DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

50 CFR Part 17

[Docket No. FWS–R1–ES–2010–0012; MO 92210–0–008]

Endangered and Threatened Wildlife and Plants; 12-Month Finding on Five Petitions To List Seven Species of Hawaiian Yellow-faced Bees as Endangered

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Notice of 12-month petition finding.

SUMMARY: We, the U.S. Fish and Wildlife Service (Service), announce a 12-month finding on five petitions to list seven species of Hawaiian yellow-faced bees (*Hylaeus anthracinus, H. assimulans, H. facilis, H. hilaris, H. kuakea, H. longiceps,* and *H. mana*) as endangered and to designate critical habitat under the Endangered Species Act of 1973, as amended (Act). After review of all available scientific and commercial information, we find that listing these seven species of Hawaiian yellow-faced bees is warranted. Currently, however, listing these seven species of Hawaiian yellow-faced bees is precluded by higher priority actions to amend the Lists of Endangered and Threatened Wildlife and Plants. Upon publication of this 12-month petition finding, we will add these seven species of Hawaiian yellow-faced bees to our candidate species list. We will develop a proposed rule to list these seven species of Hawaiian yellow-faced bees as our priorities allow. We will make any determinations on critical habitat during development of the proposed listing rule. In any interim period we will address the status of the candidate taxa through our annual Candidate Notice of Review (CNOR).

DATES: The finding announced in this document was made on September 6, 2011.

ADDRESSES: This finding is available on the Internet at *http://www.regulations.gov* at Docket Number FWS–R1–ES–2010–0012. Supporting documentation we used in preparing this finding is available for public inspection, by appointment, during normal business hours at the U.S. Fish and Wildlife Service, Pacific Islands Fish and Wildlife Office, 300 Ala Moana Boulevard, Room 3–122, Honolulu, HI 96850. Please submit any new information, materials, comments, or questions concerning this finding to the above street address.

FOR FURTHER INFORMATION CONTACT: Loyal Mehrhoff, Field Supervisor, Pacific Islands Fish and Wildlife Office (see **ADDRESSES**); by telephone at 808–792–9400; or by facsimile at 808–792–9581. If you use a telecommunications device for the deaf (TTD) please call the Federal Information Relay Service (FIRS) at 800–877–8339.

SUPPLEMENTARY INFORMATION:

Background

Section 4(b)(3)(B) of the Act (16 U.S.C. 1531 *et seq.*) requires that, for any petition to revise the Federal Lists of Endangered and Threatened Wildlife and Plants that contains substantial scientific or commercial information that listing a species may be warranted, we make a finding within 12 months of the date of receipt of the petition. In this finding, we determine whether the petitioned action is: (a) Not warranted, (b) warranted, or (c) warranted, but immediate proposal of a regulation implementing the petitioned action is precluded by other pending proposals to determine whether species are endangered or threatened, and expeditious progress is being made to add or remove qualified species from the Federal Lists of Endangered and Threatened Wildlife and Plants. Section 4(b)(3)(C) of the Act requires that we treat a petition for which the requested action is found to be warranted but precluded as though resubmitted on the date of such finding, that is, requiring a subsequent finding to be made within 12 months. We must publish these 12-month findings in the **Federal Register**.

Previous Federal Actions

On March 23, 2009, we received five petitions dated March 23, 2009, from Scott Hoffman Black, Executive Director of the Xerces Society, requesting that seven species of Hawaiian yellow-faced bees be listed as endangered under the Act and critical habitat be designated.

Each petition contained information regarding the species' taxonomy and ecology, historical and current distribution, present status, and current and potential threats. We acknowledged the receipt of the petitions in a letter to Mr. Black, dated May 8, 2009. In that letter we also stated that issuing an emergency regulation temporarily listing the species under section 4(b)(7) of the Act was not warranted at that time. We published the 90-day finding in the **Federal Register** on June 16, 2010 (75 FR 34077). This notice constitutes the 12-month finding on the March 23, 2009, petitions to list the seven species of Hawaiian yellow-faced bees as endangered.

Species Information

Overview of the Genus *Hylaeus*

The seven species of bees described in this finding belong to the genus *Hylaeus. Hylaeus* is a large, globally distributed genus comprised of over 500 species worldwide. In the Hawaiian Islands, the genus *Hylaeus* is widespread and very diverse, with 60 native species, including 20 endemic to single islands (Magnacca 2007a, p. 174). All 60 Hawaiian species are in the subgenus *Nesoprosopis* (Magnacca and Danforth 2006, p. 393). The Hawaiian *Hylaeus* genus belongs to the Colletidae family of bees, also known as plasterer bees due to their habit of lining their nests with salival secretions. The family is comprised of over 2,000 species, all of which are solitary nesting (unlike social wasps and bees), although a few do nest in close vicinity to each other.

The species of *Hylaeus* are commonly known as yellow-faced bees or masked bees for their yellow-to-white facial markings. All of the *Hylaeus* species roughly resemble small wasps in appearance, due to their slender bodies and their seeming lack of setae (sensory hairs). However, *Hylaeus* bees have plumose (branched) hairs on the body that are longest on the sides of the thorax. To a discerning eye, it is these plumose setae that readily distinguish them from wasps (Michener 2000, p. 55).

A great deal of our knowledge on Hawaiian *Hylaeus* bees is based upon surveys by Robert Cyril Layton Perkins, a distinguished British entomologist and naturalist renowned for his pioneering work on the insects of the Hawaiian Islands, particularly the Hymenoptera (sawflies, wasps, bees, and ants), in the early 20th Century. His surveys were conducted between 1892 and 1906, and form the basis for most of the historical records of *Hylaeus* in the Hawaiian Islands. According to Perkins, *Hylaeus* species were "almost the most ubiquitous of any Hawaiian insects" (Perkins 1913, p. lxxxi). However, there are about 90 years between Perkins' surveys and the most recent surveys conducted in the late 1990s for *Hylaeus* bees in the Hawaiian Islands.

Surveys in more recent years (1998–2010) for *Hylaeus* spp. in the Hawaiian Islands have largely involved targeted collecting on specific flowering plants (Daly and Magnacca 2003, pp. 217–233; Magnacca in litt. 2011, p. 5), rather than survey methods such as pan trapping or Pollard walks (see below). While this means the numbers of individuals and species observed are not strictly quantifiable by effort, the probability of collecting species actually present is higher (Magnacca in litt. 2011, p. 5). Because the number and diversity of *Hylaeus* spp. tend to be locally concentrated rather than widely distributed, randomized and more quantifiable surveys such as pan trapping and Pollard walks are actually less effective means of locating *Hylaeus* spp. (Magnacca in litt. 2011, p. 5). Pan trapping involves the use of shallow pans of fluid, and relies on the organism falling or flying into the fluid preservative. Pollard walks involve observers walking along a fixed transect route and recording the insects observed.

The recent *Hylaeus* spp. survey efforts are not easily comparable to Perkins' collections, which are considered now to have been conducted opportunistically. For example, Perkins collected higher numbers of individuals and species in certain areas, including coastal areas that were much less disturbed at the time, and some species, such as *H. facilis,* were formerly very common but have almost entirely disappeared (Magnacca in litt. 2011, p. 5).

Life History of Genus *Hylaeus*

The following discussion includes all Hawaiian *Hylaeus* species, and specific information about the seven petitioned *Hylaeus* species.

Hawaiian *Hylaeus* species are grouped within two categories: Ground-nesting species that require relatively dry conditions, and wood-nesting species that are often found within wetter areas (Zimmerman 1972, p. 533; Daly and Magnacca 2003, p. 11). Nests of *Hylaeus* species are usually constructed opportunistically within dead twigs or plant stems, or other similarly small natural cavities under bark or rocks (*i.e.,* they seek out existing cavities that they suit to their own needs). This is unlike the nests of many other bee species, which are purposefully excavated or constructed underground. Like other *Hylaeus,* Hawaiian *Hylaeus* lack strong mandibles and other adaptations for digging and often use nest burrows abandoned by other insect species (Daly and Magnacca 2003, p. 9). The female *Hylaeus* bee lays eggs in brood cells she constructs in the nest and lines with a self-secreted, cellophane-like material. Prior to sealing the nest, the female provides her young with a mass of semiliquid nectar and pollen left alongside her eggs. Upon hatching, the grub-like larvae eat the provisions left for them, pupate, and eventually emerge as adults (Michener 2000, p. 24). The adult male and female bees feed upon flower nectar for nourishment. Many species, including the Hawaiian *Hylaeus,* lack an external structure for carrying pollen, called a scopa, and instead internally transport collected pollen, often mixed with nectar, within their crop (stomach).

Recent studies of visitation records of Hawaiian *Hylaeus* bees to native flowers (Daly and Magnacca 2003, p. 11) and pollination studies of native plants (Sakai *et al.* 1995, pp. 2,524–2,528; Cox and Elmqvist 2000, p. 1,238; Sahli *et al.* 2008, p. 1) have demonstrated Hawaiian *Hylaeus* species almost exclusively visit native plants to collect nectar and pollen, pollinating those plants in the process. *Hylaeus* bees are very rarely found visiting nonnative plants for nectar and pollen (Magnacca 2007a, pp. 186, 188), and are almost completely absent from habitats dominated by nonnative plant species (Daly and Magnacca 2003, p. 11). Sahli *et al.* (2008, p. 1) quantified pollinator visitation rates to all of the flowering plant species in communities on a Hawaiian lava flow dating from 1855 to understand how pollination webs and the integration of native and nonnative species changes with elevation. In that study, eight flowering plants were observed at six sites, which ranged in elevation from approximately 2,900 to 7,900 feet (ft) (approximately 880 to 2,400 meters (m)). The study also found the proportion of native pollinators changed along the elevation gradient; at least 40 to 50 percent of visits were from nonnative pollinators at low elevation, as opposed to 4 to 20 percent of visits by nonnative pollinators at mid to high elevations. *Hylaeus* bees were less abundant at lower elevations, and there were lower visitation rates of any pollinators to native plants at lower elevations, which suggest *Hylaeus* may not be easily replaceable by nonnative pollinators (Sahli *et al.* 2008, p. 1).

For some of the seven Hawaiian yellow-faced bees addressed in this finding, we have information about the specific host plants they visit for nectar and pollen. For some species, we have also identified primary host plants visited (see description of the species where noted). However, for others, we lack detailed information on the specific host plants visited for foraging. Nonetheless, researchers believe native plants both endemic and indigenous to the Hawaiian Islands are essential to the survival of the *Hylaeus* species (Hopper *et al.* 1996, pp. 8–9; Daly and Magnacca 2003, pp. 217–229; Magnacca 2007a, pp. 185–186).

Hawaiian Island Ecosystems

The five Hawaiian Island ecosystems that support the seven Hawaiian yellow-faced bees addressed in this 12-month finding are described in the following section. See Table 1 below for a list of the ecosystems from which each species is reported. Because Hawaiian *Hylaeus* spp., including these seven, are believed to be essential pollinators of the native Hawaiian plant fauna, we are providing this background information on the different ecosystems in which they occur to better elaborate upon the specific threats found in the five ecosystem types.

TABLE 1—CURRENT (AND HISTORICAL) DISTRIBUTION OF THE SEVEN YELLOW–FACED BEES BY ECOSYSTEM TYPE AND ISLAND

Species and number of current populations	Ecosystems					
	Coastal	Lowland dry	Lowland mesic	Lowland wet	Montane mesic	Montane dry
H. anthracinus, 13 populations	HI, MA, MO, OA.	HI, KAH, (*LA), MA, (*MO), (*OA).	N/A	N/A		HI.
H. assimulans, 5 populations	KAH, (*MA), (*OA).	LA, MA, (*OA)	N/A	N/A		N/A.
H. facilis, 2 populations	(*MA), MO, (*OA).	(*LA), (*OA)	(*LA), (*MA), (*OA).	(*MA), OA	(*MO)	N/A.
H. hilaris, 1 population	(*LA), (*MA), MO.	(*MA)	N/A	N/A		N/A.
H. kuakea, 2 populations	N/A	N/A	OA	N/A		N/A.
H. longiceps, 6 populations	LA, MA, MO, OA.	LA, (*MA), (*MO).	N/A	N/A		N/A.

TABLE 1—CURRENT (AND HISTORICAL) DISTRIBUTION OF THE SEVEN YELLOW–FACED BEES BY ECOSYSTEM TYPE AND ISLAND—Continued

Species and number of current populations	Ecosystems					
	Coastal	Lowland dry	Lowland mesic	Lowland wet	Montane mesic	Montane dry
H. mana, 1 population	N/A	N/A	OA	N/A		N/A.

HI = Hawaii (Island); KAH = Kahoolawe; LA = Lanai; MA = Maui; MO = Molokai; OA = Oahu; (*XX) denotes a historical population; N/A means no population records

Coastal Ecosystem

The coastal ecosystem is found on all of the main Hawaiian Islands, with the highest species diversity found in the least populated coastal areas of Hawaii, Maui, Molokai, Kahoolawe, Oahu, and Kauai, and their associated islets, and extends from sea level to approximately 1,000 ft (approximately 300 m) in elevation. The coastal vegetation zone is typically dry, with annual rainfall of less than approximately 20 inches (in) (50.8 centimeters (cm)); however windward rainfall may be high enough (up to approximately 40 in (1,000 mm)) to support mesic-associated and sometimes wet-associated vegetation (Gagne and Cuddihy 1999, pp. 54–66). Compared to dry and mesic ecosystems, biological diversity (number of species) is low to moderate in the coastal ecosystem, but may include some specialized plants and animals such as nesting seabirds and the rare native plant *Sesbania tomentosa* (ohai) (The Nature Conservancy (TNC) 2006a). *Sesbania tomentosa* formerly occurred widely in lower elevation dry habitat on all of the main islands and at least on Necker and Nihoa of the Northwestern Hawaiian Islands. The species is now scattered throughout its former range, and is restricted to relic populations on sandy beaches, on dunes, on soil pockets on lava, and along pond margins (Wagner *et al.* 1990, p. 705).

The dominant native vegetation in coastal ecosystems is the shrub *Scaevola sericea* (naupaka kahakai) (Alpha *et al.* 1996, p. 86). Other common native plant species include *Ipomoea pes-caprae* (beach morning-glory), *Sporobolus virginicus* (beach dropseed), *Jacquemontia ovata* (pau o Hiiaka), and *Sesuvium portulacastrum* (akulikuli or sea purslane) (Wagner *et al.* 1999, pp. 57–59). Among the *Hylaeus* species addressed in this finding, five are known from coastal ecosystems, including *H. anthracinus, H. assimulans, H. facilis, H. hilaris,* and *H. longiceps.*

Lowland Dry Ecosystem

The lowland dry ecosystem includes shrublands and forests below approximately 3,300 ft (1,000 m) in elevation that receive less than 50 in (127 cm) annual rainfall, or are in otherwise prevailingly dry substrate conditions. Areas consisting of predominantly native species in the lowland dry ecosystem are now rare. This ecosystem is found on the islands of Hawaii, Maui, Molokai, Lanai, Kahoolawe, Oahu, and Kauai, and is best represented on the leeward sides of the islands (Gagne and Cuddihy 1999, p. 67). Biological diversity is low to moderate in this ecosystem, and includes specialized animals and plants such as the Hawaiian owl or pueo (*Asio flammeus sandwichensis*) and *Santalum ellipticum* (iliahialoe) (Wagner *et al.* 1999, pp. 1,220–1,221; TNC 2006b).

Hylaeus anthracinus, H. assimulans, H. facilis, and *H. longiceps* are known from lowland dry forests. These forests are typically dominated by *Diospyros sandwicensis* (lama), *Erythrina sandwicensis* (wiliwili), *Nestegis sandwicensis* (olopua), or *Metrosideros polymorpha* (ohia) and a diversity of native shrubs growing within the understory (Gagne and Cuddihy 1999, pp. 72–74).

Lowland Mesic Ecosystem

The lowland mesic ecosystem includes a variety of grasslands, shrublands, and forests, below approximately 3,300 ft (1,000 m) in elevation, that receive between 50 and 75 in (127 and 191 cm) annual rainfall, or are in otherwise mesic substrate conditions (TNC 2006c). In the Hawaiian Islands, this ecosystem is found on Hawaii, Maui, Molokai, Lanai, Oahu, and Kauai, on both windward and leeward sides of the islands. Biological diversity is high in this system (TNC 2006c).

Lowland mesic forests are typically dominated by *Acacia koa* (koa), *Diospyros sandwicensis, Metrosideros polymorpha,* or *Nestegis sandwicensis,* and a diversity of understory trees and native shrubs growing below the canopy species (Gagne and Cuddihy 1999, p. 80–82). Historically, *Hylaeus facilis* was known from lowland mesic forest, but currently only *H. kuakea* and *H. mana* are found in this habitat.

Lowland Wet Ecosystem

The lowland wet ecosystem is generally found below approximately 3,300 ft (1,000 m) in elevation on the windward sides of the main Hawaiian Islands, except Kahoolawe (Gagne and Cuddihy 1999, p. 85; TNC 2006d). These areas include a variety of wet grasslands, shrublands, and forests that receive greater than 75 in (191 cm) annual precipitation, or are in otherwise wet substrate conditions (TNC 2006d). Biological diversity is high in this system (TNC 2006d). The majority of lowland wet forests are dominated by *Metrosideros polymorpha,* with understory trees such as *Psychotria* spp. (kopiko) and *Antidesma platyphyllum* (hame) (Gagne and Cuddihy 1999, p. 87). Currently, *Hylaeus facilis* is known from lowland wet forest (Daly and Magnacca 2003, p. 81).

Montane Dry Ecosystem

The montane dry ecosystem is composed of natural communities (shrublands, grasslands, forest) found at elevations between approximately 3,300 and 6,600 ft (1,000 and 2,000 m), in areas where annual precipitation is less than 50 in (127 cm), or otherwise in dry substrate conditions (TNC 2006g). Montane dry forests occur on the leeward sides of the islands of Maui and Hawaii, and biological diversity is moderate (Gagne and Cuddihy 1999, p. 93; TNC 2006g). Montane dry forests are dominated by some combination of *Acacia koa, Sophora chrysophylla*) (mamame), *Metrosideros polymorpha,* and rarely, *Chamaesyce olowaluana* (akoko) (Gagne and Cuddihy, p. 95). In 2004, a single individual of *H. anthracinus* was collected in montane dry forest on Hawaii Island.

Specific Information on *Hylaeus anthracinus*

Taxonomy and Description

Hylaeus anthracinus was first described as *Prosopis anthracina* by Smith in 1873 (Daly and Magnacca 2003, p. 55), and transferred to *Nesoprosopis* 20 years later (Perkins 1899, pp. 75). *Nesoprosopis* was reduced to a subgenus of *Hylaeus* in

1923 (Meade-Waldo 1923, p. 1). Although the distinctness of this species remains unquestioned, recent genetic evidence (Magnacca and Brown 2010, pp. 5–7) suggests *H. anthracinus* may be composed of three cryptic (not recognized) species or subspecies that represent the populations on Hawaii, Maui and Kahoolawe, and Molokai and Oahu. However, this has not been established scientifically; therefore, we treat *H. anthracinus* as a single species in this finding.

Hylaeus anthracinus is a medium-sized, black bee with clear to smoky wings and black legs. The male has a single large yellow spot on his face, while below the antennal sockets the face is yellow. The female is entirely black and can be distinguished by the black hairs on the end of the abdomen and an unusual mandible that has three teeth, a characteristic shared only with *H. flavifrons,* a closely related species on Kauai (Daly and Magnacca 2003, p. 53).

Life History

The diet of the larval stage of *Hylaeus anthracinus* is unknown, although the larvae are presumed to feed on stores of pollen and nectar collected and deposited in the nest by the adult female. Likewise, the nesting habits of *H. anthracinus* are not known, but the species is thought to nest within the stems of coastal shrubs (Magnacca 2005a, p. 2).

Hylaeus anthracinus adults have been observed visiting the flowers of *Sesbania tomentosa, Scaevola sericea, Sida fallax* (ilima), *Argemone glauca* (pua kala), *Chamaesyce celastroides* (akoko), *Chamaesyce degeneri* (akoko), *Heliotropium anomalum* (hinahina), and *Myoporum sandwicense* (naio). This species has also been collected from inside the fruit capsule of *Kadua coriacea* (kioele) (Magnacca 2005a, p. 2). *Hylaeus anthracinus* has also been observed visiting *Tournefortia argentea* (tree heliotrope), a tree native to tropical Asia, Madagascar, tropical Australia, and Polynesia, for nectar and pollen (Wagner *et al.* 1999, p. 398; Daly and Magnacca 2003, p. 55; Magnacca 2007a, p. 181). *Tournefortia argentea* was first collected on Oahu in 1864–1865, and is naturalized and documented from all of the main islands except Kahoolawe (Wagner *et al.* 1999, p. 398). *Hylaeus anthracinus* commonly occurs alongside other *Hylaeus* species, including *H. longiceps* and *H. flavipes.*

Range and Distribution

Hylaeus anthracinus was historically known from numerous coastal and lowland dry forest habitats up to 2,000 ft (610 m) in elevation on the islands of Hawaii, Lanai, Maui, Molokai, and Oahu. Between 1997 and 2008, surveys for Hawaiian *Hylaeus* were conducted at 43 sites throughout the Hawaiian Islands that were either historical collecting localities for *H. anthracinus,* or potentially suitable habitat for this species. *Hylaeus anthracinus* was observed at 13 of the 43 survey sites, but had disappeared from each of the 9 historically occupied sites surveyed (Daly and Magnacca 2003, p. 217; Magnacca 2007b, p. 44). Several of the historical collection sites, such as Honolulu and Waikiki on Oahu and Kealakekua Bay on Hawaii, no longer contain *Hylaeus* habitat, which has been replaced by urban development or is dominated by nonnative vegetation (Liebherr and Polhemus 1997, pp. 346–347; Daly and Magnacca 2003, p. 55; Magnacca 2007a, pp. 186–188).

Hylaeus anthracinus is currently known from 13 small patches of coastal and lowland dry forest habitat (Magnacca 2005a, p. 2): five locations on the island of Hawaii; one location on Kahoolawe; two locations on Maui; three locations on Molokai; and two locations on Oahu (Daly and Magnacca 2003, p. 217; Magnacca 2005a, p. 2; Magnacca 2007b, p. 44). These 13 locations supported small populations of *H. anthracinus,* but the number of individual bees is unknown. In 2004, a single individual was collected in montane dry forest on the island of Hawaii; however, the presence of additional individuals has not been confirmed at this site (Magnacca 2005a, p. 2). Although it was previously unknown from the island of Kahoolawe, *H. anthracinus* was observed at one location on the island in 2002 (Daly and Magnacca 2003, p. 55). The species is believed to be extirpated from Lanai (Daly and Magnacca 2003, p. 55). Additionally, during surveys between 1997 and 2008, *H. anthracinus* was absent from 17 other sites on Hawaii, Maui, Molokai, and Oahu with potentially suitable habitat from which other species of *Hylaeus* were collected (Daly and Magnacca 2003; Magnacca, University of Hawaii at Hilo, pers. comm. 2008a).

Hawaii Island

Hylaeus anthracinus was first described by Perkins (1899, p. 100) from specimens collected by F. Smith on the Kona (west) coast at Kealakekua Bay. In the intervening 99 years, *H. anthracinus* appears to have declined significantly throughout its historical range on this coastline. Between 1997 and 2008, researchers thoroughly surveyed the area around Kealakekua Bay and Keei to the south, but found no species of *Hylaeus* and observed that most of these areas are either dominated by invasive, nonnative plants, such as *Leucaena leucephala* (koa haole), or lack vegetation entirely (Magnacca, pers. comm. 2008a). *Hylaeus anthracinus* is currently found in five locations in coastal and lowland dry forest on the leeward (west) side of the island, including Kohanaiki; Kaloko-Honokohau National Historic Park (NHP); Makalawena Beach; the Mahaiula section of Kekaha Kai (Kona Coast) State Park; and Kaulana Bay near Ka Lae (South Point). In addition, there is one recent collection from montane dry forest in the U.S. Army's Pohakuloa Training Area, in the northern part of the island. Collection reports from these six areas follow:

(A) Kohanaiki: *Hylaeus anthracinus* was collected in coastal habitat on *Tournefortia argentea* at this location near Puhili Point by Magnacca (2007b, p. 44). Kohanaiki is an area of land granted to indigenous Hawaiians in 1995 for cultural and recreational preservation and pursuits (Kohanaiki Ohana 1995 (*http://www.kohanaiki.org/*)). There is some possibility for increased recreational impact to the area, if and when adjacent privately owned parcels are developed, as is currently planned (Kohanaiki Ohana 1995 (*http://www.kohanaiki.org/*)).

(B) Kaloko-Honokohau NHP: In 2007, researchers collected *Hylaeus anthracinus* in coastal habitat in Kaloko-Honokohau NHP, which is just south of Kohanaiki, and managed by the National Park Service (NPS) (P. Aldrich, University of Hawaii at Manoa, pers. comm. 2008a; Magnacca, pers. comm. 2008c).

(C) Makalawena Beach: Researchers collected *Hylaeus anthracinus* in coastal habitat in south Kona at Makalawena Beach in 2007 (P. Aldrich, pers. comm., July 2008a). Inaccessible by motor vehicle, visitors must hike to the beach on a trail that begins in nearby Kekaha Kai State Park. Makalawena Beach is located on private land owned by Kamehameha Schools.

(D) Mahaiula Section of Kekaha Kai State Park: Researchers collected *Hylaeus anthracinus* in coastal habitat in the Mahaiula section of Kekaha Kai State Park in 2007 (P. Aldrich, unpublished data). The park is managed by the Hawaii Department of Land and Natural Resources' (DLNR) Division of State Parks, and is open to the public daily. This section of the park is accessed by a 1.5-mile (mi) (1.6-kilometer (km)) unpaved road from the main highway (Queen Kaahumanu Highway (Hwy 19)), and offers public recreational opportunities for swimming and beach-related activities, such as hiking, picnicking, and boating (*http://www.hawaiistateparks.org/hawaiistateparks/parks/hawaii/index.cfm?park_id=47*).

