Report Challenges Common Ecological Assumption About Species Abundance

October 4 2006

A new report finds little empirical evidence to support a widely held ecological assumption that species are most abundant near the centers of their geographic ranges and decline in abundance near the ranges' edges.

"When we reviewed data from published studies that looked at species abundance at multiple sites across a range, we found almost no evidence that supported the so-called 'abundant-center hypothesis' and strong evidence that contradicted it," said Raphael D. Sagarin, associate director for oceans and coastal policy at Duke University's Nicholas Institute for Environmental Policy Solutions.

"This is troubling," Sagarin said, "because a lot of current thinking on ecological and evolutionary issues -- including how species will respond to climate change, how to identify probable locations of pest outbreaks, how genetic diversity is distributed among populations and where to locate habitat preserves -- has been based on the hypothesis."

The validity of these ideas now needs to be re-examined using empirical studies, he said.

Sagarin is one of the principal authors of the report, which appeared in the September 2006 issue of the journal *Trends in Ecology and Evolution*. Other authors are Steven D. Gaines of the University of California-Santa Barbara's Marine Science Institute and Department of Ecology, Evolution and Marine Biology; and Brian Gaylord of the University of California-Davis' Bodega Marine Laboratory and Section of Evolution and Ecology.

For their analysis, the authors reviewed not only published studies but also some new sets of data that they had compiled from field observations in a number of coastal locations of such invertebrate species as sea urchins, sea anemones and snails. They found that most of the studies showed that patterns of abundance were affected by a complex interplay of environmental, physical, biological, genetic and geographical factors that the abundant-center hypothesis failed to take into account.

Population clusters and high abundance sometimes occurred right at the geographic edges of the species' ranges, they found.

"Ecologists need to go back into the field and sample populations, taking advantage of new technologies that allow us to see what populations are actually like on scales not previously possible," Sagarin said. "In some way, it's a return to old-school ecology, but armed with high-tech tools we didn't have 30 years ago."

Advances in remote sensing, biophysical monitoring, ecological physiology, molecular genetics and genomics are rapidly enhancing scientists' ability to identify population and individual patterns across large spatial scales, he said. Scientists can collect data on such factors as growth rates, genetics, climate, human-caused impacts and species interactions in different parts of a population's range, and then look at the overlay of these variables and see the larger story, rather than making a simplifying assumption based on one variable.

"Theory and experimentation have their place," Sagarin said. "They can play important roles in helping us predict, in general, future changes in species' ranges due to climate change. But you need empirical field-based data to know, more specifically, how this is going to look on the ground. When a range shifts, is it going to look like the gradual arrival of a new species, or like an actual invasion? Theory alone can't tell us that."

Source: Duke University

Citation: Report Challenges Common Ecological Assumption About Species Abundance (2006, October 4) retrieved 20 April 2024 from https://phys.org/news/2006-10-common-ecological-assumption-species-abundance.html