



**Monitoring for Arthropods (Insects
and Relatives) Occurring Within the
Kahului Airport Environs,
Maui, Hawa‘i, Phase II**

**Hawaii
Biological
Survey**

Final Report

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**MONITORING FOR TERRESTRIAL ARTHROPODS (INSECTS
AND RELATIVES) WITHIN THE KAHULUI AIRPORT ENVIRONS,
MAUI, HAWAI'I, PHASE II**

FINAL REPORT

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EXECUTIVE SUMMARY

This report presents the results of the second phase of a monitoring program to detect newly established alien species of arthropods (insects and their relatives) occurring within the environs of Kahului Airport, Maui. The monitoring survey was performed as part of the requirements of the Federal-State Alien Species Action Plan for the Kahului Airport, Maui (Pursuant to the Memorandum of Understanding signed August 1998.). The purposes of this project were (1) to detect newly established alien arthropods and certain other potentially invasive taxa; (2) to complement the Hawaii Department of Agriculture's quarantine program; (3) to continually update the list of taxa known to occur within the airport environs; and (4) to provide the resulting data to appropriate agencies. Fieldwork was conducted between June and November 2006. Fifteen different collection methods were employed, and nearly 200 samples were obtained. Two separate but complementary strategies were used to process the material: (1) to search for species new to the list of taxa known from the airport environs; and (2) to identify as many species as possible from representative samples of each collection method.

Over 100 species were added to the list of terrestrial arthropods occurring within the Kahului Airport environs. Of these, 83 are alien and include 31 new island records and 17 new state records. The additions bring the total number of species known from the area to 813. Of the total, 626 (77%) of the listed species are adventives; 52 (6%) were purposefully introduced; 95 (12%) are native to the islands; and 40 (5%) are of unknown status. These results corroborate the conclusions reached following the baseline and first monitoring surveys; that is, data on presence and distribution of arthropods in the state are surprisingly incomplete. The continuing high rate of discovery of additions to the list indicates that many additional species occur within the project area. However, many of the new island and state records are recent arrivals that have been intercepted soon after their establishment. These interceptions demonstrate that monitoring programs can be effective.

The increasing discovery of new species for the list also reflects the value of the list of species and associated voucher collection. One can quickly check whether or not an unknown arthropod is represented in the voucher collection. Recognizing and identifying interceptions rapidly is critically important in monitoring. To make monitoring more efficient, the next phase of the program should include the following objectives: (1) seek taxonomic expertise to identify the current unknowns; (2) continue to monitor for and add species to the list; and (3) Develop identification guides to streamline the identifications. The first two objectives will make the list and voucher collection more comprehensive, and the third will facilitate making identifications more swiftly and securely. It is proposed to make the identification guides developed under the latter web based where they would be accessible to quarantine personnel as well as others needing such information.

Of the collection methods employed, the malaise trap catches provide the most comprehensive assessment of the arthropod fauna with over 215 species recorded from a single trap. This represents over one quarter of the total fauna. The flies were best sampled with about one half the total fauna captured (85 out of 164). Some families of beetles and wasps were also well represented in the malaise trap catches. MV light collecting provides the best material for identification, especially for moths and fragile taxa, but it is limited by interference of urban lights and weather. Sticky traps were good for tiny wind-borne taxa, which are often poorly sampled because of their small size. However, handling sticky traps is a serious limitation. Host searches are required for sessile and some host-specific taxa.

Potential pest species detected include a new pentatomid stink bug (*Piezodorus* species) and an unidentified moth. Members of *Piezodorus* feed on legumes and some species are agricultural pests. In addition, the biting midge collected in 2000 has been identified as *Culicoides* species near *jamaicensis*. *Culicoides jamaicensis* and relatives are widespread in the Caribbean and South America, and some populations are pestiferous. The arrangement of sensory structures on females of the Hawaiian specimens suggests that this species feeds on birds. The 15 other new state records may also pose problems in the natural environment.

I. INTRODUCTION

In large biodiverse groups, such as insects, knowledge of what species occur within an area is basic to being able to detect newly established alien species. To fill this gap within the Kahului Airport environs on Maui, the staff of the Hawaii Biological Survey conducted an intensive survey of the terrestrial arthropods occurring there from August 1999 to August 2000 (Howarth et al. 2002). That survey found a total of 595 species of terrestrial arthropods, of which 58 were native to the islands, 490 were alien, and 47 were of unknown status. Of the alien species, 145 (~30%) represented new island records, and 38 (~8%) represented new state records. A similar percentage ($21/58 = 36\%$) of new records were found among the native species, even though these species have likely occurred naturally on Maui for millennia. The discovery that over one third of both the native and alien species of terrestrial arthropods found within the Kahului Airport environs were new records for the island of Maui was surprising and demonstrated how little is known concerning the distributions of arthropod species within the state. The survey also confirmed the daunting nature of the task of keeping track of such high biodiversity.

Following the initial baseline survey, a monitoring program was developed to detect additional newly established alien arthropods as well as add to the list of species known to occur within the Kahului Airport environs. Fieldwork for the first phase of the monitoring program ran from June to September 2003 and added 79 species to the list of terrestrial arthropods occurring within the Airport environs. Of these, 75 were alien and included 24 new island records and seven new state records. These additions brought the total number of species known from the area to 703. Of the total, 546 (78%) of the listed species were adventives; 48 (7%) were purposefully introduced; 74 (11%) were native to the islands; and 28 (6%) were of unknown status (Howarth & Preston 2006).

This report presents the results from the second phase of the monitoring program. The current monitoring program addresses the recommendations resulting from the baseline survey and first monitoring program. The objectives were (1) to detect newly established alien arthropods and certain other potentially invasive taxa; (2) to complement the Hawaii Department of Agriculture's quarantine program; (3) to continually update the list of taxa known to occur within the airport environs; and (4) to provide the data to appropriate agencies.

II. METHODS

II. A: THE AREA:

The area covered in this survey included all terrestrial habitats within the boundary of Kahului Airport, including the Airport Operations Area (AOA), the Kanaha Pond Wildlife Sanctuary, and neighboring areas. The airport property is located along the windward coast of Maui east of Kahului and west of Sprecklesville (**Figure 1**). The land area totals approximately 1447 acres (586 hectares), which originally contained the following natural habitats: sandy and rocky shorelines, strand, lowland shrub, lowland open dry forest with grass and shrub understory, and wetlands (Gagne and Cuddihy, 1990). The Kanaha Pond Wildlife Sanctuary contains about 235 acres (95 hectares) and is currently managed to promote native species. The sanctuary includes permanent ponds and associated seasonal wetlands, Keawe/mixed understory forest, and small areas of native and alien shrub lands. Urbanization and development of the airport has modified most of the area, and currently the airport environs contain the habitats and vegetation types listed below. The acreages given are modified from those given in the Final EIS (U.S. Department of Transportation, 1997) and are approximate as vegetation cover changes over time from succession and changes in land use.

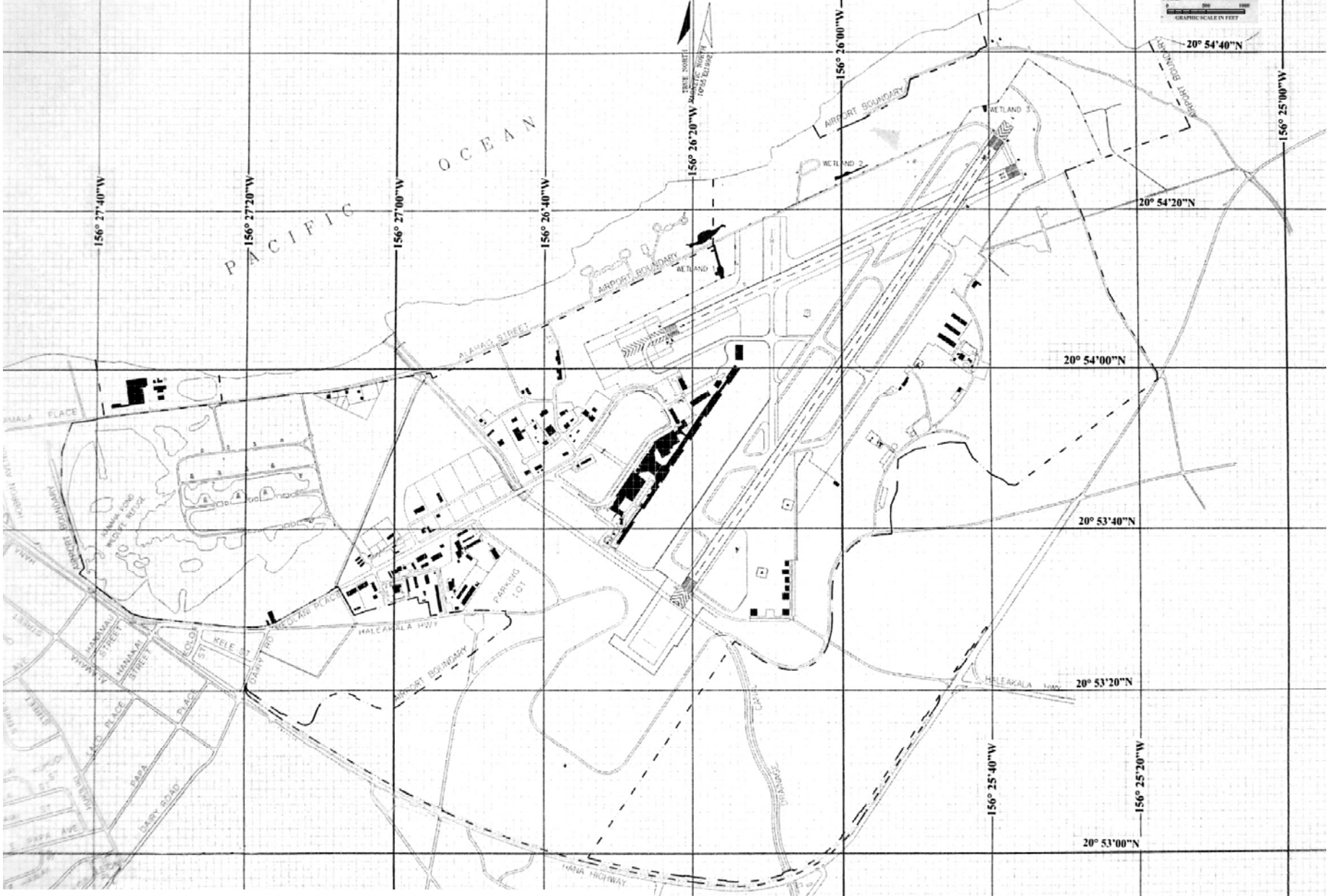


Figure 1. Map of the Kahului Airport environs. Map datum is Old Hawaiian.

II. B: HABITATS:

- Wind-sheared dune vegetation (including native strand and littoral habitats) (40 acres [16 hectares]).
- Keawe/mixed understory (265 acres [107 hectares]).
- Koa Haole shrub/mixed understory (121 acres [49 hectares])
- Open grassland (286 acres [116 hectares]).
- Cane fields and ruderal borders (258 acres [104 hectares]).
- Airfield (including the terminal, industrial and paved areas and ornamental plantings) (394 acres [160 hectares]).
- Kanaha Pond (water area) and wetlands (83 acres [34 hectares]).

II. C: FIELDWORK:

Four field trips from three to seven days duration to Kahului Airport were conducted between June and November, 2006. Each trip was scheduled to coincide with the period preceding the new moon to ensure a dark evening sky. A dark sky improves the results of night collecting. In addition, a malaise trap was set up and ran continuously from 18 July to 16 November in the keawe forest within the Airport Operations Area (AOA). The malaise trap was serviced at roughly monthly intervals by collaborators on Maui.

Approximately 150 samples were collected using a variety of methods; these are listed by method and alpha-numeric code in **Table 1**, along with their GIS coordinates. Incidental collections and host searches were also made while traveling on foot between and searching for new collection sites; these are also listed in **Table 1**. Nearly all major habitat types were been intensively sampled, including the keawe/mixed understory woodland, the margins of Kanaha Pond and other significant wetlands, former sugarcane fields and ruderal habitats, koa haole dominated scrub, wind-sheared vegetation, marine littoral habitats, roadside vegetation, and irrigated ornamental plantings and lawns. Portions of the airfield, terminal buildings, and paved industrial areas were also surveyed.

II. D: COLLECTING METHODS:

II. D1: *Gas Aspirator*

The principal method used was a gasoline-powered aspirator (vacuum pump), as this proved to be highly effective for sampling arthropods. The aspirator was worn as a backpack. A 5-inch (12.7 cm) diameter hose, which was fitted with an internal sock of fine mesh screen netting, was moved through and over vegetation and other suitable substrates. Arthropods were sucked into the net along with debris. Each sample consisted of a five to ten minute run over the chosen substrate. Most samples included a range of plant species and associated substrates within the area chosen, usually between about 25 to 50 square feet (2.3 – 4.6 m²). Often the vegetation could be sampled while walking along trails or roadways. Where host abundance or luxuriance was sufficient, samples from a single host plant species were collected. About 60 aspirator samples were collected and processed. Most were taken during daytime, but several samples were collected at night. After collection, each sample was secured inside its net-bag with a rubber band, sealed in an individual plastic bag with a label giving data on location, substrate, date and circumstances of collection. Samples were stored in a refrigerator until they could be processed. Samples were treated with a fumigant, and the arthropods sorted from the debris while still fresh with the aid of a 10 to 20 power binocular microscope. In this way, most specimens were retrieved and preserved in excellent condition for later identification. However, the method was too labor intensive to allow processing more than a few samples a day. A few groups had to be collected by other methods. These included fragile species (notably moths



Gas aspirator in operation
Photo by D.J. Preston, 2006

and butterflies) that were too damaged by the aspirator; sessile insects (such as scales and mealybugs), and those living inside the substrate that were not captured; and larger insects that could climb out of the net and escape during vacuuming. However, a surprising diversity of small wasps and flies came through the process in fine condition.

The gas aspirator has several advantages over other collecting methods. Importantly, the collections are relatively unbiased; that is, everything within its range is captured to be sorted later with the aid of a microscope. Also the efficiency is high and complements other methods because the hose can be placed over and even shoved into vegetation including spiny plants where nets and other devices cannot be used. One disadvantage is that the substrate and sample must be dry, as moisture clumps the sample and ruins the specimens.

II. D2: *Malaise Traps*

The malaise trap is an open-walled tent with baffles made of fine netting. The trap measured about eight feet high, 12 feet long and six feet wide. It was hung between keawe trees within the AOA. It captures mostly flying insects that enter the tent and become confused by the baffles. A funnel of netting at each end leads to a collecting canister. We found that a mixture of approximately equal parts 90 % ethanol and propylene glycol worked well for preserving insects for a month or more. Propylene glycol is relatively safe environmentally and diluted the alcohol to nonflammable levels.



Malaise trap
Photo by D.J. Preston, 2006

Malaise traps are excellent passive traps for monitoring the presence or activities of certain groups of insects. Dispersing insects that behaviorally try to go over obstacles (such as most wasps, flies and moths) can be sampled in a relatively unbiased manner. Some insects (especially some beetles and wasps) habitually go down, and malaise traps often miss these. Placement of the trap is important and can affect the catch. It is best to place the trap across a natural flyway.

II. D3: *Night Collecting*

Many insects are nocturnal and remain hidden during the day. This is especially true in drier lowland habitats, such as at Kahului Airport, because of the extreme desiccating environment during the daytime. We used headlamps for light and employed the same techniques at night as during the day. In addition, night collecting included shining either a 250-watt mercury vapor lamp (**MV-light**) on a white bed-sheet strung across insect flyways and collecting the arthropods attracted to the sheet. Specimens representing all species attracted to the light were collected individually into separate vials to obtain quality specimens for identification. The method is labor intensive and only one sample per night could be taken for a total of eight samples. The method is also sensitive to the locality, especially the presence of competing extraneous lights; thus we could not sample the whole area with this method. The light was run for a three- to four-hour period on two or three nights during each field trip. This method is generally good for collecting night flying insects and is one of the standard ways of surveying for moths. It is best done in a dark area and when no moon is in the sky, as the lights and moon glow compete with the light.



MV Bulb night collecting
Photo by H.M. Laederich, 2006

II. D4: *Fogging*



Fogging shrubs over white sheet
Photo by F. Starr, 2006

Dense foliage near the ground was fogged using a biodegradable pyrethroid insecticide “flea fogger.” A white plastic sheet (a shower curtain) about 6-feet square (3.3 m²) was laid on the ground, and the foliage above was fogged for 30 seconds. The stunned arthropods were collected off the sheet as they fell. The method provides a relatively unbiased sample of the species present that are vulnerable to the insecticide. It is the preferred method in vegetation not suitable for the aspirator such as plants with abundant loose dry seed heads that clogged the aspirator. Seven samples were taken.



Ant bait station
Photo by D.J. Preston, 2003

II. D5: *Ant Baits*

Since another ant survey was being conducted contemporaneously with our survey, we did not specifically search for them. Ants are usually monitored using small rapidly deployed bait stations. Cheap, wooden chopsticks work well. The bait is smeared on the chopstick, which is then left in suitable habitats for one to a few hours and retrieved. Common baits include peanut butter, honey, and canned fish-based cat food. The gas aspirator also proved to be effective for collecting most species present.

II. D6: *Bait Traps*

Bait traps were made from clear 2-liter soft drink bottles by cutting two 1-inch (2.54 cm) diameter holes on opposite sides about ½ way up from the bottom. A few ounces of ethanol propylene glycol mixture were added as a preservative, and bait (blue cheese, rotting mushrooms, or meat) was smeared or hung inside the holes above the preservative. The smelly bait attracted scavenging arthropods which fell into the preservative. Each trap was tied securely to a tree trunk and left in place for a few days or longer.



Bottle/bait trap
Photo by F.G. Howarth, 2007

II. D7: *Pan and trunk traps*

These traps are small flat, yellow-colored pans or plastic cups filled part way with soapy water and either laid on the ground (pan traps) or pinned to tree trunks (trunk traps). Pan traps and trunk traps are set out and run for two days or longer. Arthropods attracted to the traps drowned and were collected



II. D8: *Beetle trap (also called Lingren funnels)*



Lingren Funnels
Photo by D.J. Preston, 2001

Each beetle trap consisted of a set of eight plastic funnels about 10 inches (25 cm) in diameter fastened to nest about one inch (2.5 cm) apart. The bottom funnel emptied into a small jar with preservative (ethanol-propylene glycol mixture). The traps are hung next to tree trunks and left in place for a month or more. Insects attracted to tree trunks entered the gaps between the funnels and tumbled into the preservative. The traps are efficient for collecting wood-boring beetles as well as insects that migrate from the leaf-litter to the canopy. One trap was hung near the malaise trap site.

II. D9: *Tulgren funnel*

Leaf litter and soil arthropods are most efficiently collected with a Tulgren funnel, which is made with a large diameter funnel fitted with a jar containing a preservative at the bottom and a wire screen inside just below the rim. A sample of the substrate is placed on the screen, and the funnel loosely covered with a heat source (usually a low-wattage light bulb). As the substrate dries out over a few days, the arthropods move down into the funnel to escape and are captured in the jar. Tulgren funnel samples were collected in conjunction with other methods and were processed in the lab.



Berlese Funnel
Photo by D.J. Preston, 2001

II. D10: *Emergence Traps*

Material with insect damage (especially infested branches) was placed in screened cages and the insects captured as they emerged over the course of several weeks. Captured larvae were also reared to adults, by placing them in cages and providing them with their food. Material put in emergence traps was collected from potential hosts while traversing the study area

II. D11: General Collecting and Host searching

Substrates and plant hosts were also visually inspected for insects especially in conjunction with other survey methods or while walking between sites. An **insect sweep net** was used to capture specimens. Foliage was also sampled with a **beating sheet**, which is a 3-foot (0.3 m²) square of muslin stretched tight on a wooden frame. The sheet is held directly below foliage, like an inverted umbrella, and the foliage shaken. Dislodged arthropods are collected from the sheet. Locations for general collecting and host searching are listed in **Table 1**. Many additional specimens were captured incidentally while walking between sites.



D.J. Preston using hand aspirator and K. Starr with sweep net
Photo by H.M. Laederich, 2006

II. D12: Sticky traps

Sticky traps are bright yellow cardboard sheets covered with non-drying sticky adhesive. Traps are placed in trees, shrubs, and various habitat types. The yellow color is very attractive to many flying insects especially, aphids, thrips, true flies, and wasps. The sticky traps are often constructed with cardboard roofs to protect them from heavy rain and falling branches. Traps are recovered from the field and brought back to the laboratory for viewing and for specimen removal. This is a very labor-intensive technique however; many arthropods can be collected in a very short time. This method is very useful for monitoring in areas the have infrequent human traffic. Although specimens are not usually in pristine condition using this method, a sufficient percentage can be recovered for identification. Locations for sticky traps are listed in **Table 1**.



Kim Starr holding a sticky trap
Photo by D.J. Preston, 2006



Sticky trap hanging in Koa haole tree
Photo by F.G. Howarth, 2006

II. D13: Window Trap

Window traps take advantage of the behavior of many arthropods that drop to the ground when presented with an obstacle. Traditional designs use clear glass or plastic panels over trays containing a fluid preservative. We placed white elongate pans directly beneath the panels of the Malaise trap. The pans were filled to about 2” deep with ethanol-propylene glycol mixture. The fluid acts as preservative and is non-toxic to animals, however, chicken wire mesh was placed over the trays to prevent larger debris from entering and also prevent vertebrates from either drinking the fluid or stealing our catch.



Window trap utilizing the panels of the Malaise trap
Photo by D.J. Preston, 2006

II. D: LABORATORY WORK:

The collected specimens were sorted to separate each morphologically similar form (usually species), and representative specimens of each ‘morpho-species’ were appropriately mounted, labeled, and curated for identification. Larger insects were mounted on pins and stored dry. Many soft-bodied groups were collected and stored in ethanol, while the smaller species must be mounted on slides to be identified and preserved. Each morpho-species was identified as far as practical and sent to experts if available. All recognized morpho-species have been identified as far as possible. Some species could not be named and are indicated by letter (e.g., as species A). Some of these are species new to science (and therefore unnamed), and others belong to groups for which a qualified taxonomic authority who is able to identify species within the group is not currently available. Generally, morpho-species that could be identified to genus and securely separated from related species are listed as ‘identified’. About forty morpho-species, mostly tiny mites and insects, could not be so identified. Names and status follow Nishida (1997 and 2002), except where updated to include recent changes.

In processing the material, two separate but complementary strategies were used to fulfill the goals of this project: 1] to sort through the material searching especially for species new to the list; that is, monitor for new state and island records; and 2] to identify as far as possible all species within representative samples of each collection method. Both strategies are time-consuming especially given the large number of species involved. The first strategy directly addresses the main goal of the project, that is, to monitor for new alien organisms entering the state. The second strategy provides additional information on which methods are most effective at detecting new arrivals.

III. RESULTS

One hundred ten species were added to the list of terrestrial arthropods occurring within the Kahului Airport environs since Howarth and Preston (2006). The additions and name changes are annotated in **Appendix Table 2**, and the data are summarized in Text Table 1. The additions bring the total number of species known from the area to 813. The comprehensive list of all species is presented in **Appendix Table 3**. **Appendix Table 3** also includes the biogeographic status in Hawai'i of the listed species. The biogeographic data are summarized for each major taxonomic group in **Text Table 2**. Of the total, 626 (77%) of the listed species are adventives; 52 (6%) were purposefully introduced; 95 (12%) are native to the islands; and 40 (5%) are of unknown status.

III. A. Alien Species, Summary of New Records.

Eighty-three alien arthropod species were added to the list of species known to occur with the Kahului Airport environs (**Text Table 1**). Of these, 31 (37%) represent new island records, and 17 (20%) represent new state records. This brings the total recognized alien species to 678, of which 209 (31%) are new records for the island of Maui, and an additional 62 (9%) species are new records for the state (**Text Table 3**). The ratio of new records to total species is increasing somewhat compared to the ratios found during the baseline and first monitoring surveys; that is nearly 6 out ten for the current survey compared to about four tenths previously. In part, this reflects efforts to document new species to the list as well as the successful interception of recently established alien species. Specimen data validating the new state and island records are given in **Appendix Table 2**.

III. B. Overview of Native Species Collected.

Twelve native species were added to the list bringing the total to 95, including 85 endemic and 10 indigenous species. The biogeographic status for these is indicated in the list of taxa in **Appendix Table 3**, and the data summarized by major group in **Text Table 1 and 2**. A significant number (about four in ten) of the native species represent new records for Maui or new species. Since all of the native species, or at least the majority, have been on Maui for millennia, the new records corroborate the hypothesis that a significant lag time can occur between successful colonization of an alien species and its eventual discovery.