(E) Kaulana Bay: *Hylaeus anthracinus* appears to be restricted to an area of 5,000–10,000 year-old lava flows east of Ka Lae at Kaulana Bay, where it and other species of *Hylaeus* were collected in 1999 and 2002 (Magnacca 2007a, p. 181). The substrate of these lava flows is distinct from the surrounding areas covered by Pahala ash (Magnacca, pers. comm. 2010b). The area near Ka Lae, at the southernmost tip of the island of Hawaii, is believed to be the best coastal habitat for *Hylaeus* on the island. However, *H. anthracinus* was absent from several sites with potentially suitable vegetation near Ka Lae and other sites to the east along the coast, including Kalu, Kaalualu, and Mahana, where other *Hylaeus* species were collected. The population of *H. anthracinus* at Kaulana Bay appears highly localized, and may have more stringent habitat requirements related to localized substrate type than other species of Hawaiian *Hylaeus* found in nearby areas (*e.g., H. difficilis* and *H. flavipes*). The Ka Lae area, including Kaulana Bay, is registered as a National Historic Landmark District and a large portion of the area is primarily owned by the State's Department of Hawaiian Home Lands (DHHL), although a smaller portion is privately owned. Public access to Kaulana Bay is not restricted, and the area is used for recreational activities such as off-road vehicle use (Magnacca, pers. comm. 2008a).

(F) U.S. Army's Pohakuloa Training Area (PTA): In 2004, one male *Hylaeus anthracinus* was collected on the southern slopes of Mauna Kea in montane dry forest habitat in the U.S. Army's PTA at approximately 5,200–5,400 ft (1,590–1,650 m) in elevation (Magnacca 2007b, p. 44). The specimen was found inside the fruit capsule of the federally endangered plant, *Hedyotis coriacea* (kioele). *Hylaeus anthracinus* has not been observed at the PTA since the collection made in 2004 (Magnacca 2007b, p. 44). It is unknown if this collection was a single vagrant individual or from an established population at the PTA (Magnacca 2007b, p. 44).

Kahoolawe Island

Previously unknown on Kahoolawe, a population of *Hylaeus anthracinus* was discovered in 2002 in coastal habitat at Pali o Kalapakea, where four specimens were collected at an elevation of 1,000 ft (300 m) (Daly and Magnacca 2003; Magnacca, pers. comm. 2008a). However, this species was absent from potentially suitable habitat located at Kamohio on the southeastern coast of the island where other *Hylaeus* species were collected. Overgrazing by introduced cattle and goats, and bombing and target practice by the U.S. military, have led to soil erosion resulting in the loss of almost all of the coastal and lowland dry forest habitat on this island (Warren 2004, p. 461). In 1993, Congress ended military use on Kahoolawe, and the Kahoolawe Island Reserve Commission (KIRC) was created to manage land use and restore Kahoolawe's natural resources (Dept. of Defense, p. 1). Access to the island is limited and controlled by KIRC, and activities conducted on the island include fishing, habitat restoration, historical preservation, and education. Commercial enterprises are currently prohibited on the island (Warren 2004, p. 1).

Maui

Perkins (1899, p. 100) originally described *Hylaeus anthracinus* as abundant in coastal and lowland habitat on the island of Maui, where it was known from four sites. Perkins' primary collection site for coastal bees on Maui was the Wailuku sandhills, which once supported a diverse bee fauna. Lacking adequate descriptions, researchers were unable to relocate two of the Perkins collection sites during recent surveys, but two sites were relocated and surveyed in 1999 and 2001 (Magnacca 2007a, p. 173). *Hylaeus anthracinus* has also been collected at Kanaio on the lower southern slopes of Haleakala, an unusual location for this otherwise exclusively coastal species. The species was also collected at the coast nearby, at Manawainui. Descriptions of these three sites follows:

(A) Wailuku Sand Hills: Formerly a large expanse of coastal dune habitat, the Wailuku sand hills remain as small remnant dunes and only one, at Waiehu, contains intact native vegetation potentially suitable for *Hylaeus* bees. This remnant coastal sand dune covers less than 2.5 acres (ac) (1 hectare (ha)) on State lands near a golf course. *Hylaeus anthracinus* was not observed during the 1999 and 2001 surveys in this location (Daly and Magnacca 2003, p. 217). The rest of the dunes have been destroyed by development or are overgrown with the nonnative plant *Prosopis pallida* (kiawe). Researchers observed that the Kahului section of the dunes, located south of the native remnant dune, no longer contains potentially suitable habitat for species of *Hylaeus* (Magnacca 2007a, p. 182).

(B) Kanaio Natural Area Reserve: *Hylaeus anthracinus* was collected in 1999 in remnant native lowland dry forest in the State's Kanaio Natural Area Reserve (NAR) on the southern slopes of Haleakala at 2,000 ft (600 m) in elevation (Daly and Magnacca 2003, p. 217). Kanaio NAR is a State-protected area of approximately 876 ac (355 ha), and contains patches of lowland dry forest and shrub lands. The State plans to rehabilitate habitat in the Kanaio NAR by excluding feral ungulates with fencing, managing weeds, and planting native species (*http://hawaii.gov/dlnr/dofaw/rpc/projects-on-maui*).

(C) Manawainui Gulch: In 1999, *Hylaeus anthracinus* was collected at this coastal site on land owned by the State's DHHL (Magnacca, pers. comm. 2008a). The site is east of Kahikinui, and should not be confused with the Manawainui Valley, which is east of Kaupo, or Manawainui Gulch at Ukumehame on west Maui.

Molokai

Perkins collected *Hylaeus anthracinus* at Kaulawai [Kauluwai] and two unknown sites: the lower slopes of the north Molokai mountains and the ''Molokai plains'' (Perkins 1899; Daly and Magnacca 2003, p. 55). *Hylaeus anthracinus* occurred in three of five sites surveyed between 1999 and 2005. These locations include TNC's Moomomi Preserve on Molokai's northwest coast, and Hoolehua Beach and Kaupikiawa, both located on the Kalaupapa peninsula (Magnacca, pers. comm. 2008a). This species was not observed at several other sites with potentially suitable habitat, including sand dune habitat near the Kaluakoi resort on Molokai's west coast (Magnacca, pers. comm. 2008a). Collection reports of these sites follow:

(A) Moomomi Preserve: Between 1999 and 2001, researchers collected *H. anthracinus* and *H. longiceps* from an area of native vegetation in coastal dune habitat within Moomomi Preserve (Magnacca 2007a, p. 181). Moomomi Preserve contains intact coastal dunes dominated by native vegetation, as well as dune and inland areas dominated by nonnative vegetation.

(B) Hoolehua Beach and Kaupikiawa: In 2005, *Hylaeus anthracinus* was collected at a coastal site above Hoolehua Beach near the tip of the Kalaupapa peninsula, and at Kaupikiawa, just to the east (Magnacca 2007b, p. 181). Both sites are located within Kalaupapa NHP, which is cooperatively managed by the NPS, DHHL, and the State's DLNR and Departments of Health (DOH) and Transportation (DOT). The areas on the east side of the Kalaupapa peninsula are largely rocky and devoid of vegetation, but contain scattered patches of native coastal vegetation, similar to Ka Lae on the island of Hawaii (Magnacca 2007a, p. 181).

Oahu

Hylaeus anthracinus was historically known from seven sites on the island of Oahu, although two of the coastal sites were not conclusively identified by Perkins and the exact locations cannot now be determined (Perkins 1899, p. 100). This species appears to have declined precipitously since Perkins' collecting period on Oahu (1892–1906) and is currently only known from two sites, Kaena Point NAR and Mokuauia (Goat Island). Between 1997 and 2008, *H. anthracinus* was not found during surveys of five of its historical Perkins-era collection sites. Several of these sites no longer provide suitable habitat for *Hylaeus* species because native vegetation has been removed during urbanization, or the sites are dominated by invasive, nonnative vegetation. These sites include Honolulu, Waikiki, ''the Honolulu mountains,'' Waialua, and the Waianae coast (Liebherr and Polhemus 1997, pp. 345–347; Daly and Magnacca 2003, p. 55). Between 1999 and 2002, researchers searched coastal habitat at Makapuu and Kalaeloa (Barber's Point), but did not find any species of *Hylaeus* (Magnacca, pers. comm. 2008a). The coastal habitat at both sites is degraded and dominated by nonnative vegetation. Descriptions of the two known sites follow:

(A) Kaena Point NAR: Between 1998 and 2008, *Hylaeus anthracinus* was collected at Kaena Point, which is located on Oahu's northwest-most point (Daly and Magnacca 2003, p. 55; Sahli, University of Hawaii at Manoa, pers. comm. 2008). Kaena Point contains the best intact native coastal habitat on Oahu, and is an excellent example of that type of ecosystem in the Northwestern Hawaiian Islands. It provides habitat for nesting seabirds, monk seals, native plants, and other native species (Magnacca 2007a, p. 181). The primary activities within this NAR include recreation, hiking, nature study, education, and the observation of wildlife (DLNR 2007, p. 20). While illegal off-road driving was once a concern, a physical barrier is now in place that prevents vehicular access, and native vegetation is regenerating and being restored by the Kaena Point Ecosystem Restoration Project (DLNR 2007, p. 20; Magnacca 2007a, p. 181). In partnership with several agencies including the Service, the DLNR is building a predator-proof fence to prevent nonnative species, such as cats and dogs that threaten nesting seabirds, from entering 59 ac (24 ha) of coastal habitat within Kaena Point NAR (*http://www.state.hi.us/dlnr/dofaw/kaena/index.htm*).

(B) Mokuauia (Goat Island): From the lack of records, it appears Perkins and other early naturalists did not search Mokuauia or Oahu's other offshore islets for yellow-faced bees. Recently, *Hylaeus anthracinus* was found on this islet by Service biologists during general surveys of the islet (S. Plentovich, Service, pers. comm. 2008). Mokuauia, an offshore islet in Laie Bay located on Oahu's northeast coast, encompasses 13 ac (5.3 ha) and reaches a maximum elevation of 15 ft (4.5 m). The entire islet is a State Seabird Sanctuary and is managed by the State's Department of Forestry and Wildlife (DOFAW). The entire islet was designated as critical habitat for the endangered plant *Sesbania tomentosa* in 2003, and the DOFAW is actively restoring native vegetation and controlling nonnative species. Mokuauia is easily accessed by the public and is a popular destination for small boats, kayaks, and swimmers on weekends.

Lanai

Hylaeus anthracinus has not been observed on Lanai for over 100 years and is likely extirpated from this privately owned island. This species was not observed at any of the recently surveyed sites, including Manele Bay, where it was collected by Perkins in 1899 (Magnacca 2007a, p. 182; Magnacca, pers. comm. 2008a). However, other *Hylaeus* species were collected at seven of the eight locations surveyed (Daly and Magnacca 2003, pp. 217–229).

Summary of Hylaeus anthracinus Range and Distribution

Hylaeus anthracinus was historically known from numerous coastal and lowland dry forest habitats up to 2,000 ft (600 m) in elevation, on the islands of Hawaii, Lanai, Maui, Molokai, and Oahu. Currently, this species is known from a total of 13 sites in a few small patches of coastal and lowland dry forest habitat: one location on Kahoolawe, five locations on the island of Hawaii, two locations on Maui, three locations on Molokai, and two locations on Oahu. In addition, in 2004 a single individual of *H. anthracinus* was collected in montane dry forest habitat on the island of Hawaii. It is unknown if this collection was a single vagrant individual or from an established population. The lands on which *H. anthracinus* occurs are under a variety of jurisdictions, including private (*e.g.,* TNC), State (*e.g.,* DHHL, DOFAW, NARs, State Park, Seabird Sanctuary), and Federal (U.S. Army, NPS).

Specific Information on *Hylaeus assimulans*

Taxonomy and Description

Hylaeus assimulans was first described as *Nesoprosopis assimulans* (Perkins 1899, pp. 75, 101–102); *Nesoprosopis* was reduced to a subgenus of *Hylaeus* in 1923 (Meade-Waldo 1923, p. 1). The species was most recently described as *Hylaeus assimulans* by Daly and Magnacca in 2003 (pp. 55–56). *Hylaeus assimulans* is distinguished by its large size relative to other coastal *Hylaeus* species and slightly smoky to smoky-colored wings. The male is black with yellow face marks, with an almost entirely yellow clypeus (lower face region) with additional marks on the sides that narrow dorsally (towards the top). The male also has brown appressed (flattened) hairs on the tip of the abdomen. The female is entirely black, large-bodied, and has no distinct punctuation on the abdomen (Daly and Magnacca 2003, p. 56).

Life History

The diet of the larval stage of *Hylaeus assimulans* is unknown, although the larvae are presumed to feed on stores of pollen and nectar collected and deposited in the nest by the female adult (Magnacca 2005b, p. 2). Likewise, the nesting habits of *H. assimulans* are not known, but because the species is genetically related to other ground nesting *Hylaeus* spp., it is thought to be a ground nester (Magnacca 2005b, p. 2).

Hylaeus assimulans adults have been observed visiting the flowers of *Lipochaeta lobata* (nehe) and its likely primary host plant, *Sida fallax* (Daly and Magnacca 2003, p. 58). *Hylaeus assimulans* appears to be closely associated with plants in the genus *Sida,* and studies thus far suggest this yellow-faced bee species may be more common where this plant is abundant (Daly and Magnacca 2003, pp. 58, 217; Magnacca 2007a, p. 183). In recent survey efforts, *H. assimulans* seems to be more common in dry forest at relatively higher elevations, which may be related to the abundance of *Sida* in the understory (Magnacca 2005b, p. 2). *Sida* spp. were less often found in coastal habitat. It is likely *H. assimulans* visits several other native plants, including *Acacia koa, Metrosideros polymorpha, Styphelia tameiameiae* (pukiawe), and species of *Scaevola* (naupaka) and *Chamaesyce* (akoko), which are frequented by other *Hylaeus* species as well (Magnacca, pers. comm. 2008b).

Range and Distribution

Historically, *Hylaeus assimulans* was known from numerous coastal and lowland dry forest habitats up to 2,000 ft (610 m) in elevation on the islands of Lanai, Maui, and Oahu. There are no collections from Molokai, although it is likely *H. assimulans* also occurred there because all other species of *Hylaeus* known from Maui, Lanai, and Oahu also occurred on Molokai (Daly and Magnacca 2003, pp. 217–229). Between 1997 and 2008, surveys for Hawaiian *Hylaeus* were conducted in 25 sites on Kahoolawe, Lanai, Maui, Molokai, and Oahu. *Hylaeus assimulans* was absent from six of its historical localities on Lanai, Maui, and Oahu (Xerces Society 2009b, p. 4). *Hylaeus assimulans* was not observed at 19 other sites with potentially suitable habitat on Lanai, Maui, Molokai, and Oahu, including several sites from which other native *Hylaeus* species have been recently collected (Daly and Magnacca 2003, pp. 56, 217; Magnacca 2005b, p. 2; Magnacca 2007a, pp. 177, 181, 183).

Currently, *Hylaeus assimulans* is known from a few small patches of coastal and lowland dry forest habitat at one location on Kahoolawe, two locations on Lanai, and two locations on Maui (Daly and Magnacca 2003, p. 58; Magnacca 2005, p. 2). This species has likely been extirpated from Oahu because it has not been observed since Perkins' 1899 surveys and was not found during recent surveys of potentially suitable coastal habitat at Kaena Point, Makapuu, and Kalaeloa (Daly and Magnacca 2003, p. 217; Magnacca 2005, p. 2; H. Sahli, unpublished data).

Kahoolawe

Although not historically known from Kahaoolawe (Daly and Magnacca 2003, Magnacca, pers. comm. 2008a), *Hylaeus assimulans* was discovered in 1997 near the high cliffs of Kamohio Bay in the center of the southern coast of the island (Daly and Magnacca 2003, p 217). The species was absent from one other site on the island in lowland habitat on the east coast at Pali o Kalapakea where other *Hylaeus* species were collected (Daly and Magnacca 2003, pp. 217–229).

Lanai

On Lanai, Perkins found *Hylaeus assimulans* in low numbers within uninhabited coastal habitat at Awalua in northwest Lanai, and in the Koele mountains at an elevation of 2,000 ft (610 m) (Perkins 1899, p. 102). Between 1998 and 2006, seven sites with potentially suitable habitat on private lands, including Mt. Koele and Awalua, were surveyed, and *H. assimulans* was found only near Manele Road and Polihua Road in small pockets of native vegetation (Magnacca, pers. comm. 2008b). Descriptions of these sites follow:

(A) Manele Road: In 1999, *Hylaeus assimulans* was collected in lowland dry forest along Manele Road at 600 ft (180 m) in elevation, north of Manele Beach in southern Lanai (Daly and Magnacca 2003, p. 217). Researchers observed the canopy was dominated by invasive *Prosopis pallida* trees and the understory had a dense stand of *Sida fallax,* the likely primary host plant of *H. assimulans* (Magnacca, pers. comm. 2008b). However, with the exception of a few stunted plants at the roadside where moisture had accumulated, the rest of the stand of *Sida fallax* had senesced (reached maturity) or possibly died. Native plants at this site appeared to be drought-intolerant and probably did not provide consistent habitat for *Hylaeus* throughout the year (Magnacca 2007a, p. 183; Magnacca, pers. comm. 2008a).

(B) Polihua Road: In 1999, two specimens of *H. assimulans* were collected in lowland dry forest along Polihua Road at 1,000 ft in elevation (300 m) in central Lanai (Daly and Magnacca 2003, p. 58). Both sites are on private land, and we are unaware of any recent or current land management in these areas.

Maui

Perkins collected *Hylaeus assimulans* from coastal habitat at the Wailuku sand hills, and from an unknown site labeled "Maui" (Daly and Magnacca 2003, p. 58). Although other rare *Hylaeus* spp. were collected from the Waiehu dunes area during surveys conducted in 1999 and 2001, *H. assimulans,* as well as several other species once collected there by Perkins, were not found (Daly and Magnacca 2003, pp. 217–229; Magnacca, pers. comm. 2008a). Between 1998 and 2006, researchers surveyed six potentially suitable habitat locations island-wide, and *H. assimulans* was found within small pockets of native plants in only two of these sites (Daly and Magnacca 2003, p. 217; Magnacca, pers. comm. 2008a). However, researchers believe *H. assimulans* may exist in potentially suitable habitat in rugged and inaccessible portions of west Maui (Magnacca, in litt., 2010, p. 1). Descriptions of these two sites follow:

(A) Lahainaluna: In 1999, *Hylaeus assimulans* was collected in dry lowland forest at 1,800 ft (550 m) in elevation on the west side of Maui. The site is with the State's West Maui NAR. Established in 1986, the NAR's management plan calls for the control and removal of feral ungulates, and the control of selected priority invasive plant species (*http://hawaii.gov/dlnr/dofaw/nars/reserves/maui/west-maui*).

(B) Waikapu: In 2000, researchers collected *Hylaeus assimulans* in lowland dry shrubland dominated by the native shrub, *Dodonaea viscosa* (aalii) at 400 ft (120 m) elevation in Waikapu Valley, which is south of Iao Valley on the east side of west Maui (Daly and Magnacca 2003, p. 217). The 10,000-square ft (.09-square-ha) site is privately owned and surrounded by a fence to exclude nonnative axis deer (*Axis axis*). The fence was built in the mid-1980s by the Native Hawaiian Plant Society, and is currently managed by inspecting the fence for breaks; removing nonnative, invasive weeds; and collecting seeds of native plants for propagation. There have been two major fires in the past 5 years in the vicinity of the fenced area, although neither fire has burned within the enclosed area (H. Oppenheimer, Plant Extinction Prevention Program, pers. comm. 2008).

Between 1997 and 2007, *Hylaeus assimulans* was not collected during surveys of potentially suitable habitat at other locations on Maui where other rare *Hylaeus* species were collected, including lowland dry forest habitat in Kanaio NAR and coastal habitat at Manawainui Gulch (Daly and Magnacca 2003, pp. 217–229; Magnacca, pers. comm. 2008a).

Oahu

Perkins found *Hylaeus assimulans* to be widespread but not relatively abundant on Oahu (Magnacca 2005b, p. 2). His Oahu collection sites included Honolulu (Magnacca, pers. comm. 2008a), the Kaala mountains, the Waianae Mountains, and the Waianae coast (Perkins 1899, p. 102; Daly and Magnacca 2003, p. 58). There are also specimens collected by Perkins from unknown locations labeled "Oahu" and "w. coast, near sea level" (Daly and Magnacca 2003, p. 58).

Hylaeus assimulans was not found during surveys conducted between 1998 and 2008, including surveys at one historical location (Daly and Magnacca 2003, pp. 58, 217). Although *H. anthracinus* was recently found on Mokuania (see *Hylaeus anthracinus* Range and Distribution), *H. assimulans* was not found during surveys of potentially suitable habitat on this off-shore islet (S. Plentovich, Service, pers. comm. 2008). The absence of *H. assimulans* from potentially suitable coastal habitat on Oahu suggests it has likely been extirpated from this island (Daly and Magnacca 2003, p. 58; H. Sahli, unpublished data).

Summary of *Hylaeus assimulans* Range and Distribution

Hylaeus assimulans was historically known from numerous coastal and lowland dry habitats up to 2,000 ft (610 m) in elevation, on the islands of Lanai, Maui, and Oahu. Currently, this species is found in a few small patches of coastal and lowland dry forest habitat in five locations on Kahoolawe, Lanai, and Maui. The lands on which *H. assimulans* occurs are under private and State (DLNR and KIRC) ownership.

Specific Information on *Hylaeus facilis*

Taxonomy and Description

Hylaeus facilis is a member of the *H. difficilis* species group, and is closely related to *H. chlorostictus* and *H. simplex. Hylaeus facilis* was first described as *Prosopis facilis* by Smith in 1879 (Daly and Magnacca 2003, p. 80), based on a specimen erroneously reported from Maui. According to Blackburn and Cameron (1886 and 1887), the species' type locality was Pauoa Valley on Oahu (Daly and Magnacca 2003, p. 80). The species was later transferred to the genus *Nesoprosopis* (Perkins 1899, pp. 75, 77). *Nesoprosopis* was subsequently reduced to a subgenus of *Hylaeus* (Meade-Waldo 1923, p. 1). The species was most recently recognized by Daly and Magnacca (2003, p. 80) as *H. facilis. Hylaeus facilis* is a medium-sized bee with smoky colored wings. The male has an oval yellow mark on its face that covers the entire clypeus (lower face region), and a narrow stripe beside the eyes, but is otherwise unmarked. The large, externally visible gonoforceps (paired lateral outer parts of the male genitalia) distinguish *H. facilis* from the closely related *H. simplex* (Daly and Magnacca 2003, p. 83). The female is entirely black and indistinguishable from females of *H. difficilis* and *H. simplex* (Daly and Magnacca 2003, pp. 81–82).

Life History

The diet of the larval stage of *Hylaeus facilis* is unknown, although the larvae are presumed to feed on stores of pollen and nectar collected and deposited in the nest by the adult female. The nesting habits of *H. facilis* have not been observed, but the species is thought to nest underground as do the closely related species *H. chlorostictus* and *H. simplex* (Daly and Magnacca 2003, p. 83; Magnacca 2005c, p. 2).

The native host plants of adult *Hylaeus facilis* are unknown, but it is likely this species visits several plants other *Hylaeus* species are known to frequent, including *Acacia koa, Metrosideros polymorpha, Styphelia tameiameiae, Scaevola* spp., and *Chamaesyce* spp. (Daly and Magnacca 2003, p. 11). *Hylaeus facilis* has also been observed visiting the nonnative *Tourneforia argentea* for nectar and pollen (Magnacca 2007a, p. 181).

Range and Distribution

Hylaeus facilis was historically known from Lanai, Maui, Molokai, and Oahu, in dry shrubland to wet forest, from coastal to montane habitat up to 3,281 ft (1,000 m) in elevation (Gagne and Cuddihy 1999, p. 93; Daly and Magnacca 2003, pp. 81, 83). Perkins (1899, p. 77) remarked *H. facilis* was among the most common and widespread *Hylaeus* species on Oahu and all of Maui Nui (Lanai, Maui, and Molokai) (Magnacca 2007a, p. 183). The abundance of specimens in the collections at the Bishop Museum in Honolulu demonstrates the historic prevalence of this species in a diverse array of habitats and elevations (Magnacca 2007a, p. 183). Although the species was widely collected within a diverse range of habitats historically, it probably prefers dry to mesic forest and shrubland (Magnacca 2005c, p. 2), which are increasingly rare and patchily distributed habitats (Smith 1985, pp. 227–233; Juvik and Juvik 1998, p. 124; Wagner *et al.* 1999, pp. 66–67, 75; Magnacca 2005c, p. 2).

Hylaeus facilis has almost entirely disappeared from most of its historical range (Daly and Magnacca 2003, p. 7; Magnacca 2007a, p. 183). Between 1998 and 2006, 39 sites on Lanai, Maui, Molokai, and Oahu were surveyed, including 13 historical sites. *Hylaeus facilis* was absent from each of the 13 historical localities (Magnacca 2007a, p. 183) and was also not observed at 26 other sites with potentially suitable habitat, including many sites from which other native *Hylaeus* species have been recently collected (Daly and Magnacca 2003, pp. 7, 81–82; Magnacca 2007a, p. 183). Likely extirpated from Lanai, *H. facilis* is currently only known from two locations, one each on the islands of Molokai and Oahu (Daly and Magnacca 2003, pp. 81–82; Magnacca 2005c, p. 2). In addition, in 1990, a single individual was collected on Maui in a residential area near Makawao at 1,500 ft (457 m) in elevation. However, this site is an urbanized area devoid of native plants, and it is likely this collection was a single vagrant individual and not from an established population on Maui.

Lanai

Perkins (1899) described *Hylaeus facilis* as ''common'' at two Lanai locations. He noted *H. facilis* was collected from the Koele Mountains at 2,000 ft (610 m) in elevation. Researchers believe the collection locality was northwest of Puu Alii where the ridges are at an elevation of approximately 2,000 ft (600 m). The Puu Alii summit itself is 2,800 ft (850 m) in elevation, and less likely to be the site of Perkins' collection (Magnacca in litt. 2011, p. 36). Today this area contains mixed native and nonnative vegetation. Researchers collected three other species of *Hylaeus* in the same general area, along the Munro Trail and Kaiholena ridge in 1999 and 2001 (Daly and Magnacca 2003, pp. 217–229). Perkins' second collection site was in montane habitat at 3,000 ft (900 m) in elevation at Haalelepaakai in the ''summit mountains on Lanai'' (Daly and Magnacca 2003, p. 83). Researchers surveyed this area in 1999 and 2001, and were unable to find *H. facilis,* although they collected four other *Hylaeus* species (Daly and Magnacca 2003, pp. 217–229). *Hylaeus facilis* is likely extirpated from Lanai because it has not been relocated in over 100 years, and its potentially suitable habitat has been extensively surveyed (Magnacca 2007a, pp. 177, 183).

