

Challenges in the Quest for Keystones

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Abstract

Many ecologists believe that all species were not created equal. For example, it is well known that the most abundant species play a major role in controlling the rates and directions of many community and ecosystem processes. These dominant species are often crucial for the maintenance of their communities, because they typically provide the major energy flow and the three-dimensional structure that supports and shelters other organisms (Ashton 1992, Dayton 1985, Duran and Castilla 1989, Gentry and Dodson 1987, Paine and Suchanek 1983, Strong 1977). Many experiments, however, have demonstrated that some less abundant species, often called keystone species, also have strong effects on communities and ecosystems (e.g., Paine 1969). Keystone species differ from dominant species in that their effects are much larger than would be predicted from their abundance. Ambiguity in the use of the term keystone and the lack of an operational definition have led to criticism of its continued application in research and policy contexts (Mills et al. 1993, Simberloff 1991). In this article we clarify the keystone concept, discuss its relevance to management processes, and suggest additional research that needs to be performed.