IV. Results of selected monitoring methods.

To provide additional information on which methods might be more effective at detecting new arrivals, all species in representative samples of selected collection methods were identified as far as possible. Because the process is time-consuming, a limited number of samples have been processed to date, but the results are informative. Collections processed include a malaise trap, a sticky trap, the moths from three MV bulb samples, and a partial enumeration of other arthropods in one of the MV bulb samples. The number of specimens noted refers to the confirmed identifications. For common species, there are often many additional specimens not counted. This exercise became feasible because the voucher collection is now sufficiently comprehensive to allow rapid identification of the majority of species.

IV.A. Malaise Trap

One malaise trap was set in keawe and koa haole woodland within the AOA on 18 July 2006. The contents were removed, and the fluid replenished twice, before the trap removed on 13 November 2006. Each sample was given its own collection number (**Appendix Table 1**).

All species of arthropods collected in the malaise trap sample KA-0171 which ran from 21 October to 13 November were identified as far as possible. The sample contained at least 215 species, of which 186 could be identified to species level **Appendix Table 4**. The unidentified material includes species in groups for which there is presently no expertise as well as immature specimens that cannot be unidentified at the present time. The total catch represents over one quarter (27%) of the total number of terrestrial arthropods known from the airport environs.

Text Table 1. Numbers of species of terrestrial arthropods added during this study to the list of species known to occur within the Kahului Airport environs.

Taxon	Native Species			Alien Species			Unknown #	
	#	New Spp.	New to Maui	#	Previously Recorded on Maui	New Island Records		New State Records
Arachnida (Spiders & relatives)	1	-	1	4	-	2	2	-
• Acari (Mites)	-	-	-	-	-	-	-	-
• Araneae (Spiders)	1		1	4	-	2	2	-
• Pseudoscorpionida (False scorpions)	-	-	-	-	-	-	-	-
• Scorpiones (Scorpions)	-	-	-	-	-	-	-	-
Insecta (Insects)	10	3	1	78	34	29	15	15
• Blattodea (Cockroaches)	-	-	-	1	1	-	-	-
• Coleoptera (Beetles)	-	-	-	8	1	7	-	8
• Collembola (Springtails)	-	-	-	-	-	-	-	-
• Dermaptera (Earwigs)	-	-	-	-	-	-	-	-
• Diptera (Flies)	5	2	1	32	14	10	8	3
• Embiidina (Webspinners)	-	-	-	-	-	-	-	-
• Hemiptera (True bugs & relatives)	3	1	-	8	3	3	2	-
• Hymenoptera (Bees & wasps)	?	-	-	22	11	7	4	4
• Isoptera (Termites)	-	-	-	-	-	-	-	-
• Lepidoptera (Moths & butterflies)	1	-	-	5	3	1	1	-
• Mantodea (Mantids)	-	-	-	-	-	-	-	-
• Neuroptera (Lacewings)	-	-	-	-	-	-	-	-
• Odonata (Dragonflies & damselflies)	-	-	-	-	-	-	-	-
• Orthoptera (Grasshoppers & crickets)	-	-	-	1	-	1	-	-
• Psocoptera (Bark lice)	1	-	-	1	1	-	-	-
• Siphonaptera (Fleas)	-	-	-	-	-	-	-	-
• Strepsiptera (Stylopids)	-	-	-	-	-	-	-	-
• Thysanoptera (Thrips)	-	-	-	-	-	-	-	-
• Thysanura (Silverfish)	-	-	-	-	-	-	-	-
• Trichoptera (Caddisflies)	-	-	-	-	-	-	-	-
Crustacea (Crabs & relatives)	1	-	-	-	-	-	-	-
• Amphipoda (Sandhoppers)	-	-	-	-	-	-	-	-
• Isopoda (Sow bugs & slaters)	1	-	-	-	-	-	-	-
Chilopoda (Centipedes)	-	-	-	1	1	-	-	-
• Scolopendromorpha (Giant centipedes)	-	-	-	-	-	-	-	-
• Geophilomorpha (Soil centipedes)	-	-	-	1	1	-	-	-
Diplopoda (Millipedes)	-	-	-	-	-	-	-	-
• Polydesmida (Flat-backed millipedes)	-	-	-	-	-	-	-	-
• Polyxenida (Bristly millipedes)	-	-	-	-	-	-	-	-
TOTALS	12	3	2	83	35	31	17	15

TEXT TABLE 2. Numbers and geographic status of species within the major arthropod groups collected within the Kahului Airport environs from August 1999 through November 2006 during the arthropod survey and monitoring programs.

Taxon	Total Species	ID Species	Geographic Status*				
			End	Ind	Pur	Adv	Unk
Arachnida (Spiders & relatives)	72	62	9	1		42	20
• Acari (Mites)	38	29	6	1	-	14	17
• Araneae (Spiders)	32	32	3	-	-	27	2
• Pseudoscorpionida (False scorpions)	1	-	-	-	-	-	1
• Scorpiones (Scorpions)	1	1	-	-	-	1	-
Insecta (Insects)	731	684	74	9	52	577	19
• Blattodea (Cockroaches)	11	11	-	-	-	11	-
• Coleoptera (Beetles)	165	158	8	2	22	130	3
• Collembola (Springtails)	5	3	2	-	-	2	1
• Dermaptera (Earwigs)	3	3	-	-	-	3	-
• Diptera (Flies)	164	150	25	4	6	125	4
• Embiidina (Webspinners)	1	1	-	-	-	1	-
• Hemiptera (True bugs & relatives)	102	95	8	-	2	86	6
• Hymenoptera (Bees & wasps)	131	116	6	-	15	105	5
• Isoptera (Termites)	3	3	-	-	-	3	-
• Lepidoptera (Moths & butterflies)	112	109	23	1	5	83	-
• Mantodea (Mantids)	2	2	-	-	-	2	-
• Neuroptera (Lacewings)	4	4	-	-	2	2	-
• Odonata (Dragonflies & damselflies)	4	4	-	2	-	2	-
• Orthoptera (Grasshoppers & crickets)	11	11	-	-	-	11	-
• Psocoptera (Bark lice)	7	7	2	-	-	5	-
• Siphonaptera (Fleas)	1	1	-	-	-	1	-
• Strepsiptera (Stylopids)	1	1	-	-	-	1	-
• Thysanoptera (Thrips)	2	2	-	-	-	2	-
• Thysanura (Silverfish)	1	1	-	-	-	1	-
• Trichoptera (Caddisflies)	2	2	-	-	-	2	-
Crustacea (Crabs and relatives)	6	5	1	-	-	4	1
• Amphipoda (Sandhoppers)	1	-	-	-	-	-	1
• Isopoda (Sow bugs & slaters)	5	5	1	-	-	4	-
Chilopoda (Centipedes)	2	2	-	-	-	2	-
• Geophilomorpha (Soil centipedes)	1	1	-	-	-	1	-
• Scolopendromorpha (Giant centipedes)	1	1	-	-	-	1	-
Diplopoda (Millipedes)	2	2	1			1	
• Polydesmida (Flat-backed millipedes)	1	1	-	-	-	1	-
• Polyxenida (Bristly millipedes)	1	1	1	-	-	-	-
All Arthropoda (Arthropods)	813	755	85	10	52	626	40
Percentage of total # species	100%	93%	10%	1%	6%	77%	5%

* Most unidentified species are included in the unknown category; however, a few belong to known native or alien groups and therefore, could be categorized. Also, the origins of a few identified species remain obscure, and these are listed under unknown. See Table 2.

End = endemic; Ind = indigenous; Pur = purposefully introduced; Adv = adventive; and Unk = unknown.

Text Table 3. Numbers of alien species representing new state records and new island records among the major arthropod groups collected within the Kahului Airport environs during the arthropod survey and monitoring programs from August 1999 through November 2006.

Taxon	Total # Alien Species	Previously Recorded on Maui	New Island Records	New State Records
Arachnida (Spiders & relatives)	42	16	22	4
• Acari (Mites)	14	5	7	2
• Araneae (Spiders)	25	10	15	2
• Pseudoscorpionida (False scorpions)	?	-	-	-
• Scorpiones (Scorpions)	1	1	-	-
Insecta (Insects)	630	382	185	59
• Blattodea (Cockroaches)	11	9	2	-
• Coleoptera (Beetles)	152	75	54	19
• Collembola (Springtails)	2	2	-	-
• Dermaptera (Earwigs)	3	3	-	-
• Diptera (Flies)	131	84	34	13
• Embiidina (Webspinners)	1	1	-	-
• Hemiptera (True bugs & relatives)	88	57	27	4
• Hymenoptera (Bees & wasps)	120	60	43	17
• Isoptera (Termites)	3	3	-	-
• Lepidoptera (Moths & butterflies)	88	63	21	4
• Mantodea (Mantids)	2	2	-	-
• Neuroptera (Lacewings)	4	4	-	-
• Odonata (Dragonflies & damselflies)	2	2	-	-
• Orthoptera (Grasshoppers & crickets)	11	8	3	-
• Psocoptera (Bark lice)	5	3	1	1
• Siphonaptera (Fleas)	1	1	-	-
• Strepsiptera (Stylopids)	1	1	-	-
• Thysanoptera (Thrips)	2	2	-	-
• Thysanura (Silverfish)	1	-	1	-
• Trichoptera (Caddisflies)	2	2	-	-
Crustacea (Crabs & relatives)	4	3	1	-
• Amphipoda (Sandhoppers)	?	-	-	-
• Isopoda (Sow bugs & slaters)	4	3	1	-
Chilopoda (Centipedes)	2	2	-	-
• Geophilomorpha (Soil centipedes)	1	1	-	-
• Scolopendromorpha (Giant centipedes)	1	1	-	-
Diplopoda (Millipedes)	1	1	-	-
• Polydesmida (Flat-backed millipedes)	1	1	-	-
• Polyxenida (Bristly millipedes)	-	-	-	-
Alien Arthropoda (Arthropods)	678	407	209	62
Percentage of total # of alien species	100%	60%	31%	9%

IV.A. Malaise Trap (continued)

Several conclusions can be deduced from the results. First, malaise traps are excellent for sampling the true flies (Diptera). Eighty-five species were found in the sample, including 32 species that are new; that is, four new state records, eleven new island records, and 17 additions to the list. This single malaise trap sample contained over one half of the total number of species of flies currently known from the airport environs.



Malaise trap in place
Photo by DJ Preston

Other groups were less well represented. For some groups, this was expected. Studies elsewhere have shown that many wasps (Hymenoptera) and beetles (Coleoptera) avoid entering malaise traps, which may explain the relatively low catches in these orders. At least 36 species of wasps were found. These included seven species new to the list and three possible new state records. This total represents about one quarter (28%) of the species of wasps known to occur within the airport environs. Only 24 species of beetles were captured, including five new to the list. This represents about 15% of the airport environs beetle fauna.

Only 18 species of moths (Lepidoptera) were collected. The low catch of moths was somewhat surprising, especially since the moths made up about 90% of the volume of the catch. However, most of the mass consisted of 50 to more than 100 specimens each of just three species of large moths: *Anacamptodes fragilaria*, *Macaria abydata*, and *Melipotis indomita*. The first two species feed on koa haole, and the third feeds on keawe, reflecting the local dominant flora. Five, or possibly more, tiny species have not been identified because the fluid has obscured the characters normally used to distinguish them. However, if properly mounted and identified voucher specimens are available for comparison, most species of Hawaiian moths can be identified even if preserved in fluid.

IV.B. Sticky Traps

Sticky traps provide a relatively unbiased sample of smaller arthropods being carried on the wind, sometimes called “aerial plankton.” Larger flying insects can avoid the traps unless attracted by the color or presence of prey or food. Moths and some hairy species escape because the scales or hairs keep the animals from being ensnared. Baiting the traps with pheromones or other attractants can increase their efficiency for monitoring for certain species. Thirty-four sticky traps were placed in a variety of habitats and retrieved after three months (**Table 1**). About five traps were lost to the elements, and the labels lost for a few. Also, some became detached and lost their effectiveness after becoming covered with debris on the ground. However, most traps remained effective and captured an interesting array of species. The 28 species identified from trap number KA-0265 are listed in **Appendix Table 5**, and a portion of the catch is illustrated below. Two new state records, one new island record, and two species new to the list were collected. In addition, some of the unidentified wasps may represent new records. The coniopterygid is rarely collected. Except for the mess required to process the material, the method is excellent for collecting tiny species missed in other survey techniques.

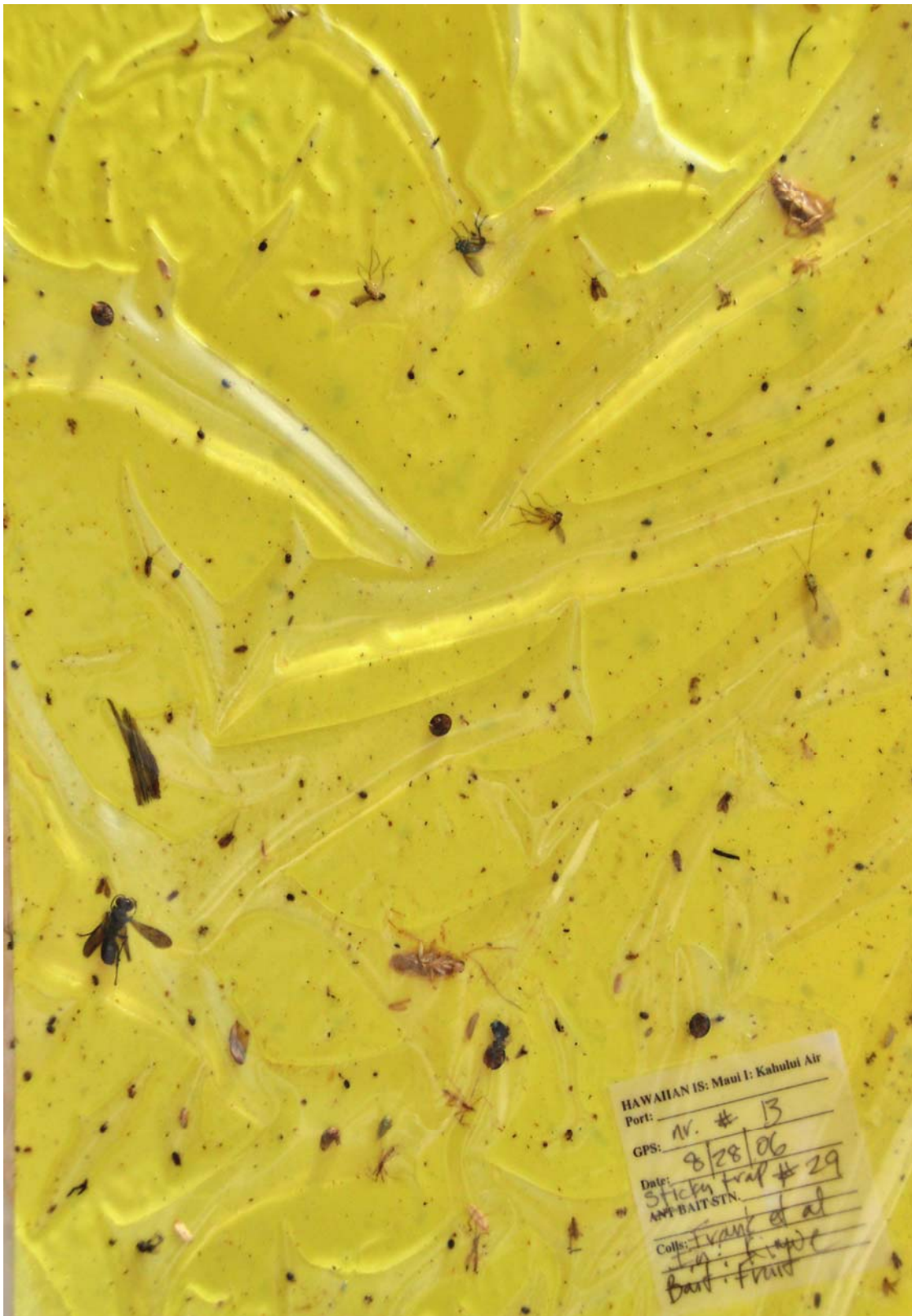


Figure Sticky trap. A portion of sticky trap number KA-0265. See Appendix Table 5 for the list of species present.

IV.C. MV Bulb

The MV bulb and sheet was set up on 6 different evenings in 2006 and monitored for arthropods from sunset to at least 10 pm and occasionally to midnight. Site descriptions are given in **Table 1**. Because moths are best collected by this method, these are listed separately in **Appendix Table 6** for two evenings: KA-068 and KA-0169.

Appendix Table 7 lists the moths as well as selected other taxa that have been identified from sample number KA-0170. Sixteen species of moths were collected at KA-0168; 25 species at KA-0169, and 20 species at KA-0170.

The number of species for the three collections combined is 35 or nearly one third of the total lepidopteran diversity within the airport environs ($35/112 = 31\%$). No new records of moths were found, but one individual of the endangered sphinx moth was seen and photographed at KA-0170. Sixty-six arthropods other than moths have been identified from KA-0170 (**Appendix Table 7**), but many additional species of flies and wasps await further study. Thirty-two species of beetles were found, including one new island record. Three additional species were added to the airport fauna: two flies and a true bug. The number of species collected may have been reduced by the competition from the airport and urban lights. Our MV collections were scheduled on moonless nights and sited to minimize light interference.



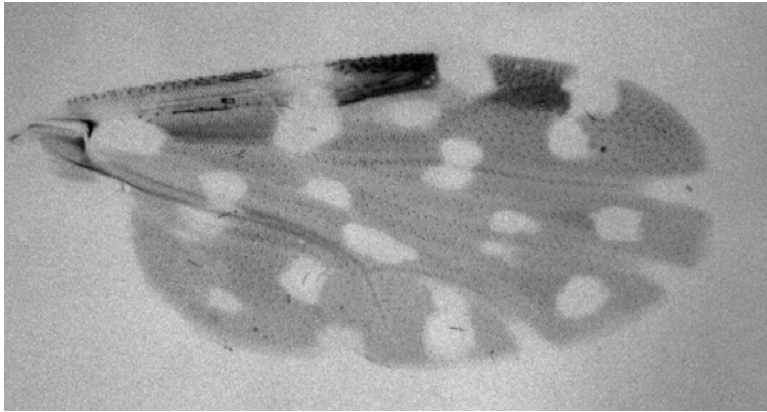
Aspirating specimens from the sheet. Note the moths also present.
Photo by DJ Preston

A significant advantage of the method is the ability to obtain excellent specimens that facilitate identification. This is especially true for the moths, certain hairy flies, and fragile insects that do not preserve well in fluid. Even the fluid preserved material is often in good condition because each specimen is collected directly off the sheet. The method can be biased in that rare species can be overlooked amongst individuals of the more abundant species. Ideally, the method requires sufficient knowledge of the fauna to judiciously collect appropriate specimens that represent all taxa present. The obverse strategy is to try to collect everything, but this method taxes resources for processing and identification, which can lead to poorer material. We compromised between these two extremes but preferred the former strategy.

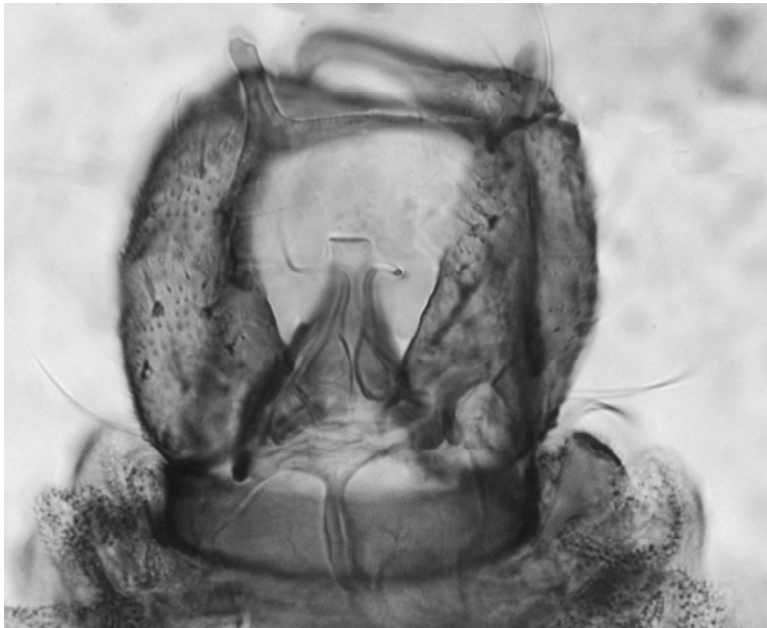
V. Notable interceptions

V.A. Biting midge, *Culicoides* cf. *jamaicensis* Edwards (Diptera: Ceratopogonidae)

The discovery of additional specimens of the potentially pestiferous species of *Culicoides* in Honolulu this spring has provided the opportunity for more precise determination of the name, source, and biology. The Hawaiian specimens closely match *Culicoides jamaicensis* Edwards, and are either this species or a closely related one. *C. jamaicensis* is widespread on Caribbean islands and Central America. Closely related species occur from the southern US to tropical South America. The known breeding habitats for the group include rotting cactus and other rotting woody plant material, as well as in tree holes. Two members of the group have been introduced outside their natural range: *C. loughnani* Edwards, 1922, to Australia and *C. paolae* Boorman, 1996 (= *C. jamaicensis*?) to Italy. Both of these are thought to have been moved inadvertently in rotting cactus (Meiswinkel et alia, 2004). A few species in the group are troublesome biters of humans, but the feeding habits of most species are unknown. Hawaiian females have well developed mouthparts that capable of taking a blood meal. They also have sense organs (sensilla coeloconica) on all antennal segments (flagellomeres) from 3-15. This pattern of sensilla suggests that this species prefers to feed on birds.



Culicoides cf. *jamaicensis*, Female wing



Culicoides cf. *jamaicensis*, Male genitalia

V.B. Stink bug, *Piezodorus* sp. (Heteroptera: Pentatomidae)

Two specimens of a pentatomid stink bug new to Hawai'i were found, one by fogging (KA-0022) and one by sticky trap (label lost). The genus *Piezodorus* is widespread in the tropics and subtropics. The Hawaiian specimens superficially match a S. Pacific species: *P. grossi* Staddon, but a firm identification will require a specialist. The host range of the Hawaiian species is unknown but species elsewhere prefer legumes. A few species are pestiferous.



Piezodorus species, male

V.C. Mystery moth (Lepidoptera)

A single specimen of an unknown moth was collected while searching an ornamental *Hibiscus* hedge at night (KA-0020). A second specimen was later found on O'ahu. We have not been able to identify the species and include a picture here to alert others to watch for it.



Unknown moth, wingspan is 1.3 cm.

VI. Taxonomic Overview and Protocols for Monitoring for Alien Arthropods

Although survey methods have been developed to collect large numbers of specimens, the great diversity of both body forms and lifestyles of arthropods makes developing general monitoring strategies to detect newly established invasive species especially daunting. Each taxonomic group usually requires the use of one or more specialized techniques to sample the species occurring in an area. Even closely related species respond differently to the same trap or collecting method. Many species require a specific method used at the right time and in the right habitat. Nevertheless, general collecting techniques can be used to sample a wide variety of arthropods. In this section, we

describe a set of useful sampling techniques for each major group of arthropods found within Kahului Airport boundary.

Class ARACHNIDA (Mites, spiders, and relatives)

Order Acari: The mites are a large diverse group of mostly tiny arthropods (0.5-3 mm long). Many species are easily dispersed, both through human activities and by natural means. There about 670 species in Hawai'i, of which about ¼ are native, but many are of unknown status. Being small and cryptic, they are relatively poorly known. Thirty-eight species occur within the airport boundary, of which seven are native, 14 are adventives, and 17 are of unknown status. They include predators, scavengers, herbivores, and parasites. Some species are believed to be invasive in Hawai'i, but except for agricultural pests, their impacts remain poorly documented. Their great diversity of both numbers of species and behavior makes monitoring for new arrivals very difficult. Furthermore, species identification generally requires taxonomic specialists. Monitoring methods include Tullgren funnel extraction, gas aspirator, and visual inspection of infested hosts. Most of the known invasive alien species were first detected only after their damage became conspicuous and reported. No new records were added in the current monitoring program.

Order Araneae: More than 225 species of spiders are recorded from Hawai'i, of which more than half are native. All spiders are predatory on invertebrates, and some appear to be invasive. We identified an additional five species during the monitoring program, bringing the total known from the airport to 32, of which only three are native. Many spiders are conspicuous and new aliens are likely to be reported. However, all of the newly listed spiders are new records for Maui. Monitoring techniques include beating or fogging vegetation, searching likely habitats (especially at night), gas aspirator, malaise traps, and Tullgren funnel extraction.