Maui

Perkins collected *Hylaeus facilis* from three different sites on Maui, including coastal habitat at the Wailuku sand hills (Waiehu dunes), montane mesic forest habitat on Haleakala, and lowland wet habitat in Iao Valley. Although other species of *Hylaeus* were collected from the Waiehu dunes in 1999 and 2001, *H. facilis,* as well as several other species collected by Perkins in the late 19th century, were absent (Daly and Magnacca 2003, pp. 217–229).

Perkins (1899) collected *Hylaeus facilis* in montane mesic forest habitat on Haleakala at an elevation of 5,000 ft (1,524 m) on Haleakala, in the Olinda area where he is known to have camped while surveying for and collecting insects (Evenhuis 2009, pp. 199–200). These native forests were once abundant in this area up to 6,000 ft (1,818 m) in elevation across the west slope of Haleakala, but have now been completely converted by agriculture and other land uses (Juvik and Juvik 1998, pp. 123–124). *Hylaeus facilis* and other species with similar habitat requirements (*e.g., H. difficilis, H. volcanicus*) are absent from the native, wetter forest across the eastern slope of Haleakala (Daly and Magnacca 2003, pp. 219–221, 228–229).

Perkins also collected *Hylaeus facilis* in lowland wet habitat at an elevation of 2,000 ft (610 m) in Iao Valley in the west Maui Mountains (H. V. Daly, unpublished data). The terrain in Iao Valley is especially rugged and wet, and Perkins relied on assistants to collect specimens from this area (Liebherr and Polhemus 1997, p. 351). Even today the vegetation in this area is predominantly native (Liebherr and Polhemus 1997, p. 351).

Since the late 1960s, there have been only two collections of *Hylaeus facilis* on Maui, but neither is from a distinct population that can be relocated. One collection was made in 1967 (Daly and Magnacca 2003, p. 221; Magnacca 2005c, p. 2), but the location is unknown (Xerces Society 2009c, p. 7). In 1990, a single individual was collected at Kokomo at an elevation of 1,500 ft (457 m) near Makawao, in a residential area devoid of native plants (Daly and Magnacca 2003, p. 221). This individual may have been a straggler blown in from a different site altogether (Magnacca 2005c, p. 2). Researchers question whether any viable *H. facilis* populations still remain on Maui (Magnacca 2007a, pp. 183–184).

Molokai

Perkins collected *Hylaeus facilis* in three locations within montane mesic forest habitat in the east Molokai Mountains (Daly and Magnacca 2003, p. 83). These locations were probably between Makakupaia and the rim of Pelekunu Valley, where Perkins did most of his collecting (Liebherr and Polhemus 1997, p. 347). Makakupaia is located within TNC's Kamakou Preserve. Researchers have surveyed extensively in similar, high-elevation habitat near Perkins' collecting area, including Kamakou Road (3,200 ft (975 m)), Puu Kolekole (3,400 ft (1,040 m)), and Kawela Gulch (3,600 ft (2,000 m)), and found other *Hylaeus* species, but were unable to locate *H. facilis* (Daly and Magnacca 2003, pp. 217–229).

In 2005, researchers collected *Hylaeus facilis* in coastal habitat at Kuololimu Point, within Kalaupapa National Historical Park (KNHP) on the southeast coast of the Kalaupapa peninsula (Magnacca 2007b, pp. 44–45). This area, located on the east side of the peninsula, is largely rocky and devoid of vegetation, but contains scattered patches of native coastal vegetation similar to habitat at Ka Lae on the island of Hawaii (Magnacca 2007a, p. 181). The park is cooperatively managed by the NPS, and the State of Hawaii's DHHL, DLNR, DOH, and DOT (NPS 2006 (*http://www.nps.gov/kala/index.htm*)).

Oahu

Perkins collected *Hylaeus facilis* from six sites on Oahu (Daly and Magnacca 2003, p. 83). One site described by Perkins was coastal habitat in Honolulu. Although the exact location is unknown, Honolulu coastal habitat has been completely developed for urban land use and there is no potentially suitable coastal habitat remaining in Honolulu for *Hylaeus* species. Perkins also described collecting *Hylaeus* species from mountains in Honolulu, and although the exact locations are unknown, these sites are presumed to be near known sites where he collected, including Waiolani Ridge, Lanihuli Ridge, Nuuanu Valley, and Konahuanui (Liebherr and Polhemus 1997, p. 348). While these mountain areas are largely undeveloped, many are dominated by nonnative vegetation. Researchers have surveyed potentially suitable native habitat near Perkins' collection sites and found other species of *Hylaeus,* but not *H. facilis* (Daly and Magnacca 2003, pp. 217–229). Descriptions of the five remaining suitable habitats follow:

(A) Makaha Valley: Perkins (1899) collected *H. facilis* at an elevation of 3,000 ft (900 m) in the upper part of Makaha Valley, on Oahu's northwest side. There have been no surveys for *Hylaeus* in this area since Perkins' collections, but researchers have observed this area now lacks suitable *Hylaeus* habitat due to development, urbanization, and conversion of native habitat to nonnative vegetation (Magnacca, pers. comm. 2008c). Some of the upper reaches of Makaha Valley contain patches of native vegetation, but much of the native vegetation has been destroyed by brush fires (Liebherr and Polhemus 1997, p. 347).

(B) Mount Kaala: Perkins (1899) collected *Hylaeus facilis* at 2,000 ft (610 m) in elevation on Mt. Kaala, possibly within what is now Mt. Kaala NAR. This area is a mix of dry and mesic forest communities (DLNR 1990, p. 3), and is generally characterized as predominantly native vegetation (Liebherr and Polhemus 1997, p. 348). This area has not been extensively resurveyed for *Hylaeus* spp. because much of it is either inaccessible (due to either private or U.S. Army ownership), or too rugged in general, requiring a long and steep approach along the Dupont Trail on the north slope of Mt. Kaala.

(C) Waianae Mountains: Perkins (1899) collected *Hylaeus facilis* in the Waianae Mountains, ''upland from Waianae'', likely in dry lowland forest, although the exact location is unknown. In 2008, researchers surveyed potentially suitable habitat in the Waianae-Kaala Forest Reserve (FR), but did not find *H. facilis* (Magnacca, pers. comm. July 2008c).

(D) Tantalus: Perkins collected *Hylaeus facilis* in lowland mesic habitat on ''Tantalus'' (Liebherr and Polhemus 1997, p. 348), which today is in close proximity to the urban core of Honolulu. This area is a mix of residential development and undeveloped sites dominated by nonnative plants, including various species of *Phyllostachys* spp. (bamboo), *Acacia confusa* (Formosa koa), *Eucalyptus robusta* (swamp mahogany), and *Aleurites moluccana* (kukui) (USDA 2001 *https://soilseries.sc.egov.usda.gov/OSD_Docs/T/TANTALUS.html*). Habitat dominated by nonnative plants does not support viable populations of *Hylaeus,* and no species have been reported from this area since Perkins' collections despite more recent surveys in the few small, widely separated areas containing native plant habitat (Magnacca in litt. 2011, p. 41).

(E) Poamoho Trail: In 1975, *Hylaeus facilis* was collected in lowland wet forest at an unknown elevation along the Poamoho Trail in Oahu's Koolau Mountains. Located in central Oahu, the Poamoho Trail is part of the Na Ala Hele trail and access system, and is within the Ewa FR (DLNR 2008, p. 15). The land adjacent to the trail, including the access road to the forest reserve, is State (DOFAW) and privately owned. The Poamoho Trail traverses a public hunting area, and some of the land surrounding the access road is leased to the Army for training purposes (DLNR 2011—*https://hawaiitrails.ehawaii.gov/trail.php?TrailID=OA+08+007*). Access is only allowed on weekends and holidays, and by permit only. Dominant vegetation in the summit area includes the indigenous fern, *Dicranopteris linearis* (uluhe), *Acacia koa,* and *Metrosideros polymorpha* (DLNR 2011—*http://hawaiitrails.ehawaii.gov/trail.php?TrailID=OA+08+007*).

Summary of *Hylaeus facilis* Range and Distribution

At the end of the 19th century, *Hylaeus facilis* was known from numerous locations in coastal and lowland habitats, including lowland dry, mesic, and wet forest habitat on the islands of Lanai, Maui, Molokai, and Oahu. Currently, this species is only known from two locations, one each on the islands of Molokai and Oahu (Magnacca 2007a, p. 177), under State (DHHL, DLNR, DOFAW, DOH, DOT) and private (TNC and others) ownership. Researchers question whether viable populations of this species remain on Maui because only two single individuals have been collected in the past 100 years.

Specific Information on *Hylaeus hilaris*

Taxonomy and Description

Hylaeus hilaris was first described as *Prosopis hilaris* by Smith in 1879 (Daly and Magnacca 2003, pp. 103–104), transferred to the genus *Nesoprosopis* 20 years later (Perkins 1899, pp. 75), and then *Nesoprosopis* was reduced to a subgenus of *Hylaeus* in 1923 (Meade-Waldo 1923, p. 1). In 2003, Daly and Magnacca described the species as *Hylaeus hilaris* (Daly and Magnacca 2003, pp. 103–104). *Hylaeus hilaris* is distinguished by its large size (male wing length is 0.185 in (4.7 mm)) relative to other coastal *Hylaeus* species. The wings of this species are slightly smoky to smoky-colored, and it is the most colorful of the Hawaiian *Hyaleus* species. The face of the male is almost entirely yellow, with yellow markings on the legs and thorax, and the metasoma (middle portion of the abdomen) are usually predominantly red. Females are drably colored, with various brownish markings. As with other cleptoparasitic species (see *Life History* below), *H. hilaris* lacks the specialized pollen-sweeping hairs of the front legs (Daly and Magnacca 2003, pp. 9, 106). It is also one of only two Hawaiian *Hylaeus* species to possess apical (at the end or tip of a structure) bands of fine white hairs on the segments of the metasoma.

Life History

Most adult Hawaiian *Hylaeus* species consume nectar for energy; however, *Hylaeus hilaris* has yet to be observed actually feeding from flowers. *Hylaeus hilaris* and the four species related to it (*H. hostilis, H. inquilina, H. sphecodoides,* and *H. volatilis*) are known as cleptoparasites or cuckoo bees. The mated female does not construct a nest or collect pollen, but instead enters the nest of another species and lays an egg in a partially provisioned cell. Upon hatching, the cleptoparasitic larva kills the host egg, consumes the provisions, pupates, and eventually emerges as an adult. As a result of this lifestyle shift, *H. hilaris* bees have lost the pollen-collecting hairs other species possess on the front legs. Cleptoparasitism is actually quite common among bees, with approximately 25 percent of known bee species having evolved to become cleptoparasites. Among the world's bees, other than the Hawaiian *Hylaeus* group, no cleptoparasites are known from the family Colletidae (Daly and Magnacca 2003, p. 9).

The larvae of *Hylaeus hilaris* and their diet are unknown (Magnacca 2005d, p. 2); however, the species is known to lay its eggs within the nests of *H. anthracinus, H. assimulans,* and *H. longiceps* (Perkins 1913, p. lxxxi). Although the species has never been observed at flowers, *H. hilaris* adults presumably consume nectar as a food source (Michener 2000, pp. 26–37, 126). *Hylaeus hilaris* depends on a number of related *Hylaeus* host species for its parasitic larvae, and its population size is inherently much smaller than its host species (Magnacca 2007a, p. 181).

Range and Distribution

Hylaeus hilaris was historically known from coastal habitat on the islands of Lanai, Maui, and Molokai. It is believed to have occurred along much of the coast of these islands' as its primary hosts, *H. anthracinus, H. assimulans,* and *H. longiceps,* likely extended throughout this habitat. The majority of coastal habitat on these islands has either been developed or degraded, and is no longer suitable for *H. hilaris* (Liebherr and Polhemus 1997, pp. 346–347; Magnacca 2007, pp. 186–188). *Hylaeus hilaris* was absent from three of its historical population sites revisited by researchers between 1998 and 2006. It was also not observed at 10 additional sites with potentially suitable habitat where other native *Hylaeus* species have been recently collected (Daly and Magnacca 2003, pp. 103, 106).

First collected on Maui in 1879, *Hylaeus hilaris* has been collected only twice in the last 100 years, but as noted above, there is a gap of about 50 to 100 years between major collecting efforts. *Hylaeus hilaris* has recently been collected on two occasions: once in 1989 and again in 1999. On the islands of Lanai and Maui, the species was absent from each of its historical Perkins-era localities revisited between 1998 and 2006 (Magnacca 2007a, pp. 177, 181–82). Currently, the only known population of *H. hilaris* is located on TNC's Moomomi Preserve on Molokai (Daly and Magnacca 2003, pp. 103, 106; Magnacca 2005d, p. 2).

Lanai

Perkins (1899) collected *Hylaeus hilaris* in coastal habitat at Manele, on the southern coast of Lanai. This area is now both the site of the ferry landing from Lahaina, Maui, and a small boat harbor, and is in close proximity to a major resort. The area was surveyed in 1999, but researchers noted little native vegetation aside from *Scaevola sericea* and an absence of *Hylaeus* species. Additionally, the nonnative bee, *Lasioglossum impavidum* (no common name (NCN)), was found at the site. Three other potentially suitable locations were surveyed between 1999 and 2007 for *Hylaeus* species, but *H. hilaris* was not observed at these sites, despite the presence of *H. assimulans* and *H. longiceps,* a recorded host species (Daly and Magnacca 2003, p. 106; Magnacca 2007a, pp. 177, 181).

Most native coastal habitats are now severely degraded across the entire island, and it is believed *Hylaeus hilaris* has likely been extirpated (Magnacca 2005d, p. 2; Magnacca 2007a, p. 181). Although large areas of remote sandy beach on the north and east coasts remain to be thoroughly surveyed for *Hylaeus* species, those that have been inspected contain few native plants. Two of the three known host species of *H. hilaris* occur on Lanai, but all recent (*i.e.,* since 1999) collections have primarily been made in lowland dry forest habitat where *H. hilaris* has never been collected.

Maui

Perkins collected *Hylaeus hilaris* from three sites, including one now unknown site possibly south of Wailuku and simply labeled ''Maui,'' and two sites in coastal habitat at the Wailuku sand hills (an area noted as ''the sandy isthmus'') (Daly and Magnacca 2003, p. 106). In addition, in 1880, Reverend Thomas Blackburn collected *H. hilaris* from an unspecified location on the island (Daly and Magnacca 2003, p. 106). Although other rare *Hylaeus* species were collected from the Waiehu dunes in 1999 and 2001 (See *H. anthracinus Range and Distribution*), *H. hilaris,* as well as several other species once collected there by Perkins, was absent (Daly and Magnacca 2003, pp. 217–229).

All three known host species of *Hylaeus hilaris* occur on Maui. However, *H. anthracinus* and *H. assimulans* are currently known only from dry forest or shrubland, which are likely unsuitable habitat for *H. hilaris.* The third known host species, *H. longiceps,* occurs in the Wailuku sand hills (Magnacca 2007a, p. 182). In addition to its known historical sites, several other potentially suitable sites were surveyed between 1998 and 2006, but *H. hilaris* was not found at any of these sites, despite the presence of two of its known host species (Daly and Magnacca 2003, pp. 217–229; Magnacca 2007a, p. 177). Therefore, researchers believe it is likely *H. hilaris* has been extirpated from the island (Magnacca 2005d, p. 2).

Molokai

Although *Hylaeus hilaris* was never collected on Molokai by Perkins, in 1918, Fullaway (1918, p. 396) collected the species at an unspecified site. As on all of the Hawaiian Islands, most of the coastal habitat on Molokai is now dominated by nonnative vegetation. Currently, the only known population of *H. hilaris* occurs on the northwest coast within TNC's Moomomi Preserve. This site is part of a large area of windswept calcified dunes, some of which are dominated by native plants while other portions of the dunes are dominated by nonnative plant species. *Hylaeus anthracinus* and *H. longiceps,* both host species of *H. hilaris,* are presently known to occur in Moomomi Preserve (Magnacca 2007a, p. 181). Only two collections of *H. hilaris* have been made at Moomomi since it was discovered at this site in 1930. Both collections, 1989 and 1999, were of a single male. Dunes to the west of Moomomi Preserve are dominated by nonnative vegetation, and no species of *Hylaeus* have been collected from those areas. While *H. anthracinus,* one of the host species of *H. hilaris,* is currently known from the Kalapapa peninsula, *H. hilaris* has never been collected there.

Summary of *Hylaeus hilaris* Range and Distribution

Hylaeus hilaris was historically known from coastal habitat on the islands of Lanai, Maui, and Molokai. It is believed to have occurred along much of the coast of these islands' as its known hosts, *H. anthracinus, H. assimulans,* and *H. longiceps,* likely also occurred throughout coastal habitat on these three islands. Currently, *H. hilaris* is only known from one site on Molokai.

Specific Information on *Hylaeus kuakea*

Taxonomy and Description

Hylaeus kuakea was first described by Daly and Magnacca (2003, pp. 1, 125–1,127) from specimens collected in 1997 in the Waianae Mountains on Oahu. *Hylaeus kuakea* is a small, black bee with slightly smoky-colored wings. This species does not fit into any of the well-defined *Hylaeus* species groups. Its facial marks are similar to those of the *H. difficilis* group and to *H. anthracinus,* but it can be distinguished by its unusual ivory facial marking covering the clypeus (the lower face region). *Hylaeus kuakea* also resembles *H. anthracinus,* but has a denser, more distinct arrangement of setae (sensory hairs) on the head and generally narrower marks next to the compound eyes (Daly and Magnacca 2003, p. 125; Magnacca 2005e, p. 2). Only four adult male specimens have been collected; females have yet to be collected or observed.

Life History

The diet of the larval stage of *Hylaeus kuakea* is unknown, although the larvae are presumed to feed on stores of pollen and nectar collected and deposited in the nest by the adult female (Daly and Magnacca 2003, p. 9). The nesting habits of *H. kuakea* have not been observed, but the species is believed to be related to other wood-nesting Hawaiian *Hylaeus* species (Magnacca and Danforth 2006, p. 403).

The native host plants of the adult *Hylaeus kuakea* are unknown, but it is likely this species visits several plants other *Hylaeus* species are known to frequent, including *Acacia koa, Metrosideros polymorpha, Styphelia tameiameiae, Scaevola* spp., and *Chamaesyce* spp. (Magnacca 2005e, p. 2).

Range and Distribution

In 1997, researchers collected 2 male individuals of *Hylaeus kuakea* in lowland mesic forest at an elevation of about 1,900 ft (579 m) on Moho Gulch Ridge at the northern end of the State's recently acquired Honouliuli Preserve in the Waianae Mountains on Oahu. Researchers surveyed the middle and southern portions of the Preserve, but they did not find *H. kuakea,* although other species of *Hylaeus* are known from these areas. In 2010, researchers collected this species (two males), on the endangered plant *Chamaesyce herbstii* (akoko) in a remnant patch of diverse lowland mesic forest in Makaha Valley on Oahu's west side (Magnacca, in litt., 2010, p. 1). Phylogenetically, *H. kuakea* belongs in a species-group primarily including mesic forest-inhabiting species (Magnacca & Danforth 2006, p. 405).

Summary of *Hylaeus kuakea* Range and Distribution

Because the first collection of *Hylaeus kuakea* was not made until 1997, its historical range is unknown (Magnacca 2005e, p. 2; Magnacca 2007a, p. 184). Only four individuals (all males) of *H. kuakea* have been collected at two different sites in lowland mesic forest habitat in the Waianae Mountains on Oahu (Magnacca 2007a, p. 184; Magnacca, in litt., 2010, p. 1), and the species has never been collected in any other habitat type or area, including some that have been more thoroughly surveyed (Magnacca in litt., 2011, p. 49). Researchers have not exhaustively surveyed all potentially suitable lowland mesic forest areas due their remote and rugged locations, small size, and distant spacing among large areas of nonnative forest. Lowland mesic forest habitat is becoming increasingly rare and patchily distributed on Oahu (Smith 1985, pp. 227–233; Juvik and Juvik 1998, p. 124; Wagner *et al.* 1999, pp. 66–67, 75).

Specific Information on *Hylaeus longiceps*

Taxonomy and Description

Hylaeus longiceps was first described in 1899 as *Nesoprosopis longiceps* (Perkins 1899, pp. 75, 98), and then *Nesoprosopis* was reduced to a subgenus of *Hylaeus* in 1923 (Meade-Waldo 1923, p. 1). Daly and Magnacca (2003, pp. 133–134) most recently described the species as *H. longiceps. Hylaeus longiceps* is a small to medium-sized, black bee with clear to slightly smoky-colored wings. Its distinguishing characteristics are its long head and the facial marks of the male. The lower face of the male is marked with a yellow band that extends at the sides of the face in a broad stripe above the antennal sockets. The area above the clypeus (lower face region) is very long and narrow, and the scape (the first antennal segment) is noticeably twice as long as it is wide. The female is entirely black and unmarked (Daly and Magnacca 2003, p. 133).

Life History

The diet of the larval stage of *Hylaeus longiceps* is unknown, although the larvae are presumed to feed on stores of pollen and nectar collected and deposited in the nest by the female adult (Daly and Magnacca 2003, p. 9). The nesting habits of *H. longiceps* are unknown, but the species is thought to nest underground, as in other closely related species (Magnacca 2005f, p. 2).

Hylaeus longiceps adults have been observed visiting the flowers of a wide variety of native plants, including *Scaevola coriacea* (dwarf naupaka), *Sida fallax, Scaevola* spp., *Sesbania tomentosa, Myoporum sandwicense, Santalum ellipticum, Chamaesyce degeneri,* and *Vitex rotundifolia* (pohinahina) (Daly and Magnacca 2003, p. 135). It is also likely *H. longiceps* visits several plant species other *Hylaeus* species are known to frequently visit, including *Scaevola* spp., *Chamaesyce* spp., *Tournefortia argentea, Jacquemontia ovalifolia,* and *Sida fallax* (Magnacca 2005f, p. 2).

Range and Distribution

Hylaeus longiceps is historically known from coastal and lowland dry shrubland habitat up to 2,000 ft (610 m) in elevation in numerous locations on the islands of Lanai, Maui, Molokai, and Oahu. Perkins (1899, p. 98) noted *H. longiceps* was locally abundant, and probably occurred historically throughout much of the leeward and lowland areas on Lanai, Maui, Molokai, and Oahu, as its host plants, *Sida fallax, Chamaesyce* spp., *Scaevola* spp., and *Jaquemontia ovalifolia,* occurred throughout these areas (Magnacca 2005f, p. 2). Most of the habitat in these areas has been either developed or degraded, and is no longer suitable for *H. longiceps* (Liebherr and Polhemus 1997, pp. 346–347; Magnacca 2007a, pp. 186–188).

Hylaeus longiceps is now restricted to small populations in small patches of coastal and lowland dry habitat on Lanai, Maui, Molokai, and Oahu (Magnacca 2005f, p. 2). Twenty-five sites that were either historical collecting localities for *H. longiceps* or contained potentially suitable habitat for this species were surveyed between 1997 and 2008. *Hylaeus longiceps* was observed at only six of the surveyed sites: three sites on Lanai and one site each on the islands of Maui, Molokai, and Oahu. Only one historical location, Waieu dunes on Maui, still supports a population of *H. longiceps* (Daly and Magnacca 2003, p. 135).

Lanai

Perkins (1899) collected *Hylaeus longiceps* at Manele, and other unspecified localities (labeled ''Lanai''). Between 1999 and 2001, researchers surveyed seven sites for *Hylaeus* species, and were unable to find *H. longiceps* at Manele Bay, although other rare *Hylaeus* species were observed there (Daly and Magnacca 2003, pp. 217–229). In addition, researchers did not find *H. longiceps* at three other sites within potentially suitable lowland dry habitat, including the Kahue unit of the privately owned Kanepuu Preserve, Garden of the Gods, and the Munro Trail/Kaiholena area of the Koele mountains (Daly and Magnacca 2003, pp. 217–229). *Hylaeus longiceps* is now known only from very small pockets of native vegetation in three locations on private land, including lowland dry forest habitat at Kahue and Polihua Road, and coastal habitat at Shipwreck Beach. Descriptions of these three locations follow:

(A) Kahue and Polihua Road: In 1999, Magnacca collected *Hylaeus longiceps* in lowland dry forest at Kahue (south of Kanepuu Preserve) at an elevation of 1,400 ft (427 m) (Daly and Magnacca 2003, p. 135). Researchers also surveyed the Kanepuu Preserve for *H. longiceps,* but were unable to find this species. In 1999, researchers collected *H. longiceps* in lowland dry forest at 1,000 ft (300 m) in elevation, along Polihua Road in central Lanai (Daly and Magnacca 2003, p. 135).

(B) Shipwreck Beach: Although he did not collect *Hylaeus longiceps* at Shipwreck Beach, Perkins collected other species of *Hylaeus* at Awalua, about 4 miles to the west (Daly and Magnacca 2003, p. 58). In 2001, researchers collected *H. longiceps* in native, coastal habitat at Shipwreck Beach (Daly and Magnacca 2003, p. 135). Shipwreck Beach is a popular tourist site on Lanai and accessible by four-wheel drive vehicles.

Maui

Perkins (1899) collected *Hylaeus longiceps* at the Wailuku sand hills (Waiehu Dunes) and on Haleakala. In addition, some of his specimens were collected from unknown localities labeled ''Maui.'' Perkins collected *H. longiceps* in dry forest habitat at an elevation of 2,000 ft (610 m) on Haleakala, probably near the towns of Pukalani or Makawao, where he stopped on his way to Wailuku (Daly and Magnacca 2003, p. 135). Native dry forests that supported populations of *Hylaeus* were common in lowland areas when Perkins collected, but this habitat has been greatly reduced and fragmented.

Hylaeus longiceps is now known from only one Maui location, at the Wailuku sand hills (Waiehu dunes). Between 1999 and 2001, a total of seven specimens were collected in native habitat in the northern portion of the dunes (Daly and Magnacca 2003, p. 224). Researchers surveyed for, but did not find, *H. longiceps* in the southern (Kahului) portion of the dunes (Daly and Magnacca 2003, p. 224).

Hylaeus longiceps was not found in five other sites on Maui surveyed between 1999 and 2001 (Daly and Magnacca, pp. 217–229). One historical site, in dry forest habitat on the slopes of Haleakala, has been developed and is overgrown with nonnative, invasive plants (Magnacca, pers. comm., 2008f). *Hylaeus longiceps* was absent from four sites (Kanaio NAR, Lahainaluna, Manawainui Gulch, and Waikapu near Kaohonua) with potentially suitable habitat where other *Hylaeus* species with similar habitat requirements were recently collected (Daly and Magnacca 2003, pp. 217–229).

