State Wildlife Grants
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Landscape Conservation Tools and Technical Guidance

Interim Report for Project Year
January 1, 2020 – December 31, 2020

NJ Department of Environmental Protection

DIVISION OF FISH AND WILDLIFE
ENDANGERED AND NONGAME SPECIES PROGRAM
P.O. BOX 420
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NEW JERSEY DIVISION OF
Fish and Wildlife

SPORT FISH & WILDLIFE RESTORATION

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, 2020 to December 31, 2020

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 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.
- A draft habitat base layer was revised due to National Hydrography Dataset (NHD) updates performed by NJDEP's Bureau of GIS. The habitat base layer incorporates 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.
- Staff has adapted 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).
- 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:

- As of January 2021, the GIS work associated with the Landscape Project mapping job was transferred to a new grant NJ FW-64-T in the Office of Fish and Wildlife Information Systems (OIS). Moving forward, the ENSP will coordinate with OIS staff to continue research, development and revisions to the Landscape Project mapping.
- 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.
- The ENSP expects the next version of the Landscape Project to be released in 2022. 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 incorporated into the mapping.

- 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 4,591 views for an average of ~382 views per month in 2020 (Figure 1a). Since the application release in May of 2017, it remains among the most-used NJDEP AGO applications.

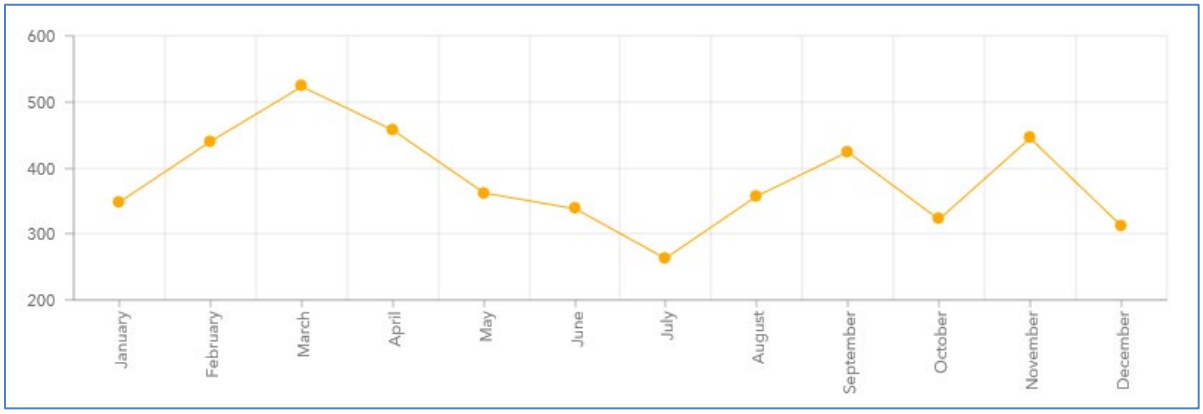

Figure 1a. Viewer monthly usage statistics for Landscape 3.3 Viewer in 2020.

Recommendations:

- Continue coordination with the Office of Fish and Wildlife Information Systems (OIS) regarding development of and revision to the New Jersey Landscape Project.
- Develop a plan with OIS to establish 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:

- 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.
- 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 ~812 views in 2020 with an average of ~68 views per month in 2020 (Figure 1b).

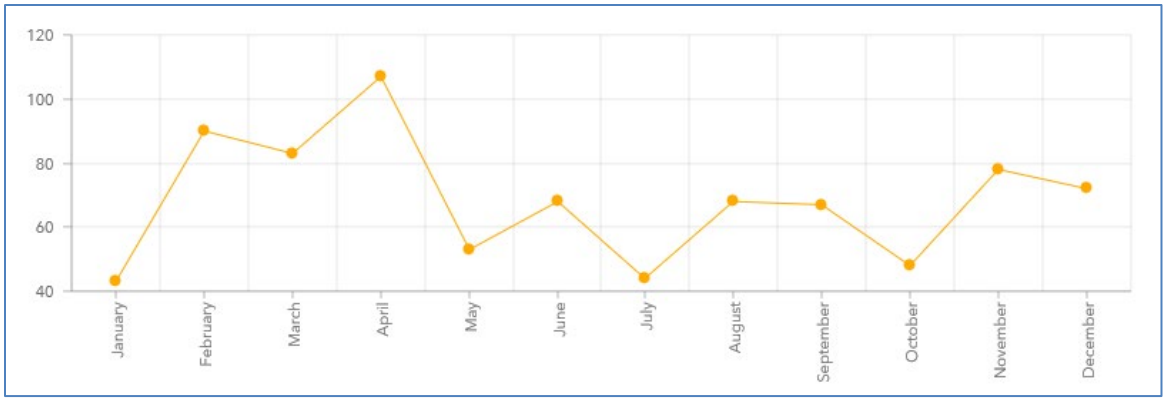

Figure 1b. Viewer monthly usage statistics for the Landscape Project Story Map in 2020.