Order Pseudoscorpionida: Pseudoscorpions are small scorpion-like animals but lack the tail and sting. Seventeen species are recorded from Hawai'i; all but two are native. They are predaceous on small arthropods. No species is known to be invasive. However, they are cryptic, and therefore, their effects may go unnoticed. One unidentified species is known from the study area. The airport specimens were collected in gas aspirator and window trap samples. Other sampling methods include Tullgren funnel extraction, Lindgren funnel trap, and visually searching suspected habitats.

Order Scorpiones: Only one scorpion is established in Hawai'i. This is the lesser brown scorpion, which has been spread worldwide by humans. Collecting methods include searching suspected habitats especially at night. The integument of some species glows in ultraviolet light making them conspicuous. Most species have cryptic behaviors, but their sting's reputation and distinctive body form persuade the public to report unusual sightings.

Class INSECTA (Insects)

The insects are the most diverse group of organisms in Hawai'i with about 8100 species, of which about 5400 are native and 2700 are alien. We added 105 species to the known fauna of the airport area. In addition, 11 names were revised due to name changes or re-identifications (**Table 2**). Currently, 728 insect species are listed from Kahului Airport, of which 82 are native, 621 are alien, and 25 are of unknown status. Monitoring methods are described for each order.

Order Blattodea: Cockroaches are familiar animals to everyone, since many species are important household pests. There are 19 species in Hawai'i, all aliens. One additional species was collected during the monitoring program, bringing the number occurring within the airport environs to 11. Populations of some species were very low at the airport, probably due to the dry conditions. Monitoring techniques include beating or fogging vegetation, searching likely habitats especially at night, gas aspirator, bait traps, Malaise traps, and sifting litter.

Order Coleoptera: Beetles comprise the largest order of insects and are represented in Hawai'i by over 2000 species, including nearly 1400 native species and over 600 alien species. We added 16 species to the list, bringing the number of beetles known from the airport environs to 165. Of these ten are native, 152 are alien, and three are of unknown status.

The habits of beetles are diverse; the group includes many important agricultural, environmental, and household pests. They are often among the dominant herbivores, predators, and scavengers in most terrestrial and freshwater habitats. Monitoring methods are as diverse as the order. The more effective methods include beating vegetation,

Lindgren funnels, gas aspirator, malaise traps, light traps, window pane traps, bait traps, sifting litter, fogging, emergence traps, pitfall traps and Tullgren extractions. Many of the new island records have been in Hawai'i for several decades, and a few have probably have been on Maui for a long time but not previously recorded.

Order Collembola: Springtails are small (1 to 5 mm long), primitive 6-legged arthropods without wings that traditionally have been placed with the insects, but they belong to a separate group. They usually live in moist or protected habitats and are sometimes abundant in leaf litter where they feed on microorganisms and rotting organic material. A few are predators on soft-bodied prey. There are about 170 species in Hawai'i, of which nearly 100 are considered native. No new records were found in the current survey. Monitoring methods include Tullgren extractions, sifting litter, pitfall traps, fogging, and gas aspirator.

Order Dermaptera: Earwigs are a small order related to the cockroaches and grasshoppers. The pincers or forceps at the hind end make the group easily recognizable. Most are omnivores, feeding on a wide range of food, including being opportunistic predators. Some catch their prey with the pincers. Only 24 species are known in Hawai'i; ten of them are native. Three alien species are known from the airport area. No additional species were found during the monitoring program. They were uncommon, which probably was a result of the drought. Monitoring methods include visual searching in suspected habitats, sifting litter, pitfall traps, fogging, gas aspirator, light traps, and, Tullgren funnel extractions.

Order Diptera: Flies have only one pair of wings for flight. This is a large, diverse order and the second largest in Hawai'i with 1450 species, of which about 1075 are native. The group includes many notorious agricultural and public health pests as well as many beneficial species. Forty names were added to the list of species known from the study area, but four of these are revised names of previously listed species. The total number of species of flies known from the airport surroundings is now 164. Of these 131 are alien; 29 are native; and four remain uncategorized. The 25 alien species added include 18 new records for Maui. As with other groups, some of the new records may have been on Maui for a long time. Eight new state records were found. An unidentified non-biting midge was abundant near wet spots at the airport. It probably has similar habits as the related *Chironomus hawaiiensis*, which is a native species. Four new biting midges were added to the list. Two of these are considered native. The adults of the two alien species visit flowers and do not bite. The potentially invasive biting midge *Culicoides* cf. *jamaicensis* Edwards was not recollected during this survey, but additional specimens have been found on O'ahu, making it possible to identify the species.

Monitoring methods for flies include Malaise traps, light traps, bait traps, emergence traps, pan traps, sweeping with net, and fogging. Most active species readily enter Malaise traps, and this method is often used to sample species in an area. Chemical lures and specific baits have been developed to sample certain pest species. Their ability to attract numbers of individuals of certain species that otherwise are at undetectable levels underscores the difficulty of monitoring for unspecified invasive species.

Order Embiidina: The webspinners are a small order of grasshopper relatives. Adults have two pairs of similar wings and resemble termites, and like termites most build nests under bark or in wood. Unlike termites, they have specialized silk glands on the front legs with which they build their silken nests. One alien species is common in lowland habitats in Hawai'i, and it was relatively common in keawe forest habitat. It is usually encountered by searching under bark and similar protected habitats. Occasionally, adults come to light and malaise traps. Embiids are not known to be invasive and therefore are currently low priority for monitoring.

Order Hemiptera: Suborder Heteroptera: True bugs are a large diverse order that includes many predatory and plant-feeding species, many of which are potentially invasive. Five species, including two new island records and two new state records, were added to the list bringing the total number of alien true bugs known from the airport environs to 48. The new stink bug, *Piezodorus* sp. is potentially invasive and is described in section V.C.

General insect collecting methods are highly effective for surveying the presence of a broad range of species of true bugs. These methods include sweep netting, beating sheet, fogging, gas aspirator, Malaise and light traps, and sifting litter. To detect some species, inspection of hosts for feeding damage is necessary. Females of many species glue their eggs on or in plant tissue, and can be transported easily with their hosts.

Order Hemiptera: Suborder Homoptera: All homopterans are plant feeders, and the group includes the plant and leafhoppers, plant lice, cicadas, aphids, mealy bugs, and scales. Many species are extremely damaging to their host plants, and therefore, most alien species are potentially serious invasives. Three species were added to the list bringing the total number alien species to 40. Two additions are whiteflies, which were recently detected by investigating damage to their host plants. The other interception is an unidentified *Cedusa* species. The latter appears to be the same as the unidentified species recorded from O'ahu. *Cedusa* species are often associated with palms. The nymphs live in rotting debris and are thought to feed on fungi. The adults feed on palm foliage and are suspected of transmitting disease.

The principal method for monitoring most homopterans host searching, especially looking for damage. The mobile species can be collected by sweep net, gas aspirator, fogging, and malaise and light traps, but often, host information and additional life stages are necessary for identification. Many species are cryptic and difficult to detect, but their feeding damage can make them more conspicuous. Their eggs are often inserted into host plant tissue and thereby often escape detection. Infested host plants often show disease symptoms and subsequently reported by the public.

Order Hymenoptera: The bees and wasps comprise the third largest order occurring in the study area, currently with 131 species, of which 120 are alien. The group includes many predators, parasites, plant feeders, and nectar and pollen feeders. We added 26 species to the list, but a few family groups remain unstudied due to the untimely death of our collaborator Dr. J.W. Beardsley.

Monitoring methods are as diverse as the order. Malaise traps capture many species, but some forms habitually move downwards when encountering an obstruction. These can be collected by placing pans with preservative beneath the malaise baffles; these modified pan traps are called window traps. Other effective monitoring strategies include sweeping and fogging vegetation, gas aspirator, collecting at lights, and rearing from their hosts. Ants and a few other groups are sampled using baits. Large or conspicuous species are noticed and reported by the public, especially if they sting.

Order Isoptera: Only five alien species of termites are known from Hawai'i, but one, the subterranean termite, is the single most damaging arthropod pest in the state. Three species are known from the airport environs. Termites are social insects and live in colonies within wood or underground. During most of their life they remain cryptic. The adults swarm at night and readily come to lights; thus light traps and malaise traps are effective for monitoring. However, swarms are seasonal, and any incipient invasion must attain a large population to be detected.

Order Lepidoptera: Moths and butterflies represent the fourth largest order of insects with 112 species currently known from the airport area. We added five species, four alien and one native, to the list. Nearly all Lepidoptera are plant feeders or scavengers, and the group includes many invasive species. We did not re-collect the South Pacific garden looper, *Ctenopplusia albostrigata*, but the species is established as additional specimens have been collected outside the airport environs on East Maui.

Monitoring for butterflies, which are often conspicuous day-flying insects, has historically relied on public reporting, as nearly all the recent arrivals have been detected that way. Moths are nocturnal and often cryptic. Most species readily come to lights and also readily captured in malaise traps; thus these two methods are the standard for the order. Host inspection and rearing larvae have been used when new damage is noted. Fogging, beating sheet, sweeping, gas aspirator, and sifting litter capture many larvae, but these are difficult to identify and often in poor condition to rear.

Order Mantodea: Preying mantids are all predatory and usually assumed to be beneficial, but they are generalists, and can impact populations of other beneficial species. Monitoring methods include malaise traps, fogging, beating sheet, sweeping, and gas aspirator. Only two of the seven alien species recorded from Hawai'i have been detected at the airport.

Order Neuroptera: Lacewings are predators on small arthropods, and three of the four alien species found have been used in biocontrol programs. The fourth, the tiny dusty-wing, is rarely collected, but the gas aspirator proved effective for detecting it. In addition to the gas aspirator, monitoring methods for neuropterans included malaise and light traps and beating and sweeping vegetation.

Order Odonata: Damselflies and dragonflies are predatory both as the aquatic nymphal stages and as adults. Adults capture prey in flight, and generally avoid entering traps or getting caught. Monitoring methods for adults are limited to visual searches, especially around potential breeding sites. Immatures can be captured using aquatic insect survey methods. The adults are strong-flying, large conspicuous insects and are therefore noticed by the public.

Order Orthoptera: Grasshoppers, crickets and allied groups have diverse habits. Most are herbivorous or omnivorous, while a few are primarily predaceous. Some species are notorious invaders. The males of most species produce audible mating songs, which can be used in detection surveys. Other monitoring methods include the use of baits, sweeping vegetation, and gas aspirator. A few specimens are also caught by fogging and in malaise, light and pan traps. We added one species of katydid to the list bringing the total to 11.

Order Psocoptera: Bark lice are generally small, usually less than one-half inch in length, and cryptic. Nevertheless they are often abundant in both numbers and species in most forest habitats. Except for a few household pests, they are not known to be invasive, but their habits are little known. Two species were added to the list, but several additional species await identification. The invasive nuisance species of *Archipsocus*, reported in 2006, was not recollected. Monitoring methods include host searches, beating vegetation, fogging, sifting, and gas aspirator.

Order Siphonaptera: The fleas are all blood sucking parasites of vertebrates, and therefore, monitoring methods include searching their hosts and inspection or making a tullgren extraction of their hosts' nesting or roosting sites. The fleas were outside the scope of this study.

Order Strepsiptera: The twisted-winged insects are a small order of strange creatures that are all parasitic on other insects. Females usually remain with their hosts, and monitoring methods would include capturing and examining hosts. Males are occasionally caught in malaise and light traps and in the gas aspirator.

Order Thysanoptera: The thrips are a large order of mostly small insects with feather-like wings. Most are plant-feeding and some of these are notorious agricultural and environmental pests. A few are predatory. Monitoring includes searching (especially wilted or diseased hosts), beating, fogging, and aspirating vegetation.

Order Thysanura: The silverfish are a small order of primitive insects. Except for a few household pests, they are not known to be invasive. They are scavengers and omnivores in soil, leaf litter, and nests of animals. Monitoring methods include sifting litter, tullgren funnel extraction, and examining nests of hosts.

Order Trichoptera: The caddisflies are aquatic as larvae, where they feed on algae and rotting organic matter. They can attain large population densities and therefore affect the ecology of invaded habitats. Monitoring for larvae entails aquatic insect survey methods. Adults enter malaise traps and come to lights. Also effective is fogging, sweeping beating, and aspirating their resting places in vegetation along margins of water bodies.

Class CRUSTACEA: (Crabs & relatives)

Three orders of crustaceans include terrestrial species, but one, the crabs (Decapoda) was outside the scope of this survey. Terrestrial members of the other two, the sandhoppers (Amphipoda) and sowbugs and pillbugs (Isopoda) have similar habits and are treated together. Both groups are primarily ground dwelling; thus monitoring methods focus on this habitat. Pitfall traps, baits, tullgren funnel extraction, sifting litter, and gas aspirating low vegetation are effective.

CLASS CHILOPODA: (Centipedes)

The centipedes are all predaceous and live primarily on or in soil. Monitoring methods are the same as described for the Crustacea.

CLASS DIPLOPODA: (Millipedes)

The millipedes are scavengers and plant feeding. A few invasive pests are known to damage plants. They live primarily in leaf litter and in soil. Monitoring methods are the same as described for the Crustacea.

VII. DISCUSSION

This report represents the completion of the second phase of monitoring for newly arriving arthropods within the Kahului Airport environs. One hundred ten species were added to the list bringing the total to 813. The 15% increase continues the trend for new records in the first monitoring report (**Figure 2**). The increase reflects the discovery of both additional common species already present and the interception of recent arrivals. Although the high diversity of the fauna hinders the discovery of additions, the development of a working voucher collection and associated documentation for all listed species has greatly facilitated the process. New species will continue to be found. Many more species both native and alien are expected to occur there.

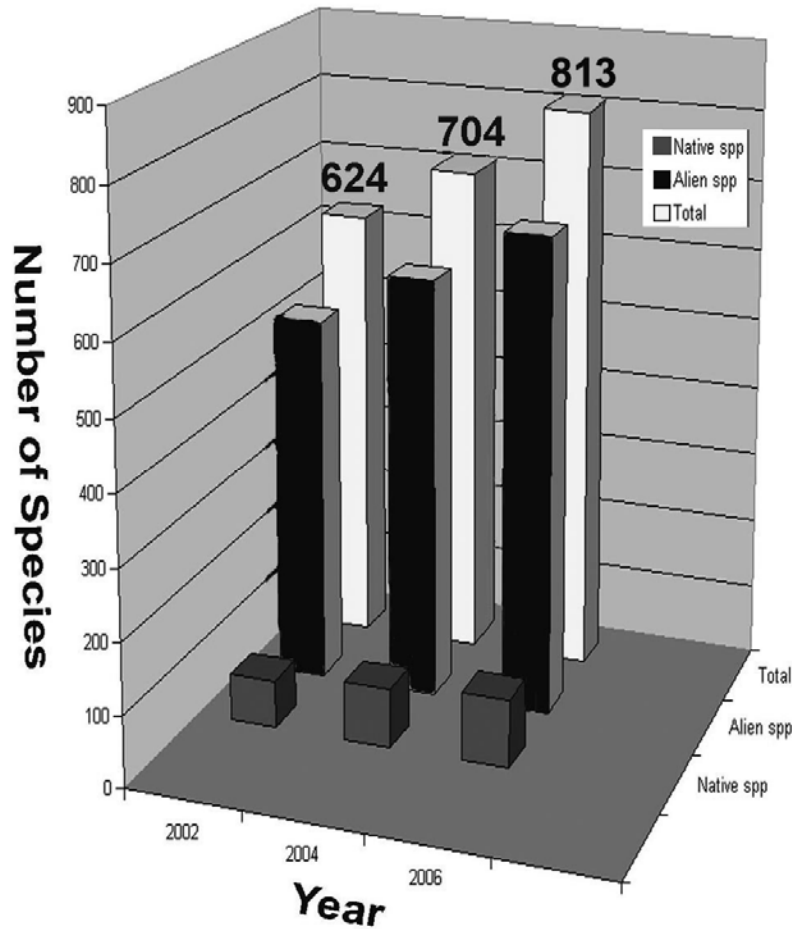


Figure 2. Numbers of native and alien species of terrestrial arthropods recorded from from the Kahului Airport environs during the baseline survey and two monitoring programs.

The list of all taxa occurring within the Kahului Airport Environs will be a dynamic, changing document as new species arrive and some established species may be extirpated. Also, species within certain groups have not yet been identified either because a qualified person able to identify species within the group was not available or because identification would require a revision of the group, possibly worldwide, before a species could be properly placed. In addition, many species were missed because of their cryptic habits and also because of the dynamic nature of insect populations, which often track their environment. This underscores the importance of understanding the role of weather and seasonal changes in arthropod detection efforts.

The discovery of so many new Hawai'i and Maui records as well as new species of native insects within the project area underscores the imperfect knowledge available on the status and distribution of arthropods in the islands. The 271 new records among the alien species (40% of the total!) found in the three surveys confirms the need for biological surveys and monitoring of the areas near ports of entry if quarantine measures are to be improved. The similar proportion (about 35%) of new records among the native species corroborates this conclusion. Before the advent of databases and the Hawaiian arthropod checklist (Nishida, 1992), determining which species had been previously recorded from Maui for such a large survey would have been nearly impossible. Now that the checklist is available, workers are filling in the gaps (e.g., Shelley, 2000).

Some orders appear to be disproportionately well represented in numbers of alien species in Hawai'i. This is also true for native species as well (Zimmerman, 1948a), and for both, the major factor is the opportunity to travel to Hawai'i to establish a new population. Most native arthropod species belong to vagile groups able to disperse to Hawai'i. Alien species were able to take advantage of several different opportunities. The household pests and other human associated species arrived with humans. Some species, especially in the orders Coleoptera, Hymenoptera, and Diptera, were purposefully introduced as pollinators or biocontrol agents. Many arrived with their associated hosts that were purposefully introduced; for example, the Homoptera, Heteroptera, Thysanoptera, and some Lepidoptera have cryptic life stages (eggs and pupae) and can travel well-concealed on or in their host plant. Many arrived hidden in high-risk commodities, such as soil or hay. The inadvertent or accidental stowaways traveling passively with transport would be expected to be a sample of the arthropod fauna of the source region, and indeed, except for the purposefully introduced taxa, the number of alien species within each taxonomic group roughly approximates the proportion of species in that group outside Hawai'i.

VII.A. Monitoring Strategies:

Monitoring for a board suite of arthropod species is a daunting task. Not only is the field work daunting, but the laboratory work of sorting, curating, and identifying the species is even more so. Most previous monitoring programs targeted one or a few high-risk pest species, and often, specialized techniques, such as baits and lures, are developed for the task. In spite of its daunting nature, broad spectrum monitoring programs are effective. First, they can be part of a rapid response protocol, in that they provide facilities and personnel for rapid identification and assessment for alien species detected through other means as well as through the monitoring program itself. As the fauna becomes better known and the list of species and voucher collection become more complete, the monitoring effort should become more efficient and less daunting. In fact, it is here proposed that the next phase of the monitoring program include the development of identification aids for the species known to occur within the project area, as well as selected highly invasive taxa not yet established. The technology for creating and managing digitized images and identification aids is now well-enough advanced to make such a project feasible. For example, see the specimen images in Table KA-0171.

VIII. Proposal to Develop Aids for Identifying Alien Arthropods

Scope of work:

There are currently 813 species known from the project area. Identification of some well known or distinctive species will be straight forward; whereas others will require more sophisticated efforts. Also, we may add selected high risk species not yet established after consultation with Hawaii Department of Agriculture and other interested parties. Providing aids for all of these would be daunting and require considerable time and effort. Given the daunting number of species, many of which are tiny and require slide mounting to identify, the initial effort will deal with the 100 higher priority species. The products can be web based and therefore accessible to anyone needing to check on a species. The aids would be hierarchical with different levels from pictures that show the gestalt of the species to detailed illustrations of critical characters that allow the user to make a firm determination. Aids would also be developed to assist inspectors to recognize high risk taxa. The different levels would allow quick identifications in the field, while the higher levels would provide the user with access additional information. The resulting product will be flexible so that additional species or information can be added at any time. As a first approximation, there would be from five to ten photographs entered for each species. These would include illustrations of feeding damage where applicable, an overall gestalt view, and a series of illustrations showing diagnostic features. After an initial experimental phase to develop the system, taking the photographs and entering the associated descriptive information should become more efficient. However, the project will be labor intensive. Products treating an individual taxonomic group (e.g. an order or family) could be distributed for either testing or

use as each is completed. An important aspect of species identifications is the determination of what it is not; that is, identification aids must rule out other possibilities to ensure that the name is correct.

Budget

Personnel:

Project manager (20% time)
Photographer (40% time)
Entomological Taxonomist (25% time)
Entomological Assistant (Full time for length of project)
Database manager (15% time)
FICA/Fringe (45% over salaries)

Total Personnel: \$80,385.24

Indirect costs (48.1% over personnel costs only) \$38,665.00

Non-Personnel:

Microscope (new dissecting microscope and upgrade lenses for compound
Digital camera (with microscope attachment)
Computer (with external hard drive for image storage)
Software (Lucid, upgrade Photoshop, etc.)
Supplies

Total Non-Personnel: \$14,500.00

Total Request: \$133,550.54

The indirect rate represents the current negotiated federal rate on personnel costs only. No funds for travel are included in the proposed budget. However, it may become desirable to field test the method or to conduct a training program at Kahului Airport, in which case supplemental funds may be necessary.

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Emmett Easton, Honolulu, (flies)
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Miquel Arnedo, UC Berkeley, CA (theridiid spiders)
Joseph Beatty, Carbondale, IL (spiders)
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Forest Starr, Makawao, Maui

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Neal Evenhuis, Hawaii Biological Survey (identification of flies)
Keith Arakaki, Hawaii Biological Survey (identification of flies)
G. Allan Samuelson, Hawaii Biological Survey (identification of beetles)
Alistair Ramsdale, Bishop Museum, (identification of beetles)
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Azadeh Ghotaslou, Hawaii Biological Survey (field collections, specimen processing and data management)
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APPENDIX TABLES

TABLE 1. Collection sites sampled for arthropods within the Kahului Airport Environs between 26 June 2006 and 18 November 2006.
Map datum is Old Hawaiian.

