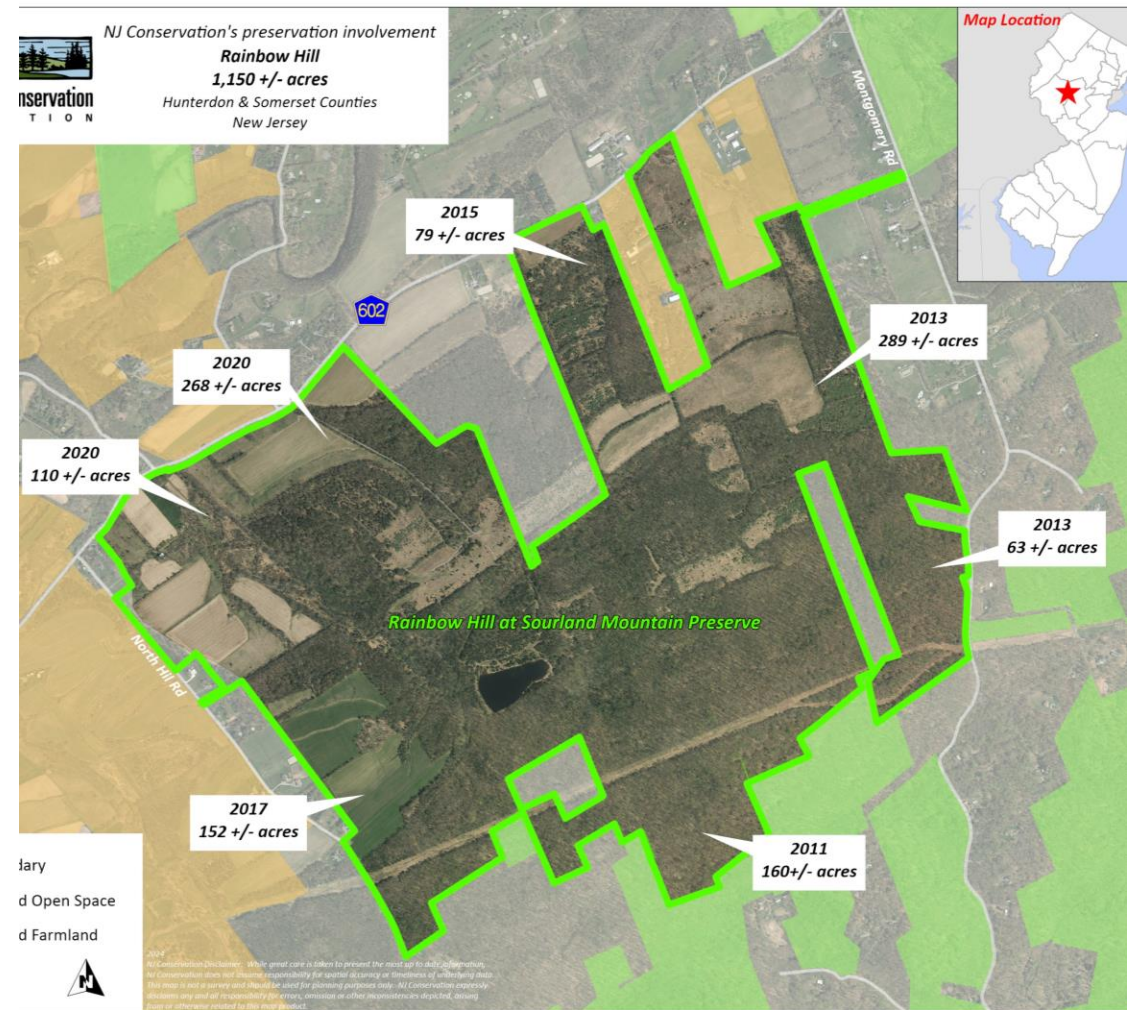
Environmental Resource Inventories

- LP data used in municipal and county Environmental Resource Inventories (ERI)
- Documents threatened and endangered wildlife habitat
- ERI for Kingwood Township, Hunterdon County



