Regional Climate Change—Science in the Southeast

"Management decisions made in response to climate change impacts must be informed by science and require that scientists work in tandem with those managers who are confronting climate change impacts and evaluating options to respond to such impacts."

—Secretary of the Interior Ken Salazar, Secretarial Order 3289 s 3b

U.S. Department of the Interior Regional Climate Science Centers

Resource managers are at the forefront of a new era of management. They must consider the potential impacts of climate change on the Nation's resources and proactively develop strategies for dealing with those impacts on plants, animals, and ecosystems. This requires rigorous, scientific understanding of environmental change.

The role of the U.S. Geological Survey (USGS) in this effort is to analyze climate-change data and develop tools for assessing how changing conditions are likely to impact resources. This information will assist federal, State, local, and tribal partners manage resources strategically. The 2008 Omnibus Budget Act and Secretarial Order 3289 established a new network of eight U.S. Department of the Interior Regional Climate Science Centers to provide technical support for resource managers. The Southeast Regional Assessment Project (SERAP) is the first regional assessment to be funded by the USGS National Climate Change and Wildlife Science Center (*http://nccw.usgs.gov/*). The USGS is working closely with the developing U.S. Department of the Interior Landscape Conservation Cooperatives to ensure that the project will meet the needs of resource managers in the Southeast. In addition, the U.S. Fish and Wildlife Service is providing resources to the SERAP to expand the scope of the project.

Flint River, Sprewell Bluff State Park, Upson County, Georgia. Photo by Alan M. Cressler, USGS.

Regional Assessments

The regional focus of the Climate Science Centers is key to providing science that is useful to resource managers. Regional assessments are a link between the planetary focus of the general circulation models (GCMs) and landscape-level dynamics that affect local resources. Regional models can analyze the interaction of global changes with local topography and ecosystems. This allows scientists to more precisely pinpoint factors driving change and to determine how these changes affect resources.

Red-cockaded woodpecker and brown-headed nuthatch photos courtesy of Will Stuart. Other photos by USGS.

Southeast Regional Assessment Project

SERAP will convert a suite of global models into regional climate projections and develop landscape change datasets that can be used to project the likely changes to the Southeast's climate and ecosystems. By concurrently downscaling global models while developing change-assessment tools for resource managers, SERAP teams can determine the best approaches for coupling models and effectively provide useful decision-making tools for assessing the impacts of climate change.

Downscaling

The USGS is deploying state-of-the science statistics to identify the parameters in global models that are most likely to affect the Southeast region's climate and local landscape dynamics. Decision makers will be provided with information about low-probability, high-impact climate extremes. The downscaled models then can be used by other SERAP research teams to conduct their assessments of regional change.

Relative Sea-Level Rise

To estimate local rates of sea-level rise along the Southeast's Gulf Coast, the USGS is factoring in parameters to represent local processes that affect land-surface elevation and other types of ecosystem changes. The team will design new tools for decision makers to visualize and assess change in coastal regions where a combination of inundation, land loss, and habitat change already is occurring and is expected to continue.

Inferring Changes to Habitat

The USGS is integrating models of urbanization and vegetation dynamics with the regional climate models to assess how landscape change could impact priority species. Models for North American land birds, for example, can predict locations where responses to climate change are most likely to occur, expressing results in terms of species persistence to help resource managers understand the long-term sustainability of bird populations. The basic modeling techniques can be applied later to other taxonomic groups.

Streams and Aquatic Habitat

Aquatic habitat is sensitive to streamflow, so the USGS is assessing how climate change can affect land cover and flow in river systems. The project team will experiment with a variety of resolutions for linking hydrology and land-cover data for analyzing streams

in the Apalachicola–Chattahoochee–Flint watershed to improve the ability to detect and project the condition of aquatic habitats. Decision makers will be consulted to determine priority species so that species-specific models can be developed and used to assess the vulnerability of fishes and mussels to climate change.

Optimizing Conservation

The USGS will work with stakeholders and managers across the Southeast to identify and assess landscape-level strategies for conserving multiple species. These strategies will incorporate predictions from downscaled climate models, sea-level rise, and changes to aquatic and terrestrial habitats.

Data Dissemination

The USGS is creating a Web-based data platform to readily share data and results from the SERAP. The platform also will host a comprehensive data library of high-resolution climate change projections for the continental United States that take into account a range of predictions.

Future Directions

The USGS continues to work closely with partners to identify further scientific-information needs and to design relevant decision-support tools to address these needs.

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