

State Wildlife Grants
T-11-T-3
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Landscape Conservation Tools and Technical Guidance

Interim Report for Project Year
January 1, 2019 – December 31, 2019

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-3

PROJECT TYPE: Research and/or Management

PROJECT TITLE: Landscape Conservation Tools and Technical Guidance

PERIOD COVERED: January 1, 2019 to December 31, 2019

JOB NUMBER AND TITLE: 1A. Landscape Project Mapping

Prepared by: John Heilferty, Chief, ENSP; Pat Woerner, Office of Fish and Wildlife Information Systems

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

Key Findings:

- The next version of the Endangered and Nongame Species Program's (ENSP) Landscape Project mapping is being coordinated with revisions the ENSP has proposed to the state list of threatened and endangered species and the completion of associated updates to species occurrence area data.
- Utilizing Citrix, draft habitat preferences and mapping methodologies were developed and documented in a Microsoft Access database for potential newly listed species. This enabled staff to enter and access their species attributes in one centralized database without having to travel to the Trenton office.
- The NJDEP's 2015 Land-use/Landcover (LULC) that will serve as the basis of the Landscape Project habitat base layer was released published in August 2019.
- A draft habitat base layer was developed and is subsequently being revised due to National Hydrography Dataset (NHD) updates performed by NJDEP's Bureau of GIS. The habitat base layer will incorporate the 2015 LULC revision based on updated hydrography, updated data on major roadways and updated SSURGO soils and FEMA flood data for development of the Riparian Corridor component of the Landscape Project.
- GIS staff upgraded to ESRI's ArcGIS Pro from older versions of ArcGIS (10.x) software.
- Staff continues to migrate geoprocessing models and Python scripts from ArcGIS 10.x to the ArcGIS Pro platform.
- All Version 3.3 Landscape Project GIS data continue to be 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](#) as well as on the NJDEP interactive mapping application ([NJ-GeoWeb](#)).
- As of August, 2019, two members of ENSP's GIS staff dedicated to developing the Landscape Project and funded by this state wildlife grant were transferred to the Division of Fish and Wildlife's newly formed Office of Fish and Wildlife Information Systems (OIS). The OIS consists of 4 full-time GIS specialists and one IT specialist. OIS was formed to support all Bureaus/Programs within the Division with GIS product development and technical assistance and will take the lead on many Division GIS project initiatives. Moving forward, ENSP will coordinate with and fund OIS staff to continue research, development and revisions to the Landscape Project mapping. This is expected to result in greater efficiencies and shorter product development timeframes.
- One GIS staff member attended the Northeast Arc Users Group (NEARC) GIS Conference.

- GIS staff continued to maintain a publicly available ArcGIS Online (AGO) application called [Landscape 3.3 Viewer](#), that provides a user-friendly way to interact with Landscape data and look up associated species and habitat information.
- No peer review committee meetings were conducted.

Conclusions:

- Statewide, New Jersey Landscape Project Version 3.3 (2017) mapping continues to provide agencies, citizens and conservation groups with the best information on habitats used by endangered, threatened and special concern wildlife species in NJ.
- ENSP expects the next version of the Landscape Project to be released in 2021. In addition to updating Version 3.3, the new version will support a rule proposal to revise the State’s species status listings.
- Product development tasks for the next version are expected to increase due to the number of potentially newly listed species being analyzed and revisions to certain species/habitat associations.
- The [Landscape 3.3 Viewer](#), has provided a more user-friendly way to interact with Landscape data and look up associated species and habitat information, with a total of 4,143 views for an average of ~345 views per month in 2019 (Figure 1a). Since the application release in May of 2017, it remains in the top six most-used NJDEP AGO applications.

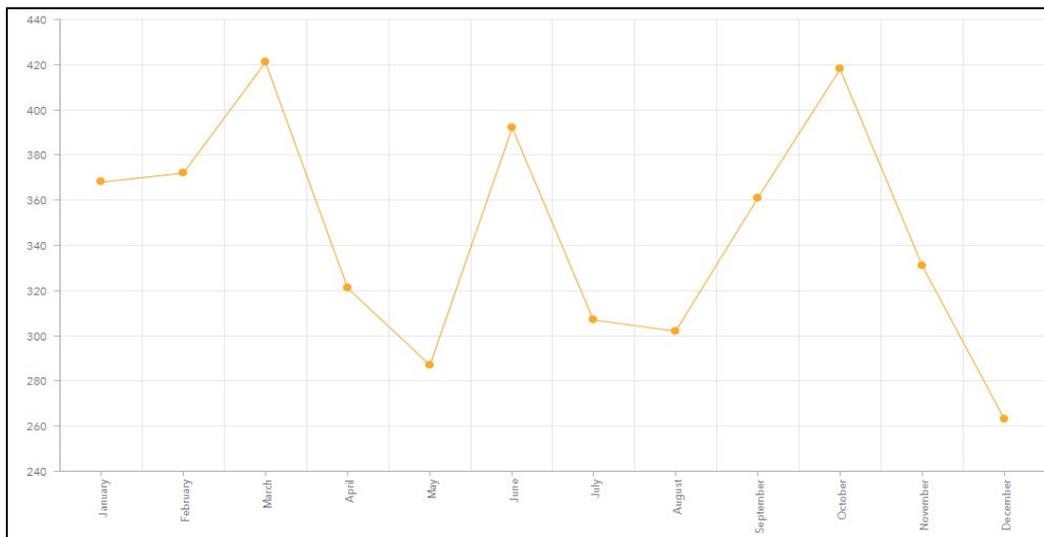


Figure 1a. Viewer monthly usage statistics for Landscape 3.3 Viewer in 2019.

- The upgrade to ArcGIS Pro is allowing staff to leverage increased geoprocessing power relevant to the creation of Landscape Project data.

