State Wildlife Grants
T-11-T-1
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Landscape Conservation Tools and Technical Guidance

Interim Report for Project Year
September 1, 2016 – September 30, 2017

NJ Department of Environmental Protection

DIVISION OF FISH AND WILDLIFE
ENDANGERED AND NONGAME SPECIES PROGRAM
P.O. BOX 420
TRENTON, NJ 08625

PERFORMANCE REPORT

STATE: New Jersey **PROJECT NUMBER:** T-11-T-1

PROJECT TYPE: Research and/or Management

PROJECT TITLE: Landscape Conservation Tools and Technical Guidance

STUDY NUMBER AND TITLE: 1. The Landscape Project

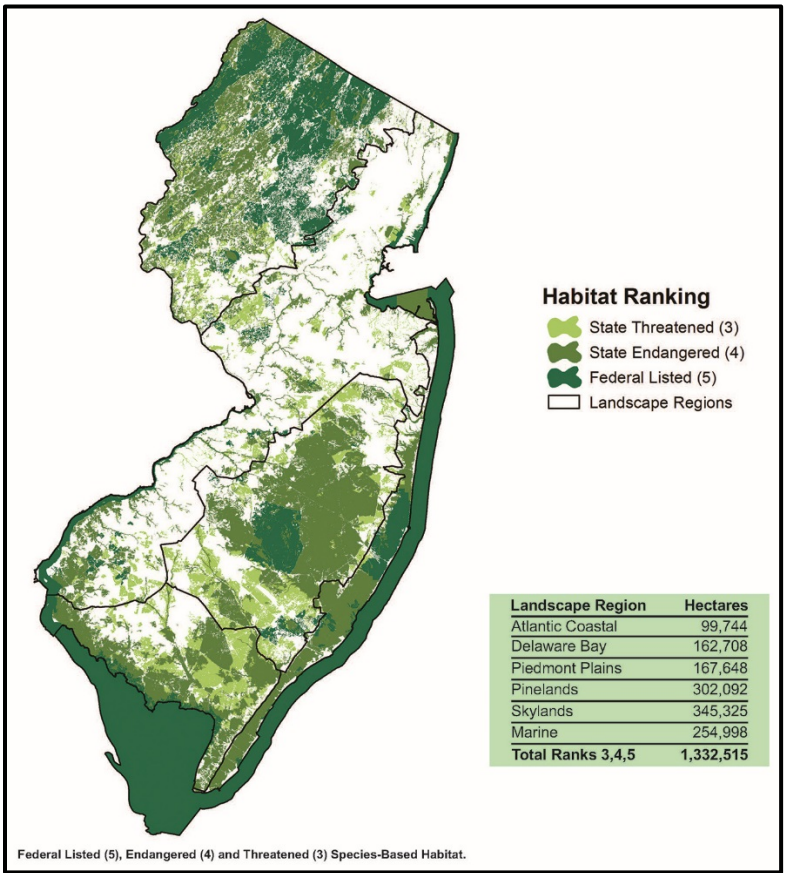
PERIOD COVERED: September 1, 2016 to September 30, 2017

JOB NUMBER AND TITLE: 1A. Landscape Project Mapping
Prepared by: Patrick Woerner

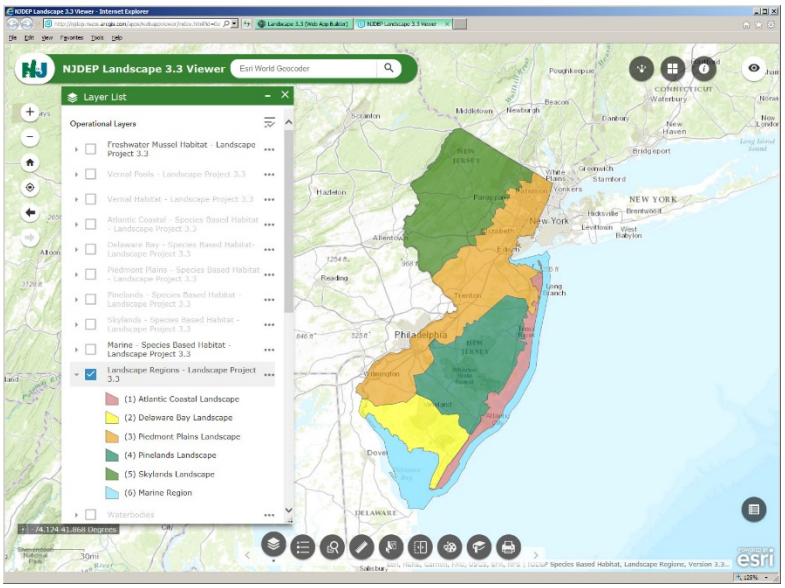
Objective: Design, refine and make available wildlife habitat designations using the most current data on rare species populations and land cover types.

Key Findings:

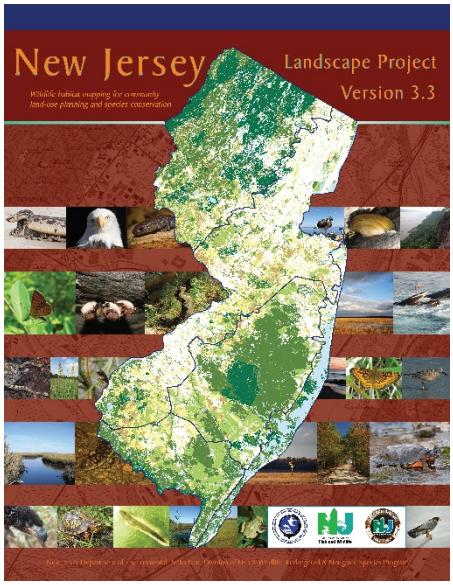
- Version 3.3 was completed and released to the public on May 9, 2017. The release of the updated mapping incorporated the most recent land use/land cover data (LULC 2012) and more than 3,400 species occurrence records since the last release. Finalized mapping for each of the six Landscape regions was completed for all listed species.



- All Version 3.3 Landscape Project GIS data were made available in file geodatabase format and are fully documented with Federal Geographic Data Committee (FGDC) compliant metadata. The data is served on the NJDEP Bureau of GIS (BGIS) website for download (http://www.nj.gov/dep/gis/landscape.html) as well as on the NJDEP interactive mapping application (NJ-GeoWeb).
- GIS staff worked with the Bureau of GIS (BGIS) to develop a new ArcGIS Online (AGO) application called Landscape 3.3 Viewer, that has provided a more user-friendly way to interact with Landscape data and look up associated species and habitat information.