Molokai

Perkins (1899) collected *Hylaeus longiceps* at Kaunakakai, and at unknown locations labeled ''Molokai coast and plains,'' the ''west end'' [of the island], and the ''Molokai Mountains.'' Although Kaunakakai is the primary urban area on Molokai, researchers surveyed this area, noting any former *Hylaeus* habitat has been lost to urban development and nonnative, invasive plants (Magnacca, pers. comm., 2008f). Most coastal habitat on the west end of Molokai, with the exception of TNC's Moomomi Preserve, has been degraded and converted to nonnative, invasive plants (Magnacca, pers. comm., 2008f).

Researchers surveyed a total of six sites on Molokai over the last several years for *Hylaeus longiceps,* and observed 8 individuals at Moomomi Preserve (in 1999 and in 2001) (Daly and Magnacca 2003, p. 135). *Hylaeus longiceps* was notably absent from three sites on the Kalaupapa peninsula (Kuololimu Point, Hoolehua Beach, and Kaupikiawa), where other *Hylaeus* species have been recently collected (Daly and Magnacca 2003, pp. 217–229). Researchers were unable to find *H. longiceps* in sand dune habitat near the Kaluakoi Resort on Molokai's northwest coastline (Magnacca, pers. comm., 2008f).

Oahu

Perkins (1899) collected *Hylaeus longiceps* from only one site, in a coastal area of southwest Waianae. In 1999, 2000, and 2002, researchers found *H. longiceps* in coastal habitat at the State's Kaena Point NAR (Daly and Magnacca 2003, p. 224). Researchers did not find *H. longiceps* during surveys conducted at other coastal sites with potentially suitable habitat, including Makapuu in 1999, and Kalaeloa in 2002. Although both areas contain vegetation similar to the vegetation in the Kaena Point NAR, albeit more degraded, no species of *Hylaeus* were observed in these areas (Daly and Magnacca 2003, pp. 217–229; Magnacca, pers. comm., 2008f).

Summary of *Hylaeus longiceps* Range and Distribution

Hylaeus longiceps was historically known from numerous coastal and lowland dry forest locations up to 2,000 ft (600 m) in elevation on the islands of Lanai, Maui, Molokai, and Oahu. Currently, *H. longiceps* is restricted to a total of six populations in small patches of coastal and lowland dry forest habitat: three sites on Lanai and one site each on the islands of Maui, Molokai, and Oahu (Magnacca 2005f, p. 2). The lands on which *H. longiceps* occurs are under a variety of jurisdictions including private (*e.g.,* TNC) and State (NARS).

Specific Information on *Hylaeus mana*

Taxonomy and Description

Hylaeus mana was first described by Daly and Magnacca (2003, pp. 135–136) from four specimens collected in 2002 on the leeward side of the Koolau Mountains on Oahu. This species is an extremely small, gracile (gracefully slender) black bee with yellow markings on the face. The smallest of all Hawaiian *Hylaeus* species, *H. mana* is a member of the *Dumetorum* species group. The face of the male is largely yellow below the antennae, extending dorsally in a narrowing stripe. The female's face has three yellow lines, one against each eye, and a transverse stripe at the apex of the clypeus (lower face region). The female's other markings are the same as the male's (Daly and Magnacca 2003, p. 135). *Hylaeus mana* can be distinguished from *H. mimicus* and *H. specularis,* species with overlapping ranges, by its extremely small size, the shape of the male's genitalia, the female's extensive facial marks, and a transverse rather than longitudinal clypeal marking (Daly and Magnacca 2003, p. 138).

Life History

The diet of the larval stage of *Hylaeus mana* is unknown, although the larvae are presumed to feed on stores of pollen and nectar collected and deposited in the nest by the adult female (Daly and Magnacca 2003, p. 9). The nesting habits of *H. mana* are not well known, but it is assumed the species is closely related to other wood-nesting Hawaiian *Hylaeus* species (Magnacca 2005g, p. 2; Magnacca and Danforth 2006, p. 403).

Adult specimens of *Hylaeus mana* were collected while they visited flowers of *Santalum freycinetianum* var. *freycinetianum* (iliahi, sandalwood), a native Hawaiian plant found only on Oahu and Molokai (Wagner *et al.* 1999, p. 1,221). It is likely *H. mana* visits several other native plant species, including *Acacia koa, Metrosideros polymorpha, Styphelia tameiameiae, Scaevola* spp., and *Chamaesyce* spp. (Magnacca 2005g, p. 2).

Range and Distribution

Hylaeus mana is only known from lowland mesic forest located along the Manana Trail in the Koolau Mountains on Oahu, at an elevation of about 1,400 ft (430 m). Few *Hylaeus* bees have been found in this type of *Acacia koa*-dominated, lowland mesic forest on Oahu (Daly and Magnacca 2003, p. 138). This type of forest is increasingly rare and patchily distributed on Oahu (Smith 1985, pp. 227–233; Juvik and Juvik 1998, p. 124; Wagner *et al.* 1999, pp. 66–67, 75).

The Manana Trail is part of the Na Ala Hele Hawaii Statewide Trail and Access System (DLNR 2007), and is located within the State's Ewa FR. Six miles in length, the beginning of the Manana Trail is dominated by nonnative plant species, but leads into an area of native forest where *Acacia koa, Metrosideros polymorpha,* and *Scaevola* spp. are common (DLNR 2011—*http://hawaiitrails.ehawaii.gov/trail.php?TrailID=OA+09+008).*

Summary of Hylaeus mana Range and Distribution

Because the first collection of *Hylaeus mana* was made in 2002, its historical range and current distribution, other than the collection on Manana Trail, are unknown at this time (Magnacca 2005g, p. 2). Additional surveys in potentially suitable habitat may reveal additional populations elsewhere on Oahu (Magnacca 2007a, p. 184). However, the extreme rarity of this species, its absence from nearby sites, and the fact it was not discovered until very recently, suggests very few populations remain (Magnacca 2005g, p. 2).

Summary of Information Pertaining to the Five Factors

Section 4 of the Act (16 U.S.C. 1533) and its implementing regulations (50 CFR 424) set forth procedures for adding species to the Federal Lists of Endangered and Threatened Wildlife and Plants. Under section 4(a)(1) of the Act, a species may be determined to be endangered or threatened based on any of the following five factors:

(A) The present or threatened destruction, modification, or curtailment of its habitat or range;

(B) Overutilization for commercial, recreational, scientific, or educational purposes;

(C) Disease or predation;

(D) The inadequacy of existing regulatory mechanisms; or

(E) Other natural or manmade factors affecting its continued existence.

In making this finding, information pertaining to the seven species of Hawaiian yellow-faced bees in relation to the five factors provided in section 4(a)(1) of the Act is discussed below.

In considering what factors might constitute threats, we must look beyond the exposure of the species to the factor to determine whether the species responds to the factor in a way that causes actual impacts to the species. If there is exposure and the species responds negatively, the factor may be a threat and we then attempt to determine how significant a threat it is. If the threat is significant, it may drive or contribute to the risk of extinction of the species such that the species warrants listing as endangered or threatened as those terms are defined by the Act.

Factor A. Present or Threatened Destruction, Modification, or Curtailment of the Habitat or Range

Degradation and loss of coastal and lowland habitat used by *Hylaeus* bees on all of the main Hawaiian Islands is the primary threat to these seven species (Cuddihy and Stone 1990, pp. 60–61; Daly and Magnacca 2003, pp. 55, 173; Magnacca, pers. comm. 2010). Coastal and lowland habitats have been severely altered and degraded, partly because of past and present land management practices, including agriculture, grazing, and urban development; the deliberate and accidental introductions of nonnative animals and plants; and recreational activities. In addition, fire is a potential threat to the habitat of these seven species in some locations.

Habitat Destruction and Modification by Urbanization and Land Use Conversion

Destruction and modification of *Hylaeus* bee habitat by urbanization and land use conversion leads to the direct fragmentation of foraging and nesting habitat of these species. In particular, because native host plant species are known to be essential to the yellow-faced bees for foraging of nectar and pollen, any further loss of this habitat may endanger their long-term chances for conservation and recovery. Additionally, conversion and modification of the seven yellow-faced bees' habitat is also likely to further exacerbate the introduction and spread of nonnative plants into and within these areas (see *Habitat Destruction and Modification by Nonnative Plants* section below).

Coastal Habitat

Native coastal habitat is one of the rarest habitats on the main Hawaiian Islands (Hawaii, Kahoolawe, Kauai, Lanai, Maui, Molokai, and Oahu) (Wagner *et al.* 1999, pp. 45, 54; Cuddihy and Stone 1990, pp. 94–95; Magnacca 2007, p. 180). Coastal habitat is highly valued for development, popular for recreation, typically dry on both the windward and leeward sides of the islands, vulnerable to fire, and especially susceptible to invasion by nonnative plants. Increased access to coastal areas, and resulting habitat disturbance, has been facilitated by development, road-building, and past agricultural activities (Cuddihy and Stone 1990, pp. 94–95). The native coastal habitat that remains is in small remnant patches, and most of these remnants have been overtaken by invasive plant species and have relatively low diversity (Cuddihy and Stone 1990, pp. 94–95) (see *Habitat Destruction and Modification by Nonnative Plants* section below). Most of the coastal areas of the main Hawaiian Islands now lack significant amounts of native plants suitable for foraging by *Hylaeus,* other than *Scaevola sericea,* which alone cannot support *Hylaeus* populations (Magnacca 2007a, p. 187). The restricted and isolated nature of coastal habitat places species that depend on these areas even more at risk for a variety of reasons, including but not limited to their increased susceptibility to random events (*e.g.,* hurricanes and wildfire), the reduced range of native plants including host plants, and the reduced number of suitable sites for species to expand their range (Sakai *et al.* 2002, p. 291).

Five species of Hawaiian yellow-faced bees (*Hylaeus anthracinus, H. assimulans, H. facilis, H. hilaris,* and *H. longiceps*) were once widespread and common in coastal habitat (Perkins 1912, p. 688) throughout the main Hawaiian Islands (see Table 1 above), with the exception of Kauai. These five species are now absent from all of Perkins' coastal collection localities (Kealakekua Bay and Keei and the urban area near Kona on the island of Hawaii; the Awalua area on Lanai; the Wailuku sand hills area on Maui; the northwest dunes and Kaunakakai areas on Molokai; and Waikiki, the Waianae area, and the Honolulu mountains on Oahu) (Daly and Magnacca 2003, pp. 217–229), although they have recently been collected in disparate coastal habitat on one or more of the islands of Hawaii, Kahoolawe, Lanai, Maui, Molokai, and Oahu (Daly and Magnacca 2003, pp. 217–229).

Lowland Dry Habitat

Lowland dry forests and shrublands have been heavily impacted by urbanization and conversion to agriculture or pasture throughout the Hawaiian Islands, with the estimated loss of more than 90 percent of dry forests and shrublands (Bruegmann 1996, p. 26; Juvik and Juvik 1998, p. 124). Less than 1 percent of lowland dry forest and shrubland remains on Oahu, Molokai, and Lanai; less than 2 percent remains on Maui; and less than 17 percent remains on Hawaii Island (Sakai *et al.* 2002, p. 296). Without greater conservation and restoration efforts, we believe the remaining lowland dry forest and shrublands, which were once abundant and perhaps the most diverse of all Hawaiian habitat types (Medeiros 2006, p. 1), could completely disappear due to continued development and other land use conversion, compounded by the effects of nonnative species, wild fire, and stochastic events (see following sections on *Habitat Destruction and Modification by Nonnative Plants;* by *Nonnative Ungulates;* by *Fire;* by *Recreational Activities;* by *Hurricanes and Drought;* and by *Climate Change*) (Cabin *et al.* 2000, p. 449).

Four species (*Hylaeus anthracinus, H. assimulans, H. facilis,* and *H. longiceps*) were once widespread (*i.e.,* there were several populations across two or more islands) and found within lowland dry habitat on several islands, including Hawaii, Lanai, Maui, Molokai, and Oahu. However, these species have not been observed during recent surveys from their historical population sites on these islands (Magnacca 2005a, b, c, f, pp. 1–2). Five of the seven *Hylaeus* bee species (*Hylaeus assimulans, H. facilis, H. kuakea, H. longiceps,* and *H. mana*) are most often found in dry and mesic forest (see discussion below) and shrubland habitat (Daly and Magnacca 2003, p. 11), and the greatest proportion of endangered or at-risk Hawaiian plant species are also limited to these same habitats; 25 percent of Hawaiian listed plant species are from dry forest and shrubland alone (Sakai *et al.* 2002, pp. 276, 291, 292). According to Magnacca (2007, pp. 186–187), lowland dry and mesic forests now support less-diverse *Hylaeus* communities because many native plants used for foraging are extirpated from these habitats.

Lowland Mesic Habitat

Hawaii's lowland mesic forest habitat was once abundant and considered the most diverse (in terms of number of species) of all Hawaiian forest types (Rock 1913, p. 9). Lowland mesic forest habitat is now very rare, and has been converted to pasture, military use, agricultural use, or lost to urbanization. Development and land use conversion is ongoing (Cuddihy and Stone 1990, p. 61; Magnacca 2007, p. 187; Wagner *et al.* 1999, p. 75). Fire has also negatively impacted this habitat type and remains a significant threat (see *Habitat Destruction and Modification by Fire* section below).

Historically, *Hylaeus facilis* was found in a wide variety of habitats including lowland mesic forest on Lanai, Maui, and Oahu and montane mesic habitat on Molokai. However, this species no longer occurs in these habitats on any of these four islands. *Hylaeus kuakea* and *H. mana* are known from a total of three locations in lowland mesic forest habitat on the island of Oahu. Because we lack information on the historical range of *H. kuakea* and *H. mana* (they were only discovered relatively recently), we are unable to determine the extent of habitat loss these two species have experienced. However, because the extent and the quality of lowland mesic forest has been reduced throughout the Hawaiian Islands, it is reasonable to conclude *H. kuakea* and *H. mana* now have less habitat because of urbanization and land use conversion.

Lowland Wet Habitat

Native lowland wet forests were once one of the dominant ecosystem types in lowland areas on the main Hawaiian Islands (Wagner *et al.* 1999, p. 45). Most of the original loss of this habitat type was due to agricultural uses in the 18th and 19th centuries, and many remaining areas were overtaken by aggressive nonnative plant species such as *Psidium cattleianum* (strawberry guava), nonnative grasses such as *Brachiaria mutica* (California grass), and *Rubus* spp. (*e.g.,* prickly Florida blackberry, thimbleberry). Remnants of native lowland wet forest can be found in rocky or steep terrain, such as on some peaks and summit ridges on Oahu, Molokai, and West Maui (Cuddihy and Stone 1990, p. 105). Although these remaining remote and remnant native lowland areas are now less likely threatened by land use conversion, they remain very threatened by the impacts of nonnative plants (see *Habitat Destruction and Modification by Nonnative Plants* section below). Furthermore, the original loss of lowland and montane wet forest habitat on Oahu, Lanai, Maui, and Molokai was likely a contributing factor to the decline of *H. facilis,* a species now known only from coastal habitat on Molokai and wet forest habitat on Oahu's Poamoho Trail. Researchers believe the site on Oahu likely once had more open understory and the presence of *H. facilis* in this wet forest habitat represents an outlier or residual population (Perkins 1899, p. 76; Liebherr and Polhemus 1997, p. 347).

In summary, destruction and modification by urbanization and land use conversion of the coastal and lowland habitat of the seven *Hylaeus* bees is continuing, and is expected to continue reducing and fragmenting the remaining habitat available to the yellow-faced bees in the future, endangering the species' long-term chances for conservation and recovery. Because of the decreased amount of suitable native coastal and lowland habitat remaining in the Hawaiian

Islands and the continued conversion of these native habitats by development, road building, or agriculture, we conclude the ongoing habitat loss and land modification is a significant ongoing threat to *H. anthracinus, H. assimulans, H. facilis, H. hilaris, H. kuakea, H. longiceps,* and *H. mana.*

Habitat Destruction and Modification by Nonnative Plants

Native vegetation on all of the main Hawaiian Islands has undergone extreme alteration because of past and present land management practices, including ranching, agricultural development, and the deliberate introduction of nonnative plants and animals (Cuddihy and Stone 1990, pp. 27, 58). The original native flora of Hawaii (species that were present before humans arrived) consisted of about 1,000 taxa, 89 percent of which were endemic (species that occur only in the Hawaiian Islands). Over 800 plant taxa have been introduced from elsewhere, and nearly 100 of these have become pests (*e.g.,* injurious plants) in Hawaii (Smith 1985, p. 180; Cuddihy and Stone 1990, p. 73; Gagne and Cuddihy 1999, p. 45). Some of these plants were brought to Hawaii by various groups of people, including the Polynesians, for food or cultural reasons. Beginning in the early 1900s, plantation owners (and the territorial government of Hawaii), alarmed at the reduction of water resources for their crops caused by the destruction of native forest cover by grazing feral and domestic animals, introduced nonnative trees for reforestation and continued the practice through the late 1930s (Nature Conservancy of Hawaii 2003, p. 19). Ranchers intentionally introduced pasture grasses and other nonnative plants for agriculture, and sometimes inadvertently introduced weed seeds as well. Other plants were brought to Hawaii for their potential horticultural value (Scott *et al.* 1986, pp. 361–363; Cuddihy and Stone 1990, p. 73).

Nonnative plants adversely impact native Hawaiian habitat, including that of the seven yellow-faced bees identified in this finding, by modifying the availability of light, altering soil-water regimes, modifying nutrient cycling, altering fire characteristics of native plant communities (for example, successive fires that burn farther and farther into native habitat, destroy native plants, and remove habitat for native species by altering microclimatic conditions to favor nonnative species), and ultimately converting native dominated plant communities to nonnative plant communities (Smith 1985, pp. 180–181; Cuddihy and Stone 1990, p. 74; D'Antonio and Vitousek 1992, p. 73; Vitousek *et al.* 1997, p. 6). Nonnative plants directly and indirectly affect the seven yellow-faced bees by modifying or destroying their terrestrial and riparian habitat and reducing food sources.

The spread of nonnative plant species is one of the primary causes of decline of the seven *Hylaeus* bee species, and a current threat to their existing populations because these bees depend closely on native vegetation for nectar and pollen. The bees are almost entirely absent from habitat dominated by invasive, nonnative vegetation (Sakai *et al.* 2002, pp. 276, 291; Daly and Magnacca 2003, p. 11; Liebherr 2005, p. 186). The native flora within most of lowland habitat in the Hawaiian Islands is being replaced by aggressive, nonnative plant species (Cuddihy and Stone 1990, pp. 73–74; Wagner *et al.* 1999, p. 52). Many native plant species communities that have been replaced by often monotypic communities of nonnative plants were once foraging resources for numerous species of *Hylaeus* bees (Cox and Elmqvist 2000, p. 1238; Daly and Magnacca 2003, p. 11; USFWS 1999, pp. 145, 163, 171, 180; USFWS 2008b, pp. 7, 9).

Many of the native plants that currently serve as foraging resources for the adults of the seven *Hylaeus* bee species are declining due to a lack of pollinators and competition with nonnative plants (Daly and Magnacca 2003, p. 11; USFWS 2008b, pp. 7, 9; Smith 1985, pp. 180–181; Cuddihy and Stone, 1990, p. 74; D'Antonio and Vitousek 1992, p. 73; Vitousek *et al.* 1997, p. 6), and are found only in very small populations (USFWS 1999, pp. 145, 163, 171, 180; Cox and Elmqvist 2000, p. 1,238). For example, *H. longiceps* and *H. anthracinus* are known to forage on the federally endangered plant *Sesbania tomentosa.* Both *H. longiceps* and *H. anthracinus* also visit *Chamaesyce celastroides* var. *kaenana,* a federally endangered plant endemic to coastal dry shrubland on Oahu (Koutnik 1999, p. 606; Daly and Magnacca 2003, pp. 55, 74). *Hylaeus longiceps* is also known to forage on the endangered *Scaevola coriacea* (USFWS 1999, p. 145; Daly and Magnacca 2003, pp. 55, 135). In addition, *H. anthracinus* has been collected from inside the fruit capsule of *Hedyotis coriacea*, a federally endangered dry forest plant, known from fewer than 200 individuals on the island of Hawaii (Center for Environmental Management of Military Lands, 2010). Several other widespread nonnative plant species threaten coastal habitats of the five Hylaeus species known from these areas. Understory and sub-canopy species include *Asystasia gangetica* (Chinese violet), *Atriplex semibaccata* (Australian saltbush), *Leucana leucocephala* (koa haole), *Pluchea indica* (Indian fleabane), *P. symphytifolia* (sourbush), and *Verbesina encelioides* (golden crown-beard) (DOFAW 2007, pp. 20–22, 54–58; HBMP 2008). Nonnative canopy species include *Prosopis pallida* (kiawe) (DOFAW 2007, pp. 20–22, 54–58; HBMP 2008), an invasive, nonnative, deciduous thorny tree (TNC 2009, p. 8). For example, in Moomomi Preserve on Molokai, which represents the only known location for *Hylaeus hilaris,* most of the sand dunes and areas adjacent to the preserve are entirely covered in *Prosopis pallida.* The narrow coastal strip in the Preserve itself is the only area that remains somewhat intact with native plant species (TNC 2008, p. 8; Magnacca in litt. 2011, p. 65). In addition, several nonnative grasses such as *Cenchrus ciliaris* (buffelgrass), *Chloris barbata* (swollen fingergrass), *Digitaria insularis* (sourgrass), and *Panicum maximum* (guinea grass) threaten the coastal habitats in which they are known to occur (DOFAW 2007, pp. 20–22, 54–58; HBMP 2008).

As noted in the Life History section, above, *Hylaeus* species almost exclusively visit native plants to collect nectar and pollen (Daly and Magnacca 2003, p. 11), pollinating those plants in the process (Sakai *et al.* 1995, pp. 2,524–2,528; Cox and Elmqvist 2000, p. 1,238; Sahli *et al.* 2008, p. 1). *Hylaeus* bees are very rarely found visiting nonnative plants for nectar and pollen (Magnacca 2007a, pp. 186, 188). Unpublished data on *Hylaeus* spp. pollen use (Magnacca in litt. 2011, p. 65) suggest only approximately 3 percent of pollen collected by yellow-faced bees (although not exclusively the seven *Hylaeus* species addressed in this finding) is from nonnative plant sources. These data do not include observations regarding yellow-faced bee use of *Tournefortia argentea,* which is a naturalized and relatively recent arrival to the Hawaiian Islands, as a pollen resource (Magnacca in litt. 2011, p. 65) (see additional information on this species below). Other than *Scaevola sericea,* native vegetation is lacking along most of the coastline of the main Hawaiian Islands. As *Hylaeus* spp. have not been observed at coastal sites where *Scaevola sericea* represents the only native plant species occurrence, researchers believe the yellow-faced bees are unable to survive on this species alone (Magnacca 2007, p. 187; Magnacca in litt. 2011, p. 65).

In summary, the spread of nonnative plants throughout the coastal and lowland habitat of the seven *Hylaeus* bees represents a serious and ongoing threat to these species. Many of the native plant species being replaced by invasive, nonnative plants provide foraging resources (*e.g.* pollen, nectar) for *Hylaeus* bees, including these seven species. The best available information indicates these seven bee species do not characteristically forage on nonnative plants (Daly and Magnacca 2003, p. 13). Only 14 of 820 recent (1998 to 2010) *Hylaeus* spp. observations were on flowers of nonnative plant species; however, none of those observations involved the seven *Hylaeus* species addressed in this finding. We acknowledge those observations do not include records documenting *Hylaeus* spp. using *Tournefortia argentea* (another nonnative species). However, there are only 13 observations of *Hylaeus* spp. using this species, including four records for *H. anthracinus* and one record for *H. facilis* (Magnacca in litt. 2011, p. 66). Therefore, we conclude that the ongoing spread of nonnative plants into the habitats of the seven Hylaeus bees remains a significant threat due to manner in which nonnative plants alter and fragment habitat, increase the likelihood of fire, and attract nonnative insect species. This threat further endangers the species' long-term chances for conservation and recovery.

Habitat Destruction and Modification by Nonnative Ungulates

The presence of nonnative mammals, such as feral pigs (*Sus scrofa*), cattle (*Bos taurus*), goats (*Capra hircus*), and axis deer (*Axis axis*), is considered one of the primary factors underlying the alteration and degradation of native vegetation and habitat in the Hawaiian Islands (Stone 1985, pp. 262–263; Cuddihy and Stone 1990, pp. 60–66; 73 FR 73801). Beyond the direct effects of trampling and consuming native plants, nonnative ungulates contribute significantly to increased erosion, and their behavior (*i.e.,* rooting and moving across large areas) facilitates the spread and establishment of competing, invasive, nonnative plant species (Cuddihy and Stone 1990, p. 65). Feral pigs occur on all of the main Hawaiian Islands except Kahoolawe and Lanai (HEAR 1998; C. Kessler, USFWS, pers. comm. 2011); goats are found on all of the main Hawaiian Islands except Lanai (HEAR 1998); feral cattle are found on Hawaii and Maui (HEAR 1998); Mouflon sheep and hybrids are found on Hawaii and Lanai (Hawaii Conservation Alliance (HCA) 2007); and axis deer are found on Lanai, Maui, Molokai, and Oahu (HCA 2007). At least one endangered coastal and lowland plant species, *Sesbania tomentosa,* threatened by the browsing, trampling, and digging activities of nonnative ungulates (*e.g.,* axis deer, goats, and cattle), is a foraging source for *Hylaeus anthracinus* and *H. longiceps* (USFWS 1999, pp. 145, 163, 171, 180; Daly and Magnacca 2003, pp. 11, 13).

The State of Hawaii provides game mammal (*e.g.,* feral pigs, goats, and deer) hunting opportunities on State-designated public hunting areas on the islands of Hawaii, Kauai, Lanai, Maui, Molokai, and Oahu (Hawaii Administrative Rules § 13–123–14–13–123–20; DLNR 1999). The State's management objectives for game animals ranges from maximizing public hunting opportunities (*e.g.,* ''sustained yield'') in some areas to removal by State staff, or their designees, in other areas (Hawaii Administrative Rules § 13–123). Several of the seven *Hylaeus* bees have populations in or adjacent to areas where terrestrial habitat may be manipulated for game enhancement and where game populations are maintained at certain levels for public hunting (Hawaii Administrative Rules § 13–123). Public hunting areas are predominantly not fenced, and game mammals have unrestricted access to most areas across the landscape, regardless of underlying land use designation. While fences are sometimes built to provide protection from game mammals to the natural resources within the fenced area, the current number and locations of fences are not adequate to prevent habitat destruction and degradation of the terrestrial habitat of the seven species of Hawaiian yellow-faced bees.

