

Traits matter: When rarity means more than abundance to functional diversity

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Rare species can significantly contribute to ecosystem stability and resiliency. Furthermore, wider taxonomic trees can support a wider range of functional diversity. These ideas with the notion that functional diversity leads to ecosystem resiliency suggest rare species can disproportionately increase taxonomic and functional diversity. To test this hypothesis, functional distinctness was used to estimate functional diversity, and average taxonomic distinctness to evaluate taxonomic diversity for rocky intertidal species assemblages sampled by three surveys separated by years examining a total 41 locations spanning the Gulf of Maine. Fifteen life-history and ecological traits were assigned to the 95 species observed using a total of 90 options. Species were ranked either rare or abundant using incidence. Influence of rarity on functional and taxonomic distinctness was appraised by comparing intact assemblages to ones where rare species (observed once per location) were removed to imitate rare species loss. For intact assemblages, functional and taxonomic distinctness correlated. However, rare species removal significantly decreased functional diversity for some assemblages while taxonomic diversity was less affected. Removal of abundant species produced no significant effects. Results demonstrate rare species can increase functional diversity without necessarily being rare taxonomically. Abundant species exert their effects through their numbers; mere presence makes no difference.