Recommendations:

- Continue coordination with and dedicate appropriate T-11-T-3 grant funding for the newly formed Office of Fish and Wildlife Information Systems (OIS) regarding development of and revision to the New Jersey Landscape Project, including addressing the following tasks:
 - Continue work on the Species Habitat Preference database and development and review of draft mapping for species not previously mapped in the Landscape Project.
 - Continue to implement enhancements to the next version including riparian corridor mapping, the inclusion of newly proposed species, and the revised 2015 LULC.
 - Continue maintenance and development of Python scripting and ArcGIS Pro geoprocessing models for automating aspects of Landscape Project Mapping.

- Continue to collaborate with the Department's Bureau of GIS to ensure the Department continues to support the creation of the Land Use Land Cover data which is the basis for Landscape Project mapping.
- Continue maintenance and enhancement of the ArcGIS Online (AGO) [Landscape 3.3 Viewer](#).
- As time and resources allow, conduct research and development work on new data components and methodology for future versions of the Landscape Project.
- Develop a plan with OIS to establish costs and timeframes for releasing the Landscape Project products and, to the extent possible, minimize delays in product updates.
- Utilize the peer review committee to guide the development of methodologies and identify areas where current methods can be improved.

JOB NUMBER AND TITLE: 1B. Landscape Project Training, Information and Technical Guidance Program

Prepared by: Office of Fish and Wildlife Information Systems

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:

- As noted in Job 1A, two members of ENSP's GIS staff dedicated to developing the Landscape Project and funded by this state wildlife grant were transferred to the newly formed Office of Fish and Wildlife Information Systems (OIS). This is expected to result in greater efficiencies in the delivery of training, information and technical guidance.
- GIS training and/or technical 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.
- The Landscape Project Training and Information Webinar program was suspended due to the termination of DEP's Citrix GoToWebinar software and ongoing work with DEP's Division of Information Technology on migration to the Skype for Business platform.
- GIS staff continued to maintain a publicly-available ArcGIS Online (AGO) Story Map application entitled, [New Jersey Landscape Project Version 3.3](#) designed to provide a broad overview of the purpose of the Landscape Project, a description of the Landscape Regions, a summary of the data used, and examples of Landscape Project applications. The [Landscape Project Story Map](#) received a total of ~1000 views in 2019 with an average of ~80 views per month in 2019 (Figure 1b).

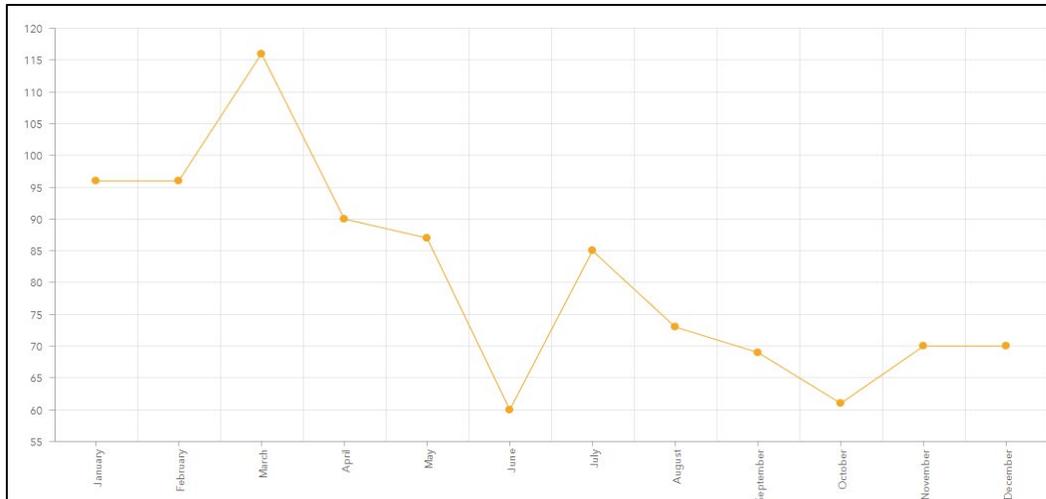


Figure 1b. Viewer monthly usage statistics for the Landscape Project Story Map in 2019.

- A presentation on Landscape Project was given to the EPA’s [Watershed Resource Registry \(WRR\)](#) Team.
- GIS staff participate as a member of the EPA’s [Watershed Resource Registry \(WRR\)](#) Team in support of the development of a public-facing mapping application focused on preservation and restoration targets in New Jersey. Landscape Project data and derivative products as well as [Nature’s Network](#) data are being incorporated into the preservation and restoration models in progress.
- Landscape Project data as well as Nature’s Network data were incorporated into the Bureau of Land Management (BLM) Wildlife Management Area acquisition planning and mapping.
- GIS staff continued to participate, as a member of the Science Advisory Committee and Rare Species work group, in the development of the [NJ Conservation Blueprint Project](#) regarding habitat connectivity data and incorporation of Landscape Project and Nature's Network GIS products into the Blueprint’s ranking scheme.
- GIS staff supported the Division of Land Use Regulation (DLUR) by providing technical guidance on the Landscape Project for regulatory reviews.

Conclusions:

- Communication and information on the Landscape Project maps and their limitations are vital as the Department utilizes the mapping to implement various rules and regulations and continues to incorporate the mapping into policy and planning decisions.
- Landscape Project data continues to serve as a vital basis for habitat prioritization projects and environmental review such as the EPA’s [Watershed Resource Registry](#), the [NJ Conservation Blueprint Project](#), the Bureau of Land Management’s Acquisition Mapping and NHR’s Land Management Review (LMR) policy.
- Both the utility of Landscape data and the impact of technical guidance efforts are reflected in usage statistics for the new ArcGIS Online (AGO) [NJDEP Landscape 3.3 Viewer](#) and [Landscape Project Story Map](#).

Recommendations:

- Continue coordination with and dedicate appropriate T-11-T-3 grant funding for the newly formed Office of Fish and Wildlife Information Systems regarding the delivery of New Jersey Landscape Project technical assistance, information and training, including addressing the following task:
 - Continue to provide guidance to state, federal, and municipal agencies and conservation groups.
 - Continue to meet with public land managers and others as opportunities arise to promote integration of Landscape Project data into existing or developing conservation and management plans.