- Landscape Project data is being incorporated into the development of a wildlife management area (WMA) planning tool for use by Bureau of Land Management staff to guide habitat management activities.
- GIS staff continued to 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.
- GIS staff continued to participate, as a member of the Science Advisory Committee and Rare Species work group, in the support and maintenance 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 Resource Protection (DLRP; formerly Division of Land Use Regulation) by providing technical guidance on the Landscape Project for regulatory reviews.

Conclusions:

- This job (1a and 1b), along with Job 4, were transferred to new grant FW-64-T and will be discontinued in this grant.
- 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.
- 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.
- 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:

- Responsibilities for training staff and public in the use of Landscape Project products will fall under new grant FW-64-T beginning January 2021. Recommendations for its implementation may be made by the NJDFW Office of Fish and Wildlife Information Services.

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:

- Having lost one full time and one part time Biotics data managers, due to them being shifted to another NJ Division of Fish and Wildlife (NJDFW) program in 2019, the ENSP had been down to one full-time temporary employee (FTE) for Biotics data managers. That temporary employee resigned in February 2020 leaving the ENSP with no data managers, just one FTE database administrator who can only spend a small portion of her time on Biotics given other job responsibilities. In May a temporary employee, who previously helped on Biotics in another role, was hired to work part-time on Biotics, and a second temporary employee was hired to work full-time on Biotics, but she was not familiar with Biotics or GIS so training, remotely, was required. Given COVID and work at home requirements, staff computers needed to be set up to connect to network drives remotely, which took until September. The two temporary employees are using either borrowed or personal laptops, one of which is lacking GIS software. A computer order for two new laptops initiated in February still had not been fulfilled by the end of the reporting period. The fulltime temporary employee never did work fulltime hours due to family obligations and resigned in October.
- Given lack of staffing to keep up with emailed inquiries and report submittals, and COVID restricting access to our Trenton campus where hardcopy sighting report forms describing rare species observations are mailed, the ENSP put an automatic reply message on our Biotics email saying that data was received, but we are unable to send personal replies and tracking information. That auto reply remained for the duration of this reporting period.
- The Biotics data management, record processing system is set up to handle paper records in Trenton with some data then stored electronically on a shared drive. Even emailed records would be first printed, then tracked, mapped, reviewed, etc. A major reconfiguration of how data are processed needed to be implemented remotely as best we could during this reporting period with very limited staff.
    - Staff 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 the ENSP. A version of NJ Wildlife Tracker has been utilized by staff and a couple of partners as a pilot in the last year. In the meantime, NatureServe further developed an online submittal application similar to NJ Wildlife Tracker, that ties in with their new batch upload tools (that streamline entry of data into Biotics) that they had previously developed and the ENSP had started using during the last reporting period. Given this development, the ENSP decided to update the piloted version of NJ Wildlife Tracker to better reflect NatureServe's model and additionally worked with NatureServe to get their help in creating customized batch upload tools for our purposes to enable a streamlined system of data processing electronically from entry into NJ Wildlife Tracker, to review by species experts and Biotics data managers, through to entry into Biotics. The development of this new system has required a lot of time, review, and coordination with NatureServe and BGIS. The customized NJ batch upload tools have been completed and are being utilized when time allows. Otherwise, we continue to work with BGIS to finish the development of the back-end of the NJ Wildlife Tracker system to incorporate automated scripting tasks and for it to enable review of records remotely by species experts. An extensive plan for the backend development has been developed and we continue to coordinate with BGIS to implement that plan.
        - Staff have switched to entering records in NJ Wildlife Tracker now rather than paper copies and tracking the records in an Access database in a shared drive. Instead, Biotics staff are now using a "Reviewer' NJ Wildlife Tracker version to enter sighting report forms submitted to the ENSP via hardcopy (later scanned by Biotics staff) or email, as well as any records still in our backload of records to enter into Biotics. Biologists and a couple of partners are now utilizing a 'Biologist' NJ Wildlife Tracker version for entry of opportunistic rare species sightings. Ultimately, individuals

with existing ArcGIS Online licenses will be allowed to enter data through this 'Biologist' version of NJ Wildlife Tracker, and thanks to a new HUB ESRI system that BGIS now has, the ENSP will be able to offer borrowed ArcGIS Online licenses to as many as a few hundred users who regularly submit rare species data, to also use this NJ Wildlife Tracker Version, which thanks to the license login, won't require them to enter their contact information upon record entry. Finally, we are developing an 'Anonymous' NJ Wildlife Tracker version that will be released to the general public for data submittal. This version will not require a login, but then will require entry of contact information with each record by the user. In anticipation of the HUB user system, staff worked with BGIS to create an initial online survey for invited users that will populate their information in a database and enable tracking of the borrowed licenses during this reporting period.