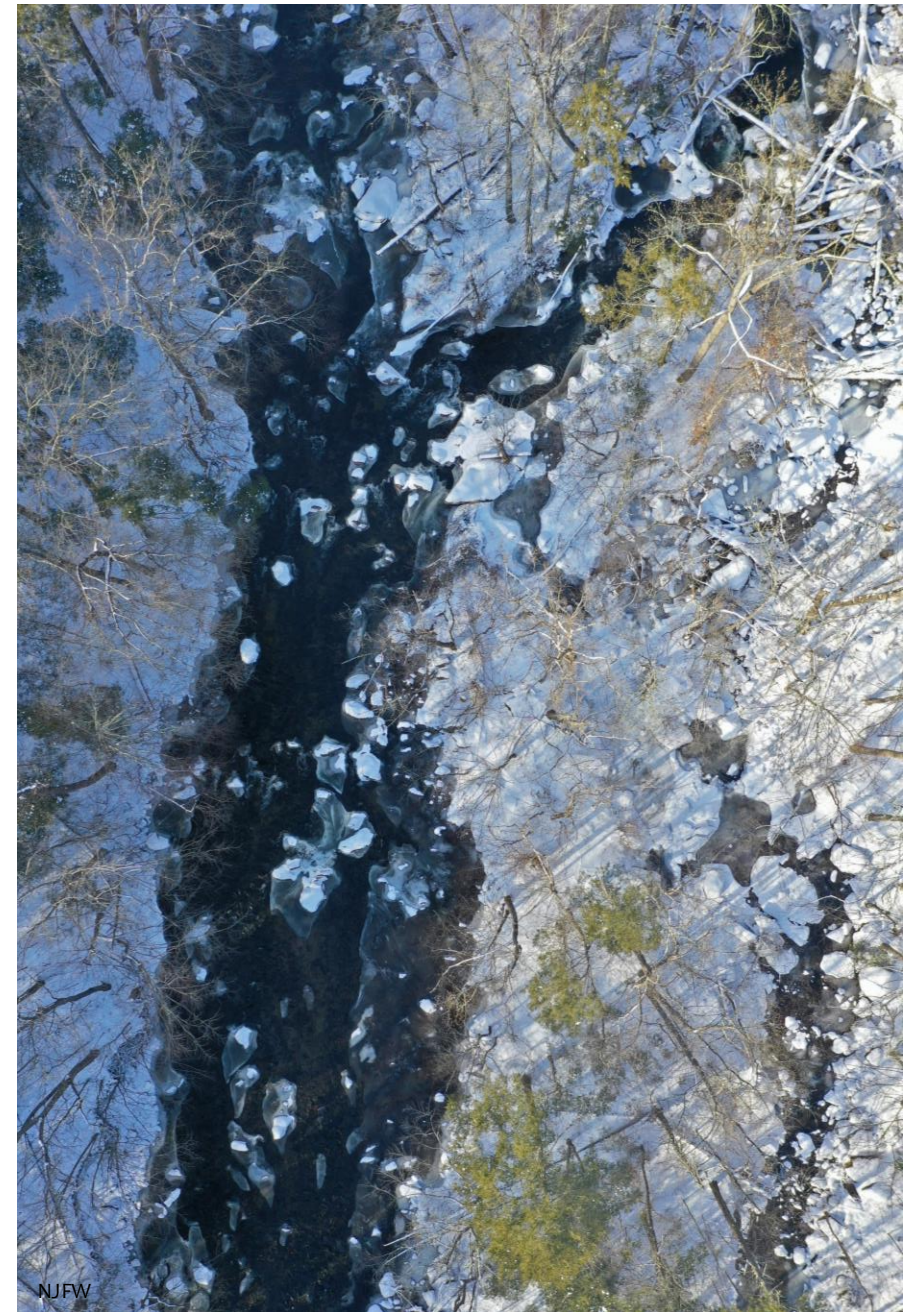
Prioritizing Conservation Acquisitions: Green Acres