- 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.
- Ensure that the Division of Fish and Wildlife defers to, and relies upon, ENSP's products under this grant's Job 3, "Connecting Habitat Across New Jersey" (CHANJ) GIS habitat connectivity project data in all future external interactions with partners and stakeholders where habitat connectivity issues are concerned, including OIS coordination efforts with the NJ Conservation Blueprint Project and the Highlands Regional Master Plan.

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 in the State's official rare wildlife database.

Key Findings:

- Updates were made to taxonomic, status, and modeling-related tables in the internal ENSP species Access database as well as to Biotics related to the upcoming revisions to state lists of threatened, endangered, and special concern species. In addition, a push was made to seek, process, and enter data in Biotics of upcoming newly listed species (N=61) that otherwise were not represented in the database or not represented well.
- A data exchange of element and element occurrence records from our local NJ Biotics database to the NatureServe central database was completed in June 2019. ENSP and the Natural Heritage Program agreed with NatureServe to pilot regular central-to-local data exchanges of taxonomic information and associated references.
- Biotics staff finished working with NatureServe to bulk-upload hundreds of bee species element records, that were not represented yet in the NJ local Biotics, allowing for observation data to be entered for those species.
- Biotics staff received approximately 9,310 additional rare animal records, 296 from the public, and 9,014 from ENSP staff and partners. Approximately 10,729 rare animal records were entered into Biotics, including 2,296 bee observation records from a survey conducted by Rutgers University. There remains a backlog of approximately 1,233 endangered and threatened species records that have been reviewed and accepted by biologists and await entry into Biotics. The backlog of special concern-ranked species records that have been reviewed and accepted by biologists and awaiting Biotics entry is approximately 1,223.
- Staff worked on generating updated Species Occurrence Area (SOA), Sensitive Area, and Source Features (SOA 12). Multiple rounds of quality control were conducted by the data management staff, and biologists reviewed three drafts of the files and made necessary corrections. A final version of the SOA 12 is expected to be released in January 2020; the final dataset was pulled from Biotics in November 2019.
- Fifty-six percent of records entered into Biotics need to be quality controlled.
- Biotics staff has continued to use 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. New templates have been created for ENSP biologists and partners to use based on the schema needed to implement the batch upload tool. This is allowing for more efficient processing of species observation data.
- Updates continued to be made to the comprehensive, written data management protocol to explicitly describe how observation data from various sources is processed and managed from receipt to entry into the Biotics

database, as well as subsequent QC and filing to serve as a user guide to train new data managers since there has been a lot of turn-over in recent years.

- ENSP continued to work with DEP's Bureau of GIS to develop NJ Wildlife Tracker, an ArcGIS Online mobile-friendly application. The intent of the application is for staff, consultants and the general public to report rare species observations as well as roadkill data to ENSP. A version of NJ Wildlife Tracker has been utilized by staff and some partners as a pilot in the last year. In the meantime, NatureServe has developed a protocol for developing an application like this that also uses the schema needed for the batch upload tool described above, which will streamline data management. Given this development, ENSP decided to update the piloted version of NJ Wildlife Tracker to better follow NatureServe's model. Also recently, the Bureau of GIS worked with ESRI to add capabilities with this particular application in mind to allow for individuals without ArcGIS Online accounts to use the application, while ensuring data security. ENSP is also working with the BGIS to manage the flow of data on the backside of the application, including allowing biologists to review observations assigned to them online. An updated NJ Wildlife Tracker application that will be usable by the public is expected to be completed in the spring of 2020.
- There were no outreach efforts this reporting period related to the rare species database.
- In July 2019, ENSP lost one full-time and one part-time employee(s), and in October an hourly employee who was entering data was moved. Since October 2019 staffing has been down to one full-time temporary employee for data management.

Conclusions:

- The updates made to internal ENSP species Access database as well as to Biotics and data exchanges with NatureServe have resulted in our local taxonomic data being up-to-date, our products reflecting the best available information, and the central database being current when it comes to the NJ element occurrence data.
- Data were entered for 41 of the 61 species proposed for listing.
- The number of rare animal records received was approximately four times the normal volume, likely a result of a data push to produce a new SOA, and one intended to capture the many new species proposed for listing, most of which not previously in Biotics.
- The number of records entered this year was five times higher than most recent years, helped by the new batch upload tool made available by NatureServe and integrated into our data management process.
- The number of records in the backlog for threatened, endangered, and special concern species has increased from approximately 1,500 last year to 2,500 by the end of this reporting period. There are more species that we are now tracking because of the proposed listing, which includes 61 newly-listed species; 9 species were de-prioritized because they are proposed for downlisting (i.e., they will no longer be threatened, endangered or special concern), making the total number of new species tracked equal to 52.
- The near completion of a new version of the SOA is significant since it has been >4 years since SOA 11 was released. The goal has been to release an updated SOA every 6 months to help fill the gap between the releases of the Landscape Project mapping, which is less frequent.
- The number of records needing to be quality-controlled increased from 43% to 56% since the last reporting period.
- NatureServe's new batch upload tool is helping to streamline data entry, which is important at this time of staff limitations.
- The development of a template that follows the batch upload schema, for use by our ENSP biologists and partners has been used effectively by most ENSP biologists, making the processing of species observation survey data much more efficient.
- The continued development of NJ Wildlife Tracker, an ArcGIS Online web application for reporting rare species data to ENSP with DEP's Bureau of GIS, has taken longer than anticipated, but will now incorporate the schema and steps developed by NatureServe to streamline the flow of data from the application to the Biotics batch upload tools. Also the BGIS now has more capabilities through their ESRI licensing to enable more public users to submit data to ENSP in a user-friendly yet secure way. The application has great

potential to make submittal of observations much more user-friendly for staff, consultants, and the public, while streamlining the data flow on the back end for data management staff.

