

Title

Assessing the presence and distribution of 19 Hawaiian yellow-faced bee species proposed for endangered species status, and/or designated as species of concern, on lands adjacent to military installations on Oahu and Hawaii Island

Project Synopsis

We propose to assess the presence and distribution of 19 native Hawaiian yellow-faced bee species (*Hylaeus* spp.) on lands adjacent to military installations on Oahu and Hawaii Island. Five of these species (*H. anthracinus*, *H. assimulans*, *H. facilis*, *H. kuakea*, and *H. mana*) are currently under review for endangered species status; the remainder are species of concern or otherwise rare, and therefore may appear in future endangered species proposals. The discovery of populations on adjacent lands will enable greater flexibility for the Army and Navy to conduct offsite mitigation if the yellow-faced bee species are listed. Alternatively, if many additional populations of a given *Hylaeus* species are discovered, it is possible that the species will not be recommended for listing. In either case, information obtained during the course of these biological surveys will enable continued use of Oahu and Hawaii Island military lands for training, and facilitate military preparedness in Hawaii and the greater Pacific region.

Abstract

Native Hawaiian yellow-faced bees in the genus *Hylaeus* (Hymenoptera: Colletidae) have adapted to a wide array of habitat types ranging from coastal strand to high elevation wet forests. These solitary bees are important pollinators of native Hawaiian plants and trees in every environment in which they occur. Early naturalist R.C.L. Perkins described Hawaiian yellow-faced bees as “almost the most ubiquitous of any Hawaiian insects” during surveys he conducted in Hawaii during the late 19th century. However, like much of the native biota, yellow-faced bees, once so abundant across the Hawaiian Islands, have experienced dramatic range reductions, population declines and possibly extinctions over the last 100 years. As a consequence, thirty-three yellow-faced bee species were placed on the U.S. Fish and Wildlife Service Category 2 candidate list, and were later reclassified as “Species of Concern” (SOC) in 1996. In March 2009 an invertebrate conservation organization, The Xerces Society, petitioned for the federal listing of seven species of yellow-faced bees, citing that there are sufficient data which show the species to be at imminent risk of extinction. In June 2010, the U.S. Fish and Wildlife Service responded by publishing a 90-day finding for the seven species (*Hylaeus anthracinus*, *H. assimulans*, *H. facilis*, *H. hilaris*, *H. kuakea*, *H. longiceps*, and *H. mana*).

There remains a significant dearth of information available for most yellow-faced bee species, including data on distribution, biology, ecology and host plant use. Most recent distribution and abundance data are based on only one or two visits to each field site. The U.S. Fish and Wildlife Service is currently seeking any information available on the proposed endangered (PE) species to assist with determining whether endangered species status is warranted. In a February 2010 DoD Pacific Islands Region Threatened, Endangered, and At-Risk Species Workshop-II, the need to “conduct research to acquire basic life history information and data for invertebrate species” was recognized and identified as a “high” priority for the DoD. Furthermore, all *Hylaeus* species have been identified as Species of Greatest Conservation Need in the Hawaii Statewide Comprehensive Wildlife Conservation Strategy, and research priorities for the species include to “conduct surveys to determine the distribution and abundance of known

hymenopterans”, and to “conduct studies to document the biology, habitat requirements, and life history.”

Based on the available data, we know that five of the seven PE yellow-faced bees (*Hylaeus anthracinus*, *H. assimulans*, *H. facilis*, *H. kuakea*, and *H. mana*) have recently been, or are likely to be, documented on Army and Navy lands on Oahu and Hawaii Island. Oahu in particular contains multiple important military installations, including Kawaihoa and Kahuku Training Areas, Schofield Army Barracks, Makua Military Reservation, and Naval Magazine Lualualei, while Hawaii has the extensive Pohakuloa Training Area. The listing of the yellow-faced bee species would result in the immediate need to implement costly and labor intensive T/E species survey, management and mitigation on many of these installations. For example, one species, *H. kuakea*, has only ever been identified from Schofield Army Barracks land. Based on the limited information currently available for the yellow-faced bee species, designation of endangered species status will adversely affect unrestricted military access to lands, consequently limiting training opportunities and potentially impacting military readiness.

In addition to those already proposed for listing, 11 SOC yellow-faced bee species have been found within or adjacent to these military lands, six on Oahu and five on Hawaii. An additional three species not included in the SOC listing are also considered extremely rare due to only one or two recent collections (two of these were not described at the time). With increased attention being paid to invertebrate conservation, and particularly the role of pollinators such as bees, it is likely that more will be proposed for endangered status. Such a scenario is especially likely under the current state of limited geographic sampling for many of these species.