Ant Bait						
Collection Number	Date	Time of Day	Latitude	Longitude	Habitat	Host(s)
KA-0118	20 July 2006	Day	20°53'28"N	156°26'37"W	Keawe/mixed understory woodland	peanut butter
Cup Trap						
KA-0026	20 July 2006	Day	20°53'28"N	156°26'37"W	Keawe/mixed understory woodland	Bait: banana and beer
Fogging						
KA-0001 KA-0037	18 July 2006	Night	20°54'16"N	156°26'16"W	Wetland dominated by <i>Bacopa</i>	<i>Thespesia populnea</i>
KA-0022	18 July 2006	Day	20°54'40"N	156°25'34"W	<i>Leucaena</i> sp. mixed weeds	<i>Macroptilium atropurpureum</i>
KA-0023	20 July 2006	Night	20°54'40"N	156°25'34"W	Wind-sheared dune vegetation	<i>Leucaena</i> sp. (Haole Koa)
KA-0024	18 July 2006	Night	20°54'16"N	156°26'16"W	Wetland dominated by <i>Bacopa</i>	<i>Schinus terebinthifolius</i>
KA-0039 KA-0219	17 November 06	Day	20°53'49"N	156°26'58"W	Keawe/mixed understory woodland	<i>Leucaena</i> sp. (Haole Koa)
KA-0040 KA-0124	18 July 2006	Night	20°54'16"N	156°26'16"W	Wetland dominated by <i>Bacopa</i>	<i>Bacopa monierri</i>
KA-0217	16 November 06	Day	20°54'30"N	156°25'51"W	<i>Bacopa</i> dominated wetland, keawe/mixed understory	<i>Pluchea</i> sp. (small leaf)
Gas Aspirator						
KA-0002 KA-0238	18 July 2006	Night	20°54'16"N	156°26'16"W	Wetland dominated by <i>Bacopa</i>	<i>Bolboschoenus maritimus</i>
KA-0004 KA-0010	18 July 2006	Night	20°54'16"N	156°26'16"W	Wetland dominated by <i>Bacopa</i>	<i>Pluchea</i> spp.
KA-0005 KA-0012	20 July 2006	Day	20°53'24"N	156°26'04"W	koa haole dominated scrub	<i>Tridax procambens</i> (Coat buttons)

Table 1. Continued

Gas Aspirator (cont.)						
Collection Number	Date	Time of Day	Latitude	Longitude	Habitat	Host(s)
KA-0006 KA-0015 KA-0246 KA-0249	17 July 2006		20°54'01"N	156°27'46"W	Beach strand and keawe/mixed understory woodland	<i>Sporobolus virginicus</i> (Akiaki)
KA-0007	20 July 2006		20°53'24"N	156°26'04"W	koa haole dominated scrub	<i>Abutilon grandifolium</i>
KA-0008	18 July 2006	Night	20°54'16"N	156°26'16"W	Wetland dominated by <i>Bacopa</i>	<i>Cyperus javanicus</i>
KA-0009	20 July 2006		20°53'24"N	156°26'04"W	koa haole dominated scrub	<i>Ipomoea</i> sp.
KA-0013	18 July 2006	Day	20°54'07"N	156°25'41"W	Koa haole dominated scrub	general: lawn
KA-0014 KA-0235 KA-0240	18 July 2006	Day	20°54'07"N	156°25'41"W	Koa haole dominated scrub	<i>Wedelia sphagneticola trilobata</i>
KA-0016 KA-0244	18 July 2006	Day	20°54'07"N	156°25'41"W	koa haole dominated scrub	<i>Cassia xnealii</i> (Shower tree)
KA-0029	18 July 2006		20°54'26"N	156°25'54"W		
KA-0030	24 July 2006		20°53'36"N	156°26'59"W	Irrigated ornamental and lawns	<i>Erythrina</i> sp.
KA-0035	20 July 2006	Night	20°54'40"N	156°25'34"W	Wind-sheared dune vegetation	general
KA-0036 KA-0236	18 July 2006	Night	20°54'16"N	156°26'16"W	Wetland dominated by <i>Bacopa</i>	general: lawn, scrubs, plants
KA-0038 KA-0239	17 July 2006	Day	20°53'35"N	156°26'59"W	Industrial, buildings	<i>Hibiscus rosa sinensis</i>
KA-0041 KA-0241	17 July 2006	Day	20°54'01"N	156°27'46"W	Beach strand and keawe/mixed understory woodland	<i>Sesuvium portulacastrum</i> (Akulikuli)
KA-0042 KA-0125	18 July 2006	Night	20°54'16"N	156°26'16"W	Wetland dominated by <i>Bacopa</i>	<i>Bacopa monierri</i>
KA-0086	19 September 06	Day	20°53'53"N	156°27'39"W	Wetland, mixed native/ keawe/mixed alien understory woodland	<i>Ipomoea pescaprae</i> subsp. <i>brasiliensis</i>
KA-0087	19 September 06	Day	20°53'53"N	156°27'39"W	Wetland, mixed native/ keawe/mixed alien understory woodland	general: <i>Leucaena</i> sp., <i>Sesuvium portulacastrum</i> , <i>Capparis sandwichiana</i>
KA-0088 KA-0097	20 September 06	Night	20°53'56"N	156°27'17"W	Wetland, mixed native/ keawe/mixed alien understory woodland	<i>Vitex rotundifolia</i> (Pohinahina), <i>Scaevola</i> sp. (Naupaka)
KA-0089	20 September 06	Night	20°53'30"N	156°26'53"W	Ruderal, mixed ornamentals.	general: lawn

Table 1. Continued

Gas Aspirator (cont.)						
Collection Number	Date	Time of Day	Latitude	Longitude	Habitat	Host(s)
KA-0090	20 September 06	Night	20°53'56"N	156°27'17"W	Wetland, mixed native/ keawe/mixed alien understory woodland	<i>Sporobolus virginicus</i> (Akiaki)
KA-0091 KA-0098	19 September 06	Day	20°53'46"N	156°27'28"W	Wetland, mixed native/ keawe/mixed alien understory woodland	<i>Sporobolus virginicus</i> (Akiaki)
KA-0092	19 September 06	Day	20°53'46"N	156°27'28"W	Wetland, mixed native/ keawe/mixed alien understory woodland	<i>Pluchea</i> spp.
KA-0093	20 September 06	Night	20°53'55"N	156°27'23"W	Wetland, mixed native/ keawe/mixed alien understory woodland	<i>Dodonaea viscosa</i> (Aalii)
KA-0094	19 September 06	Night	20°53'46"N	156°27'28"W	Wetland, mixed native/ keawe/mixed alien understory woodland	<i>Sesuvium portulacastrum</i> (Akulikuli)
KA-0095	20 September 06	Night	20°53'43"N	156°27'28"W	Wetland, mixed native/ keawe/mixed alien understory woodland	<i>Dodonaea viscosa</i> (duff, leaf litter)
KA-0096	20 September 06	Night	20°53'56"N	156°27'18"W	Wetland, mixed native/ keawe/mixed alien understory woodland	<i>Dodonaea viscosa</i> (foliage)
KA-0099	20 September 06	Night	20°53'05"N	156°27'29"W	Wetland, mixed native/ keawe/mixed alien understory woodland	general
KA-0100	20 September 06	Night	20°53'29"N	156°27'29"W	Wetland, mixed native/ keawe/mixed alien understory woodland	general at pond edge
KA-0101	20 September 06	Night	20°53'35"N	156°26'58"W	Irrigated ornamental plantings and lawns	general:lawn
KA-0102	19 September 06	Day	20°53'46"N	156°27'28"W	Wetland, mixed native/ keawe/mixed alien understory woodland	<i>Cyperus laevigatus</i> (Makaloa)
KA-0175	09 September 1999		20 °54.12'N	156 °25.29'W	Wetland, airport drainage ditch	general
KA-0176	26 April 2000		20 °54.40'N	156 °25.29'W	Wind-sheared dune vegetation, beach strand	general
KA-0220 KA-0226	14 November 06		20°53'14"N	156°26'39"W	keawe/mixed understory woodland	general
KA-0221 KA-0223	17 November 06		20°53'50"N	156°26'55"W	Wetland, mixed native/ keawe/mixed alien understory woodland	<i>Atriplex</i> sp.
KA-0222	17 November 06		20°53'54"N	156°26'57"W	Wetland, mixed native/ keawe/mixed alien understory woodland	<i>Pluchea x Fosbergii</i>
KA-0224	17 November 06		20°53'50"N	156°26'54"W	Wetland, mixed native/ keawe/mixed alien understory woodland	<i>Abutilon grandifolium</i>

Table 1. Continued

Gas Aspirator (cont.)						
Collection Number	Date	Time of Day	Latitude	Longitude	Habitat	Host(s)
KA-0225	17 November 06		20°53'50"N	156°26'55"W	Wetland, mixed native/ keawe/mixed alien understory woodland	<i>Pluchea indica</i>
KA-0228	14 November 06		20°53'45"N	156°25'35"W	Wind-sheared dune vegetation, beach strand	beach
KA-0229	20 July 2006	Night	20°54'39"N	156°25'34"W	Wind-sheared dune vegetation	<i>Chenopodium oahuense</i>
KA-0231	14 November 06		20°53'11"N	156°26'52"W	Ruderal, keawe/mixed understory woodland	general
KA-0232	14 November 06		20°53'30"N	156°26'44"W	Ruderal, keawe/mixed understory woodland	general
KA-0237 KA-0233	20 July 2006		20°54'40"N	156°25'34"W	Wind-sheared dune vegetation	<i>Leucaena leucocephala</i>
KA-0242	14 November 06		20°53'02"N	156°26'42"W	Ruderal, keawe/mixed understory woodland	general
KA-0243	20 July 2006	Day	20°53'13"N	156°25'55"W	koa haole dominated scrub	<i>Ipomoea obscura</i>
KA-0245	14 November 06		20°53'30"N	156°26'51"W	Ruderal, mixed ornamentals	general
KA-0247	14 July 2006		20°54'46"N	156°25'35"W	Wind-sheared dune vegetation, beach strand	<i>Cenchrus ciliaris</i> (Buffel grass)
KA-0248	20 July 2006		20°53'13"N	156°25'55"W	koa haole dominated scrub	<i>Abutilon grandifolium</i> (Hoary Abutilon)
KA-0250	14 November 06	Day	20°54'46"N	156°25'35"W	Wind-sheared dune vegetation, beach strand	<i>Tournefortia argentea</i>
KA-0251	14 November 06		20°54'46"N	156°25'35"W	Wind-sheared dune vegetation, beach strand	<i>Leucaena leucocephala</i>
KA-252	17 July 2006		20°53'50"N	156°26'54"W	Wetland, mixed native/ keawe/mixed alien understory woodland	<i>Verbesina</i> sp.
General						
KA-0011	18 July 2006		20°54'16"N	156°26'16"W	Wetland dominated by <i>Bacopa</i>	general
KA-0047	19 July 2006	Night	20°54'01"N	156°27'42"W	Rocky beach strand	rock splash zone
KA-0058	21 September 06		20°53'53"N	156°27'09"W	Wetland, mixed native/ keawe/mixed alien understory woodland	general – on ground

Table 1. Continued

General (cont.)						
Collection Number	Date	Time of Day	Latitude	Longitude	Habitat	Host(s)
KA-0061	18 September 06		20°53'23"N	156°25'54"W	keawe/mixed understory woodland	general
KA-0103	22 July 2006		20°53'35"N	156°26'59"W	Irrigated ornamental plantings and lawns	general: night lights and ground
KA-0104	23 July 2006	Night	20°53'35"N	156°26'59"W	Irrigated ornamental plantings and lawns	general
KA-0109	19 September 06		20°53'53"N	156°27'38"W	Wetland, mixed native/ keawe/mixed alien understory woodland	general
KA-0111	19 September 06	Day	20°53'40"N	156°27'21"W	Wetland, mixed native/ keawe/mixed alien understory woodland	general: on person
KA-0114	18 July 2006	Day	20°53'34"N	156°27'02"W	Irrigated ornamental plantings and lawns	general: building
KA-0122	22 July 2006		20°53'34"N	156°27'02"W	Irrigated ornamental plantings and lawns	general
KA-0148	18 September 06		20°54'26"N	156°25'50"W	Keawe/koa haole/mixed understory woodland	general: grass
KA-0174	05 August 1999		20°54.3'N	156°26.19'W	Keawe woodland, mixed understory	general – mixed shrubs
KA-0213	16 November 06	Day	20°54'28N	156 26'05"	Keawe/ironwood/mixed understory woodland	"general"?
KA-0227	17 November 06		20°53'50"N	156°26'54"W	Wetland, mixed native/ keawe/mixed alien understory woodland	general: grasses
Host Search						
KA-0017	20 July 2006		20°53'35"N	156°26'59"W	Industrial, buildings	<i>Citrus</i> sp.
KA-0019	20 July 2006	Night	20°54'31"N	156°25'47"W	Mixed shrubland and grasses	<i>Nicotiana</i> .
KA-0020	18 July 2006	Night	20°54'16"N	156°26'16"W	Wetland margin, irrigated lawn	<i>Hibiscus</i> hedge
KA-0048	19 July 2006	Night	20°54'01"N	156°27'44"W	Beach strand and keawe/mixed understory woodland	<i>Prosopis pallida</i> (Kiawe) trunks
KA-0084	19 July 2006		20°53'35"N	156°26'59"W	Industrial, buildings	<i>Plumeria rubra</i>
KA-0085	23 July 2006		20°53'35"N	156°26'59"W	Industrial, buildings	<i>Citrus</i> sp.
KA-0108	19 September 06		20°53'53"N	156°27'38"W	Wetland, mixed native/ keawe/mixed alien understory woodland	<i>Cyperus laevigatus</i> (Makaloa)

Table 1. Continued

Host search (cont.)						
Collection Number	Date	Time of Day	Latitude	Longitude	Habitat	Host(s)
KA-0110	19 September 06		20°53'39"N	156°27'22"W	Wetland, mixed native/ keawe/ alien understory woodland	<i>Cyperus laevigatus</i> (Makaloa)
KA-0112	21 September 06	Day	20°53'34"N	156°27'02"W	Irrigated ornamental plantings and lawns	<i>Cascabela thevetia</i>
KA-0113	19 July 2006	Day	20°53'35"N	156°26'59"W	Industrial, buildings	<i>Plumeria rubra</i>
KA-0116	20 July 2006	Night	20°54'40"N	156°25'34"W	Wind-sheared dune vegetation	<i>Ipomoea</i> sp. (flowers)
KA-0119	19 September 06		20°53'40"N	156°27'21"W	Wetland, mixed native/ keawe/mixed alien understory woodland	<i>Sesuvium portulacastrum</i> (Akulikuli)
KA-0120	22 July 2006	Day	20°53'35"N	156°26'59"W	Industrial, buildings	<i>Erythrina sandwicensis</i> (Wiliwili)
KA-0123	18 July 2006	Night	20°54'16"N	156°26'16"W	Wetland, mixed native/ keawe/mixed alien understory woodland	<i>Ficus benjamina</i>
KA-0126	21 September 06	Day	20°53'34"N	156°26'59"W	Irrigated ornamental plantings and lawns	<i>Hibiscus rosasinensis</i>
KA-0127	21 September 06	Day	20°53'35"N	156°26'60"W	Irrigated ornamental plantings and lawns	<i>Gossypium tomentosum</i> (Mao)
KA-0128 KA-0130 KA-0131 KA-0135	21 September 06	Day	20°53'34"N	156°26'60"W	Irrigated ornamental plantings and lawns	<i>Citrus</i> sp.
KA-0129	21 September 06	Day	20°53'34"N	156°26'60"W	Irrigated ornamental plantings and lawns	<i>Chamaesyce hirta</i>
KA-0133 KA-0134	21 September 06	Day	20°53'35"N	156°26'59"W	Irrigated ornamental plantings and lawns	<i>Gossypium tomentosum</i> (Mao)
KA-0136	22 September 06	Day	20°53'44"N	156°26'27"W	Industrial/mixed ornamentals	<i>Psidium</i> sp. (Guava)
KA-0137	22 September 06	Day	20°53'33"N	156°26'49"W	Ruderal, mixed ornamentals.	<i>Hibiscus</i> sp.
KA-0138	22 September 06	Day	20°53'33"N	156°26'49"W	Ruderal, mixed ornamentals.	<i>Abutilon menziesii</i>
KA-0139	22 September 06	Day	20°53'33"N	156°26'49"W	Ruderal, mixed ornamentals.	<i>Chamaesyce</i> sp.
KA-0140	22 September 06	Day	20°53'33"N	156°26'48"W	Ruderal, mixed ornamentals.	<i>Pouteria sandwicensis</i>
KA-0141	22 September 06		20°53'45"N	156°26'38"W	Industrial/mixed ornamentals	<i>Ipomoea indica</i>
KA-0145	21 September 06		20°53'81"N	156°27'39"W	Wetland, mixed native/ keawe/mixed alien understory woodland	<i>Cynodon dactylon</i>
KA-0146	21 July 06	Day	20°53'34"N	156°27'02"W	Industrial, buildings	<i>Citrus</i> sp.

Table 1. Continued

Host Search (cont.)						
Collection Number	Date	Time of Day	Latitude	Longitude	Habitat	Host(s)
KA-0150	21 September 06	Day	20°53'33N	156°26'59"W	Irrigated ornamental plantings and lawns	<i>Chrysalidocarpus lutescens</i> (Areca palm)
KA-0151	21 September 06		20°53'33N	156°26'59"W	Irrigated ornamental plantings and lawns	<i>Schefflera actinophylla</i>
KA-0152	21 September 06	Day	20°53'35N	156°26'59"W	Irrigated ornamental plantings and lawns	<i>Hibiscus clayi</i>
KA-0153	21 September 06		20°53'35N	156°26'59"W	Irrigated ornamental plantings and lawns	<i>Hibiscus rosa sinensis</i>
KA-0154	29 September 06	Day	20°53'35N	156°26'59"W	Irrigated ornamental plantings and lawns	<i>Ophiopogon japonicus</i> (Mondo grass)
KA-0230	17 November 06		20°53'50"N	156°26'54"W	Wetland, mixed native/ keawe/mixed alien understory woodland	<i>Prosopis pallida</i> (Kiawe)
KA-0234	18 November 06	Night	20°54'16"N	156°26'16"W	Wetland dominated by <i>Bacopa</i>	<i>Pluchea</i> spp.
Lingren Funnels Trap						
KA-0066	18 July - 18 September 2006	Day & Night	20°54'26"N	156°25'50"W	Keawe/koa haole/mixed understory woodland	NA
KA-0158	18 September – 21 October 2006	Day & Night	20°54'26"N	156°25'50"W	Keawe/koa haole/mixed understory woodland	NA
KA-0172	21 October -13 November 2006	Day & Night	20°54'26"N	156°25'50"W	Keawe/koa haole/mixed understory woodland	NA
Malaise Trap						
KA-0065	18 July - 18 September 2006	Day & Night	20°54'26"N	156°25'50"W	Keawe/koa haole/mixed understory woodland	NA
KA-0157	18 September – 21 October 2006	Day & Night	20°54'26"N	156°25'50"W	Keawe/koa haole/mixed understory woodland	NA
KA-0171	21 October -13 November 2006	Day & Night	20°54'26"N	156°25'50"W	Keawe/koa haole/mixed understory woodland	NA
KA-0173	30 September 1999	Day & Night	20°54.16'N	156°25.42'W	Koa haole scrub	NA
KA-0178	16 November 1999	Day & Night	20°54'22"N	156°25'56"W	Koa haole scrub	NA

Table 1. Continued

Malaise Trap Continued						
Collection Number	Date	Time of Day	Latitude	Longitude	Habitat	Host(s)
KA-0179	18 April 2000	Day & Night	20°54'22"N	156°25'56"W	Koa haole scrub	NA
KA-0181	04 October 1999	Day & Night	20°54'25"N	156°25'58"W	wetland 2, mixed weeds and ornamentals. <i>Thespesia populnea</i>	NA
KA-0183	30 November 1999	Day & Night	20°54'18"N	156°25'42"W	Koa haole scrub	NA
KA-0184	01 February 2000	Day & Night	20°54'22"N	156°25'56"W	Koa haole scrub	NA
MV Bulb						
KA-0018 KA-0034	19 July 2006	Night	20°54'01"N	156°27'44"W	Beach strand and keawe/mixed understory woodland	NA
KA-0022	18 July 2006	Night	20°53'46"N	156°27'26"W	Wetland keawe/mixed understory woodland	NA
KA-0057	21 September 06	Night	20°53'53"N	156°27'09"W	Wetland, mixed native/ keawe/mixed alien understory woodland	NA
KA-0059	26 June 2006	Night	20°54'16"N	156°26'16"W	Wetland dominated by <i>Bacopa</i>	NA
KA-0060	19 September 06	Night	20°53'49"N	156°27'23"W	Wetland, mixed native/ keawe/mixed alien understory woodland	NA
KA-0168	14 November 06	Night	20°53'48"N	156°27'22"W	Wetland, mixed native/ keawe/mixed alien understory woodland	NA
KA-0169	16 November 06	Night	20°24'26"N	156°26'01"W	Keawe/ironwood/mixed understory woodland	NA
KA-0170	17 November 06	Night	20°53'49"N	156°26'58"W	Keawe/mixed understory woodland	NA
KA-0177	29 March 1999	Night	20°54'29"N	156°25'52"W	<i>Bacopa</i> dominated wetland, keawe/mixed understory	NA
KA-0180	31 May 2003	Night	20°53'36"N	156°27'5.5"W	Keawe mixed understory	
KA-0185	3 November 1999	Night	20°53'40"N	156°27'06"W	Kanaha Pond Reserve	NA
Pitfall Trap						
KA-0056	21 September 06	Night	20°53'53"N	156°27'09"W	Wetland, mixed native/ keawe/mixed alien understory woodland	

Table 1. Continued

Soil Sample						
Collection Number	Date	Time of Day	Latitude	Longitude	Habitat	Host(s)
KA-0117	18 July 2006	Day	20°54'07"N	156°25'41"W	Koa haole dominated scrub	soil/litter below: <i>Wedelia</i> sp.
KA-0121	18 July 2006	Day	20°54'07"N	156°25'41"W	Koa haole dominated scrub	soil/litter below: <i>Sphagneticola trilobata</i>
KA-0210	14 November 06	Day	20°54'39"N	156°25'34"W	Wind-sheared dune vegetation	soil/litter below: <i>Chenopodium oahuense</i> .
KA-0211	14 November 06	Day	20°54'34"N	156°25'39"W	Wind-sheared dune vegetation	soil/litter below: <i>Nicotiana glauca</i>
KA-0212	14 November 06	Day	20°54'46"	156°25'36"W	Beach strand and wind-sheared dune vegetation	soil/litter below wood chip pile
Sticky Trap						
KA-0063/ FS-8	28 August 06 – 18 November 06	Day & Night	20°53'54"N	156°27'43"W	Beach strand and keawe/mixed understory woodland	<i>Prosopis pallida</i> , bait: fruit
KA-0147 / FS-2	28 August 06 – 18 November 06	Day & Night	20°53'59"N	156°25'43"W	Wind-sheared dune vegetation	<i>Leucaena leucocephala</i> , bait: fruit
KA-0149/ FS-5	28 August 06 – 18 November 06	Day & Night	20°53'35"N	156°26'59"W	Irrigated ornamental plantings and lawns	<i>Citrus</i> sp., bait: fruit
KA-0155/ FS-23	28 August 06 – 18 November 06	Day & Night	20°53'59"N	156°25'43"W	Wind-sheared dune vegetation	<i>Leucaena leucocephala</i> , bait: spam
KA-0256/ FS-4	28 August 06 – 18 November 06	Day & Night	20°53'42"N	156°26'00"W	Koa haole dominated scrub	<i>Prosopis pallida</i> , bait: fruit
KA-0258/ FS-6	28 August 06 – 18 November 06	Day & Night	20°53'35"N	156°26'59"W	Irrigated ornamental plantings and lawns	<i>Gossypium tomentosum</i> , bait: fruit
KA-0259/ FS-7	28 August 06 – 28 August 06	Day & Night	20°53'35"N	156°26'59"W	Irrigated ornamental plantings and lawns	<i>Plumeria rubra</i> , bait: fruit
KA-0261/ FS-9	28 August 06 – 18 November 06	Day & Night	20°53'57"N	156°27'17"W	Beach strand and keawe/mixed understory woodland	<i>Scaevola sericea</i> , bait: fruit
KA-0263/ FS-11	28 August 06 – 18 November 06	Day & Night	20°54'06"N	156°26'41"W	Beach strand and keawe/mixed understory woodland	<i>Schinus terebinthifolius</i> , bait: fruit
KA-0264/ FS-12	28 August 06 – 18 November 06	Day & Night	20°54'18"N	156°26'19"W	Wetland dominated by <i>Bacopa</i>	<i>Prosopis pallida</i> , bait: fruit
KA-0265/ FS-13	28 August 06 – 18 November 06	Day & Night	20°54'21"N	156°26'17"W	Beach strand and keawe/mixed understory woodland	<i>Pluchea</i> sp., bait: fruit
KA-0266/ FS-14	28 August 06 – 18 November 06	Day & Night	20°54'02"N	156°26'36"W	Keawe/mixed understory woodland	<i>Ricinus communis</i> , bait: fruit

Table 1. Continued

Sticky Trap						
Collection Number	Date	Time of Day	Latitude	Longitude	Habitat	Host(s)
KA-0267/ FS-15	28 August 06 – 28 August 06	Day & Night	20°54'00"N	156°26'41"W	Keawe/mixed understory woodland	<i>Leucaena leucocephala</i> , bait: fruit
KA-0268/ FS-16	28 August 06 – 18 November 06	Day & Night	20°53'53"N	156°26'46"W	Keawe/mixed understory woodland	<i>Ricinus communis</i> , bait: fruit
KA-0269/ FS-17	28 August 06 – 18 November 06	Day & Night	20°53'55"N	156°26'51"W	Beach strand and keawe/mixed understory woodland	<i>Prosopis pallida</i> , bait: fruit
KA-0270/ FS-18	28 August 06 – 18 November 06	Day & Night	20°53'37"N	156°26'46"W	Ruderal, keawe/mixed understory woodland	<i>Leucaena leucocephala</i> , bait: fruit
KA-0271/ FS-19	28 August 06 – 18 November 06	Day & Night	20°53'37"N	156°26'46"W	Ruderal, keawe/mixed understory woodland	<i>Erythrina crista-galli</i> , bait: fruit
KA-0272/ FS-20	28 August 06 – 18 November 06	Day & Night	20°53'46"N	156°26'39"W	Ruderal, mixed ornamentals.	<i>Leucaena leucocephala</i> , bait: fruit
KA-0273/ FS-27	28 August 06 – 18 November 06	Day & Night	20°54'06"N	156°26'41"W	Beach strand and keawe/mixed understory woodland	<i>Schinus terebinthifolius</i> , bait: fruit
KA-0274/ FS-28	28 August 06 – 18 November 06	Day & Night	20°54'18"N	156°26'19"W	Wetland dominated by Bacopa	<i>Prosopis pallida</i> , bait: fruit
KA-0275/ FS-29	28 August 06 – 18 November 06	Day & Night	20°54'21"N	156°26'17"W	Beach strand and keawe/mixed understory woodland	<i>Pluchea</i> sp., bait: fruit
KA-0276/ FS-30	28 August 06 – 18 November 06	Day & Night	20°54'02"N	156°26'36"W	Keawe/mixed understory woodland	<i>Ricinus communis</i> , bait: fruit
KA-0277/ FS-31	28 August 06 – 18 November 06	Day & Night	20°54'00"N	156°26'41"W	Keawe/mixed understory woodland	<i>Leucaena leucocephala</i> , bait: fruit
KA-0278/ FS-32	28 August 06 – 18 November 06	Day & Night	20°53'53"N	156°26'46"W	Keawe/mixed understory woodland	<i>Ricinus communis</i> , bait: fruit
KA-0279/ FS-33	28 August 06 – 18 November 06	Day & Night	20°53'37"N	156°26'46"W	Ruderal, keawe/mixed understory woodland	<i>Leucaena leucocephala</i> , bait: fruit
KA-0280/ FS-34	28 August 06 – 18 November 06	Day & Night	20°53'46"N	156°26'39"W	Ruderal, mixed ornamentals.	<i>Leucaena leucocephala</i> , bait: fruit
KA-0285/ FS-25	28 August 06 – 18 November 06	Day & Night	20°53'57"N	156°27'17"W	Beach strand and keawe/mixed understory woodland	<i>Scaevola sericea</i> , bait: spam
KA-0286/ FS-26	28 August 06 – 18 November 06	Day & Night	20°54'01"N	156°26'51"W	Beach strand and keawe/mixed understory woodland	<i>Pluchea</i> sp., bait: spam

