Notice of Funding Opportunity
State of New Jersey
Department of Environmental Protection
Fish and Wildlife

New Jersey Skylands Region
Timber Rattlesnake and Eastern Copperhead Grant:

Eastern Copperhead Survey Technique Development and Assessment

1.0 Grant Overview

The eastern copperhead (*Agkistrodon contortrix*) of New Jersey (formerly, northern copperhead, *Agkistrodon contortrix mokasen*) is currently a state species of special concern in New Jersey and is a candidate for listing as a threatened species in the state as well. Its threatened status will likely be approved in 2024. The change in regulatory status will enable the NJ Department of Environmental Protection (NJDEP) additional opportunities to recommend, if not require, conservation measures for the copperhead, including surveys to identify critical habitat features (e.g., dens and birthing rookeries). As such, it will be imperative the NJDEP be able to guide land use permit applicants on the most effective method to survey for eastern copperheads and to identify their critical habitat features (i.e., dens and birthing rookeries) requiring protective measures.

Currently, the NJDEP (via the Endangered and Nongame Species Program, ENSP) rely on survey methods used for montane timber rattlesnakes (i.e., Phase I habitat assessments and Phase II "presence" surveys to confirm those habitats as critical habitat features). Due to behavioral differences between the two species, particularly during emergence and gestation when copperheads are more concealed, the survey method for timber rattlesnakes is inadequate for eastern copperheads.

The ENSP has developed this grant in an effort to solicit, test and analyze innovative ideas to develop a reliable survey methodology for eastern copperheads, specifically to identify critical habitat features (dens and birthing rookeries). We are seeking applicants who have professional and/or academic field research experience with snakes, particularly in montane habitats, and an academic/academics experienced in project design and analyses in the field of conservation (*see 4.3*). The ENSP will award one or more grants to fulfill this need.

2.0 Grant Program

This grant is supported by mitigation funds secured during the 2010 – 2016 construction of a gas pipeline through conserved lands within the New Jersey Skylands region. Although the new pipeline ran parallel to an existing pipeline, the construction activities, temporary and permanent changes to the rights-of-way, and a subsequent increase in human activity, particularly off-road vehicle activity, resulted in short- and long-term impacts on reptiles and amphibians and their habitats.

The NJDEP required the responsible gas company to provide mitigation funds to NJ Fish and Wildlife's Endangered and Nongame Species Program (ENSP) for the purpose of conservation work to help sustain reptile and amphibian habitats and populations, primarily focused on timber rattlesnakes and eastern copperheads within the Skylands region of New Jersey. Currently, this grant opportunity focuses on the development and assessment of eastern copperhead survey techniques to locate critical habitat features (i.e., dens and birthing rookeries) that do not rely on radio-telemetry *(see 4.5.4.3 below)*. Future implementation of a successful technique and its resultant findings will enable the NJDEP to protect these sensitive areas.

*Note, while preference will be given to proposals focused on improved methods to identify these critical habitat features, the ENSP will also consider projects that develop and test a method or technique to accurately refine the area (i.e., acreage) that would be targeted for [more intense] standard Phase I and II surveys, heretofore referred to as the "alternative objective."

3.0 Objective

- Primary objective: Design, test, and evaluate the efficacy and cost of methods, other than radio-telemetry, to successfully identify and confirm New Jersey's eastern copperheads' winter dens and birthing rookeries.
- Alternative objective: Design, test, and evaluate the efficacy and cost of methods, other than radio-telemetry, to accurately reduce the target survey area for standard Phase I and II surveys to identify New Jersey's eastern copperheads' winter dens and birthing rookeries.

It is important to understand how the NJ DEP currently guides personnel conducting such surveys as part of land use application permits (i.e., construction activities).

- Step 1: Project areas are reviewed through the NJ DEP's Landscape Project Map. This map values habitats based on species observations, habitat suitability, and activity ranges. NJDEP| Fish & Wildlife | New Jersey's Landscape Project
- Step 2: Internally, the project area is reviewed using the ENSP's most current data and for habitat suitability through aerial imagery, elevation contours, potential barriers, etc.
- Step 3: If the NJ DEP determines the snakes may inhabit the area, personnel are directed to perform Phase I (habitat assessment) and Phase II (presence) surveys.

However, as previously described, these surveys are insufficient in identifying copperhead winter dens and birthing rookeries. This grant aims to identify an improved method to locate such critical habitat features.

4.0 NJDEP Request for Applications

4.1 ***Maximum Grant Amount Available:*** Not to exceed a total of $500,000.00 through one or more grants.

4.2 ***Period of Performance:***

The project, final analyses, and reporting is expected to be completed within five (5) years of the Grant Agreement's start date. However, should an applicant require more time, the ENSP will consider the proposed work to determine if the applicant's proposed timeframe is appropriate and acceptable. A request for such an extension must be included with the application and will be granted at the sole discretion of the ENSP. The ENSP anticipates the development and execution of a formal Grant Agreement to take place no earlier than January 1, 2025, and for the project to begin in early 2025. However, the ENSP is willing to consider a later start date based on the project and Grantee's/Grantees' needs (*see 4.5.4.5 and 5.4 for example of potential cause for delay).*

4.3 ***Eligibility Requirements:***

To be eligible to receive funding under this grant program, an applicant and their research team must meet the requirements outlined below and the proposal must strive to achieve at least one of the objectives of this grant.

4.3.1 At least one Principal Investigator must have professional field research experience with terrestrial snakes. Applicants with montane snake field research experience are preferred but not required. (*See 4.5.5.1.3 regarding activities that do not qualify as "field research experience."*)

4.3.2 At least one Principal Investigator must be currently or formerly affiliated with an academic institution and have experience with wildlife-, ecological-, and/or conservation-focused research including, but not limited to, having obtained field experience pertaining to wildlife and/or working closely with wildlife-, ecological-, or conservation-focused field researchers, has been instrumental in project design (excluding laboratory-based research with the exception of computer modeling for field application), and has experience conducting analyses for such projects (e.g., population trends, suitable habitats and habitat selection/use, land cover trends and loss of wildlife population connectivity, etc.).

*Notes regarding Principal Investigator(s):

- A single Principal Investigator satisfying both requirements above is acceptable.
- A prospective Principal Investigator currently affiliated with an academic institution is <u>not</u> required to apply for this grant and/or implement the project through the academic institution. This person can work as a private contractor.

4.3.3 Personnel proposed to work on the project must disclose whether they have been convicted of violating state/territory wildlife laws and/or wildlife-related permit

conditions within any state or territory of the United States within the last five (5) years. Personnel who have been convicted of such a violation may be prohibited from working on the project.

4.3.4 Individuals and/or organizations requiring approval by the Institutional Animal Care and Use Committee (IACUC) will be required to submit the IACUC letter of approval with their proposal packet or within thirty days (30 days) of submitting their proposal packet. Failure to produce the necessary documentation will result in the rejection of your proposal. If submitted separately from their proposal packet and IACUC requires minor changes to the proposal, the ENSP will consider those changes as part of the proposal. However, if the ENSP determines the required changes are significant, the proposal will be rejected.

4.4 ***Project Area(s):***

The project area could vary depending on the proposed strategies. However, eastern copperheads are known to inhabit two general landscapes of New Jersey including the northern counties that reach higher elevations (Warren, Sussex, Morris, Passaic, and Bergen Counties), and lower elevation central counties (the Watchung Mountains of Union and Essex Counties, and Somerset, Hunterdon, and Mercer Counties).

A successful survey technique to identify critical habitat features is needed for both landscapes; however, the ENSP acknowledges that the same technique may not be suitable for both. As such, the proposal should identify the proposal's target landscape(s) within New Jersey.

4.5 ***Proposal Requirements:***

Proposals must meet the following requirements :

4.5.1 The proposed technique must be replicable and reproducible by others.

4.5.2 Clearly define your proposal's objective (i.e., "primary objective" or "alternative objective" described above).

4.5.3 Identify your project area(s) (*see 4.4*).

4.5.4 Include the proposed methods of how you and your team will identify the locations of eastern copperhead critical habitat features (i.e., dens and rookeries*) or alternatively refine the target survey area for on-the-ground visual surveys, the timeframe for each proposed [significant] task or strategy, the proposed method to analyze the success of the technique (e.g., ground-truthing or other means), if appropriate, the number of currently documented sites within each targeted landscape on which efforts will focus (see *Appendix A* for confirmed locations), and which, if any, of the data presented in *Appendix A* will be needed and/or if other data are needed.

*Gestation sites can be different locations from birthing rookeries. While the ENSP is *most* interested in rookeries, the current ENSP data is lacking and as such, the ENSP is willing to consider proposals targeting gestation sites *if* efforts are made to ascertain if the sites are used for both gestation and birthing and to assess the proposed method and/or survey strategy for both targets (i.e., gestation site vs rookery).

4.5.4.1 If the proposed technique is new and innovative (i.e., has never been applied to snakes, reptiles, and/or wildlife, in general), the applicant must provide a detailed explanation (a self-assessment) of why they believe the technique will be successful in achieving the objectives (i.e., demonstrate that the innovation has potential applicability to this target species or critical habitat features' type(s)). Demonstration of applicability may include specific examples of approaches that relate to the target species' life history or critical habitat feature type(s).

4.5.4.2 For proposed methods including computer modeling, are there any peer-reviewed, published, or white papers, or academic theses addressing any components of the proposed strategy and the method's beneficial uses versus what it lacks?

4.5.4.2.1 Proposals including the use of Geographic Information System (GIS) must include ground-truthing strategies to evaluate if site conditions match GIS data layers, how any differences impact the technique's results, and on-site characteristics that may be applied in conjunction with GIS mapping to refine visual survey efforts.

4.5.4.3 The ENSP does **not** consider radio-telemetry a reasonable technique for eastern copperhead surveys that may be required for the NJDEP's land use (i.e., regulatory) applications and permits. While radio-telemetry will not be an acceptable strategy to satisfy the objective of this grant, a Grantee *could* use radio-telemetry to evaluate the success of their proposed method and/or survey strategy. If the proposal will include radio-telemetry, please provide details regarding the purpose, maximum number of snakes, sex ratio, transmitter (make/model) for both implantable and external attachments, transmitter implant and/or external attachment techniques (for ENSP's review and approval), resume detailing the experience of proposed qualified personnel to implant, remove, and/or externally attach transmitters, etc., and please be mindful of the conditions provided in the accompanying set of standard permit conditions in *Attachment I* regarding radio-telemetry.

4.5.4.4 Standard Phase I (habitat assessments) and Phase II (presence surveys) assessments may be components of the survey method, but alone are **not**

acceptable methods to satisfy the objective of this grant, and alone will not be considered for this grant. However, as with radio-telemetry, a Grantee may incorporate these methods into their project to test, refine, and/or confirm the success of their proposed strategy.

4.5.4.5 Describe whether and to what extent you will need to coordinate with the Rutgers University (RU) researcher conducting eastern copperhead radio-telemetry research (*see 5.4*) and/or if and why your proposal must be delayed until after RU has completed their work.

4.5.5 Personnel information:

4.5.5.1 Please provide the names and resumes of all personnel to work on the project or, if personnel have not yet been identified, see 4.5.5.1.3 (below). **Please limit resume(s) to applicable/relevant information only.**

4.5.5.1.1 Describe the "academic" Principal Investigator's experience and personal role in project design for wildlife-, ecological-, and/or conservation-focused research, and data management and analyses, including [accessible] links to any published, peer-reviewed, and white papers. (*See 4.3.2*)

4.5.5.1.2 Describe in detail the Principal Investigator's/Investigators' field research experience with terrestrial snakes, particularly montane snakes in general, and with montane snakes in terrain within or similar to the proposal's targeted NJ landscape region(s) (i.e., within or similar to NJ's northern montane "higher" elevation and/or central montane "lower" elevation" described in 4.4). (*See 4.3.1 above and additional guidance regarding "field research experience" within 4.5.5.1.3 below.*)

4.5.5.1.3 Describe in detail the minimum experience you will accept for each role/job responsibility throughout the project for all applicable positions (e.g., field technicians, assistants, computer technicians, and/or other contributing personnel). The Copperhead Notice of Funding Opportunity (NOFO) Technical Review Committee will rely on these details to score currently identified and unidentified personnel to work on the project. (*See guidance regarding "field research experience" within 4.5.5.1.3 below.*)

**Field research experience:* Provide detailed information regarding field research experience (e.g., surveys conducted, number of snakes tracked, days per week, weeks/months during each year, etc.). *(See "Appendix C, Round 2, Personnel Experience" to understand the level of detail necessary for the application review.)* Note, "field research experience" for

project personnel may have been obtained through academic, professional, and/or volunteer research under the supervision and/or authorization of the governing agency, and excludes authorized and unauthorized "snake hunting," snake nuisance response/removal, monitoring on construction/project sites, caretaking and husbandry (e.g., zookeeper, pet stores, private collections, etc.), laboratory-based studies, and animal breeding, collection, trade, and sales. In addition, publications are not considered "field research experience."

4.5.5.1.4 Please identify all personnel that have been convicted of violating state/territory wildlife laws and/or wildlife-related permits within any state or territory of the United States within the last five (5) years. Personnel who have been convicted of such a violation may be prohibited from working on the project.

4.5.5.2 Provide examples of similar work the Principal Investigator(s) have conducted if available.

4.5.5.3 Provide detailed description of each position's role/responsibilities on the proposed project (e.g., Principal Investigators, animal care takers during temporary captivity, field personnel/technicians, statisticians, etc.).

4.5.6 Describe the Principal Investigator's/Investigators' experience(s) in solving complex wildlife conservation issues or concerns, particularly for reptiles, including but not limited to:

4.5.6.1 Brief descriptions of problem(s) and solution(s).

4.5.6.2 Did your solution(s) provide the anticipated outcome to the problem? If not, how did it fall short?

4.5.6.3 How many times has/have the Principal Investigator(s) been tasked with finding a solution to a complex reptile conservation issue or concern? Describe one – two examples.

4.5.6.4 Provide links to publicly available or PDFs of relevant published, peer-reviewed, or white papers authored by the Principal Investigator(s), demonstrating the Principal Investigator's/Investigators' ability to solve complex conservation questions about wildlife, particularly reptiles, and if applicable and available, supporting the proposed strategy or technique.

4.5.7 Describe the Principal Investigator's and/or primary contributing partner's (personnel from a partnering organization, University, company, etc.) familiarity and experience with the proposed techniques as they have been employed in other studies with wildlife, particularly reptiles.

4.5.8 Preferred start date (cannot be before January 01, 2025) and anticipated end date (not to exceed five (5) years from Grant Agreement's start date). If seeking an

alternate start date and/or an extension of the 5-year timeframe, please provide a written request and detailed explanation as to why these adjustments are needed to complete the proposed project, and the proposed start date and timeframe.

4.5.9 Proposed location/facility to hold snakes in temporary captivity and/or to conduct transmitter implantation/removal, if applicable. Please provide a letter from the facility confirming their agreement of use, their decontamination protocols and animal quarantining ability, snake husbandry experience for all personnel responsible for the snakes' care while in their custody, and security protocols. Such a facility must be within New Jersey.

4.5.10 Description of data security protocols, including confidentiality of species locations.

4.5.11 Description of how the prospective Grantee will stay engaged with ENSP's snake biologist. (*See 5.6.2 and 5.6.3*.)

4.5.12 Budget

4.5.12.1 Itemize the costs for each major component of your proposal (e.g., identifying sites, confirming sites, data entry, analyses, and other major tasks).

4.5.12.2 Provide a list of and itemized costs for equipment, supplies, field and office materials, and miscellaneous expenses. Note, some Information Technology (IT) equipment may not be eligible for funding through this grant.