- LP data used in evaluation of lands offered to NJ for acquisition:
- Sensitive habitats represented in site-specific planning maps
- Review the quality and quantity of habitats ranked 3, 4, & 5 on offered properties
- Land offers are scored based on wildlife occurrence data



NJ Land Use Regulations

- Coastal Permit Program Rules
- Coastal Zone Management Rules
- Freshwater Wetlands Protection Act Rules
- Flood Hazard Area Control Act Rules
- Highlands Water Protection and Planning Act Rules
- Water Quality Management Planning Rules



Habitat Patch Attributes

- LINKID - Unique ID used to link polygons with species look-up tables
- LNDR (Rank) - patches are classified, or “valued,” based on the status of the species present
- LU20 - Numeric 4-digit code representing land use/land cover category, (2020)
- LABEL20 - Description of land use/land cover category, (2020)
- TYPE20 - Generalized (Level I) land use/land cover category, (2020)
- RIPARIAN - Designates if polygon is inside/outside riparian corridor
- FOREST CORE - Designates if a polygon is inside/outside a patch that meets the 10-hectare core requirement
- GRASSLAND MINIMUM SIZE - Designates if a polygon is inside/outside a patch that meets the 18-hectare minimum size requirement
- REGION - The Landscape Region where the geographic centrum of the polygon occurs
- CONTACT - Contact info for US Fish and Wildlife Service
- VERSION - Number used to track version

Species Occurrence Attributes

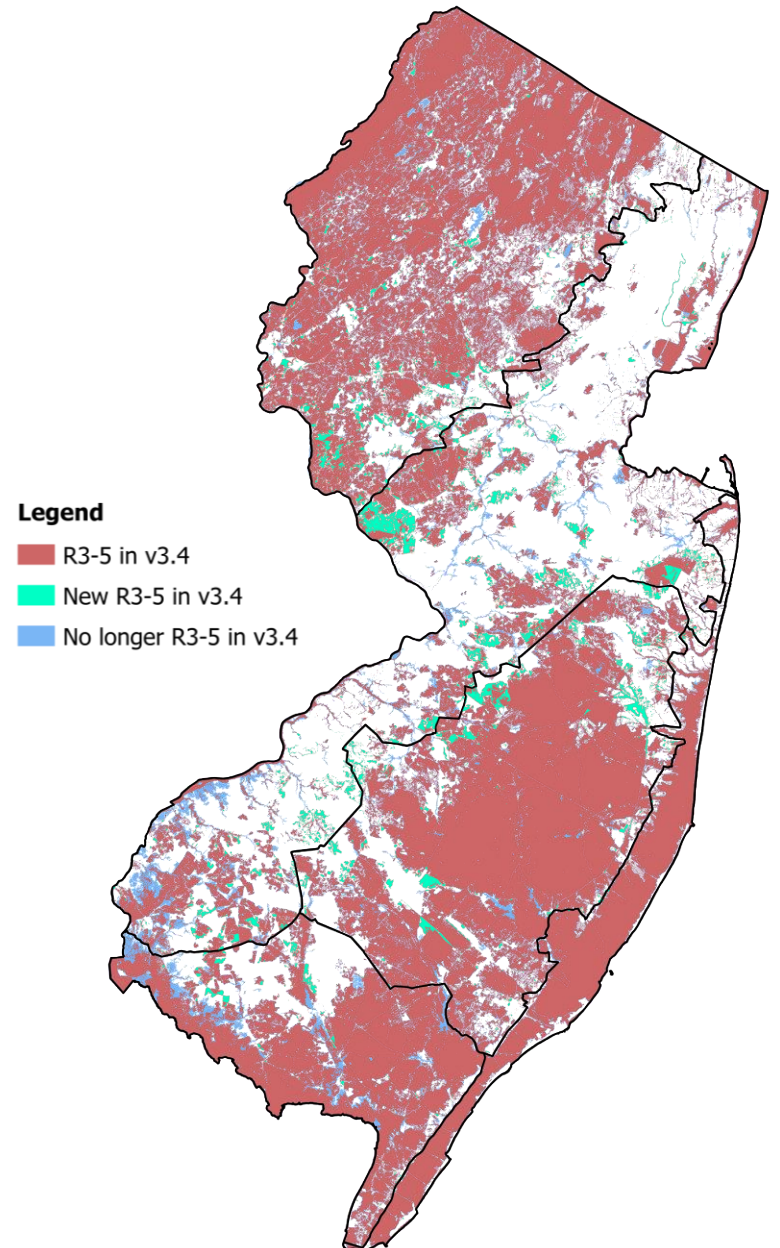
- LINKID - Unique ID used to link species information with habitat polygons
- COMNAME (Common Name) - Common name of species present
- SCINAME (Scientific Name) - Scientific name of species present
- FEAT_LABEL (Feature Label) - A label assigned to each occurrence that describes the occurrence type (e.g., nest, den, dead on road, etc.)
- CLASS - a taxonomic level
- RANK - the conservation status of the species
- FED_STATUS (Federal Status) - Federal status of species present
- NJ_STATUS (New Jersey Status) - The New Jersey Status of species present
- MAX_YEAR (Last observation year) - Year species was last observed
- CNT_SOA (Species occurrence area count) - count of the number of species occurrence areas that intersect the patch of habitat