Table 1. Continued

Sweeping						
Collection Number	Date	Time of Day	Latitude	Longitude	Habitat	Host(s)
KA-0045	19 July 2006	Night	20°54'01"N	156°27'42"W	Beach strand and keawe/mixed understory woodland	wrack
KA-0046	19 July 2006	Night	20°54'01"N	156°27'42"W	Beach strand and keawe/mixed understory woodland	<i>Scaevola</i> sp. (Naupaka)
KA-0105	19 September 06		20°53'40"N	156°27'21"W	wetland, mixed native/ keawe/mixed alien understory woodland	
KA-0106	20 September 06	Night	20°53'30"N	156°26'53"W	Ruderal, mixed ornamentals.	<i>Wikstroemia monticola</i> (Akia)
KA-0107	19 September 06		20°53'46"N	156°27'28"W	wetland, mixed native/ keawe/mixed alien understory woodland	
KA-0115	20 September 06	Night	20°53'44"N	156°27'28"W	Wetland, mixed native/ keawe/mixed alien understory woodland	<i>Dodonaea viscosa</i> (Aalii)
KA-0216	16 November 06	Day	20°53'55"N	156°26'56"W	Keawe/mixed understory woodland	<i>Pluchea</i> sp.
KA-0218	16 November 06	Day	20°54'29"N	156°25'52"W	<i>Bacopa</i> dominated wetland, keawe/mixed understory	over puddles
Window Trap						
KA-0064	18 July - 18 September 2006	Day & Night	20°54'26"N	156°25'50"W	Keawe/koa haole/mixed understory woodland	Window trap
KA-0067	18 September – 21 October 2006	Day & Night	20 ° 54'26"N	156 ° 25'50"W	Keawe/koa haole/mixed understory woodland	NA
KA-0159	21 October -13 November 2006	Day & Night	20 ° 54'26"N	156 ° 25'50"W	Keawe/koa haole/mixed understory woodland	NA
Yellow Pan Trap						
KA-0182	03 June 2000	Day & Night	20 ° 53'47"N	156 ° 27'59"W	Keawe mixed understory	NA

TABLE 2. – Additions and corrections to the list of species of terrestrial arthropods known to occur within the Kahului Airport environs. Names and arrangement follow Nishida (2002) except as noted.

ACTION	SCIENTIFIC NAME	NOTES
Phylum: ARTHROPODA		
Class: ARACHNIDA:		
Subclass: ARANEAE (Spiders)		
Clubionidae		
Add	<i>Clubiona?</i> sp.A	New state record. This hunting spider doesn't match any of the known species in Hawai'i. Material examined: KA-0171. Kahului Airport, 20°54'26"N; 156°25'50"W, Keawe-koa haole woodland, malaise trap, 21 Oct. - 13 Nov. 2006. 10 spmns. Det. FG Howarth
Desidae		
Add	<i>Paratheuma makai</i> Berry & Beatty, 1989	New island record. This native marine littoral spider is also known from Kaua'i & Hawai'i Is. Material examined: KA-0047. Kahului Airport, 20°54'01"N; 156°27'42"W, Rocky shore at night, 19 Jul. 2006, 1 male, 1 female. Det. FG Howarth
Mysmenidae		
Add	<i>Mysmenella?</i> sp. A	New island record. <i>M. cf. samoensis</i> (Marples, 1955) is recorded from Kaua'i & Hawai'i Is. This could be that sp. or something new. Material examined: KA-0065. Kahului Airport, 20°54'26"N; 156°25'50"W, Keawe-koa haole woodland, malaise trap, 18 Sep. - 21 Oct. 2006 1 male, 1 female; KA-0048 general, 1 female. Det. FG Howarth
Oonopidae (6-eyed jumping spiders)		
Add	<i>Orchestina</i> sp. B	New island record. An unidentified <i>Orchestina</i> species is recorded from Kaua'i and Hawai'i islands. This may be that species or something new. Material examined: KA-0171. Kahului Airport, 20°54'26"N; 156°25'50"W, Keawe koa haole woodland, malaise trap, 21 Oct. - 13 Nov. 2006. 5 males. Det. FG Howarth
Add	<i>Orchestina</i> sp. C	New state record. These tiny spiders easily disperse in the wind, and the <i>Orchestina</i> could be native. However, they are also easily transported in soil or on plant material. Material examined: KA-0171. Kahului Airport, 20°54'26"N; 156°25'50"W, Keawe koa haole woodland, malaise trap, 21 Oct. - 13 Nov. 2006. 1 male. Det. FG Howarth
Class: INSECTA (insects)		
Order: BLATTODEA (Cockroaches)		
Blattidae		
Add	<i>Loboptera dimidiatipes</i> (Bolivar, 1890)	This widespread lowland cockroach is not common within the airport environs.
Order: COLEOPTERA (Beetles)		
Anthribidae		
Add	<i>Exillus lepidus</i> Jordon, 1922	This fungus weevil was reported from the Kahului Airport environs, Maui, by Samuelson et al. 2007.
Bostrichidae		
Add	<i>Dinoderus minutus</i> (Fabricius, 1775)	This twig borer was reported from the Kahului Airport environs, Maui, by Samuelson et al. (2007).

Table 2. Continued.

ACTION	SCIENTIFIC NAME	NOTES
Order: COLEOPTERA (Beetles) (continued)		
Buprestidae		
Revise	<i>Aphanisticus cochinchinae seminulum</i> Obenberger, 1929	This tiny metallic wood-boring beetle was listed as an unidentified new state record in the 2002 baseline survey report, but the specimens have been identified. The species is a potential pest of sugar cane and has been known from O'ahu since the 1920s. Samuelson et al. (2007) recorded it for the first time from Maui.
Cerambycidae		
Revise	<i>Plagithmysus</i> sp. nov. A	Change to <i>Plagithmysus kahului</i> Samuelson, 2006
Add	<i>Plagithmysus kahului</i> Samuelson, 2006	This new endemic sp has been described.
Coccinellidae (lady beetles)		
Add	<i>Diomus</i> species A	Possible new state record, but ID needs confirmation. This beetle doesn't match species known from Hawai'i.
Revise	<i>Scymnus horni</i> Gorham, 1897	This tiny lady beetle has been identified.
Corylophidae		
Add	<i>Anisomeristes basalis</i> Sharp, 1885	This minute fungus beetle was reported from the Kahului Airport environs, Maui, by Samuelson et al. (2007)
Curculionidae		
Add	<i>Sphenophorus venatus vestitus</i> Chittenden, 1904	A common alien weevil.
Elateridae		
Add	<i>Prodrasterius collaris</i> (Candeze, 1859)	New island record. Adventive. Previously known from O'ahu and Kaua'i . Material examined: KA-0171. Kahului Airport, 20°54'26"N; 156°25'50"W, Keawe koa haole woodland, malaise trap, 21 Oct. - 13 Nov. 2006. 1 spmn. Det. DJ Preston.
Rhipiphoridae		
Add	<i>Rhipidius pectinicornis</i> Thunberg, 1806	New island record. Adventive. Previously known from O'ahu. Material examined: KA-0171. Kahului Airport, 20°54'26"N; 156°25'50"W, Keawe-koa haole woodland, malaise trap, 21 Oct. - 13 Nov. 2006. 1 spmn. Det. FG Howarth
Staphylinidae		
Revise	<i>Astenus</i> sp. A	Revise spelling; previously listed as <i>Asterus</i> sp.
Add	<i>Atheta</i> sp. A	Possible new record but group needs revision.
Add	<i>Coproporus</i> sp. B	Possible new state record.
Add	Oxytelinae: genus sp. A	Possible new state record. Another tiny rove beetle waiting ID or description.
Add	<i>Philonthus</i> nr <i>discoides</i> (Gravenhorst 1802)	
Add	<i>Philonthus rectangulus</i> Sharp, 1874	New island record. Adventive. Previously known from O'ahu. Material examined: KA-0064 Kahului Airport, 20°54'26"N; 156°25'50"W, Keawe-koa haole woodland, window trap, 18 Jul. - 18 Sep. 2006, 1 spmn. Det. A.Y. Solodovnikov.
Add	<i>Philonthus</i> sp A	Another tiny rove beetle waiting ID or description.
Add	<i>Sunius</i> sp A	Another tiny rove beetle waiting ID or description.
Add	Xantholinini: genus sp. A	Another tiny rove beetle waiting ID or description.
Tenebrionidae		
Add	Genus species A	This darkling beetle is new to the list but may be recorded from Maui

Table 2. Continued.

ACTION	SCIENTIFIC NAME	NOTES
Order: DIPTERA (Flies)		
Cecidomyiidae		
Add	<i>Lestremia leucophaea</i> (Meigen, 1818)	New island record. Adventive. Previously known from O'ahu. Material examined: KA-0171. Kahului Airport, 20°54'26"N; 156°25'50"W, Keawe-koa haole woodland, malaise trap, 21 Oct. - 13 Nov. 2006. 2 males. Det. FG Howarth
Add	<i>Lestremia</i> sp. A	A gall gnat different from the above species.
Add	Genus species B	
Add	Genus species C	
Ceratopogonidae		
Add	<i>Atrichopogon</i> sp A	New state Record. Material examined: KA-0042. Kahului Airport, 20°54'16"N; 156°26'16"W, <i>Bacopa</i> wetland, gas aspirator, night, 18 Jul.2006. 1 male. KA-0124, same data, fogging, 1 male, 1 female. Det. K. Arakaki & FG Howarth
Revise	<i>Culicoides</i> species A	Re-identified as <i>Culicoides</i> species near <i>jamaicensis</i> . q.v.
Add	<i>Culicoides</i> species near <i>jamaicensis</i> Edwards, 1922	Previously listed as <i>C. species A</i> . <i>C. jamaicensis</i> is widespread in Central America and is a potential pest species.
Revise	<i>Dasyhelea digna</i> Borkent, 1996	Re-identified as <i>Dasyhelea</i> species D, q.v.
Add	<i>Dasyhelea excellentis</i> Borkent, 1996	New island record. Endemic. Previously known from Kaua'i . Material examined: KA-0171. Kahului Airport, 20°54'26"N; 156°25'50"W, Keawe-koa haole woodland, malaise trap, 21 Oct. - 13 Nov. 2006. 1 female. KA-0042. Kahului Airport, 20°54'16"N; 156°26'16"W, <i>Bacopa</i> wetland, gas aspirator, night, 18 Jul.2006. 1 male. KA-0124, same data, fogging, 1 male. Det. FG Howarth
Add	<i>Dasyhelea</i> species C	Endemic? Material examined: KA-0057. Kahului Airport, 20°53'53"N; 156°27'09"W, wetland, woodland, MV bulb, 21 Sep 2006, 4 males, 1 female. Det. FG Howarth
Add	<i>Dasyhelea</i> species D	Endemic? Previously listed as <i>Dasyhelea digna</i> Borkent, 1996. KA-0171. Kahului Airport, 20°54'26"N; 156°25'50"W, Keawe-koa haole woodland, malaise trap, 21 Oct. - 13 Nov. 2006. 1 male 3 females. Kahului Airport, Kanaha Pond, MV bulb, 25. Jul. 2003, 2 males, 4 females. Det. FG Howarth
Add	<i>Forcipomyia biannulata</i> Ingram & Macfie, 1924	New state record. African species widespread through commerce. Material examined: KA-0171. Kahului Airport, 20°54'26"N; 156°25'50"W, Keawe-koa haole woodland, malaise trap, 21 Oct. - 13 Nov. 2006. 3 males, 25 females. Det. FG Howarth
Revise	<i>Forcipomyia borbonica</i>	re-identified as <i>F. chrysolopha</i> (Kieffer, 1911) q.v.
Add	<i>Forcipomyia chrysolopha</i> (Kieffer, 1911)	New state record. African species widespread through commerce. Previously listed under <i>F. borbonica</i> . Material examined: KA-0171. Kahului Airport, 20°54'26"N; 156°25'50"W, Keawe-koa haole woodland, malaise trap, 21 Oct. - 13 Nov. 2006. 2 males, 10 females. KA-0169 swarming nr MV. 100 males. Det. FG Howarth
Revise	<i>Forcipomyia</i> cf. <i>kaneohe</i> Wirth & Howarth, 1983	re-identified as <i>F. cf. quasiingrami?</i> Macfie, 1939
Add	<i>Forcipomyia</i> cf. <i>quasiingrami?</i> Macfie, 1939	New state record. Maui specimens closely related to or the same as this Neotropical species. Material examined: KA-0171. Kahului Airport, 20°54'26"N; 156°25'50"W, Keawe-koa haole woodland, malaise trap, 21 Oct. - 13 Nov. 2006. 10 males, 10 females. Det. FG Howarth

Table 2. Continued.

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ACTION	SCIENTIFIC NAME	NOTES
Order: DIPTERA (Flies) [continued]		
Chironomidae		
Add	<i>Chironomus</i> sp. nr. <i>hawaiiensis</i> Grimshaw, 1901	New state record. This species is easily confused with the native <i>C. hawaiiensis</i> , but the male terminalia are distinct. Material examined: KA-0171. Kahului Airport, 20°54'26"N; 156°25'50"W, Keawe-koa haole woodland, malaise trap, 21 Oct. - 13 Nov. 2006. 10 males. Det. FG Howarth
Add	<i>Thalassomya setosipennis</i> Wirth, 1947	A native sea coast species
Chloropidae		
Add	<i>Conioscinella formosa</i> (Becker, 1911)	
Add	<i>Rhodesiella scutellata</i> (Meijere, 1908)	
Chyromyidae		
Add	<i>Nannodastia horni</i> Hendel, 1930	New island record. Adventive. Previously known from O'ahu and Moloka'i. Material examined: KA-0171. Kahului Airport, 20°54'26"N; 156°25'50"W, Keawe-koa haole woodland, malaise trap, 21 Oct. - 13 Nov. 2006. 1 female. Det. FG Howarth
Dolichopodidae		
Add	<i>Chrysotus longipalpus</i> Aldrich, 1896	
Add	<i>Condylostylus longicornis</i> (Fabricius, 1775).	New island record. Previously known from O'ahu. Material examined: KA-0065 & KA-0171. Kahului Airport, 20°54'26"N; 156°25'50"W, Keawe-koa haole woodland, malaise traps, 21 Oct. - 13 Nov. 2006. 1 male, 1 female. KA-0265 sticky trap 3 spmns. Det. N. Evenhuis.
Drosophilidae		
Add	<i>Drosophila simulans</i> Sturtevant, 1919	
Add	<i>Drosophila suzukii</i> (Matsumura, 1931)	New island record. Previously known from Kaua'i, O'ahu, Moloka'i and Hawai'i. Material examined: KA-0171. Kahului Airport, 20°54'26"N; 156°25'50"W, Keawe-koa haole woodland, malaise traps, 21 Oct. - 13 Nov. 2006. 1 male. Det. FG Howarth
Ephydriidae		
Add	<i>Brachydeutera hebes</i> Cresson, 1926	A common dull gray shore fly.
Add	genus species. A	Unidentified. Possible new state record?
Keroplastidae		
Add	<i>Tylparua hawaiiensis</i> (Grimshaw, 1901)	A native fungus gnat
Milichiidae		
Add	<i>Desmometopa cf tarsalis</i> Loew, 1865	
Otitidae		
Add	<i>Notogramma cimiciforme</i> Loew, 1867	
Add	<i>Physiphora</i> species A	New state record. Material examined: KA-0171. Kahului Airport, 20°54'26"N; 156°25'50"W, Keawe-koa haole woodland, malaise trap, 21 Oct. - 13 Nov. 2006. 2 spmns. Det. FG Howarth

Table 2. Continued.

ACTION	SCIENTIFIC NAME	NOTES
Order: DIPTERA (Flies) [continued]		
Phoridae		
Add	<i>Dohrniphota cornuta</i> (Bigot, 1857)	New island record. Previously known from O‘ahu and Hawai‘i. Material examined: KA-0171. Kahului Airport, 20°54’26”N; 156°25’50”W, Keawe-koa haole woodland, malaise trap, 21 Oct. - 13 Nov. 2006. 25 spmns. Det. FG Howarth
Add	<i>Metopina ventralis</i> Schmitz, 1927	New island record. Previously known from O‘ahu. Material examined: KA-0171. Kahului Airport, 20°54’26”N; 156°25’50”W, Keawe-koa haole woodland, malaise trap, 21 Oct. - 13 Nov. 2006. 10 spmns. Det. K. Arakaki
Psychodidae		
Add	<i>Psychoda pseudalternata</i> Williams, 1946	New island record. Previously known from O‘ahu. Material examined: KA-0171. Kahului Airport, 20°54’26”N; 156°25’50”W, Keawe-koa haole woodland, malaise trap, 21 Oct. - 13 Nov. 2006. 20 spmns. Det. FG Howarth
Add	<i>Psychoda savaiiensis</i> Edwards, 1928	New island record. Previously known from Kaua‘i, O‘ahu, and Hawai‘i. Material examined: KA-0171. Kahului Airport, 20°54’26”N; 156°25’50”W, Keawe-koa haole woodland, malaise trap, 21 Oct. - 13 Nov. 2006. 10 spmns. Det. FG Howarth
Scatopsidae		
Add	<i>Rhegmoclemina parvula</i> Hardy, 1956	A common alien minute black scavenger fly
Add	<i>Scatopse</i> sp. A	Unidentified. Possible new state record.
Scenopinidae (
Add	<i>Scenopinus</i> ? species A.	An alien window fly
Sciaridae		
Add	<i>Bradysia molokaiensis</i> (Grimshaw, 1901)	New island record. Material examined: KA-0171. Kahului Airport, 20°54’26”N; 156°25’50”W, Keawe-koa haole woodland, malaise trap, 21 Oct. - 13 Nov. 2006. 5 males. Det. FG Howarth
Add	<i>Bradysia spatitergum</i> (Hardy, 1960)	
Add	<i>Corynoptera latistylata</i> ? (Hardy, 1956)	New island record? Previously known from O‘ahu. Material examined: KA-0171. Kahului Airport, 20°54’26”N; 156°25’50”W, Keawe-koa haole woodland, malaise trap, 21 Oct. - 13 Nov. 2006, 2 males. Identification needs confirmation. Det. FG Howarth
Add	<i>Hyperplasion</i> ? species A	New state record. Material examined: KA-0171. Kahului Airport, 20°54’26”N; 156°25’50”W, Keawe-koa haole woodland, malaise trap, 21 Oct. - 13 Nov. 2006. 2 males. Det. FG Howarth
Syrphidae		
Add	<i>Copestylum</i> cf. <i>tamaulipanum</i> (Townsend, 1898)	
Tipulidae		
Add	genus species A	New state record. This resembles the limoniid crane flies but has distinctive antennae and male terminalia as well as conspicuous pleural stripes. Material examined: KA-0124, Kahului Airport, 20°54’16”N; 156°26’16”W, <i>Bacopa</i> wetland, fogging, night, 18 Jul.2006. 1 male. same data, 1 male. Det. FG Howarth

Table 2. Continued.

ACTION	SCIENTIFIC NAME	NOTES
Order: HEMIPTERA: Suborder Heteroptera (True Bugs)		
	Lygaeidae	
Add	<i>Nysius coenosulus</i> Stal	
Add	<i>Nysius terrestris</i> Usinger	
	Mesovelidae	
Revise	<i>Mesovelia mulsanti</i> ? White, 1879	The nymph reported in 2002 as <i>Mesovelia</i> sp. A is most likely the widespread <i>M. mulsanti</i> .
Add	<i>Mesovelia amoena</i> (Uhler, 1894)	A small secretive species preferring darkly shaded pools.
	Miridae	
Add	<i>Opuna</i> sp. A	New state record , probably undescribed endemic species. Material examined: KA-0018, Kahului Airport, 20°54'01"N; 156°27'44"W, keawe & strand, MV bulb, 19 Jul 2006, 2 males, 2 females. Det. DJ Preston & DA Polhemus.
Add	<i>Stenotus binotatus</i> (Fabricius, 1794)	New island record . This species is recorded from Hawai'i I. Material examined: KA-0168, Kahului Airport, 20°53'48"N; 156°27'22"W, wetland, mixed keawe woodland, MV bulb, 14 Nov. 2006, 1 male. Det. DJ Preston
Add	<i>Stenotus</i> sp. A	New island record . This species is recorded from Hawai'i I. Material examined: KA-0170. Kahului Airport, 20°53'49"N; 156°26'58"W, mixed keawe woodland, MV bulb, 17 Nov. 2006, 6 spmns. Det. FG Howarth
	Nabidae	
Add	<i>Nabis</i> sp. A	New state record . This newly established adventive species is not related to native species. Material examined: KA-0018, Kahului Airport, 20°54'01"N; 156°27'44"W, keawe & strand, MV bulb, 19 Jul 2006, 1 female. Det. DA Polhemus
	Pentatomidae	
Add	<i>Piezodorus</i> sp near <i>grossi</i> Staddon, 1997	New state record . <i>P. grossi</i> is widespread in S Pacific, but the genus is circumtropical; potential pest of legumes. Material examined: KA-0022. Kahului Airport, 20°54'40"N; 156°25'34"W, <i>Leucaena</i> , mixed weeds, fogging <i>Macroptilium atropurpureum</i> , day, 18 Jul. 2006, 1 male. (Label lost) Kahului Airport, 20 Aug – 18 Nov. 2007, sticky trap, 1 male. Det. FG Howarth
Order: HEMIPTERA: Suborder Homoptera (Hoppers & Scales)		
	Aleroididae	
Add	<i>Aleurocanthus woglumi</i> Ashby, 1915	The citrus blackfly
Add	<i>Aleurodicus dugesii</i> Cockerell	The giant whitefly
	Derbidae	
Add	<i>Cedusa</i> sp. A	New island record . Unusual planthopper resembling <i>Melomenis</i> but smaller (4-5 mm long) with different wing venation and tiny last rostral segment. Previously recorded from O'ahu. Material examined: KA-0171. Kahului Airport, 20°54'26"N; 156°25'50"W, Keawe-koa haole woodland, malaise trap, 21 Oct. - 13 Nov. 2006. 2 spmns. Det. FG Howarth

Table 2. Continued.

