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Gail Gallesich Brown

ECOLOGISTS SIMPLIFY POPULATION THEORY

Analyzing a single species in a food web is easier than it appears to be, according to scientists publishing in this week's issue of Nature._x000B__x000B_ Many species are generalist feeders; they eat many different prey or food types over their lifetime. These animals include oceanic and freshwater fish, bears, badgers and other mammals, many birds, and invertebrates like crabs. Populations of such species live in complex food webs._x000B__x000B_ "Nature is notoriously complex," said William W. Murdoch, first author of the paper and a professor of biology at the University of California, Santa Barbara. "Most species live in food webs that contain a multitude of other species, and most species interact with many other species. A central problem for ecologists is to understand the dynamics of populations of such species in spite of the great complexity."_x000B__x000B_ For almost a century, theoretical ecologists have hoped to study this problem by using simple mathematical models that usually contain only one or two species' populations. Over this same period, field studies of natural ecosystems have shown just how complicated they are, and how many interconnections there are among species._x000B__x000B_ This paper shows that scientists can understand the population dynamics of such generalists by assuming that they live alone in an environment where their food is supplied at a constant rate. _x000B__x000B_ "The very complexity of their connections to other prey species is paradoxically what allows this major simplification," said Murdoch. "They eat so many species, it is as if there is a constant food supply."_x000B__x000B_ The theory of population dynamics -- the balance of nature -- relates to whether or not the numbers of organisms in the population are stable or

not. If they fluctuate over time, do they show regular cycles (such as salmon, for example), and, if they do, how much do they fluctuate and why? In brief, the researchers are searching for the mechanisms that keep some populations stable and others unstable._x000B__x000B_The authors analyzed over 100 animal populations in the wild that exhibit cycles of population. They looked at approximately 60 or so that are generalist feeders. The period of the cycles of numbers (in other words the time between peak abundances) of generalist feeding organisms were all short, four or fewer times as long as it took the animal to become an adult. Those that feed only on one species have long periods, as predicted by the theory._x000B__x000B_ The researchers used a large database of ecological information at Imperial College in Canada._x000B__x000B_ Co-authors on the paper are B.E. Kendall of the Donald Bren School of Environmental Science and Management at UC Santa Barbara; R.M. Nisbet of the Department of Ecology, Evolution and Marine Biology at UC Santa Barbara; C. J. Briggs of the Department of Integrative Biology at UC Berkeley; E. McCauley of the Ecology Division, Biological Sciences at the University of Calgary, Calgary, Canada; and R. Bolser of the Department of Ecology, Evolution and Marine Biology at UC Santa Barbara._x000B__x000B__x000B_Contact: William W. Murdoch, (805) 893-4887, murdoch@lifesci.ucsb.edu_x000B_

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