Rank 1 Attributes

- LINKID - Unique ID used to link polygons to species look-up tables and Rank 1 habitat tables
- HABNAME (Habitat) - Name of Rank 1 habitat
- DESC (Description) - Indicates polygon with related LINKID is part of a contiguous patch that meets a Rank 1 habitat suitability requirement
- LNDR (Rank) - Patches are classified, or valued, based on the status of the species present
- MAX YEAR (Last observation year) - Year of the Land Use/Land Cover used to determine if an area meets a Rank 1 habitat suitability requirement
- CP_DISID (Contiguous Patch Dissolve ID) - Identifier for each contiguous patch of Rank 1 habitat. For a given Rank 1 habitat, the CP_DISID can be joined to the related Landscape Project feature class and used to dissolve polygons into contiguous patches of Rank 1 habitat.
- CP_AC (Contiguous Patch Acres) - Acres of contiguous patch of Rank 1 habitat
- CP_HA (Contiguous Patch Hectares) – Hectares of contiguous patch of Rank 1 habitat
- CP_PARA (Contiguous Patch Edge to Area Ratio) - Perimeter to area ratio of contiguous patch of Rank 1 habitat
- FCORE_AC (FOREST CORE ACRES) - Acres of forest core area for each contiguous forest patch containing greater than or equal to 10 hectares core area
- FCORE_HA (FOREST CORE HECTARES) - Hectares of forest core area for each contiguous forest patch containing greater than or equal to 10 hectares core area
- FCORE_AI (FOREST CORE AREA INDEX) - Percent of each contiguous forest patch comprised of core area greater than or equal to 10 hectares
- FCORE_N (NUMBER OF FOREST CORE AREAS) - Number of core areas within each contiguous forest patch containing greater than or equal to 10 hectares core area

