Can Modeling Save Florida's Native Bromeliads from the Evil Weevil?

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The large, long-lived, epiphytic bromeliads *Tillandsia utriculata* and *Tillandsia fasciculata* are currently listed as endangered in Florida due to significant population reduction from predation by an invasive weevil, *Metamasius callizona* (colloquially known as the "evil weevil"). We have developed demographic models of Florida populations of *T. utriculata* and *T. fasciculata* using stage-structured Lefkovitch matrices. Model analysis is used to determine the minimum germination rate required for population viability in the presence and absence of weevil predation, and the conditions under which a population diminished by weevil predation can rebound. Additionally, we reframe the *T. utriculata* model as an optimal control problem with a seed bank state to determine optimal seed banking strategies (a promising conservation strategy currently under consideration).