

**Modeling Bioinvasions:  
Some Preliminary Results**

**By  
James E. Wilen**

**Abstract**

There is increasing alarm among ecologists and biologists about bioinvasions, particularly of organisms that are newly and inadvertently introduced into ecosystems. Some examples that have gotten recent attention include plants such as black wattle and arundo donax, marine organisms including the zebra mussel, round goby, seastar, and green crab, and insects such as the honey bee mite, Asian tiger mosquito and fire ant. These are all cases of biological organisms that diffuse over space under natural and human-mitigated means. The general policy problem of bioinvasives is actually a subset of a wider class of spatial-dynamic control problems that economists have not paid much attention to. Other examples of spatial-dynamic management problems include: epidemics, groundwater aquifer management, metapopulation management, subsurface contamination, etc. The basic economic question raised in all of these examples is: how do we manage these spatial-dynamic processes? In particular, in the bioinvasions case, how, when, where and at what intensity should management efforts be introduced to control the invasion? I will start this talk by discussing some mathematics used to describe bioinvasions. Then I will discuss a simple model of optimal management and some preliminary results.