- Examples of items that would likely be funded through this grant:
  - Salary for postdoctoral fellows/graduate students and student/laboratory assistants;
  - Salaries for principal investigators (PIs), technical staff and office personnel; however, requesting funding to support staff that routinely receive regular salaries from federal, state (including universities), or endowed sources may be considered a detriment in proposal consideration. Exceptions may be project time that PIs or technical staff would not be paid by their institutions (e.g., on a leave of absence, or positions that are less than full time or less than 12 months per year).
    Clear documentation should be provided with the estimated budget for any request for a Principal Investigator or pre-existing technical staff salaries that indicates their eligible status with their employer (on leave, reductions in time base) and the specific tasks that they will perform on the project;
  - Supplies and expenses (including office expenses);
  - Animals and animal care;
  - Laboratory fees;
  - Equipment under $5,000.00 may be requested but may become the property of the ENSP at the conclusion of the study; and
  - Travel (for data collection/project implementation only).

- Examples of items that would not likely be funded through this grant:
  - Ongoing maintenance and operations;
  - Publication costs;
  - Travel not associated with data collection (e.g., travel to conferences);
  - Equipment over $5,000.00 may be requested but will not likely be approved; and if it is, it may become the property of the ENSP at the conclusion of the study; and
  - Indirect costs/overhead.

4.5.12.3 Provide total cost of project.

*A checklist for required documents and Ranking Criteria Form have been provided in *Appendices A and B*, respectively, for your reference.

5.0 Grant Terms and Conditions:

5.1 *Data:*

All location data of NJ's listed and special concern wildlife and candidates for listing or special concern status gathered during and/or associated with this grant will be considered property of the NJ Department of Environmental Protection and cannot be distributed in any format (e.g., verbal, photographs, maps, written descriptions, online posts, etc.) without written permission from the NJ Department of Environmental Protection, Fish and Wildlife's Endangered and Nongame Species Program (ENSP). This includes but is not limited to species' location data submitted to the ENSP by the Grantee and such data shared with Grantee by the ENSP; the latter would be shared only through a data sharing agreement.

5.1.1 Grantee requiring the data described in *Appendix A* or other data held by the ENSP will be required to enter into a data sharing agreement with the ENSP which will outline the specified use of and personnel access to the data, security measures, etc.

5.2 *Temporary Captivity of Snakes:*

No snakes will be removed from New Jersey for any reason except if a snake requires *special* medical assistance from the Wildlife Conservation Society at the Bronx Zoo, NY. Such an event would be determined by the ENSP. Otherwise, medical assistance will be provided by Woodlands Wildlife Refuge (Pittstown, Hunterdon County) and their partnering veterinarian. As such, if snakes will be held in temporary captivity, it is the prospective Grantee's responsibility to coordinate with NJ-approved facilities (e.g., venomous snake-approved wildlife rehabilitators, State Universities/Colleges, other state-approved facilities). (*See 4.5.9 regarding required information.*)

5.3 ***Permits and Permit Conditions:***

5.3.1 Any activity that requires handling of NJ wildlife and/or drawing wildlife to a specific location (e.g., shelter boards, traplines) requires the Grantee(s) to obtain a Scientific Collecting Permit (SCP) from NJ Fish and Wildlife (FW) each year of the study when performing such tasks. Such a permit currently costs $22.00/year but is *anticipated* to increase to $100.00/year in 2025. The permit currently allows (and in the future will allow) for an unlimited number of subpermittees at no additional cost.

5.3.1.1 Grantee (permittee) and all subpermittees must comply with the Scientific Collection Permit's conditions. Conditions address decontamination protocols, captivity/containment/transport, quarantining of animals, as well as provide specific instruction regarding annual reports and data submittal, implementing traplines, pit tagging, and radio-telemetry. A set of additional standard conditions (labeled *Attachment I: Special Conditions per the ENSP*) regarding data submittal, traplines, pit tagging, and radio-telemetry has been provided for your reference. Please note, these conditions:

- May be revised based on the most current available data.
- May be amended (e.g., tracking schedule, trap/trapline design, etc.) upon request. Such requests for changes must be submitted as part of the proposal with justifications (and where appropriate, supporting literature and research) for the requests. For example, the current guidance for traplines is focused on the Pine Barrens' more conducive substrate. A trapline in rocky, montane habitat would need amendments to the installation and possibly, trap design.

5.3.2 Activities performed on state lands require the Grantee(s) to obtain permits from the managing division (i.e., Division of Parks, Forests and Historic Sites or Division of Fish and Wildlife). Each permit can apply to multiple locations. The ENSP can assist in the application processes. *(See 5.5.3.)*

5.3.2.1 Division of Parks, Forests, and Historic Sites issues their own Scientific Collecting Permit for work in state parks and forests. There is no fee.

5.3.2.2 Division of Fish and Wildlife issues Special Use Permits for work on Wildlife Management Areas. The permit fee is waived for scientific research.

5.3.3 Activities performed on lands managed by county or local governments or by non-government agencies *may* require authorization and possibly include permit fees. *(See 5.5.3.)*

5.3.4 Grantee (permittee) must remove all field supplies/equipment (e.g., shelter boards, flagging, posts, traplines, etc.) and snake transmitters (see the applicable sections within *Attachment I* for details).

5.4 ***Cooperation and Coordination with On-going Research:***

The ENSP is working with a researcher from Rutgers University (RU) conducting a radio-telemetry study to assess habitat use, activity ranges and dispersal distances of eastern copperheads, and identify differences between NJ's northern and central regions' eastern copperheads. This researcher will be working in the area of, and using as his "base" study sites, most of the telemetry-confirmed eastern copperhead den areas in the northern montane landscape (described in *Appendix A*) from 2022 - spring 2025. Should the awarded project's timeline for this grant overlap with the Rutgers' study, the RU researcher is willing to coordinate and cooperate with the awarded Grantee(s) of this grant to avoid conflicts, and where appropriate, share beneficial information. (Should new location data for listed and special concern species' be identified, Grantee access would require amendments to the data sharing agreement with the ENSP.)

5.5 ***Additional responsibilities of Grantee:***

Grantee:

5.5.1 Will be responsible for training and supervising all field personnel, including but not limited to safety procedures when working in venomous snake habitat, and decontamination procedures of all equipment, apparel, and footwear.

5.5.2 Will ensure that all personnel receive appropriate training for the tasks they are assigned.

5.5.3 Will be responsible for working with landowners/residents to obtain access to private lands and permits to state lands when necessary. The ENSP will assist in this process as needed.

5.6 ***Deliverables:***

5.6.1 Submit annual location data for observed listed and special concern species' and candidate species for listing or special concern status (per Scientific Collecting Permit conditions, *Attachment I*).

5.6.2 Provide periodic project status updates to the ENSP. <u>At a minimum</u>, provide at least one (1) brief update regarding the status of the project in July for each year of the project, in addition to the annual project summary and data submittal required under the Scientific Collecting Permit policy and standard conditions due by January 31 of each of the following years of the project (see *"Attachment I…"*).

5.6.3 Within six (6) months of the completion of the project, provide a final description of the technique including but not limited to a detailed guidance and instruction document on how others should perform this technique, the timeframe that is required to implement a survey using the method(s) described, the cost/resources needed to conduct such a survey), and analysis/analyses evaluating the efficacy of

the proposed method, including successes, failures, and/or difficulties encountered. (Note, the cost/resource analysis should *not* include components unrelated to the overall concept. In other words, if tasks such as radio-telemetry are conducted to confirm the proposed survey method but are not part of the proposed survey method, such tasks and associated resources/costs should not contribute to the cost/resource analysis of the proposed survey method.)

- If the technique deploys and results in GIS-identifiable features, a GeoDatabase featuring the critical habitat features (dens and rookeries/gestation sites) within the project's target area(s) (i.e., northern and/or central montane habitats as described in section 4.4) must be provided to the ENSP.

6.0 Application Deadlines and Selection

6.1 *Submittal of and Response to Questions:*

In the interest of keeping the grant process open and fair, the ENSP is unable to answer questions posed by prospective Grantees on an individual basis. If interested parties have questions, please submit them by email (with delivery confirmation request please) to the ENSP: Kris.Schantz@dep.nj.gov. **All questions must be received by C.O.B., Friday, April 19, 2024**. The ENSP will respond to all questions and post the questions and responses on the same DEP web page as the *Notice of Funding Opportunity* by C.O.B. [Friday, May 3, 2024].

6.2 *Application Deadline:*

To be considered for this grant, please submit one (1) electronic copy of a complete proposal and associated documentation **no later than 5:00 PM on Friday, August 2, 2024.** The electronic copy must be e-mailed to kris.schantz@dep.nj.gov with a subject heading of "Eastern Copperhead Survey Technique."

6.3 *Ranking of Proposals:*

All proposals will be reviewed based on their innovation, likelihood of successfully providing the desired products to the ENSP, and personnel qualifications. Where similar proposals are submitted, the tasks, proposed assessments, and rate for major components will be considered.

All proposals will be reviewed by a Copperhead NOFO Technical Review Committee (Review Committee). Applicants can view the Checklist of Required Information (*Appendix B*) and the Scoring Criteria Form (*Appendix C*) to be used by the Review Committee. Note, while scores will be applied regarding field personnel/technician experience (specifically for those conducting visual surveys, habitat assessments, telemetry tracking snakes, pit-tagging snakes, catching snakes, etc.) and partnering organizations, this information will only be used to conduct the initial evaluation of individual proposals and when the ENSP is comparing multiple proposals deploying such field personnel and/or partnerships. When comparing proposals for which not all will

deploy field personnel or include such partnerships, the applicable scores will be omitted from the comparative assessment of competing proposals.

6.4 ***Notification of Award:***

If the scoring process results in multiple projects receiving the same score (or very close, e.g., within 10 points) and the total cost of the proposed projects exceeds $500,000.00, the Review Committee may request applicants to provide a brief presentation further detailing their proposed method(s). This additional detail will enable the Review Committee to make a final determination regarding the proposed projects.

Successful applicants will be notified by approximately Friday, October 18, 2024, via e-mail and the NJDEP will begin the process of developing a Grant Agreement shortly after.

All grantees must be registered vendors with the State of NJ. Please visit NJSTART.gov to register or to check your organization's status. During the registration process, vendors are required to complete the online AA/EEOC document regarding Affirmative Action/ Equal Opportunity and submit an online payment of $150.00. Grant Agreements will be created with successful applicants to formalize the award amount and payment schedule, Scope of Work, and project period including submittal of the final products and deliverables.

6.5 ***Grant Payment:***

Payment will be conducted in installments over the life of the project through reimbursement of annual costs and identified annual deliverables (if applicable). A payment schedule will be finalized during the development of the Grant Agreement, but prospective Grantees can assume and the ENSP will withhold the final payment of up to 25% until ENSP's receipt of the final costs and deliverables (final report and analyses described in *5.6*).

APPENDIX A

New Jersey Fish and Wildlife
Timber Rattlesnake and Eastern Copperhead Grant:
Current ENSP Eastern Copperhead Data

Potential available data as of November 29, 2023:

For your consideration during proposal and budget development, below is a summary of ENSP's [potentially] available eastern copperhead data for use (*via a data sharing agreement*):

1) Northern montane region (*as described in section 4.4 of NOFO*):
   a) Winter dens:
      1. Telemetry-confirmed points (not captured within polygons listed below): 6
      2. Telemetry-confirmed polygons (den complexes/den areas): 7
      3. Not telemetry-confirmed points, locations discovered through visual surveys: 6
      4. Not telemetry-confirmed polygon, locations discovered through visual surveys: 1, den was telemetry confirmed for timber rattlesnakes, copperheads were observed during multiple spring emergence periods
   b) Gestation sites:
      1. Telemetry-confirmed points (not captured within polygons listed below): 2 with neonates documented at one location
      2. Telemetry-confirmed polygons (den complexes/den areas): 4
      3. Not telemetry-confirmed points, locations discovered through visual surveys: 7; two are natural areas, five are either artificially created or disturbed natural areas (e.g., edges of rights-of-way).
   c) Incidental observations, excluding observations on roads and telemetry relocations: 125

2) Central montane region (*as described in section 4.4 of NOFO*):
   a) Winter dens:
      1. Telemetry-confirmed points (not captured within polygons listed below): 1
      2. Telemetry-confirmed polygons (den complexes/den areas): 5
      3. Not telemetry-confirmed points, locations discovered through visual surveys: 4
   b) Gestation sites:
      1. Telemetry-confirmed points (not captured within polygons listed below): 1
      2. Not telemetry-confirmed points, locations discovered through visual surveys: 6; five are natural areas, one is either artificially created or disturbed natural areas (e.g., edges of rights-of-way).
   c) Incidental observations, excluding observations on roads and telemetry relocations: 40

***The proposal must identify which, if any, of the data above will be needed and/or if other data are needed. If other data are needed, please explain.**

APPENDIX B

New Jersey Fish and Wildlife
Timber Rattlesnake and Eastern Copperhead Grant:
Checklist of Required Information

Applicant:_____ Project Title/Subject: _____

Proposed Start Date: _____

Date Received:_____ Date Reviewed: _____

Please refer to complete descriptions within the Notice of Funding Opportunity

Personnel Information

	Description	Yes	No	N/A
4.5.5.1.1	Provide detailed description of the "academic" Principal Investigator's experience and links to relevant papers.			
4.5.5.1.2	Provide detailed description of the Principal Investigator's field research experience; provided all information requested.			
4.5.5.1.3	Provide detailed description of the minimum experience that will be accepted for each role/job responsibility throughout the project.			
4.5.5.1.4	Identify all personnel convicted of wildlife-related violations.			
4.5.5.2	Examples of similar work if available.			
4.5.5.3	Provide detailed description of each position's role/responsibilities on the proposed project.			
4.5.6	Provide detailed description of Principal Investigator's/Investigators' experience in solving complex wildlife conservation issues or concerns.			
4.5.7	Provide detailed description of the Principal Investigator's and/or primary contributing partner's familiarity and experience with the proposed techniques as they have been employed in other studies with wildlife, particularly reptiles.			
4.5.9	Provide detailed description of the holding facility's personnel responsible for husbandry and their experience with snakes and venomous snakes.			

APPENDIX B

New Jersey Fish and Wildlife
Timber Rattlesnake and Eastern Copperhead Grant:
Checklist of Required Information

Proposed Project

Description		Yes	No	N/A
4.5.2	Define the proposal's objective.			
4.5.3	Identify the project's target landscapes.			
4.5.4	Provide detailed information regarding the proposed methods to achieve the project's objectives.			
4.5.4.1	Provide detailed explanation regarding why applicant believes new and innovative idea will successfully achieve the objectives.			
4.5.4.2	Provide supportive literature regarding proposed computer modeling.			
4.5.4.3	Details regarding radio-telemetry (if applicable).			
4.5.4.4	Details regarding use of standard Phase I and II assessments (if applicable).			
4.5.4.5	Description of whether and to what extent applicant will need to coordinate with the Rutgers University (RU) researcher. *(Please also see 5.4 in NOFO.)*			
4.2, 4.5.8	Identify preferred start date and anticipated end date or provide a request and explanation as to why the project start date must be delayed and/or requires an extension beyond 5-year timeframe.			
4.5.9	Provide necessary information on holding facility and/or location of transmitter implantation/removal.			
4.5.10	Description of data security protocols and flexibility to work with and meet the needs of ENSP.			
4.5.11	Description of how the prospective Grantee will stay engaged with ENSP's snake biologist. (Please see 5.6.2 and 5.6.3 in NOFO.)			