- ENSP updated the Landscape Project website to reflect the changes to the updated version. http://www.state.nj.us/dep/fgw/ensp/landscape/index.htm
- Landscape Project Version 3.3 has been fully documented in a 1,523-page report available for download on the Landscape Project website. The report is organized as follows:



New Jersey's Landscape Project (Version 3.3)

- Appendix I – Protocol for Accepting or Rejecting Species Sighting Reports
- Appendix II - Species Occurrence Area Justifications
- Appendix III - NJDEP 2012 Land Use/Land Cover Categories
- Appendix IV - Land Use/Land Cover Analysis for Species and their Feature Label Components
- Appendix V - Land Use/Land Cover Selections and Patch Type Justifications

- Version 3.3 incorporates two Federal-listed species not previously represented in the Landscape Project; Atlantic sturgeon and northern long-eared bat (northern myotis).
- Version 3.3 includes updated Riparian Corridor mapping based on available USGS flood-prone areas, a composite of FEMA flood data, SSURGO hydric soils, and NJDEP 2012 LULC wetlands and water data.
- Freshwater Mussel Habitat was updated with listed mussel species occurrences and stream habitat data represented by the most recent statewide National Hydrography Dataset (NHD) stream centerlines.
- Vernal pool point data was released publicly for the first time in Version 3.3 of the Landscape Project. Vernal pool point data were categorized as either "potential vernal habitat location" or "vernal habitat location" and associated, via a relationship class, with updated Vernal Habitat Areas data.
- New Habitat Suitability (Rank 1) tables and relationship classes were developed for each of the six Landscape regions including new forest core metrics to allow prioritization of forested habitat patches. Some of the new attributes include perimeter to area ratio, number of core areas within each contiguous patch containing core forest, and percent of each contiguous forest patch comprised of core area greater than or equal to 10 hectares.
- GIS staff designed and implemented a geodatabase structure with geoprocessing models for generating potential and valued habitat for each species (BIOPID) mapped in Landscape.
- Using Python scripting and ArcGIS geoprocessing models, GIS staff continues to work on automating aspects of Landscape Project Mapping. Incorporating all aspects of Landscape creation within the ArcGIS platform will enable a more automated, standardized and efficient process.
- GIS staff coordinated and collaborated with the Office of Natural Lands Management (ONLM) on incorporating newly released Landscape Version 3.3 data into the response process for Natural Heritage Data Requests.
- GIS staff collaborated with the Division of Land Use Regulation (DLUR) to include two new species attributes to help guide implementation and compliance with new Flood Hazard Area Control Act Rules:
    - 1) Flood Hazard Area Terrestrial Species of Concern – designates if a species is considered a Terrestrial Species of Concern according to the Flood Hazard Area Control Act rules at N.J.A.C. 7:13.
    - 2) Flood Hazard Area Species Critically Dependent on Water – designates if a species is considered “critically dependent on the regulated water for survival” according to the Flood Hazard Area Control Act rules at N.J.A.C. 7:13.

Conclusions:

- In May 2017, ENSP published the new statewide Landscape Version 3.3 mapping. This was a major accomplishment and provided agencies, citizens and conservation groups with the best information on habitats used by listed wildlife species in NJ. Release of the new map products was accompanied by thorough documentation of the data and methodologies employed to create them.
- Utilizing a geodatabase structure and geoprocessing models is an effective means of generating species-specific habitat patches.
- Creating an updated statewide version of the Landscape Project was more time consuming than anticipated. Product development timeframes can only be expected to increase if the ENSP advances with plans to create more detailed and species-specific mapping, such as mapping for all species assessed in New Jersey’s 2017 State Wildlife Action Plan.
- Dedicated, full-time staff resources are a more desirable staffing solution than part-time and temporary staff, and allocation of such resources would enhance the ENSP’s ability to continue with development and maintenance of the project within desired timeframes.

Recommendations:

- Review and assess the appropriate allocation of ENSP GIS staff resources and funding to support the update and maintenance of the project.

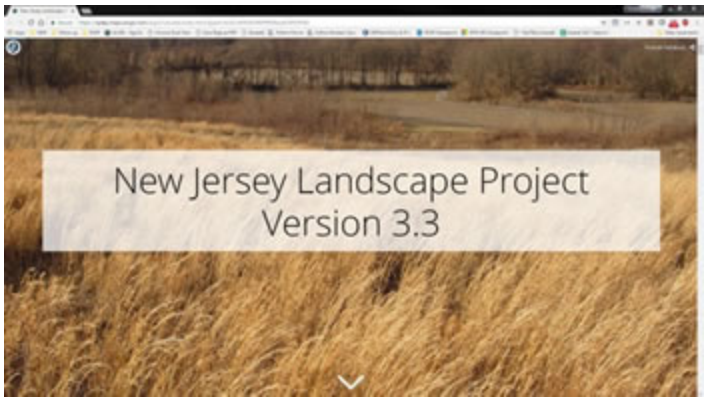
- Work with the Department's Bureau of GIS (BGIS) to ensure the Department continues to support the creation of the Land Use Land Cover data which is the base for Landscape Project mapping.
- Begin research and development work on methodology for Version 3.4 or 4.x of the Landscape Project.
- Continue work on developing a plan for releasing the Landscape Project products and, to the extent possible, minimize delays in product updates.
- Begin work on base layer creation for Landscape Project including new roads, riparian corridor and 2015 LULC. The Department has started the process of updating the Land Use Land Cover data from the current 2012 to 2015.
- Continue to develop modeling within the ArcGIS platform that will speed up the update process.
- Continue the peer review process on new methodologies as they are developed.

JOB NUMBER AND TITLE: 1B. Training, Information and Technical Guidance Program
Prepared by: Patrick Woerner and Brian Henderson