ACTION	SCIENTIFIC NAME	NOTES
Order: HYMENOPTERA: (Bees and Wasps)		
	Agaonidae	
Add	Unidentified genus species A	
	Anthophoridae	
Add	<i>Ceratina (Pithitis) smaragdula</i> (Fabricius, 1787)	New island record. Previously recorded from O'ahu.. Widespread in tropical Asia. Material examined: KA-0064 Kahului Airport, 20°54'26"N; 156°25'50"W, Keawe-koa haole woodland, window trap, 18 Jul. - 18 Sep. 2006, 1 male, 1 female. Det. FG Howarth
	Aphelinidae	
Add	<i>Aphytis hispanicus</i> ? Mercet, 1912	New island record. Previously known from Midway. Material examined: KA-0179, Kahului Airport, 20°54'22"N; 156°25'56"W, koa haole shrubland, malaise trap, 04 Apr. 2000, 1 female. Det. JW Breadsley.
	Bethylidae	
Add	<i>Goniozus emigratus</i> Rower	New island record. Previously known from O'ahu. Material examined: KA-0178, Kahului Airport, 20°54'22"N; 156°25'56"W, koa haole shrubland, malaise trap, 16 Nov. 1999, 1 male. Det. JW Breadsley.
Add	Unidentified genus species	
	Braconidae	
Add	<i>Apanteles sp. nr carpatus</i>	New state Record. Material examined: KA-0178, Kahului Airport, 20°54'22"N; 156°25'56"W, koa haole shrubland, malaise trap, 16 Nov. 1999, 2 females. Det. JW Breadsley.
Add	<i>Cotesia</i> sp A	Specimens representing this and the following four genera were identified by J.W.Beardsley and returned to the museum after his death.
Add	Undetermined genus near <i>Opius</i>	
Add	Undetermined genus near <i>Rhacontus</i>	
Add	Undetermined genus near <i>Orgilus</i>	
Add	Undetermined genus species A	
Add	Undetermined genus species B	10 specimens not matching any of the species on the list were collected from KA-0171, malaise trap.
	Chalcididae	
Add	<i>Brachymeria discreta</i>	New island record. Adventive. Previously known from O'ahu. Material examined: KA-0180. Kahului Airport, 20°53'36"N; 156°27'05"W, Keawe woodland, MV bulb, 31 May 2003, 1 female. Det. JW Breadsley.
Add	<i>Dirhinus</i> species A	New island record. Material examined: KA-0171. Kahului Airport, 20°54'26"N; 156°25'50"W, Keawe-koa haole woodland, malaise trap, 21 Oct. - 13 Nov. 2006. 1 male. Det. DJ Preston
	Chrysididae	
Add	<i>Trichrysis</i> possibly <i>luzonica</i> (Mocsary, 1889)	
	Encyrtidae	
Add	genus species A	A series of specimens in JWBeardsley's collection that are identified only to family.

Table 2. Continued.

ACTION	SCIENTIFIC NAME	NOTES
Order: HYMENOPTERA [continued]		
	Eucoilidae	
Add	<i>Eucoila impatiens</i> (Say, 1836)	
	Eulophidae	
Add	<i>Quadrastichus erythrinae</i> Kim, 2004	The <i>Erythrina</i> gall wasp
Add	<i>Tetrastichinae</i> genus sp. A	probably a new state record
Add	<i>Zagrammosoma</i> possibly <i>multilineatum</i> (Ashmead, 1888)	New state record. This species is different from <i>Z. flavolineatum</i> Crawford, 1913, known from O'ahu. Material examined: KA-0065. Kahului Airport, 20°54'26"N; 156°25'50"W, Keawe-koa haole woodland, malaise trap, 18 Sep. - 21 Oct. 2006. 1 female. Det. J. Heraty.
	Evanidae (ensign wasps)	
	<i>Szepligetella sericea</i> (Cameron, 1883)	New island record. Adventive or purposeful. Previously known from Kaua'i, O'ahu, Moloka'i, Lana'i and Hawai'i. Material examined: KA-0171. Kahului Airport, 20°54'26"N; 156°25'50"W, Keawe-koa haole woodland, malaise trap, 21 Oct. - 13 Nov. 2006. 1 female. Det. FG Howarth
Add	Leucospidae	
Add	<i>Leucospis</i> sp. A not <i>affinis</i> Say, 1824	This wasp was first collected within the airport environs by M. Fukada, HDOA, in 2004. KA-0109- general
	Scelionidae	
Add	<i>Baeus</i> species A	New state record. Material examined: KA-0171. Kahului Airport, 20°54'26"N; 156°25'50"W, Keawe-koa haole woodland, malaise trap, 21 Oct. - 13 Nov. 2006. 1 female. Det. DJ Preston
	Sphecidae	
Revise	<i>Dicranorhina ritsemae luzonensis</i> (Rohwer, 1919)	" <i>Dicranorhina</i> " is a scarab beetle. The correct name for the wasp is <i>Polemistis luzonensis</i>
Add	<i>Polemistis luzonensis</i> (Rohwer, 1919)	New name for <i>Dicranorhina ritsemae luzonensis</i> (Rohwer, 1919)
Add	unidentified genus species A	New state record. Material examined: KA-0171. Kahului Airport, 20°54'26"N; 156°25'50"W, Keawe-koa haole woodland, malaise trap, 21 Oct. - 13 Nov. 2006. 1 female. Det. DJ Preston
Order: LEPIDOPTERA (Moths and Butterflies)		
	Crambidae	
Add	<i>Mestolobes minuscula</i> (Butler, 1881)	More than one species of this endemic genus appears to be represented. The most common form matches <i>M. minuscula</i> , found in the lowlands of all the islands.
Revise	<i>Orthomecyna</i> sp. near <i>exigua</i> (Butler, 1879)	Determined as <i>O. exigua</i> , but more than one species may be represented among the bewildering variation.
Add	<i>Orthomecyna exigua</i> (Butler, 1879)	Endemic.
Add	Immidae	
Add	<i>Imma mylias</i> Meyrick, 1906	
	Noctuidae	
Add	<i>Hypocala deflorata</i> (Fabricius, 1793)	
	Pyralidae	
Add	<i>Galleria mellonella</i> (Linnaeus, 1758)	The greater wax moth, an occasional pest of honey bee colonies.

Table 2. Continued.

ACTION	SCIENTIFIC NAME	NOTES
Order: LEPIDOPTERA (continued)		
Tortricidae		
Add	<i>Amorbia imigratella</i> Busck, 1910	
Add	Family? Genus species A	New state record. A single specimen of an unusual moth. Here also reported from O'ahu. Material examined: KA-0020 Kahului Airport, 20°54'16"N; 156°26'16"W, host search at night <i>Hibiscus</i> , 18 Jul. 2006. 1 female. O'AHU: Honolulu, Kalihi, 120 m, 21°20.6'N; 157°52.6'W, at light, 31 Jan.2007, FG Howarth, coll., 1 female. Det. FG Howarth.
Order: ORTHOPTERA (Grasshoppers and relatives)		
Tettigoniidae		
Add	<i>Phaneroptera furcifera</i> Stal, 1874	New island record. Previously known from Kaua'i, O'ahu, and Hawai'i. Material examined: KA-0169, Kahului Airport, 20°24'26"N; 156°26'01"W, keawe woodland, MV light, 16 Nov. 2006, 1 female. Det. DJ Preston.
Order: PSOCOPTERA (Bark lice)		
Lepidopsocidae		
Add	<i>Lepidopsocus maculatus</i> Thornton, Lee & Chui, 1972	.
Psocidae		
Add	<i>Ptycta</i> sp. A	A relatively large native bark louse (wingspan ~1 cm) living on keawe tree trunks.
Class: CRUSTACEA (Crabs and relatives)		
Order: ISOPODA (sowbugs & pillbugs)		
Ligiidae		
Add	<i>Ligia hawaiiensis</i> Dana, 1853	A native littoral isopod
Class: CHILOPODA (centipedes)		
Order: GEOPHILOMORPHA (soil centipedes)		
Mecistocephalidae		
Add	<i>Mecistocephalus spissus?</i> Wood, 1862	

TABLE 3. -- List of species of terrestrial arthropods known to occur within the Kahului Airport environs. Names and arrangement follow Nishida (2002), except as noted in Table 2.

ARTHROPOD FAUNA	Status in	Status on	Status and Distribution within Kahului Airport Environs		
	Hawai'i ¹	Maui ²	Veg Type ³	Relative ⁴ Abundance	Collection sites and Methods ⁵
Phylum: ARTHROPODA					
Class: ARACHNIDA:					
Subclass: ACARI (mites):					
Acaridae					
<i>Tyrophagus putrescentiae</i> (Schrank, 1781) mold mite	adv	-	G, J		2B-Dodonea leaf litter
Ameroseiidae					
genus & sp. ?	?	A	G, J		2B-Dodonea leaf litter
Anystidae					
<i>Anystis</i> sp. A	adv?	-	K		3B-Gas aspirator

¹ = **Biogeographic Status:** end=endemic to HIs, ind=indigenous to HIs, adv=adventive, pur=purposefully introduced, ?=Unknown,

² = **Status on Maui:** NIR = new island record, NSR = new state record and NTL = new to list for current study.
 A = new island record in 2002 report;
 B = new state record in 2002 report;
 C = new island record in 2006 report;
 D = new state record in 2006 report.
 E = new to list in 2006 report.

³ = **Habitat-Vegetation Types :**
 A = Wind sheared dune vegetation.
 B = Keawe/mixed understory.
 C = Open grassland.
 D = Koa Haole shrub/mixed understory.
 E = Cane fields and ruderal borders.
 F = Airfield /terminal/industrial.
 G = Kanaha Pond (water area).
 H = Wetlands.
 I = Unvegetated littoral.
 J = Native beach strand.
 K = Non-native ornamentals

⁴ = A subjective measure of abundance within the airport environs:
 'Common' = found at many sites or commonly seen;
 'Local' = common but restricted to one or few areas;
 'Uncommon' = only one or few specimen but found at multiple sites;
 'Scarce' = only one or a few specimens seen.

⁵ = See **Table 1** for collection sites for new records in the current study. These are indicated by the 6-digit alpha numeric code. The 2-digit alpha-numeric codes refer to areas where specimens reported in the 2002 and 2006 studies were collected.

Table 3 continued

ARTHROPOD FAUNA	Status in Hawai'i ¹	Status on Maui ²	Status and Distribution within Kahului Airport Environs		
			Veg Type ³	Relative ⁴ Abundance	Collection sites and Methods ⁵
Aphelacaridae					
<i>Aphelacarus</i> sp. A	?	A	D		4B- <i>Sida</i> leaf litter
Ascidae					
<i>Asca duosetosa</i> Fox, 1946	adv	A	G, J		2B- <i>Dodonea</i> leaf litter
<i>Asca</i> sp. A	adv?	A	B		3B-Tulgren funnel extraction-bird nest
Bdellidae					
<i>Bdella distincta</i> (Baker & Balock, 1944)	adv	A	G, J,D		2B- <i>Dodonea</i> leaf litter
<i>Bdellodes longirostris</i> (Hermann, 1804)	adv	A	D		4B-Malaise #2
<i>Spinibdella</i> sp. A	?	A	G, J, D		2B- <i>Dodonea</i> leaf litter, #2, 4B-Gas aspirator
Camerobiidae					
<i>Neophyllobius</i> sp. A	?	B	F		3B-Tulgren funnel extraction-bird nest
Cheyletidae					
<i>Hemicheyletia bakeri</i> Ehara, 1962	adv	A	G,J,B		1B-Gas aspirator- <i>Sporobolus</i> , 3B-Gas aspirator, 2B- <i>Dodonea</i> leaf litter, 3A-Tulgren funnel of bird nest, 4A-Gas aspirator
<i>Acarocheyla hawaiiensis</i> (Baker, 1949)	end?	-	D		4A-Malaise #1
Cunaxidae					
<i>Cunaxa</i> sp. nov. A ?	end?	-	G.J.B		1B-Gas aspirator- <i>Sporobolus</i> , 2B- <i>Dodonea</i> leaf litter, 4B-Gas aspirator, 3B-Tulgren funnel bird nest
Ereynetidae?					
genus & sp. ?	?	A	D		4B- <i>Sida</i> leaf litter
Erythraeidae					
<i>Balaustium</i> sp. nov. A	end?	-	D		4B-Gas aspirator, 4B-Malaise #2 4B- <i>Sida</i> leaf litter
genus & sp. ?	?	A	D		4A-Gas aspirator #2 at Malaise #1
Eupodidae					
<i>Eupodes</i> sp. nov. A	end	-	D		3B-Gas aspirator, 4A- Gas aspirator
Fusacaridae?					
genus & sp. ?	adv?	B	D		4B- <i>Sida</i> leaf litter
Galumnatidae					
<i>Pergalumna bryani</i> (Jacot, 1934)	adv	B	G,J		2B- <i>Dodonea</i> leaf litter,4B-Gas aspirator

Table 3 continued

ARTHROPOD FAUNA	Status in	Status on	Status and Distribution within Kahului Airport Environs		
SCIENTIFIC NAME	Hawai'i ¹	Maui ²	Veg Type ³	Relative ⁴ Abundance	Collection sites and Methods ⁵
Laelapidae					
<i>Hypoaspis</i> sp. A	?	-	D		4A-Malaise #1
Oribatulidae					
<i>Lucoppia burrowsii</i> (Michael, 1890)	adv	-	G,J,D		2C-Gas aspirator, 2B- <i>Dodonea</i> leaf litter, 3B-cup trap, 3B-Gas aspirator, 4A, 4B-Gas aspirator
<i>Zygoribatula</i> sp. A	adv?	A	G,J,D		4A-Gas aspirator, 2C-Gas aspirator, 2B-Gas aspirator, 2B- <i>Dodonea</i> leaf litter, 3B-Gas aspirator
Phthiracaridae					
<i>Atropacarus</i> (A.) <i>striculus</i> (Koch, 1834)	adv	-	G,J		2B- <i>Dodonea</i> leaf litter
Phytoseiidae					
genus & sp.? undetermined	?	?	D		4B-Gas aspirator
Pyemotidae					
<i>Pyemotes tritici</i> (LaGreze-Fossart & Montagne, 1851)	adv	-	B		3A-Tulgren funnel bird nest
Schelorbitidae					
<i>Schelorbitates castlei</i> Jacot, 1934	end?	A	D		4B-Gas aspirator
<i>Schelorbitates muiri</i> Jacot, 1934	end	A	G,J		2B- <i>Dodonea</i> leaf litter
<i>Schelorbitates</i> sp. A	?	A	G,J		2B- <i>Dodonea</i> leaf litter
<i>Schelorbitates</i> sp. B	?	A	G,J		2B- <i>Dodonea</i> leaf litter
? <i>Schelorbitates</i> sp. C	?	A	B,D		3A- Tulgren funnel -bird nest, 4B-Malaise #2, 3B-Gas aspirator
Tarsonemidae					
<i>Tarsonemus</i> ? sp. A	?	-	H		3B-Gas aspirator
Tenerifiidae					
genus & sp. ?	?	?	D		4B- <i>Sida</i> leaf litter
Tetranychidae					
genus & sp. ?	?		G,H,J		4A-Gas aspirator, 4B- <i>Sida</i> leaf litter
Tydeidae					
<i>Lorryia pandana</i> Baker, 1968	ind	B	D		4A-Gas aspirator, 4B- <i>Sida</i> leaf litter
<i>Pronematus</i> sp. A	?	A	D		4B-Gas aspirator nr Malaise
<i>Tydeus tutlei</i> Baker, 1965	adv	A	D		4A-Gas aspirator, 4B- <i>Sida</i> leaf litter
Tyroglyphidae					
genus & sp. ?	?	A	H,D		3B-Gas aspirator
Uropodina, family?					
genus & sp. ?	?	?	D		4A-Malaise #1

Table 3 continued

ARTHROPOD FAUNA	Status in	Status on	Status and Distribution within Kahului Airport Environs		
	Hawai'i ¹	Maui ²	Veg Type ³	Relative ⁴ Abundance	Collection sites and Methods ⁵
Subclass: ARANEAE (spiders)					
Araneidae (orb weavers)					
<i>Argiope appensa</i> (Walckenaer, 1841) (*yellow garden spider)	adv	-	B,H	Common	4B-Malaise #2
<i>Gasteracantha cranciformis</i> (Linnaeus, 1758) spinybacked spider	adv	A	B,G	Scarce	1B- search
<i>Gasteracantha mammosa</i> C.L. Koch, 1844 (Asian spinybacked spider)	adv	-	B,G	Common	2B-general 1B-host search
<i>Neoscona theisi</i> (Walkenaer, 1841)	adv	E	G,B,D	Uncommon	1B, 3B, Gas Aspirator-grass
Clubionidae					
<i>Clubiona</i> sp. A	adv	NSR?			KA-0171-Malaise trap
<i>Cheiracanthium mordax</i> L. Koch, 1866 (*pale leaf spider)	adv	-	B,H	Uncommon	3B-Gas aspirator
Desidae					
<i>Paratheuma makai</i> Berry & Beatty, 1989	end	NIR	coast		KA-0047, general
Dysderidae					
<i>Dysdera crocota</i> C.L. Koch, 1838	adv	-	B,H	Scarce	2B Gas aspirator
Gnaphosidae					
<i>Scotophaeus blackwalli</i> (Thorel, 1871)	adv	C	B	Local	4A-Malaise
<i>Zelotes reformans</i> Chamberlin, 1924	adv	A	H	Local	4A-On ground
Heteropodidae (giant crab spiders)					
<i>Heteropoda venatoria</i> (Linnaeus, 1767) cane spider	adv	-	B, D	Common	3B-general
Linyphiidae (sheet-web spiders)					
<i>Erigone</i> species A	adv?	C	C	Local	3B-Gas Aspirator
Lycosidae (wolf spiders)					
<i>Lycosa</i> sp. A (wolf spider)	end?	-	H	Scarce	3B-on ground
Mysmenidae					
<i>Mysmenella?</i> sp. A	adv?	NIR?	H	Scarce	KA-0065 malaise trap. KA-0048 general
Ochyroceratidae (minute web spiders)					
<i>Theotima radiata</i> (Simon, 1891)	adv	E	B	Local	4A-Malaise. KA-0064 Window trap
Oonopidae (6-eyed jumping spiders)					
<i>Opopaea</i> sp. A	end?	C	B	Uncommon	4A, Tulgren funnel-bird nest, KA-0064 window trap
<i>Orchestina</i> sp. A?	?	NIR	B	Uncommon	KA-0171-Malaise trap
<i>Orchestina</i> sp. B	?	NSR	B	Uncommon	KA-0171-Malaise trap

Table 3. continued

ARTHROPOD FAUNA	Status in	Status on	Status and Distribution within Kahului Airport Environs		
	Hawai'i ¹	Maui ²	Veg Type ³	Relative ⁴ Abundance	Collection sites and Methods ⁵
Oxyopidae (lynx spiders)					
<i>Oxyopes</i> sp. A [Kumashiro, et. al., 1990] (lynx spider)	adv	-	A-H	Common	On vegetation at most sites. gas aspirator
Pholcidae					
<i>Artema atlanta</i> Walckenaer, 1837	adv	C	F	Local	3B-General, in bunker
<i>Smeringopus pallidus</i> Blackwall, 1858)	adv	E	F	Local	2B-General, in well-shaft
Salticidae (jumping spiders)					
<i>Hasarius adansoni</i> (Audouin, 1826)	adv	E	J	?	4A, general
<i>Menemerus bivittatus</i> (Dufour, 1831)	adv	C	K	?	3B, Gas aspirator
<i>Messua</i> c.f. <i>felix</i> (Peckham & Peckham, 1901)	adv	E	D	Local	4B, Malaise
<i>Phintella versicolor</i> ? (CL Koch, 1846)	adv	C	K	?	3B, Gas aspirator
Scytodidae (spitting spiders)					
<i>Scytodes fusca</i> ? Walckenaer, 1837	adv	E	B	Local	2B, General, Keawe trunks at night, KA-0171-Malaise trap
Tetragnathidae (long-jawed spiders)					
<i>Tetragnatha</i> sp. A	adv?	?	H	Local	2B, 3A-Gas aspirator, pool margins
Theridiidae (cob-web spiders)					
<i>Argyrodes argentatus</i> Cambridge, 1880	adv	C	H	Uncommon	3A, Sweeping pool margin
<i>Coleosoma floridanum</i> Banks, 1900	adv	A	K	?	3B, Gas aspirator
<i>Steatoda erigoniformis</i> (Cambridge, 1872)	adv	E	E	Local	4A, General, under stones
<i>Theridion melanostictum</i> Cambridge, 1876	adv	A	K,B	Common	1B,2C,3B,4A,4B-Gas aspirator, general
Uloboridae					
<i>Zosis geniculata</i> (Olivier, 1789)	adv	C	F	Local	General, in bunker
Order: PSEUDOSCORPIONIDA (false scorpions)					
Family?					
genus & sp. A	?	?	B	Local	3C-under bark. KA-0064 window trap
Order: SCORPIONES (scorpions)					
Buthidae					
<i>Isometrus maculatus</i> (DeGeer, 1778) lesser brown scorpion	adv	-	B	Common	3B-general

Table 3 continued

ARTHROPOD FAUNA	Status in	Status on	Status and Distribution within Kahului Airport Environs		
SCIENTIFIC NAME	Hawai'i ¹	Maui ²	Veg Type ³	Relative ⁴ Abundance	Collection sites and Methods ⁵
Class: INSECTA (insects)					
Order: BLATTODEA (cockroaches)					
Blaberidae					
<i>Diploptera punctata</i> (Eschscholtz, 1822) beetle cockroach	adv	-	A	Scarce	4A-general
<i>Pycnoscelus indicus</i> (Fabricius, 1775) (Surinam cockroach)	adv	-	H	Common	4A-general, KA-0170 – MV light
Blatellidae					
<i>Balta</i> sp. A [probably Kumashiro (1998)]	adv	-	A, B	Scarce	3A, 4A-Gas aspirator, Fog, general
<i>Blatella lituricolis</i> (Walker) false German cockroach	adv	-	F, K	Common	3A, 3B, 4A Gas aspirator, general, MV Bulb, , KA-0171-Malaise trap, KA-0170 – MV light
<i>Loboptera dimidiatipes</i> (Bolivar, 1890)	adv	NTL	B	Uncommon	KA-0057 – MV light window trap KA-0064
<i>Symploce pallens</i> (Stephens, 1835)	adv	A	D	Scarce	4A-general
Blattidae					
<i>Neostylopyga rhombifolia</i> (Stoll, 1813)	adv	C		Scarce	4A-General, grasses and shrubs
<i>Periplaneta americana</i> (Linnaeus) American cockroach	adv	-	F, B	Common	3B, 4A-general
<i>Periplaneta australasiae</i> (Fabricius, 1775)	adv	E	B	Scarce	1B- MV Bulb.
<i>Platyzosteria soror</i> (Brunner, 1865)	adv	-	A, C	Common	3A, 4A-general
Polyphagidae					
<i>Euthyrrhapha pacifica</i> (Coquebert, 1804) (Pacific cockroach)	adv	-	A,B,D	Common	4A-Malaise #1, 3A- on road, KA-0171-Malaise trap
Order: COLEOPTERA (beetles)					
Aderidae (ant-like leaf beetles)					
<i>Xylophilus marquesanus</i> Blair, 1934	adv	A	D	Common	2B-Gas Aspirator, 3A, 4B-MV Bulb
Anobiidae (death-watch beetles)					
<i>Ozognathus</i> sp. A	adv	A	C,D	Common	2B-Gas Aspirator, 2B-host search; 4B-Black light
<i>Tricorynus herbarium</i> (Gorham, 1883)	adv	E	D	Scarce	4A- Lindgren funnels
<i>Tricorynus sharpi</i> (Pic, 1912)	end	-	D,H	Common	2B, 3B-MV bulb, 4B-Malaise #2, KA-0170 – MV

Table 3. continued

ARTHROPOD FAUNA	Status in Hawai'i ¹	Status on Maui ²	Status and Distribution within Kahului Airport Environs		
			Veg Type ³	Relative Abundance ⁴	Collection sites and Methods ⁵
Anthicidae (ant-like flower beetles)					
<i>Anthicus recens</i> Werner, 1967	adv	A	D	Common	4A-Lindgren funnels
<i>Anthicus tobias</i> Marseul, 1879	adv	C	C	Scarce	3C-MV Bulb
<i>Formicomus imperator</i> (LaFerte, 1847)	adv	C	H	Scarce	4A-Gas aspirator, on <i>Heliotropium</i>
Anthribidae (fungus weevils)					
<i>Araecerus constans</i> Perkins, 1900	end	A	B	Local	3A-Bait trap KA-00171
<i>Araecerus fasciculatus</i> (DeGeer, 1775) (*coffee bean weevil)	adv	-	H,K	Common	4A-Malaise, 2B-host search, Lindgren funnels
<i>Araecerus levipennis</i> Jordan, 1924 (koa haole seed weevil)	adv	-	B,D,H, K	Common	3A, 3B, 4A-Gas Aspirator, 4B-Malaise #2 #2
<i>Exillus lepidus</i> Jordon, 1922	adv	NTL	D	Scarce	4B- Malaise
Bostrichidae (branch & twig borers)					
<i>Amphicerus cornutus</i> (Pallas, 1772) powderpost bostrichid	adv	-	B,G,H	Common	1B-MV bulb, 2B-Black light, 4A- Malaise
<i>Dinoderus minutus</i> (Fabricius, 1775)	adv	NTL	H	Scarce	4B Lindgren funnels, <i>Hibiscus</i>
<i>Sinoxylon conigerum</i> Gerstaecker, 1855	adv	-	B,C,F	Uncommon	4A-Malaise #1, 4B-Malaise #2
<i>Trogoxylon aequale</i> (Wollaston, 1867)	adv	A	J	Local	2B-host search- sifting <i>Dodonaea</i> litter
<i>Xylopsocus capucinus</i> (Fabricius, 1781)	adv	A	D,F	Scarce	4A-Malaise #1
<i>Xylopsocus castanoptera</i> (Fairmaire, 1850)	adv	A	D,F	Local	4A-Malaise #1, 4A-MV bulb
Brentidae (straight-snouted weevils)					
<i>Cylas formicarius</i> (Fabricius, 1798) Sweet potato weevil	adv	-	D, E	Common	2C,4A-Gas aspirator, 2B-host search- <i>Ipomea</i>
Buprestidae (metallic wood-boring beetles)					
<i>Chrysobothris indica</i> Castlenau & Gory, 1837 flatheaded borer	adv	-	D	Local	4B-Malaise #2
<i>Aphanisticus cochinchinae seminulum</i> Obenberger, 1929	adv	B	E	Uncommon	2C, 3B, 4A-Gas Aspirator.
Cantharidae (soldier beetles)					
<i>Caccodes oceaniae</i> (Bourgeois, 1884)	adv	-	D	Local	4B-Malaise #2