    - An updated template for the ENSP and partner survey data was also developed and released that works with the new customized NJ batch upload toolsets enabling more seamless entry into Biotics as well as making the data compatible with the NJ Wildlife Tracker database for more efficient tracking of data after Biotic entry.
  - Updates continue to be made to the comprehensive 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, and extensive changes made in management system in 2020.
- Staff finalized and released an updated Species Occurrence Area (SOA), Sensitive Area, and Source Features (SOA 12) in January. The final dataset was pulled from Biotics in November 2019 and includes approximately 3,840 new source feature records currently ranked 3-5 compared to the previous SOA (11). SOA 12 also includes records for most of the candidate species (N = 52) that are proposed for listing for the first time. Several errors were discovered in some of the species data and SOA locations, which were fixed and an updated version (12c) was released in October. The SOA dataset was released to entities with which we have established data sharing agreements as well as the new GIS office in NJDFW to begin developing the next version of Landscape Project mapping.
- Two data exchanges of element and element occurrence records from our local NJ Biotics database to the NatureServe central database were completed in June and December 2020. During each exchange there are quality control issues to address. The ENSP and the Natural Heritage Program are now participating in ongoing central to local data exchanges of element taxonomic information and associated references with NatureServe.
- Biotics staff had several meetings with biologists from the Bureau of Freshwater Fisheries to review what the ENSP needs for each of the 14 species that will be tracked in Biotics going forward, including the form the data needs to be in for entry into Biotics and how to generate SOAs for appropriate data so that they can be included in future version of the Landscape Project mapping. As of the end of the reporting period, we have not received data for entry.
- Biotics staff received approximately 1,855 additional rare animal records, 438 from the public, and 1,417 from ENSP staff and partners. Approximately 555 rare animal records were entered into Biotics. There remains a backlog of approximately 1,492 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 3,282. There are expected to be and additional >1,000 freshwater fish records that are not included in this tally, in early 2021 that will need to be entered. It is challenging even tallying this information because there also is a backlog of data from the public that needs to be entered into NJ Wildlife Tracker to properly track it.
- Fifty-five percent of records entered into Biotics need to be quality controlled.
- 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:

- ENSP's Biotics program has struggled with lack of staff resources most importantly, as well as lack of access to paper files, computer connectivity, and computer equipment during this reporting period.
- Responsiveness to inquiries from the public regarding rare species data submittal has been minimal.
- An entire reconfiguration of how data are processed has been the focus of the limited Biotics staff during this reporting period to update the system from handling most data in the form of paper to a much more streamlined purely electronic data system ultimately. The new system includes a mobile-friendly online submittal system called NJ Wildlife Tracker that will work as seamlessly as possible with new customize NJ batch upload tools that enable much more efficient entry of data into Biotics. The NJ batch upload tool development is complete and the front end of NJ Wildlife Tracker is complete, but more work in collaboration with the Bureau of GIS to build the backend of the application before it can be fully utilized. Concurrently, a comprehensive data management protocol is being developed to explicitly describe the new data management system being implemented.
- Biotics staff finalized and released the next version of the SOA dataset (version 12) during this reporting period.
- Biotics staff entered the lowest number of records into Biotics in at least the past 15 years because of staffing and COVID related issues, while the backlog of records to be entered has grown, and will likely continue to grow as a result of the anticipated listing of over 50 species.
- The percentage of quality-controlled records in Biotics (45%) has remained about the same since the last reporting period.

Recommendations:

- Find additional staffing resources.
- Continue to work to streamline the data management system. Continue to collaborate with BGIS to complete the development of the backend of the NJ Wildlife Tracker system so that the new system can be implemented.
- Though a new streamlined, electronic system should increase efficiency and decrease errors, any new system requires close scrutiny to make sure it is working properly so Biotics staff will need to be vigilant with quality control as the new system is implemented to ensure it is functioning as expected.
- Consider whether proper staffing resources are in place to successfully release a public version of NJ Wildlife Tracker once the system is in place and verified to be working properly.
- Work to release an SOA of any updated species records in early 2021 if possible to finalize what is needed for a complete run of the Landscape Project mapping.

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:

- Having rolled out the two main CHANJ products: CHANJ Mapping and Guidance Document (both accessible from the CHANJ website) to the public in April, 2019, the CHANJ Team focused on updating layers, developing additional tools and resources, and reaching out to potential implementers to demonstrate the CHANJ tools and discuss how their groups might use and apply these tools to help preserve and reconnect habitats for wildlife.
- The CHANJ website, the 'one stop shop' for CHANJ information and from which the CHANJ products are available was accessed over 25,000 times in 2020 (Fig. 1).