Proposed Budget

Description		Yes	No	N/A
4.5.12.1	Provide itemized costs for each major component of the proposal.			
4.5.12.2	Provide a list of and itemized costs for equipment, supplies, field and office materials, and miscellaneous expenses.			
4.5.12.3	Provide total cost of project.			

APPENDIX B

New Jersey Fish and Wildlife
Timber Rattlesnake and Eastern Copperhead Grant:
Checklist of Required Information

Technical Review Committee comments:

APPENDIX C

New Jersey Fish and Wildlife
Timber Rattlesnake and Eastern Copperhead Grant:
Eastern Copperhead Survey Technique Development and Assessment
Scoring Criteria Form

Applicant:_____ Project Title/Subject: _____

Proposed Start Date: _____ Proposed End Date: _____

Date Received:_____ Date Reviewed: _____

1. Is the proposed project likely replicable?

   YES = Proceed with ranking
   NO = Proposal should not be considered for funding **YES** ☐ **NO** ☐

2. Have all required elements outlined within "Eligibility Requirements" and "Proposal Requirements" been submitted?

   YES = Proceed with ranking
   NO = Proposal should not be considered for funding **YES** ☐ **NO** ☐

3. Will the proposed project be completed within 5 years of start date? *Note, the maximum five-year timeframe must include the completion and submittal of deliverables.*

   YES = Proceed with ranking

   NO but applicant provided request for and justification of extension request = Proposal should proceed with consideration of requested extension (see *4.2* of NOFO)

   NO and no request and justification for extension has been provided = Proposal should not be considered for funding (see *4.2* of NOFO)

   PROCEED ☐ **STOP** ☐

4. The proposed strategy to stay engaged with the ENSP throughout the project meets the minimum requirement of providing at least one [brief] update during the field season and the required annual report/summary and data (to date) (see *5.6.2* of NOFO).

   YES = Proceed with ranking
   NO = Proposal should not be considered for funding **YES** ☐ **NO** ☐

5. At least one Principal Investigator is currently or formerly affiliated with an academic institution and has experience with wildlife-, ecological-, and/or conservation-focused research as described in “Eligibility Requirements” (see *4.3.2* of NOFO)?

   YES = Proceed with ranking
   NO = Proposal should not be considered for funding **YES** ☐ **NO** ☐

APPENDIX C

New Jersey Fish and Wildlife
Timber Rattlesnake and Eastern Copperhead Grant:
Eastern Copperhead Survey Technique Development and Assessment
Scoring Criteria Form

6. At least one Principal Investigator has professional field research experience with terrestrial snakes (see *4.3.1* of NOFO)?

   YES = Proceed with ranking
   NO = Proposal should not be considered for funding **YES** ☐ **NO** ☐

7. Proposal describes sufficient minimum experience parameters for proposed/anticipated personnel positions/job responsibilities (see *4.5.5.1.3* of NOFO).

   N/A = Proceed with ranking

   YES = Proceed with ranking

   NO = Proposal should not be considered for funding

   N/A ☐ **YES** ☐ **NO** ☐

8. Are the proposed data security protocols acceptable to the ENSP (see *4.5.10* of NOFO)?

   N/A = Proceed with ranking

   YES = Proposed security data protocols are acceptable. Proceed with ranking.

   NO = Proposed security data protocols are not acceptable. Proposal should not be considered for funding.

   N/A ☐ **YES** ☐ **NO** ☐

9. If snakes will be taken into temporary captivity for any reason, is the proposed facility and care-taking staff acceptable (e.g., letter from facility confirming agreement of use, decontamination protocols and animal quarantining ability, venomous snake husbandry experience for all personnel responsible for the snakes' care while in their custody, and security protocols) (see *4.5.9* of NOFO)?

   N/A = Proceed with ranking

   YES = Acceptable and confirmed by facility. Proceed with ranking.

   NO = Unacceptable and/or not confirmed by facility. Proposal should not be considered for funding.

   N/A ☐ **YES** ☐ **NO** ☐

APPENDIX C

New Jersey Fish and Wildlife
Timber Rattlesnake and Eastern Copperhead Grant:
Eastern Copperhead Survey Technique Development and Assessment
Scoring Criteria Form

ROUND 1a

Round 1a *pertains to proposals focused on achieving the* ***"primary objective"*** *of identifying critical habitat features (i.e., dens and/or rookeries). Projects focused on this objective are preferred over the alternative of refining a target survey area (assessed in Round 1b).*

The Review Committee will first assess the proposed project on the targets (critical habitat features and landscape regions), the likelihood of successfully fulfilling the Grant's primary objective, and the effort and ability to confirm success before continuing to Round 2, assessment of personnel.

PROJECT ASSESSMENT

1. Project focuses on methods/techniques that would locate montane eastern copperhead winter dens.

   (no) 0 (yes) 5 **SCORE:** _____

2. Project focuses on methods/techniques that would either locate montane eastern copperhead rookeries (and consequently, late-season gestation sites) or eastern copperhead gestation sites and attempt to confirm birthing at those sites to verify technique.

   (no) 0 (yes) 5 **SCORE:** _____

3. Project focuses on methods/techniques that would be applicable across both NJ's central and northern landscape regions.

   (no) 0 (yes) 5 **SCORE:** _____

   If no, identify target landscape for reference: _____

4. Proposal explains why and how the proposed methods/techniques are [*potentially*] applicable for use on identifying montane eastern copperheads' winter dens and/or gestation sites/rookeries. *(See 4.5.4, 4.5.4.1, and 4.5.4.2 of NOFO.)*

   ***This section strives to assess the applicability of the proposed method, including innovative approaches not yet tested for this purpose.*

   Limited applicability = 1

   - Applicant has demonstrated that the proposed technique, tools, and/or equipment and/or the project design has been successfully applied to a wildlife species or species group, not necessarily reptiles, *or* to terrestrial habitats.
     or
   - Applicant has demonstrated the innovative approach has potential applicability to a wildlife species or species group, not necessarily reptiles, *or* to terrestrial habitats, but there are limited or no examples of approaches that relate specifically to wildlife species or their habitats.

Moderate applicability = 3

- Applicant has demonstrated successful application of the technique, tools, and/or equipment and/or the project design to terrestrial snakes *and/or* montane habitats.
  or
- Applicant has demonstrated the innovative approach has potential applicability to terrestrial snakes *and/or* montane habitat type. Demonstration of applicability may include specific examples of approaches that relate to a terrestrial snake species' life history *and/or* montane habitats.

Strong experience/skilled = 5

- Applicant has demonstrated successful application of the technique, tools, and/or equipment and/or the project design to montane snakes *and* montane habitats.
  or
- Applicant has demonstrated the innovative approach is well justified by presenting information that demonstrates the innovation has applicability to montane snakes *and* montane habitats. Demonstration of applicability may include specific examples of approaches that relate to a montane snake species' life history *and* montane habitats.

SCORE: _____

5. Applicability of proposed technique to achieve primary objective:

No application = 0

- Technique has not been applied successfully to wildlife species or species group ***and/or*** the applicant has not sufficiently demonstrated the potential successful application of the technique on wildlife species or species group.

Limited application = 1

- Applicant has demonstrated there has been successful application (not necessarily by the Applicant) of the technique, tools, and/or equipment on and/or the project design for a wildlife species or species group, not necessarily reptiles. Alternatively, the technique has been successful in other applications, not necessarily wildlife, and the applicant has demonstrated that the innovative approach has potential applicability to wildlife and/or wildlife habitat, but there are limited or no examples of approaches that relate to relate to wildlife or wildlife habitat.

Moderate application = 3

- Applicant has demonstrated there has been successful application (not necessarily by the Applicant) of the technique, tools, and/or equipment on and/or the project design for reptiles. Alternatively, the technique has been successful in other applications, not necessarily wildlife, but the applicant has demonstrated that the innovative approach has potential applicability to reptiles and/or montane habitats, but there are limited or no examples of approaches that relate to montane, venomous snakes' life

histories or habitats. Demonstration of applicability may include specific examples of approaches that relate to reptiles' life histories and/or habitat(s).

Strong experience/skilled = 5

- Applicant has demonstrated there has been successful application (not necessarily by the Applicant) of the technique, tools, and/or equipment on and/or the project design for snakes in montane habitats. Alternatively, the technique has been successful in other applications, not necessarily wildlife, but the applicant has demonstrated that the innovative approach has potential applicability to montane snakes, but there are limited or no examples of approaches that relate to montane, venomous snakes' life history or habitats. Demonstration of applicability may include specific examples of approaches that relate to snakes' life histories and/or habitat(s).

SCORE: _____

*Review Committee members, please provide your justification of your assigned rank for item #4.

TOTAL PROJECT SCORE (*Round 1a*): 0.00

APPENDIX C

New Jersey Fish and Wildlife
Timber Rattlesnake and Eastern Copperhead Grant:
Eastern Copperhead Survey Technique Development and Assessment
Scoring Criteria Form

ROUND 1b

Round 1b *pertains to proposals focused on achieving the "**alternative objective**" of refining a target survey area. Scores will be used to compare proposals focused on this alternative objective and not to those assessed in Round 1a.*

Preference will be given to projects assessed in Round 1a however, if necessary, the Review Committee will assess proposed projects for the alternative objective on the targets (critical habitat features and landscape regions), the likelihood of successfully fulfilling the Grant's alternative objective, and the effort and ability to confirm success. ***If no proposals are acceptable in Round 1a (targeting the primary objective), top-ranking proposed methods/techniques for Round 1b (targeting the alternative objective) will continue to Round 2, assessment of personnel.***

PROJECT ASSESSMENT

1. Project focuses on methods/techniques that would refine the target survey area for montane eastern copperhead winter dens.

   (no) 0 (yes) 5 **SCORE:** _____

2. Project focuses on methods/techniques that would refine the target survey area for montane eastern copperhead rookeries (and consequently, late-season gestation sites) or eastern copperhead gestation sites and attempt to confirm birthing at those sites to verify technique.

   (no) 0 (yes) 5 **SCORE:** _____

3. Project focuses on methods/techniques that would be applicable across both NJ's central and northern landscape regions.

   (no) 0 (yes) 5 **SCORE:** _____

   If no, identify target landscape for reference: _____

4. Proposal explains why and how the proposed methods/techniques are [*potentially*] applicable for use on refining the target survey area for montane eastern copperheads' winter dens and/or gestation sites/rookeries. *(See 4.5.3, 4.5.3.1, and 4.5.3.2 of NOFO.)*
   ***This section strives to assess the applicability of the proposed method, including innovative approaches not yet tested for this purpose.*

   Limited applicability = 1
   - Applicant has demonstrated that the proposed technique, tools, and/or equipment and/or the project design has been successfully applied to a wildlife species or species group, not necessarily reptiles, <u>*or*</u> to terrestrial habitats.
     or

- Applicant has demonstrated the innovative approach has potential applicability to a wildlife species or species group, not necessarily reptiles, *or* to terrestrial habitats, but there are limited or no examples of approaches that relate specifically to wildlife species or their habitats.

Moderate applicability = 3

- Applicant has demonstrated successful application of the technique, tools, and/or equipment and/or the project design to terrestrial snakes *and/or* montane habitats.
  or
- Applicant has demonstrated the innovative approach has potential applicability to terrestrial snakes *and/or* montane habitat type. Demonstration of applicability may include specific examples of approaches that relate to a terrestrial snake species' life history *and/or* montane habitats.

Strong experience/skilled = 5

- Applicant has demonstrated successful application of the technique, tools, and/or equipment and/or the project design to montane snakes *and* montane habitats.
  or
- Applicant has demonstrated the innovative approach is well justified by presenting information that demonstrates the innovation has applicability to montane snakes *and* montane habitats. Demonstration of applicability may include specific examples of approaches that relate to a montane snake species' life history *and* montane habitats.

SCORE: _____

5. Applicability of proposed technique to achieve alternative objective:

No application = 0

- Technique has not been applied successfully to wildlife species or species group ***and/or*** the applicant has not sufficiently demonstrated the potential successful application of the technique on wildlife species or species group.

Limited application = 1

- Applicant has demonstrated there has been successful application (not necessarily by the Applicant) of the technique(s), tools, and/or equipment on and/or the project design for a wildlife species or species group, not necessarily reptiles. Alternatively, the technique has been successful in other applications, not necessarily wildlife, and the applicant has demonstrated that the innovative approach has potential applicability to wildlife and/or wildlife habitat, but there are limited or no examples of approaches that relate to wildlife or wildlife habitat.

Moderate application = 3

- Applicant has demonstrated there has been successful application (not necessarily by the Applicant) of the technique(s), tools, and/or equipment on and/or the project

design for reptiles. Alternatively, the technique has been successful in other applications, not necessarily wildlife, but the applicant has demonstrated that the innovative approach has potential applicability to reptiles and/or montane habitats, but there are limited or no examples of approaches that relate to montane, venomous snakes' life histories or habitats. Demonstration of applicability may include specific examples of approaches that relate to reptiles' life histories and/or habitat(s).

Strong experience/skilled = 5

- Applicant has demonstrated there has been successful application (not necessarily by the Applicant) of the technique(s), tools, and/or equipment on and/or the project design for snakes in montane habitats. Alternatively, the technique has been successful in other applications, not necessarily wildlife, but the applicant has demonstrated that the innovative approach has potential applicability to montane snakes, but there are limited or no examples of approaches that relate to montane, venomous snakes' life history or habitats. Demonstration of applicability may include specific examples of approaches that relate to snakes' life histories and/or habitat(s).

SCORE: _____

*Review Committee members, please provide your justification of your assigned rank for item #4.

TOTAL PROJECT SCORE (*Round 1b*): 0.00

APPENDIX C

New Jersey Fish and Wildlife
Timber Rattlesnake and Eastern Copperhead Grant:
Eastern Copperhead Survey Technique Development and Assessment
Scoring Criteria Form

ROUND 2

The Review Committee will review the qualifications/experience of the Principal Investigator(s) and "key" personnel from partnering universities/agencies/companies (if applicable). Highest scores will continue to Round 3.

Scores will be based on a 0 – 5 rating system with 0 (no experience or "no") and 5 (strong experience/skilled or successful or "yes").

PERSONNEL EXPERIENCE – Principals and Primary Partners

Principal Investigator(s)

1. Academic Principal Investigator(s): Experience and lead role in project design, data management and analyses, and authorship of papers pertaining to wildlife-, ecology-, and/or conservation-focused research.

   No experience = 0

   Limited experience = 1
   - Instrumental in designing at least one wildlife-, ecology-, and/or conservation-focused research project.
   - Managed and analyzed the data for that project.
   - Is the first or second author of at least one associated published, peer-reviewed, or white paper.

   Limited – moderate experience = 2
   - Instrumental in designing at least two wildlife-, ecology-, and/or conservation-focused research projects.
   - Managed and analyzed the data for at least one of these projects.
   - Is the first or second author of at least one associated published, peer-reviewed, or white paper.

   Moderate experience = 3
   - Instrumental in designing at least three wildlife-, ecology-, and/or conservation-focused research projects including at least one wildlife-focused project, i.e., wildlife species oriented (e.g., wildlife spatial needs, ecology, population trends, etc.) and/or focused on wildlife species' habitat use/selection.
   - Managed and analyzed the data for at least two of those projects, including at least one wildlife-focused project.
   - Is the first and/or second author of at least two associated published, peer-reviewed, or white papers.

Moderate – strong experience = 4

- Instrumental in designing at least four wildlife-, ecology-, and/or conservation-focused research projects including at least two wildlife-focused projects (one of which included or was focused on reptiles), i.e., wildlife species oriented (e.g., wildlife spatial needs, ecology, population trends, etc.) and/or focused on species' habitat use/selection.
- Managed and analyzed the data for at least two of those projects, including at least one wildlife-focused project, and conducted or supervised the management and analysis of the data for at least one other project focused on reptiles.
- Is the first and/or second author of at least two associated published, peer-reviewed, or white papers.