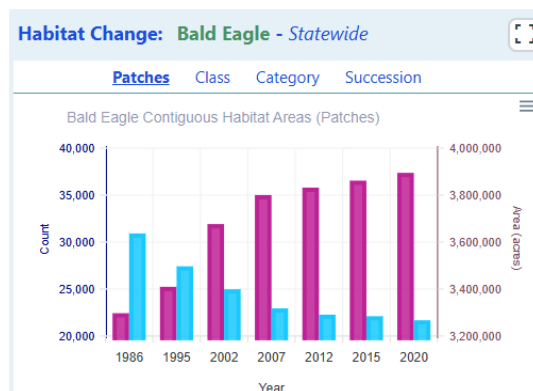
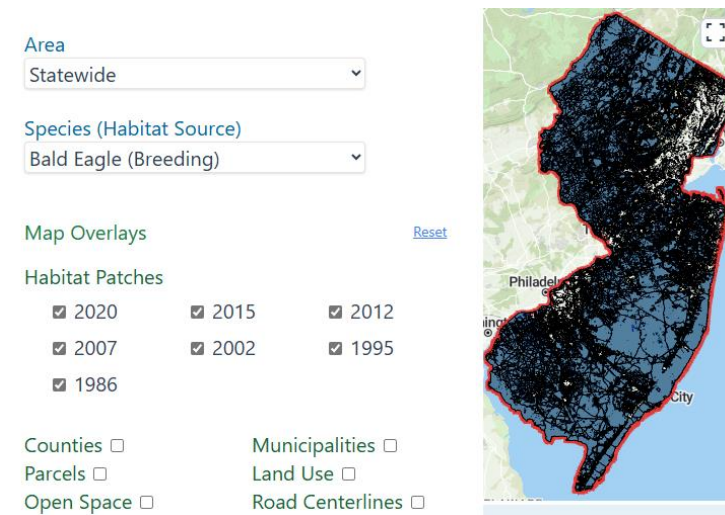
Statewide Land: Ranks 3, 4, and 5

- 1.3 million hectares ranked 3, 4, 5 in Landscape Project v3.4
- 123,138 acres of land ranked 3, 4, 5 in v3.4, but not in v3.3
- 61,976 acres of land ranked 3, 4, 5 in v3.3, but no longer in v3.4
- Net increase of 61,162 acres of land ranked 3, 4, 5 in v3.4
- 75.8% of all ranked land was ranked 3, 4, or 5 in v3.4
 - Decrease of 0.5% from v3.3



Statewide Habitat Change

- Habitat Change Analysis Project (HCAP)
- View potential wildlife habitat for more than 100 sensitive species in NJ
- Compiles species range extents and habitat associations
- Incorporates LULC data



Habitat Change: **Bald Eagle - Statewide**

[Patches](#) [Class](#) [Category](#) [Succession](#) [Land Use](#) [Export CSV](#)

Year	Count	Count Change	Acres	Acres Change	Edge (ft.)	Edge/Acres	Smallest Patch	Largest Patch
1986	22,424	0	3,636,662	0	415,584,955	114	0	95,168
1995	25,233	2,809	3,496,730	-139,932	431,857,905	124	0	94,487
2002	31,914	6,681	3,398,944	-97,786	455,223,267	134	0	93,308
2007	35,007	3,093	3,317,501	-81,442	457,185,714	138	0	93,445
2012	35,794	787	3,290,794	-26,707	456,022,445	139	0	93,772
2015	36,539	745	3,284,226	-6,568	450,252,040	137	0	93,625
2020	37,369	830	3,266,906	-17,321	450,858,717	138	0	93,520



New Jersey Landscape Project

Wildlife habitat mapping for community land-use planning and species conservation



A Tool for Strategic Wildlife Habitat Conservation

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. The Landscape Project categorizes New Jersey into six distinct Landscape Regions regarding the similarity of ecological communities and geographic features. This serves as a spatial framework for management and conservation of species and their habitats.

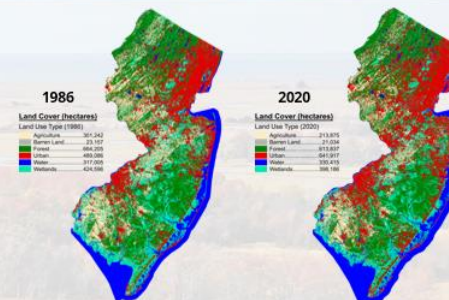
The NJDEP Fish and Wildlife (NJDEP FW) mapped habitat for endangered, threatened, and special concern wildlife within each region based on species occurrence information, Land Use/Land Cover classifications, and species habitat requirements.

