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Critical Patch Size Problems for a Changing World.

We consider a stage-structured population model consisting of mobile adult insects and sessile (or nearly so) juveniles. In contrast to previous stage-structured models, we assume that adult insects breed continuously over a window of time corresponding to the adult lifespan. Consequently, juvenile recruitment depends on the length of time available for reproduction. This, in turn, is a function of the length of the adult lifespan as well as the timing of resource availability (e.g. nectar or host plants necessary for reproduction). Assuming that larvae can only survive within a predefined patch (e.g. where host plants are found), but that adults can survive anywhere on the landscape, we derive an expression for the critical patch size necessary to support a viable insect population. Because the timing of insect emergence relative to resource emergence affects the level of juvenile recruitment, we find that the critical patch size is a function of the mismatch between insect and resource phenology. Implications with respect to species conservation in the face of global change are discussed. (Received August 12, 2013)