Strong experience/skilled = 5

- Instrumental in designing at least four wildlife-focused research projects including at least one snake-focused project, i.e., species oriented (e.g., wildlife spatial needs, ecology, population trends, etc.) and/or focused on species' habitat use/selection.
- Managed and analyzed the data for at least three of those projects, including the snake-focused project, and conducted or supervised the management and analysis of the data for the remaining fourth project.
- Is the first and/or second author of at least two associated published, peer-reviewed, or white papers, including at least one wildlife-focused project.

"Academic" PI SCORE: _____

2. Principal Investigator(s) *(can be the same person as the "Academic" Principal Investigator)*: Field research experience with terrestrial snakes, particularly montane snakes (in any state).

Notes:

- *Overlapping experience may apply below where multiple years of telemetry are described for different groups of snakes. For example, experience with "montane, venomous snakes" would also apply to "montane snakes," and both would apply to "terrestrial snakes."*
- *References to an "active season" include snake emergence through ingress and can span years (e.g., July 2023 – June 2024).*
- *Where Phase I and Phase II surveys contribute to the Principal Investigator's experience, undocumented dens, gestation sites, and rookeries claimed to have been discovered must have been confirmed or accepted as accurate by the State wildlife and/or other governing agency to be considered successful and/or later confirmed through radio-telemetry or repeated visual observations during spring emergence (to confirm overwintering) and late summer gestation and/or birthing (to confirm gestation sites and/or birthing rookeries) in other years. In addition, Phase I & II surveys apply when*

conducted in any state requiring such surveys as part of regulatory applications and/or authorizing such surveys as part of research efforts.

No experience = 0

Limited experience = 1

- Performed as field team leader physically tracking a minimum of five (5) terrestrial snakes using radio-telemetry at least twice per week throughout at least one active season for each species.
  or
- Performed as team member conducting state-authorized Phase I & II surveys for montane venomous snakes for one season and the survey team located previously undocumented dens and/or gestation sites/rookeries while the Principal Investigator was present.
  or
- See "*OTHER potential field experience"* below.

Limited – moderate experience = 2

- Performed as field team leader physically tracking a minimum of ten (10) terrestrial snakes, including at least five (5) montane snakes, two times/week using radio-telemetry throughout at least one active season for each species.
  or
- Performed as team member conducting state-authorized Phase I & II surveys for montane venomous snakes for at least two seasons and the survey team located previously undocumented dens and/or gestation sites/rookeries in both seasons while the Principal Investigator was present.
  or
- See "*OTHER potential field experience"* below.

Moderate experience = 3

- Performed as field team leader physically tracking a minimum of ten (10) terrestrial snakes, including at least five (5) montane snakes, two times/week using radio-telemetry throughout at least two active seasons for each species.
  or
- Performed state-authorized Phase I & II surveys for montane venomous snakes for at least three seasons and functioned as the Principal Investigator/team leader for at least one of those seasons, whereby the survey team located previously undocumented dens and/or gestation sites/rookeries in at least two seasons while the Principal Investigator was present and the Principal Investigator personally located such sites during at least one of those seasons.
  or
- See "*OTHER potential field experience"* below.

APPENDIX C

New Jersey Fish and Wildlife
Timber Rattlesnake and Eastern Copperhead Grant:
Eastern Copperhead Survey Technique Development and Assessment
Scoring Criteria Form

Moderate – strong experience = 4

- Performed as field team leader physically tracking a minimum of ten (10) montane snakes, two times/week using radio-telemetry throughout at least three active seasons for each species, including at least five (5) montane, venomous snakes tracked throughout at least two active seasons.

  or
- Performed state-authorized Phase I & II surveys for montane venomous snakes for at least four seasons and functioned as the Principal Investigator/team leader for at least two of those seasons, whereby the survey team located previously undocumented dens and/or gestation sites/rookeries during at least three seasons while the Principal Investigator was present and the Principal Investigator personally located such sites during at least two of those seasons.

  or
- See "*OTHER potential field experience"* below.

Strong experience/skilled = 5

- Performed as field team leader physically tracking a minimum of ten (10) montane, venomous snakes, two times/week using radio-telemetry throughout at least three active seasons for each species.

  or
- Performed State-authorized Phase I & II surveys for montane venomous snakes for at least five seasons and functioned as the Principal Investigator/team leader for at least three of those seasons, whereby the survey team located previously undocumented dens and/or gestation sites/rookeries during at least three seasons while the Principal Investigator was present and the Principal Investigator personally located previously undocumented dens and/or gestation sites/rookeries during at least three of those seasons.

  or
- See "*OTHER potential field experience"* below.

"Field" PI SCORE: _____

OTHER potential field experience: Applicants may present other relevant experience as "field research experience" other than those tasks previously identified but should focus on snakes, particularly work with montane and/or montane, venomous snakes. Such activities will be assessed by the Copperhead NOFO Technical Review Committee (Review Committee) to determine the appropriate score [0 – 5 rating system with 0 (no experience) and 5 (strong experience/skilled)]. Applicant must have provided details of other activities they wished to be considered as "field research experience" including but not limited to a description of the activities, detailed time periods each activity was conducted by the prospective Principal Investigator, species targets for each activity, tasks conducted, objectives, if the task required state authorization, etc. Please refer to the grant's description of activities that do not qualify as "field research experience" in section 4.5.5.1.3, "*Field research experience…*"

APPENDIX C

New Jersey Fish and Wildlife
Timber Rattlesnake and Eastern Copperhead Grant:
Eastern Copperhead Survey Technique Development and Assessment
Scoring Criteria Form

Review Committee members to describe applicable field research experience to be ranked:

3. Principal Investigator(s) *(can be the same person as the "Academic" Principal Investigator)*: Field research experience with montane snakes within the same or similar terrain as the proposed targeted New Jersey landscape region(s) of the proposal (e.g., NJ's northern, higher elevation, montane habitat vs. NJ's central, lower elevation, montane habitat). *(Refer to experience identified within Round 2, # 2 above when appropriate.)*

   No experience = 0

   Limited experience = 1
   - At least one season of field research conducted on montane snakes within the same or similar terrain of at least one of the proposal's targeted NJ landscape regions.

   Limited – moderate experience = 2
   - At least two seasons of field research conducted on montane snakes within the same or similar terrain of at least one of the proposal's targeted NJ landscape regions.

   Moderate experience = 3
   - At least three seasons of field research conducted on montane snakes within the same or similar terrain of at least one of the proposal's targeted NJ landscape regions.

   Moderate – strong experience = 4

- At least four seasons of field research conducted on montane snakes within the same or similar terrain of at least one of the proposal's targeted NJ landscape regions.

Strong experience/skilled = 5

- At least five seasons of field research conducted on montane snakes within the same or similar terrain of at least one of the proposal's targeted NJ landscape regions.

SCORE: _____

TOTAL "Field" PI SCORE: 0.00

4. Principal Investigator's/Investigators' experience in solving complex wildlife conservation issues or concerns, particularly for reptiles, and the successes of the strategies developed (see *4.5.5* of NOFO):

This section attempts to understand the prospective Principal Investigator's ability to solve complex wildlife conservation issues and the success and [unexpected] application(s) of past strategies. For example, eDNA may have been developed with a limited focus but now has many applications. Survey strategies may be developed for a target species but apply to others within the taxonomic group or beyond.

No experience and/or any related efforts were unsuccessful at resolving task. = 0

Limited experience = 1

- Reported success in resolving task for at least one species or species group, but no peer-reviewed (including published manuscripts or college theses) paper, white paper, or similar technical documentation demonstrating the actions and results of the technique.

Moderate experience = 3

- Reported success in resolving task for at least one species or species group, and at least one peer-reviewed (including published manuscripts or college theses) paper, white paper, or similar technical documentation demonstrating the actions and results of the technique.

Strong experience/skilled = 5

- Reported success in resolving task for at least one species or species group, and at least one peer-reviewed (including published manuscripts or college theses) paper, white paper, or similar technical documentation demonstrating the actions and results of the technique. The successful technique has also been demonstrated and reported to have applicability beyond the initial target species or species group. (The technical

committee will also consider whether the technique is applicable beyond the initial geographic area).

SCORE: _____

***Principal Investigator and/or Primary Personnel Contributing from Partnering Universities, Organizations, Companies, etc. (if applicable)*:**
(If "not applicable" to proposal, enter "n/a" in rank box.)

This section attempts to understand your team's knowledge and experience of the proposed technique and the success of that technique in similar and/or unrelated applications. If the applicant is proposing a new and/or innovative approach, they must submit a detailed explanation of why they believe the method will work.

5. Principal investigator's and/or primary contributing partner's/partners' (personnel from a partnering organization, University, company, etc.) familiarity and experience with the proposed techniques, tools, and/or equipment use and/or project design as they have been employed in other studies or projects: *(See 4.5.7 of NOFO.)*

   No experience with proposed technique. = 0

   Limited experience = 1
   - Principal Investigator and/or primary contributing partner(s) have demonstrated successful application of the technique, tools, and/or equipment and/or the project design on at least one project, not necessarily associated with wildlife or ecology.

   Moderate experience = 3
   - Principal Investigator and/or primary contributing partner(s) have demonstrated successful application of the technique, tools, and/or equipment and/or the project design on at least three projects, not necessarily associated with wildlife or ecology.

   Strong experience/skilled = 5
   Principal Investigator and/or primary contributing partner(s) have demonstrated successful application of the technique, tools, and/or equipment and/or the project design on at least three projects, including at least one focused on wildlife-, conservation-, or ecological-objectives.

TECHNIQUE FAMILIARITY SCORE: _____

APPENDIX C

New Jersey Fish and Wildlife
Timber Rattlesnake and Eastern Copperhead Grant:
Eastern Copperhead Survey Technique Development and Assessment
Scoring Criteria Form

ROUND 3

The Review Committee will review the qualifications/experience of the proposed supportive staff and/or the minimum set of experience requirements outlined for each position (see 4.5.5.1.3 of NOFO), if applicable.

Scores will be based on a 0 – 5 rating system with 0 (no experience or "no") and 5 (strong experience/skilled or successful or "yes").

PERSONNEL EXPERIENCE – Supporting Personnel

Field technicians, assistants, etc. (if applicable):

1. Personnel and/or proposed minimum experience requirements to fulfill the roles and responsibilities of the proposed project.

   Without knowing the activities and tasks to be proposed, the ENSP is unable to provide a clear set of parameters to distinguish the rank/score with the level of experience needed to fulfill all the potentially proposed activities and tasks. As such, the ENSP has provided examples for more commonly associated activities that the grant applicants and the Review Committee can use as a guide when reviewing the proposals.

   a. Radio-telemetry field experience (*if applicable*):
   Note, "active season" refers to the reptile's emergence to hibernation and can span years depending on when an animal entered the study (e.g., July 2022-June 2023).

   No experience = 0

   Limited experience = 1
   - Tracked a minimum of five (5) terrestrial reptiles using radio-telemetry twice per week throughout one complete season of the species' active season.

   Moderate experience = 3
   - Tracked a minimum of 10 terrestrial snakes, three times per week, throughout one active season ***or*** five (5) montane, venomous snakes, three times/week throughout one active season.

   Strong experience/skilled = 5
   - Tracked a minimum of 10 montane snakes, three times per week, throughout three active seasons ***or*** 10 montane, venomous snakes, three times/week for two active seasons

SCORE: _____

APPENDIX C

New Jersey Fish and Wildlife
Timber Rattlesnake and Eastern Copperhead Grant:
Eastern Copperhead Survey Technique Development and Assessment
Scoring Criteria Form

b. Authorized Phase I (habitat assessments) and Phase II (presence surveys) surveys of montane, venomous snakes (*if applicable*):

No experience = 0

Limited experience = 1

- Participated as a team member conducting authorized Phase I & II surveys for montane venomous snakes for at least one season and the survey team located previously undocumented dens and/or gestation sites/rookeries while the prospective field technician was present.

Moderate experience = 3

- Participated as a team member conducting authorized Phase I & II surveys for montane venomous snakes for at least three seasons whereby the survey team located previously undocumented dens and/or gestation sites/rookeries during at least two of those seasons, including the prospective field technician personally locating such sites during at least one of those seasons.

Strong experience/skilled = 5

- Participated as a team member conducting authorized Phase I & II surveys for montane venomous snakes for at least five seasons whereby the survey team located previously undocumented dens and/or gestation sites/rookeries during at least four of those seasons, including the prospective field technician personally locating such sites during at least two of those seasons.

SCORE: _____

c. Computer modeling and analyses of suitable habitat and/or landscape features (*if applicable*):

No experience = 0

Limited experience = 1

- Working knowledge of GIS software applications to visualize data.
- Have utilized GPS technology to record locational data.
- Have acquired GIS data layers and brought into GIS software application.

Moderate experience = 3

- Have conducted univariate spatial analyses using GIS software applications to estimate habitat association of wildlife.
- Have utilized GPS locational data in a GIS software application.
- Have acquired and edited GIS data layers.

Strong experience/skilled = 5

- Have conducted multivariate spatial analyses using GIS and statistical software applications to develop predictive habitat models.
- Have utilized GPS locational data in a GIS software application.
- Have acquired, edited, and generated GIS data layers.
- Have experience analyzing both vector and raster datasets.

SCORE: _____

d. Use of statistical analyses software (e.g., SAS, R, etc.) to analyze data.

No experience = 0

Limited experience = 1

- Able to conduct basic statistical analyses (mean, standard deviation, standard error, confidence intervals, etc.)

Moderate experience = 3

- Able to conduct univariate statistical tests (Chi-squared, T-test, etc.)
- Able to create graphs with trend analyses

Strong experience/skilled = 5

- Able to conduct multivariate statistical tests (MANOVA, PCA, etc)
- Able to conduct statistical models (occupancy, mark-recapture, etc.)

SCORE: _____

e. Other experience needed to fulfill the roles and responsibilities of this position:
Please provide a detailed summary of personnel needs and the proposed minimum experience requirements to fulfill these positions.

Copperhead NOFO Technical Review Committee (Review Committee) Comments - *Based on the Review Committee's assessment of the information provided, please rank the experience 0 (no experience) through 5 (strong experience/skilled).*:

APPENDIX C

New Jersey Fish and Wildlife
Timber Rattlesnake and Eastern Copperhead Grant:
Eastern Copperhead Survey Technique Development and Assessment
Scoring Criteria Form

SCORE: _____

SUMMARY for SUPPORT PERSONNEL:

TELEMETRY SCORE (*if applicable*): 0.00

PHASE I/II SURVEYS SCORE (*if applicable*): 0.00

COMPUTER MODELING/ANALYSIS SCORE (*if applicable*): 0.00

STATISTICAL ANALYSES SOFTWARE SCORE (*if applicable*): 0.00

OTHER EXPERIENCE SCORE (*if applicable*): 0.00

APPENDIX C

New Jersey Fish and Wildlife
Timber Rattlesnake and Eastern Copperhead Grant:
Eastern Copperhead Survey Technique Development and Assessment
Scoring Criteria Form

Additional Information: ***Miscellaneous information for reference only; the following does not contribute to the proposal's rank but will be considered collectively with the information above.***

a. Does the proposed project focus on developing a method or technique to accurately refine the area (i.e., acreage) that would be targeted for [more intense] standard Phase I and II surveys instead of identifying critical habitat features (i.e., dens and rookeries)?

YES ☐ **NO** ☐

b. Have any proposed personnel and/or contributing partners been convicted of violating state/territory wildlife laws and/or wildlife-related permits within any state or territory of the United States within the last five (5) years?

