A Push-Pull IPM Scheme for the Protection of Barn Owl Nest Boxes and Cane Workers from Invasive Africanized Honey Bees

Caroline Efstathion[1], William Kern[1], Richard Raid[2], and Timothy Lang[2]
University of Florida, IFAS, [1]Ft. Lauderdale Research & Education Center, Ft. Lauderdale, FL
[2]Everglades Research & Education Center, Belle Glade, FL (contact: rnraid@ufl.edu)

Fig. 1. Barn owls are one of nature's most efficient rodent predators. A single pair of nesting barn owls may eliminate several thousand rodents per year.

Background

Consisting of over 700,000 acres of organic soils, the Everglades Agricultural Area (EAA) of south Florida is some of the most productive land in the U.S. Supporting sugarcane, rice, sod, and vegetable production, it is also a haven for millions of rodent pests. Since 1994, the University of Florida has sponsored a sustainable rodent control program featuring barn owls (*Tyto alba*), one of nature's most prodigious rodent predators. With suitable nesting sites being the limiting factor, the program promotes the widespread use of barn owl nesting boxes to serve as housing. Barn owls readily make use of the boxes for both nesting and roosting and their populations have flourished. The program has been widely accepted by the local agricultural industry, resulting in: 1) less rodent damage to sugarcane, 2) reductions in the use of toxic rodenticides, and 3) an increase in barn owl densities. Classified as "threatened" throughout much of its range, south Florida now supports some of the highest barn owl densities in North America, due primarily to the UF nesting box program.

Fig. 2. Barns owls readily accept nesting boxes, supporting two broods per year in FL. With rodents causing $30 million dollars in losses per year to sugarcane and other crops, their use has reduced both rodent damage and rodenticide use.

The Problem

Since its first report in Florida in 2005, the Africanized Honey Bee (*Apis mellifera scutellata,* AHB) has quickly expanded its range and has become problematic, establishing hives in unexpected, and frequently, hidden locations. Unfortunately, barn owl nesting boxes ideally fit their needs. AHBs now routinely displace barns owls from their boxes and seriously jeopardized this highly successful IPM program for sustainable rodent control. Due to their defensive nature, they also pose a serious and even mortal danger to any humans that disturb their hives.

The Proposed Solution

To deter AHBs from taking up residence in owl nesting boxes, we have proposed a Push-Pull IPM method. This technique uses an insecticide, permethrin, that is highly repellent to bees but of low toxicity to avian species, to keep the bees out of nesting boxes (push), while at the same time, attracting them to "swarm traps " using an artificial pheromone (pull). Swarm traps, mounted on posts 6 feet above ground, are easily monitored and are removed immediately following colonization to a quarantine area where they pose no threat. There, plans are to renovate the hives using European honey bee queens to form docile, commercially acceptable hives that can be used for pollination and honey production.

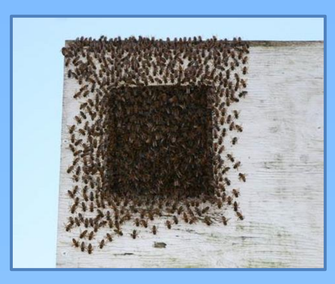

Fig. 3. The proliferation of Africanized bees in FL seriously threatens both wildlife and humans. They have displaced dozens of barn owls from their nesting boxes and ag workers have died from their stings.

Outreach and Extension

Swarming as many as 2 to 4 times more frequently than their European counterparts, AHBs are in constant search for suitable hive locations. Along with nesting boxes, AHBs also colonize drainage culverts, farm buildings, tractors, piles of shipping pallets, and even holes in the ground. Hives in any of these locations may pose a significant threat to farm workers who unintentionally disturb their hives. Along with the research, agricultural producers in the EAA are being surveyed to calculate the extent of the problem and safety programs are being developed on how to identify feral hives and safely deal with them.

