NORTH ATLANTIC LANDSCAPE

CONSERVATION COOPERATIVE GRANT

2014 PROGRESS REPORT

Quarter: (circle one) **2014 1ˢᵗ** 2014 2ⁿᵈ 2014 3ʳᵈ 2014 4ᵗʰ

Grant Program, Number and Title: Grant 2011-07; **ASSESSING PRIORITY AMPHIBIAN AND REPTILE CONSERVATION AREAS (PARCAS) AND VULNERABILITY TO CLIMATE CHANGE IN THE NORTH ATLANTIC LANDSCAPE CONSERVATION COOPERATIVE**

Organization: Association of Fish and Wildlife Agencies, University of Maine (USGS MCFWRU), Clemson University

Project Leader: Priya Nanjappa

Were planned goals/objectives achieved last quarter? **YES**

Progress Achieved: (For each Goal/Objective, list Planned and Actual Accomplishments)

Objective 1: Work directly with state fish and wildlife agency personnel throughout the NA-LCC states to gather data toward PARCA criteria review and proposed conservation area identification.

UMaine and Clemson: We consider this objective now completed, though we are still awaiting Delaware data that has been promised.

AFWA: Nanjappa and deMaynadier confirmed the date and time of the PARCAs workshop at the NEAFWA meeting in Portland, Maine to be Monday, April 14ᵗʰ, following the session of herpetofauna talks. Also, deMaynadier continues to maintain contact with Delaware regarding promised data transfer.

Objective 2: Provide spatially-explicit maps of current and future climatic suitability for priority amphibians and reptiles in the NA-LCC region, and then use these data a) to rank species vulnerability to climate change based projected losses in the species' ranges, and b) to identify areas within the NA-LCC where either there are high losses of vulnerable species or there is high potential for climatic refugia for priority species, and c) identify species for which this Objective cannot be completed due to gaps in current known distributional data and thus identifies priorities for species data acquisition.

Clemson: Sutton and Barrett have constructed climatic niche models for all target (high priority) amphibians and reptiles except for the Wood Turtle (*Glyptemys insculpta*) and Blanding's Turtle (*Emydoidea blandingii*). We lack access to adequate records to model the impact of climate change for these two species. We have made

contacts with researchers at the University of Massachusetts-Amherst who have extensive locality information for these species and these researchers have agreed to complete the modeling process for these two rare turtle species. In addition to completing the climate models, we have assembled model outputs for each of 61 priority amphibian and reptile species among two representative concentration pathways (RCP), including the RCP 4.5 and RCP 8.5 climate scenarios. Our next step is to determine loss of climate envelope for each priority species.

We have identified species that lack distribution data throughout the known geographic range for each of the northeastern priority species. Three species in particular, *G. insculpta*, *E. blandingii*, and the Rainbow Snake (*Farancia erytrogramma*) lack adequate locality data to determine species sensitivity to climate change. As discussed above are currently preparing data to have outside parties prepare the climate models for both *G. insculpta* and *E. blandingii*. We have completed an Excel spreadsheet detailing the number of distribution points, geographic areas where points are lacking, and a ranking of predicted vulnerability assessment accuracy for each priority species.

UMaine: We have further refined the model sets based on outside expert review. Our four initial models sets are based on experts' responses and vary in certainty based on the number of experts who agreed.

All required data layers for the northeastern U.S. have been downloaded including layers from University of Massachusetts' McGarigal lab. Derived data layers for distance to rivers, lakes, streams and wetlands have been constructed for Maine.

Species distribution models have been run for all priority species in Maine, the pilot area. Of the 11 species that had occurrences in Maine – one was excluded as escaped pets (Box Turtle); three had insufficient sample size for the modelling process (Northern Ring-necked Snake, *Diadophis punctatus edwardsii*; Smooth Greensnake *Opheodrys vernalis*; Northern Brown Snake, *Storeria d. dekayi*), and two were excluded because they failed the model fit metric (Blue-spotted Salamander, *Ambystoma laterale*; Northern Spring Salamander, *Gyrinophils p. porphyriticus*). We modelled the species distribution of the remaining five species and they were combined (though we are evaluating other approaches to combining species' models) to create pilot, species distribution-based PARCAs. We are continuing to discuss the other two factors (species richness and landscape integrity) that will be combined to create candidate PARCAs. A map of species richness in the pilot area at the township scale has been developed which will inform the delineation of candidate PARCAs.