In order to prepare for the potential listing of these species, we propose to assess the presence and distribution of *H. anthracinus*, *H. assimulans*, *H. facilis*, *H. kuakea*, and *H. mana* on state and private lands adjacent or with similar habitats to Oahu and Hawaii Island military installations. We will also survey for the 14 yellow-faced bee species that could potentially affect military lands in future listing proposals: the 11 SOC species (*H. anomalus*, *H. dimidiatus*, *H. filicum*, *H. flavipes*, *H. fuscipennis*, *H. hula*, *H. kona*, *H. laetus*, *H. ombrias*, *H. specularis*, and *H. volatilis*), and three additional rare species (*H. akoko*, *H. paradoxicus*, and *H. n. sp. 'makaha'*). It is likely that surveys conducted on state and private lands could identify additional populations of the species. The discovery of populations on adjacent lands would enable greater flexibility for the Army and Navy to conduct offsite mitigation if the species are indeed listed. Alternatively, if many additional populations of a given *Hylaeus* species are discovered, particularly on more distant sites, it is less likely that the species will be recommended for endangered status. In either scenario, the data collected on yellow-faced bee distribution has the potential to facilitate current and future endangered plant restoration projects by Army and Navy Environmental programs. The Army and Navy currently mitigate for many endangered Hawaiian plants species, and yellow-faced bees are known to be important pollinators of most keystone tree and shrub species. For example, *Hylaeus* provide pollination services for the threatened tree *Chamaesyce olowaluana*, which is the target of restoration work at Pohakuloa Training Area, and related endangered species, *C. herbstii*, which is the subject of recovery efforts by Army Environmental staff on Oahu.

Once populations are located, U.S. Fish and Wildlife Service, the State of Hawaii, Army and/or Navy will have the option to initiate long-term monitoring, assess population stability, gather needed data on host plant and habitat use, and assess future management needs. Such proactive data collections could ensure preparedness if the listings are revisited, as is common when USFWS issues a “warranted but precluded” decision for a species under review.

Benefits to military

The proposed work will directly benefit personnel at Schofield Army Barracks, Makua Military Reservation, Naval Magazine Lualualei, and Kawaihoa, Kahuku and Pohakuloa Training Areas. Data collected during the course of the project will help minimize and/or eliminate costly and labor intensive T/E species management and mitigation measures which limit the ability of military personnel to train unrestricted at Hawaii installations. Furthermore, the information will expand knowledge on distribution and abundance of the proposed yellow-faced bee species and SOCs, to better inform decisions on endangered species listing. Ultimately data may be used to create more accurate distribution prediction models and enable the completion of targeted surveys for *Hylaeus* spp. Army and Navy natural resource management programs responsible for endangered plant restoration will also benefit from this survey program, as resource managers will be able to integrate plant and pollinator information to maximize effectiveness of mandated restoration efforts.

Deliverables

The information collected will be used to produce updated collection localities and distribution maps for each of the 19 *Hylaeus* spp. A yearly report which summarizes all survey activities will be completed and submitted to the DoD Legacy Program, and provided as reference to the U.S. Fish and Wildlife Service, and the State of Hawaii Dept. of Land and Natural Resources, Division of Forestry and Wildlife. Following project completion, any voucher specimens that were collected will be made available for accession into the Bishop Museum Insect Collection.

Budget

The total amount requested is \$113,786.64. This budget will support 1 full-time entomologist/researcher for one year. The salary level is for a Master’s Degree or PhD level individual, as the field, laboratory and taxonomic expertise required to complete this survey is substantial. The fringe category represents 38% of the salary amount. Supplies will include basic entomological collecting supplies (vials, nets, aspirators, etc.) as well as personal protective equipment (boots, first aid supplies, etc.) Travel costs include airfare between islands, car rental, and per diem for the minimum 128 field days this project will require, in addition to helicopter time for remote access sites. Administrative costs are estimated based on a 3% cost which DLNR-DOFAW will require, as well as the 11% which the Research Corporation of the University of Hawaii would require to administer the grant. If we are able to administer this grant through the University of Hawaii, the administrative costs may be lower, and the budget may be adjusted accordingly.

A total match of \$17,976.60 is available. The Department of Land and Natural Resources, Division of Forestry and Wildlife (DOFAW) Entomologist will provide a 25% salary match. The use of DOFAW vehicles will also be possible for field work occurring on Oahu, and will be used

as in-kind match. The cost match for vehicle use is calculated at the standard federal rate (\$0.50/mile) based on an average of 75 miles/trip.

Item	Cost	Match
Salary	51312.00	15951.60
Fringe	19498.56	
Supplies	2000.00	
Travel	27002.28	2025.00
subtotal	99812.84	
Admin. costs	13973.80	
total	113786.64	17976.60