In summary, feral pigs, cattle, goats, and axis deer continue to alter and degrade native vegetation within *Hylaeus* habitat in the Hawaiian Islands. We believe these ungulates represent a significant and ongoing threat to the continued existence of the seven *Hylaeus* bees, endangering the species' long-term chances for conservation and recovery. Ungulates directly trample and consume native plants, including plants used for foraging by *H. anthracinus* and *H. longiceps.* The best available information indicates that other than the plant *Tournefortia argentea,* none of the seven *Hylaeus* bees use nonnative plants for foraging (Daly and Magnacca 2003, p. 13). While some specific areas throughout the State, including some *Hylaeus* spp. habitat sites, are managed to exclude the presence of or control ungulates, we are unaware of any plans to entirely eradicate or eliminate ungulates from the Hawaiian Islands. In addition, public hunting areas maintain populations of nonnative ungulates and often do not provide adequate fencing to prevent nonnative ungulates from negatively impacting the habitat of the seven yellow-faced bees. Therefore, the ongoing alteration and degradation of many of the native coastal and lowland habitat where these seven *Hylaeus* bees occur by ungulates is expected to further impact the bees' foraging and nesting habitat through the direct consumption and trampling of native plants, introduction and spread of nonnative plants, and increased erosion.

Habitat Destruction and Modification by Fire

Fire is a relatively new, human-exacerbated threat to native species and natural vegetation in Hawaii. The historical fire regime in Hawaii was characterized by infrequent, low severity fires, as few natural ignition sources existed (Cuddihy and Stone 1990, p. 91; Smith and Tunison 1992, pp. 395–397). Natural fuel beds were often discontinuous, with moderate to high rainfall in many areas on most islands. Fires inadvertently or intentionally ignited by the original Polynesians in Hawaii probably contributed to the initial decline of native vegetation in the drier plains and foothills. These early settlers practiced slash-and-burn agriculture that created open lowland areas suitable for the later colonization of nonnative, fire-adapted grasses (Kirch 1982, pp. 5–6, 8; Cuddihy and Stone 1990, pp. 30–31). Beginning in the late 18th century, Europeans and Americans introduced plants and animals that further degraded native Hawaiian ecosystems. Pasture areas and ranching, in particular, created highly fire-prone areas of nonnative grasses and shrubs (D'Antonio and Vitousek 1992, p. 67). Fires of all intensities, seasons, and sources are destructive to native Hawaiian ecosystems (Brown and Smith 2000, p. 172), and a single grass-fueled fire can kill most native trees and shrubs in the burned area (D'Antonio and Vitousek 1992, p. 74). Although Vogl (1969) (in Cuddihy and Stone 1990, p. 91) suggests naturally occurring fires, primarily from lightning strikes, have been important in the development of the original Hawaiian flora, and many Hawaiian plants might be fire-adapted, Mueller-Dombois (1981) (in Cuddihy and Stone 1990, p. 91) points out most natural vegetation types of Hawaii would not carry fire before the introduction of nonnative grasses. Smith and Tunison (in Cuddihy and Stone 1990, p. 91) state native plant fuels typically have low flammability.

Fire represents a threat to the seven *Hylaeus* species in coastal, lowland dry, and lowland mesic habitat. In addition, ordnance-induced fires have periodically occurred on Hawaii's military installations, including the Army's PTA, and are considered an ongoing threat to the montane dry forest habitat that supports *H. anthracinus* (The Center for Environmental Management of Military Lands 2002, Appendix 1 pp. 1–6; USFWS 2004, p. 110). Fire threatens the seven *Hylaeus* species by destroying the native plant species and communities on which the bees depend and opening up habitat for increased invasion by nonnative plants. Fire can destroy dormant seeds of native plants as well as the plants themselves. Successive fires that burn farther and farther into native habitat destroy native plants and remove habitat for native plant and animal species by altering microclimate conditions favorable to nonnative plants. Nonnative plant species most likely to be spread as a consequence of fire are those that (1) produce a high fuel load; (2) are adapted to survive and regenerate after fire; and (3) establish rapidly in newly burned areas. Grasses (particularly those that produce mats of dry material or retain a mass of standing dead leaves) that invade native forests and shrublands provide fuels that allow fire to burn areas that would not otherwise easily burn, including even the edges of wetter forests (Fujioka and Fujii 1980, in Cuddihy and Stone 1990, p. 93; D'Antonio and Vitousek 1992, pp. 70, 73–74; Tunison *et al.* 2002, p. 122). Native woody plants may recover from fire to some degree, but fire tips the competitive balance toward nonnative species (National Park Service 1989, in Cuddihy and Stone 1990, p. 93).

For example, on a post-burn survey at Puuwaawaa on the island of Hawaii, an area of native *Diospyros* forest with undergrowth of the nonnative grass *Pennisetum setaceum,* Takeuchi noted ''no regeneration of native canopy is occurring within the Puuwaawaa burn area'' (Takeuchi 1991, p. 2). Takeuchi also stated, ''burn events served to accelerate a decline process already in place, compressing into days a sequence which would ordinarily have taken decades'' (Takeuchi 1991, p. 4). The author concluded that in addition to increasing the number of fires, the nonnative *Pennisetum* acted to suppress establishment of native plants after a fire (Takeuchi 1991, p. 6).

There have been several recent fires on Oahu that have impacted rare or endangered species in coastal, lowland dry, and mesic habitats. Between 2004 and 2005, wildfires burned more than 360 ac (146 ha) of mesic habitat in Honouliuli Preserve, home to more than 90 rare and endangered plants and animals, and located along the windward side of the Waianae Mountains (The Nature Conservancy, in litt. 2005). In 2006, a fire at Kaena Point State Park burned 60 ac (24 ha) and encroached on endangered plants in Makua Military Training Area. The area that burned in this fire is near the Kaena Point NAR, where two of the yellow-faced bees (*Hylaeus anthracinus* and *H. longiceps*) in this finding are still known to occur. In 2007, there was a significant fire in lowland dry and mesic habitat at Kaukonahua that crossed 12 gulches, eventually encompassing 5,655 ac (2,289 ha), negatively impacting seven endangered plant species. Occurrences of three of the species were extirpated as a result of the fire. The Kaukonahua fire also provided pathways for nonnative ungulates (cattle, goats, and pigs) to access previously undisturbed areas. This fire opened gaps in previously densely vegetated areas allowing the growth of the invasive grass *Panicum maximum* (guinea grass), which is also used as a food source by cattle and goats. An area infested by guinea grass burned, and the grass resprouted blades over 2 feet in length only 2 weeks after the fire (U.S. Army Garrison 2007, p. 3). In 2009, there were two smaller fires which burned 200 ac (81 ha) at Manini Pali (Kaena Point State Park), and 3.8 ac (1.5 ha) at Makua Cave (at the mouth of Makua Valley). These examples of recent fires illustrate nonnative grass invasion leads to grass/fire cycles that convert native vegetation to grassland (D'Antonia and Vitousek 1992, p. 77)

Several areas in the State of Hawaii, including some areas containing *Hylaeus* spp. habitat sites, are currently loosely addressed under fire management plans. For example, in 2003, the Army completed an Integrated Wildland Fire Management Plan (WFMP) for all of its Oahu training installations. This plan is currently being updated (U.S. Army 2009, pp. 4–73). The goal of the WFMP is to reduce the threat of wildfire that adversely affects listed and other rare species. Although none of the Oahu yellow-faced bees are known from military lands, at least one species, *H. kuakea,* occurs on lands roughly adjacent to military lands and which could be impacted by fires caused by military activities, or conversely, could benefit from activities to suppress and control origination of fires either on or adjacent to military lands.

Additionally, DOFAW maintains a fire management program tasked with fire suppression activities targeted toward the protection of watershed areas, forest reserves, public hunting areas, wildlife and plant sanctuaries, and NARS. Their activities include the maintenance of fire break roads, signage, and helicopter dip tanks; active fire control during fire outbreak; controlled burns when and where deemed necessary; fire training efforts, including education; and maintenance of a State fire management program Web site (*http://www.state.hi.us/dlnr/dofaw/fmp*). According to their Web site, DOFAW is involved in the protection of 3,360,000 acres Statewide, which is approximately 81percent of the State's land area.

In summary, while we are aware of fire management in some areas of the State, including some *Hylaeus* spp. habitat sites, there is evidence that the repeated outbreak of fire within Hawaii's native coastal, lowland dry, and lowland mesic forests often leads to the irrevocable conversion of native to nonnative habitat (*i.e.,* nonnative plant species). These nonnative habitats are unsuitable for nesting and foraging by the seven *Hylaeus* bees. Therefore, we conclude fire is a significant ongoing threat to the habitat of all seven species of *Hylaeus* bees in coastal, lowland dry, and lowland mesic habitat.

Habitat Destruction and Modification by Recreational Activities

Some of the best habitat areas for *Hylaeus* species are also popular recreational sites, particularly those areas located within coastal habitat (Magnacca 2007a, p. 180). Suitable remaining habitat for *H. anthracinus* and *H. longiceps* are also popular hiking areas, including coastal sites such as Kaena Point (on Oahu); the Mahaiula section of Kekaha Kai State Park, Makalawena, Mokuauia, and Kalauna Bay (on the island of Hawaii); and Kahu, Polihua Road, and Shipwreck Beach on Lanai. Human impacts at recreational sites can include removal or trampling of vegetation on or near trails and the compaction of vegetation by off-road vehicles (Magnacca 2007a, p. 180). None of these areas, however, are known to be currently impacted by recreational activities (Magnacca pers. comm. 2010).

In summary, while trampling and compaction of vegetation from human activities may negatively impact the habitat of some populations of the seven *Hylaeus* bees, we have no basis to conclude these impacts would be at a scale that represents a threat to the seven Hawaiian yellow-faced bees. While some areas, particularly coastal sites, are undoubtedly popular recreational sites, we believe this is a local rather a rangewide problem for each of the seven species. Therefore, we conclude that recreational activities are not a threat to the seven yellow-faced bees at this time.

Habitat Destruction and Modification by Hurricanes and Drought

Stochastic (random, naturally occurring) events, such as hurricanes and drought, can alter or degrade the habitat of Hawaiian *Hylaeus* bees directly by modifying and destroying native coastal and lowland dry and mesic habitats (*e.g.,* by mechanical damage to vegetation). Indirect effects include creating disturbed areas conducive to invasion by nonnative plants, which out-compete the native plants used by the bees for foraging of nectar and pollen. We presume these events also alter microclimatic conditions (*e.g.,* opening the tree canopy leading to an increase in habitat temperature, soil erosion, and decreasing soil moisture) so that the habitat no longer supports the native host plants necessary to the *Hylaeus* bees for nectar and pollen foraging, as well as nesting.

Hurricanes affecting Hawaii were only rarely reported from ships in the area from the 1800s until 1949. Between 1950 and 1997, 22 hurricanes passed near or over the Hawaiian Islands, 5 of which caused serious damage (Businger 1998, pp. 1–2). In November 1982, Hurricane Iwa struck the Hawaiian Islands, with wind gusts exceeding 100 miles per hour (mph) (161 kilometers per hour (kph)), causing extensive damage, especially on the islands of Niihau, Kauai, and Oahu (Businger 1998, pp. 2, 6). Many forest trees were destroyed (Perlman 1992, pp. 1–9), which opened the canopy and facilitated the invasion of nonnative plants (Kitayama and Mueller-Dombois 1995, p. 671). Habitat alteration and degradation by nonnative plants is a threat to the habitat of each of the seven yellow-faced bees addressed in this finding, as described in the *Habitat Destruction and Modification by Nonnative Plants* section above. In September 1992, Hurricane Iniki, a category 4 hurricane with maximum sustained wind speeds recorded at 140 mph (225 kph), passed directly over the island of Kauai and close to the island of Oahu, causing significant damage to areas along Oahu's southwestern coast (Barber's Point or Kalaeloa, through Kaena) (Blake *et al.* 2007, p. 20), where populations of two of the seven bee species (*H. anthracinus* and *H. longiceps*) are found. Damage by future hurricanes could further decrease the remaining native-plant-dominated habitat areas that support the yellow-faced bees (Bellingham *et al.* 2005, p. 681).

All seven of the *Hylaeus* bees may also be affected by temporary habitat loss (*e.g.,* desiccation of habitats, die-off of host plants) associated with droughts, which are not uncommon on the Hawaiian Islands. Between 1860 and 2002, the Hawaiian Islands were affected by approximately 49 periods of drought (Giambelluca *et al.* 1991, pp. 3–4; Hawaii Commission on Water Resource Management 2009a and 2009b). These drought events lead to an increase in the number of forest and brush fires (Giambelluca *et al.* 1991, p. v), causing a reduction of native plant cover and habitat (D'Antonio and Vitousek 1992, pp. 77–79). With populations that have already been severely reduced in both abundance and geographic distribution, and particularly in the case of *H. hilaris,* with only one known population, even such a temporary loss of habitat can have a severe negative impact on the species if, for example, the host plants for nectar and pollen foraging are lost for one or more seasons. Because small populations are demographically vulnerable to extinction caused by random fluctuations in population size and sex ratio, stochastic events such as hurricanes pose the threat of immediate extinction of a species with a very small and geographically restricted distribution such as the seven species of Hawaiian yellow-faced bees (Lande 1988).

In summary, natural disasters, such as hurricanes and drought, represent a significant threat to coastal and lowland dry and mesic habitats and the seven *Hylaeus* species addressed in this finding, endangering their chances for conservation and recovery. These types of events are known to cause significant habitat damage, and because the species addressed in this finding now persist in low numbers or occur in restricted ranges, they are more vulnerable to these events and less resilient to such habitat disturbances. Hurricanes and drought, even though unpredictable, have been and are expected to continue to be threats to the Hawaiian yellow-faced bees, and they therefore pose immediate and ongoing threats to the seven *Hylaeus* species and their habitat.

Habitat Destruction and Modification by Climate Change

Climate change will be a particular challenge for biodiversity because the interaction of additional stressors may push species beyond their ability to survive (Lovejoy *et al.* 2005, pp. 325–326). The synergistic implications of climate change and habitat fragmentation are the most threatening facet of climate change for biodiversity (Lovejoy *et al.* 2005, p. 4). The magnitude and intensity of the impacts of global climate change and increasing temperatures on native Hawaiian ecosystems are unknown; we are not aware of climate change studies specifically related to the coastal and lowland habitat areas occupied by the seven *Hylaeus* bees, or to other *Hylaeus* bee species. Based on the best available information, climate change impacts could include the loss of native plant species that comprise the habitats in which the seven *Hylaeus* bees occur (Pounds *et al.* 1999, pp. 611–612; Still *et al.* 1999, p. 610; Benning *et al.* 2002, pp. 14,246 and 14,248); however, because there have been no climate change studies looking at effects to coastal and lowland habitat, we have no way of predicting the amount or extent of any such possible habitat loss. Because the host plant habitat of the five coastal species in this finding are outside of the tidal and immediate near shore zone, we do not expect any direct effects to their habitat from sea level rise itself.

In addition, the seven yellow-faced bees may be vulnerable to changes in precipitation caused by global climate change. However, future changes in precipitation are uncertain because they depend in part on how El Niño (a disruption of the ocean atmospheric system in the tropical Pacific having important global consequences for weather and climate) might change, and reliable projections of changes in El Niño have yet to be made (Benning *et al.* 2002, pp. 14,248–14,249). Oki (2004, p. 4) has noted long-term evidence of decreased precipitation and stream flow in the Hawaiian Islands, based upon evidence collected by stream gauging stations. This long-term drying trend, coupled with periodic El Niño-caused drying events, has created a pattern of severe and persistent stream dewatering events (D. Polhemus, in litt 2008, p. 26). Future changes in precipitation and the forecast of those changes are highly uncertain because they depend, in part, on how the El Niño-La Niña (a different disruptive extreme weather and climate pattern that can alternate with El Niño) weather cycle might change (Hawaii Climate Change Action Plan 1998, pp. 2–10).

If precipitation is significantly reduced, the seven yellow-faced bees may be among the species most vulnerable to extinction, with possible impacts expected to include habitat loss and alteration or changes in disturbance regimes (*e.g.,* storms and hurricanes), in addition to possible direct physiological stress of an unknown nature, which could potentially cause the species to seek out less suitable habitats as their preferred habitats become degraded. The probability of a species going extinct as a result of these factors increases when ranges are restricted, habitat decreases, and population numbers decline (Intergovernmental Panel on Climate Change 2007, p. 8). Such is the case for each of the seven yellow-faced bees, which are characterized by limited climatic ranges and restricted habitat requirements, small population size, and low number of individuals. However, without reliable predictions of the amount and extent of anticipated precipitation change, we are unable to determine whether precipitation changes would result in negative impacts to any of the seven yellow-faced bees at this time.

In summary, the seven *Hylaeus* bees, like most insects, are presumed to have limited environmental tolerances. They also have limited ranges and restricted habitat requirements (Daly and Magnacca 2003, p. 11). Four species (*H. facilis, H. hilaris, H. kuakea,* and *H. mana*) have small population sizes (*i.e.,* a limited number of populations restricted to relatively small habitat sites), and low numbers of individuals. The projected effects of global climate change and increasing temperatures on the seven Hawaiian yellow-faced bees would likely be related to changes in microclimatic conditions in their habitats. These changes may also lead to the loss of native plant species due to direct physiological stress, the loss or alteration of habitat, increased competition from nonnative bee species, and changes in disturbance regimes (*e.g.,* fire, storms, and hurricanes). Therefore, we believe all seven species will be exposed to projected environmental impacts that may result from changes in climate, and subsequent impacts to their habitats (Pounds *et al.* 1999, pp. 611–612; Still *et al.* 1999, p. 610; Benning *et al.* 2002, pp. 14,246 and 14,248), and we do not anticipate a reduction in this ongoing threat any time in the near future. However, because the specific and cumulative effects of climate change on these seven species are presently unknown, we are not able to determine the magnitude of this potential threat with confidence or precision.

Summary of Factor A

The seven species of Hawaiian yellow-faced bees are dependent upon the persistence of native Hawaiian plants and their increasingly rare associated habitat types, particularly coastal, lowland dry, and lowland mesic areas. As identified above in our Factor A analysis, the native habitats on which the *Hylaeus* bees depend have been drastically directly altered during the last century, with many areas either converted for development or agriculture, or indirectly altered due to the effects of nonnative ungulates, nonnative plants, and fire. Habitat conversion and loss of host plants, and other stochastic events (*e.g.,* hurricanes and drought), are all contributing factors to the present and threatened destruction, modification, and curtailment of the habitat and range of the seven Hawaiian yellow-faced bees.

Land conversion and fragmentation of remaining coastal, lowland dry, and lowland mesic habitat is continuing throughout these species' known ranges, particularly due to the effects of feral ungulates, fire, and nonnative plants. We anticipate habitat conversion and fragmentation to continue, and likely increase, throughout their known ranges. As discussed above, at least five of the seven bees have experienced significant habitat losses. It is reasonable to presume the substantial reduction in lowland mesic habitat has similarly impacted the populations of *Hylaeus kuakea* and *H. mana* (Magnacca in litt. 2011, p. 78). As more habitats become unsuitable, we expect their population declines to continue or accelerate.

We have evaluated the best scientific and commercial information available regarding the present or threatened destruction, modification, or curtailment of the seven Hawaiian yellow-faced bees' habitat or range. Based on the current and ongoing habitat issues identified, their synergistic effects, and their likely continuation, we have determined this factor poses a significant threat to *Hylaeus anthracinus, H. assimulans, H. facilis, H. hilaris, H. kuakea, H. longiceps,* and *H. mana.*

Available Conservation Measures

Some historic and current collection localities are protected from development, urbanization, and conversion to agriculture by Federal, State, or private agencies: one of two known populations of *H. facilis* and two of three known populations of *H. anthracinus* occur at Kalaupapa NHP on Molokai; three species (*H. anthracinus, H. assimulans,* and *H. kuakea*) occur in the State's Kaena Point NAR (Oahu), Kanaio NAR (Maui), West Maui NAR, and the recently acquired Honouliuli Preserve (Oahu); and three species (*H. anthracinus, H. hilaris,* and *H. longiceps*) are found on TNC's Moomomi Preserve. These areas are actively managed to restore native habitat and to reduce or eliminate many of the common threats to the native plant communities found there, including feral ungulates and wildfire. However, existing regulatory mechanisms are inadequate to provide the necessary active management needed to protect the habitat of the populations outside of these protected TNC, NHP or NAR areas (see discussion under Factor D, below). Conservation of the seven *Hylaeus* bees will require active management of their known population sites, involving exclusion and removal of feral ungulates, control and removal of nonnative plant and insect species, and the restoration of native vegetation (Magnacca 2007, p. 185).

Factor B. Overutilization for Commercial, Recreational, Scientific, or Educational Purposes

We are unaware of any collections of the seven yellow-faced bees by recreational or insect enthusiast collectors. However, insect collecting is a valuable component of research, including taxonomic work, and is often necessary to document the existence of populations and population trends. Based on comments received in response to the 90-day finding, six of the yellow-faced bees are not believed to be particularly vulnerable to over-collection; however, one species (*H. hilaris*) may be vulnerable (Magnacca, in litt. 2010, p. 2). This species is a cleptoparasite on other rare bees, and has an inherently smaller population size and lower reproductive rate than most *Hylaeus* species, including the other six species in this finding. However, as both sexes of *H. hilaris* are readily recognizable to *Hylaeus* researchers, experts believe there will be little need to retain individuals collected during field surveys in the future (Magnacca, in litt. 2010, p. 2). Additionally, while this species is known from only one population site, the area where this population is found occurs within the Moomomi Preserve and is actively managed by TNC for common habitat threats such as feral ungulates, wild fire, and nonnative plant species.

Therefore, we find that overutilization for commercial, recreational, scientific, or educational purposes is not a threat to *Hylaeus anthracinus, H. assimulans, H. facilis, H. kuakea, H. longiceps,* and *H. mana* because we could find no evidence they are being collected by insect collection enthusiasts or over-collected by researchers for scientific purposes. We examined whether *H. hilaris* was directly or indirectly vulnerable to over-collection due to its small population size (one known location), low reproductive rate, and biological dependence upon other rare *Hylaeus* host species. However, as both sexes are easily recognizable in the field and it does not collect pollen (which differentiates it from all other species), researchers believe there is little reason to retain individuals observed during surveys (Magnacca, in litt. 2010, p. 2). Therefore, we find over-collection of *H. hilaris* is not a threat to this species.

Factor C. Disease or Predation

Disease

We are not aware of any information indicating disease presents a threat to *Hylaeus anthracinus, H. assimulans, H. facilis, H. hilaris, H. kuakea, H. longiceps,* or *H. mana.* Therefore, based on the best available information, we do not find that disease is a threat to the seven Hawaiian yellow-faced bees.

Predation

Predation by Nonnative Ants

Ants are known to prey upon *Hylaeus* species (Medeiros *et al.* 1986, pp. 45–46; Reimer 1994, p. 17), thereby directly eliminating them from specific areas. In this study, nests of *Nesoprosopis* sp., an endemic ground-nesting bee, could not be found in ant-infested plots but were commonly encountered in ant-free sites of the same habitat. *Nesoprosopis* was reduced to a subgenus of *Hylaeus* in 1923 (Meade-Waldo 1923, p. 1). Ants are not a natural component of Hawaii's arthropod fauna, and the native *Hylaeus* species of the islands evolved in the absence of predation pressure from ants. Ants can be particularly destructive predators because of their high densities, recruitment behavior, aggressiveness, and broad range of diet (Reimer 1993, pp. 17–18). The threat of ant predation on the seven *Hylaeus* bee species is amplified by the fact that most ant species have winged reproductive adults (Borror *et al.* 1989, p. 738) and can quickly establish new colonies in suitable habitats (Staples and Cowie 2001, p. 55). In addition, these attributes allow some ants to destroy otherwise geographically isolated populations of native arthropods (Nafus 1993, pp. 19, 22–23). Ants have not been observed preying upon any of the seven species addressed in this finding. However, at least one or more of the most aggressive and widespread species (discussed below) occur in every known population site of the seven *Hylaeus* species and are presumed to be a serious threat due to the impact of predation.

At least 47 species of ants are known to be established in the Hawaiian Islands (Hawaii Ants 2008, pp. 1–11). Native insect fauna, likely including *Hylaeus* bees (Zimmerman 1948, p. 173; Reimer *et al.* 1990, pp. 40–43; HEAR database 2005, pp. 1–2), have been severely impacted by at least four particularly aggressive ant species: the big-headed ant (*Pheidole megacephala*), the long-legged ant (also known as the yellow crazy ant) (*Anoplolepis gracilipes*), *Solenopsis papuana* (NCN), and *Solenopsis geminata* (NCN). Numerous other species of ants are recognized as threats to Hawaii's native invertebrates, and an unknown number of new species of ants are established every few years (Staples and Cowie 2001, p. 53). Due to their preference for drier habitat sites, ants are more likely to occur in high densities in the coastal, dry, and mesic habitat currently occupied by the seven bees (Reimer 1994, p. 12).

The big-headed ant originated in central Africa (Krushelnycky *et al.* 2005, p. 24) and was first reported in Hawaii in 1879 (Krushelnycky *et al.* 2005, p. 24). This species is considered one of the most invasive and widely distributed ants in the world (Krushelnycky *et al.* 2005, p. 5). In Hawaii, this species is the most ubiquitous ant species found, from coastal to mesic habitat up to 4,000 ft (1,219 m) in elevation, including within the habitat areas of the seven *Hylaeus* species addressed in this finding. With few exceptions, native insects have been eliminated in habitats where the big-headed ant is present (Perkins 1913, p. xxxix; Gagne 1979, p. 81; Gillespie and Reimer 1993, p. 22). Consequently, big-headed ants represent a threat to populations of all seven *Hylaeus* bee species in coastal to dry and mesic areas Hawaii, Lanai, Maui, and Oahu (Reimer 1993, p. 14; Reimer 1994, p. 17; Daly and Magnacca 2003, pp. 9–10).