- There is concern about the lack of dedicated, full-time staff resources allocated to Biotics database management by the end of the reporting period.

Recommendations:

- Continue to update and improve the data management protocol to ensure standardization in data management. The 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 backlog of records to be entered into Biotics that developed this reporting period.
- Continue to work to streamline the data management process, while adhering to the data standards required by ENSP and NatureServe, such as the new batch upload tool and templates developed for staff and partners.
- Encourage ENSP staff to submit their survey data regularly and not all immediately prior to a planned update of the SOA. Provide a video tutorial describing how to use the templates for different scenarios that biologists/partners can access on their own for directions on using the data template.
- 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 finalize an online application for the submittal of rare species data to ENSP, for use by the public and allowing for online review of records by ENSP biologists.
- Work to release SOA12 in early 2020, and 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 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:

- The CHANJ team completed development of the two main CHANJ products: CHANJ Mapping and Guidance Document and released the products to the public for the first time in April. Both products are accessible from the [CHANJ website](#).
 - The fundamental CHANJ mapping product consists of habitat Cores, Corridors, and Road Segments across the state. The mapping methodology was thoroughly documented and incorporated into a chapter of the [Guidance Document](#).
 - The CHANJ layer (above), as well as the additional CHANJ mapping layers described below were finalized, published by the Bureau of GIS as GIS feature services (each with metadata included), made available as downloadable layers and were also all assembled into a [CHANJ Web Viewer](#), which is an online interactive map that is accessible from a desktop computer or mobile device. The web viewer was accessed about 5,000 times in 2019 (Fig. 1).
 - Stepping Stones – small core habitat areas (<12.56 ha in size) that occur within CHANJ Corridors and may provide “live-in” habitat for smaller, less vagile species.
 - NAACC Culvert Inventory – the NJ component of the 13 state North Atlantic Aquatic Connectivity Collaborative Database identifying road/stream crossings, thus likely crossing structures across the state as well as inventory results of those that have been surveyed according to the NAACC survey protocol. One layer depicts terrestrial wildlife passability scores and the other depicts aquatic wildlife

passability scores. The CHANJ team collaborated with the Bureau of GIS and the NAACC database developer to create a web service representing just the NJ component of the database that is updated regularly.

- Road/Wildlife Mitigation Projects – Existing and proposed structures that provide safe passage for terrestrial wildlife across roadways in NJ.
- CHANJ Action Regions - Delineate the regions within which CHANJ Action Teams (comprised of wildlife experts, transportation planning, habitat management, and land acquisition professionals) will coordinate work on habitat connectivity.
- Terrestrial Wildlife Habitat (TWH) Preserved Lands - Areas that have terrestrial wildlife habitat value now, have a high likelihood of being managed for wildlife conservation, and are permanently protected.

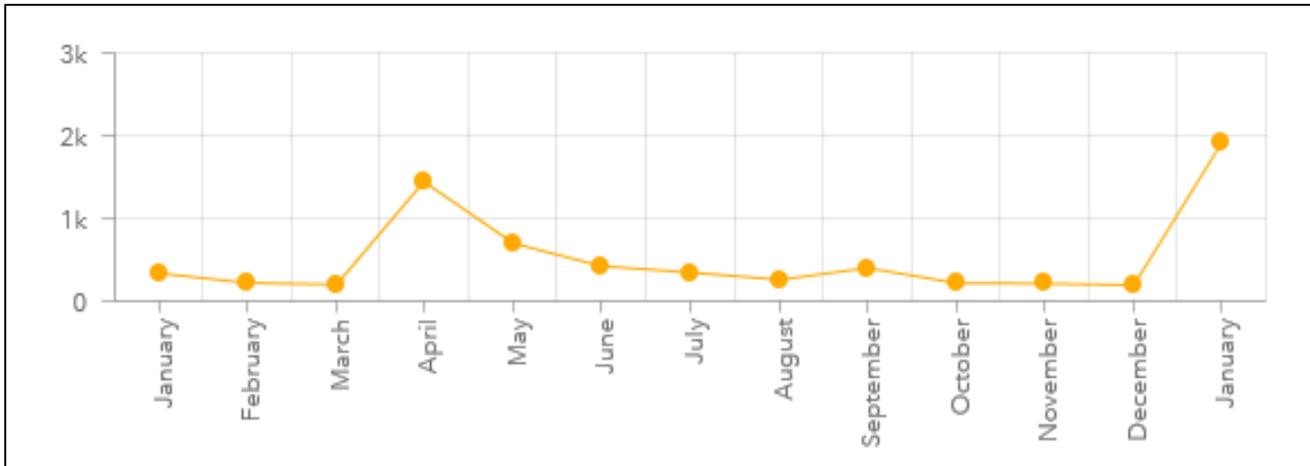


Figure 1. The number of times the [CHANJ Web Viewer](#) was accessed each month in 2019.

- The first version of the [CHANJ Guidance Document](#) was finalized in April. The document includes five chapters of information on Introduction, the Mapping Tools, Connectivity Assessments, Guidance for Cores and Corridors (including road mitigation best practices), and a section on collaboration called Action Teams. The document will undergo review and necessary modification on an annual basis or as needed.
- The CHANJ team is working with the Bureau of GIS to develop additional tools to enhance the usefulness of the CHANJ toolset and resources. These include:
 - [A web application](#) specifically for the NJ component of the NAACC Culvert Inventory data that was released last year. This continued to be publicly available and is useful for individuals conducting NAACC culvert inventories, particularly before the full suite of CHANJ layers was available.
 - An Action Team Initiative, which is a website specifically for CHANJ action implementers such as land stewards and managers, and transportation planners. It will be an invite-only website wherein team members can map projects they are working on or recently completed, overlaid on the same mapping that is accessible from the CHANJ Web Viewer. The goal is to enhance collaboration and communication among implementers, which will ultimately result in combinations of projects that enhance functional connectivity. It was still in development at the end of the reporting period.
 - NJ Wildlife Tracker, which is a mobile friendly web application that individuals, including the public, can use to report roadkill observations to ENSP. The data can be used to help increase awareness of the issue of habitat fragmentation, and also help identify roadkill ‘hot spots’ where road mitigation efforts may be warranted. It was still in development at the end of the reporting period.
 - The Road/Wildlife Mitigation database (an ArcGIS Online Survey 123 application developed in collaboration with the DEP Bureau of GIS, NJDOT, and DLUR during the last reporting period), which is populated with new and proposed projects across the state. It is functional and a filtered version of the

database was used to populate the Road/Wildlife Mitigation Projects layer described above, but the back end/data flow needs to be developed further for seamless updated mapping. In the long term, the full database can be used by counties and municipalities to help plan and implement road/wildlife work as part of CHANJ.