Table 3 continued

ARTHROPOD FAUNA	Status in Hawai'i ¹	Status on Maui ²	Status and Distribution within Kahului Airport Environs		
			Veg Type ³	Relative Abundance ⁴	Collection sites and Methods ⁵
Carabidae (ground beetles)					
<i>Anisotarsus (Eurytrichus) purpurascens</i> Bates	adv?	B	B,D	Local	4A-MV bulb
<i>Bembidion niloticum batesi</i> (Putzeys, 1875)	adv?	A	B,D	Common	2B-MV bulb, 4A-MV bulb, KA-0170 – MV light
<i>Gnathaphanus picipes</i> (Macleay, 1864)	adv	-	B,D	?	2B-MV bulb
<i>Gnathaphanus upolensis</i> (Csiki, 1915)	adv	-	B	Common	2B-MV bulb, KA-0170 – MV light
<i>Metacolpodes buchanani</i> (Hope, 1831)	adv	-	B	Common	2A-MV bulb
<i>Perigona nigriceps</i> (Dejean, 1831)	adv	A	D	Local	2A-MV bulb, KA-0170 – MV light
<i>Stenolophus ?limbalis</i> LeConte, 1860	pur?	A	D,F,G	Common	3C-MV bulb, 4A-Malaise #1 KA-0170 – MV light
Cerambycidae (long-horned wood boring beetles, longicorn beetles)					
<i>Ceresium unicolor</i> (Fabricius, 1787)	adv	-	B	Scarce	2B-MV bulb, KA-0171-Malaise trap
<i>Curtomerus flavus</i> (Fabricius, 1775)	adv	-	K	Uncommon	2B-Gas aspirator
<i>Placosternus crinicornis</i> (Chevrolat, 1860)	adv	-	B	Common	4A-Malaise, KA-0171-Malaise trap
<i>Plagithmysus kahului</i> Samuelson, 2006 (Hawai'i longhorned beetle)	end	N TL	A	Local	2B-Gas aspirator 2B, 4A Host search- <i>Chenopodium</i>
<i>Sybra alternans</i> (Wiedemann, 1825)	adv	-	All veg. types.	Common	Many MV bulb, Malaise & Gas aspirator, 4A-fogging, KA-0171-Malaise, KA-0170 – MV
Chrysomelidae (leaf & seed beetles)					
<i>Acanthoscelides macrophthalmus</i> (Schaeffer, 1907)	adv	A	A, D	Common	2B-Host search, 3B-Malaise, 4A KA-0171
<i>Algarobius bottimeri</i> Kingslover, 1972. kiawe bean weevil	adv	-	G	Common	1B-general, 2B-MV bulb KA-0171
<i>Carydon serratus</i> (Oliver, 1790) Tamarind seed weevil	adv	-	G	Common	1B-general KA-0171
<i>Diachus auratus</i> (Fabricius, 1801) bronze leaf beetle	adv	-	K	Common	3B-host search
<i>Lema trilineata</i> White, 1981	adv	-	H	Scarce	2B-beating <i>Chenopodium</i>
<i>Megacerus leucospilus</i> (Sharp, 1885)	adv	-	J	Scarce	2B-Gas aspirator
<i>Mimosestes amicus</i> (Horn, 1873)	adv	-	F, D	Common	2B-fogging, 3A-MV bulb, 4B-fogging, KA-0170 – MV light KA-0171
<i>Mimosestes insularis</i> Kingsolver & Johnson, 1978	adv	A	B,F	Uncommon	1B, 3C-MV bulb, general, KA-0170 – MV light

Table 3 continued

ARTHROPOD FAUNA	Status in	Status on	Status and Distribution within Kahului Airport Environs		
SCIENTIFIC NAME	Hawai'i ¹	Maui ²	Veg Type ³	Relative ⁴ Abundance	Collection sites and Methods ⁵
Chrysomelidae (continued)					
<i>Specularius impressithorax</i> (Pic,)	adv	E	K	Local	2B, On <i>Erythrina</i> seeds
<i>Stator pruininus</i> (Horn, 1873) pruinose bean weevil	adv	-	F, D	Common	2B, 3A, 3B-Malaise, 4A-Gas Aspirator,
Ciidae (minute tree-fungus beetles)					
<i>Cis</i> sp. A	end	-	B	Scarce	3C-MV bulb
Clambidae (minute beetles)					
<i>Clambus</i> sp. A not <i>pubescens</i> Redtenbacher	adv/ end?	B	B	Local	4A-Gas aspirator - Christmas berry, Malaise
Cleridae (checkered beetles)					
<i>Tarsostenus univittatus</i> (Rossi, 1792)	adv	A	B,D,F	Uncommon	2C-MV bulb, 4B-Malaise #2
<i>Tillus notatus</i> Klug, 1840	adv	-	D, K	Common	2B-Malaise, 4B-Gas aspirator
Coccinellidae (lady beetles, ladybugs)					
<i>Brumoides suturalis</i> (Fabricius, 1798) threestriped lady beetle	adv	A	J	Local	2B, 4A-leaf litter sift, Sweep net
<i>Coccinella septempunctata</i> Linnaeus, 1758 (sevenspotted lady beetle)	pur	-	D,F	Uncommon	3A-general, 4A-host search
<i>Coelophora inaequalis</i> (Fab., 1775) Common Australian lady beetle	pur	-	H	Common	3B-MV bulb, 4A-Malaise & Gas Aspirator, 2B-host search
<i>Cryptolaemus montrouzieri</i> Mulsant, 1853	pur	E	A	Local	4A-General, predator, found on native shrubs
<i>Curinus coeruleus</i> (Mulsant, 1850)	pur	-	A	Common	4A-host search
<i>Delphastus pusillus</i> (Le Conte) spiraling white fly lady beetle	pur	-	F, K	Scarce	4B-Gas aspirator
<i>Diomus debilis</i> (Le Conte, 1852)	pur	-	G, B	Common	2B, 3B Gas aspirator
<i>Diomus notesens</i> (Blackburn, 1889)	pur	-	F	Local	3B-Gas aspirator
<i>Diomus</i> sp A	pur?	NTL	B	Scarce	KA-00171 malaise
<i>Hippodamia convergens</i> Guerin-Meneville, 1844	pur	-	G,H	Scarce	2C-Gas aspirator
<i>Hyperaspis pantherina</i> Fürsch, 1975	pur	-	A	Common	4A-host search
<i>Nephaspis</i> cf <i>bicolor</i> Gordon, 1982	pur	A	K	Local	3B-host, orchid tree flower
<i>Nephus bilucernarius</i> Mulsant, 1850	pur	-	B	Local	2B-Gas Aspirator, 2B-host search
<i>Nephus roepkei</i> (Fluiter, 1938)	pur	-	D	Local	4A-Lingren funnels
<i>Olla v-nigrum</i> (Mulsant, 1866)	pur?	-	B, A, D	Common	2C-MV bulb 4A-Gas aspirator 4B-Malaise #2 #2
<i>Rodolia cardinalis</i> (Mulsant, 1853)	pur	-	D	Local	3B-Malaise, 2B-host search
<i>Scymnus horni</i> Gorham, 1897	adv	C	C	Local	4B-Sweeping <i>Abutilon</i>
<i>Sticholotis ruficeps</i> Weise, 1902	pur	-	F, K	Common	3B-Gas Aspirator
<i>Telsimia nitida</i> Chapin, 1926	pur	A	F	Scarce	2B-host search

Table 3 continued

ARTHROPOD FAUNA	Status in Hawai'i ¹	Status on Maui ²	Status and Distribution within Kahului Airport Environs		
			Veg Type ³	Relative Abundance ⁴	Collection sites and Methods ⁵
Corylophidae (minute fungus beetles)					
<i>Anisomeristes basalis</i> Sharp, 1885	adv	NTL	G	Local	Gas aspirator, night, <i>Dodonaea viscosa</i> , 2.xii. 00
<i>Sericoderus ?pubipennis</i> Sharp, 1885	end?	-	B	Local	3B-MV bulb & Lindgren funnels
Curculionidae (weevils)					
<i>Acalles</i> sp. A	end	-	J	Scarce	2B-Gas aspirator
<i>Asynonychus godmanni</i> Crotch, 1867	adv	-	B, H	Common	3B & 4A-host search, most Malaise & MV, KA-0171- KA-0170
<i>Crossotarsus externedentatus</i> (Fairmaire, 1850)	adv	A	H	Common	3B-MV.light
<i>Hypothenemus eruditus</i> (Westwood, 1835)	adv	-	B,D	Uncommon	3A-Lindgren funnels
<i>Hypothenemus</i> sp. A	adv	?	D	Common	4A, 4B-Malaise
<i>Hypothenemus ? pubescens</i> Hopkins, 1915	adv	?	B,D	Scarce	3A-Lindgren funnels
<i>Hypothenemus ?farinosa</i> Blandford	adv	B?	B,D	Uncommon	3A-Lindgren funnels, 4A Gas aspirator <i>Schinus</i>
<i>Hypothenemus ?seriatus</i> (Eichhoff, 1871)	adv	A	B,D	Common	3A-Lindgren funnels
<i>Hypurus bertrandi</i> (Perris, 1852)	adv	-	E	Local	3A-Gas aspirator, 4A-host search
<i>Listroderes difficilis</i> Germain, 1895	adv	E	A	Scarce	4A-MV Bulb
<i>Lixus mastersi</i> Pascoe, 1874	adv	A?	B, A	Common	3B-Gas Aspirator, 4A-host search, <i>Atriplex</i>
<i>Myllocerus</i> sp. A [Beardsley & Kumashiro, et al., 1990,	adv	A	B, K	Common	3A-MV bulb, 3A-Gas aspirator, KA-0170 – MV
<i>Platypus parallelus</i> (Fabricius,)	adv	B	B, G	Uncommon	2B-MV bulb
<i>Sitophilus oryzae</i> (Linnaeus, 1763)	adv	-	C,D,F		4A-Malaise #1
<i>Sphenophorus venatus vestitus</i> Chittenden, 1904	adv	NTL	K	Scarce	KA-0061 – MV light
<i>Xyleborus affinis</i> Eichhoff, 1867	adv	-	B,D	Scarce	3A-Lindgren funnels
Dermestidae (skin & carpet beetles)					
<i>Attagenus fasciatus</i> (Thunberg, 1795)	adv	-	D,K	Local	3B-host search, 4A-Lindgren funnels
<i>Attagenus undulatus</i> (Motschulsky, 1858)	adv	C	H	Scarce	4A-Lindgren beetle trap. 2B- night on lily flowers.
<i>Orphinus terminalis</i> (Sharp, 1885)	ind	-	B, D	Common	3A-Gas aspir., 3A-Lindgren funnels, 4B-Malaise #2

Table 3 continued

ARTHROPOD FAUNA	Status in Hawai'i ¹	Status on Maui ²	Status and Distribution within Kahului Airport Environs		
			Veg Type ³	Relative Abundance ⁴	Collection sites and Methods ⁵
Elateridae (click beetles)					
<i>Aeolus livens</i> (Le Conte, 1853)	adv	A	F, G	Common	2B-MV bulb, 2C-MV bulb
<i>Cardiophorus stolatus</i> Erichson, 1840	adv	A	H, B, G	Common	2B-MV bulb, 4A-MV bulb, KA-0170 – MV light
<i>Conoderus exsul</i> (Sharp, 1877)	adv	-	D, H	Common	3A, 4A-MV bulb. KA-0171 Malaise, KA-0170 MV
<i>Conoderus pallipes</i> (Eschscholtz, 1830)	adv	A	H, D	Common	3A-MV, 3B, 4A-Malaise & Gas Aspirator, KA-0171 Malaise. KA-0170 MV
<i>Lacon modestus</i> (Boisduval, 1835)	adv	A	B	Common	2B-MV bulb
<i>Melanotus punctosus</i> (Walker,)	adv	D	F	Common	2B-general, KA-0171-Malaise trap, KA-0170 – MV light
<i>Melanoxanthus melanocephalus</i> (Fabricius, 1781)	adv	-	D	Common	4A-Malaise, KA-0171-Malaise trap
<i>Prodrasterius collaris</i> (Candeze, 1859)	adv	NIR	B	Uncommon	KA-0170 – MV light KA-0171-Malaise trap
<i>Simodactylus cinnamomeus</i> (Boisduval, 1835)	adv	-	H, D	Common	4A-MV bulb, KA-0171-Malaise trap, KA-0170 – MV light
Endomychidae (handsome fungus beetles)					
<i>Eidoreus minutus</i> Sharp, 1885	end	A	D	Scarce	3A-Lindgren funnels
Erotylidae (pleasing fungus beetles)					
<i>Cryptophilus integer</i> (Heer, 1841)	adv	A	B	Common	3C, 4A-Lindgren funnels
Hydrophilidae (water scavenger beetles)					
<i>Cercyon</i> sp. nr. <i>fimbriatus</i> Mannerheim, 1852	adv	B	J	Local	4A-general, KA-0170 – MV light
<i>Cercyon quisquilius</i> (Linnaeus, 1761)	pur		D	Local	4B-Malaise #2
<i>Enochrus sayi</i> Gundersen, 1977	adv	A	G	Common	2B-MV bulb, KA-0170 – MV light
<i>Tropisternus salsamentus</i> Fall, 1901	adv	-	H,B	Local	2B-MV bulb., KA-0170 – MV light
Laemophloeidae (lined flat bark beetles)					
<i>Laemophloeus</i> sp. A not <i>L. minutus</i> Oliver,	adv	B	D	Local	3A-Lindgren funnels
Latridiidae (minute brown scavenger beetles)					
<i>Corticaria?</i> <i>longicollis?</i> (Zeterstedt, 1838)	adv?	A	D	Local	4A-Lindgren funnels
<i>Cartodere?</i> sp. A	adv	C/D?	J	Scarce	2B-Tullgren funnel

Table 3 continued

ARTHROPOD FAUNA	Status in	Status on	Status and Distribution within Kahului Airport Environs		
SCIENTIFIC NAME	Hawai'i ¹	Maui ²	Veg Type ³	Relative ⁴ Abundance	Collection sites and Methods ⁵
Mycetophagidae (hairy fungus beetles)					
<i>Litargus balteatus</i> Le Conte, 1856	adv?	-	B, G	Local	2C-MV bulb, 3A-Lindgren funnels
<i>Litargus vestitus</i> Sharp, 1879	ind	-	B, K	Uncommon	3A-MV bulb, 4A-Lindgren funnels
<i>Typhaea stercorea</i> (Linnaeus, 1758)	adv	-	D	Local	4B-Malaise #2
Nitidulidae (sap beetles)					
<i>Carpophilus dimidiatus</i> (Fabricius, 1792)	adv	-	K	Local	2B-HDOA Lab. 3A-Bait trap
<i>Carpophilus hemipterus</i> (Linnaeus, 1758)	adv	-	K	Common	3B-host search, spider lily flowers
<i>Carpophilus humeralis</i> (Fabricius, 1798)	adv	-	F, G	Common	3B-Gas Aspirator &, 2C-Gas Aspirator, KA-0171-Malaise trap
<i>Carpophilus marginellus</i> Motschulsky, 1858	adv	A	D, K	Common	3B-host search, 4A-Malaise KA-0171-Malaise trap
<i>Carpophilus mutilatus</i> Erichson, 1843	adv	C	K	Common	3B-General, on ornamentals
<i>Conotelus mexicanus</i> Murray, 1864	adv	-	K	Local	3B-host search, spider lily flowers
<i>Haptoncus luteolus</i> (Erichson, 1843)	adv	A	F	Scarce	2B-general, KA-0170 – MV light
<i>Phenolia limbatus tibialis</i> (Boheman, 1851)	adv	A	B	Common	3B-MV bulb, KA-0170 – MV light
<i>Stelidota chontalensis</i> Sharp [= sp. A Beardsley et al, 1992, in part ?]	adv	D	B	Scarce	2B- MV bulb
<i>Stelidota geminata</i> (Say, 1825) (strawberry sap beetle)	adv	D	B, D	Scarce	2B-MV bulb, 4A-MV bulb KA-0170 – MV light
Rhipiphoridae					
<i>Rhipidius pectinicornis</i> Thunberg, 1806	adv	NIR			KA-0171-Malaise trap
Oedemeridae (false blister beetles)					
<i>Ananca bicolor</i> (Fairmaire, 1849)	adv	A	H	Common	1B,3A,3B,4A-(Most MV bulbs)
Scarabaeidae (scarabs)					
<i>Adoretus sinicus</i> Burmeister, 1855 (Chinese rose beetle)	adv	-	E, G, H	Common	2C-Gas Aspirator, 3C-MV bulb, 4B-Malaise #2, KA-0171-Malaise trap, KA-0170 – MV light
<i>Larrus lividus</i> (Olivier, 1789)	adv	-	E	Common	2C-MV&Blk light bulb, KA-0170 – MV light
<i>Ataenius cognatus</i> (Le Conte, 1859)	adv	-	G	Common	2B-MV bulb, KA-0170 – MV light
<i>Onthophagus catta</i> (Fabricius, 1787)	pur	E	B	Uncommon	B2, MV bulb
<i>Protaetia fusca</i> (Herbst, 1790)	adv	E	B	Scarce	2B- Gas aspirator

Table 3 continued

ARTHROPOD FAUNA	Status in Hawai'i ¹	Status on Maui ²	Status and Distribution within Kahului Airport Environs		
			Veg Type ³	Relative Abundance ⁴	Collection sites and Methods ⁵
Scirtidae (marsh beetles)					
<i>Scirtes</i> sp. A [Beardsley & Mau, 1976]	adv	A	H	Common	4A-MV bulb
Silvanidae (silvanid flat bark beetles)					
<i>Cryptamorpha desjardinsi</i> (Guerin-Meneville, 1844)	adv	-	A to K	Common	3B-host search most MV bulbs
<i>Psammoechus insularis</i> Sharp, 1885	adv	A	K	Scarce	3B-MV bulb
<i>Silvanoprus scuticollis</i> (Walker)	adv	B	F, G	Scarce	2B-MV bulb, 2C-MV bulb
Staphylinidae (rove beetles)					
<i>Anotylus</i> sp. A	adv	A/ B	B, D, H,	Uncommon	2B-general, 4A-MV bulb, KA-0171-Malaise trap, KA- 0170/0169 – MV light
<i>Astenus</i> sp. A	adv	D	H	Scarce	3A-sweeping pool margin
<i>Atheta</i> sp. A	adv?	NTL			KA-0171-Malaise trap
<i>Carpelimus</i> sp. A	adv?	A	B,D	Common	3A-Lindgren funnels, 4A-MV bulb
<i>Carpelimus</i> sp. B	adv?	C	B,D	Scarce	3A-Lindgren funnels, 4A-MV bulb
<i>Carpelimus</i> sp. C	adv?	C	B,D	Scarce	3A-Lindgren funnels, 4A-MV bulb
<i>Coproporus</i> sp. A [=“ <i>Tachinus</i> sp. (Williams, 1931)” in Nishida 2000	adv	A	G,H	Scarce	2B, MV bulb, KA- 0170/0169 – MV light
<i>Coproporus</i> sp. B	adv	NTL			KA-0171-Malaise trap
<i>Lithocharis</i> sp. A	adv	A	D, H	Uncommon	4A-MV bulb
<i>Hesperus</i> sp. A [NB corrected name in Table 2]	adv	D	C,F	Scarce	4B-Malaise #2
Oxytelinae: genus? and sp. A		NSR?	B	Scarce	KA-0064-window trap
<i>Philonthus discoideus</i> (Gravenhorst, 1802)	adv	-	B,D,H	Scarce	4A-MV bulb
<i>Philonthus</i> nr. <i>discoideus</i> (Gravenhorst, 1802)	adv	NSR?	B	Scarce	KA-0169/0170 – MV light KA-0064-window trap
<i>Philonthus longicornis</i> Stephens, 1832	adv	-	D	Scarce	4A, 4B-Malaise
<i>Philonthus rectangulus</i> Sharp, 1874	adv	NIR	B	Scarce	KA-0064 – window trap
<i>Philonthus turbidus</i> Erichson, 1840	adv	-	B, H	Common	4A-MV bulb
<i>Philonthus</i> sp. A	adv	NSR?	B	Scarce	KA-0169 – MV light
<i>Philonthalpus analis</i> (Erichson, 1840)	pur	-	C,D,F	Scarce	4A-Malaise #1, KA-0170 – MV light
<i>Rugilus</i> sp. A	adv	D	B,H	Scarce	3B-4B- MV bulb
<i>Scopaeus</i> sp. A	adv	A	F	Scarce	3B-Gas aspirator
<i>Sunius</i> sp. A	adv	NSR?	B	Scarce	KA-0064 – window trap
<i>Sunius</i> sp. B	adv	D	B	Scarce	3C-MV bulb
Xantholinini: genus sp. A	adv	NSR?	B	Scarce	KA-00170 MV bulb

Table 3 continued

ARTHROPOD FAUNA	Status in	Status on	Status and Distribution within Kahului Airport Environs		
SCIENTIFIC NAME	Hawai'i ¹	Maui ²	Veg Type ³	Relative ⁴ Abundance	Collection sites and Methods ⁵
Tenebrionidae (darkling beetles)					
<i>Alphitobius diaperinus</i> (Panzer, 1796)	adv	-	D,H	Scarce	4A-MV bulb
<i>Alphitobius laevigatus</i> (Fabricius, 1781)	adv	A	D,H	Scarce	4A-Pitfall trap, 4A-General
<i>Ammophorus insularis</i> (Boheman, 1858)	adv	-	A	Common	4A-leaf litter
<i>Blapstinus dilatatus</i> Le Conte, 1851	adv	A	B	Common	3B-decaying wood
<i>Blapstinus histricus</i> Casey	adv	A	D,H	Scarce	4A-Pitfall trap,
<i>Lepidocnemeplatia sericea</i> (Horn,)	adv	B	B	Unique specimen	MV2/28.IV. 2000
<i>Gnatocerus maxillosus</i> (Fabricius, 1801)	adv	A	D,H	Scarce	4A-MV bulb
<i>Gonocephalum adpressiforme</i> Kaszab, 1951	adv	-	D,H	Scarce	4A-Pitfall trap,
<i>Lobometopon diremptus</i> (Karsch, 1881)	adv	-	B, D, H	Common	2B & 4A-host search, MV bulbs, KA-0170 – MV, KA-00065-malaise
<i>Lyphia</i> sp. near <i>angusta</i> (Lucas, 1846)	adv	A./ B	B,D	Scarce	3B-MV bulb, 4A-Malaise #1
Throscidae (minute false click beetles)					
<i>Trixagus extraneus</i> Fisher, 1942	adv	A	D,H	Scarce	4A-MV bulb
Zopheridae (ironclad beetles)					
<i>Colobicus parilis</i> Pascoe, 1861	adv	A	B,D	Scarce	4A-MV bulb
Order: COLLEMBOLA (springtails)					
Entomobryidae					
<i>Entomobrya</i> sp. A	adv?	E	D	Local	3B-Gas aspirator
<i>Entomobryoides</i> sp. A	end	E	B	Local	3A-On bare ground
<i>Lepidocyrtus immaculatus</i> Folsom, 1932	adv	E	C	Common	3B-Gas aspirator
genus & sp. ?	?	?	D	Local	3B-Gas aspirator
Hypogastruridae					
genus & sp. ?	end?	B?	I		4A-Gas aspirator
Order: DERMAPTERA (earwigs)					
Carcinophoridae					
<i>Euborellia annulipes</i> (Lucas, 1847)	adv	-	H	Common	3B-MV bulb
Chelisochidae					
<i>Chelisoches morio</i> (Fabricius, 1775)	adv	-	E	Local	2C-General
Labiduridae					
<i>Labidura riparia</i> (Pallas, 1773)	adv	-	G,H	Locally Common	2B-MV bulb