Fig. 4

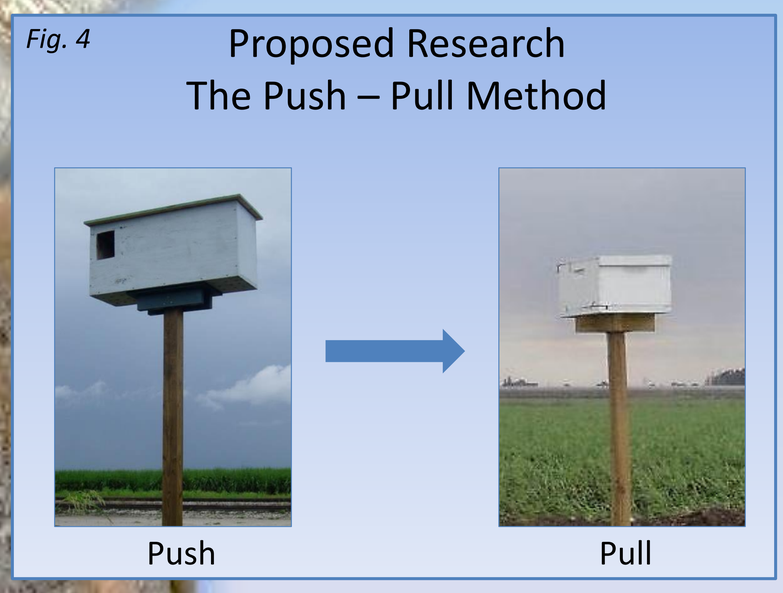

Fig.5. Pheromones are used to draw feral AHB swarms to bait hives. Mounted on six-ft posts, these are easily monitored and are immediately removed for safety and renovation, thus preserving valuable pollinators.

Fig. 5. Barn owl health and safety are also being measured. Hatching and fledging success are being monitored, as well as stress levels of owlets.

Preliminary results reveal no negatives, and actually, a reduction in parasitism by hemato-phagous insects that afflict barn owls, such as mosquitoes and mites.

Preliminary Results & Future Plans

Early results are encouraging. Of 60 nesting boxes Involved in the study, only 2 were colonized by AHBs, and those were among the controls not treated with permethrin. In contrast, 33 of 60 swarm hives baited with the attractant pheromone were colonized over the 3-mo period. This demonstrates the proclivity of AHB to swarm. Hive renovation results also appear promising. and monitoring of barn owl nesting success and hatchling vigor reveals no negative impact. With the shortage of honey bees currently being experienced in the U.S. due to Colony Collapse Disorder, it is hoped that this project may present a partial solution by augmenting supplies of pollinators. Funding for an expansion of this research is pending.

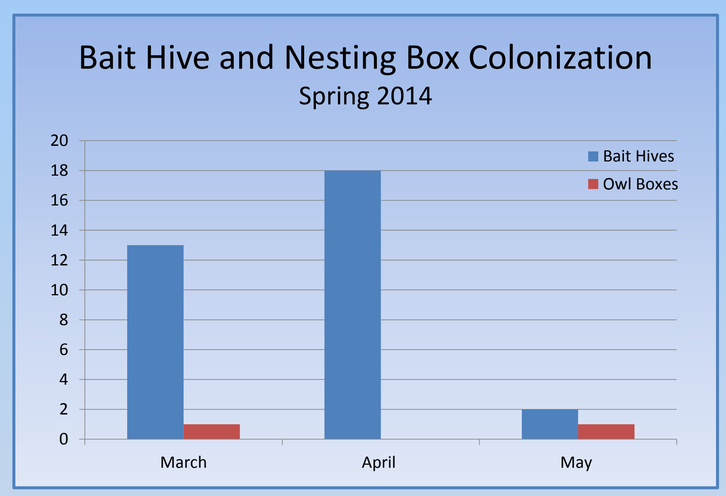

Fig. 6. Preliminary results indicate the push-pull method is working. During Spring 2014, feral bee swarms colonized only 2 of 60 owl nesting boxes (both untreated controls,) while colonizing 33 of 60 bait hives.

Fig. 7. The ultimate goal is to renovate AHB hives removed from locations endangering wildlife and humans , producing viable commercial hives. This will assist in solving Colony Collapse Disorder, a crisis of national importance