1011-92-391 **James Powell*** (jim.powell@math.usu.edu), Department of Mathematics and Statistics, Utah State University, UMC 3900, Logan, UT 84322-3900. *Modelling the Evolution of Life Cycle Timing.*

Cold blooded (poikilothermic) organisms develop through a sequence of life stages at rates directly (but nonlinearly) related to environmental temperatures. This nonlinear dependence, together with seasonal temperature swings, can serve to suynchronize the developmental timing of poikilotherms. Such seasonal synchrony is highly adaptive, enhancing chances of finding mates, avoiding predators, and foraging on ephemeral resources. Climate change threatens to destroy this seasonal timing, and possible persistence of a species depends on a foot race between desynchronizing climate change and the species' ability to adapt. We couple existing models for phenology (developmental timing) with quantitative genetic theory to predict how phenological parameters can be expected to evolve. Stability analysis, using a test function and steepest descents methods, indicates that parametrically marginal states are evolutionarily stable, but with very slow convergence. Real-world species are likely to be in a transient state which positions them to respond to short term survival challenges via developmental plasticity. Results are discussed in the context of Mountain Pine Beetle, a native-invasive species in North America currently beginning a continental-scale outbreak in Canada. (Received August 31, 2005)