The long-legged ant appeared in Hawaii in 1952, and now occurs on Hawaii, Kauai, Maui, and Oahu (Reimer *et al.* 1990, p. 42; *http://www.antweb.org 2011*). It inhabits low-to-mid-elevation (less than 2,000 ft (600 m)) rocky areas of moderate rainfall (less than 100 in (250 cm) annually) (Reimer *et al.* 1990, p. 42). Although surveys have not been conducted to ascertain this species' presence in each of the known habitat sites occupied by the seven *Hylaeus* species addressed in this finding, we may presume that the long-legged ant likely occurs within some of the identified population sites based upon anecdotal evidence of their expanding range and their preference (as indicated where the species is most commonly collected) for coastal and dry forest habitats (antweb.org 2011). Direct observations indicate Hawaiian arthropods are susceptible to predation by this species; Gillespie and Reimer (1993, p. 21) and Hardy (1979, pp. 37–38) documented the complete extirpation of several native insects within the Kipahulu area on Maui after this area was invaded by the long-legged ant. Lester and Tavite (2004, p. 391), found that long-legged ants in the Tokelau Atolls (New Zealand) can form very high densities in a relatively short period of time with locally serious consequences for invertebrate diversity. Densities of 3,600 individuals collected in pitfall traps within a 24-hour period were observed, as well as predation upon invertebrates ranging from crabs to other ant species. On Christmas Island in the Indian Ocean, numerous studies have documented the range of impacts to native invertebrates, including the red land crab (*Gecarcoidea natalis*), as a result of predation by supercolonies of the long-legged ant (Abbott 2006, p. 102). Long-legged ants have the potential as predators to profoundly affect the endemic insect fauna in territories they occupy. Studies comparing insect populations at otherwise similar ant-infested and ant-free sites found extremely low numbers of large endemic noctuid moth larvae (*Agrostis* spp. and *Peridroma* spp.) in ant-infested areas. Nests of ground-nesting cottelid bees (*Nesoprosopis* spp.) were eliminated from ant-infested sites (Reimer *et al.* 1990, p. 42). Although only cursory observations exist in Hawaii (Reimer *et al.* 1990, p. 42), we believe long-legged ants are a threat to populations of all seven yellow-faced bees, in dry to mesic areas within their elevation ranges.

Solenopsis papuana is the only abundant, aggressive ant that has invaded intact mesic to wet forest, as well as coastal and lowland dry habitats. This species occurs from sea level to over 2,000 ft (600 m) on all of the main Hawaiian Islands, and is still expanding its range (Reimer 1993, p. 14). Although surveys have not been conducted to ascertain this species' presence in each of the known habitat sites occupied by the seven *Hylaeus* species addressed in this finding, because of this species' expanding range and its widespread occurrence in coastal, dry lowland, and mesic habitats, it may threaten populations of all seven *Hylaeus* bees with predation pressure on the islands of Hawaii, Kahoolawe, Lanai, Maui, and Oahu over 2,000 ft (600 m) in elevation (Reimer *et al.* 1990, p. 42; Reimer 1993, p. 14).

Like *Solenopsis papuana, S. geminata* is also considered a significant threat to native invertebrates (Gillespie and Reimer 1993) and occurs on all the main Hawaiian Islands (Reimer *et al.* 1990; Nishida 1997). Found in drier areas of the Hawaiian Islands, it has displaced *Pheidole megacephala* as the dominant ant in some areas (Wong and Wong 1988, p. 175). Known to be a voracious nonnative predator in many areas to where it has spread, the species was documented to significantly increase fruit fly mortality in field studies in Hawaii (Wong and Wong 1988, p. 175). In addition to predation, *S. geminata* workers tend honeydew-producing members of the Homoptera suborder, especially mealybugs, which can impact plants directly and indirectly through the spread of disease (Manaaki Whenua—Landcare Research 2011: *http://www.landcareresearch.co.nz/research/biocons/invertebrates/Ants/invasive_ants/solgem_info.asp*).

Solenopsis geminata was included among the eight species ranked as having the highest potential risk to New Zealand in a detailed pest risk assessment for the country (Global Invasive Species Database 2011: *http://www.issg.org/database/species/ecology.asp?si=169&fr=1&sts=&lang=EN*), and is included as one of five ant species listed among the ''100 of the World's Worst invaders'' (Manaaki Whenua—Landcare Research 2011: *http://www.landcareresearch.co.nz/research/biocons/invertebrates/Ants/invasive_ants/solgem_info.asp*).

Although surveys have not been conducted to ascertain this species' presence in each of the known habitat sites occupied by the seven *Hylaeus* species addressed in this finding, because of this species' expanding range and its widespread occurrence in coastal, dry lowland, and mesic habitats, it may threaten populations of all seven *Hylaeus* bees with predation pressure on the islands of Hawaii, Kahoolawe, Lanai, Maui, and Oahu from sea level up to 1,000 ft (300 m) in elevation (Wong and Wong 1988, p. 175).

The *Hylaeus* egg, larvae, and pupal stages are more vulnerable to attack by ants than the mobile adult bees (Daly and Magnacca 2003, p. 10). Invasive ants have severely impacted ground-nesting *Hylaeus* species in particular (Cole *et al.* 1992, pp. 1317, 1320; Medeiros *et al.* 1986, pp. 45–46), because their nests are easily accessible and in or near the ground. Because *Hylaeus anthracinus, H. facilis, H. hilaris,* and *H. longiceps* are believed to be ground-nesting species, they may also be more susceptible to ant predation (Magnacca 2005g, p. 2).

Hylaeus populations are known to be drastically reduced in ant-infested areas (Medeiros *et al.* 1986, pp. 45–46; Stone and Loope 1987, p. 251; Cole *et al.* 1992, pp. 1313, 1317, 1320; Reimer 1994, p. 17). The presence of ants in nearly all of the low-elevation habitat sites historically and currently occupied by the seven *Hylaeus* bee species may increase the uncertainty of *Hylaeus* recovery within these areas (Reimer 1994, pp. 17–18; Daly and Magnacca 2003, pp. 9–10). Although the primary impact of ants on the native invertebrate fauna is via predation (Reimer 1994, p. 17), they also compete for nectar (Howarth 1985, p. 155; Hopper *et al.* 1996, p. 9; Holway *et al.* 2002, pp. 188, 209; Daly and Magnacca 2003, p. 9; Lach 2008, p. 155) and nest sites (Krushelnycky *et al.* 2005, pp. 6–7). Some ant species may impact *Hylaeus* bees indirectly as well, by preying on seeds of native plants, thereby reducing the plant's recruitment and fecundity (Bond and Slingsby 1984, p. 1,031). Several studies (Krushelnycky 2005, p. 9; Lach 2008, p. 155) suggest a serious ecosystem-level effect of invasive ants on pollination. Where ranges overlap, ants compete with native pollinators such as *Hylaeus* bees and preclude them from pollinating native plants. For example, the big-headed ant is known to actively rob nectar from flowers without pollinating them (Howarth 1985, p. 157). Lach (2008, p. 155) found that *Hylaeus* bees that regularly collect pollen from flowers of *Metrosideros polymorpha* were entirely absent from trees with flowers exposed to foraging by big-headed ants.

The rarity or disappearance of native *Hylaeus* species from historically documented localities over the past 100 years (including the seven Hawaiian yellow-faced bee species) is due to a variety of factors. Although we have no direct information that conclusively correlates the decrease in populations of these seven *Hylaeus* bees due to the establishment of nonnative ants, severe predation of other *Hylaeus* species by ants has been documented, resulting in clear reductions in populations. We expect similar predation impacts to these seven *Hylaeus* bees to continue as a result of the widespread presence of ants throughout the Hawaiian Islands, their highly efficient and non-specific predatory behavior, and their ability to quickly disperse and establish new colonies. Therefore, we conclude that predation by nonnative ants represents a serious threat to the continued existence of *H. anthracinus, H. assimulans, H. facilis, H. hilaris, H. kuakea, H. longiceps,* and *H. mana* now and into the future.

Predation by Nonnative Western Yellow Jacket Wasps

The western yellow jacket wasp (*Vespula pensylvanica*) is a potentially serious threat to the seven *Hylaeus* bees (Gambino *et al.* 1987, p. 170; Wilson *et al.* 2009, pp. 1–5). The western yellow jacket wasp is a social wasp species native to the mainland of North America. It was first reported from Oahu in the 1930s (Sherley 2000, p. 121), and an aggressive race became established in 1977 (Gambino *et al.* 1987, p. 170). In temperate climates, the western yellow jacket wasp has an annual life cycle, but in Hawaii's tropical climate, colonies of this species persist through a second year, allowing them to have larger numbers of individuals (Gambino *et al.* 1987, p. 170) and thus a greater impact on prey populations. Most colonies are found between approximately 2,000 and 3,500 ft (approximately 600 and 1,050 m) in elevation (Gambino *et al.* 1990, p. 1,088), although they can also occur at sea level. The western yellow jacket wasp is known to be an aggressive, generalist predator (Gambino *et al.* 1987, p. 170), and has been documented preying upon Hawaiian *Hylaeus* species (although not specifically upon any of the seven species addressed in this finding) (Wilson *et al.* 2009, p. 2). However, predation by the western yellow jacket wasp is a potentially significant threat to all seven of the yellow-faced bees because of the wasp's presence in habitat occupied by the seven Hylaeus bees combined with their small population sizes. This may present a particular threat to *H. facilis, H. hilaris, H. kuakea,* and *H. mana,* because each species is known from only two or fewer sites. It has been suggested the western yellow jacket wasp may compete for nectar with *Hylaeus* species, but we have no information to suggest this represents a threat to the seven *Hylaeus* bees.

Predation by Nonnative Parasitoid Wasps

Native and nonnative parasitoid wasps are known to parasitize some *Hylaeus* species on Oahu (although not upon any of the seven species addressed in this finding), and may pose a threat to five of the seven yellow-faced bees (*H. anthracinus, H. facilis, H. kuakea, H. longiceps,* and *H. mana*) (Daly and Magnacca 2003, p. 10) because they occur on Oahu as well. While the available information indicates some Oahu *Hylaeus* larvae have been parasitized (and subsequently killed) by parasitoid wasps from the Encyrtidae and Eupelmidae families, it is unknown whether these wasps also utilize *H. anthracinus, H. facilis, H. kuakea, H. longiceps,* and *H. mana* as nutritional hosts for their larvae (Daly and Magnacca 2003, p. 98). We are concerned that *H. anthracinus, H. facilis, H. kuakea, H. longiceps,* and *H. mana* may be exposed to wasp parasitism, but we are unaware of any information to indicate this is a threat to these five *Hylaeus* bees.

Summary of Factor C

We do not find evidence that disease is currently impacting the seven Hawaiian yellow-faced bees, nor do we have information to indicate disease outbreaks will occur in the future. Although we have no direct information that conclusively correlates the decrease in populations of these seven *Hylaeus* bees due to the establishment of western yellow jacket wasps, severe predation of other *Hylaeus* species by yellow jacket wasps has been documented, resulting in clear reductions in populations. We expect similar predation impacts to these seven *Hylaeus* bees to continue as a result of the widespread presence of yellow jacket wasps in many areas throughout the Hawaiian Islands, their highly efficient and non-specific predatory behavior, and their ability to quickly disperse and establish new colonies.

While we are concerned that *Hylaeus anthracinus, H. facilis, H. kuakea, H. longiceps,* and *H. mana* may be threatened by wasp parasitism on Oahu, we are unaware of any information to indicate this is a threat to these five *Hylaeus* bees at this time, or that it is likely to become so in the future. The presence of nonnative ants in nearly all lowland habitat historically and currently occupied by the seven *Hylaeus* bees, combined with the near extirpation of native insects in these areas, suggest predation by nonnative ants is a serious threat to the seven Hawaiian yellow-faced bees. Observations and reports have documented that ants are particularly destructive predators because of their high densities, broad ranges of diet, and ability to establish new colonies in otherwise geographically isolated locations because the reproductive adult ants are able to fly. Because the ranges of the big-headed ant, long-legged ant, *Solenopsis geminata,* and *Solenopsis papuana* overlap the ranges of the seven *Hylaeus* bees, and based on their observed predatory behavior at other locations where they occur, these nonnative predators represent an imminent and serious threat to *H. anthracinus, H. assimulans, H. facilis, H. hilaris, H. kuakea, H. longiceps,* and *H. mana.* Unless these aggressive, nonnative ant predators are eliminated or controlled, we expect this threat to continue or increase. Furthermore, a decrease in the amount and distribution of suitable host plants for foraging could indirectly impact these seven species by forcing them to seek less optimal, but predator-free, foraging sites.

Factor D. The Inadequacy of Existing Regulatory Mechanisms

Currently, there are no Federal, State, or local laws, treaties, or regulations that specifically conserve or protect the seven *Hylaeus* bee species from the threats described in this finding. There are some regulations that potentially address the threats posed by introduced, nonnative species; these are discussed below.

Inadequate Protection from Nonnative Ungulates

Nonnative ungulates pose a major ongoing threat to the seven *Hylaeus* bees through destruction and degradation of their habitat. Although some public hunting areas are fenced to prevent the incursion of nonnative ungulates, there are currently no Federal, State, or local laws, treaties, or regulations that adequately address the threats from nonnative ungulates to the seven yellow-faced bees' terrestrial habitat. The existing regulatory mechanisms do not address the threats from nonnative ungulates to the seven yellow-faced bee species or their habitat. The absence of regulatory mechanisms exacerbates the threats discussed under Factor A.

Inadequate Protection from Introduction of Nonnative Species

The Hawaii Department of Agriculture (HDOA) is the lead State agency in protecting Hawaii's agricultural and horticultural industries, animal and public health, natural resources, and environment from the introduction of nonnative, invasive species (HDLNR 2003, p. 3–10). While there are several State agencies (Hawaii Department of Agriculture (HDOA), Hawaii Department of Lands and Natural Resources (HDLNR), Hawaii Department of Health (HDOH)) authorized to prevent the entry of pest species into the State, the existing regulations are inadequate for the reasons discussed in the sections below.

In 1995, a partnership, Coordinating Group on Alien Pest Species (CGAPS), comprised primarily of managers from every major Federal, State, county, and private agency and organization involved in invasive species work in Hawaii, was formed in an effort to influence policy and funding decisions, improve communication, increase collaboration, and promote public awareness (CGAPS 2009). This group facilitated the formation of the Hawaii Invasive Species Council (HISC), which was created by gubernatorial executive order in 2002 to coordinate local initiatives for the prevention and control of invasive species by providing policy-level direction and planning for the State departments responsible for invasive species issues. In 2003, the governor signed into law Act 85, which conveys statutory authority to the HISC to coordinate approaches among the various State and Federal agencies, and international and local initiatives, for the prevention and control of invasive species (HDLNR 2003, p. 3–15; HISC 2009a; Haw. Rev. Stat. section 194–2(a)). Some of the recent priorities for the HISC include interagency efforts to control nonnative species such as the plants *Miconia calvescens* (miconia) and *Cortaderia* sp. (pampas grass), coqui frogs (*Eleutherodactylus coqui*), and ants (HISC 2009). However, in October 2009, HISC approved a 2010 budget that, due to a tighter economy in Hawaii and anticipated budget cuts in State funding support, resulted in a 50 percent reduction in funding with an anticipated setback in conservation achievements and the loss of experienced, highly trained staff (HISC 2009b).

Inadequate Regulatory Control of Nonnative Invertebrate Species

As noted above (see *Factor C, Disease and Predation*), predation by nonnative ants and the nonnative yellow jacket wasp is a potentially significant threat to the seven species. Commercial shipping and air cargo, as well as biological introductions to Hawaii, have resulted in the establishment of over 3,372 species of nonnative insects (Howarth 1990, p. 18; Staples and Cowie 2001, p. 52), with an estimated continuing establishment rate of 20 to 30 new species per year (Beardsley 1962, p. 101; Beardsley 1979, p. 36; Staples and Cowie 2001, p. 52). The prevention and control of introduced pest species in Hawaii is the responsibility of Hawaii State government and Federal agencies, along with a few private organizations. Even though these agencies have regulations and some controls in place, complete control of introduced pest species is difficult to achieve. Consequently, the introduction and movement of nonnative invertebrate pest species, including nonnative ants and yellow jacket wasps, between islands and from one watershed to the next, continues.

Inadequate Regulatory Control of Nonnative Plant Species

Nonnative plants destroy and modify habitat throughout the ranges of each of the seven *Hylaeus* species addressed in this 12-month finding. As such, they represent a significant and immediate threat to each of these species. In addition, nonnative plants have been shown to out-compete native plants and convert native-dominated plant communities to nonnative plant communities (see *Factor A—Habitat Destruction and Modification by Nonnative Plants*). The HDOA regulates the import of plants into the State from domestic origins under Hawaii State law (Haw. Rev. Stat. Ch. 150A). While all plants require inspection upon entry into the State and must be ''apparently free'' of insects and diseases, not all plants require import permits. Parcels brought into the State by mail or cargo must be clearly labeled as ''Plant Materials'' or ''Agricultural Commodities,'' but, given budget constraints and an insufficient number of personnel, it is unlikely that all of these parcels are inspected or monitored prior to delivery in Hawaii. Shipments of plant material into Hawaii must be accompanied by an invoice or packing manifest listing the contents and quantities of the items imported, although it is unclear if all of these shipments are inspected or monitored prior to delivery (HDOA 2009). There are only 12 plant crops regulated (H.A.R. chapter 4–70) to some degree: sugarcane and grasses, pineapple and other bromeliads, coffee, cruciferous vegetables, orchids, banana, passion fruit, pine, coconut, hosts of European corn borer, palms, and hosts of Caribbean fruit fly (HDLNR 2003, p. 3–11). The HDOA also maintains the State list of noxious weeds, and these plants are restricted from entry into the State except by permit from the HDOA's Plant Quarantine Branch.

Although the State has general guidelines for the importation of plants, and regulations are in place regarding the plant crops mentioned above, the intentional or inadvertent introduction of nonnative plants outside the regulatory process and movement of species between islands and from one watershed to the next continues, which represents a threat to native flora and fauna for the reasons described above. In addition, government funding is inadequate to provide for sufficient inspection services and monitoring. One study concluded plant importation laws virtually ensure new invasive plants will be introduced via the nursery and ornamental trade, and outreach efforts cannot keep up with the multitude of new invasive plants being distributed. The author states the only thing wide-scale public outreach can do in this regard is to let the public know new invasive plants are still being sold, and suggest that people should ask for noninvasive or native plants instead (C. Martin, in litt. 2007, p. 9).

On the basis of the above information, existing regulatory mechanisms do not adequately protect the seven *Hylaeus* species from the threat of new introductions of nonnative species, and the continued expansion of nonnative species populations on and between islands and watersheds. Nonnative species may directly compete with, prey upon, or modify or destroy the habitat of one or more of the seven yellow-faced bees for food, space, and other necessary resources. Because current Federal, State, and local laws, treaties, and regulations are inadequate to prevent the introduction and spread of nonnative species from outside the State of Hawaii, as well as between islands and watersheds, the threats from these introduced species remain immediate and significant due to an inadequacy of existing regulatory mechanisms.

Summary of Inadequacy of Existing Regulatory Mechanisms

We found that existing regulatory mechanisms and agency policies do not address the primary threats to the seven yellow-faced bee species and their habitat from nonnative ungulates. The State's current management of nonnative game mammals does not prevent the degradation and destruction of habitat of *Hylaeus anthracinus, H. assimulans, H. facilis, H. hilaris, H. kuakea, H. longiceps,* and *H. mana* (see discussion under Factor A).

We consider the threat from inadequate regulatory mechanisms to be immediate and significant for the following reasons:

(1) Existing State and Federal regulatory mechanisms are not preventing the introduction and spread of nonnative species between islands and watersheds. Habitat-altering nonnative plant species (Factor A) and predation by nonnative animal species (Factor C) pose major ongoing threats to the seven *Hylaeus* species.

Because existing regulatory mechanisms are inadequate to maintain habitat for the seven species of *Hylaeus* and to prevent the spread of nonnative species, the inadequacy of existing regulatory mechanisms is considered to be a significant and immediate threat to *Hylaeus anthracinus, H. assimulans, H. facilis, H. hilaris, H. kuakea, H. longiceps,* and *H. mana.*

Factor E. Other Natural or Manmade Factors Affecting the Species' Continued Existence

Small Number of Populations and Individuals

Species endemic to single islands or known from few, widely dispersed locations are inherently more vulnerable to extinction than widespread species because of the higher risks from genetic bottlenecks, random demographic fluctuations, climate change, and localized catastrophes such as hurricanes, landslides, and drought (Lande 1988, p. 1,455; Mangel and Tier 1994, p. 607; Pimm *et al.* 1988, p. 757). These problems can be further magnified when populations are few and restricted to a limited geographic area, and the number of individuals is very small. Populations with these characteristics face an increased likelihood of stochastic extinction due to changes in demography, the environment, genetics, or other factors, in a process described as an extinction vortex (Gilpin and Soulé 1986, pp. 24–25). Small, isolated populations often exhibit a reduced level of genetic variability or genetic depression due to inbreeding, which diminishes the species' capacity to adapt and respond to environmental changes, thereby lessening the probability of long-term persistence (Frankham 2003, pp. S22–S29; Soulé 1986, pp. 31–34). The negative impacts associated with small population size and vulnerability to random demographic fluctuations or natural catastrophes can be further magnified by synergistic interactions with other threats.

The seven *Hylaeus* bee species have very small populations and are likely more vulnerable to habitat change and stochastic events due to low genetic variability (Daly and Magnacca 2003, p. 3; Magnacca 2007, p. 173). According to Magnacca (2007, p. 3), five species have not been collected recently from one or more islands from which they were historically known, all seven species are restricted to rare habitat, and two are particularly rare and potentially endangered. *Hylaeus facilis* and *H. hilaris* have not been recently observed at some historical collection sites; *H. facilis* is currently known from two populations, and *H. hilaris* is known from only a single population. In addition, *H. kuakea,* first collected in 1997, is only known from two populations, and *H. mana,* just collected in 2002, is known from a single population. Although *H. kuakea* and *H. mana* were only discovered relatively recently, researchers believe these two species were once more widespread when their lowland mesic habitat was not highly fragmented and degraded by invasive species, as is currently the case (Magnacca in litt. 2011, p. 95). The small number of populations known for each of these four *Hylaeus* species increases their risk of extinction due to stochastic events such as hurricanes, wildfires, or prolonged drought (Jones *et al.* 1984, p. 209; Smith and Tunison 1992, p. 398).

The recurrence intervals for stochastic events, for example, wildfires, prolonged drought, and hurricanes, cannot be predicted, which introduces some uncertainty regarding potential effects to *H. facilis, H. hilaris, H. kuakea,* and *H. mana* (the four species most at risk of the seven *Hylaeus* bees). However, because *Hylaeus hilaris* is cleptoparasitic and restricted to one known population, it is at particularly high risk of extinction because of the rarity of its hosts and the fact it is the most habitat-specific of all Hawaiian bees (Magnacca 2007a, p. 181). The fact that a species is potentially vulnerable to stochastic processes does not necessarily mean it is reasonably likely to experience or have its status affected by a given stochastic process within timescales meaningful under the Act. Because of their small number of populations, negative impacts to *H. facilis, H. hilaris, H. kuakea,* and *H. mana* from hurricanes, wildfires, and drought would be likely if these events occur. Because these events have been documented on Oahu and other Hawaiian islands in the past, we believe that they represent an ongoing threat to these four species, although the specific timing, location, or magnitude is unknown. The threat from fire is unpredictable, but omnipresent in habitats that have been invaded by nonnative, fire-prone grasses. Hurricanes and drought conditions present an ongoing and ever-present threat, because they can occur at any time, although the incidence and magnitude of specific events is not predictable.

Competition With Nonnative Insects

There are 15 known species of nonnative bees in Hawaii (Snelling 2003, p. 342), including two nonnative *Hylaeus* species (Magnacca 2007, p. 188). Most nonnative bees inhabit areas dominated by nonnative vegetation and do not compete with native Hawaiian bees for foraging resources (Daly and Magnacca 2003, p. 13). The European honey bee (*Apis mellifera*) is an exception; this social species is often very abundant in areas with native vegetation and aggressively competes with *Hylaeus* for nectar and pollen (Hopper *et al.* 1996, p. 9; Daly and Magnacca 2003, p. 13; Snelling 2003, p. 345).

The European honey bee was first introduced to the Hawaiian Islands in 1875, and currently inhabits areas from sea level to the upper tree line boundary (Howarth 1985, p. 156). European honey bees have been observed foraging on *Hylaeus* host plants such as *Scaevola* spp. and *Sesbania tomentosa* (Hopper *et al.* 1996, p. 9; Daly and Magnacca 2003, p. 13; Snelling 2003, p. 345). Although we lack information indicating Hawaiian *Hylaeus* populations have declined because of competition with European honey bees for nectar and pollen, the European honey bee does forage in *Hylaeus* spp. habitat and may exclude *Hylaeus* spp. (Magnacca 2007, p. 188; Lach 2008, p. 155). *Hylaeus* species do not occur in native habitat where there are large numbers of honey bees, although the impact of moderate populations of honey bees is not known (Magnacca 2007, p. 188). Nonnative, invasive bees are widely documented to decrease nectar volumes and usurp native pollinators (Lach 2008, p. 155). There are also indications that populations of the European honey bee are not as vulnerable as *Hylaeus* bees to predation by nonnative ant species (see *Factor C. Disease and Predation).* Lach (2008, p. 155) observed that *Hylaeus* bees that regularly collect pollen from the flowers of *Metrosideros polymorpha* trees were entirely absent from trees with flowers visited by the big-headed ant, while visits by the European honey bee were not affected. As a result, the European honey bee may have a competitive advantage over *Hylaeus* spp., as it is not excluded by the big-headed ant (Lach 2008, p. 155).

Other nonnative bees found in areas of native vegetation include carpenter bees (*Ceratina* species), Australian colletid bees (*Hylaeus albonitens*), and *Lasioglossum impavidum* (NCN) (Magnacca 2007, p. 188). While it has been suggested these nonnative bees may impact native *Hylaeus* bees through competition for pollen based on their similar size and flower preferences, there is no information that demonstrates these nonnative bees forage on *Hylaeus* host plants (Magnacca 2007, p. 188). It has also been suggested parasitoid wasps may compete for nectar with native *Hylaeus* species (Daly and Magnacca 2003, p. 10); however, information demonstrating nonnative parasitoid wasps forage on the same host plants as the seven Hawaiian yellow-faced bees is unavailable.

We acknowledge the potential for negative impacts on *Hylaeus anthracinus, H. assimulans, H. facilis, H. hilaris, H. kuakea, H. longiceps,* and *H. mana* from competition with the European honey bee for nectar and pollen (Magnacca 2007, p. 188). In addition, one study in Hawaii suggests the European honey bee may have an additional advantage for collecting pollen and nectar because it may not be negatively affected by the presence of predatory big-headed ants on native vegetation (Lach 2008, p. 155). Competition with the European honey bee may be a potential threat to the seven *Hylaeus* species, because (1) Honey bees forage on *Hylaeus* host plant species; (2) they may exclude *Hylaeus* spp. from those resources (*Hylaeus* spp. are never found foraging in the presence of European honey bees); and (3) honey bees may have a competitive advantage over Hawaiian *Hylaeus* ssp., as one study suggests honey bees are not negatively affected by the presence of big-headed ants on native vegetation to the extent the *Hylaeus* species may be. Honey bees have been known to exclude other *Hylaeus* species, and it is well-documented that they forage in native plant areas. However, the best available scientific information indicates that competition with the European honey bee may represent a threat to these seven Hylaeus species, but the threat is of unknown magnitude, and additional research would be helpful to better understand this interaction.