Landscape Regions

- Atlantic Coastal
- Delaware Bay
- Piedmont Plains
- Pinelands
- Skylands
- Marine



Since 1986, urbanization has resulted in a loss of nearly 5,000 hectares of wildlife habitat per year. In 2007, the amount of land classified as 'Urban' surpassed the amount classified as 'Forest' for the first time. Over time, much of New Jersey's remaining wildlife habitat has become less suitable due to habitat fragmentation, which threatens imperiled wildlife species that require large, contiguous tracts of appropriate habitat.



Applications

Landscape Project maps enable state, county, municipal, and private agencies to identify important habitats and protect them in a variety of ways, including:

- Prioritizing conservation acquisition
- Guiding regulators and planners
- Providing citizens with conservation tools
- Guiding stewardship of conserved areas

Species Occurrence Areas

- Imperiled wildlife occurrence data, based on field observations from a variety of sources including Endangered and Nongame Species Program (ENSP) surveys and public reports, are stored and managed in the NJ Biotics database.
- All data must meet certain criteria and 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.).
- A **Species Occurrence Area (SOA)** is a polygon generated from each species occurrence location and used to assign value to habitats. A SOA represents habitat that supports an individual occurrence and often indicates the presence of a species population beyond that individual occurrence.

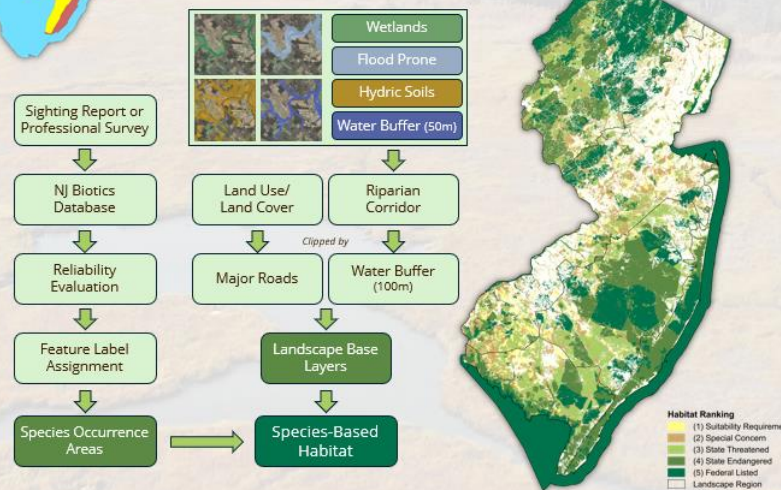
Feature Label	SOA
Hibernaculum	4 kilometer buffer
Non-breeding sighting	2 kilometer buffer
Maternity colony	2 kilometer buffer
Breeding sighting	2 kilometer buffer

Feature labels and SOAs for the Indiana bat, *Myotis sodalis*

Landscape Base Layers

- NJDEP 2020 Land Use/Land Cover (LULC) classifications provide the foundation of the base layer.
- NJDOT Major Roadways bisect LULC classifications, serving as barriers to species movement or boundaries between contiguous LULC classes.
- Riparian Corridors are defined based on a Rutgers University Center for Remote Sensing and Spatial Analysis (CRSSA) method and multiple GIS datasets.
 - Riparian corridors are critical travel corridors for many species
- NJDEP FW and CRSSA mapped potential vernal habitat locations, which includes vernal pools and any adjacent freshwater wetlands.

Species-Based Habitat Development



Patch Types

Each species-feature label combination is assigned a patch type that describes the method used to value habitat area from polygons of the Landscape base layer and construct patches of habitat:

1. **Limited extent:** values LULC polygons that directly intersect the SOA.
2. **Contiguous area:** LULC polygons are dissolved/combined into contiguous areas and then valued upon intersection with the SOA.
3. **Cardinal-proximate:** a cardinal set of LULC polygons are valued upon intersection with a SOA and a proximate set is valued based on adjacency to the valued cardinal set.
4. **Stream centerline:** valued upon intersection with an SOA. Only freshwater species use this patch type.



