

Life-History Correlates of Depensation in Marine Fishes

Jeffrey A. Hutchings

Abstract

The study of depensation, or Allee effects, in marine fishes has been problematic. Limitations include confusion as to what actually constitutes ‘depensation’, insufficient data at the stock sizes at which depensation is likely to be manifest, and over-reliance on recruits-per-spawner as a metric of realized per capita rate of population growth, $r[\text{realized}]$. Put simply, the definition of depensation is the same as that of an Allee effect: a positive association between population size and $r[\text{realized}]$. Almost all studies of depensation have been based on statistical model-fitting of stock-recruit relationships. One under-appreciated fact is that such analyses can fail to detect depensation because of their implicit assumption that natural mortality remains constant with changes in stock size. Taking an alternative approach, I examine data on depleted populations whose trajectories since threat mitigation are consistent with the slow and uncertain recovery predicted by depensation. Results indicate that threat amelioration can be insufficient to generate recovery for stocks depleted to less than 10% of their maximum size, especially when they remain depleted for lengthy periods of time. Data will be examined to identify potential life-history correlates of depensatory population dynamics, by comparing attributes of stocks that have recovered following threat mitigation with those that have not.

Keywords: depensation, Allee effects, recovery, population thresholds, life history

Contact details: Jeffrey A. Hutchings, Department of Biology, Dalhousie University, CANADA; jhutch@dal.ca