- Another web viewer is being developed that will be internal and will replace the NJ GeoWeb that is no longer being supported by the BGIS. The new web viewer is being developed in collaboration with the BGIS, DEP's Division of Land Use, ENSP, DOT and the USFWS. It will include the layers the entities generally use for their reviews when it comes to transportation projects, with the addition of the CHANJ layers, the full Road/Wildlife Mitigation database, and other layers, such as bats in bridges that would be too sensitive to release publicly. The goal of the application is to enhance communication and collaboration among the agencies and to produce more streamlined and effective decision making.
- CHANJ communications expanded well beyond our internal working groups during this period, launched by the official public release of the major CHANJ products in April 2019.
 - CHANJ and its newly available products were announced in April 2019 via the NJ Division of Fish and Wildlife's GovDelivery listserv system. Several subscriber groups – totaling more than 17,800 people – were included in the announcement.
 - Our team worked with our Information & Education bureau, Director's office, and press office to prepare a press release (published May 7, 2019) introducing CHANJ and its mapping and guidance products to the broader media and public.
 - We also worked with our Information & Education bureau on several CHANJ-branded outreach and swag items, including informational postcards, stickers, magnets, and a retractable banner for events, all of which were professionally printed in early April 2019.
 - The CHANJ team debuted the newly released products and promotional materials at the annual NJ Land Conservation Rally on April 12, 2019 (Fig. 2). This event was attended by around 400 people, primarily land trusts, nonprofit conservation groups, land managers and stewards, and government-sector natural resource conservation personnel; a key audience of potential CHANJ implementers.
 - The team made several posts to the new CHANJ listserv to share project-related information and stories with partners and the public. Posts highlighted the Senate-proposed Wildlife Corridors Conservation Act, our research partnership with The Nature Conservancy in "Bobcat Alley," New Jersey's North Atlantic Aquatic Connectivity Collaborative (NAACC) programs, among others. The listserv grew from approx. 5,000 to 14,800 subscribers during the work period. Topics were also shared via NJDFW's Facebook and Instagram feeds.
 - We continued adding and updating content on our CHANJ public website (www.CHANJ.nj.gov), highlighting current projects and the available products. The website averaged approximately 1,800 'hits' a month starting in April, when the products were first released.
 - We worked with our nonprofit partner, the Conserve Wildlife Foundation of NJ (CWF), to draft a video tutorial for the CHANJ mapping; this tutorial will be finalized in the coming work period. CWF is also creating a CHANJ StoryMap and classroom activities to promote the concepts and tools of habitat connectivity among a wider and younger audience.
 - The CHANJ team coordinated the filming of a PBS episode of 'EcoSense' in mid September, highlighting the CHANJ project and specifically road mitigation work across the state, bringing in partners across the state to describe their work.
 - We attended the International Conference on Ecology and Transportation in mid September and presented a poster on the CHANJ project alongside a poster presented by TNC and the University of Delaware, both on CHANJ related projects.
 - NJ Division of Fish and Wildlife is hosting two major conferences in 2020 where CHANJ will be prominently featured. The Northeast Association of Fish and Wildlife Agencies (NEAFWA) in April 2020 will include a symposium organized by the CHANJ team, entitled Connecting Habitat Across New Jersey: Multi-scale, collaborative efforts to reconnect the landscape. The CHANJ team, in partnership with the South Jersey Transportation Authority, successfully bid to host the biennial Northeastern

Transportation and Wildlife Conference (September 2020), which has never been hosted in New Jersey before. The conference will include several field trip options to habitat connectivity-related conservation/mitigation sites.



Figure 2. The CHANJ team debuting CHANJ at the NJ Land Conservation Rally in April 2019.

- As CHANJ transitions from project development to the implementation stage, our CHANJ team has been meeting with agencies and organizations that can implement habitat connectivity enhancing actions.
 - The CHANJ working groups have been replaced by regional Implementation Teams comprised of sign-up members of the former working groups as well as new partners. Implementation Teams will be contacted when opportunities for CHANJ-relevant mitigation projects or land acquisition arise in an action region. The Action Team Initiative tool described above will be a mechanism for communicating about opportunities and accomplishments. Currently there are 17 Implementation Team members in the north region of the state, 25 members in central NJ, and 18 in the south.
 - ENSP staff reconvened the Roads and Wildlife Working Group – made up of CHANJ partners from DOT, USFWS, and DEP (Division of Land Use Regulation and ENSP) in October. Now that CHANJ is released the group will reconvene bi-monthly to discuss pro-active road mitigation strategies and opportunities, including potential projects related to the Flood Hazard Regulation Rule requiring dry passage in culverts and under bridges where habitat for threatened, endangered, or special concern terrestrial species is bisected by a roadway.
 - In addition to exhibiting and demonstrating the CHANJ products at the Land Conservation Rally in April 2019, the team met with or delivered presentations to several audiences of local and state agencies and conservation organizations during this work period, promoting the CHANJ products to key potential implementers and in some cases working out next steps of coordination. These included:
 - Presentation to the NJ Endangered and Nongame Species Advisory Committee
 - Webinar meeting with the New Jersey Transportation Planning Authority and follow up call to incorporate elements of the CHANJ mapping in their PRIME system to alert transportation planners and engineers to possible road/wildlife conflict areas. More coordination is planned