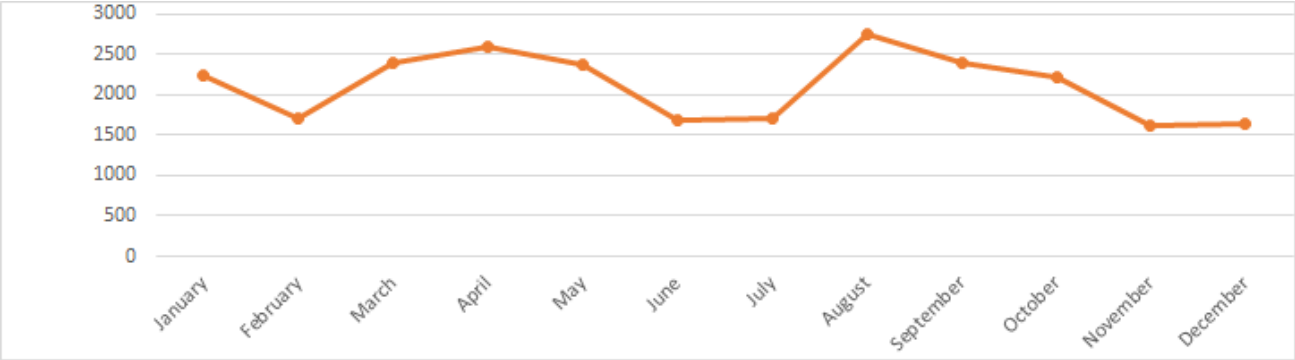

Figure 1. The number of times the CHANJ website was accessed in 2020, on a monthly basis.

- The CHANJ Web Viewer, an online interactive map containing all of the CHANJ Mapping layers, was accessed about 5,000 times in 2020 (Fig. 2). Over this reporting period, several of the CHANJ layers have been incorporated into other mapping applications, which may reduce "hits" to the CHANJ Web Viewer.

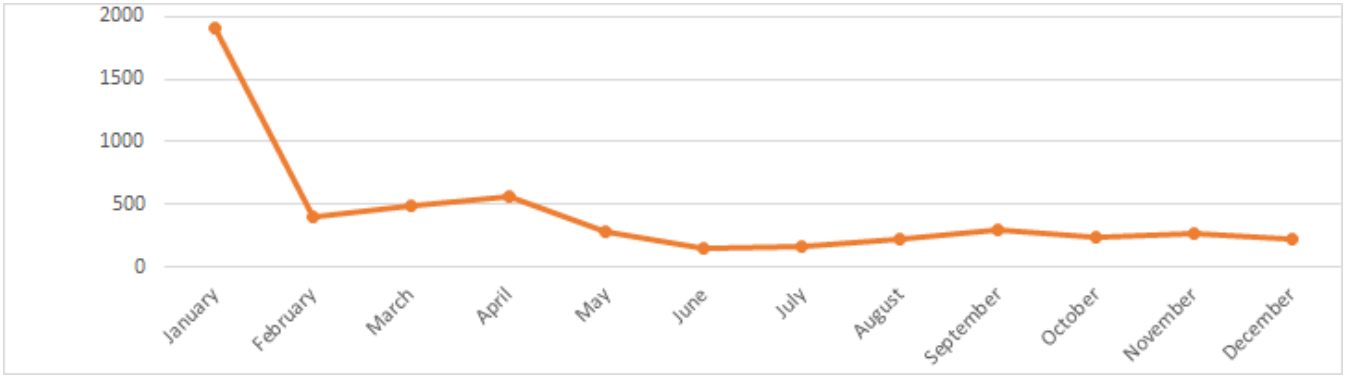

Figure 2. The number of times the CHANJ Web Viewer was accessed in 2020, on a monthly basis.

- Updates were made to the following CHANJ layers and these updates are reflected in their associated GIS feature services and downloadable layers:
  - 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. The symbology for the layer depicting terrestrial wildlife passability scores was updated in collaboration with the Bureau of GIS (BGIS) and the NAACC database developer.
  - 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. The layer was updated to reflect updates to the New Jersey Open Space layer from which it filters.
  - Road/Wildlife Mitigation Projects – Existing and proposed structures that provide safe passage for terrestrial wildlife across roadways in NJ. Edits were made to existing records, including updated photograph attachments, and additional records were added to reflect the current status of constructed and permitted projects across the state. In addition, a new system was implemented by the CHANJ Team in collaboration with the Division of Land Resource Protection (formerly Division of Land Use Regulation) on Microsoft Teams to enable the partners to more easily access and maintain an up-to-date database of permitted road/wildlife mitigation projects.
- The CHANJ Team has worked on some additional tools and resources to enhance the CHANJ project. These include:

- A CHANJ Web Viewer video tutorial - The CHANJ team worked with partners from the Conserve Wildlife Foundation to finalize a video tutorial on how to use the CHANJ Web Viewer mapping tool. The tutorial was posted on the CHANJ website, is available from within the Web Viewer, and was shared via our listserve.
- An Action Team Web Viewer and Action Team Project Survey – These tools are being created specifically for CHANJ implementers such as land trusts, land managers and transportation planners. They are invite-only and require an ArcGIS Online login, which we are able to provide to partners without one through the Bureau of GIS's (BGIS) ESRI Hub. We coordinated with BGIS to finish the development of the Web Viewer, which has all of the same layers as the CHANJ Web Viewer, but it has an additional layer representing connectivity projects underway or completed. This new layer is populated by Action Team partners via a Survey123 Action Team Survey, a link to which is on the Web Viewer. The goal is to enhance collaboration and communication among implementers, which should ultimately result in more complimentary projects to enhance functional connectivity. At the end of the reporting period the CHANJ Team had identified and talked with partners (the Sourlands Conservancy, NJ Conservation Foundation, and NRCS) willing to pilot the new tools to try them out.
- NJ Wildlife Tracker - This is a mobile-friendly web application that individuals, including the public, can use to report roadkill observations to ENSP. The platform can be used to help increase awareness of the issue of habitat fragmentation, while the data can help identify roadkill 'hot spots' where road mitigation efforts may be warranted. It was still in development at the end of the reporting period.
- Roads & Wildlife Reviewer Web Viewer and Pre-app Mitigation Survey – The web viewer is intended for internal use by the CHANJ team and inter-agency partners working together on road/wildlife mitigation efforts, specifically ENSP, DOT, the Division of Land Resource Protection (DLRP), and USFWS. It was developed in collaboration with the BGIS with input from the different partners, and includes the layers that the entities generally use for their transportation project reviews, plus the CHANJ layers, and the full Road/Wildlife Mitigation database. It incorporates the Full Wildlife Mitigation Project Database, previously developed, as well as two new surveys: Pre-app Mitigation Survey that populates a database capturing projects in the pre-application stage that DOT and DLRP are coordinating on, and Fish Barriers Survey that captures locations where existing barriers may be beneficial for separating native and non-native fish populations. The goal of the application is to enhance communication and collaboration among the agencies, hopefully resulting in more streamlined and effective decision making on road projects when it comes to wildlife. A draft of the application was completed and demo'ed during a Roads & Wildlife Working Group meeting with inter-agency partners present with the addition of biologists from the Bureau of Freshwater Fisheries in order to get feedback on it during this reporting period.

- CHANJ mapping layers are now incorporated in mapping applications maintained outside of the ENSP:
  - NJ GeoWeb – An interactive mapping application maintained by the BGIS that offers users access to NJDEP GIS data. The CHANJ Team worked with BGIS this reporting period to incorporate several CHANJ layers in a 'CHANJ' group in the NJ GeoWeb application in late April, as well as incorporate appropriate queries for the layers.
  - New Jersey Conservation Blueprint – An interactive mapping application developed by the Nature Conservancy, Rowan University, and the New Jersey Conservation Foundation aimed at guiding land preservation and land use decisions. The CHANJ Team worked with NJ Conservation Blueprint staff to incorporate CHANJ layers in the Ecological Integrity mapping of the NJ Conservation Blueprint.
  - North Jersey Transportation Authority – The CHANJ Team collaborated with NJTPA to incorporate CHANJ layers into their internal PRIME mapping system to help transportation and land use planners identify where wildlife movement needs should be considered.
  - NJDFW Bureau of Wildlife Management (BLM) – The CHANJ Team collaborated with the BLM to incorporate CHANJ mapping and considerations into their internal WMA Acquisition Boundary mapping to guide the Division's acquisition of new lands that will enhance habitat connectivity.
- CHANJ communications reached a wide audience during this period, following last year's public release of the major CHANJ products.

- The CHANJ Team was scheduled to present a CHANJ workshop at the annual NJ Land Conservation Rally (March 2020), give a CHANJ mapping demo for the Northeast SWAP Coordinators (March 2020), and lead a CHANJ-themed symposium at the NEAFWA Northeast Fish & Wildlife Conference (April 2020), but these events were canceled due to the COVID-19 pandemic. The CHANJ Team took advantage of a variety of "virtual" format opportunities described below to expand outreach efforts.
- The CHANJ Team gave a presentation and web viewer demonstration at the virtual Northeastern Transportation and Wildlife Conference (NETWC) in September 2020, as well as presentations and posters about three different road mitigation projects and post-installation monitoring. NJDFW had been preparing to co-host the conference in-person in NJ, but will instead serve that role for the next NETWC gathering in 2022. Significantly, more than 40 NJDOT staff attended the virtual conference as a direct result of the Roads and Wildlife Working Group's encouragement and involvement; NJDOT had never attended a NETWC previously. The CHANJ Team also worked with our Division Bureau of Information and Education to develop a promotional video (available on www.netwc.org) for the NJ hosted 2022 NETWC that highlights habitat connectivity projects in New Jersey, including CHANJ.
- The CHANJ project was featured in an episode of the PBS show EcoSense for Living, called *Wild Crossings*, which aired in April 2020 (Fig. 3). The episode tells the story of three major habitat connectivity projects across the eastern U.S., of which ours is one.
- The team made eight posts to the NJDFW CHANJ email listserv to share project-related information and stories with partners and the public. Posts highlighted our new CHANJ Mapping video tutorial, tips and tools to upgrade your yard for wildlife during quarantine, our feature on PBS, and more. The listserve grew from approx. 14,800 to 26,000 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.
- We worked with the Conserve Wildlife Foundation to finalize a CHANJ StoryMap to promote the concept of habitat connectivity and the CHANJ tools among a wider and younger audience, complete with classroom/family-friendly activities. The StoryMap will be posted and publicly shared early in the next work period.
- CHANJ leader G. Fowles was invited and participated on a panel coordinated by the Theodore Roosevelt Conservation Partnership to educate conservation foundations, funders, and some Congressional staff about wildlife-vehicle collisions and crossings.

