Reduced fertility and asymptotics in a logistic two-sex model with age groups

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We propose a logistic two-sex model that includes three age groups separated by their reproductive status: juveniles who do not reproduce, adults at full reproductive capacity and older individuals who reproduce at a reduced rate. We show that pairings between individuals of different fertility rates may lead to multiple equilibria and bi-stability: the total population converges to different limits depending on its initial size. We show that this behavior is driven by transition rates from high to low fertility groups and by the frequency of pairing among the groups of various reproduction level. In some circumstances this is similar to an Allee effect caused not only by external factors such as low population density but also from varying fertility and from mating across groups.

References

[1] D. Maxin, F.A. Milner and L. Sega *Reduced fertility and asymptotics of the logistic model*. Mathematical Population Studies, 23.1 (2016):37-49

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[*]Mini-Symposium: Two-sex and other multi-species interactions in ecology and human population dynamics