- Presentation to the Monmouth County Transportation Council
 - Interactive exhibition at the NJ Department of Transportation's annual Research Showcase
 - Presentation and mapping demonstration at the NJ Conservation Foundation's Natural Lands Stewardship Workshop
 - Attendance at The Nature Conservancy's Conservation Blueprint science advisory committee meeting to provide input on how to best incorporate CHANJ mapping into the Ecological Integrity mapping along with follow-up phone call
 - Webinar with The Nature Conservancy to discuss ways to incorporate the CHANJ tools and resources to help guide their land acquisition priorities
 - Attendance at meeting to discuss the integration of CHANJ mapping as a major component of the Wildlife Management Area acquisition boundaries being developed by the Bureau of Wildlife Management.
- The ENSP CHANJ team continued work under another federal grant (NJ W-78-R) to collaborate with partners to collect road assessment and culvert inventory data to be applied ultimately as a product of CHANJ to help further inform implementation actions.
 - ENSP staff continued 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.

Conclusions:

- Staff continued to successfully engage a multi-partner, multi-disciplinary working group and after an initial Kickoff Meeting in 2012, completed and released the first version of the CHANJ products (Mapping and Guidance Document), which was a significant achievement. The mapping includes the fundamental CHANJ layer, which delineates habitat cores, corridors, and road segments, as well as several additional layers that will help with decision making. The Guidance Documentation provides documentation on the mapping methodology, the importance of habitat connectivity in New Jersey, information and resources to help guide actions, and connectivity assessments that provide a baseline status of habitat connectivity in New Jersey that we can update over time to evaluate progress.
- Several additional tools are currently in development to enhance the CHANJ tools and resources.
- Many communications efforts were implemented in conjunction with the public release of the CHANJ products and more are underway to engage more people and make them aware of the issue of habitat connectivity and the tools and resources available through the CHANJ project. The listserv audience is our biggest audience and posts related to introducing the audience to the CHANJ Web Viewer has resulted in increased pulses of use of the online mapping.
- As we transitioned from the development to implementation phase of CHANJ, the team gave numerous presentations on CHANJ at local, regional, and state forums to promote the CHANJ products and discuss ways with key implementers to coordinate work efforts. We also re-convened the Roads and Wildlife Working Group and committed to meeting bi-monthly to collaborate more closely and proactively with DOT, USFWS, and Land Use Regulation on road mitigation implementation and monitoring.
- ENSP staff continue to implement, research and test project monitoring and tracking tools.
- Creation and development of the CHANJ 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 make updates to the mapping and guidance document and run the connectivity assessments to evaluate progress on the implementation of effective connectivity actions over time.

- Continue to develop the numerous tools that are in progress to enhance the existing CHANJ tools and resources.
- Continue outreach efforts to engage the public in the issue of habitat connectivity. Continue to release listserv posts that step by step introduce the readers to the CHANJ Web Viewer and complete the video tutorial and StoryMap in collaboration with CWF.
- Continue to recruit and engage with key implementers across the state and identify ways to collaborate.
- 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, maintenance and continued development of the project.

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

Prepared by: Office of Fish and Wildlife Information Systems

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:

- As noted in Job 1A, two ENSP GIS specialists dedicated to developing the Habitat Change Analysis Project (HCAP) and funded by this state wildlife grant was transferred to the newly formed Office of Fish and Wildlife Information Systems (OIS). This is expected to result in greater efficiencies in the delivery of GIS products.
- GIS staff maintained the Habitat Change Analysis Project (HCAP) initiated by the Division of Fish and Wildlife in partnership with Rowan University.
- GIS staff began development of a draft scope of work for incorporating the 2015 LULC change update into HCAP and for creating data visualizations serving up HCAP results internally and externally.
- An HCAP model was developed for Northern Bobwhite Quail and incorporated into the Division's conservation planning efforts.
- GIS staff continues to maintain range extents for 59 species covering 66 unique species-occurrence type combinations.
- All deliverables to date are maintained on an internal file sharing site for access by Division biologist to review and use in species' status assessments and other internal conservation initiatives. The HCAP directory includes:
 - feature classes on habitat change and fragmentation for each of the 60+ species analyzed as well as species' range extents, road-bound blocks and relevant geodatabase tables
 - Excel files with predetermined habitat calculations and fragmentation statistics for each of the 60+ species.
 - a composite of statewide E&T habitat change.
 - a compilation of derivative maps, charts and other data visualization outputs.
 - deliverables related to habitat change on Wildlife Management Areas (WMAs).
- 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.
- GIS staff has obtained the 2015 Land Use/Land Cover (LULC) and will use it to develop a new habitat base layer to add to a consistent basis for comparative analysis across all LULC datasets.
- As time has allowed, staff continue to investigate Insights for ArcGIS software and Tableau Professional for creating data visualization products and dashboards to serve up HCAP products.

Conclusions:

- Implementing a programmatic approach to analysis is an effective and efficient way of obtaining nuanced multi-level estimates of habitat change for an extensive list of species.

- Finalizing a scope of work was delayed due to the availability of the 2015 LULC for incorporation into the next round of analysis and because staff requires time to test in-house options including Insights for ArcGIS and Tableau Professional as they relate to creating data visualization products and dashboards to serve up HCAP products.
- The development of species range extent data products can have ancillary benefits for other Division conservation planning projects (e.g., Wildlife Management Area planning and species status assessments and recovery plans).
- Results can be used for secondary analysis of Wildlife Management Areas, preservation areas (Highlands, Pinelands, CAFRA) and regulated areas.
- Although originally designed to address changes in habitat available to endangered and threatened species, HCAP modeling has applicability to additional game and nongame species, such as Northern Bobwhite.