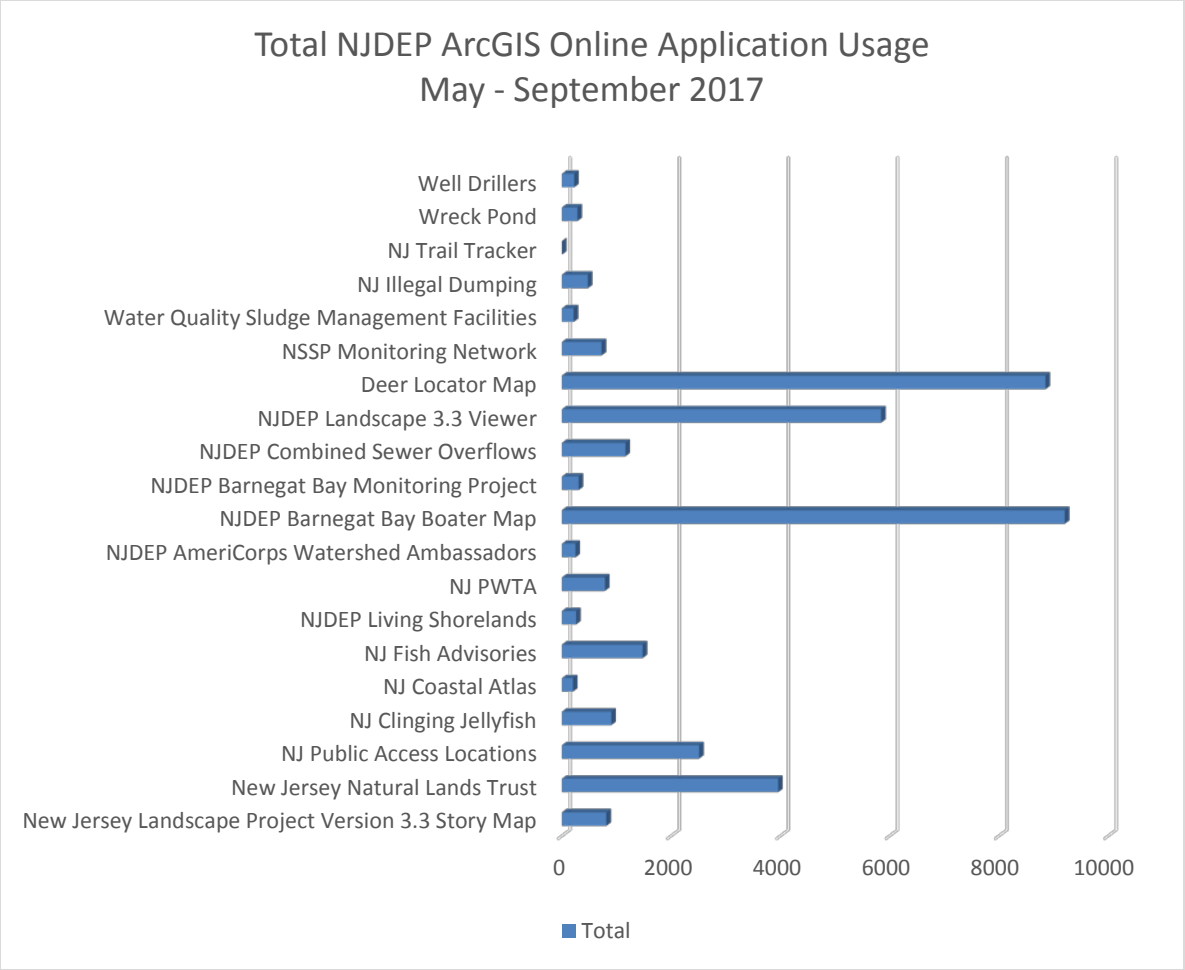
Objective: Build knowledge of critical habitat locations and disseminate Landscape Project data and training to guide land management, habitat conservation and acquisition, and land planning at all levels of government and non-government organizations.

Key Findings:

- Since the release of Landscape Project Version 3.3 in May of 2017, GIS staff has coordinated and conducted four Landscape Project GIS training/information sessions attended by a total of approximately 150 people.
- GIS training and/or guidance on Landscape Project Version 3.3 was provided to representatives of municipal agencies, environmental commissions, county planning agencies, state agencies, NGOs, private consulting firms, and the general public. Examples of some of the organizations represented by individuals that attended GIS training or information sessions include NJ Audubon, USDA-NRCS, Cumberland County Planning, Middlesex County Planning, NJDOT, Green Acres Program, Highlands Council, and Rowan University.
- GIS staff designed and produced GIS training materials related to the newly released Version 3.3 Landscape Project data and tools, including presentations, tutorials, and other supplemental products to facilitate use of the Landscape Project's wildlife habitat mapping.
- Continued to provide the Landscape Project Training and Information Webinar program over Citrix GoToWebinar software to allow users to participate remotely.
- GIS staff developed an ESRI Story Map entitled New Jersey Landscape Project Version 3.3 designed for the general public to provide a broad overview of the purpose of the Landscape Project as well as the data and methodology used to create the version 3.3 update and an overview of the changes made since version 3.1. It also presents a description of the Landscape Regions, a summary of the data used as well as examples of Landscape Project applications.



- ENSP GIS staff continues to coordinate and collaborate with the Highlands Council technical staff to incorporate Landscape Project Version 3.3-derived data into the Highlands Regional Master Plan and Critical Wildlife Habitat designations.
- GIS staff continues to participate, as a member of the Science Advisory and Rare Species work groups, in the development of the NJ Conservation Blueprint Project (https://www.njmap2.com/blueprint/) to prioritize land preservation targets. Staff has identified GIS data, including Landscape 3.3 derived data for inclusion.
- A presentation on the Landscape Project Version 3.3 was given at the New Jersey Geospatial Forum (NJGF) quarterly meeting.
- ENSP GIS staff attended a meeting, and responded to inquiries, on Landscape Project Version 3.3 to NJDEP Bureau of GIS (BGIS) and the New Jersey Builder's Association (NJBA).
- ENSP GIS staff supported the Division of Land Use Regulation (DLUR) by providing applicable analysis and GIS data derived from the Landscape Project for regulatory reviews.
- Staff continued to provide Landscape Project support to the Division of Natural and Historic Resources' (NHR) Land Management Review Policy *Standard Operating Procedure* for screening management and other actions to determine if they will have an adverse impact on threatened and endangered species habitat.
- GIS staff worked with BGIS on enhancement to the new Landscape 3.3 Viewer ArcGIS Online (AGO) application based on public feedback received at Landscape Project GIS training and information session.
- Usage statistics from May 2017 (when Version 3.3 was released) through September 2017 revealed that the newly developed ArcGIS Online (AGO) NJDEP Landscape 3.3 Viewer application was the third most used NJDEP AGO application with 5,842 visits while the NJ Landscape Project Story Map had 814 visits.



- Landscape Project GIS data is among one of the most downloaded NJDEP GIS datasets with an estimated total of ~2,500 downloads (geodatabase files) from May 2017 (when Version 3.3 was released) through September 2017.

Conclusions:

- Both the utility of Landscape data and the impact of outreach and dissemination efforts are reflected in the volume of data download requests as well as usage statistics for the new ESRI ArcGIS Online (AGO) NJDEP Landscape 3.3 Viewer.
- Communication and information on the Landscape maps and their limitations are vital as the Department references the mapping in various rules and regulations and continues to incorporate the mapping into policy decisions.
- Providing Landscape Project GIS training and information sessions is an essential means of disseminating guidance information and proactively addressing potential misinterpretation and misuse of Landscape Project products.
- The creation of the New Jersey Landscape Project Version 3.3 ESRI Story Map is an effective means and valuable public information tool to provide an overview of the purpose of the Landscape Project showcase the data and methodology used to create the version 3.3 update and examples of Landscape Project applications.
- Landscape Project data serves as a vital basis for analysis such as the Highlands Critical Wildlife Habitat designations in the Highlands Regional Master Plan, the NJ Conservation Blueprint Project and other habitat prioritization projects and environmental review.

- Maintaining a viable statewide training, information and technical guidance program on the Landscape Project is time consuming. While the level of staff resources has been reduced, the level of demand for such training and guidance has not. If training is to be maintained and/or developed further, more staff time and resources may need to be devoted to the program, or alternate training solutions may need to be considered.

