



Hawaii's Native Bees - Nalo Meli Maoli

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With increasing worldwide awareness of the decline of pollinators, there is now great interest in promoting the diversity and abundance of wild bees as alternatives to imported honeybees. But most of the information is produced in mainland North America and is geared towards the bees found there. What about Hawai'i's native bees?

As the most isolated island archipelago in the world, Hawai'i had a truly unique biological history until the arrival of humans. No other region had both so little interchange with other islands or continents, and had so many local endemic species evolve. Only one type of bee managed to successfully

reach the islands on its own – a yellow-faced bee, *Hylaeus*. From that one original colonist they evolved into 63 known endemic species, about 10% of the world's yellow-faced bees and more than are found in this genus in all of North America. With no other bees to compete with, they spread to all habitats

in the islands, from the wettest to the driest forests, and from the shore within reach of the sea, to the alpine desert near 10,000 feet on Mauna Kea and Haleakalā where they visit silversword flowers. The great naturalist R.C.L. Perkins called them “almost the most ubiquitous of any Hawaiian insects.”



The rare Hylaeus psammobius, found on the coast of Maui and formerly Hawaii, concentrating nectar by holding a drop between its mandibles to evaporate the water. Unlike most bees, Hylaeus carry pollen internally in the crop instead of on body hairs, so the nectar is cloudy with pollen grains.

Hylaeus sphecodoides, one of the five Hawaiian cuckoo bees, at Hakalau National Wildlife Refuge.



- nalo = fly (or flying bug)
- meli = honey
- nalo meli = bee
- maoli = native
- nalo meli maoli = native bees

The Hawaiian bees are also evolutionarily unique. About 1/4 of all bees worldwide are cleptoparasites, or cuckoo bees – instead of visiting flowers and collecting pollen and nectar, they lay their eggs in the nests of other species. The larva then hatches and feeds on the stored food, either killing the host egg or larva directly or causing it to starve. This behavior has evolved multiple times among bees, but is absent from the family Colletidae, to which *Hylaeus* belongs – except for the Hawaiian bees, where a group of five related species have developed this lifestyle.

They are important pollinators of many of the most important trees and shrubs of Hawai'i – 'Ōhi'a lehua (*Metrosideros polymorpha*) and 'Ōlapa (*Cheirodendron* spp.) in wet forests; māmane (*Sophora chrysophylla*), naio (*Myoporum sandwicense*), 'akoko (*Chamaesyce* spp.), 'a'ali'i (*Dodonaea sandwicensis*), and pūkiawe (*Leptecophylla tameiameia*) in dry forests and shrublands; silverswords and their relatives (*Argyroxiphium* and *Dubautia* spp.) and nohoanu (*Geranium* spp.) in subalpine areas; and naupaka (*Scaevola taccada*), 'ohai (*Sesbania tomentosa*), pā'ū o Hi'iaka (*Jacquemontia ovalifolia*), and 'ilima (*Sida fallax*) at the coast. While honeybees also visit these plants, they often act as nectar robbers, using their long tongues to reach the nectar without pollinating the flower.



Two *Hylaeus nivicola* on a native geranium (nohoanu), Haleakala National Park.

But as change came to the islands – first with the arrival of the Polynesian people over 800 years ago, and accelerating dramatically after European contact in the late 1700's – the native diversity has been under pressure to change faster than it can adapt. Having evolved in isolation with no native mammals aside from a bat, and a relatively low natural fire frequency, the native plants were unprepared for the alterations brought by humans. While fire has always been present, the new plants introduced intentionally or accidentally by people recolonize burned areas quickly and exclude native ones. Rats, followed by cattle, goats, pigs, and sheep, radically altered the vegetation, changing forests to grasslands and preventing reproduction of some of the most important native plants. Even earthworms, often thought of as beneficial, have had a dramatic effect by changing the nutrient balance in forests and providing food for pigs that dig up the ground. Since they almost exclusively visit native plants, the *Hylaeus* have retreated along with their favored flowers. Ants have also had a devastating direct impact on bees, particularly the long-legged or yellow crazy ant (*Anoplolepis gracilipes*) and the Argentine ant (*Linepithema humile*), which exclude bees by both direct predation and by feeding on nectar themselves.

Today, it is difficult to find the native *Hylaeus* except by making a trek to the native-dominated forest or shrublands of the mountains, or going to just the right bit of coastline. Except for a few places, such as Volcano on the Big Island, they aren't found in places where people live. Seven are candidate endangered species, and nine others have not been seen in about 80 years and may be extinct; others that were rare but could still be consistently found at certain sites ten years ago have now disappeared from those places. And new challenges continue to arise, especially from invasive species. On Hawai'i Island, naio (*Myoporum sandwicense*) is a key floral host for bees in dry forests, but it has been devastated by the arrival of the naio thrips in 2008. With thousands of trees dead or too weak to flower, the bees are absent or dramatically reduced in some of the places where they were most diverse just 15 years ago. Formerly found in only a few sites, Argentine ants have continued to spread over larger and larger areas, eliminating bees as they go. And just a few years ago, a new alien yellow-faced bee was discovered on O'ahu. Almost totally unknown in its native range in India, this species, *Hylaeus strenuus*, has quickly spread to coastal and lowland areas throughout the island and will likely be a more serious competitor with the native bees than the other alien bees present because of its similar size and habits. With weak regulations on plant imports, it is inevitable that more problematic invasive species will continue to arrive in the future.

Yet through all this change, the bees have managed to persist with amazing tenacity. New discoveries continue to be made – 11 new native species have been found in the past 15 years. More surprisingly, six of those have been from O'ahu, which is both the most heavily collected and the most heavily impacted island. While some rare species have not been found at their old collecting sites, others have been found at new ones. Several of the coastal species have adapted to use and even favor the introduced tree heliotrope (*Tournefortia argentea*). This has allowed them to thrive in some places where the native coastal vegetation has been largely lost, including even the shoreline in front of upscale Kohala resorts. The future is uncertain for our native pollinators, but they have already surprised us with their adaptability and perseverance.



Hylaeus anthracinus, one of the seven candidate endangered species, on flowers of the introduced tree heliotrope near the Fairmont Orchid hotel in Kohala. A sign of hope?