Woods Hole Oceanographic Institution Biology Department Seminar

Thursday, February 28, 2013 Redfield Auditorium - 12:00 Noon

A seasonal, density-dependent model for the management of an invasive weed

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Harvest, the often selective removal of individuals from a population, underlies the management of resource, invasive, and conserved species alike. However, the population effects of harvest depend on complex interactions between many factors, including density dependence, seasonality, stage structure, and management timing. Modeling these factors requires a framework that incorporates seasonal density dependence with stage- and seasonally-selective harvest. Here, I present such a framework using periodic nonlinear matrix population models and applying newly-developed perturbation analyses to determine how population densities respond to changes in harvest and demographic parameters. I have used this modeling framework to examine the effects of popular control strategies and demographic perturbations on the invasive weed garlic mustard (Alliaria petiolata). Seasonality, in both management timing and population observation, is a major factor in harvest outcomes. Strategies that reduce densities in one season can drive increases in another, leading to compensatory effects that invasive species managers should avoid. Conversely, demographic parameters to which density is very elastic may indicate promising management targets.