1163-91-1127    **Robert Stephen Cantrell**, **Chris Cosner** and **King-Yeung Lam***, 100 Math Tower, 231 W 18th Avenue, Columbus, OH 43210. *Ideal Free Dispersal in Spatio-temporally Heterogeneous Habitats.* Preliminary report.

A population is said to have an ideal free distribution in a spatially heterogeneous but temporally constant environment if each of its members have chosen a fixed spatial location in a way that optimizes its individual fitness, allowing for the effects of crowding. In this paper, we extend the idea of individual fitness associated with a specific location in space to account for the full path that an individual organism takes in space and time over a periodic cycle, and extend the mathematical formulation of an ideal free distribution to general time periodic environments. We find that, as in many other cases, populations using dispersal strategies that can produce a generalized ideal free distribution have a competitive advantage relative to populations using strategies that do not produce an ideal free distribution. A sharp criterion on the environmental functions is found to be necessary and sufficient for such ideal free distribution to be feasible. In the case the criterion is met, we showed that there exist dispersal strategies that can be identified as producing a time-periodic version of an ideal free distribution, and such strategies are evolutionarily steady and are neighborhood invaders from the viewpoint of adaptive dynamics. (Received September 14, 2020)

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