Recommendations:

- Continue to provide guidance to state, federal, and municipal agencies and conservation groups.
- Continue to promote the appropriate application of Landscape Project maps to land-use regulation and conservation planning. In doing so, the Department will continue to afford transparency and predictability to the land-use permitting and development process.
- Continue to maintain and develop online mapping tools including the ArcGIS Online (AGO) NJDEP Landscape 3.3 Viewer and Landscape Project Version 3.3 Story Map.
- Continue to support state and regional planning efforts such as the NJ Conservation Blueprint Project and the Highlands Regional Master Plan by providing applicable Landscape Project data and guidance.
- Continue development and use of the GoToWebinar tool to support outreach and dissemination efforts.
- Continue to promote the integration and use of Landscape Project GIS data among and municipal and county planners.
- Review and assess the appropriate allocation of ENSP GIS staff resources and funding to support the update and maintenance of the project, as well as potential modifications or alternatives to the current training program.

JOB NUMBER AND TITLE: 2. Biotics Database
Prepared by: Gretchen Fowles

Objective: Update and maintain the most current data on rare species populations in New Jersey.

Key Findings:

- Updates continue to be made to the comprehensive, written data management protocol that was developed last year by ENSP to explicitly describe how observation data from various sources is processed and managed from receipt to entry into the Biotics database to serve as a user guide to train new data managers
- The Biotics specific email address put in place last year to serve as the central repository for species observations that ENSP receives electronically is working well and with one part-time data manager in charge of managing the account, the responses are more timely and there is a low likelihood of information being misplaced compared to emails with sightings information being distributed to multiple staff members regular email accounts.
- A data exchange of element occurrences from the NJ local Biotics database to the Biotics central database was completed in January 2017.
- Calculations of the following numbers were between 9/1/2016 and 8/31/2017 to allow comparison to the previous years' 12 month reporting periods. Biotics staff received approximately 2,440 additional rare animal records, 481 from the public, and 1,959 from ENSP staff and partners. Approximately 1,990 rare animal records were entered into Biotics. There remains a backlog of approximately 679 endangered and threatened species records that have been reviewed and accepted by biologists and await entry into Biotics. The backlog of special concern species records that have been reviewed and accepted by biologists and are awaiting entry into Biotics is approximately 1,560.
- One ENSP, one DFW employee, and one temporary employee attended NatureServe's Core Methodology Training in Arlington, VA in May 2017.
- Biotics staff has been using a new tool made available by NatureServe that allows batch uploading of source feature and element occurrence data into Biotics to help streamline the data entry process. ENSP is concurrently creating templates, a user guide, and a new protocol for data managers related to the new tool.
- ENSP has been working with DEP's Bureau of GIS to develop an ArcGIS Online mobile-friendly application for staff, consultants and the general public to report rare species observations as well as roadkill data to ENSP. The application uses the schema needed for the batch upload tool described above, which will streamline data management. Currently, users will need an AGO account login to use the application, which is very limiting and will not enable crowd sourced data that we desire. BGIS has said that ESRI is working on a mechanism to allow for crowd sourced data with the level of security needed for rare species information, but that development has not yet occurred.
- Staff did not generate updated Species Occurrence Area (SOA), Sensitive Area, and Source Features files due to limited time. Data to produce the last files (SOA_11) were pulled from the Biotics database August 2015.
- There were no outreach efforts this reporting period related to the rare species database, procedure for submitting data, and how the data is used.

Conclusions:

- The Biotics specific email has been helpful in increasing our responsiveness to the public and having sightings information be sent directly to one source that only receives that one type of information, resulting in much less of a likelihood of misplaced information.
- The recent data exchange of information from the NJ local Biotics database to the Biotics central database will enable us to send entities interested in data agreements to NatureServe to get the data rather than using our staff time to fulfill them.
- The number of rare animal records received (2,440) was average, although a large portion (76%) of the records were from one data source and represent a currently non-listed species. Like last year, few ENSP staff records were received compared to prior years.

- A similar number of records were entered this year compared to years past, but in part this was due to a short term contract awarded to CWF to help reduce the backlog of E, T, SC herptile records. That contract will end shortly.
- The number of records in the backlog has decreased for threatened, endangered, and special concern species observations compared to last year, but it is still >2,000 without the usual amount of ENSP staff-generated data, and despite a short-term contractor specifically charged with reducing the backlog. There are also several species status changes pending for 2018, which will increase the number of listed and tracked species, likely increasing the backlog.
- About 42% of animal records in Biotics still need to be quality-controlled.
- NatureServe's new batch upload tool is helping to streamline data entry, which is important at this time of staff limitations.
- Staff have begun developing a pilot ArcGIS Online option for reporting rare species data to ENSP within the with DEP's Bureau of GIS. The application has great potential to make submittal of observations much more user-friendly for staff, consultants, and the public. Also by using the schema required for NatureServe's new batch upload tool, gathering data through the application should tremendously streamline the data flow into Biotics. However, for the application to be usable by the public, ESRI needs to release enhancements for ArcGIS Online applications that allow for both security and crowd-sourcing.
- A schedule of releasing an updated SOA file every six months was not achieved during this segment due to staff limitations.
- Dedicated, full-time staff resources are a more desirable staffing solution than part-time and temporary staff, and allocation of such resources would enhance the ENSP's ability to continue with Biotics database management and the release of associated products within desired timeframes.

Recommendations:

- Continue to update and improve the data management protocol to help ensure standardization in data management. Protocol can be used to help train new data management staff, but not without oversight from an experienced data manager. Once that oversight is in place, find additional staffing resources to limit the amount of backlog of records to be entered into Biotics that has been developing this reporting period.
- Continue to work to streamline the data management protocol, while adhering to the data standards required by ENSP and NatureServe, as much as possible, such as with the new batch upload tool and templates developed for staff and consultants based on the schema needed for the upload tool.
- Encourage ENSP staff to submit their survey data so that it is not all submitted immediately prior to a planned update of the SOA.
- Increase the number of data managers and ensure there is one experienced staff data manager overseeing the flow of data on-site.
- Continue to work with the Bureau of GIS to develop an application for the submittal of rare species to ENSP. If crowd-sourcing ultimately will not be possible, evaluate other options.
- Work to get back on track following the deadlines and work procedures put in place to ensure an update of the SOA and Source Feature files are ready for release every six months. Lack of sufficient staff is the main limitation.
- Review and assess the appropriate allocation of ENSP GIS/biologist staff resources and funding to support the update and maintenance of the project within desired timeframes.

JOB NUMBER AND TITLE: 3. Habitat Connectivity Project
Prepared by: Gretchen Fowles, Brian Zarate, and MacKenzie Hall

Objective: To develop a strategic plan for wildlife conservation that will identify key areas and the actions needed for preserving and restoring habitat connectivity for terrestrial wildlife in New Jersey.

