



CLEARED

For Open Publication

# Managing Invasive Ants as New and Emerging Threats to Endangered Insect Species on DoD Lands in Hawai'i

Project # 18-844

Aug 16, 2021

Department of Defense

## Background: OFFICE OF PREPUBLICATION AND SECURITY REVIEW

Natural resource managers on DoD installations are mandated to manage for federally listed threatened and endangered (T&E) species that may be impacted by training on their lands. At least four species of endangered picture-winged *Drosophila* flies and one to two species of endangered yellow-faced *Hylaeus* bees occur on lands used by the Army, Navy and Marine Corps in Hawai'i. All of these species share a common vulnerability to predation and population depletion by invasive ant species. Management of T&E insect populations may therefore require the ongoing, periodic suppression of invasive ants that are now beyond the point of eradication, in order to allow rare native populations to recover and stabilize.

## Objective:

This project aimed to fulfill two main objectives: 1) conduct invasive ant distribution mapping around T&E insect breeding habitats across a number of DoD installations on the islands of O'ahu and Kaua'i, including sites being considered for re-introduction of listed species to meet stabilization goals; 2) conduct efficacy and non-target risk studies for two different ant control approaches that target two different groups of invasive ants that currently impact T&E insects on DoD lands.

## Summary of Approach:

Ants were surveyed in four areas covering the main known breeding sites of T&E insects occurring on or near Marine Corps Base Hawai'i, Schofield Barracks Army Base, Dillingham Military Reservation, and Pacific Missile Range Facility. Non-target impacts of broadcasting Amdro Ant Block bait on ground-dwelling invertebrates was assessed, as was attractiveness of Amdro to picture-winged flies. Three types of water-storing granules were evaluated for rate of water retention, attractiveness to ants, and efficacy for delivering sugar water bait and active ingredients to two ant species in two different environments. Three pesticide active ingredients were evaluated for repellency and efficacy for controlling ants when formulated in water storing granules. Non-target risks and levels of pesticide residues produced were also evaluated for the water storing granule control method.

## Benefit:

Information on the distribution of invasive ants in relation to T&E insect breeding habitats on DoD lands, and tools for mitigating their impacts, are of direct relevance for DoD land managers attempting to meet their compliance obligations, under the US Endangered Species Act, of stabilizing these listed insect species. Such information and tools also advance installation objectives to control invasive species under the Invasive Species Executive Order, and contribute to the overall ecological health of military-operated natural areas as dictated under the Sikes Act. Baseline documentation of the ant species present at the breeding sites of listed insect species is prerequisite information needed in order to develop any subsequent management strategies concerning invasive ants. Effective, efficient, and safe methods for controlling problematic invasive ants are critical to recovery of listed insect species.



Yellow crazy ants (*Anoplolepis gracilipes*) attracted to a bait card used to survey endangered yellow-faced bee habitat at Marine Corps Base Hawaii.





## Managing invasive ants as new and emerging threats to endangered insect species on DoD lands in Hawai'i

Project # 18-844

### Accomplishments:

All installations were successfully surveyed, detecting a total of 22 ant species at over 7400 sampling points in and around T&E insect breeding sites. Ant species prevalence and relative abundance were summarized, and management recommendations for each installation were provided.

It was determined that broadcast of Amdro Ant Block bait is effective for long-term suppression of the damaging thief ant *Solenopsis papuana* in mesic montane forests, and should pose little risk to non-target ground-dwelling invertebrate communities as well as to endangered picture-winged flies. A single broadcast application of the bait strongly suppressed abundances of *S. papuana* for at least six months, with somewhat weaker effects persisting for up to one year. The bait broadcast did not appear to have strong negative impacts on non-target invertebrates in these forests, and laboratory trials suggested that picture-winged flies are not strongly attracted to the bait.

Three types of water-storing granules (WSG) were found to be effective bait and pesticide delivery tools for the control of ant species attracted to sugar water, which are common in endangered yellow-faced bee breeding habitats. Bait preference trials found little evidence of differential attractiveness among the WSG types for three ant species tested (*Linepithema humile*, *Anoplolepis gracilipes*, and *Wasmannia auropunctata*). Repellency trials, however, found that different ant species are sensitive to different pesticide active ingredients. Field efficacy trials found that indoxacarb at 0.05% concentration is highly effective in reducing densities of *L. humile*, and thiamethoxam at 0.0005% concentration exerts good but possibly inconsistent control of *L. humile*. For *A. gracilipes*, dinotefuran formulated at 0.05% or 0.005% yielded good control, while formulations with indoxacarb generally performed more poorly. Despite differences in drying rates among the three WSG types, all three were highly successful in controlling both *L. humile* and *A. gracilipes* when formulated with the right active ingredients and concentrations.

Non-target attraction to WSG baits was assessed through video observation and protein marking methods. Both suggested that pollinating insects are not strongly attracted to the granules, but will readily

feed on the granules if encountered near flowers. Several taxa, including some native species, were regularly marked when collected in field plots where WSG were broadcast, indicating that some non-target mortality can be expected. Some indirect exposure to the active ingredients may also occur via pesticide residues. Residues were generally relatively low in comparison to other pesticide application methods, but pesticide behavior and persistence in the environment is dependent on many complex factors, and these would need to be considered when using this ant control method.



Laboratory cage and video equipment used to assess attractiveness of Amdro Ant Block bait to endangered picture-winged flies.

### Contact Information:

Paul Krushelnycky  
Assistant Researcher  
University of Hawai'i at Mānoa  
3050 Maile Way, Gilmore 310, Honolulu, HI 96822  
Phone: 808-956-8261  
Fax: 808-956-2428  
Email: pauldk@hawaii.edu