YES ☐ **NO** ☐

If yes, who & what are their responsibilities on this proposed project?

c. Does the proposal require the use of ENSP data? **YES** ☐ **NO** ☐

If yes, what data? (See attachment A for available copperhead data, but also identify any additional data needed.)

d. Does the proposal require coordination with the on-going Rutgers University research?

YES ☐ **NO** ☐

e. Does the proposal require a delayed start date to avoid interference with the Rutgers University research?

YES ☐ **NO** ☐

APPENDIX C

New Jersey Fish and Wildlife
Timber Rattlesnake and Eastern Copperhead Grant:
Eastern Copperhead Survey Technique Development and Assessment
Scoring Criteria Form

Applicant:_____ Project Title/Subject: _____

Summary of Scores:

Round 1a, Project Score: 0.00

Round 1b, Project Score: 0.00

Round 2, Principal Investigator(s) - Academic & Field: 0.00

Round 2, Principal Investigator(s) & Primary Partners – Technique Familiarity: 0.00

Round 3, Supporting Personnel Experience Summary (*if applicable, proposals will be compared based on implementing the same or similar experience and roles*):

Telemetry Score (*if applicable*): 0.00

Phase I/II Surveys Score (*if applicable*): 0.00

Computer Modeling/Analysis Score (*if applicable*): 0.00

Statistical Analyses Software Score (*if applicable*): 0.00

Other Experience Score (*if applicable*): 0.00

Review Committee member comments:

ATTACHMENT I

New Jersey Fish and Wildlife
Timber Rattlesnake and Eastern Copperhead Grant:
Eastern Copperhead Survey Technique Development and Assessment
Standard Scientific Collecting Permit Conditions

2024

Below please find 2024 standard scientific collecting permit conditions associated with the following snake survey activities to consider when responding to NJ's Notice of Funding Opportunity for the Eastern Copperhead Survey Technique Development and Assessment. Where able, NJ Fish & Wildlife has edited some of the conditions to focus on this grant's objectives, montane habitats and/or the regional landscape targets.:

- Data submittal: Pages 2 – 5
- Snake Survey Efforts: Page 6
  - Trapping and Trapline: Page 7 – 21
  - PIT-tagging: Page 22
  - Shelter boards: Page 22
  - Radio-telemetry on Snakes: Pages 23 – 28

Please note, conditions may change after 2024 based on the most current research findings.

ATTACHMENT I

New Jersey Fish and Wildlife
Timber Rattlesnake and Eastern Copperhead Grant:
Eastern Copperhead Survey Technique Development and Assessment
Standard Scientific Collecting Permit Conditions

Data Collection and Submittal:

The Endangered and Nongame Species Program **(**ENSP) shall require, as a condition of this Scientific Collecting Permit, the collection and submittal of **all reptile and amphibian observation data (for both listed and non-listed species) when conducting work that implements fencing, traps, and/or shelter/cover boards and encourage such data submittal for all other work conducted. Data will be submitted in digital format** *(see additional details below)***.**

The ENSP uses all data submitted to inform New Jersey Fish and Wildlife (NJFW) species' conservation efforts, environmental and land management reviews, species' status updates (i.e., species undergoing the Delphi Status Review), and to develop or support models applied to the Landscape Project Map valuing species' habitats. The relative value of such data is factored into the risks of data collection. While the ENSP may use raw data submitted in association with scientific collection permit reports for its wildlife conservation research purposes, it does not use such data for publications.

Sensitive information: The ENSP considers all location data for listed and special concern species, and candidate species' for listing/SC status as sensitive information. As such, and as a DFW permit holder, location data **cannot** be distributed in any format (verbal, maps, tagged photographs, field site visits with unapproved/non-permitted personnel, etc.) without the ENSP's written consent.

- Unauthorized personnel (i.e., "visitors" meaning persons not identified as a permittee or subpermittee on a project) are prohibited from visiting project sites without accompanying the permittee or authorized subpermittees. If on private lands, it is the responsibility of the permittee to obtain permission from the landowner. Such permission authorizes their temporary presence at/on project site(s) but does **not** give authorization to handle wildlife. Visitors will be held to the same confidentiality standards to protect sensitive location data. If a "visitor" violates this, the permittee *may* be held responsible and such action *may* prevent future approval of Scientific Collecting Permits for listed, special concern, and candidate species' work.
- All personnel identified as a subpermittee on the Scientific Collecting Permit must remain officially employed, contracted, or in partnership (even if at no cost) by an approved permittee. If personnel approved as a subpermittee are subsequently removed from the approved project or are otherwise no longer contracted by, employed by, or in partnership with a permittee, their status as an approved subpermittee shall immediately become null and void. Such persons are no longer sheltered from enforcement of "take" prohibitions under the Endangered and Nongame Species Conservation Act (N.J.S.A. 23:2A-1-13). It is the responsibility of the permittee to immediately notify the individual(s) that they are no longer approved by the scientific collecting permit, and to collect the subpermittee's copy(-ies) of the approved scientific collection permit(s) for

return to the Division, and to immediately request a permit amendment to have any such subpermittee removed from their permit. **Failure of a permittee to take such actions shall constitute a violation of this permit.**

Data submittal:
Permittees shall submit data and summary reports by January 31 for the preceding calendar year ending December 31 for ALL work conducted to the Endangered & Nongame Species Program:

COPPERHEAD GRANT APPLICANTS: A data submittal timeline will be developed during the development of the Grant Agreement.

1. **The Endangered & Nongame Species Program shall receive** data as follows:
   a. ***Species:*** The ENSP is interested in obtaining ALL reptile and amphibian observations (listed and non-listed). For other taxonomic groups, observations focused on endangered, threatened and special concern species will suffice.
   b. ***Reptile/amphibian Data Submittal:***
      ***Please see list of reptiles and amphibians and their current status below.**

      Listed, special concern, and candidates for listing/SC status: Submit reptile and amphibian observations by completing the Excel spreadsheet provided to the permittee annually upon receipt of their approved Scientific Collecting Permit, scanned copies of field data sheets, and if appropriate, a detailed summary report to Kris Schantz, ENSP (kris.schantz@dep.nj.gov) **unless otherwise instructed**. *(K. Schantz will ensure applicable ENSP biologists receive their species' data.)* **Digital copies** of field data sheets/notebook pages *may be required by the ENSP* to accompany the data spreadsheet and must contain [at least] all the same information as that found on the applicable worksheets. *The ENSP may request original information to ensure no transcription errors occurred between the field notes and Excel spreadsheet.*

      Non-listed reptiles/amphibians (excluding special concern and candidates for listing/SC – see above):
      Please note, the ENSP acknowledges that documentation of every non-listed reptile and amphibian can be time consuming and interrupt your valuable work. However, such information to populate our database is extremely important. **As such, the ENSP requests you consider the following in your efforts to document such species**:
      1) **Critical features** such as dens, nest sites and/or gestation sites and rookeries, and vernal pools for breeding amphibians are extremely important. For these, **please document specific locations and findings, and enter all pertinent data into the EXCEL data submittal template you've been provided.**

      2) **Incidental observations** of non-listed reptiles/amphibians throughout your project area will help the ENSP provide important information to future reviewers during the Delphi process to assess a species' status. As such:

a) When you have defined locations that can be GPS'd in advance (e.g., traps, fence, shelter boards), please document your findings at each and report them in the data submittal template. For these, in place of coordinates for each observation, you can reference IDs for traps, fence segments between traps, and/or shelter boards for which you provide a spreadsheet of their IDs and coordinates the ENSP can cross reference.

b) When you have larger survey areas (e.g., incidental observations made while tracking target animals via radio-telemetry, construction/maintenance monitoring, etc.), if you are able, please continue to document such observations (precise locations, dates, etc.). However, if you are unable to do so as it is requiring an excessive amount of time/resources based on the number of reptiles/amphibians you observe, please consider providing the ENSP with polygons of smaller, more localized areas (e.g., a portion of a state forest, shorter segments of rights-of-way, etc.) and report approximately how many of each species was observed on a particular day, week or month of that year. The more precise your data (location, dates), the more helpful it is to the ENSP and future conservation of the species. Please limit your linear segments along rights-of-way to no more than 400-m spans, preferably 50-m or less for the data to be meaningful to the ENSP.

c. *Non-herptile Data Submittal:* All non-reptile/amphibian endangered, threatened, and special concern species' sightings should be reported through the same Excel spreadsheet (with accompanying datasheets and/or entry in report).

REPTILE & AMPHIBIAN STATUS

Endangered (and Candidate Endangered = CE)

Snakes	Turtles	Amphibians	Lizards
Corn Snake (Red ratsnake)	Bog Turtle	Blue-spotted Salamander	-
Timber Rattlesnake		E. Tiger Salamander	
Queen Snake (extirpated)		S. Gray Treefrog	

Threatened (and Candidate Threatened = CT)

Snakes	Turtles	Amphibians	Lizards
N. Pine Snake	Wood Turtle	E. Mud Salamander	-
N. Copperhead (SC, CT)		Longtail Salamander	
N. Scarlet Snake (CT)		Pine Barrens Treefrog	

ATTACHMENT I

New Jersey Fish and Wildlife
Timber Rattlesnake and Eastern Copperhead Grant:
Eastern Copperhead Survey Technique Development and Assessment
Standard Scientific Collecting Permit Conditions

Reptile & Amphibian Status (con't)

Special Concern (and Candidate Special Concern = CSC)			
Snakes	**Turtles**	**Amphibians**	**Lizards**
E. Hognose Snake (CSC)	E. Box Turtle	Carpenter Frog	Ground Skink (CSC)
E. Kingsnake	Diamondback Terrapin (CSC)	E. Spadefoot (toad) (CSC)	
E. Smooth Earth Snake (CSC)	Spotted Turtle	Fowler's Toad	
Rough Green Snake (CSC)		Jefferson Salamander	
Smooth Green Snake (CSC)		Marbled Salamander	
		New Jersey Chorus Frog (CSC)	
		N. Cricket Frog (CSC)	
		Spotted Salamander (CSC)	

Non-listed Species			
Snakes	**Turtles**	**Amphibians**	**Lizards**
Black Rat Snake	Common Musk Turtle	American Toad	Five-lined Skink
"Coastal Plain" Milk Snake	Common Snapping Turtle	Atlantic Coast Leopard Frog	Italian Wall Lizard (exotic)
E. Garter Snake	E. Mud Turtle	Bullfrog	N. Fence Lizard
E. Milk Snake	E. Painted Turtle	Four-toed Salamander	
E. Ribbon Snake	E. Spiny Softshell (exotic)	Green Frog	
E. Worm Snake	N. Map Turtle	Mountain Dusky Salamander	
N. Black Racer (reg. priority)	Red-eared Slider (exotic)	N. Dusky Salamander	
N. Brown Snake	Redbelly Turtle	N. Gray Treefrog	
N. Redbelly Snake		N. Red Salamander	
N. Ringneck Snake		N. Slimy Salamander	
N. Water Snake		N. Spring Peeper	
S. Ringneck Snake		N. Spring Salamander	
		N. Two-lined Salamander	
		Pickerel Frog	
		Red-spotted Newt	
		Redback/ Leadback Salamander	
		S. Leopard Frog	
		Wood Frog	

ATTACHMENT I

New Jersey Fish and Wildlife
Timber Rattlesnake and Eastern Copperhead Grant:
Eastern Copperhead Survey Technique Development and Assessment
Standard Scientific Collecting Permit Conditions

Snake Survey Efforts:

It is the responsibility of the NJ Division of Fish and Wildlife's Endangered and Nongame Species Program (ENSP) to review and assess proposed survey and research techniques to ensure the benefits of implementing such efforts outweigh the risks to listed and non-listed nongame wildlife. Please find guidance below regarding the minimum requirements for snake survey efforts using trapping and traplines, pit-tagging, and radio-telemetry. Permit applicants may propose alternate strategies/methods than those presented below and provide literature and/or findings to demonstrate the proposed methods' successes. However, the ENSP will make the final determination of whether the proposed strategies/methods will result in a sufficient survey effort to achieve the projects' objectives (i.e., locate target species) while minimizing the risk to animals.

The permit applicant will be required to integrate agreed upon survey designs and methods into project proposals **prior to receiving an approved Scientific Collecting Permit** to ensure approved designs and methods are contained/documented within one document for regulatory agencies' references.

Please note, under the Endangered and Nongame Species Conservation Act (N. J. S. A. Title 23:2A-8), "No person shall obstruct or interfere with the performance by the Department of Environmental Protection or its personnel of any duty under the provisions of this act, or refuse to permit such personnel to perform their duties by refusing them, upon proper identification, entrance to any premises at reasonable hours." **As such, personnel from the ENSP may perform site inspections to ensure permit conditions are being met** including but not limited to: a) approved trap/trapline installation, b) disinfection protocols for all gear and traps, c) closure of all traps upon seasonal survey completion, and d) removal of all trap/trapline material upon completion of survey. **It is the responsibility of the permittee to inform private landowners of the possibility of such a site visit PRIOR to APPLYING for and/or RECEIVING an approved Scientific Collecting Permit and the landowner's response must be part of the application and/or proposal.**

ATTACHMENT I

New Jersey Fish and Wildlife
Timber Rattlesnake and Eastern Copperhead Grant:
Eastern Copperhead Survey Technique Development and Assessment
Standard Scientific Collecting Permit Conditions

Trapping and Trapline:

The method of using a trapline and traps to survey for wildlife ultimately puts those species at increased risk of harm. They are stalled at or forced to move along a fence, increasing their exposure to predators and extreme temperatures, they are at risk of desiccation within improperly prepared traps, and they are at risk of predation within the traps if multiple species enter. As such, in an effort to ensure the benefit of using such techniques outweighs the risk, the ENSP has conducted a literature review and assessment of past performances to develop and provide standardized protocols for implementation when using fence/trap methods to survey for snakes primarily outside of montane habitats that have proven most successful at catching pine snakes (adults and juveniles) as well as small- and medium-bodied snakes such as corn and rough green snakes, other snake species and amphibians.

COPPERHEAD GRANT APPLICANTS using traplines and/or den corrals: Conditions pertaining to traplines and den corrals are *mostly* focused on NJ's pine barrens and as such, certain conditions (e.g., installation method to ensure a seal with the substrate, timelines) will require adjustments in montane habitats. **If proposing to use traplines and/or den corrals** within montane habitats, please review the following information for reference and provide details regarding how you propose this guidance be adjusted to accommodate the terrain and target species.

PROJECT PROPOSALS submitted with Scientific Collecting Permit applications must include details regarding the survey method(s), proposed fence and trap design, and geographic information system (GIS) shapefiles of proposed trapline(s) and traps' locations for DFW's review of the traplines' orientation within the landscape, number/length of fence(s) and trap locations. The GIS attribute tables must include assigned identification numbers of the fence(s) and traps to be referenced when reporting findings (species and locations) in the annual report.

General Performance Requirements for All Reptiles and Amphibians

1) All traps used for surveying reptiles and amphibians must be checked **at least once every 24 hours**. **This requires personnel to physically search the leaf litter & moss with their hands, or if within venomous snake territory, gently and slowly with a stick or similar object to ensure no reptiles, amphibians, small mammals, or predacious beetles are within. All animals shall be removed from the traps.** *(Note, only approved venomous snake handlers can remove rattlesnakes and copperheads.)*

2) Box traps used for surveying reptiles and amphibians must be protected from direct sunlight. This can be accomplished by covering the center of the top of the trap with a ½"-thick piece of plywood *(see photograph 1.)*. The board must not completely cover the top of the trap; i.e., it should be placed along the center of trap such that it allows rainfall access to the duff within the trap to help maintain moisture.