Key Findings:

- ENSP continued to engage the Full Working Group as well as core teams: Mapping, Guidance Document, and Communication, to develop the habitat connectivity project, now called Connecting Habitat Across New Jersey, or **CHANJ**. There are over 100 individuals in the Full Working Group, over 40 on the Mapping and Guidance Document core teams, and over 20 on the Communication core team made up of partners from both government and non-government agencies. During the reporting period, engagement with the teams was mainly via email as we worked to finish developing drafts of the products the teams have provided to date.
- The Communication team, led by ENSP, worked on both internal working group communications efforts, as well as public outreach products in anticipation of the release of the CHANJ products.
    - The team continued to develop CHANJ Bulletins that previously had been sent out quarterly to the Full Working Group. Bulletins highlight progress being made on the project as well as other habitat connectivity work taking place in New Jersey, profile species of interest, share connectivity issues in the news, and post interesting facts and photos relating to the topic. The team prepared a CHANJ Bulletin for public distribution for the first time, met with the Assistant Commissioner and his communication team to brief them on CHANJ progress and discuss releasing the CHANJ Bulletin to the public. The release is currently pending DEP Communications Office approval.
    - The team developed a public website for CHANJ (www.CHANJ.nj.gov) that is live and will be populated with many of the same items as the Bulletin once the team receives approval from the Communications Office to do so.
    - The team developed a list of talking points for the project to convey a unified message, and developed a PowerPoint presentation that is appropriate for a general public audience.
    - The team finished work on a promotional video for CHANJ, with production services contracted out to Hundred Year Films. The video can be found on our public website.
    - ENSP gave presentations on CHANJ at the Wildlife Society annual conference in Raleigh, NC (Oct 2016), the Nature Conservancy in Chester, NJ (public audience; Aug 2017), and the Wildlife Society annual conference in Albuquerque, NM (Sept 2017). We also featured CHANJ at ENSP's display table at the NJ WILD Outdoor Expo (Sept 2016), an event attended by several thousand members of the public.
- ENSP staff worked with members of the Mapping and Guidance Document core teams during the reporting period to finish developing the GIS-based map and the Guidance Document.
    - The team continues to use GIS tools made available by the Washington Wildlife Habitat Connectivity Working Group to map the habitat cores and corridors in New Jersey: Core Mapper and Linkage Mapper. A landscape integrity approach, or areas least modified by humans, were used to identify the base input habitat layers. The team applied the methodology that was developed by the mapping team in the Skylands Region of New Jersey as a pilot in the previous reporting periods, now to the entire state, using newly available 2012 land use land cover data. Draft statewide core and corridor habitat areas were reviewed by species and landscape experts in different regions of the state and will be reviewed one final time by the Mapping and Guidance teams, as well as the Full Working Group early in the next reporting period.
    - Mapping methodology documentation and summary statistics are being developed and will also be reviewed next period.

- Review of the mapping products by the Bureau of GIS and guidance on preparing the final mapping products and mechanisms available for release of the products will be sought.
- The teams continued to improve early drafts of the Guidance Document both internally and by incorporating partner feedback. Additional sub-chapters were developed to provide further guidance and resources for habitat protection, management, and road mitigation. We are now working with our Information & Education bureau to produce a visually-appealing final draft for review by the Full Working Group in February 2018.

- ENSP staff gave presentations on CHANJ during the reporting period in local, regional, and national forums. ENSP staff presented at the Passaic River Institute annual conference, at the Northeast Transportation and Wildlife Conference, and at the national Wildlife Society meetings as invited speakers at the 2016 meeting in 'The Role of Wildlife Professionals in Transportation Planning' session and then in 2017 in a special session called 'Freedom to Roam – Wildlife Connectivity in Action from Data to Implementation and Assessment'. ENSP CHANJ staff also attended the International Conference on Ecology and Transportation during this reporting period to learn about the latest road ecology science.
- ENSP staff did not meet with the Roads and Wildlife Working Group made up of CHANJ partners from DOT, USFWS, and DEP (Division of Land Use Regulation and ENSP) during the reporting period, but worked with the members via email and web meetings to develop roads and wildlife specific guidance document content.
  - The Working Group focused specifically on developing components of a Roads/Wildlife Toolkit that will be a component of CHANJ. The toolkit will consist of a) CHANJ mapping, which incorporates road segments that intersect habitat cores and corridors, b) road segment assessments, which include culvert inventory data, c) Road/Wildlife Best Management Practices (BMPs), and d) Road/Wildlife Mitigation Projects database that together will offer a package of tools that are transparent, proactive, user-friendly, and informative for helping to strategically provide more safe passages for terrestrial wildlife through our road network.
  - The ENSP CHANJ team was awarded a federal grant to collect road assessment and culvert inventory data to be applied as part of the Road/Wildlife Toolkit and ultimately as a product of CHANJ.
  - An ArcGIS Online Survey 123 application was developed in collaboration with the DEP Bureau of GIS as the Road/Wildlife Mitigation Projects database. Access to the database was set up for ENSP, DLUR, and DOT to provide input and ultimately to populate it. In the long term the tools can be used by counties and municipalities to help plan and implement road/wildlife work as part of CHANJ.
  - The ENSP CHANJ team is also working a mobile friendly ArcGIS Online application that can be used by CHANJ partners and the public to document wildlife roadkill.
- ENSP staff began providing technical guidance on CHANJ and effective design of wildlife crossing structures, specific to new DEP Flood Hazard Area Control Act Rules to require dry passage to be incorporated where a new (or existing) bridge or culvert in a roadway that fragments threatened, endangered, or special concern species habitat.
- A draft of the statewide CHANJ products are not yet complete, but projects that enhance habitat connectivity are occurring in New Jersey, through land protection, management and restoration, and road mitigation.
  - ENSP staff continued to use and develop tools and protocols for project monitoring, such as remotely triggered cameras as well as collaborate with partners to collect data that will inform the project, such as wildlife on-road data and a culvert inventory.
  - ENSP staff continued to regularly meet with land managers and planners and transportation planners, to provide critical review and develop projects that will enhance habitat connectivity where appropriate.
  - CHANJ data provided the basis for projects that will be pursued under separate funding: The CHANJ team obtained a DOT Transportation Alternatives grant that will create a

wildlife passage system (fencing and tunnels) at the most significant amphibian crossing migration site in the state. Another new project, under Pittman-Robertson, will collect data to test and validate CHANJ modeling, and thereby help inform and prioritize recommendations in the CHANJ Guidance Document and Road/Wildlife Toolkit.

Conclusions:

- Staff continued to successfully engage a multi-partner, multi-disciplinary working group to finish developing Connecting Habitat Across New Jersey, including three core teams: Mapping, Guidance Document, and Communication.
- Several communications efforts are underway to keep the CHANJ working group engaged in the project new products, including a short promotional video and a CHANJ webpage, and are already being used to reach out to public audiences in anticipation of the release of the CHANJ products.
- Draft statewide habitat core and corridor mapping was completed based on the methodology developed in the Skylands Region and will be reviewed one final time before public release.
- The Guidance Document team developed additional content, refined and improved earlier draft documents, and began formatting final draft layout and design.
- ENSP CHANJ staff gave presentations on CHANJ at local, regional and national forums, and attended several wildlife and wildlife/transportation conferences to keep abreast of the latest developments in road ecology research to inform the CHANJ projects.
- Development of a Roads/Wildlife Toolkit continues, that will be a component of CHANJ, and specifically is a package of tools that are transparent, proactive, user-friendly, and informative for helping to strategically provide more safe passages for terrestrial wildlife through roadways.
- ENSP provided technical guidance for CHANJ projects in relation to new Flood Hazard Area Control Act Rules calling for the design of dry passage for terrestrial wildlife when a bridge or culvert is built or replaced. The Communication and Guidance Document teams worked on mechanisms, tools, and materials for the provision of additional technical guidance as part of the CHANJ product release.
- ENSP staff are implementing, researching and testing the tools that will be needed for future phases of CHANJ, including project monitoring and tracking.
- Creation and development of the CHANJ habitat connectivity mapping project has required the dedication of significant ENSP GIS and biologist staff resources, as well as the coordination with several task-specific core teams and a Full Working Group that consists of over 100 volunteers.