Habitat Ranking

SOAs are overlaid onto species-based habitat patches and patches are valued based on the status of the species present as follows:

Rank 5	Patches containing one or more occurrences of wildlife listed as endangered or threatened pursuant to the Federal Endangered Species Act of 1973.
Rank 4	Patches containing one or more occurrences of State endangered species.
Rank 3	Patches containing one or more occurrences of State threatened species.
Rank 2	Patches containing one or more occurrences of species of special concern.
Rank 1	Patches that meet habitat-specific suitability requirements for endangered, threatened, or special concern wildlife species, but do not intersect with confirmed occurrences of such species.

Data Availability

Maps are available in ArcGIS file geodatabase format. Data are best viewed using ArcGIS Pro 3.2. Questions related to the Landscape Project Data or mapping applications should be directed to dfwgis@dep.nj.gov.

Landscape Project Products

Access NJDEP Fish and Wildlife's interactive Landscape Project products through the QR codes to the right, or online at: <https://dep.nj.gov/njfw/conservation/new-jerseys-landscape-project/>



Experience



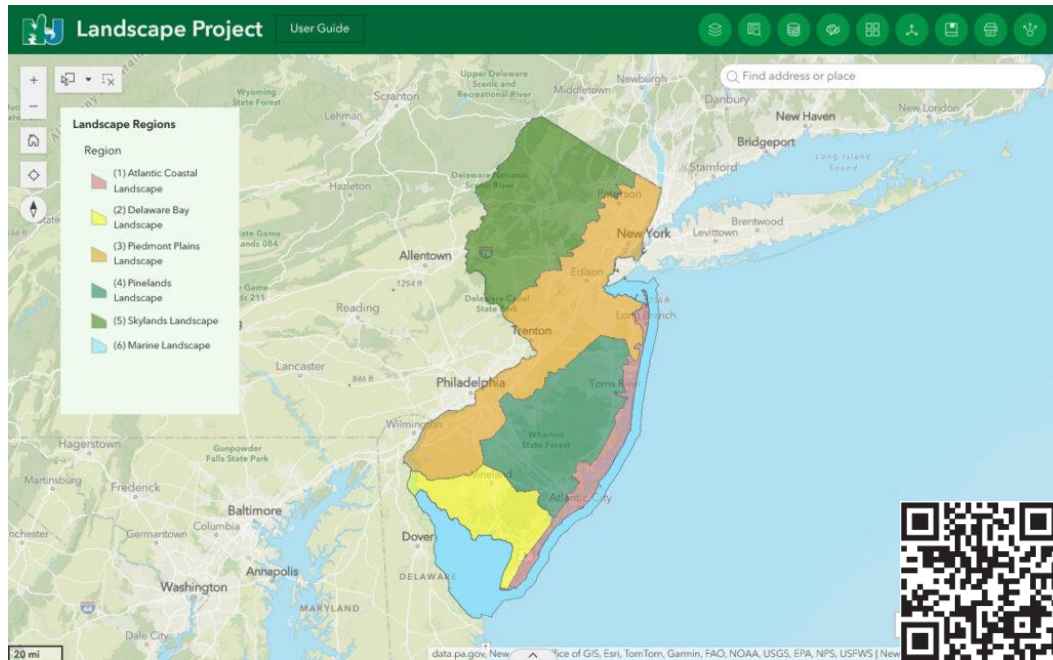
Landscape
Conservation Explorer



StoryMap

Data Availability

Landscape Project Experience



Landscape Project StoryMap



NJ Fish and Wildlife: <https://dep.nj.gov/njfw/conservation/new-jerseys-landscape-project/>
NJDEP Open Data: <https://gisdata-njdep.opendata.arcgis.com/>

Questions?

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