3) All box traps or bucket/pitfall traps **must contain ample amounts of leaf litter AND store-bought* sphagnum moss** in order to provide adequate moisture and shelter for animals that are captured so that desiccation, heat stress, and/or cold shock to these animals is avoided. (This will require approximately 1 gallon of sphagnum moss per trap with two – three heaping handfuls of leaf litter on top of the moss; creating an approximate 75% sphagnum moss with 25% leaf litter mound of material. In addition, this duff must be towards the "back" (or back half) of the trap (i.e., end opposite the funnel door) so as not to impede the function of the 1-way funnel door. **Sponges are not a substitute for leaves or sphagnum moss but *could* be used in combination to increase moisture retention; i.e., cover the wet sponge with ample, moist leaf litter and sphagnum moss.** If sponges are used, they should be *approximately* 3 ½" x 6" x 1" to hold more moisture and enable larger amphibians to stand atop the sponge/vegetative debris mound. .

   a) Surveyors must check this substrate daily to ensure it remains moist and moisten it as needed.

   b) Surveyors must adjust the duff materials as needed each time the box traps are checked as snakes can shift the materials as they move around the box trap and may block the one-way door from closing properly.

   *** "Store-bought" sphagnum moss: No sphagnum moss shall be removed from conserved lands or lands managed by water authorities without proper permits and authorizations from the land-managing entity.**

4) All box and bucket/pitfall traps must be labeled with the applicable year's NJDEP scientific collecting permit number.

5) All traps must be scrubbed with soap and water to remove all organic matter, disinfected using a 10% bleach solution and thoroughly rinsed between sites and annually.

6) All traps, regardless of type, must be properly closed to **ALL** wildlife during non-survey periods of a study season, if not removed entirely. (*See condition # 7 below regarding proper closure procedures.*)

7) Scientific Collecting Permit permittee is responsible for removing fence material, supports/stakes, and all traps within 10 days of the scientific study's end date unless written approval from the ENSP is obtained to leave fence material and [seasonally closed] traps installed for multi-year projects. Failure to do so could result in future inability to obtain State permits. For trapline surveys (spring and fall), traps must be closed mid-season and if permission is obtained to leave fence material and traps installed for multi-year projects, the permittee will be responsible for appropriately closing the traps each fall - winter, ensuring there is no access to the traps when not in use. **CLOSING THE TRAPS REQUIRES**:

a) Removing all sphagnum moss, leaf litter and sponges July 15 (for summer closure) and again October 31 (for winter closure). This will ensure no wildlife is within the trap and no mold/mildew will form.
b) Using larger pieces of fencing material to cover the fence-funnel access by overlapping the funnel access and securely stapling it to the standing fence.
c) Affix boards or other rigid material inside the traps leaning on (or otherwise holding closed) the one-way trap doors to prevent anything from entering should the fence-funnel access reopen.
d) Seal the tops of the traps, closed with locks or some other method that will withstand climatic conditions (duct tape is not acceptable as it easily separates from the trap after precipitation events) such that the trap lids will not open if traps are shifted.

***Note, the permittee is responsible for checking the trapline/traps once per month and following severe storms during the period they are closed to ensure the exclusionary measures are in place and to correct them as needed.** *All mortality events must be reported to the ENSP.*

8) Depending on the level of potential human activity on and/or adjacent to a project site, the permittee may be required to lock all traps. Such a condition will be determined by the NJDEP, Pinelands Commission and/or Highlands Commission and if required by any of these agencies will be considered a condition of the Scientific Collecting Permit and must be implemented.

9) PITFALL TRAPS must implement the following steps to minimize harm to small mammals:
   a) Traps: Each pitfall trap will have an elevated lid that will be removable for checking the traps daily; traps will be checked once within every 24-hour period (per # 1 above). Personnel must search the materials as appropriate (by hand outside of venomous snake territory, gently using a stick or snake hook when working within venomous snake territory).
   b) Cover: Debris for cover and Sphagnum moss for moisture will be added inside the pitfall traps (as with box traps, see # 3 above). Sand will also be included at the bottom of the trap within the Pinelands.
   c) Seeds: A daily (or as needed) ample supply of loose sunflower seeds will be provided in each pitfall trap instead of "seed cakes."
   d) Worms: A daily (or as needed) ample supply of dried mealworms will be provided in each pitfall trap.
   e) Escape string: An "escape string" must be installed for any studies not conducing small mammal research.

ATTACHMENT I

New Jersey Fish and Wildlife
Timber Rattlesnake and Eastern Copperhead Grant:
Eastern Copperhead Survey Technique Development and Assessment
Standard Scientific Collecting Permit Conditions

Trap/trapline Surveys for Snakes (Listed, Special Concern, and Candidates for Listing/SC status) within the Pinelands and CAFRA Zone

Trap/trapline surveys required as part of a land use pre-application review and/or permit application (i.e., required by the NJDEP, the Pinelands Commission, and/or Highlands Commission) **must include at least one full season of surveys** to be considered a sufficient/adequate survey effort, and ideally should include more. A "season" is the target snake species' emergence period through ingress. If emergence is missed during the first year of work, surveyors ***will be*** required to continue into a second or third year (if two full seasons are required) to fulfill this requirement.

Surveys required by the Pinelands and/or Highlands Commissions can be more stringent than the guidance outlined within the DFW Scientific Collecting Permit but cannot be less stringent.

Surveys required by the NJDEP may include one or two full seasons of surveys depending on the extent of the project, the location (i.e., within optimal or core snake habitats of target species), and current knowledge of the target snake species' presence.

1) Implement conditions within "*General Performance Requirements for all Reptiles and Amphibians" above.*

2) Only ENSP-approved personnel can handle timber rattlesnakes (using appropriate, clean, and disinfected capture/handling equipment).

3) Survey periods:
   a) Required for surveys pertaining to land use permit applications (regardless of regulatory agency) and recommended for conservation research:
      1. Rattlesnakes: Surveys from April 15-July 15 and September 1 – October 31
      2. Pine and Corn Snakes: Surveys from April 1 – July 15 and September 1 – October 31
   b) Optional:
      1. Those who wish to trap July 16 – August 31 must submit this request in their permit application via a proposal that details the objective of trapping during mid-summer, justify why it's necessary to do it at this time, the conservation objective, and explain what steps they will take to minimize the risk of animals (reptiles, amphibians, **and** small mammals) overheating, dehydrating, and/or desiccating. Applicant must demonstrate the conservation benefit of this action outweighs the risk to the animals.

   *Notes:
   - ***Fence lines with closed funnel-fence trap access and closed traps must be installed prior to the commencement of survey dates*** *such that personnel are prepared to begin trapping on the required start date. All traps and fence*

*materials will be removed from the study site **within 10 days** of the scientific study's end date unless written approval from the ENSP is obtained to leave fence material and [seasonally closed] traps installed for multi-year projects. (See # 7 under "General Performance Requirements…" above for details regarding closing traps.)*

- *The ENSP acknowledges that fence/trapping method is not an adequate method to survey for Pinelands Timber Rattlesnakes but remains the best available survey method when incorporated with visual and coverboard surveys throughout suitable hibernacula, gestation, and foraging habitats. However, survey personnel should still be cautious when checking traps and/or repairing fallen fences where snakes may hide under/within the folds/layers.*

4) Survey effort:
   a) Traps must be in operation every day during the target species' identified survey periods and must be checked once per every 24 hours.
   b) Fencing must be installed in areas most likely to capture the target species' (i.e., the most suitable habitat on site), based on habitat maps, topography and additional areas found through field investigation(s).
   c) The amount of fencing needed will vary with the size of the site in question and habitat suitability. At a minimum, fence/traplines must be appropriately positioned within the project area to intercept target snakes moving in all directions. A minimum of 200-ft of fence/trapline for parcels </= 2-acres and an additional 50-ft of fence/trapline for every additional acre for parcels >2-acres (e.g., 2.1- through 3.0-ac parcels receive 250-ft fence/trapline, 3.1- through 4-ac parcel receive 300-ft fence/trapline, etc.). Please note, upon review of the project area, the Division of Fish and Wildlife *may* require additional or approve of less fence/trapline based on habitat suitability and/or size and parcel footprint (layout).
      1. Habitat suitability: If a portion of the project parcel is not suitable as snake habitat for the target snake species (i.e., listed, special concern, and candidate species for listing/SC status), that portion can be removed from the fence/trapline calculation.
      2. Wetlands: Portions of the project parcel including forested and/or herbaceous wetlands – both of which are used by northern pine snakes, timber rattlesnakes and eastern king snakes, but are not necessarily optimal for northern pine snakes – *may* warrant a decrease in the required fence/trapline length depending on the size, habitat structure, isolation versus connectivity to other wetlands, etc. Project proposals that include such areas may propose a decrease in the overall amount of fence/trapline, but such proposals must include a detailed description of the area, photographs, and justification for the change in length, as well as GIS shapefiles of the proposed locations for the fence and traps.

*Note: This condition applies only to DEP-, Pinelands Commission- or Highlands Commission-required surveys as part of a land use permit application process or pre-application review. For private, scientific research (i.e., research not associated with

potential land use alteration), the fencing length (and subsequently, the number of traps used) may be less as survey results will not lead to an alteration of the landscape.

5) Box trap design and trap/fence installation for traplines:
   a) Fence must extend a minimum of **44" above the substrate** and be embedded in the ground a minimum of 4"; these metrics typically result in using a red guideline found on most drift fence material. Fencing material must be pulled taught to eliminate folds that may enable snakes to more easily climb and breach the fence. *(See photograph 2.)* Backfill against the fence (on both sides) and tamp down the soil with your foot to compact the soil to minimize the risk of snakes attempting to dig under the fence. *(Please note, the revised height requirement is based on unpublished research conducted by the Pinelands Commission, Herpetological Associates, Inc., and Dr. Howard Reinert, 2019-2021.)*
   b) Traps must be placed a maximum of [approximately] every 100 feet on each side of the fence alternating on each side resulting in traps on opposing sides of the fence approximately every 50 feet. *(See diagram A.)*
   c) Traps must meet the NJ DEP's (and where appropriate, the Pinelands Commission's) approved design and dimensions. The "funnel" opening must be 1 ¾" – 2 ¼" in diameter with the target of a 2" diameter opening. *(See diagrams B and C and photograph 3 for NJ DEP-approved box trap design.)*
   d) Trap door must be made of 1/4" hardware mesh/hardware cloth attached at two (2) points using wire (copper or stainless-steel wire) or small metal rings as shown in *diagram C and photograph 3*.
   e) All fences must have traps at each fence "end" and each end must include "wing walls" that guide the snakes to the end trap. *(See diagram D and photograph 4.)*
   f) Access to trap entry holes must be flush; i.e., soil must be fanned out and gently graded 180-degrees along the fence leading to the trap entry. Soil must be flush with the base of the access hole and a little soil must be pushed inside the hole along the base of the access funnel to minimize the snake's detection of an abnormal environment. *(See photograph 5.)*
   g) Most of the area along the top of each trap must be covered with a board centered on the trap such that the board provides shade and limits water access. The funnel end of the trap must be clear of debris so that it doesn't interfere with the trap door function. The terminus end, where vegetation, leaf litter and/or sponge material is provided to retain moisture, must be sparsely sheltered on the top to allow rainwater to enter and assist in maintaining moisture while still providing [some] shade. *(See photograph 1.)* Personnel checking traps daily should test materials to ensure the material remains moist but not soaking wet and the trap interior as a whole is not soaking wet or excessively dry. The bottom of traps must be mesh (i.e., hardware cloth) to allow rainwater to drain. Traps must be slightly embedded into the soil to allow for a sandy surface within the trap.

ATTACHMENT I

New Jersey Fish and Wildlife
Timber Rattlesnake and Eastern Copperhead Grant:
Eastern Copperhead Survey Technique Development and Assessment
Standard Scientific Collecting Permit Conditions

1. **All traps must implement the 1/8" hardware cloth bottom by the 2024 field season.**

   * The 1/8" hardware cloth will eliminate the risk of smaller snakes exiting through and/or becoming entrapped within the metal aperture.

Encirclement of Suspected Dens: Trapping

1) Survey periods:
   a) **Fence encirclements (i.e., den corrals)** must be installed in February with 2 - 3 one-way doors/flaps to enter the corral. The one-way doors/flaps allow den access to snakes that have temporarily surfaced to bask away from their dens and wish to return as temperatures fall. The corrals must remain in place, at a minimum, until May 15. However, the maximum time a den-associated fence shall be installed in such areas is February 01 – May 31 for any species unless otherwise approved by the NJ ENSP.

   (Please see photographs 6a-6c and additional guidance below.)

   1. Installation of the one-way door units:
      a. Each unit must be securely fastened to the corral fence with no gaps between the fence and one-way door unit. This can be accomplished by cutting a hole in the fence just smaller than the cross section of the tunnel portion of the unit, and attach the fence to that cross-section edge with a staple gun.
      b. Level the tunnel with the access door hole. This can be accomplished in two ways:
         i. Create a graded, sand ramp within the tunnel such that the ramp leads to and is level with the bottom of the access door hole.
         ii. Sink the one-way door units slightly into the sand but at a slight angle back towards the fence, such that the bottom of the access hole is at grade, but the hardware cloth one-way door is not impeded from swinging open/close. The angle also assists in closing the door flap properly.
      c. Maintenance: Personnel must check the one-way door units regularly and attend to them as needed to ensure proper function (e.g., repairs, clipping vegetation, shifting sand, etc.).

   *Applicants may propose alternate strategies for ENSP review and approval.

   b) **Visual surveys/inspection of the corralled dens must be conducted following installation** to ensure corral integrity, perform repairs upon discovery of corral damage, and to document surfaced snakes (particularly after March 15)**:**
      - *A minimum of once per week **and** following heavy snow fall **and/or** severe storms upon installation (approximately February 01) through March 06 each year the corral is in place.*

- *A minimum of twice per week **and** following heavy snow fall **and/or** severe storms March 07 – 14.*
- *Daily March 15 until the corral is removed or "opened" (if remaining for multiple years) by May 31. Surveys during this timeframe must consider climatic conditions to target the warmer periods of each day to improve the likelihood of observing surfaced snakes (including those sheltering under cover boards).*

c) **For conservation-focused, scientific research** (i.e., research not associated with surveys required as part of land use permit applications), the permittee may request for the fenced corral to remain in place over multiple seasons provided corral/fence openings are installed such that snakes can move in/out freely outside of the survey period. (*See # 7 under "General Performance Requirements…" above for details regarding closing traps.*)

d) Scientific Collecting Permit permittee is responsible for removing fence material, supports/stakes, etc. and all traps (***if*** approved to install traps, see condition # 2 below) within 10 days of the study's end date. Failure to do so could result in future inability to obtain State permits.

2) No traps will be utilized with den corrals unless specifically approved by the NJ ENSP as snakes may become trapped and freeze to death between trap checks. If applicants wish to utilize traps in combination with den corrals, they must provide a detailed proposal of the purpose, need, and how they will prevent such harm.

3) Survey effort: Corrals must be in operation every day during the target species' identified **spring** survey periods. The corrals and shelter boards within the enclosed area must be checked once per every 24 hours during the target species' identified **spring** survey period.

4) Trap/fence installation for den corrals:
   a) Fence encirclement:
      1. Permittees must identify the [potential] den access hole and install fence encirclements a minimum 15-ft from the identified den access hole (creating a 30-ft diameter encirclement centered on the identified den access hole). If multiple holes are identified in close proximity, the encirclement should be expanded such that the fence is no closer than 15-ft from any potential den access hole. When installing the fence (and *if approved*, traps), every effort must be made to minimize disturbance to the identified den and adjacent habitat that may include multiple den entrances/exits. Cover boards (plywood, rubber matting) or natural shelters must be placed within the encircled den area to provide protective shelter from avian predators.