Recommendations:

- Continue to engage and lead the Mapping and Guidance Document Core teams, as well as the Full Working Group and seek their feedback on the final review of the draft statewide CHANJ products and on beginning implementation of the project when products are released publicly.
- Work with the new administration to release the CHANJ products in 2018.
- Continue to develop communications products such as the CHANJ promotional video and an engaging website, as well as other products that highlight habitat connectivity work to inform the public about CHANJ and the importance of a connected landscape. Continue to work with the DEP Communications Office to try to expedite approval to release completed products.
- Continue to lead the Communication and Guidance Document teams to develop mechanisms, tools, and materials that will provide technical guidance on CHANJ when it is released.
- Continue to research and develop tools related to project monitoring and tracking, including collaboration with partners to collect data that will inform the project.
- Continue to stay abreast of research and ideas on habitat connectivity.
- Review and assess the appropriate allocation of ENSP GIS and biologist staff resources and funding to support the update and maintenance of the project.

JOB NUMBER AND TITLE: 4. Habitat Change Analysis Project (HCAP)

Prepared by: Patrick Woerner and Sharon Petzinger

Objective: Develop and conduct habitat change analysis that will allow for the ongoing examination of wildlife habitat transition and fragmentation trends over a time.

Key Findings:

- ENSP worked to continue the Habitat Change Analysis Project (HCAP) initialized by the Division of Fish and Wildlife in partnership with Rowan University. Building upon previous habitat change analysis work, Rowan worked with the Endangered and Nongame Species Program (ENSP) to run analysis on all species incorporating the 2012 Land Use/Land Cover (LULC)-derived habitat base layer into the existing change analysis.
- Lack of staff resources, and GIS work required for the Wildlife Action Plan update (Conservation Focal Area mapping) and the update to the Landscape Project mapping released in May, 2017, significantly delayed work on HCAP.
- ENSP staff continued to collaborate with Rowan University to develop and execute automated geo-processing and statistical routines to analyze habitat change taking a programmatic, reproducible approach for ongoing examination of wildlife habitat transition and fragmentation trends over time. ENSP received the deliverables from Rowan University covering four time periods 1986-1995 (T1), 1995-2002 (T2), 2002-2007 (T3) and 2007-2012 (T4).
- Deliverables were received that show habitat change specifically on state-owned lands (WMAs, Parks and Forestry, NLTs) and within different jurisdictions (Highlands, Pinelands, CAFRA) of protection. A composite of all endangered and threatened species habitat is available by Open Space categories versus lands held in private ownership.
- ENSP staff is preparing to create a new habitat base layer from the 2015 Land Use/Land Cover (LULC) when it becomes available to create a consistent basis for comparative analysis across all LULC datasets (1986, 1995, 2002, 2007, 2012, 2015).
- ENSP collaborated with the Bureau of Lands Management (BLM) to review analysis deliverables and reporting components for endangered and threatened species by each Wildlife Management Area (WMA). A composite file of all endangered and threatened species habitat is available for each WMA.
- ENSP continues to maintain range extents for 59 species covering 66 unique species-occurrence type combinations. Range extents were typically developed by applying minimum bounding geometry in the form of a convex hull to available species occurrence data. Where occurrence data was spatially disparate, separate hulls were generated for a given species-occurrence type combination. Finally, range extent polygons were hand-edited to accurately represent the occupied range and to generally conform to habitat regions bounded by major roads.
- Habitat associations based on 1986, 1995, 2002, 2007, and 2012 LULC level III Anderson codes were maintained for each of the 66 unique species-occurrence type combinations. Two new LULC categories in the 2012 data were reviewed for each species: 5412 – Tidal Mud Flat and 7440 – Disturbed Tidal Wetlands.
- ENSP GIS staff and Rowan presented on HCAP at the bi-annual Mid-Atlantic Chapter of Urban and Regional Information Systems Association (MAC URISA) Conference in Atlantic City.
- Staff created habitat fragmentation summary report outputs for each BIOPID and for all BIOPIDS combined showing total habitat acres, number of patches, average, median, minimum, maximum patch size and average, median, minimum, maximum edge-to-area ratio. These summaries are currently being reviewed by staff biologists.
- ENSP and Rowan University have provided draft pilot products of data visualizations that will inform development of an interactive dashboard that enables non-technical staff to explore the findings in a guided way, and end-user documentation that explains how the dashboard and/or reports can be used to answer land-use/land-management related questions.

Conclusions:

- Implementing a programmatic approach to analysis has proved an effective and efficient way of obtaining nuanced multi-level estimates of habitat change for an extensive list of species.
- The development of species range extent data products can have ancillary benefits for other conservation planning projects (e.g., Wildlife Management Area planning, Focal Species mapping for Wildlife Action Plan development, no-net-loss habitat conservation plans).
- Results can be used for secondary analysis of Wildlife Management Areas, preservation areas (Highlands, Pinelands, CAFRA) and regulated areas.
- ENSP review of preliminary outputs confirmed that analysis results will be a useful component to determine trends in habitat loss and conversion, and for development of species status assessments and recovery plans.
- Dedicated, full-time staff resources are a more desirable staffing solution than part-time and temporary staff, and allocation of such resources would enhance the ENSP's ability to continue with development and maintenance of the project within desired timeframes.

Recommendations:

- Utilize analysis results and provide feedback on the analysis for its application to the development of species status assessments and recovery plans.
- Provide additional funding for contract work with Rowan University to expand the analysis and further develop data interpretation products/visualizations and an interactive dashboard.
- Purchase licenses for ESRI Insights software and/or Tableau to develop dashboards and data visualization tools.
- Continue to coordinate with Division of Fish and Wildlife's Bureau of Lands Management to refine and expand the analysis of Wildlife Management Areas.
- Continue to collaborate with Rowan to develop and implement GIS and statistical routines to analyze wildlife habitat change and fragmentation utilizing a programmatic approach.
- Update species range extents and habitat associations as new data become available.
- As they are updated, incorporate the latest Land Use/Land Cover (LULC), range extents, species-habitat associations and road-bound blocks into the HCAP database, analysis routines and report outputs.
- Explore leveraging analysis results to guide and monitor effectiveness of habitat conservation planning, land-use regulation and planning, land management, restoration and preservation efforts.
- Gain proficiency in leveraging PostgresSQL and PostGIS in order to manage habitat change database and run automated scripts to produce data outputs and reporting components.
- Continue to develop guidance and interpretive products to package with analysis outputs to guide use and application of change analysis data.
- Review and assess the allocation of ENSP GIS/biologist staff resources and funding to support the update and maintenance of the project.

