Final report for work performed at University of Georgia: "Assessing Priority Amphibian and Reptile Conservation Areas (PARCAs) and Vulnerability to Climate Change in the North Atlantic Landscape Conservation Cooperative"

University of Georgia PI: Dr. Kyle Barrett

University of Georgia Co-PIs: Nathan P Nibbelink, John C Maerz

Transfer request note: Dr. Kyle Barrett (PI) has recently taken a position as Assistant Professor of Wetland Ecology in the School of Agricultural, Forest, and Environmental Sciences (SAFES) at Clemson University. Dr. Barrett is requesting to transfer the remaining funding for the project listed above to his current institution. Toward that end, this document summarizes the current progress on the project so that the current University of Georgia agreement can be terminated and a new agreement between Wildlife Management Institute and Clemson can be initiated.

Progress Achieved

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.*

Barrett has maintained frequent contact with the PIs of the South Atlantic Landscape Conservation Cooperative (SALCC) PARCA team and southeastern state fish and wildlife agency personnel (monthly updates during Southeastern Partners in Amphibian and Reptile Conservation steering committee calls, and in person meetings on February 17, Fall Creek Falls State Park, TN; and September 11, Association of Fish and Wildlife Agencies meeting). During these meeting the SALCC team has shared several potential approaches to identifying PARCAs in the SALCC. During the February 17 meeting, we talked with state personnel, and state personnel responded with their own thoughts regarding PARCA identification in their specific areas of responsibility. The issues worked out in these meeting will greatly benefit the NALCC team's ability to streamline and implement a similar process with northeastern state fish and wildlife personnel.

Barrett has been in email contact with representatives of each state located within the NA-LCC to make the partner agencies aware of this project and the associated data needs, and we have established a database of state contacts to facilitate ongoing discussions among all members of the project (attached to the email submission of this document; "NA-LCC PARCA contacts.xlsx").

We have identified a species for the climate suitability modeling (attached to the email submission of this document; "NA-LCC_PARCA_splist.xlsx"). We have collected all publically available locality data for these species, and we have requested state-held locality data for each of them. We are now in the process of combining state-received data with those data already

acquired, and we are undergoing quality assessment / quality checking for all locality data. We have finalized data sharing agreements with Maryland, Virginia, and New York, but have only received data from Maryland.

***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.*

We are continuing to build and refine our species locality databases, which are essential for generating products associated with Objective 2. For some species, data have been obtained in sufficient quantity and quality to initiate model development. We've completed first-run modeling for: *Anaxyrus fowleri*, *Lithobates sylvaticus*, *Hyla andersonii*, *Ambystoma tigrinum* (Fig. 1 provides an example of a completed forecast for this species), *Cryptobranchus alleganiensis*, *Crotalus horridus*, and *Clemmys guttata*. Some of these may be modified if we were to receive data in certain data-poor areas of the species' range.

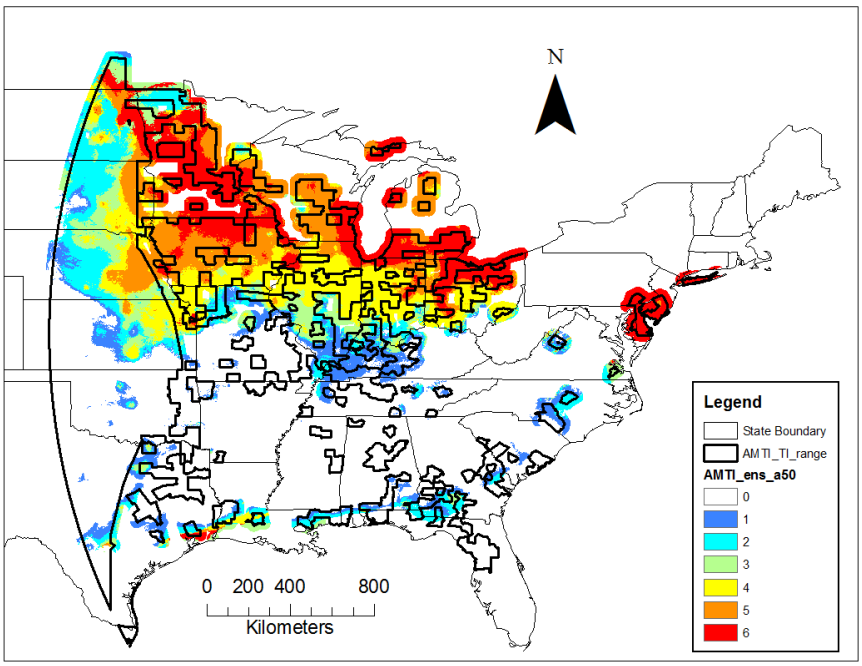

Fig. 1. A forecasted model of climatic suitability for *Ambystoma tigrinum tigrinum* (Eastern Tiger Salamander) under the A2a (high) greenhouse gas emissions scenario. We are also conducted runs of the B2a (moderate) greenhouse gas emissions scenario. These models indicate areas where future climates are (and are not) expected to match the climate envelope currently used by the species. These models do not forecast where the species is facing extirpation. Such models will help to identify the long-term viability of PARCAs.

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

This objective has not been addressed yet.

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.*

The Maine Cooperative Fish and Wildlife Research Unit will take lead on this Objective.

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

This objective cannot be addressed until all previous Objectives are complete.

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

This objective cannot be addressed until all previous Objectives are complete.

Summary of Progress: Our team continues to exchange updates frequently by email and we have held periodic conference calls among all team members. In addition to internal discussions, we have maintained contact with the SA-LCC team to ensure the NA-LCC project is as effective and efficient as possible. Recently, Barrett met with Chris Jenkins (a SA-LCC PARCA PI) during the Association of Fish and Wildlife Agencies meeting in Hilton Head, SC. During the AFWA meeting Barrett provided an update on both the NA-LCC and the SA-LCC projects to the Amphibian and Reptile Subcommittee for AFWA and solicited comments from the subcommittee and other attendees.

To date, all publically available georeferenced data for focal species have been collected, and additional, state-held, data have been requested from any state within the NALCC. We are also exploring the option of obtaining state data via a multi-jurisdictional data request through NatureServe. The data that are in hand are currently being compiled and quality checked. For several species (detailed under Objective 2 in the section above), data collection has been sufficient to allow for the creation of models.

Our team has progressed to the point that we are now implementing the full PARCA and PARCA climate resiliency portions of the project in Maine. This state will serve as a test of the full application of all methodologies and allow us to work out any needed adjustments before implementation across all NA-LCC states.

Barrett will be hiring a postdoctoral associate to assistant with the remaining project duties. This hire will be partially supported by the anticipated transfer of funds from WMI to Clemson University, and the remainder of support for the postdoc will be paid from startup funds provided

by the School of Agricultural, Forest, and Natural Resources to Barrett. The contribution of partial funding for a postdoctoral hire and the contribution of Barrett's time represent a significant resource contribution for this project that were unanticipated during the original submission of this proposal.