Figure 3. The filming of *Wild Crossings* episode on PBS EcoSense for Living, with Producer Suzan Satterfield and the "clacker."

- 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. Due to the pandemic, most of these efforts were virtual in 2020 (Fig. 4).
  - ENSP staff organized bi-monthly web meetings of the Roads and Wildlife Working Group – made up of CHANJ partners from DOT, USFWS, and DEP (Division of Land Resource Protection and the ENSP) throughout the work period. The group discussed proactive road mitigation strategies and opportunities, from inter-agency communication needs, to reducing the use of plastics and netting in soil erosion control, to implementing 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. The group also reviewed projects that have gone in the ground to identify improvements in the process or construction, and steered DOT-funded camera monitoring of two road/wildlife mitigation projects for the first time.
  - The CHANJ team met with or presented to select 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:
    - Web meeting with approx. 15 staff from McCormick-Taylor, one of NJDOT's primary consulting firms for project design and construction, to introduce our habitat connectivity goals, demonstrate the CHANJ tools and discuss collaboration.
    - Web presentation and meeting with a consortium of conservation groups (20 representatives) from the NJ Sourlands region, introducing CHANJ, demonstrating the mapping and guidance tools, and underscoring the Sourlands' tenuous role in our state's habitat connectivity.
    - Web meeting with 10 staff of NJDFW Bureau of Freshwater Fisheries and Trout Unlimited to demonstrate the CHANJ Mapping and discuss mutual interest areas for completing NAACC culvert assessments.
    - Web meeting with staff of the Lower Raritan Watershed Association to demonstrate the CHANJ Mapping tool and discuss NAACC culvert survey priorities.
    - Web meeting and CHANJ Mapping demo with the Delaware Valley Regional Planning Commission.
    - Web meeting and CHANJ Mapping demo with the NJ Highlands Council.

- Joint web meeting with Sussex County Division of Engineering, DEP Division of Land Resource Protection and The Nature Conservancy.
- Web meeting with National Wildlife Refuge staff across NJ to discuss how to incorporate CHANJ into land acquisition and management decisions.
- Web meeting and CHANJ Mapping demo with 6 staff of the New Jersey Conservation Foundation to incorporate CHANJ into land preservation and management decision-making and cross-promoting projects.
- Web meeting with Jersey-Friendly Yards team about mutual public outreach.
- Web meeting with the Sourlands Conservancy about piloting the new CHANJ Action Team web app tool.
- Web meeting with snake researchers from The College of New Jersey and Arcadia University to discuss areas of concern for road mitigation in southern NJ.
- Web meeting and CHANJ Mapping demo with NJDFW Bureau of Lands Management staff.

Figure 4. Virtual – the new normal! CHANJ project co-leader Brian Zarate gives an online presentation about turtle tunnels recently installed in Monmouth County, NJ.

- The CHANJ team continued work under another federal grant 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 to DEP’s Division of Land Resource Protection and the NJ Department of Transportation on the CHANJ tools and effective design of wildlife crossing structures, specific to DEP Flood Hazard Area Control Act Rules requiring dry passage to be incorporated where new (or replacement) bridge or culvert projects are planned along roadways that fragment threatened, endangered, or special concern species habitat.

Conclusions:

- The CHANJ website continues to be accessed consistently over 1,500 times per month, and the CHANJ Web Viewer was accessed over 5,000 times in 2020. The incorporation of the CHANJ layers into other interactive mapping applications may affect CHANJ Web Viewer “hits” numbers.
- The CHANJ Team updated several CHANJ layers to incorporate new data and/or symbology.

- The CHANJ Team worked on developing several new tools and resources to enhance the project, include a video tutorial of the CHANJ mapping, an application for the public to report roadkill observations, an application for Action Team members to identify habitat connectivity work being conducted and to coordinate efforts, and an application for agencies working on transportation planning at the state level to better communicate and coordinate on opportunities to enhance habitat connectivity.
- The CHANJ layers were also incorporated in several other mapping applications outside of the ENSP.
- Staff continued to successfully engage a multi-partner, multi-disciplinary Roads and Wildlife Working Group in bi-monthly meetings to facilitate progress on important state-scale wildlife mobility issues, including road mitigation implementation and monitoring.
- Despite the pandemic limiting in-person activities in 2020, the CHANJ team were able to accomplish a great deal of communications. We completed and posted the CHANJ Mapping video tutorial and provided final comments to CWF on the educational StoryMap. We engaged a wide public audience through presentations and listserv posts, making people aware of the issue of habitat connectivity and the resources available through the CHANJ project. The listserv audience is our biggest, and we have drawn measurable attention to the CHANJ website and Mapping tool via listserv posts.
- Settling into the implementation stage of the project, the CHANJ team gave numerous presentations within local, regional, and state forums to promote the CHANJ products and discuss ways to coordinate work efforts with key implementers. The CHANJ team also reached regional and national audiences with a few outreach efforts.
- ENSP staff continue to implement, research and test project monitoring and tracking tools.