JOB NUMBER AND TITLE: Job 5 - Technical Guidance on Behalf of SGCN

Prepared by: John H. Heilferty

Objectives:

To identify projects, proposals, policies or management plans which have the potential for adverse impacts to populations of SGCN and/or the habitat(s) essential for their long-term viability.

To provide consultation on projects, proposals, policies and management plans proposed or conducted by federal, State, county, municipal, NGO, commercial and/or private residents in order to minimize adverse effects and maximize beneficial effects to endangered, threatened, special concern and rare wildlife. Consultation shall include: targeted environmental impact assessments of specific projects, activities or management plans; habitat and/or environmental assessments; development of planning tools such as habitat-, activity- or species-specific "best management practices;" or the generation of applicable GIS data or tools for constituent use in performing site assessments, species and/or critical habitat investigations or regional planning efforts.

JOB 5A. Project Review

Key Findings:

- In this reporting period over 31 state, federal, and local agencies requested or were provided input and guidance from ENSP on projects and activities related to SGCN wildlife and habitats, resulting in 712 reviews completed by ENSP staff. A listing of the reviews by category is found in Table 1.
- ENSP biologists continued to perform impact assessments and review resource reports and/or proposed mitigation efforts for a variety of projects including but not limited to 1) a proposed project by the NJ Department of Transportation to minimize rock fall onto a major highway, a review conducted in collaboration with the National Park Service, 2) Transco NE Supply Enhancement Project, and 3) NJ Transit's Northbranch Corridor to add railroad stations and a rail corridor.
- Staff continued working with NRCS biologists on Working Lands for Wildlife, which focused on managing early successional habitat specifically to benefit golden-winged warblers. ENSP staff worked with NRCS biologists to assess and provide guidance for applicants interested in participating in this program.
- Staff continued to consult with other DEP agencies and the USFWS on bald eagle nest area protections in the face of proposed developments, including working with USFWS staff to develop conditions included in Bald and Golden Eagle Protection Act permits.
- ENSP staff continued to review projects on behalf of the US Department of Housing and Urban Development ("HUD"), in their capacity as the action agency relating to the rebuilding of homes and businesses after Hurricane Sandy in the coastal zone, to assess whether the proposed plans had the potential to negatively impact federally listed species (including piping plover, red knot and northern long-eared bat) and to determine whether consultation with USFWS should be initiated. Staff also reviewed projects relating to state listed species to determine what, if any, impacts were expected and how to mitigate or prevent those impacts.
- Staff continued to review coastal development projects related to the elevation of existing structures to new state/FEMA standards, new coastal hardening projects (private landowners), extensive coastal beach-fill projects (USACE) to screen for potential impacts to state- or federally-listed species.
- Staff coordinated with the Bureau of Freshwater Fisheries and the Division of Water and Land Use Enforcement on the Eastern Concrete, Spruce Run silt event. Guidance was provided on impact of siltation on state-threatened wood turtles documented in the area of impact.

Table 1. Number of Technical Guidance reviews and consultations conducted by ENSP by category, 9/1/16 through 9/30/17.	**Number of Reviews: 9/1/16 – 9/30/17**
1. State: reviews	
DEP Land Use Regulation Program (Freshwater Wetland Act, CAFRA, Waterfront Development, Stream Encroachment, Highlands Act, Pinelands Act)	141
Bureau of Coastal and Land Use Enforcement	3
Sandy Related: HUD/CDBG/Debris removal Reviews	14
Division of Watershed Management	
Division of Water Quality	
Division of Construction and Engineering	4
Office of Program Coordination and Environmental Review	41
Office of Dredging and Sediment Technology	7
Office of Permit Information and Assistance	
Division of Parks and Forestry	36
NJDEP Review of Activities Proposed for N&HR-Administered Lands and Waters	154
Division of Solid and Hazardous Waste Management	1
Site Remediation Program	4
Bureau of Surface Water Permitting	
Bureau of Wastewater Management	1
Bureau of Marine Water Monitoring	
Office of Water Policy	
Office of the Commissioner	1
New Jersey Department of Transportation	14
New Jersey Pinelands Commission	
Office of Policy, Planning and Science	1
Office of Sustainability and Green Energy	
Office of Coastal and Land Use Planning	2
Bureau of Land Management	27
Division of Fish and Wildlife, Exotic and Nongame Permits Office: Scientific Collecting Permits	88
2. U.S. Government: reviews and consultations	
U.S. Fish and Wildlife Service	62
Army Corps of Engineers	17
Federal Emergency Management Agency (FEMA)	
Nuclear Regulatory Commission	
National Marine Fisheries Service	
National Park Service	2
Natural Resource Conservation Service	32
National Oceanic and Atmospheric Administration (NOAA)	
Environmental Protection Agency	
Federal Energy Regulatory Commission	
U.S. Military: Army, Navy, Air Force, Coast Guard	7
Bureau of Ocean Energy Management	1
3. Interstate Commissions, etc.: reviews and consultations	
Delaware River Basin Commission	
NY/NJ Port Authority	
Atlantic States Marine Fisheries Commission	
Meadowlands Commission	
Atlantic Flyway Council	1
US Fish & Wildlife Service, Atlantic Coast Joint Venture	
Other officially recognized interstate committees and cooperatives	
4. County and Local Entities: reviews and consultations	
County Mosquito Commissions	4
County and Local Park Commissions	2
Watershed Associations	
Local Municipalities	4
Local and Regional Environmental Commissions	1
5. Private, Non-Profit Conservation Organizations: reviews	
National Fish and Wildlife Foundation	
State and county Federations of Sportsmen's Clubs	
The Nature Conservancy, Natural Lands Trusts, NJ Audubon, etc.	11
NJ Conservation Foundation	5
Other (other direct-contact project reviews)	24
Total:	**712**

Conclusions:

- Within this reporting period over 31 state, federal, and local agencies requested input and guidance from ENSP on projects/activities related to SGCN and their habitat, with 712 reviews completed by ENSP staff. The ENSP clearly serves an instrumental role in representing the needs of rare wildlife on behalf of the NJDEP.
- ENSP staff has served a particularly critical role in performing efficient, knowledgeable technical guidance regarding impacts to federally-listed species for state and federally-implemented projects where rapid and accurate response or assessment was critical to delivery of project goals.
- Interstate and Flyway organizations, particularly when sanctioned by state agencies, have a high likelihood of producing near-term, population-scale benefit for SGCN via standardized methods, comparable trend and other data, prioritized conservation action and regional implementation.
- There has been a consistent increase in the volume and intricacy of Technical Guidance and environmental reviews performed on behalf of SGCN species, and this job has required the dedication of extensive staff time and resources during the reporting period.

