

Northern and Peripheral Populations of the Timber Rattlesnake: Preserving Viability and Function

A Proposal to the NEAFWA Regional Conservation Needs (RCN) Program

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Justification

Approximately ten rattlesnake metapopulations persist in New England, several of which have reached critically low and potentially non-viable densities. The goal of this project is to assess and ensure the viability, function, persistence, connectivity, and evolutionary potential of northern timber rattlesnake populations and to minimize the loss of genetic diversity caused by genetic drift and inbreeding. We propose to initiate, develop, and maintain a multi-state cooperative framework for maintaining rattlesnake population viability and preserving genetic connectivity and diversity. This information is vital to the development of state-specific conservation plans for this species in the Northeast, especially in New England, and to strategically manage habitat and populations where necessary. This project will help to stabilize extant rattlesnake populations with critically low densities and will proactively prevent declines of larger and more robust populations, while providing a quantitative framework for preserving genetic connectivity and diversity among highly isolated and relict populations. Our proposed approach will also allow New England states to adaptively refine management actions through population monitoring.

Methods

Project Structure

We propose a four-tiered approach to facilitate rattlesnake conservation efforts. Four major projects will be coordinated and managed by a university partner. The four state agencies will review and approve key personnel decisions.

Project I. Population Viability Analyses

Across New England, the timber rattlesnake has declined so significantly that it is now necessary to comprehensively manage the remaining populations at a relatively precise scale (including den areas, basking areas, birthing areas) in order to ensure that the species persists in the New England region. Further, it is necessary to obtain quantitative baselines of population structure, den site occupancy (where appropriate), and population viability in order to effectively manage

populations. The project leader will gather existing and available rattlesnake monitoring data, capture-mark-recapture data, and occupancy data from state agency partners (NH, VT, MA, CT) and nongovernmental partners, and will undertake an analysis, where feasible, of population size, structure, and viability. Further, the project leader will develop a georeferenced and photo-referenced database of overwintering (den) locations, where feasible and where den areas are known. Because of the extreme sensitivity of the occurrence data, the project leader will coordinate closely with the state agency leads to ensure data security protocols are enforced and will lead monthly project phone calls. **Project I cost: \$15,000.00 (including overhead)**

Project II. Standardized Monitoring Protocols

To effectively prioritize conservation actions and to assess the effectiveness of conservation efforts, it is necessary to develop and implement a monitoring protocol that is robust to low detection rates, observer bias, variable effort, and observer effects, and further which is flexible and tracks negative data. The project leader will develop a recommended monitoring protocol designed to detect significant trends in den occupancy, population abundance, distribution, and/or demographic structure. The final protocol may be based on PIT-based capture-mark-recapture (CMR), occupancy sampling, time lapse cameras, genetic sampling, and/or other criteria, and will strive to reconcile disparate or divergent population assessment techniques. The project leader will strive to use the most current population modeling techniques, including spatially-explicit capture-recapture (SECR) analyses. The four partnering states will contribute occurrence and capture-recapture data to the lead contractor and will implement feasible aspects of the recommended protocol. This project includes the purchase and distribution of necessary monitoring equipment, such as PIT tags, PIT readers, remote cameras, and snake handling equipment. All handling of snakes will be conducted according to protocols established during the 2013 Competitive SWG funded project (*Conserving Snake Species of Greatest Conservation Need Threatened by an Emerging Fungal Skin Disease*, Appendix H). Equipment purchased with grant funds will remain the property of the state fish and wildlife agency during and after the grant period, until it is no longer needed or in working condition. **Project II cost: \$25,000.00 (including overhead)**

Project III. Genetic Management Plan

Most New England rattlesnake populations are small (fewer than 50 to 100 adults) and isolated. To maintain genetic connectivity and minimize the loss of genetic diversity through inbreeding and genetic drift, it is necessary to develop and implement a genetic management plan for remaining rattlesnake populations. The project leader will incorporate population viability and demographic analyses from Project I with all available genetic information (including unpublished and published literature on rattlesnakes) to develop a recommended, spatially-explicit genetic management plan for NH, VT, MA, and CT. The management plan will be based on available microsatellite data and/or theoretical genetic models, where appropriate and where data are available. The project leader will develop a genetics management plan with guidance

and input from agency leads; the final plan will be distributed only to the state wildlife agencies in New England. **Project III cost: \$10,000.00 (including overhead)**

Project IV. Additional Conservation Planning and Implementation (including habitat management)

This project provides targeted support to the participating states to facilitate the development and critical review of state-specific conservation plans (e.g., MA) or to implement existing conservation plans (e.g., VT) or conservation action documents (e.g., NH). In particular, this project will help the four partner states incorporate information and results and recommendations from Projects I, II, and III into state-level conservation plans and actions. Further, the four states will convene a New England Rattlesnake Conservation Group that will meet at least annually. New Hampshire will participate in regional working group; implement conservation action plan; Vermont will participate in the regional working group and implement priority actions identified in the Vermont Timber Rattlesnake Recovery Plan, Massachusetts will finalize its state conservation plan and implement priority conservation actions from conservation plan; Connecticut will develop a state conservation plan and participate in regional working group. This project includes some necessary equipment for habitat management and monitoring of habitat management actions, including chain saws and remote cameras. This project will also provide equipment to support headstarting efforts in some states (such as refrigerators, thermostats, enclosures, feed supplies). Headstarting will be conducted according to protocols established during the 2013 Competitive SWG funded project (*Conserving Snake Species of Greatest Conservation Need Threatened by an Emerging Fungal Skin Disease*, Appendix H). The project leader will coordinate the purchase of necessary equipment for regional work through WMI. Headstarted snakes will only be located in sites with documented rattlesnake occurrence; nonew populations will be established. Equipment purchased with grant funds will remain the property of the state fish and wildlife agency during and after the grant period, until it is no longer needed or in working condition. All appropriate information pursuant to animal care and handling, as well as compliance documentation specifically addressing NLEB concerns regarding tree removal will be provided to USFWS by the participating state(s) prior to any on-the-ground work. **Project IV Budget: \$10,000**

Deliverables

Quantitative estimates of population size and demographic structure for known dens; den database for (at minimum) Massachusetts dens; repeatable, quantitative, and flexible monitoring protocols; distributed equipment for recommended monitoring protocols; guidelines and regional plan for appropriately maintaining genetic connectivity based on the best available science (genetic management plan); habitat and population management at strategic locations; inter-agency New England working group.

Budget

Project I. Personnel salary, equipment, and university overhead: \$15,000

Project II. Personnel salary, equipment, and university overhead: \$25,000

Project III. Personnel salary, equipment, and university overhead: \$10,000

Project IV. Personnel salary, equipment, and university overhead: \$10,000

Match will be provided or obtained, documented, and certified by the project leader.

Match documentation will be provided quarterly or with submitted invoices. Match will be in the form of overhead waivers/reduction, reduced rate services, volunteer field efforts, donated travel, and donated equipment. Match will come from non-federal sources and not already serve as match for another grant.