Exploring connectivity in ecology: Distilling complexity with graphs
Christopher P. Brooks, Department of Biology, Colorado State University

Abstract
Among the few universal themes in ecology is that resources, energy, and organisms, themselves, are patchily distributed in space. This patchy distribution imposes a need for some dispersal or connectivity among spatially separate patches in order to allow organisms to acquire sufficient resources for survival. To date, general patterns of connectivity which ultimately describe the pattern of organization for a population have not emerged; likely because different species respond to different scales of patchiness. I propose a basic framework to control for such differences, and reveal potential generalities about how natural populations are organized. Using statistical methods and simple applications of graph theory and continuum percolation I demonstrate a general pattern of organization that suggests a statistical truncated fractal structure among populations in both a plant-pathogen system at an extent of $10^2$ square meters and gene flow in a salamander species across a sub-continental range. The consequences of this structure are discussed in the context of ecological and evolutionary theory.