Recommendations:

- This job should continue to be funded continuously since it allows ENSP staff to thoroughly consider impacts to State- and federally-protected endangered, threatened, special concern and nongame wildlife habitat in the course of permit and environmental review.
- Review and assess the appropriate allocation of ENSP GIS/biologist staff resources and funding to support the growing level of Technical Guidance and environmental reviews.

Job 5B. Policy and Planning

Key Findings:

- Staff continued work on a programmatic consultation for the bog turtle with NJ Department of Transportation, US Fish and Wildlife Service – New Jersey Field Office, and Division of Land Use Regulation staff. An ongoing effort, previous funding from the Federal Highways Administration had been exhausted. The programmatic will cover transportation projects in NJ receiving federal funding that may affect the bog turtle.
- Staff spent extensive time reviewing and providing comments on the Division's proposed "Stokes State Forest" forest stewardship plan.
- Staff spent extensive time on the newly-revived Forest Stewardship Advisory Council reviewing the Forest Action Plan and advising on forestry policies.
- Staff served as members of the Natural Resources Technical Advisory Committee for the Highlands Regional Master Plan (RMP), offering input on the indicators used to evaluate the natural resource goals and policies of the RMP for the first 10 years of its existence, as well as make refinements to milestones and monitoring activities for the next 10 year period.
- GIS staff continued to coordinate with the Division of Land Use Regulation (DLUR) and the Bureau of GIS (BGIS) to carry out GIS data development work for the migration of information from the Department's wetland mitigation database (WETMIT) to its centralized NJEMS database and creation of GIS data layers of wetland mitigation site locations, bank locations and bank service areas for use by Department staff, federal agencies and the general public via the Department's interactive mapping website. GIS data of mitigation bank locations and service areas have been publicly released and are available on the Department's interactive mapping application. GIS wetland mitigation site data has been developed and reviewed and is awaiting public release.
- GIS staff continued to participate in the NJ Conservation Blueprint Project's Science Advisory and Rare Species work groups and provided guidance on GIS data for inclusion, including Landscape Project and Nature's Network data.

- ENSP GIS staff continued to serve as NJDFW's State Representative on the Nature's Network Project; a collaborative effort among 13 states, the North Atlantic Landscape Conservation Cooperative (LCC), U.S. Fish and Wildlife Service, and partners, to develop a conservation design that identifies the best opportunities for conserving intact terrestrial, aquatic and coastal ecosystems, supporting habitat for imperiled species, and connecting natural areas across the Northeast region. Staff participated in web meetings to review the first version of the Nature's Network products developed by the Terrestrial Cores, Aquatic Core Networks, Regional Species of Greatest Conservation Need (RSGCN), Connectivity, and Restoration sub-teams. An "Integration sub team" of the Nature's Network Team worked on GIS products to integrate the various Nature's Network data in Version 1.0 related to four objectives: terrestrial habitat, imperiled species, aquatic habitat and connectivity. GIS staff also presented on Nature's Network data at a GIS Day event held by Rowan College at Burlington County.
- GIS staff served on DEP's Land Use Land Cover (LULC) Change evaluation committee for the 2015 LULC change update project. DEP's framework LULC dataset is the basis of habitat mapping for many of the Division of Fish and Wildlife's GIS products and projects, including Landscape Project, CHANJ, and HCAP.
- ENSP GIS staff continued to work with Division of Fish and Wildlife's Bureau of Law Enforcement (BLE) to assist conservation officers in preventing and deterring illegal collection of endangered and threatened wildlife species, particularly pinelands snake species. ENSP provided spatial data that depicted known critical habitats for rare snake species, and that identified particular sites that were perceived to be targeted by individuals seeking to partake in illegal collection. Spatial data were incorporated into BLE's Environmental Police Conservation Enforcement and Management System (EPCEMS) so that conservation officers can access digital species maps in their vehicles while conducting patrols. This initial effort to programmatically share endangered and threatened species site data with BLE has served as a basis for increased coordination between ENSP and BLE.
- Staff spent significant time working on the following committees of the Atlantic States Marine Fisheries Commission:
  - The Delaware Bay Ecosystem Technical Committee: ENSP staff conducted data analysis, reviewed reports, stock assessments and harvest allocation recommendations, and other duties in preparation for bi-annual meetings.
  - The Adaptive Resource Management (ARM) Subcommittee: ENSP staff contributed red knot data (aerial survey, re-sightings of marked birds) and technical guidance for developing annual harvest allocation with ARM Model (implemented in 2013).
- Staff conducted a detailed review of Atlantic States Marine Fisheries Commission (ASMFC) Addenda and annual reports to identify data they collect on number, sex and mortality of biomedical horseshoe crabs, (i.e., crabs collected and bled to produce Limulus Amebocyte Lysate). This review, prompted by the New Jersey Endangered and Nongame Species Advisory Committee (ENSAC), was conducted in response to the lack of increase in Delaware Bay horseshoe crabs given 20 years of bait harvest reductions focused primarily on increasing females. ENSAC is responsible for status review of horseshoe crab and shorebird food resources (i.e., horseshoe crab eggs) pursuant to NJ's legislated moratorium on the bait harvest of crabs.
- In response to the Programmatic Biological Assessment (PBA) for intertidal structural aquaculture, completed last year by ENSP and Bureau of Shellfisheries, the USFWS issued a Programmatic Biological Opinion (PBO) to the US Army of Engineers concerning issuance of Nationwide Permits for shellfish aquaculture. The PBO provides conservation measures for aquaculture operations and a ten-year framework to conduct new studies (impacts of aquaculture on red knots, horseshoe crabs, benthic invertebrates) and present new information to inform, and potentially revise, conservation measures. To implement the PBO, three work groups were formed: a Stakeholder Group, mainly aquaculture and conservation interests, a Science Advisory Group convened as needed, and an Agency Work Group to oversee this process (NJDFW, NJ Dept. of Agriculture, USFWS, US Army Corps).
- Staff of ENSP and Bureau of Law Enforcement cooperated with the USFWS–NJ Field Office, in a preliminary assessment/policy review of banner plane disturbance to red knots (federally threatened). This effort led to a USFWS guidance document, issued to five banner plane companies operating in New Jersey,

detailing best practices to avoid disturbance of red knot habitat along Delaware Bay (spring, May-early June) and Atlantic Coasts (summer- Mid-July through September).

- Staff of ENSP provided technical guidance (two reports) on migrant shorebird abundance and use of North Brigantine Natural Area, including the importance of this area to red knots. The guidance, provided to NJ Division of Parks and Forestry, was used to review and update seasonal recreation management to reduce disturbances to red knot habitat.

Conclusions:

- ENSP staff contributed to a number of state and federally initiated planning efforts, delivering important regional expertise on species abundance, trends and habitat needs, helping to assess regional threats and to identify the actions which might address them.
- ENSP staff has also helped steer State or local policies or regulations in a manner which advocate for wildlife needs.

Recommendations:

- This job should continue to be funded continuously since it allows ENSP staff to remain engaged in the development of federal, State and local planning or policy initiatives, which will help advance the needs of State and federally protected wildlife.