We have no information indicating other species of nonnative bees or parasitoid wasps negatively impact populations of the seven species of *Hylaeus* bees due to competition for nectar and pollen. Therefore, we have determined that competition with other species of nonnative bees or parasitoid wasps is not a threat.

Summary of Factor E

The small number of populations of *Hylaeus facilis, H. hilaris, H. kuakea,* and *H. mana* increase their risk of extinction due to stochastic events such as hurricanes, wildfires, and drought, which, although unpredictable, represent an ongoing and significant threat to *H. facilis, H. hilaris, H. kuakea,* and *H. mana.* We have no information indicating other nonnative bees or parasitoid wasps compete for nectar and pollen on *Hylaeus* host plants. Therefore, we have determined that competition with these species does not present a significant threat to the seven *Hylaeus* species. Honey bees forage in native plant areas and have been known to exclude other *Hylaeus* species. However, the best available information does not indicate competition between honey bees and the seven *Hylaeus* species addressed in this finding is a significantly quantifiable threat.

Finding

As required by the Act, we conducted a review of the status of the species and considered the five factors in assessing whether *Hylaeus anthracinus, H. assimulans, H. facilis, H. hilaris, H. kuakea, H. longiceps,* and *H. mana* are endangered or threatened throughout their ranges. We examined the best scientific and commercial information available regarding the past, present, and future threats faced by these seven *Hylaeus* species. We reviewed the petitions, information available in our files, information submitted to us following publication of our 90-day petition finding (75 FR 34077; June 16, 2010), and other available published and unpublished information, and we consulted with *Hylaeus* bee experts and other Federal and State resource agencies. In considering what factors might constitute a threat, we must look beyond the mere exposure of the species to the factor to determine whether the species responds to the factor in a way that causes actual impacts to the species. If there is exposure to a factor, but no response, or only a positive response, that factor is not a threat. If there is exposure and the species responds negatively, the factor may be a threat and we then attempt to determine how significant a threat it is. If the threat is significant, it may drive or contribute to the risk of extinction of the species such that the species warrants listing as endangered or threatened as those terms are defined by the Act. This does not necessarily require empirical proof of a threat. The combination of exposure and some corroborating evidence of how the species is likely impacted could suffice. However, the mere identification of factors that could impact a species negatively is not sufficient to compel a finding that listing is appropriate; we require evidence that these factors are operative threats that act on the species to the point the species meets the definition of endangered or threatened under the Act.

In this review of the status of the seven *Hylaeus* species, we identified a number of threats under the five-factor analysis including: destruction or modification of coastal and lowland habitats from urbanization and land conversion, nonnative plants, nonnative ungulates, and wildfire (Factor A); predation by nonnative ants and the western yellow jacket wasp (Factor C); inadequate protection from threats by existing regulatory mechanisms (Factor D); and other natural or manmade factors, such as small population size (Factor E).

Under Factor A (''*Present or Threatened Destruction, Modification, or Curtailment of the Habitat or Range''*), we evaluated the effects of: (1) Urbanization and land use conversion; (2) nonnative plant species; (3) nonnative ungulates; (4) fire; (5) recreational activities; (6) stochastic events, such as hurricanes and droughts; and (7) climate change.

Hylaeus anthracinus, H. assimilans, H. facilis, H. hilaris, H. kuakea, H. longiceps, and *H. mana* are known from native coastal, lowland dry, and lowland mesic habitats. These habitats have been severely altered and degraded over the past 200 years due to land management practices such as agriculture and urban development, and from the impacts of nonnative species, fire, recreational activities, and stochastic events (*e.g.,* hurricanes and drought). The loss of native coastal and lowland dry habitats in the main Hawaiian Islands is estimated to be more than 75 percent and 90 percent, respectively (Bruegmann 1996, p. 26; Juvik and Juvik 1998, p. 124; Xerces Society 2009, p. 23). Additionally, native coastal and lowland habitats continue to become increasingly fragmented due to a variety of factors, thereby reducing the ability of the seven *Hylaeus* species to locate host plants to forage for nectar and pollen and to locate suitable nesting sites. In particular, coastal and lowland dry habitats remain popular for land use and development. During surveys conducted between 1998 and 2007, the five *Hylaeus* species collected by Perkins over 100 years ago (*Hylaeus anthracinus, H. assimilans, H. facilis, H. hilaris,* and *H. longiceps*), were largely absent from almost all of their historically known locations. *Hylaeus kuakea* and *H. mana* were discovered relatively recently, and we lack information that would conclusively establish their historical range. Based on our assessment of the best available information, we believe degradation and destruction of native coastal and lowland habitats due to past and present land management practices, such as agriculture and urban development, pose a significant threat to the seven *Hylaeus* species throughout their ranges now and will likely continue for the foreseeable future.

The spread of nonnative plants and the conversion of coastal and lowland native habitat to nonnative habitat are believed to be primary causes of the decline of, and current threats to, the known populations of each of the seven *Hylaeus* species. The seven *Hylaeus* species depend on native plants for nectar and pollen and are almost entirely absent from habitat dominated by nonnative plants. Many of the native plants used as foraging resources by the adults of the seven *Hylaeus* species are declining due to competition with nonnative plants and a lack of native pollinators that actually pollinate while collecting nectar. For example, *H. anthracinus* and *H. longiceps* forage on three federally endangered plants (*Chamaesyce celastroides* var. *kaenana, Hedyotis coriacea,* and *Sesbania tomentosa*). To compound our concerns, inadequate regulatory control (see *Factor D. The Inadequacy of Existing Regulatory Mechanisms*) has led to and continues to contribute to an ever increasing number of nonnative plant species introductions to the Hawaiian Islands. Once established, nonnative plant species are quickly spread by intrastate commerce, birds, people, feral ungulates, and on their own, and result in the rapid alteration and degradation of the native plant communities upon which these seven Hawaiian yellow-faced bees depend. Therefore, based on our assessment of the best available information, we believe degradation and destruction of native coastal and lowland habitat due to nonnative plants poses a significant threat to the seven *Hylaeus* species throughout their ranges now and will likely continue for the foreseeable future.

Nonnative ungulates (*e.g.,* pigs, goats, axis deer, and cattle) are one of the primary causes of the alteration and degradation of native vegetation and habitat in the Hawaiian Islands. Because feral ungulate populations are managed by the State for the enhancement of State Game Management Units and because there is no regulatory mechanism for their control or elimination (see *Factor A. Habitat Destruction and Modification by Nonnative Ungulates*), it is expected that this threat will continue to impact the habitat of the seven yellow-faced bees addressed in this finding. Habitat degradation and destruction, due to their direct effects of trampling and consuming native plants and indirect effects of rooting, erosion, and spreading seeds and fruits of nonnative plants, pose a significant threat to the seven *Hylaeus* species throughout their ranges now and will likely continue for the foreseeable future.

Fire is a human-exacerbated threat to native species and natural vegetation in Hawaii. Fire can kill most native trees and shrubs, and in a burned area native plants are usually replaced by nonnative plants adapted to survive and regenerate after fire. The seven *Hylaeus* bees primarily occur in coastal, lowland dry, and lowland mesic habitat areas that are particularly prone to the impacts of fire. Repeated fires in these areas often result in the conversion of native-dominated vegetation to nonnative-dominated vegetation. Fires enable fire-adapted, nonnative plants to gain a competitive edge over native plants, resulting in the replacement of native plants used for foraging by *Hylaeus* bees with nonnative plants that are not used by the bees for foraging. Although there are management plans in place to address the threat of fire in many areas of the State, fires continue to occur annually across the State and threaten the future existence of known yellow-faced bee habitat and population sites (see *Factor A. Habitat Destruction and Modification by Fire*). For these reasons, we conclude fire remains a significant threat to the seven *Hylaeus* species throughout their ranges in coastal, lowland dry, and lowland mesic habitats, and will likely continue for the foreseeable future.

While trampling and compaction of vegetation from human activities may negatively impact the habitat of some populations of the seven Hylaeus bees, we conclude recreational activities are not a threat to *Hylaeus anthracinus, H. assimulans, H. facilis, H. hilaris, H. kuakea, H. longiceps,* and *H. mana* throughout their ranges.

We are concerned about the effects of projected climate change, particularly rising temperatures and their impact on *Hylaeus* spp. host plants; however, we recognize there is limited information on the exact nature of impacts from climate change. Because the specific and cumulative effects of climate change on the seven *Hylaeus* bees are presently unknown, any conclusion regarding the immediacy and significance of the threat from climate change would be speculative. However, the effects of climate change are expected to exacerbate and compound the many ongoing threats facing these species and their habitat (*e.g.,* frequency of wildfire, reduced precipitation, etc.).

Based on our evaluation of Factor A, using the best available scientific and commercial information as summarized above, we conclude the present or threatened destruction, modification, or curtailment of the habitat or range of *Hylaeus anthracinus, H. assimilans, H. facilis, H. hilaris, H. kuakea, H. longiceps,* and *H. mana* presents a significant threat to these seven *Hylaeus* species across their ranges.

Under Factor B (''*Overutilization for Commercial, Recreational, Scientific, or Educational Purposes''*), we determined six of the seven *Hylaeus* species are not threatened by over-collection. We examined whether *H. hilaris* was potentially vulnerable to over-collection because it is inherently rare, known from only one location, and has a cleptoparasitic life history. However, because this species is easily recognizable, we see little reason for scientists to retain specimens observed in the field during future collections. In addition, because it occurs in habitat that is protected and managed by TNC, we find overutilization is not a threat to *H. hilaris* throughout its range. Furthermore, recreational or insect enthusiast collection of the seven *Hylaeus* bees does not appear to be a threat to any of these species.

Under Factor C (''*Disease or Predation''*), we found no evidence that disease is currently impacting the seven Hawaiian yellow-faced bees, or that disease outbreaks will increase in the future. Ants are found in habitats throughout the Hawaiian Islands, are known to prey upon *Hylaeus* bees, and are reported to have eliminated *Hylaeus* species from specific areas where their ranges overlap. Because ants are easily able to widely disperse and are efficient predators, and because *Hylaeus* species are not adapted to avoid ant predation, we believe this threat will continue to threaten all populations of all seven yellow-faced bees. Therefore, we conclude predation by ants is an ongoing and significant threat to the seven *Hylaeus* bees across their entire ranges, and this threat is likely to continue into the future.

Yellow jacket wasps are aggressive, generalist predators found in the same types of habitats as these seven *Hylaeus* species, and have been documented preying upon other Hawaiian *Hylaeus* bees. Therefore, we conclude yellow jacket wasp predation is a significant threat to the seven *Hylaeus* bees across their entire ranges and particularly to those species known from two or fewer population sites. The best available information does not suggest predation by native and nonnative parasitoid wasps is a significant threat to the seven *Hylaeus* bees.

Under Factor D (''*Inadequacy of Existing Regulatory Mechanisms''*), we consider the threat from inadequate regulatory mechanisms to be immediate and significant. The State of Hawaii's current management of nonnative game mammals does not adequately address the primary threats to *Hylaeus anthracinus, H. assimulans, H. facilis, H. hilaris, H. kuakea, H. longiceps,* and *H. mana* or their habitat (Factor A). Existing State and Federal regulatory mechanisms are not adequately preventing the introduction and spread of nonnative animal and habitat-altering plant species between islands and watersheds (Factor A), and predation by nonnative animal species (Factor C) poses a major ongoing threat to the seven *Hylaeus* species. In addition, existing regulatory mechanisms are inadequate to prevent the introduction and spread of nonnative insect predators, or competitors that directly compete with one or more of the seven bee species for food, space, and other necessary resources (see Factors C and E). Based on our evaluation of Factor D, we conclude that the seven *Hylaeus* bee species are threatened by inadequate existing regulatory mechanisms across their ranges.

Under Factor E (''*Other Natural or Manmade Factors Affecting the Species' Continued Existence''*), we determined that small population size is a significant threat to *Hylaeus facilis, H. hilaris, H. kuakea,* and *H. mana.* These species are each only known from one or two populations, and the risk of extinction from stochastic events (*e.g.,* hurricanes, wildfires, and drought) is high. We have also determined that competition with the European honey bee is a potentially significant threat to all seven species. While we lack information indicating Hawaiian *Hylaeus* populations have declined because of competition with the European honey bee for nectar and pollen, the native *Hylaeus* and the European honey bee are competing for the same pollen and nectar resources. However, we have no information indicating that competition is at a level that represents a threat to the seven *Hylaeus* species addressed in this finding.

We found that competition for nectar and pollen with other species of nonnative bees or parasitoid wasps is not a threat to the seven *Hylaeus* bees at this time. Based on our evaluation under Factor E as summarized above, we conclude *Hylaeus facilis, H. hilaris, H. kuakea,* and *H. mana* are threatened because of their small population size across their ranges.

On the basis of the best scientific and commercial information available, we find that the petitioned action, listing the seven species of Hawaiian yellow-faced bees (*Hylaeus anthracinus, H. assimulans, H. facilis, H. hilaris, H. kuakea, H. longiceps,* and *H. mana*) as endangered or threatened is warranted. We will make a determination on the status of these species as endangered or threatened when we prepare a proposed listing determination. However, as explained in more detail below, an immediate proposal of a regulation implementing this action is precluded by higher priority listing actions, and progress is being made to add or remove qualified species from the Lists of Endangered and Threatened Wildlife and Plants.

We reviewed the available information to determine if the existing and foreseeable threats render any of the seven Hawaiian yellow-faced bee species at risk of extinction now such that issuing an emergency regulation temporarily listing the species under section 4(b)(7) of the Act is warranted. We determined that issuing an emergency regulation temporarily listing these species is not warranted at this time for the following reasons. Although populations are small, five of the seven species occur in several discrete localities, and we do not believe there are any potential threats of such great immediacy, severity, or scope that would simultaneously threaten all of the known populations of these five species with the imminent risk of extinction. Although *Hylaeus hilaris* is known from one population on the northwest coast within TNC's Moomomi Preserve on Molokai, and *H. mana* is known from one population along the Manana Trail in the Koolau Mountains on Oahu, within the State's Ewa Forest Reserve, we are unaware of any potential threats in either of these areas that would threaten these populations with the imminent risk of extinction. However, if at any time we determine that issuing an emergency regulation temporarily listing any of these seven species of Hawaiian yellow-faced bees is warranted, we will initiate this action at that time.

Listing Priority Number

The Service adopted guidelines on September 21, 1983 (48 FR 43098), to establish a rational system for utilizing available resources for the highest priority species when adding species to the Lists of Endangered or Threatened Wildlife and Plants or reclassifying species listed as threatened to endangered status. These guidelines, titled ''Endangered and Threatened Species Listing and Recovery Priority Guidelines,'' address the immediacy and magnitude of threats, and the level of taxonomic distinctiveness by assigning priority in descending order to monotypic genera (genus with one species), full species, and subspecies (or equivalently, distinct population segments of vertebrates). We assigned the seven species of Hawaiian yellow-faced bees a Listing Priority Number (LPN) of 2, based on our finding that the seven species face threats that are of high magnitude and are imminent. This is the highest priority that can be provided to a species under our guidance.

Threats to the seven species of Hawaiian yellow-faced bees include the present or threatened destruction, modification, or curtailment of their habitat, predation, the inadequacy of existing regulatory mechanisms, and other natural or manmade factors. One or more of the threats are occurring in each of the seven species' known populations in the Hawaiian Islands. These threats are ongoing and, in some cases (such as nonnative species), are considered irreversible. Our rationale for assigning each of the seven species of Hawaiian yellow-faced bees an LPN 2 is outlined below.

Under the Service's LPN Guidance, the magnitude of threat is the first criterion we look at when establishing a listing priority. The guidance indicates that species with the highest magnitude of threat are those species facing the greatest threats to their continued existence. These species receive the highest listing priority. The threats facing the seven species of Hawaiian yellow-faced bees are high in magnitude because the major threats (destruction or modification of their habitat, predation, inadequate protection from threats by existing regulatory mechanisms, and other natural or manmade factors) occur throughout all of the ranges of each of the seven species.

Based on an evaluation of the effects of urbanization and land use conversion, nonnative plants and ungulates, fire, and stochastic events on the coastal and lowland habitat of each of the seven *Hylaeus* bees, we determined these effects occur throughout the range of each species and will continue to occur into the future. While habitat degradation and destruction continues to reduce the amount of potentially suitable habitat available for foraging, predation by nonnative ants and likely predation by yellow jacket wasps are a significant threat to the seven species throughout their ranges, and, lacking any viable means of their control, will continue to occur into the future. Regulations are not in place at the local, State, or Federal level to adequately minimize the threat of habitat degradation and destruction from nonnative plants and ungulates. In addition, existing regulatory mechanisms are inadequate to prevent the introduction and spread of nonnative insect predators or competitors. We determined these threats occur throughout the range of each of the seven species of *Hylaeus* bees and will continue to occur into the future unless restriction on the introduction and the control of, nonnative plants and animals, are put in place. We believe the ability of the populations of the seven *Hylaeus* bees to stabilize or increase over the long term is highly diminished given the widespread landscape-level changes and the threats from predation and competition that are occurring. Thus, we believe the available information indicates the magnitude of threats is high.

Under our LPN Guidance, the second criterion we consider in assigning a listing priority is the immediacy of threats. This criterion is intended to ensure species that face actual, identifiable threats are given priority over those for which threats are only potential or that are intrinsically vulnerable but are not known to be presently facing such threats. The threats to the seven Hawaiian yellow-faced bees are imminent because we have factual information that the threats are identifiable, and that all of the seven species are currently facing these threats throughout all portions of their ranges. The identifiable threats are covered in detail under the discussion of Factors A and E of this finding and include destruction or modification of their habitat, predation, inadequate existing regulatory mechanisms, and other natural or manmade factors such as small population size. In addition to their current existence, we expect these threats to continue and likely intensify into the foreseeable future.

The third criterion in our LPN guidance is intended to devote resources to those species representing highly distinctive or isolated gene pools as reflected by taxonomy. The seven Hawaiian yellow-faced bees are valid taxa at the species level, and therefore receive a higher priority than subspecies or distinct population segments, but a lower priority than species in a monotypic genus.

The seven Hawaiian yellow-faced bees face high magnitude, imminent threats, and are valid taxa at the species level. Thus, in accordance with our LPN guidance, we have assigned each of the seven Hawaiian yellow-faced bees an LPN of 2. We will continue to monitor the threats to the seven *Hylaeus* bees and the species' status on an annual basis; should the magnitude or the imminence of the threats change, we will revisit our assessment of the LPN.

Work on a proposed listing determination for *Hylaeus anthracinus, H. assimulans, H. facilis, H. hilaris, H. kuakea, H. longiceps,* and *H. mana* is precluded by work on higher priority listing actions with absolute statutory, court-ordered, or court-approved deadlines and final listing determinations for those species that were proposed for listing with funds from Fiscal Year 2011. This work includes all the actions listed in the tables below under expeditious progress.

Preclusion and Expeditious Progress

Preclusion is a function of the listing priority of a species in relation to the resources that are available and the cost and relative priority of competing demands for those resources. Thus, in any given fiscal year (FY), multiple factors dictate whether it will be possible to undertake work on a listing proposal regulation or whether promulgation of such a proposal is precluded by higher priority listing actions.

The resources available for listing actions are determined through the annual Congressional appropriations process. The appropriation for the Listing Program is available to support work involving the following listing actions: Proposed and final listing rules; 90-day and 12-month findings on petitions to add species to the Lists of Endangered and Threatened Wildlife and Plants (Lists) or to change the status of a species from threatened to endangered; annual ''resubmitted'' petition findings on prior warranted-but-precluded petition findings as required under section 4(b)(3)(C)(i) of the Act; critical habitat petition findings; proposed and final rules designating critical habitat; and litigation-related, administrative, and program-management functions (including preparing and allocating budgets, responding to Congressional and public inquiries, and conducting public outreach regarding listing and critical habitat). The work involved in preparing various listing documents can be extensive and may include, but is not limited to: Gathering and assessing the best scientific and commercial data available and conducting analyses used as the basis for our decisions; writing and publishing documents; and obtaining, reviewing, and evaluating public comments and peer review comments on proposed rules and incorporating relevant information into final rules. The number of listing actions that we can undertake in a given year also is influenced by the complexity of those listing actions; that is, more complex actions generally are more costly. The median cost for preparing and publishing a 90-day finding is $39,276; for a 12-month finding, $100,690; for a proposed rule with critical habitat, $345,000; and for a final listing rule with critical habitat, $305,000.

We cannot spend more than is appropriated for the Listing Program without violating the Anti-Deficiency Act (see 31 U.S.C. 1341(a)(1)(A)). In addition, in FY 1998 and for each fiscal year since then, Congress has placed a statutory cap on funds that may be expended for the Listing Program, equal to the amount expressly appropriated for that purpose in that fiscal year. This cap was designed to prevent funds appropriated for other functions under the Act (for example, recovery funds for removing species from the Lists), or for other Service programs, from being used for Listing Program actions (see House Report 105–163, 105th Congress, 1st Session, July 1, 1997).

Since FY 2002, the Service's budget has included a critical habitat subcap to ensure that some funds are available for other work in the Listing Program (''The critical habitat designation subcap will ensure that some funding is available to address other listing activities'' (House Report No. 107–103, 107th Congress, 1st Session, June 19, 2001)). In FY 2002 and each year until FY 2006, the Service has had to use virtually the entire critical habitat subcap to address court-mandated designations of critical habitat, and consequently none of the critical habitat subcap funds have been available for other listing activities. In some FYs since 2006, we have been able to use some of the critical habitat subcap funds to fund proposed listing determinations for high-priority candidate species. In other FYs, while we were unable to use any of the critical habitat subcap funds to fund proposed listing determinations, we did use some of this money to fund the critical habitat portion of some proposed listing determinations so that the proposed listing determination and proposed critical habitat designation could be combined into one rule, thereby being more efficient in our work. At this time, for FY 2011, we plan to use some of the critical habitat subcap funds to fund proposed listing determinations.

We make our determinations of preclusion on a nationwide basis to ensure that the species most in need of listing will be addressed first and also because we allocate our listing budget on a nationwide basis. Through the listing cap, the critical habitat subcap, and the amount of funds needed to address court-mandated critical habitat designations, Congress and the courts have in effect determined the amount of money available for other listing activities nationwide. Therefore, the funds in the listing cap, other than those needed to address court-mandated critical habitat for already listed species, set the limits on our determinations of preclusion and expeditious progress.

Congress identified the availability of resources as the only basis for deferring the initiation of a rulemaking that is warranted. The Conference Report accompanying Pub. L. 97–304 (Endangered Species Act Amendments of 1982), which established the current statutory deadlines and the warranted-but-precluded finding, states that the amendments were ''not intended to allow the Secretary to delay commencing the rulemaking process for any reason other than that the existence of pending or imminent proposals to list species subject to a greater degree of threat would make allocation of resources to such a petition [that is, for a lower-ranking species] unwise.'' Although that statement appeared to refer specifically to the ''to the maximum extent practicable'' limitation on the 90-day deadline for making a ''substantial information'' finding, that finding is made at the point when the Service is deciding whether or not to commence a status review that will determine the degree of threats facing the species, and therefore the analysis underlying the statement is more relevant to the use of the warranted-but-precluded finding, which is made when the Service has already determined the degree of threats facing the species and is deciding whether or not to commence a rulemaking.

In FY 2011, on April 15, 2011, Congress passed the Full-Year Continuing Appropriations Act (Pub. L. 112–10), which provides funding through September 30, 2011. The Service has $20,902,000 for the listing program. Of that, $9,472,000 is being used for determinations of critical habitat for already listed species. Also $500,000 is appropriated for foreign species listings under the Act. The Service thus has $10,930,000 available to fund work in the following categories: Compliance with court orders and court-approved settlement agreements requiring that petition findings or listing determinations be completed by a specific date; section 4 (of the Act) listing actions with absolute statutory deadlines; essential litigation-related, administrative, and listing program-management functions; and high-priority listing actions for some of our candidate species. In FY 2010, the Service received many new petitions and a single petition to list 404 species. The receipt of petitions for a large number of species is consuming the Service's listing funding that is not dedicated to meeting court-ordered commitments. Absent some ability to balance effort among listing duties under existing funding levels, the Service is only able to initiate a few new listing determinations for candidate species in FY 2011.

In 2009, the responsibility for listing foreign species under the Act was transferred from the Division of Scientific Authority, International Affairs Program, to the Endangered Species Program. Therefore, starting in FY 2010, we used a portion of our funding to work on the actions described above for listing actions related to foreign species. In FY 2011, we anticipate using $1,500,000 for work on listing actions for foreign species, which reduces funding available for domestic listing actions; however, currently only $500,000 has been allocated for this function. Although there are no foreign species issues included in our high-priority listing actions at this time, many actions have statutory or court-approved settlement deadlines, thus increasing their priority. The budget allocations for each specific listing action are identified in the Service's FY 2011 Allocation Table (part of our record).

We assigned each of the seven species of Hawaiian yellow-faced bees an LPN of 2, based on our finding that each species faces immediate and high magnitude threats from the present or threatened destruction, modification, or curtailment of its habitat, the threat of predation from and competition with nonnative species, and from the inadequacy of existing regulatory mechanisms. In addition, *H. facilis, H. hilaris, H. kuakea,* and *H. mana* are each significantly threatened by small population size. Under our 1983 Guidelines, a ''species'' facing imminent high-magnitude threats is assigned an LPN of 1, 2, or 3 depending on its taxonomic status. Because *H. anthracinus, H. assimulans, H. facilis, H. hilaris, H. kuakea, H. longiceps,* and *H. mana* are species, we assigned each an LPN of 2 (the highest category available for a species). For the above reasons, funding a proposed listing determination for the seven species of Hawaiian yellow-faced bees is precluded by court-ordered and court-approved settlement agreements, listing actions with absolute statutory deadlines, and work on proposed listing determinations for those candidate species with a higher listing priority.