Recommendations:

- Continue coordination with and dedicate appropriate T-11-T-3 grant funding for the newly formed Office of Fish and Wildlife Information Systems regarding the delivery of habitat change analysis products that will allow for the ongoing examination of wildlife habitat transition and fragmentation trends over a time, information and training, including addressing the following task:
- Utilize analysis results and provide feedback on the analysis for its application to the development of species status assessments and recovery plans.
- Finalize collaboration with Rowan on HCAP to develop and implement GIS and statistical routines to analyze wildlife habitat change and fragmentation utilizing a programmatic approach.
- Develop a new habitat base layer to add to a consistent basis for comparative analysis across all LULC datasets (1986, 1995, 2002, 2007, 2012, and 2015).
- Develop a scope of work that incorporates the 2015 LULC change update into HCAP and partner with Rowan University to expand the analysis and further develop data interpretation products/visualizations and an interactive dashboard.
- Collaborate with bureaus throughout the NJ Division of Fish and Wildlife that may be able to apply HCAP data for conservation planning efforts.
- Continue to explore leveraging analysis results to guide and monitor effectiveness of habitat conservation planning, land-use regulation and planning, land management, restoration and preservation efforts managed within the Division of Fish and Wildlife as well as other Divisions in the Department.
- Improve upon the DFW staff interface with HCAP products to facilitate ease of use and maximum incorporation into DFW conservation efforts.
- Identify and deploy additional sources of funding to facilitate OIS staff continuing HCAP analysis of data regarding non-SGCN wildlife species and/or specific to projects with alternate funding options.

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

Prepared by: Kris Schantz

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:

- Over the course of the grant period, more than 50 different state, federal, and local agencies or programs requested or were provided input and guidance from ENSP on projects and activities involving SGCN wildlife and habitats, resulting in over 450 reviews completed by ENSP staff. A listing of the reviews by category is found in Table 1.
- In many cases, ENSP reviews were performed in association with local, state and/or federal regulatory reviews where the ENSP staff guidance ensured that relevant agencies could arrive at finding of compliance regarding threatened or endangered species regulations or that project proposals were altered or denied in order to avoid adverse impacts that might otherwise have occurred. Important examples of these reviews included routine coordination with the Department’s Division of Land Use Regulation, with whom nearly 100 reviews were performed during the grant period.
- In other cases, ENSP coordination and expertise was sought voluntarily by partners or non-profits who were engaged in project(s) specifically designed to benefit threatened or endangered species, or where secondary project elements were sought that might add in beneficial habitat elements to an otherwise species-neutral proposal.

Table 1. Number of Technical Guidance reviews and consultations conducted by ENSP by category, 01/01/19 through 12/31/19.	Number of Reviews:
1. State reviews	
DEP Land Use Regulation Program (Freshwater Wetland Act, CAFRA, Waterfront Development, Stream Encroachment, Highlands Act, Pinelands Act)	91
Bureau of Coastal and Land Use Enforcement	1
Division of Watershed Management	1
Division of Water Quality	0
Division of Engineering and Construction	0
Office of Program Coordination and Environmental Review	13
Office of Dredging and Sediment Technology	2
Office of Permit Information and Assistance	0
Division of Parks and Forestry	6
NJDEP Review of Activities Proposed for N&HR-Administered Lands and Waters	114
Division of Solid and Hazardous Waste Management	2
Site Remediation Program	2
Bureau of Surface Water Permitting	0
Bureau of Wastewater Management	0
Bureau of Marine Water Monitoring	0
Office of Water Policy	0
Office of the Commissioner	1
New Jersey Department of Transportation	16
New Jersey Pinelands Commission	0
Office of Policy, Planning and Science	6
Office of Sustainability and Green Energy	0
Office of Coastal and Land Use Planning	0
Bureau of Land Management	10
Bureau of Wildlife Management	0
Division of Fish & Wildlife, Exotic & Nongame Permits Office: Scientific Collecting Permits	95
Division of Science and Research	0
Green Acres Program	2
2. U.S. Government reviews	

U.S. Fish and Wildlife Service	44
Army Corps of Engineers	4
Federal Emergency Management Agency (FEMA)	0
Nuclear Regulatory Commission	0
National Marine Fisheries Service	0
National Park Service	7
Natural Resource Conservation Service	10
National Oceanic and Atmospheric Administration (NOAA)	0
Environmental Protection Agency	0
Federal Energy Regulatory Commission	0
U.S. Military: Army, Navy, Air Force, Coast Guard	4
U.S. Geologic Survey	0
Bureau of Ocean Energy Management	0
3. Interstate Commissions, etc. reviews	
Delaware River Basin Commission	0
NY/NJ Port Authority	0
Atlantic States Marine Fisheries Commission	0
Meadowlands Commission	1
Atlantic Flyway Council	1
US Fish & Wildlife Service, Atlantic Coast Joint Venture	1
Other officially recognized interstate committees and cooperatives	0
4. County and Local Entities: reviews and consultations	
County Mosquito Commissions	6
County and Local Park Commissions	2
Watershed Associations	0
Local Municipalities	0
Local and Regional Environmental Commissions	4
5. Private, Non-Profit Conservation Organization reviews	
National Fish and Wildlife Foundation	2
State and county Federations of Sportsmen's Clubs	6
The Nature Conservancy, Natural Lands Trusts, NJ Audubon, Land Conservancy of NJ, etc.	7
NJ Conservation Foundation	0
Other (other direct-contact project reviews)	0
Total:	461

Conclusions:

- Within the reporting period approximately 35 state, federal, and local agencies or partners requested input and guidance from ENSP on projects/activities related to SGCN and their habitats. The ENSP clearly serves an instrumental role in representing the needs of rare wildlife on behalf of the NJDEP.
- ENSP staff has served a 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.
- ENSP is committed to maintaining a close working relationship with the USFWS, particularly as staff work to 1) implement regulatory protection of bald eagle nests and related supporting habitat; 2) enhance habitat for migratory shorebirds including red knot; 3) improve site management for piping plovers; 4) enhance long term viability of bog turtle habitats; 5) improve conditions for endangered and threatened freshwater mussels; 6) Prepare for federal listing of Eastern Black Rail; 7) conserve remaining populations of imperiled bats.
- Similarly, ENSP's work to coordinate with the NRCS continues to be an effective means of delivering early-successional habitat management on private land, and this will continue to be an ENSP priority.