2. The fence encirclement will consist of a minimum 4-foot high fence using a maximum ¼" hardware cloth wire fence material with 4" sunk below substrate (leaving 44" above grade). (Note, as an alternative to hardware cloth, opaque nylon woven fencing may be used but personnel must take the necessary steps to ensure its stability and rigidity to avoid sags.) Backfill against the perimeter of the fence (interior and exterior) and tamp down the soil on both sides with your foot to compact the soil. (*Note, this is an important step as pine snakes may attempt to dig their way out.)*
3. Create a personnel access door in each encirclement using the same hardware cloth fence material by overlapping the access door with the stationary fence. The access door must be pulled taught to avoid folds in the material and the edges must be "sealed" (via tying/strapping edges to the stationary fence and securing the base to the ground) to prevent snake access/exit or buckling of the hardware cloth which may allow a snake to escape in the spring.
4. If there are trees within the corral, branches overhanging the fence encirclement will be trimmed to prevent snakes from escaping.
5. Depending on the size of the encirclement, surveyors *may* be required to install netting material on the top of the enclosure to prevent predation from avian predators and minimize predation from non-volant species.

b) Shelter boards: A minimum of 4 shelter boards (measuring approximately 3' x 1.5' or 3' x 2') must be positioned along the base of the fence within the corral, set between trap locations to provide shelter for the snakes from avian predators and inclement weather. Additional shelter must be placed closer to the identified den access hole if natural cover is not plentiful.

Snakes: Specifications and installation of traps and trapline:

Photograph 1: Shade board atop the trap.

Photograph 2. Taught fence at 44" above grade; 4" below substrate. (Photo courtesy of Robert Zappalorti and Howard Reinert, 2019.)

Snakes: Specifications and installation of traps and trapline:

Diagram A: Trap layout along drift fence. (Copied with permission from Herpetological Associates, Inc., 2002).

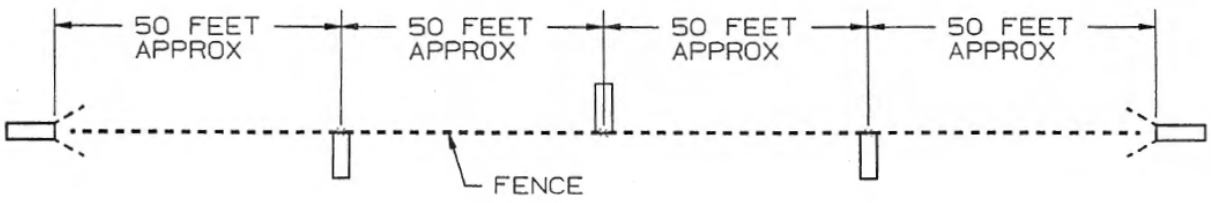
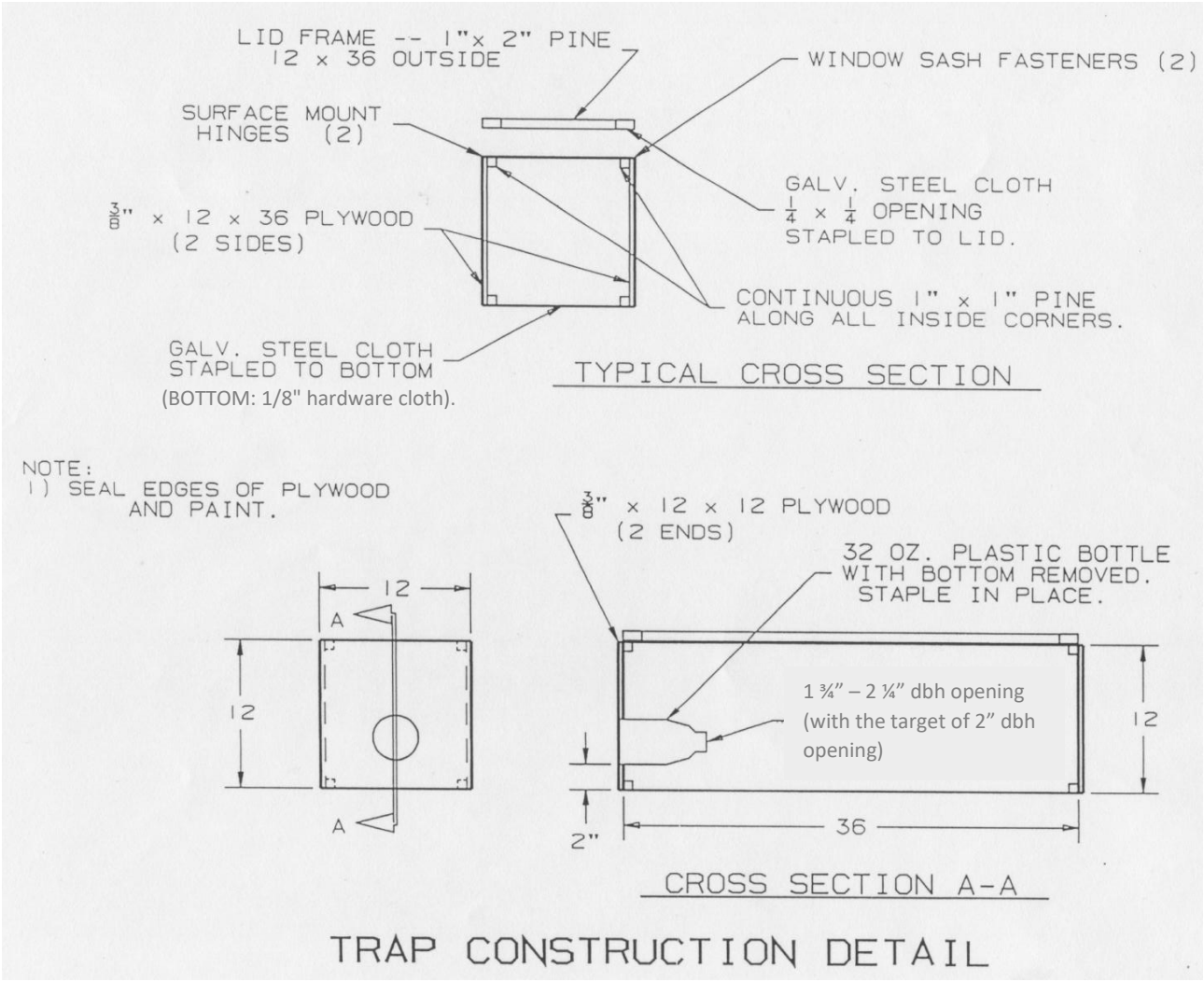
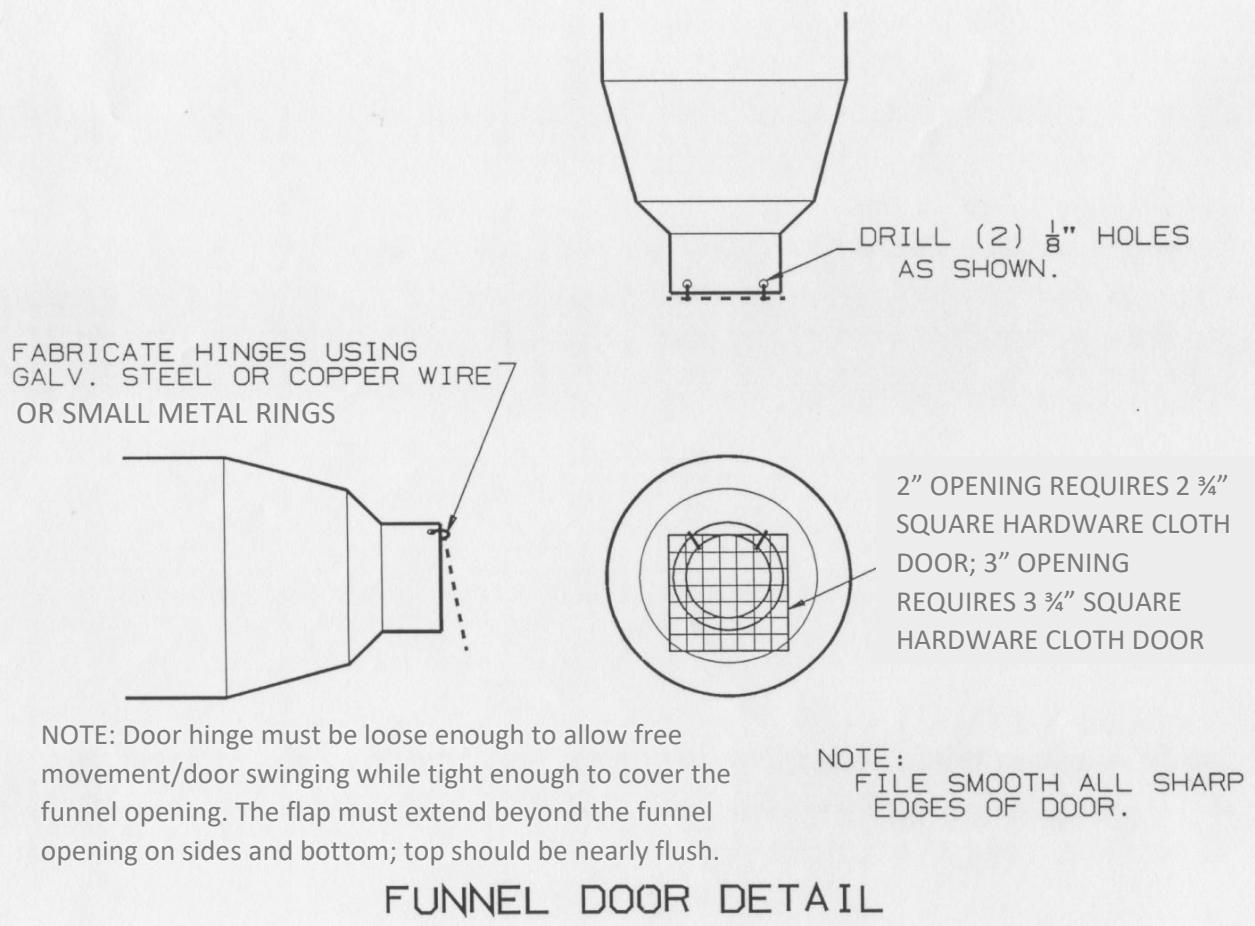


Diagram B. Box trap design. (Copied with permission from Herpetological Associates, Inc., 2018; revised funnel trap door dimension 2019).



Snakes: Specifications and installation of traps and trapline:

Diagram C. Funnel trap door detail. (Copied with permission from Herpetological Associates, Inc., 2018; revised door and hinges, 2019.)

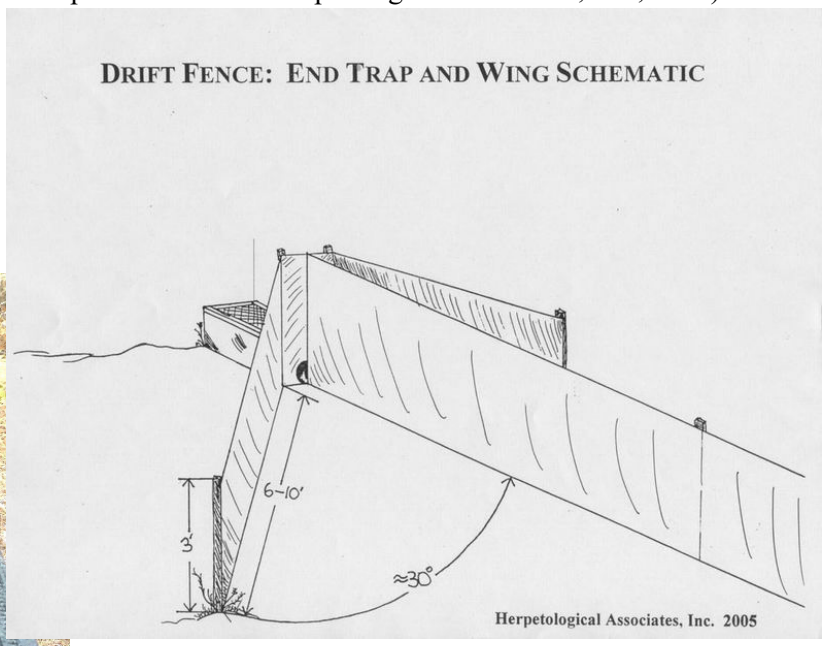


*Note, it is imperative the trap door opens and self-closes easily and does not require snakes to push the door open with any noticeable effort as this may cause the snakes to retreat.

Snakes: Specifications and installation of traps and trapline:

Photograph 3. Funnel trap door extends beyond the funnel trap opening, attached with wire.

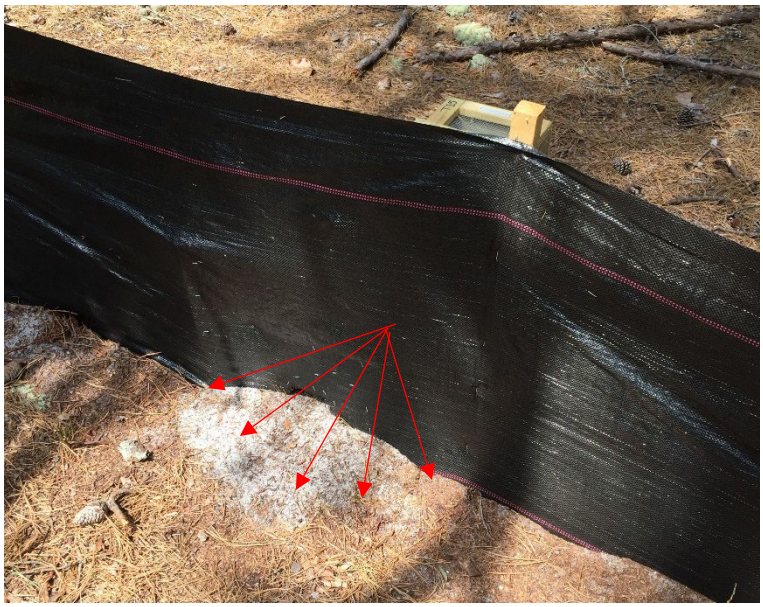
Diagram D: End trap design. (Copied with permission from Herpetological Associates, Inc., 2005).



Photograph 4: End trap along fence. (Photo courtesy of Robert Zappalorti and Howard Reinert, 2019.)

Snakes: Specifications and installation of traps and trapline:

Photograph 5: Trap access with soil graded and fanned 180-degrees along fence; soil flush with access hole bottom and light layer of soil pushed into access hole.

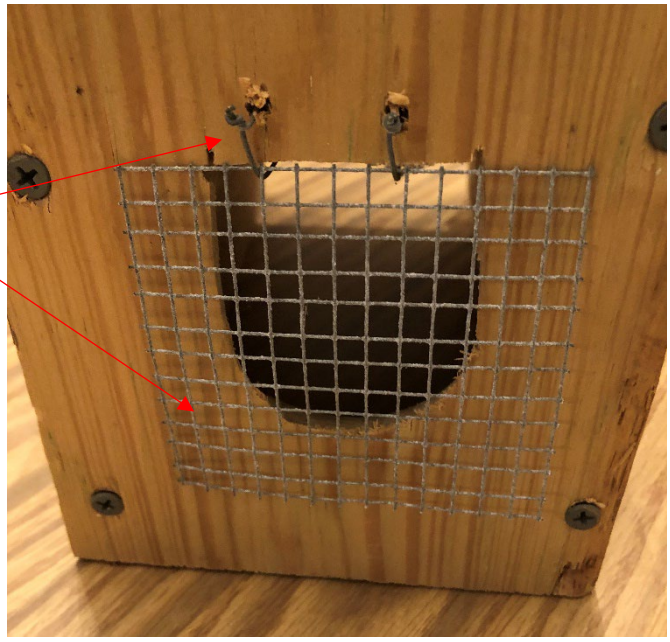


Encirclement of Suspected Dens: Trapping (cont'd)

Example of approved 1-way door unit design and installation for use with den corrals.