Recommendations:
- Continue to make updates to the mapping and guidance document and run the connectivity assessments to evaluate progress in implementing 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. Release listserv posts that introduce the readers step-by-step to the CHANJ Web Viewer.
- 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.

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:
- GIS staff maintained the Habitat Change Analysis Project (HCAP) initiated by the Division of Fish and Wildlife's Endangered and Nongame Species Program in partnership with Rowan University.
- A scope of work is on hold and will be revised in order to incorporate the 2020 LULC into HCAP, expected to be available within the next two years.
- HCAP data were used to evaluate habitat loss and fragmentation on NHR-managed lands vs other state and private lands.
- GIS staff continues to maintain range extents for 59 species covering 66 unique species-occurrence type combinations.
- All deliverables continue to be maintained on an internal file sharing site for access by NJDFW biologists 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 derivate 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.
- 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:

- As of January 2021, the Habitat Change Analysis Project (HCAP) was transferred to a new grant FW-64-T in the Office of Fish and Wildlife Information Systems (OIS).
- Implementing a programmatic approach to analysis continues to be 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 will be delayed until the 2020 LULC becomes available for incorporation into the next round of analysis.
- The development of species range extent data products can have ancillary benefits for other DFW 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 and black bear.

Recommendations:

- Coordinate with the Office of Fish and Wildlife Information Systems (OIS) regarding development other products that may be necessary to interpret habitat trends over time.

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 38 different state, federal, and local agencies or programs requested or were provided input and guidance from the ENSP on projects and activities involving SGCN wildlife and habitats, resulting in 424 reviews completed by ENSP staff. A listing of the reviews by category is found in Table 1.
- In many cases, the 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 Resource Protection (formerly Division of Land Use Regulation), with whom 86 reviews were performed during the grant period.
- In other cases, the 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, 01/01/20 through 12/31/20.	Number of Reviews:
1. State reviews	
New Jersey Department of Transportation	12
New Jersey Pinelands Commission	0
DEP Division of Land Resource Protection, formerly *Land Use Regulation Program* (Freshwater Wetland Act, CAFRA, Flood Hazard Area Control Act, Waterfront Development, Stream Encroachment, Highlands Act, Pinelands Act)	86
DEP Bureau of Coastal and Land Use Enforcement and Compliance	4
DEP Division of Watershed Protection and Restoration (formerly the Division of Watershed Management)	1
DEP Division of Water Quality	0
DEP Division of Coastal Engineering	4
DEP Office of Permit Coordination and Environmental Review	20
DEP Office of Dredging and Sediment Technology	4
DEP Office of Permit Information and Assistance	0
DEP Division of Parks and Forestry	4
DEP Review of Activities Proposed for N&HR-Administered Lands and Waters	98
DEP Division of Solid and Hazardous Waste Management	2
DEP Site Remediation Program	2
DEP Bureau of Surface Water Permitting	0
DEP Bureau of Wastewater Management	0
DEP Bureau of Marine Water Monitoring	0
DEP Office of Water Policy	0
DEP Office of the Commissioner	1
DEP Office of Policy, Planning and Science	1
DEP Office of Sustainability	1
DEP Office of Coastal and Land Use Planning	0
DEP Division of Fish & Wildlife, Bureau of Land Management	8
DEP Division of Fish & Wildlife, Bureau of Wildlife Management	3
DEP Division of Fish & Wildlife, Exotic & Nongame Permits Office: Scientific Collecting Permits	79
DEP Division of Science and Research	2
DEP Green Acres Program	3
DEP Bureau of Climate Resilience Planning	1
DEP Office of Policy	1
2. U.S. Government reviews	

U.S. Fish and Wildlife Service	33
Army Corps of Engineers	7
Federal Emergency Management Agency (FEMA)	0
Nuclear Regulatory Commission	0
National Marine Fisheries Service	0
National Park Service	3
Natural Resource Conservation Service	5
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	1
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	2
Atlantic Flyway Council	2
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	0
County and Local Park Commissions	5
Watershed Associations	1
Local Municipalities	9
Local and Regional Environmental Commissions	0
5. Private, Non-Profit Conservation Organization reviews	
National Fish and Wildlife Foundation	0
State and county Federations of Sportsmen's Clubs	1
The Nature Conservancy, Natural Lands Trusts, NJ Audubon, Land Conservancy of NJ, etc.	8
NJ Conservation Foundation	0
Environment and Climate Change Canada, Canadian Wildlife Service	1
Other (other direct-contact project reviews)	4
Total:	**424**

Conclusions:

- Within the reporting period approximately 38 state, federal, and local agencies or partners requested input and guidance from the 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.
- The 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) determine what steps are needed to protect and recover newly listed eastern black rail; 7) conserve remaining populations of imperiled bats.
- Similarly, the 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 have begun to come up for review.
- Reviews associated with green or renewable energy projects increased, including those associated with offshore wind and solar farms and floating solar arrays.
- 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.
- Reviews and inter-agency coordination between the ENSP, USFWS, and NJ Department of Transportation increased to address the potential for federally-listed bats to occupy bridge structures.
- Habitat connectivity continues to be 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 incorporate CHANJ guidelines for design of terrestrial safe passage structures under roadways in application requirements, and the ENSP's expertise in this area of concern include coordination with the FHWA, state DOT, county and municipal transportation entities and regional planning associations.
- NJ DEP's leadership and commitment to executing, supporting, and guiding beneficial reuse projects has increased. The ENSP plays a critical role (and will continue to do so) in site identification, setting project goals, and ensuring natural resources are both protected and promoted on these projects.