We are preparing additional data layers before sending to our colleagues at UMass, a collaboration that we anticipate will provide better source data for *G. insculpta*, *E. blandingii* and preliminary peer review of our species modeling approach.

Objective 3*: Summarize these results with respect to species occurring on lands under current state and federal management.*

Maine: While this has not yet been conducted for the entire NA-LCC region yet, in the Maine pilot region, only 18% of initial candidate PARCAs (based solely on modelled species distributions) occur within currently protected areas. This estimate is anticipated to change considerably as candidate PARCAs are further refined, incorporating species richness, landscape integrity, and expert review.

Clemson: Sutton and Barrett anticipate summarizing species vulnerability results from climate envelop models summarize across protected areas in the next quarter.

Objective 4: *Conduct an analysis of candidate PARCAs to help identify those highest priority conservation areas supporting reptiles and amphibians in the Northeast that are not currently protected.*

This objective has not yet been addressed.

Objective 5*: Incorporate climate vulnerability projections into final PARCA analysis, including a ranking of high priority current and future conservation areas.*

Clemson and UMaine: In progress. Vulnerability framework is ready to be applied to PARCAs as soon as they are identified.

Objective 6: *Communicate results to key state, federal, and NGO partners via publications and a Northeast regional workshop.*

All: The PARCA team is set to present the most current results to interested parties at the annual Northeast Fish and Wildlife Conference (NEAFWA) on Monday, April 14th, in Portland, Maine. Moody will give a talk during the general herpetofauna session, and deMaynadier, Moody, and Sutton will provide additional background and presentations during the separate PARCAs workshop. Loftin, deMaynadier and Moody have drafted an agenda for this workshop. Moody will also give a short presentation and poster at the annual Cooperative Meeting for the Maine Cooperative Fish and Wildlife Research Unit, held on the UMaine campus on 2 April.

Difficulties Encountered:

UMaine: Evaluating the results of the species distribution models has been a challenge. The most widely used method (area under the receiver operating characteristic curve, generally known as AUC) has significant problems. It may still be the best available method for evaluating model performance, but we are researching alternatives. We also are evaluating approaches (e.g., weighting) for combining the PARCA guideline metrics.

Clemson: None at this time.

AFWA: We continue to struggle to obtain species locality data in a timely fashion, particularly from Delaware who has agreed to provide these. We did not receive a response at all from Pennsylvania, and settled for lower resolution data Rhode Island.

Activities Anticipated Next Quarter:
1) (All) Continue monthly progress update conference calls among the team
2) (All) Prepare oral presentation and interactive workshop session for NEAFWA meeting on 14 April; Moody will also prepare a brief presentation for the Cooperative Meeting for the Maine Cooperative Fish and Wildlife Research Unit on 2 April.

3) (UMaine) Finish derived variables for northeastern region.
4) (UMaine): Share modelling framework and landscape variables with UMass Group (Dr. Mike Jones & Dr. Liz Willey) to allow them to run species distribution models for Blanding's Turtles and Wood Turtles and provide preliminary peer review of our proposed Maxent modeling methodology.
5) (UMaine) Evaluate draft protocol for PARCA delineations (based on Maine pilot effort) with stakeholders (based on discussion at the upcoming NEAFWA workshop).
6) (UMaine) Develop species distribution models and use in the PARCA delineation for the entire NA-LCC region.
7) (UMaine) Develop protocol for use by state biologists to assess the initial PARCAs.
8) (Clemson) Test vulnerability framework and make necessary adjustments to determine PARCA vulnerability.
9) (UMaine and Clemson) Designate PARCAs and begin determination of PARCA vulnerability

Expected End Date: Dec. 31, 2014

Costs:

Total life to date expenses (include this quarter): **$213,282.56** (Q4: $185,814.49 + 2014 Q1: $6,339.87 Clemson University + $20,607.03 UMaine + $521.17 AFWA)

Total Approved Budgeted Funds: **$315,902**

Are you within the approved budget plan and categories? YES

Signature:

Date: 23 April 2014