

***Ecological Archives* E090-010-A6**

Jessica J. Kuang and Peter Chesson. 2009. Coexistence of annual plants: Generalist seed predation weakens the storage effect. *Ecology* 90:170–182.

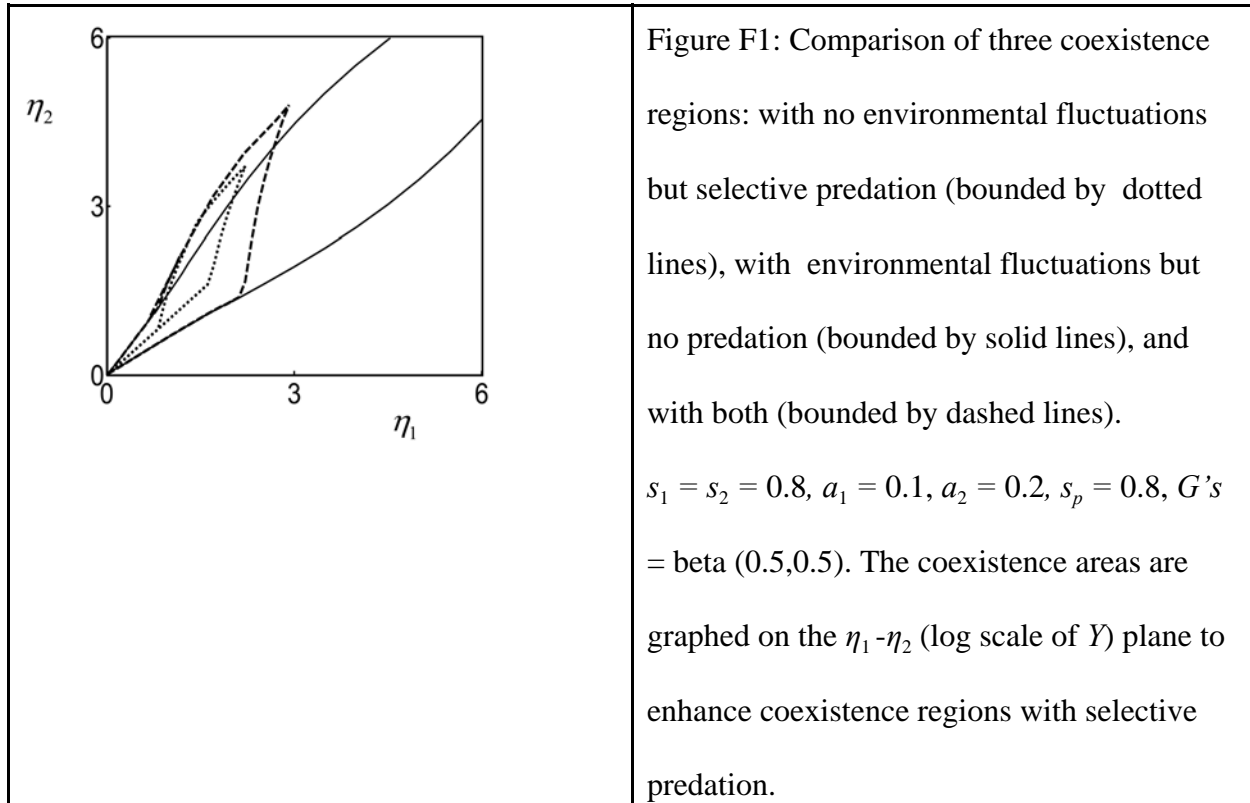
Appendix F. Selective predation

The text considers the effects of nonselective predation on species coexistence. Here we check the extent to which those findings hold up in the more realistic but more complex case of selective predation, i.e. when the attack rates, a , differ between species. However, attention is restricted to the case where the attack rates do not change with density, i.e. frequency dependence is not considered. It is well-known that selective predation can lead to coexistence when it is associated with a predation-competition tradeoff, as discussed in the text. That case is discussed for seed predation with the same model as we use here in Kuang and Chesson (2008). Although the existence of selective predation will allow coexistence in some situations where it would not be possible without it, selective predation might nevertheless continue to undermine the storage effect in a variable environment, with the potential of greatly reducing the coexistence region, as we have found here for the case of nonselective predation.

In the presence of selective predation and environmental fluctuations, the potential exists for three coexistence mechanisms: predation-competition tradeoffs, the storage effect, and another fluctuation-dependent mechanism termed *relative nonlinearity* (Chesson 1994) discussed for this model in a constant environment in Kuang and Chesson (2008). Our purpose here is not to disentangle the contributions from these different mechanisms, but instead simply to see how the coexistence region without predation changes when selective predation is added. In general we find that although selective predation does lead to some new opportunities for coexistence, it greatly reduces the coexistence region overall. We illustrate this outcome in Fig. F1.

Starting with selective predation, Fig. F1 shows that adding environment fluctuations increases the area of coexistence region: the region with the dotted boundary expands to the region with the dashed boundary. However, predation continues to undermine the effect of

environmental fluctuations: the area enclosed by the solid lines is replaced by the smaller region enclosed by the dashed lines. Thus, predation can contribute to coexistence through competition-predation tradeoffs, but the stronger mechanism, the storage effect, is undermined by predation, and overall predation has a strong negative effect on coexistence when the storage effect is present.



Literature Cited

- Chesson, P. 1994. Multispecies Competition in Variable Environments. *Theoretical Population Biology* **45**:227-276.
- Kuang, J. J., and P. Chesson. 2008. Predation-Competition Interaction for seasonally recruiting species. *American Naturalist* **171**:E119–E133.