Based on our September 21, 1983, guidelines for assigning an LPN for each candidate species (48 FR 43098), we have a significant number of species with a LPN of 2. Using these guidelines, we assign each candidate an LPN of 1 to 12, depending on the magnitude of threats (high or moderate to low), immediacy of threats (imminent or nonimminent), and taxonomic status of the species (in order of priority: monotypic genus (a species that is the sole member of a genus); species; or part of a species (subspecies, or distinct population segment)). The lower the listing priority number, the higher the listing priority (that is, a species with an LPN of 1 would have the highest listing priority).

Because of the large number of high-priority species, we have further ranked the candidate species with an LPN of 2 by using the following extinction-risk type criteria: International Union for the Conservation of Nature and Natural Resources (IUCN) Red list status/rank, Heritage rank (provided by NatureServe), Heritage threat rank (provided by NatureServe), and species currently with fewer than 50 individuals, or 4 or fewer populations. Those species with the highest IUCN rank (critically endangered), the highest Heritage rank (G1), the highest Heritage threat rank (substantial, imminent threats), and currently with fewer than 50 individuals, or fewer than 4 populations, originally comprised a group of approximately 40 candidate species (''Top 40''). These 40 candidate species have had the highest priority to receive funding to work on a proposed listing determination. As we work on proposed and final listing rules for those 40 candidates, we apply the ranking criteria to the next group of candidates with an LPN of 2 and 3 to determine the next set of highest priority candidate species. Finally, proposed rules for reclassification of threatened species to endangered species are lower priority, because as listed species, they are already afforded the protections of the Act and implementing regulations. However, for efficiency reasons, we may choose to work on a proposed rule to reclassify a species to endangered if we can combine this with work that is subject to a court-determined deadline.

With our workload so much bigger than the amount of funds we have to accomplish it, it is important that we be as efficient as possible in our listing process. Therefore, as we work on proposed rules for the highest priority species in the next several years, we are preparing multi-species proposals when appropriate, and these may include species with lower priority if they overlap geographically or have the same threats as a species with an LPN of 2. In addition, we take into consideration the availability of staff resources when we determine which high-priority species will receive funding to minimize the amount of time and resources required to complete each listing action.

As explained above, a determination that listing is warranted but precluded must also demonstrate that expeditious progress is being made to add and remove qualified species to and from the Lists of Endangered and Threatened Wildlife and Plants. As with our ''precluded'' finding, the evaluation of whether progress in adding qualified species to the Lists has been expeditious is a function of the resources available for listing and the competing demands for those funds. (Although we do not discuss it in detail here, we are also making expeditious progress in removing species from the list under the Recovery program in light of the resource available for delisting, which is funded by a separate line item in the budget of the Endangered Species Program. So far during FY 2011, we have completed delisting rules for three species.) Given the limited resources available for listing, we find that we are making expeditious progress in FY 2011 in the Listing Program. This progress included preparing and publishing the following determinations:

FY 2011 COMPLETED LISTING ACTIONS

Publication date	Title	Actions	FR pages
10/6/2010	Endangered Status for the Altamaha Spinymussel and Designation of Critical Habitat.	Proposed Listing Endangered	75 FR 61664–61690
10/7/2010	12-month Finding on a Petition To list the Sacramento Splittail as Endangered or Threatened.	Notice of 12-month petition finding, Not warranted.	75 FR 62070–62095
10/28/2010	Endangered Status and Designation of Critical Habitat for Spikedace and Loach Minnow.	Proposed Listing Endangered (uplisting).	75 FR 66481–66552
11/2/2010	90-Day Finding on a Petition To List the Bay Springs Salamander as Endangered.	Notice of 90-day Petition Finding, Not substantial.	75 FR 67341–67343

FY 2011 COMPLETED LISTING ACTIONS—Continued

Publication date	Title	Actions	FR pages
11/2/2010	Determination of Endangered Status for the Georgia Pigtoe Mussel, Interrupted Rocksnail, and Rough Hornsnail and Designation of Critical Habitat.	Final Listing Endangered	75 FR 67511–67550
11/2/2010	Listing the Rayed Bean and Snuffbox as Endangered	Proposed Listing Endangered	75 FR 67551–67583
11/4/2010	12-Month Finding on a Petition To List Cirsium wrightii (Wright's Marsh Thistle) as Endangered or Threatened.	Notice of 12-month petition finding, Warranted but precluded.	75 FR 67925–67944
12/14/2010	Endangered Status for Dunes Sagebrush Lizard	Proposed Listing Endangered	75 FR 77801–77817
12/14/2010	12-Month Finding on a Petition To List the North American Wolverine as Endangered or Threatened.	Notice of 12-month petition finding, Warranted but precluded.	75 FR 78029–78061
12/14/2010	12-Month Finding on a Petition To List the Sonoran Population of the Desert Tortoise as Endangered or Threatened.	Notice of 12-Month petition finding, Warranted but precluded.	75 FR 78093–78146
12/15/2010	12-Month Finding on a Petition To List *Astragalus microcymbus* and *Astragalus schmolliae* as Endangered or Threatened.	Notice of 12-month petition finding, Warranted but precluded.	75 FR 78513–78556
12/28/2010	Listing Seven Brazilian Bird Species as Endangered Throughout Their Range.	Final Listing Endangered	75 FR 81793–81815
1/4/2011	90-Day Finding on a Petition To List the Red Knot subspecies *Calidris canutus roselaari* as Endangered.	Notice of 90-day Petition Finding, Not substantial.	76 FR 304–311
1/19/2011	Endangered Status for the Sheepnose and Spectaclecase Mussels.	Proposed Listing Endangered	76 FR 3392–3420
2/10/2011	12-Month Finding on a Petition To List the Pacific Walrus as Endangered or Threatened.	Notice of 12-month petition finding, Warranted but precluded.	76 FR 7634–7679
2/17/2011	90-Day Finding on a Petition To List the Sand Verbena Moth as Endangered or Threatened.	Notice of 90-day Petition Finding, Substantial.	76 FR 9309–9318
2/22/2011	Determination of Threatened Status for the New Zealand-Australia Distinct Population Segment of the Southern Rockhopper Penguin.	Final Listing Threatened	76 FR 9681–9692
2/22/2011	12-Month Finding on a Petition To List *Solanum conocarpum* (marron bacora) as Endangered.	Notice of 12-month petition finding, Warranted but precluded.	76 FR 9722–9733
2/23/2011	12-Month Finding on a Petition To List Thorne's Hairstreak Butterfly as Endangered.	Notice of 12-month petition finding, Not warranted.	76 FR 9991–10003
2/23/2011	12-Month Finding on a Petition To List *Astragalus hamiltonii, Penstemon flowersii, Eriogonum soredium, Lepidium ostleri,* and *Trifolium friscanum* as Endangered or Threatened.	Notice of 12-month petition finding, Warranted but precluded & Not Warranted.	76 FR 10166–10203
2/24/2011	90-Day Finding on a Petition To List the Wild Plains Bison or Each of Four Distinct Population Segments as Threatened.	Notice of 90-day Petition Finding, Not substantial.	76 FR 10299–10310
2/24/2011	90-Day Finding on a Petition To List the Unsilvered Fritillary Butterfly as Threatened or Endangered.	Notice of 90-day Petition Finding, Not substantial.	76 FR 10310–10319
3/8/2011	12-Month Finding on a Petition To List the Mt. Charleston Blue Butterfly as Endangered or Threatened.	Notice of 12-month petition finding, Warranted but precluded.	76 FR 12667–12683
3/8/2011	90-Day Finding on a Petition To List the Texas Kangaroo Rat as Endangered or Threatened.	Notice of 90-day Petition Finding, Substantial.	76 FR 12683–12690
3/10/2011	Initiation of Status Review for Longfin Smelt	Notice of Status Review	76 FR 13121–13122
3/15/2011	Withdrawal of Proposed Rule To List the Flat-Tailed Horned Lizard as Threatened.	Proposed rule withdrawal	76 FR 14210–14268
3/15/2011	Proposed Threatened Status for the Chiricahua Leopard Frog and Proposed Designation of Critical Habitat.	Proposed Listing Threatened; Proposed Designation of Critical Habitat.	76 FR 14126–14207
3/22/2011	12-Month Finding on a Petition To List the Berry Cave Salamander as Endangered.	Notice of 12-month petition finding, Warranted but precluded.	76 FR 15919–15932
4/1/2011	90-Day Finding on a Petition To List the Spring Pygmy Sunfish as Endangered.	Notice of 90-day Petition Finding, Substantial.	76 FR 18138–18143
4/5/2011	12-Month Finding on a Petition To List the Bearmouth Mountainsnail, Byrne Resort Mountainsnail, and Meltwater Lednian Stonefly as Endangered or Threatened.	Notice of 12-month petition finding, Not Warranted and Warranted but precluded.	76 FR 18684–18701
4/5/2011	90-Day Finding on a Petition To List the Peary Caribou and Dolphin and Union Population of the Barren-Ground Caribou as Endangered or Threatened.	Notice of 90-day Petition Finding, Substantial.	76 FR 18701–18706
4/12/2011	Proposed Endangered Status for the Three Forks Springsnail and San Bernardino Springsnail, and Proposed Designation of Critical Habitat.	Proposed Listing Endangered; Proposed Designation of Critical Habitat.	76 FR 20464–20488
4/13/2011	90-Day Finding on a Petition To List Spring Mountains Acastus Checkerspot Butterfly as Endangered.	Notice of 90-day Petition Finding, Substantial.	76 FR 20613–20622
4/14/2011	90-Day Finding on a Petition To List the Prairie Chub as Threatened or Endangered.	Notice of 90-day Petition Finding, Substantial.	76 FR 20911–20918
4/14/2011	12-Month Finding on a Petition To List Hermes Copper Butterfly as Endangered or Threatened.	Notice of 12-month petition finding, Warranted but precluded.	76 FR 20918–20939
4/26/2011	90-Day Finding on a Petition To List the Arapahoe Snowfly as Endangered or Threatened.	Notice of 90-day Petition Finding, Substantial.	76 FR 23256–23265
4/26/2011	90-Day Finding on a Petition To List the Smooth-Billed Ani as Threatened or Endangered.	Notice of 90-day Petition Finding, Not substantial.	76 FR 23265–23271
5/12/2011	Withdrawal of the Proposed Rule To List the Mountain Plover as Threatened.	Proposed Rule, Withdrawal	76 FR 27756–27799

FY 2011 COMPLETED LISTING ACTIONS—Continued

Publication date	Title	Actions	FR pages
5/25/2011	90-Day Finding on a Petition To List the Spot-Tailed Earless Lizard as Endangered or Threatened.	Notice of 90-day Petition Finding, Substantial.	76 FR 30082–30087
5/26/2011	Listing the Salmon-Crested Cockatoo as Threatened Throughout Its Range With Special Rule.	Final Listing Threatened	76 FR 30758–30780
5/31/2011	12-Month Finding on a Petition To List Puerto Rican Harlequin Butterfly as Endangered.	Notice of 12-month petition finding, Warranted but precluded.	76 FR 31282–31294
6/2/2011	90-Day Finding on a Petition To Reclassify the Straight-Horned Markhor (*Capra falconeri jerdoni*) of Torghar Hills as Threatened.	Notice of 90-day Petition Finding, Substantial.	76 FR 31903–31906
6/2/2011	90-Day Finding on a Petition To List the Golden-Winged Warbler as Endangered or Threatened.	Notice of 90-day Petition Finding, Substantial.	76 FR 31920–31926
6/7/2011	12-Month Finding on a Petition To List the Striped Newt as Threatened.	Notice of 12-month petition finding, Warranted but precluded.	76 FR 32911–32929
6/9/2011	12-Month Finding on a Petition To List *Abronia ammophila, Agrostis rossiae, Astragalus proimanthus, Boechera (Arabis) pusilla,* and *Penstemon gibbensii* as Threatened or Endangered.	Notice of 12-month petition finding, Not Warranted and Warranted but precluded.	76 FR 33924–33965
6/21/2011	90-Day Finding on a Petition To List the Utah Population of the Gila Monster as an Endangered or a Threatened Distinct Population Segment.	Notice of 90-day Petition Finding, Not substantial.	76 FR 36049–36053
6/21/2011	Revised 90-Day Finding on a Petition To Reclassify the Utah Prairie Dog From Threatened to Endangered.	Notice of 90-day Petition Finding, Not substantial.	76 FR 36053–36068
6/28/2011	12-Month Finding on a Petition To List *Castanea pumila* var. *ozarkensis* as Threatened or Endangered.	Notice of 12-month petition finding, Not warranted.	76 FR 37706–37716
6/29/2011	90-Day Finding on a Petition To List the Eastern Small-Footed Bat and the Northern Long-Eared Bat as Threatened or Endangered.	Notice of 90-day Petition Finding, Substantial.	76 FR 38095–38106
6/30/2011	12-Month Finding on a Petition To List a Distinct Population Segment of the Fisher in Its United States Northern Rocky Mountain Range as Endangered or Threatened With Critical Habitat.	Notice of 12-month petition finding, Not warranted.	76 FR 38504–38532
7/12/2011	90-Day Finding on a Petition To List the Bay Skipper as Threatened or Endangered.	Notice of 90-day Petition Finding, Substantial.	76 FR 40868–40871
7/19/2011	12-Month Finding on a Petition To List *Pinus albicaulis* as Endangered or Threatened With Critical Habitat.	Notice of 12-month petition finding, Warranted but precluded.	76 FR 42631–42654
7/19/2011	Petition To List Grand Canyon Cave Pseudoscorpion	Notice of 12-month petition finding, Not warranted.	76 FR 42654–42658
7/26/2011	12-Month Finding on a Petition To List the Giant Palouse Earthworm (*Drilolerius americanus*) as Threatened or Endangered.	Notice of 12-month petition finding, Not warranted.	76 FR 44547–44564
7/26/2011	12-month Finding on a Petition To List the Frigid Ambersnail as Endangered.	Notice of 12-month petition finding, Not warranted.	76 FR 44566–44569
7/27/2011	Determination of Endangered Status for *Ipomopsis polyantha* (Pagosa Skyrocket) and Threatened Status for *Penstemon debilis* (Parachute Beardtongue) and *Phacelia submutica* (DeBeque Phacelia).	Final Listing Endangered, Threatened.	76 FR 45054–45075
7/27/2011	12-Month Finding on a Petition To List the Gopher Tortoise as Threatened in the Eastern Portion of Its Range.	Notice of 12-month petition finding, Warranted but precluded.	76 FR 45130–45162
8/2/2011	Proposed Endangered Status for the Chupadera Springsnail (*Pyrgulopsis chupaderae*) and Proposed Designation of Critical Habitat.	Proposed Listing Endangered	76 FR 46218–46234
8/2/2011	90-Day Finding on a Petition To List the Straight Snowfly and Idaho Snowfly as Endangered.	Notice of 90-day Petition Finding, Not substantial.	76 FR 46238–46251
8/2/2011	12-Month Finding on a Petition To List the Redrock Stonefly as Endangered or Threatened.	Notice of 12-month petition finding, Not warranted.	76 FR 46251–46266
8/2/2011	Listing 23 Species on Oahu as Endangered and Designating Critical Habitat for 124 Species.	Proposed Listing Endangered	76 FR 46362–46594
8/4/2011	90-Day Finding on a Petition To List Six Sand Dune Beetles as Endangered or Threatened.	Notice of 90-day Petition Finding, Not substantial and substantial.	76 FR 47123–47133
8/9/2011	Endangered Status for the Cumberland Darter, Rush Darter, Yellowcheek Darter, Chucky Madtom, and Laurel Dace.	Final Listing Endangered	76 FR 48722–48741
8/9/2011	12-Month Finding on a Petition To List the Nueces River and Plateau Shiners as Threatened or Endangered.	Notice of 12-month petition finding, Not warranted.	76 FR 48777–48788
8/9/2011	Four Foreign Parrot Species [crimson shining parrot, white cockatoo, Philippine cockatoo, yellow-crested cockatoo].	Proposed Listing Endangered and Threatened; Notice of 12-month petition finding, Not warranted.	76 FR 49202–49236
8/10/2011	Proposed Listing of the Miami Blue Butterfly as Endangered, and Proposed Listing of the Cassius Blue, Ceraunus Blue, and Nickerbean Blue Butterflies as Threatened Due to Similarity of Appearance to the Miami Blue Butterfly.	Proposed Listing Endangered Similarity of Appearance.	76 FR 49408–49412

FY 2011 COMPLETED LISTING ACTIONS—Continued

Publication date	Title	Actions	FR pages
8/10/2011	90-Day Finding on a Petition To List the Saltmarsh Topminnow as Threatened or Endangered Under the Endangered Species Act.	Notice of 90-day Petition Finding, Substantial.	76 FR 49412–49417
8/10/2011	Emergency Listing of the Miami Blue Butterfly as Endangered, and Emergency Listing of the Cassius Blue, Ceraunus Blue, and Nickerbean Blue Butterflies as Threatened Due to Similarity of Appearance to the Miami Blue Butterfly.	Emergency Listing Endangered Similarity of Appearance.	76 FR 49542–49567

Our expeditious progress also includes work on listing actions that we funded in FY 2010 and FY 2011 but have not yet been completed to date. These actions are listed below. Actions in the top section of the table are being conducted under a deadline set by a court. Actions in the middle section of the table are being conducted to meet statutory timelines, that is, timelines required under the Act. Actions in the bottom section of the table are high-priority listing actions. These actions include work primarily on species with an LPN of 2, and, as discussed above, selection of these species is partially based on available staff resources, and when appropriate, include species with a lower priority if they overlap geographically or have the same threats as the species with the high priority. Including these species together in the same proposed rule results in considerable savings in time and funding, when compared to preparing separate proposed rules for each of them in the future.

ACTIONS FUNDED IN FY 2010 AND FY 2011 BUT NOT YET COMPLETED

Species	Action
Actions Subject to Court Order/Settlement Agreement	
4 parrot species (military macaw, yellow-billed parrot, red-crowned parrot, scarlet macaw) [5]	12-month petition finding.
4 parrot species (blue-headed macaw, great green macaw, grey-cheeked parakeet, hyacinth macaw) [5]	12-month petition finding.
Longfin smelt	12-month petition finding.
Actions With Statutory Deadlines	
Casey's june beetle	Final listing determination.
6 Birds from Eurasia	Final listing determination.
5 Bird species from Colombia and Ecuador	Final listing determination.
Queen Charlotte goshawk	Final listing determination.
Ozark hellbender [4]	Final listing determination.
Altamaha spinymussel [3]	Final listing determination.
6 Birds from Peru and Bolivia	Final listing determination.
Loggerhead sea turtle (assist National Marine Fisheries Service) [5]	Final listing determination.
2 mussels (rayed bean (LPN = 2), snuffbox No LPN) [5]	Final listing determination.
CA golden trout [4]	12-month petition finding.
Black-footed albatross	12-month petition finding.
Mojave fringe-toed lizard [1]	12-month petition finding.
Kokanee—Lake Sammamish population [1]	12-month petition finding.
Cactus ferruginous pygmy-owl [1]	12-month petition finding.
Northern leopard frog	12-month petition finding.
Tehachapi slender salamander	12-month petition finding.
Coqui Llanero	12-month petition finding/ Proposed listing.
Dusky tree vole	12-month petition finding.
Leatherside chub (from 206 species petition)	12-month petition finding.
Platte River caddisfly (from 206 species petition) [5]	12-month petition finding.
3 Texas moths (*Ursia furtiva, Sphingicampa blanchardi, Agapema galbina*) (from 475 species petition)	12-month petition finding.
3 South Arizona plants (*Erigeron piscaticus, Astragalus hypoxylus, Amoreuxia gonzalezii*) (from 475 species petition).	12-month petition finding.
5 Central Texas mussel species (3 from 475 species petition)	12-month petition finding.
14 parrots (foreign species)	12-month petition finding.
Mohave Ground Squirrel [1]	12-month petition finding.
Western gull-billed tern	12-month petition finding.
HI yellow-faced bees	12-month petition finding.
OK grass pink (*Calopogon oklahomensis*) [1]	12-month petition finding.
Ashy storm-petrel [5]	12-month petition finding.
Honduran emerald	12-month petition finding.
Southeastern pop. snowy plover & wintering pop. of piping plover [1]	90-day petition finding.
Eagle Lake trout [1]	90-day petition finding.
32 Pacific Northwest mollusk species (snails and slugs) [1]	90-day petition finding.
42 snail species (Nevada and Utah)	90-day petition finding.
Spring Mountains checkerspot butterfly	90-day petition finding.
10 species of Great Basin butterfly	90-day petition finding.
404 Southeast species	90-day petition finding.
Franklin's bumble bee [4]	90-day petition finding.

ACTIONS FUNDED IN FY 2010 AND FY 2011 BUT NOT YET COMPLETED—Continued

Species	Action
American eel [4]	90-day petition finding.
Leona's little blue [4]	90-day petition finding.
Aztec gilia [5]	90-day petition finding.
White-tailed ptarmigan [5]	90-day petition finding.
San Bernardino flying squirrel [5]	90-day petition finding.
Bicknell's thrush [5]	90-day petition finding.
Chimpanzee	90-day petition finding.
Sonoran talussnail [5]	90-day petition finding.
2 AZ Sky Island plants (*Graptopetalum bartrami and Pectis imberbis*) [5]	90-day petition finding.
I'iwi [5]	90-day petition finding.
Humboldt marten	90-day petition finding.
Desert massasauga	90-day petition finding.
Western glacier stonefly (Zapada glacier)	90-day petition finding.
Thermophilic ostracod (Potamocypris hunteri)	90-day petition finding.
Sierra Nevada red fox [5]	90-day petition finding.
Boreal toad (eastern or southern Rocky Mtn population) [5]	90-day petition finding.
High-Priority Listing Actions	
20 Maui-Nui candidate species [2] (17 plants, 3 tree snails) (14 with LPN = 2, 2 with LPN = 3, 3 with LPN = 8)	Proposed listing.
8 Gulf Coast mussels (southern kidneyshell (LPN = 2), round ebonyshell (LPN = 2), Alabama pearlshell (LPN = 2), southern sandshell (LPN = 5), fuzzy pigtoe (LPN = 5), Choctaw bean (LPN = 5), narrow pigtoe (LPN = 5), and tapered pigtoe (LPN = 11)) [4].	Proposed listing.
Umtanum buckwheat (LPN = 2) and white bluffs bladderpod (LPN = 9) [4]	Proposed listing.
Grotto sculpin (LPN = 2) [4]	Proposed listing.
2 Arkansas mussels (Neosho mucket (LPN = 2) & Rabbitsfoot (LPN = 9)) [4]	Proposed listing.
Diamond darter (LPN = 2) [4]	Proposed listing.
Gunnison sage-grouse (LPN = 2) [4]	Proposed listing.
Coral Pink Sand Dunes Tiger Beetle (LPN = 2) [5]	Proposed listing.
Lesser prairie chicken (LPN = 2)	Proposed listing.
4 Texas salamanders (Austin blind salamander (LPN = 2), Salado salamander (LPN = 2), Georgetown salamander (LPN = 8), Jollyville Plateau (LPN = 8)) [3].	Proposed listing.
5 SW aquatics (Gonzales Spring Snail (LPN = 2), Diamond Y springsnail (LPN = 2), Phantom springsnail (LPN = 2), Phantom Cave snail (LPN = 2), Diminutive amphipod (LPN = 2)) [3].	Proposed listing.
2 Texas plants (Texas golden gladecress (Leavenworthia texana) (LPN = 2), Neches River rose-mallow (*Hibiscus dasycalyx*) (LPN = 2)) [3].	Proposed listing.
4 AZ plants (*Acuna cactus (Echinomastus erectocentrus var. acunensis*) (LPN = 3), Fickeisen plains cactus (*Pediocactus peeblesianus fickeiseniae*) (LPN = 3), Lemmon fleabane (*Erigeron lemmonii*) (LPN = 8), Gierisch mallow (*Sphaeralcea gierischii*) (LPN = 2)) [5].	Proposed listing.
FL bonneted bat (LPN = 2) [3]	Proposed listing.
3 Southern FL plants (Florida semaphore cactus (*Consolea corallicola*) (LPN = 2), shellmound applecactus (*Harrisia* (= *Cereus*) *aboriginum* (= *gracilis*)) (LPN = 2), Cape Sable thoroughwort (*Chromolaena frustrata*) (LPN = 2)) [5].	Proposed listing.
21 Big Island (HI) species [5] (includes 8 candidate species—6 plants and 2 animals; 4 with LPN = 2, 1 with LPN = 3, 1 with LPN = 4, 2 with LPN = 8).	Proposed listing.
12 Puget Sound prairie species (9 subspecies of pocket gopher (*Thomomys mazama* ssp.) (LPN = 3), streaked horned lark (LPN = 3), Taylor's checkerspot (LPN = 3), Mardon skipper (LPN = 8)) [3].	Proposed listing.
2 TN River mussels (fluted kidneyshell (LPN = 2), slabside pearlymussel (LPN = 2)) [5]	Proposed listing.
Jemez Mountain salamander (LPN = 2) [5]	Proposed listing.

[1] Funds for listing actions for these species were provided in previous FYs.
[2] Although funds for these high-priority listing actions were provided in FY 2008 or 2009, due to the complexity of these actions and competing priorities, these actions are still being developed.
[3] Partially funded with FY 2010 funds and FY 2011 funds.
[4] Funded with FY 2010 funds.
[5] Funded with FY 2011 funds.

We have endeavored to make our listing actions as efficient and timely as possible, given the requirements of the relevant law and regulations, and constraints relating to workload and personnel. We are continually considering ways to streamline processes or achieve economies of scale, such as by batching related actions together. Given our limited budget for implementing section 4 of the Act, these actions described above collectively constitute expeditious progress.

Hylaeus anthracinus, H. assimulans, H. facilis, H. hilaris, H. kuakea, H. longiceps, and *H. mana* will be added to the list of candidate species upon publication of this 12-month finding. We will continue to monitor the status of these species as new information becomes available. This review will determine if a change in status is warranted, including the need to make prompt use of emergency listing procedures.

We intend that any proposed listing action for the seven species of Hawaiian yellow-faced bees will be as accurate as possible. Therefore, we will continue to accept additional information and comments from all concerned governmental agencies, the scientific community, industry, or any other interested party concerning this finding.

References Cited

A complete list of all references cited in this document is available on the

Internet at *http://www.regulations.gov* and upon request from the Pacific Islands Fish and Wildlife Office (see **FOR FURTHER INFORMATION CONTACT**).

Authors

The primary authors of this notice are the staff members of the Pacific Islands Fish and Wildlife Office (see **FOR FURTHER INFORMATION CONTACT**).

Authority

The authority for this action is the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*).

Dated: August 22, 2011.

Daniel M. Ashe,

Director, U.S. Fish and Wildlife Service.

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