Photograph 6a:
The darkened "tunnel" effect attracts returning snakes guiding them to enter the corral through that location.

Photograph 6b:
The interior of the guiding "tunnel" must be a minimum of 6-in long x 4-in wide x 4-in high.



Photograph 6c:
The access hole must be 2 – 2 1/2" in diameter (in any direction). Attach ¼" hardware cloth as the one-way door flap; it must extend beyond the opening/hole (on the exterior side of the unit). Attach hardware cloth "flap" to the tunnel box by metal hooks (or some other product) along the upper edge such that the door to easily swings open when pressed by a snake and completely closes on its own.

ATTACHMENT I

New Jersey Fish and Wildlife
Timber Rattlesnake and Eastern Copperhead Grant:
Eastern Copperhead Survey Technique Development and Assessment
Standard Scientific Collecting Permit Conditions

PIT-tagging:

Performance Requirements

1) The ENSP is encouraging permittees to use AVID manufacturer for PIT-tags and either AVID readers or universal readers able to read AVID PIT-tags. ENSP is doing this because multiple NJ's researchers have been PIT-tagging for decades using this equipment. We hope that by standardizing the equipment, we will minimize the risk of individuals being tagged multiple times. It is the permittee's responsibility to ensure that all efforts are made to determine if a snake has been PIT-tagged previously. Therefore, this would warrant the use of universal readers.

2) Permittee must use sterile techniques when tagging snakes; i.e., single-use sterile needles and/or sterilizing needles between single uses for a minimum of 30 minutes in rubbing alcohol (70% ethyl alcohol) or by using an autoclave.

Shelter Boards:

Performance Requirements

1) All shelter boards must be labeled on the "top" (visible) side of each board with the permit number (e.g., "DEP SCP [insert permit number]"). If the boards will likely be in place beyond the initial permit year, please add the end year to the ID label (e.g., "DEP SCP [insert permit number]-[insert end year]").

2) MUST BE CHECKED ON A REGULAR BASIS, preferably at least once every 48 hours to assess the safety of the location (e.g., no targeted predation, human disturbance, etc.).

3) Wood boards will be confined to one (1) site and will not be reused. Tin sheets can be reused but must be cleaned of all organic matter and disinfected prior to relocation.

4) ALL equipment/supplies/boards/metal sheets used to conduct surveys MUST be removed from the landscape at the end of the study.

ATTACHMENT I

New Jersey Fish and Wildlife
Timber Rattlesnake and Eastern Copperhead Grant:
Eastern Copperhead Survey Technique Development and Assessment
Standard Scientific Collecting Permit Conditions

Radio-telemetry on Snakes:

Since radio-telemetry requires an invasive and potentially harmful procedure (i.e., transmitter implantation/removal and/or transmitter external attachment), the Endangered and Nongame Species Program (ENSP) does not generally permit the use of radio-telemetry on snakes for the purpose of fulfilling land use permitting requirements (i.e., development applications). However, the ENSP may coordinate on situations where telemetry is required by the Pinelands Commission in accordance with the following telemetry performance requirements:

Performance Requirements

1) The Endangered and Nongame Species Program **must pre-approve any person that is conducting surgical implantation, removal, and/or external attachment of radio-transmitters.** Permits will be revoked if unapproved individuals are used to conduct these surgeries or transmitter attachments, if the activity is conducted on a species suite for which the person lacks experience, or if the State discovers the individual is not sufficiently qualified. Permittees are encouraged to contact Kris Schantz (908-713-1734; kris.schantz@dep.nj.gov) to obtain names and contact information for pre-approved individuals prior to the commencement of the study although this does not guarantee assistance from these individuals.

2) **Procedures for transmitter implantation and removal, and external transmitter attachment must be included in the project proposal for ENSP's review and approval**.

   a) **The permit application package must include**:
      1. A detailed project proposal that also provides the name and experience of the proposed person to conduct the transmitter implantation/removal surgeries and/or transmitter external attachment for the ENSP's review. That person must demonstrate they understand the procedure(s) and have experience successfully performing the procedure(s) on the target species suite (i.e., pit vipers vs. constrictors). (For persons previously authorized by the ENSP to conduct surgical implantations/removals on specific species suites, no additional details regarding experience are required. If proposing work on a new species suite and/or for all those performing external transmitter attachments, experience details pertaining to that suite **are** required.)
      2. Citation(s) and if appropriate, publications, for or details of the method(s) proposed.
      3. The transmitters' make, model, dimensions, weight, and antenna gauge.

   b) **All transmitters** (peritoneal, subcutaneous and external) **are to be less than 3% of the snake's body weight** to reduce the risk of adverse impacts on the snake**.** (Final weight of transmitter must include the final potting/packaging.) ***No*** peritoneal (or cecum) and subcutaneous transmitters will have external antenna.

   c) **Implantable, subdermal, and injectable transmitters**:

1. Implantable, subdermal, and injectable transmitters used in smaller bodied, juvenile, and sub-adult snakes (e.g., eastern copperheads, cornsnakes, and juvenile and sub-adult northern pinesnakes and timber rattlesnakes, etc.) and adult timber rattlesnakes **must use 32-gauge (32 AWG) whip antennas** to minimize the risk of punctures. **The antenna wire must be teflon insulated (no bare braided wire or plastic insulated wire). It is the responsibility of the permittee to ensure the transmitter manufacturer/distributor adheres to these requirements.**

d) **Externally-attached transmitters**:
   1. ENSP will not approve the application of the sub-dermal stitch or glue-on methods as research has demonstrated an increased risk of adverse effects on the snakes.
   2. Consider antenna length for species-specific range movements to ensure a sufficient signal for relocations.
   3. Consider using flexible, medical tape as the adhesive for the attachment procedure to reduce restrictions to the snakes' movements, and potentially reduce the risk of prolonged entanglement as the medical tape is more apt to give way (come off) than other non-medical tapes, potentially reducing the risk of harm and exposure to snakes that become entangled in vegetation.
   4. If a snake is pre-shed or in ecdysis, wait until after the snake sheds to apply the external transmitter. Note, increased lipids on the skin post-shed may decrease the success of the adhesive depending on the adhesive product and attachment method used.
   5. If replacing an externally-attached transmitter, remove them using an ENSP-approved method (*see condition 10.b.1 regarding retrieval and removal of externally-attached transmitters*). **If there are any signs of injury** (e.g., scales stuck to the adhesive, skin abraded, bleeding, or scabbed), **do not reapply the transmitter, release the snake.**

3) All transmitter implantations must be conducted in a facility with a properly decontaminated environment (i.e., following the most current reptile and snake fungal disease decontamination protocols) and the ability to quarantine the study snakes from all other reptiles. Personnel proposing to do such work must provide the ENSP with the location and contact information of the facility where snakes will be temporarily housed, and surgeries performed.

4) No snakes will be removed from New Jersey for any reason except if a snake requires medical assistance from the Wildlife Conservation Society at the Bronx Zoo, NY. Such an event would be determined by the ENSP.

5) All transmitters' frequencies must be obtained from the ENSP prior to purchasing/placing an order for transmitters. Contact Kris Schantz (kris.schantz@dep.nj.gov) to request approved frequencies for your target species, provide the general area of study, number of transmitters needed, and band width of your receiver(s). Please note, the 150.000-151.999 MHz bandwidths are congested.

6) The following tasks shall not be conducted without written permission from the ENSP that specifically addresses the applicable issue. Permittees wishing to conduct one or more of the following tasks are encouraged to contact the ENSP to further discuss their study.
   a) No surgical implantations or removals of radio transmitters are to be performed on vipers or eastern king snakes after August 1st of each year or other constrictors after August 15th of each year without written authorization from the ENSP and/or special conditions approving/detailing such work within the annual Scientific Collecting Permit approved by the ENSP.
   b) No surgical implantation of radio-transmitters is to be performed on gravid snakes (any species) or post-partum timber rattlesnakes or eastern copperheads without written authorization from the ENSP and/or special conditions approving/detailing such work with the annual Scientific Collecting Permit approved by the ENSP.
   c) No neonates, young-of-year or juveniles shall be used in telemetry studies without written authorization from the ENSP and/or special conditions approving/detailing such work within the annual Scientific Collecting Permit approved by the ENSP.

7) No snakes shall remain in captivity for more than four (4) days (96 hours) without written approval from ENSP. Exemptions are given to snakes in ecdysis; surgeries must wait until the snake has shed.

8) The life span of all radio transmitters must be calculated ***prior*** to their surgical implantation (or injection of subcutaneous transmitters) in snakes. All transmitters must be removed a minimum of one month prior to the expected failure date but not after August 1 of each year. For peritoneal and subcutaneous transmitters, permittee must use transmitters that are not scheduled to fail prior to expected emergence the following spring unless the permittee can demonstrate they can successfully corral the snake's den and retrieve the transmitter.

   The strength of a transmitter's signal should be monitored throughout the field season. With the understanding that some transmitters fail prematurely, **the permittee must submit a proposal to ENSP *prior to the commencement of the project and receive written approval* for the permittee's method to address this situation while upholding the requirements outlined in this permit.**

9) **TRACKING SCHEDULE:** The location of all snakes in which radio transmitters have been implanted, injected, or attached must be determined, using standard ground-based radio-tracking techniques, **at least once in any 48-hour period while the snake is out of its hibernaculum. In addition, permittee (and subpermittees) must track the snake at least twice in late fall (at least once each at the end of both November and December) and prior to spring emergence to determine (and document) if the snake has shifted or moved, and that the transmitter is functioning.**

Telemetry data for each snake must include the first location/date of capture, each relocation (even when the snake is in the same location as the previous relocation including late fall – spring emergence visits to document the date and confirmation of the relocation), with the final record being the point of capture to remove the snake from the study. (Note, the pre-emergence and subsequent relocations and final record will likely be the following season.)

*Note, **when tracking snakes using external transmitters**, each snake must be tracked daily for three days following their releases. The trackers must attempt to observe the snakes and their transmitter attachments to assess if the adhesive is peeling (creating a potential entanglement issue with vegetation), causing injury, or otherwise disrupting the snakes' behavior. If trackers cannot make visual contact with the snakes, they must return daily until they have observed and assessed the snakes' and transmitter attachments' conditions for three days following their releases. Once this requirement is fulfilled, the snakes may follow the standard tracking schedule described above.

a) All radio-telemetry-tracked snakes (using implanted, injected, or externally-attached transmitters) must be tracked throughout their range. As such, prior to beginning the study, the investigators must make a diligent effort to get permission from project-adjacent properties' owners, and if applicable, obtain the necessary State Parks and Forest, Wildlife Management Area, and/or federal permits to comply with the above condition. Permittees may be required to show evidence that they attempted to gain access to private property. Failure to demonstrate such efforts were made may result in future inability to obtain State permits for such activity. If access to private property is denied and study snakes move off of the subject property during the study, the consultant must use standard triangulation techniques to estimate the snake's position and note this method within the comments section of the datasheets/spreadsheets so it is understood that the coordinates are not precise. When estimating snake locations using "triangulation," bearing readings must be taken **at a minimum of four different locations to improve accuracy**. Triangulation error/accuracy must also be estimated and reported.

*Triangulated relocations data shall be provided to the ENSP with the relocation data via the data submittal spreadsheet and include the locations from where the signal was obtained and the directions the signal came from. "Comments" regarding triangulated relocations shall provide pertinent details (e.g., "signal came from north-northeast and was strongest from this location").

b) **Tracking duration of any individual snake using implanted or injected transmitters** must be for a minimum 12-month period in addition to steps taken to retrieve the transmitters (*see condition #10.a below)* to provide a more accurate representation of the landscape used by the snake. For snakes with externally-attached transmitters, tracking shall continue until the transmitters are shed or the snakes pull them off (via

entanglements). Personnel shall NOT attempt to manually remove the external transmitters or adhesive.

*Note: Condition # 9.b applies only to DEP-, Pinelands Commission- or Highlands Commission-required surveys as part of a land use permit application process or pre-application review. For private, scientific research (i.e., research not associated with potential land use alteration), the tracking duration may be less as survey results will not lead to an alteration of the landscape. However, transmitter retrieval (*condition 10.a*) applies to all.

c) Tracking duration of any individual snake using externally-attached transmitters must continue until the transmitter has been shed off, come off (e.g., snake pulled it off upon vegetation entanglement), or removed through an ENSP-approved method. (*See condition 10.b regarding transmitter retrieval*).

*Note: This condition (9.c) applies to anyone using externally-attached transmitters.

COPPERHEAD GRANT APPLICANTS using telemetry: Tracking duration can be adjusted to meet the objectives of your proposal.

10) **TRANSMITTER RETRIEVAL:**

a) Implantable/injectable transmitters:

1. **All efforts must be made to recapture snakes for transmitter removal and/or reimplantation/replacement.** Please note the time constraints on performing surgeries (*see condition # 6 above*). As a result of the surgical timing constraints, personnel may be required to recapture the snakes the following spring which will require the renewal of the Scientific Collecting Permit.
2. **Snakes that will no longer be tracked the following year and/or are at risk of transmitter failure over the winter or early spring**: The permittee will be required to encircle the winter den(s) with fencing and one-way doors to [attempt to] recapture such snakes following the design and procedures outlined within *Trapping and Trapline* of this document. All such efforts must be proposed in permit renewal applications and summarized in both years' reports. Failing to do so may lead to future permit application denials for telemetry on snakes using implanted transmitters.
3. **Snakes whose transmitters fail prior to recapture and/or are not recaptured during egress from the encircled den trapline:** The permittee must demonstrate a concerted effort to recapture such snakes. This will include but is not limited to the permittee revisiting the snakes' prior observed locations for shedding, basking, etc. and if needed, encircling the den the following year, for a second time (prior to egress) for another attempt to recapture the snake(s).

****Please note: The duration of the survey must be extended as necessary to facilitate the recapture and removal of transmitters.**

b) Externally-attached transmitters:

1. **Do not attempt to manually remove (i.e., peel off) the external transmitter and/or adhesive from the snake's body** unless you have presented the ENSP with a safe method to do so and been approved in writing by the ENSP or through amendments to your Scientific Collecting Permit. Examples of approved methods include the use of swab-applied alcohol or vegetable oil and gently working to break down the adhesive prior to removing it.
2. **All external transmitters and their adhesives must be retrieved as such materials could be harmful to other wildlife if left in the environment.**

11) **PERSONNEL CONDUCTING TRACKING:**

a) Field personnel tasked with tracking snakes **must** be trained by personnel with ample experience tracking snakes via radio-telemetry.

Of particular importance to note with **inexperienced trackers,** personnel relocating snakes must be cautious in their approach and vigilant in using their receiver's tools (e.g., attenuator, volume, gain) to avoid directly approaching and thereby, risking harming or disturbing the snakes. (This is often achieved by performing slow, concentric circles around the snake until it is observed.) Once observed, trackers should collect the data that requires personnel to be within 5-m of the snake. Once that information is gathered, personnel should move approximately 5-10m away to minimize disturbance while documenting their remaining findings and notes.

b) No more than two (2) field personnel shall track any individual snake together.

c) "Assistant" or person accompanying primary tracker must remain behind the primary tracker until the snake is located to avoid unintentional disturbance and/or harm to the snake.