

Project Title: Identifying Climate Resilient Sites for Conservation of Terrestrial Species and Habitats in the Southeast

Headline Title: Resilient Sites in the Southeast

Brief Summary (Abstract): Conservationists need a method through which to conserve biological diversity while allowing species and communities to rearrange in response to a changing climate. We developed and tested such a method for southeast North America that we based on physical features associated with ecological diversity and site resilience to climate change. We comprehensively mapped 35 distinct geophysical settings based on geology and elevation. Within each geophysical setting, we identified sites that were both connected by natural cover and that had relatively more microclimates indicated by diverse topography and elevation gradients. We did this by scoring every 30 m cell in the region for these two characteristics and selecting those that scored $>SD\ 0.5$ above the mean combined score for each setting. We hypothesized that these high-scoring sites had the greatest resilience to climate change. This research is a companion to the Northeast Resilient Site project released in 2011, and covers nine southeast states: NC, SC, GA, FL, AL, TN, KY, WV, and VA. Because our method identifies – for every geophysical setting - sites that are the most likely to retain species and functions longer under a changing climate, it reveals natural strongholds for future conservation that would also capture substantial existing biodiversity and correct the bias in current secured lands.

Project Location: Southeast US (NC, SC, GA, FL, AL, TN, KY, WV, and VA)

Partners: This project was designed and led by The Nature Conservancy's Eastern Conservation Science office with a steering committee representative of nine states and including members of the US Fish and Wildlife's South Atlantic Landscape Conservation Cooperative, the Wildlands Institute, Georgia Department of Natural Resource, North Carolina and Florida Natural Heritage Programs, and the Open Space Institute, Data contributed by the Southeast Natural Heritage Programs and NatureServe.

Background: Biodiversity is threatened by climate change, and conservationists urgently require a way to prioritize strategic land conservation that will conserve biological diversity in spite of a changing climate. In 2010 we explored an approach which asserted that in addition to trying to protect biodiversity one-species at a time, it is important to protect the ultimate drivers of biodiversity. We tested how well geology predicted the species diversity of 14 US states and three Canadian provinces, using a comprehensive new spatial dataset and found that four factors; the number of geological classes, latitude, elevation range and the amount of calcareous bedrock, predicted species diversity with certainty (adj. $R^2 = 0.94$). Our results suggested that protecting geophysical settings will conserve the stage for current and future biodiversity and may be a robust alternative to species-level predictions. We expanded the test to include the Southeast states and in 2014 we completed this study adopting methods developed in the Northeast to identify sites for each geophysical setting that are the most likely to retain their native diversity.

Project Goals: Identify sites for each of 30 geophysical settings in the Southeast that are most likely to sustain native species diversity and ecological function in spite of a changing climate. f

Strategy Goals Implemented: Goal 2, Strategy 2.2, Action 2.2.1 Use vulnerability assessments to design and implement management actions at species to ecosystem scales, And Strategy 2.1, Action 2.1.3 Identify species and habitats particularly vulnerable to transition under climate change. The Nature Conservancy has integrated the results of this study into their land protection criteria as a filter to identify place likely to be resilience or vulnerable to climate change. The work was followed up by a 5.5 M land conservation fund from the Doris Duke Foundation.

Climate Impacts Addressed: Impacts on species and habitats. We specifically address the need for species to move and communities to continually rearrange in response to a changing climate.

Status of Project Implementation: Complete

Project Outcomes: A wall to wall map of the Southeast where every 30m cell and 1000 acre hexagon is identified as to its geophysical setting and scored for its resilience to climate change

Funding Sources: The Nature Conservancy, The Doris Duke Charitable Foundation.

Contact Info: The Nature Conservancy, Eastern Conservation Science, Eastern Regional Office, Boston, MA 02111. Dr. Mark Anderson, Director, manderson @tnc.org . Southeast Resilience Webpage <http://nature.ly/resilienceSE>

Photos/Attachments: Report and data: Anderson, M.G., A. Barnett, M. Clark, C. Ferree, A. Olivero Sheldon, and J.Prince. 2014. Resilient Sites for Terrestrial Conservation in the Southeast Region. The Nature Conservancy, Eastern Conservation Science. 127 pp. <http://nature.ly/resilienceSE>

Photo/Figure Credits (do we have permission to print): Yes

Suggested Photo Caption: Estimated of Climate Resilience for Sites in the Southeast. This map shows the places with the highest landscape diversity and local connectedness for each of 35 geophysical settings. Areas in brown are vulnerable to climate