- With the NJ DEP’s commitment to renewable energy generation, we saw an increase in policy and project-related consultations, and we expect this to become a major component of technical guidance performed by the Program in the coming years. In particular, off-shore wind energy projects are expected to come up for review.
- Reviews associated with green or renewable energy projects increased, and ENSP biologists expect more proposals for off-shore wind energy projects and solar farms.
- Reviews associated with instream projects (e.g., bridge replacements/repairs, dam removals, dredging) relative to listed freshwater mussel species continued. We coordinated with DLUR to minimize project impacts on listed and rare mussels and provided guidance on survey, relocation and monitoring requirements.
- Habitat connectivity has become a major focus of the Program’s technical guidance, particularly in association with the Program’s “Connecting Habitat Across New Jersey” (CHANJ) initiative. The Department’s flood hazard regulations already incorporate CHANJ guidelines into application requirements, and ENSP’s expertise in this evolving area of concern will include coordination with the FHWA, state DOT, county and municipal transportation entities and regional planning associations.

Recommendations:

- This job should continue to be funded continuously since it allows ENSP staff to thoroughly and proactively consider impacts to State- and federally-protected endangered, threatened, special concern and nongame wildlife habitat in the course of permit and environmental review.

Job 5B. Policy and Planning

Key Findings:

- Staff met with a number of Department partners to affect policy decisions or help with planning initiatives. Coordination with the Division of Land Use Regulation included technical guidance on recommendations concerning species associations with a variety of regulatory standards (such as species considered to be “critically dependent upon the watercourse” under the FHCA Rules, and justifying Exceptional Resource Value Wetland Classification guidelines for Northern Myotis). Coordination with the Bureau of Shellfisheries continued to adaptively manage the state’s aquaculture development zone on the Delaware Bay. Staff also contributed to the Office of Permit Coordination and Environmental Review’s review of three offshore wind energy proposals solicited by the Department. Additional coordination took place with Department partners regarding wind and solar energy, and Category 1 Water designations.
- Staff continued coordinating with USFWS and NJDOT on a formal bridge inspection program for bats, following the recent adoption of a Range-wide Programmatic Agreement between the Service and Federal Highway Administration requiring bat inspections prior to bridge repairs or modifications that may affect federally listed Indiana Bats or Northern Long-eared Bats. Where colonies of non-federally listed bats are documented, state protections against take will apply as per New Jersey’s Endangered and Nongame Species Conservation Act. ENSP and USFWS finalized a guidance document and reporting form for bridge-bat surveys and co-led two training workshops for NJDOT personnel and consultants.
- 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 continued work on a programmatic consultation for the piping plover with US Army Corps of Engineers, NJ Division of Coastal Engineering, US Fish and Wildlife Service – New Jersey Field Office, and Division of Land Use Regulation staff.
- Staff worked with NJ Division of Parks and Forestry and U.S. Fish and Wildlife Service – NJ Field Office, to hone predator management strategies, while abating public concerns, for the benefit of endangered beach nesting birds.

- Staff worked with U.S. Fish and Wildlife Service, and their contractors, and the NJ Division of Parks and Forestry to update or create beach management plans for the benefit of beach nesting birds in municipalities and state parks along the coast. These plans were then implemented by NJDFW.
- Staff worked with Bureau of Lands Management, NJ Department of Transportation, U.S Army Corps of Engineers, U.S. Fish and Wildlife Service, and local NGOs to pilot projects to increase resilience of coastal marsh systems in the face of sea-level rise, subsidence, and the consequences of a stabilized shoreline. Especially notable is the collaborative effort of the Seven Mile Island Innovation Lab.
- 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.
- Staff spent significant time working on two 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 the 2019 Benchmark Stock Assessment for Horseshoe Crab and provided comments. For the first time, the Stock Assessment Subcommittee accounted for other sources of female crab mortality from trawl bycatch and dredge fisheries that are relevant to bait harvest management. However, information on number of Delaware Bay crabs used for biomedical use, and those (outside NJ) harvested for bait but sold to biomedical use, continues to be withheld under Magnuson-Stevens confidentiality clause, and are thus not accounted.
- In response to a 2016 Programmatic Biological Assessment (PBA) for intertidal structural aquaculture, the USFWS issued a Programmatic Biological Opinion (PBO) to the US Army of Engineers concerning Nationwide Permits for shellfish aquaculture in a portion of Delaware Bay. The PBO provides conservation measures for red knot (federal threatened) on aquaculture operations, a ten-year framework for impacts assessment, and a process for science-based revisions to Conservation Measures; 2019 was year three of PBO implementation.
- ENSP staff assessed and worked on revisions to the Program's best management practice document regarding routine vegetation management on overhead transmission line rights-of-way (ROW). Based upon the demonstrated utility of such BMPs and their usefulness informing and expediting certain types of project reviews, the original BMP document is being expanded to address a wider range of standard maintenance activities (including activities requiring excavation or grading) on any form of maintained utility ROW (not merely overhead transmission lines).
- Program staff made recommendations or provided technical guidance to Department or State agencies regarding changes or amendments to federal law, regulations or policies, including the Migratory Bird Treaty Act and the Endangered Species Act.
- ENSP staff have worked closely with Natural Lands (*formerly Natural Lands Trust*), Friends of Hopewell Valley Open Space (FoHVOS), and Raritan Headwaters (*formerly Raritan Headwaters Association*) to expand the American kestrel nest box project to appropriate suitable habitats in areas either not covered by the ENSP's existing study areas or by expanding to new locations in these areas.

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.