Recommendations:

- This job should continue to be funded continuously because 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 of Environmental Protection's (Department) partners to guide policy decisions or help with planning initiatives. Coordination with the Division of Land Resource Protection (*formerly* 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. Aquaculture development of the NJ Atlantic coast is being planned; staff are updating coastal red knot data and will provide input for an Aquaculture Siting Tool under development by Rutgers University that will identify areas of E&T and other conflicts. Staff participated in ongoing adaptive management for red knots and horseshoe crabs with the Atlantic States Marine Fisheries Commission. Staff participated in a threats assessment for red knot in Canada (federal endangered) covering three red knot subspecies and reviewed a proposed rule aimed at streamlining permitting for coastal restoration and resiliency projects using nature-based methods (rule to *Protect Against Climate Threats*, NJ PACT Rule). Additional coordination took place with Department partners regarding recent developments concerning 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. The ENSP and USFWS finalized bat survey guidance, reporting methods, and

conservation measures associated with bridge maintenance activities and co-led a bats-in-bridges workshop as part of the 2020 virtual Northeastern Transportation and Wildlife Conference.

- 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 Resource Protection 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 Resource Protection 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 NJ DFW.
- 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, and living shoreline projects being developed by American Littoral Society and the Nature Conservancy.
- Staff worked with the Bureau of GIS to incorporate several Connecting Habitat Across New Jersey (CHANJ) layers in the newly released NJ GeoWeb.
- Staff developed a Roads and Wildlife Reviewer web application in collaboration with the Bureau of GIS, NJ DOT, and the Division of Land Resource Protection that allows for more efficient and collaborative review of proposed road projects and ways to incorporate safe wildlife passage if appropriate.
- GIS staff continued to participate in the NJ Conservation Blueprint Project's Science Advisory work groups and provided guidance on the inclusion of the CHANJ Cores, Corridors, and Stepping Stones habitat connectivity GIS layers, which are now included in the Ecological Integrity mapping of the NJ Conservation Blueprint project.
- 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, 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).
- In 2019, staff had conducted a detailed review of the 2019 Benchmark Stock Assessment for Horseshoe Crab. Results from the 2019 stock assessment are intended to update the ARM Model (used to predict crab bait harvest given red knot population stability). That work is underway. In 2016, the USFWS issued a Programmatic Biological Opinion (PBO) for shellfish aquaculture in a portion of Delaware Bay. The PBO provides conservation measures for red knot (federal threatened) on aquaculture operations, and a ten-year framework for impacts assessment including stakeholder and agency working groups process for considering new science and/or changes to Conservation Measures; 2020 was year four of PBO implementation.
  - Red knot (*rufa* subspecies) is federal endangered in Canada (2007) and federal threatened in the US (2016). Staff participated in a threats assessment update, by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), covering five designated units of red knot: DU1 – *C. c. islandica,* DU2 – *C .c. roselaari,* DU3 – *C. c. rufa* (Tierra del Fuego wintering population); DU4 – *C. c. rufa* (Brazilian wintering population), and DU5 – *C. c. rufa* (SE USA, Gulf of Mexico/Caribbean wintering population).

Canada, the US and South American countries share recovery responsibility and were represented in the assessment.
    - Staff participated in the review of a proposed rule to Protect Against Climate Threats (the NJ PACT Rule). Germane to endangered species and habitats, the rule seeks to plan for sea level rise and increase coastal protection by repairing/restoring damaged habitats (e.g., salt marsh) and incentivize use and monitoring of nature-based methods.
- ENSP staff assessed and worked on revisions to the Program's minimize harm guidance document (*formerly* a best management practices document) regarding maintenance and construction activities on rights-of-way (ROWs). The current document provides both optimal and minimally-accepted minimize harm strategies for rare species pertaining to routine vegetation maintenance (e.g., mow, cut, herbicide), excavation and grading, and general activities conducted on ROWs.
    - Late 2019 - early 2020, at the request of PSE&G, the ENSP conducted a thorough statewide review of their ROW and current rare snake observations and provided PSE&G with segment-specific rare snake minimize harm guidance in an effort to minimize conflicts with other rare species.
- Program staff made recommendations and provided technical guidance to the Department of Environmental Protection regarding federal-proposed changes to the Migratory Bird Treaty Act.
- ENSP staff have worked closely with Natural Lands, Friends of Hopewell Valley Open Space (FoHVOS), and Raritan Headwaters 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.
- Staff reviewed and provided extensive comments on the draft 2020 State Forest Action Plan.
- Staff provided comments to Watershed and Land Management on revisions to the freshwater wetlands protection, flood hazard area control act, and coastal zone management rules.

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.