

Meeting: 1003, Atlanta, Georgia, SS 18A, AMS-SIAM Special Session on Recent Advances in Mathematical Ecology, I

1003-92-1193 **Paula Federico*** (pfederic@utk.edu), 1416 Circle Drive, 569 Dabney Hall, Dept Ecol and Evol Biology, Knoxville, TN 37996-1610, and **A. Nelly Correa-Sandoval, William E. Grant** and **Thomas G. Hallam**. *Valuing the Agricultural Pest Control Service Provided by Brazilian Free-tailed Bats (*Tadarida brasiliensis*) in South Texas through mathematical models*. Preliminary report.

The diet of Brazilian free-tailed bats (*Tadarida brasiliensis*) in southern Texas during the summer includes significant proportions of major crop pests in the area such as bollworm (*Helicoverpa zea*) and fall armyworm (*Spodoptera frugiperda*). The significant natural agricultural pest control service that these bats provide has both a direct economic impact and an avoided costs component. We have developed a mathematical model based on difference equations that describes bat and bollworm population dynamics in cotton crops in southwestern Texas during the summer. The model focuses on the direct ecological and economic impact of bats by simulating scenarios such as changes in bat population numbers and different patterns of insect migration. Number and timing of pesticide applications, cotton yield and number of insects emigrating from the crops are used as main response variables to analyze the economic impact of the bats. At a local scale, the presence of bats in the ecosystem may reduce up to 2 out of 4 pesticide applications during the cotton-growing season. At a broader scale, the avoided costs may be quantified in terms of the consumption of adult moths by bats, which significantly reduce the emigrating numbers of insects that would infest crops in northern areas. (Received October 04, 2004)