Table 3 continued

ARTHROPOD FAUNA	Status in	Status on	Status and Distribution within Kahului Airport Environs		
	Hawai'i ¹	Maui ²	Veg Type ³	Relative ⁴ Abundance	Collection sites and Methods ⁵
Order: DIPTERA (flies)					
Agromyzidae (agromyzid leaf miners)					
<i>Liriomyza</i> sp. A	adv	-	D	?	2B-Gas Aspirator
<i>Melanagromyza splendida</i> Frick, 1953	adv	-	D	Local	4A, 4B-Malaise Traps, KA-0171-Malaise trap
<i>Pseudonapomyza spicata</i> (Malloch, 1914)	adv	-	D	?	2B-Gas aspirator, Malaise Trap
Anthomyiidae (anthomyid flies)					
<i>Anthomyia vicarians</i> Schiner, 1868	adv	E	D	Common	4A, Malaise Trap 1.
Asteiidae (asteiid flies)					
<i>Loewimyia orbiculata</i> Hardy, 1980	end	A	B, H	Local	2B-Gas aspirator, KA-0171-Malaise trap
Bombyliidae (bee flies)					
<i>Anthrax koshunensis</i> Matsumura 1916	adv	-	B, D, I	Local	4A-Malaise #1 3B- General
Calliphoridae (blow flies)					
<i>Chrysomya megacephala</i> (Fabricius, 1774)	adv	-	B,J,E	Scarce	4A-MV light KA-0170 MV
Canacidae					
<i>Canaceoides</i> sp. A	end/ind/ adv	E	I	Scarce	4A-Gas aspirator beach KA-0045 sweeping
Cecidomyiidae (gall gnats)					
<i>Lestremia leucophaea</i> (Meigen, 1818)	adv	NIR	B	Local	KA-0171-Malaise trap
<i>Lestremia</i> sp. A	?	NTL	B	Local	KA-0171-Malaise trap
genus & sp. A	?	-	A to K	Common	Most Gas aspirators, Malaise traps, MV bulbs KA-0171-Malaise trap
genus & sp. B	?	NTL			KA-0171-Malaise trap
genus & sp. C	?	NTL			KA-0171-Malaise trap
Ceratopogonidae (biting midges)					
<i>Atrichopogon jacobsoni</i> (Meijere, 1907)	adv	-	G, H	Common	2B-MV Bulb, KA-0171-Malaise trap, KA-0170 – MV light
<i>Atrichopogon</i> sp A	adv	NSR	H	Scarce	Wetland, KA-0042 gaspirator/ KA-0124 fog
<i>Culicoides</i> sp.nr. <i>jamaicensis</i> Edwards, 1922	adv	NSR [A]	D	Scarce	4A-Malaise
<i>Dasyhelea excellentis</i> Borkent, 1996	end	NIR	B,H		KA-0171-Malaise trap. KA-0042 gaspirator/ KA-0124 fog KA-0057

Table 3 continued

ARTHROPOD FAUNA	Status in Hawai'i ¹	Status on Maui ²	Status and Distribution within Kahului Airport Environs		
			Veg Type ³	Relative Abundance ⁴	Collection sites and Methods ⁵
Ceratopogonidae (continued)					
<i>Dasyhelea</i> sp. C	end?	NSR	H	Local	KA-0057-MV bulb
<i>Dasyhelea</i> sp. D	end?	NSR [C]	G,H	Uncommon	1B, MV Bulb, KA-0171-Malaise trap
<i>Forcipomyia biannulata</i> Ingram & Macfie, 1924	adv	NSR	B	Common	KA-0171-Malaise trap
<i>Forcipomyia brevis</i> (Johannsen, 1927)	end	C	G H	Common	2B, 3A-MV Bulbs, 4A-Malaise trap, KA-0171-Malaise trap
<i>Forcipomyia chrysolopha</i> (Kieffer, 1911)	adv	NSR [C]	H	Common	4A-Malaise, 2B-MV bulb. KA-0171-Malaise KA-0169 swarming nr MV.
<i>Forcipomyia hardyi</i> Wirth & Howarth, 1982	end	-	B - H	Common	Most MV's and Gas aspirators near wet spots. KA-0171-Malaise trap
<i>Forcipomyia</i> sp nr <i>quasiingrami</i> Macfie, 1939	adv	NSR [C]	B	Common	3A, MV Bulb KA-0171-Malaise trap
Chironomidae (non-biting midges)					
<i>Chironomus hawaiiensis</i> Grimshaw, 1901	end?	-	H	Common	3B-MV bulb, KA-0171-Malaise trap, KA-0170 – MV light
<i>Chironomus</i> sp. nr. <i>hawaiiensis</i> Grimshaw, 1901	adv	NSR	B	Local	KA-0171-Malaise trap
<i>Clunio vagans</i> Stone and Wirth, 1947	end	A	I	Local	4A-Gas aspirator
<i>Cricotopus bicinctus</i> (Meigen, 1818)	adv	C	B, H	Uncommon	2B-MV Bulb, 4A-Malaise, KA-0170 – MV light
<i>Orthocladius williamsi</i> Hardy, 1960	end	A	H	Local	3B-MV bulb
<i>Polypedilum nubiferum</i> (Skuse, 1889)	adv	-	H, G	Local	2B,4A-Gas aspirator, KA-0170 – MV light
<i>Thalassomyia setosipennis</i> Wirth, 1947	end	NTL			KA-0171-Malaise trap KA-0040
genus & sp. A	adv	D	B, H	Common	2B-MV Bulb, 4A-Malaise
Chloropidae (eye gnats)					
<i>Cadrema pallida</i> (Loew, 1865)	adv	E	H	Uncommon	3A, MV Bulb, KA-0171-Malaise trap
<i>Conioscinella formosa</i> (Becker, 1911)	adv	NTL			KA-0171-Malaise trap
<i>Meromyza</i> sp. A	adv	E	B,G	?	2B, MV Bulb
<i>Monochaetoscinella anonyma</i> (Williston, 1896)	adv	-	H	Uncommon	2C, 4A-Gas aspirator, Pan Trap
<i>Rhodesiella sauteri</i> (Duda, 1930)	adv	-	D	?	4A-Malaise Trap
<i>Rhodesiella scutellata</i> (Meijere, 1908)	adv	NTL			KA-0171-Malaise trap
<i>Semaranga dorsocentralis</i> Becker, 1911	adv	C	C	?	2B, Gas aspirator

Table 3 continued

ARTHROPOD FAUNA	Status in Hawai'i ¹	Status on Maui ²	Status and Distribution within Kahului Airport Environs		
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Chyromyidae					
<i>Aphaniosoma</i> sp. A	end?	?	H	?	2B-Gas Aspirator
<i>Gymnochyromyia hawaiiensis</i> Hardy, 1980	end	E	B	?	4A, Gas aspirator
<i>Nannodastia horni</i> Hendel, 1930	adv	NIR			KA-0171-Malaise trap
Cryptochetidae					
<i>Cryptochetum iceryae</i> (Williston, 1888) cottony cushion scale fly	adv	A	D	Local	4A-Malaise Trap, KA-0171-Malaise trap
Culicidae (mosquitoes)					
<i>Aedes albopictus</i> (Skuse, 1984)	adv	-	D, H	Scarce	2B,3B-general
<i>Culex quinquefasciatus</i> Say, 1823	adv	-	D, H	Common	2B,3B-general, KA-0171-Malaise trap
Dolichopodidae (long-legged flies)					
<i>Achradocera arcuata</i> (van Duzee, 1924)	adv	C	D	?	4B, Gas aspirator
<i>Amblypsilopus pallidicornis</i> (Grimshaw, 1901)	adv	C	D	Scarce	4A, Malaise, KA-0171-Malaise trap
<i>Asyndetus carcinophilus</i> Parent, 1937	end	-	B,H	?	4A-1 st Malaise
<i>Chrysosoma globiferum</i> (Wiedemann, 1830)	adv	A	B,D	Common	4B-Malaise #2, 3B-Gas aspirator, KA-0171-Malaise trap
<i>Chrysotus longipalpus</i> Aldrich, 1896	adv	NTL			KA-0171-Malaise trap
<i>Condylostylus longicornis</i> (Fabricius, 1775)	adv	NIR	F	Uncommon	KA-0065 + KA-0171-Malaise trap. KA-0265 sticky trap.
<i>Dolichopus exsul</i> Aldrich, 1922	adv	-	F	Common	2C-Gas aspirator
<i>Thambemyia acrosticalis</i> (Parent, 1938)	end	-	H	Common	3B,4B-general
Drosophilidae (pomace flies)					
<i>Cacoxenus perspicax</i> (Knab, 1914)	adv	-	D	Common	4B-Malaise Trap, KA-0171-Malaise trap
<i>Chymomyza procnemis</i> (Williston, 1896)	adv	-	D	Common	4A-Malaise, gas aspirator, KA-0171-Malaise trap
<i>Drosophila simulans</i> Sturtevant, 1919	adv	NTL		Scarce	KA-0171-Malaise trap
<i>Drosophila suzukii</i> (Matsumura, 1931)	adv	NIR		Scarce	KA-0171-Malaise trap KA-0124 fog
Empididae (dance flies)					
<i>Chersodromia hawaiiensis</i> Melander, 1938	end	-	H, I	Local	3B-Gas aspirator, MV Bulb
<i>Crossopalpus insularis</i> (Melander, 1952)	adv?	C	H	Local	3A-MV bulb.

Table 3 continued

ARTHROPOD FAUNA	Status in Hawai'i ¹	Status on Maui ²	Status and Distribution within Kahului Airport Environs		
			Veg Type ³	Relative Abundance ⁴	Collection sites and Methods ⁵
Ephydriidae (shore flies)					
<i>Atissa oahuensis</i> Cresson, 1948	end	A	H	Local	2B-Gas Aspirator
<i>Brachydeutera</i> sp. A	adv	?	H	Scarce	3B-MV bulb
<i>Brachydeutera hebes</i> Cresson, 1926	adv	NTL	B	Local	KA-0171-Malaise trap
<i>Ceropsilopa coquilletti</i> Cresson, 1922	adv	-	D, H	Common	3A, 4A-Gas aspirator, 3B-MV bulb
<i>Clasiopella uncinata</i> Hendel, 1914	adv	A	H	Scarce	4A-Gas Aspirator
<i>Donaceus nigronotatus</i> Cresson, 1943	adv	-	D,H	Common	3A-Gas aspirator, KA-0171-Malaise trap
<i>Hecamede</i> sp. ? <i>granifera</i> (Thomson, 1869)	adv	-	J	Local	4A-On beach
<i>Psilopa girschneri</i> Von Roeder, 1889	adv	-	D	?	4B-Gas Aspirator
<i>Scatella sexnotata</i> (Cresson, 1926)	ind	-	H,B,G	Common	3B-Pan trap, 2B- MV bulb, Gas aspirator, KA-0171-Malaise trap
<i>Scatella stagnalis</i> (Fallen, 1813)	adv	A	H,G	Common	3B-Pan trap, 2B-Gas aspirator, KA-0171-Malaise trap
genus ? and sp. A	adv	NTL	B	Uncommon	KA-0171-Malaise trap
Heleomyzidae					
<i>Spilochroa ornata</i> (Johnson, 1895)	adv	A	D	Common	4A-Malaise #1, KA-0171-Malaise trap
Keroplastidae					
<i>Tylparua hawaiiensis</i> (Grimshaw, 1901)	end	NTL			KA-0171-Malaise trap
Lauxaniidae					
<i>Poecilominettia sexseriata</i> Hendel, 1932	adv	-	D	Common	4A-Malaise #1
Limoniidae (limoniid crane flies)					
<i>Dicranomyia hawaiiensis</i> Grimshaw, 1901	end	-	C, D	Scarce	4B-Malaise, KA-0171-Malaise trap
<i>Dicranomyia</i> ? sp. A	adv	B	B,D,H	Common	2B-MV, 4A-Malaise
<i>Dicranomyia</i> cf <i>variabilis</i> Grimshaw, 1901	end	E	H	Local	3A-Sweeping pool 3A-MV Bulb
<i>Geranomyia advena</i> (Alexander, 1954)	end	E	H,B	Scarce	4A-Malaise
<i>Styringomyia didyma</i> Grimshaw, 1901	adv	-	F,H	Common	2C-Gas aspirator, 2B-MV light, KA-0171-Malaise trap. KA-0170 MV
<i>Trentepohlia australasiae</i> Skuse, 1890	adv	C	F	Scarce	3B-lights in Terminal

Table 3 continued

ARTHROPOD FAUNA	Status in Hawai'i ¹	Status on Maui ²	Status and Distribution within Kahului Airport Environs		
			Veg Type ³	Relative Abundance ⁴	Collection sites and Methods ⁵
Lonchaeidae					
<i>Lamprolonchaea metatarsata</i> (Kertész, 1901)	adv	-	D	Scarce	4A-Malaise #1, KA-0171-Malaise trap
<i>Lonchaea</i> sp. A	adv	? E	B	?	3C-MV Bulb, KA-0171-Malaise trap
Lonchopteridae (spear-winged flies)					
<i>Lonchoptera furcata</i> (Fallen, 1823)	adv	-	H	Scarce	4A-MV light
Micropezidae (stilt-legged flies)					
<i>Taeniptera</i> cf <i>angulata</i> (Loew, 1866)	adv	A	D	Scarce	4B-Malaise trap, KA-0171-Malaise trap
Milichiidae					
<i>Desmometopa</i> cf <i>tarsalis</i> Loew, 1865	adv	NTL			KA-0171-Malaise trap
<i>Desmometopa</i> sp. probably <i>inaurata</i> Lamb, 1914	adv	-	H	?	2B-Gas Aspirator
<i>Milichiella lacteipennis</i> (Loew, 1865)	adv	C	B	Scarce	2B-Gas Aspirator, KA-0171-Malaise trap
Muscidae (house flies)					
<i>Atherigona orientalis</i> Schiner, 1868	adv	-	D	Common	4A-Malaise #1, KA-0171-Malaise trap
<i>Atherigona reversura</i> Villeneuve, 1936	adv	-	F,K	Common	2C, 4A-Gas aspirator KA-0171-Malaise trap
Coenosiinae: genus & sp.	adv	B	D	Uncommon	4B-gas aspirator
<i>Haematobia irritans</i> (Linnaeus, 1758) (horn fly)	adv	E	D	?	4A-Malaise Trap 1. KA-0171-Malaise trap
<i>Lispe pectinipes</i> Becker, 1903	adv	C	C, D	?	4B-Malaise Trap 2.
<i>Lispe</i> sp. A	adv/end ?	? E	C, D	?	4B-Malaise Trap 2. KA-0171-Malaise trap
<i>Stomoxys calcitrans</i> (Linnaeus, 1758) (Stable fly)	adv	-	D	Common	4A-Malaise #1
<i>Synthesiomysia nudiseta</i> (Van der Wulp, 1883)	adv	-	D	Scarce	4A-Malaise #1
Mycetophilidae (fungus gnats)					
<i>Sciophila</i> sp. A	adv	D	D	Scarce	4A-Malaise 1, KA-0171-Malaise trap
<i>Leia</i> sp. A	adv	A	D	Scarce	4A-Malaise 1
Otitidae (picture-winged flies)					
<i>Acrosticta apicalis</i> (Williston, 1896)	adv.	-	D	?	4A-Malaise, KA-0171-Malaise trap
<i>Ceroxys latiusculus</i> (Loew, 1873)	adv	A	G	?	1B-Sweeping pond
<i>Euxesta anonnae</i> (Fasbricius, 1794)	adv	-	B, D	Common	3B-MV bulb, 4A-Malaise #1, KA-0171-Malaise trap
<i>Notogramma cimiciforme</i> Loew, 1867	adv	NTL			KA-0171-Malaise trap
<i>Physiphora</i> sp. ?	adv	NTL			KA-0171-Malaise trap

Table 3 continued

ARTHROPOD FAUNA	Status in Hawai'i ¹	Status on Maui ²	Status and Distribution within Kahului Airport Environs		
			Veg Type ³	Relative Abundance ⁴	Collection sites and Methods ⁵
Phoridae (scuttle flies)					
<i>Chonocephalus</i> sp. A	end?	-	B,H	Common	4A-Malaise 1, KA-0171-Malaise trap
<i>Dohrniphota cornuta</i> (Bigot, 1857)	adv	NIR			KA-0171-Malaise trap
<i>Megaselia furcatilis</i> Beyer, 1964	end	E	B	Scarce	3A-Pitfall trap in wood chips, KA-0171-Malaise
<i>Megaselia scalaris</i> (Loew, 1866) coffin fly	adv	-	D	Common	4A-Malaise #1
<i>Megaselia setaria</i> (Malloch, 1912)	adv	E	D, C	?	4A-Malaise 1, 3B-Gas aspirator
<i>Metopina ventralis</i> Schmitz, 1927	adv	NIR			KA-0171-Malaise trap
<i>Puliciphora lucifera</i> Dahl, 1897	adv	C	C	Scarce	3B-Gas aspirator
Platystomatidae					
<i>Scholastes bimaculatus</i> Hendel, 1914 (the coconut fly)	adv	NTL	H	Scarce	KA-0264, sticky trap
Psychodidae (moth flies)					
<i>Clogmia albipunctata</i> (Williston, 1893)	adv	E	H	Common	2B, 3A, 4A, Sweeping wetland, Malaise. KA-0171-Malaise trap
<i>Psychoda alternata</i> Say, 1824	adv	E			3A, Sweeping pool margin at night. 3B-MV bulb KA-0171-Malaise trap
<i>Psychoda pseudalternata</i> Williams, 1946	adv	NIR	H	Local	KA-0171-Malaise trap
<i>Psychoda savaiiensis</i> Edwards, 1928	adv	NIR			KA-0171-Malaise trap
<i>Trichopsychoda insulicola</i> (Quate, 1954)	adv	C	H	Local	3A, MV Bulb, KA-0171-Malaise trap
Sarcophagidae (flesh flies)					
<i>Helicobia morionella</i> (Aldrich, 1930)	adv	-	D	Common	4A-Malaise #1, KA-0171-Malaise trap
<i>Sarcophaga africa</i> (Wiedemann, 1824)	adv	A?	D	Local	2B-MV light
<i>Sarcophaga dux</i> Thomson, 1869	adv	-	D	Common	4A-Malaise #1 KA-0171-Malaise trap
Scatopsidae (minute black scavenger flies)					
<i>Colbodia fuscipes</i> (Meigen, 1830)	adv	-	B	Scarce	2B-MV light
<i>Rhegmoclemina parvula</i> Hardy, 1956	adv	NTL	B	Local	KA-0171-Malaise trap
<i>Scatopse</i> sp. A	?	NTL			KA-0171-Malaise trap
Scenopinidae (window flies)					
<i>Scenopinus adventicius</i> Hardy, 1960	adv	-	H	Common	3B- Gas aspirator, 4A-Malaise, KA-0061-general, KA-0171-Malaise trap
<i>Scenopinus</i> ? sp. A		NTL			KA-0171-Malaise trap

Table 3 continued

ARTHROPOD FAUNA	Status in Hawai'i ¹	Status on Maui ²	Status and Distribution within Kahului Airport Environs		
			Veg Type ³	Relative ⁴ Abundance	Collection sites and Methods ⁵
Sciaridae (black fungus gnats)					
<i>Bradysia molokaiensis</i> (Grimshaw, 1901)	end	NTL			KA-0171-Malaise trap
<i>Bradysia tritici</i> (Coquillet, 1895)	adv	-	D,H	Common	3B-Gas aspirator, KA-0171-Malaise trap
<i>Bradysia spatitergum</i> (Hardy, 1960)	adv	NTL		Local	KA-0169-MV
<i>Corynoptera latistylata</i> (Hardy, 1956)	adv	NIR?			KA-0171-Malaise trap
<i>Hyperplasion</i> ? sp. A	adv	NSR			KA-0171-Malaise trap
<i>Plastosciara</i> sp. A	end?	? E	D	?	4A-Malaise 1
Sepsidae (black scavenger flies)					
<i>Sepsis biflexuosa</i> Strobl, 1893	adv	-	D,	Common	4A-Malaise #1
<i>Sepsis thoracica</i> (Robineau-Desvoidy, 1830)	adv	-	D, H	Common	2B,3B-Gas aspirator
Sphaeroceridae (small dung flies)					
<i>Leptocera abdominiseta</i> (Duda, 1925)	adv	E	D,H,B	Common	3B-Gas aspirator 3B- Pan trap, KA-0171-Malaise trap
<i>Leptocera fuscipennis</i> (Haliday, 1833)	adv	-	H, G	?	2B-Gas Aspirator
<i>Leptocera</i> sp. A	adv	NTL			KA-0171-Malaise trap
<i>Poecilosomella punctipennis</i> (Wiedemann, 1824)	adv	-	D	Common	4A-Malaise #1
<i>Thoracochaeta brachystoma</i> (Stenhammar, 1855)	adv	-	J	Local	4A-On beach
Stratiomyidae (soldier flies)					
<i>Hermetia illucens</i> (Linnaeus, 1758)	adv	-	I	Uncommon	4A-Gas aspirator
Syrphidae (hover & flower flies)					
<i>Allograpta exotica</i> (Wiedemann, 1830)	adv	E	D	Common	4A-Malaise 1
<i>Allograpta obliqua</i> (Say, 1823)	adv	-	D	Common	4A-Malaise 1, KA-0171-Malaise trap
<i>Copestylum</i> cf. <i>tamaulipanum</i> (Townsend, 1898)	adv	NTL			KA-0171-Malaise trap
<i>Eristalinus aeneus</i> (Scopoli, 1763)	adv	-	D	Common	4A-Malaise 1
<i>Eristalinus arvorum</i> (Fabricius, 1787)	adv	-	H	Common	3B-MV bulb, 4A-Malaise
<i>Eumerus aurifrons</i> (Wiedemann, 1824)	adv	A	D	Common	4A-Malaise #1
<i>Ornidia obesa</i> (Fabricius, 1775)	adv	-	D	Common	4A-Malaise #1
<i>Simosyrphus grandicornis</i> (Macquart, 1942)	adv	-	D	Common	4A-Malaise #1, KA-0171-Malaise trap
<i>Syritta orientalis</i> Macquart, 1842	adv	-	G	Common	2C, 2B, 4A-Gas aspirator
<i>Toxomerus marginatus</i> (Say, 1823)	adv	-	D	Common	4A-Malaise #1

Table 3 continued

ARTHROPOD FAUNA	Status in Hawai'i ¹	Status on Maui ²	Status and Distribution within Kahului Airport Environs		
			Veg Type ³	Relative Abundance ⁴	Collection sites and Methods ⁵
Tachinidae					
<i>Actia eucosmae</i> Bezzi, 1926	adv	A	D	Common	4A,4B-Malaise
<i>Archytas cyrphis</i> Curran, 1927	pur	-	D, H	Common	4A-Malaise
<i>Chaetogaedia monticola</i> (Bigot, 1887)	pur	-	D	Common	4A-Malaise #1
<i>Eucelatoria armigera</i> (Coquillett, 1889)	adv	-	D	Common	4A-Malaise #1 3A- MV light KA-0171-Malaise trap
<i>Euvespivora decipiens</i> (Walker, 1859)	adv	C	C,D	?	4B-Malaise 2 KA-0171-Malaise trap
genus & sp. ? [close to <i>Euvespivora</i> ?]	adv	D	C,D	?	4B-Malaise 2
<i>Lespesia archippivora</i> (Riley, 1871)	pur	-	D	Common	3B-MV light, 4A-Malaise #1
<i>Ormia ochracea</i> (Bigot, 1888)	adv	A	H,B	Scarce	2B-MV light
<i>Trichopoda pilipes</i> (Fabricius, 1805)	pur	-	D	Common	4A-Malaise #1
Tephritidae (fruit flies)					
<i>Acinia picturata</i> (Snow, 1894)	pur	-	D	Common	4A, 4B-Malaise, MV bulb, KA-0171-Malaise trap
<i>Bactrocera cucurbitae</i> (Coquillett, 1899) Melon fly	adv	-	D	Common	4B-Malaise #2, Sticky trap
<i>Bactrocera dorsalis</i> (Hendel, 1912) Oriental fruit fly	adv	-	K	Local	2C-Gas aspirator, Bait trap KA-0171-Malaise trap Sticky trap
<i>Ensina sonchi</i> (Linnaeus, 1767)	adv	C		?	4A-Malaise 1
<i>Tetruaresta obscuriventris</i> (Loew, 1873)	pur	-	D	Common	3B-MV bulb, 4B-Gas aspirator
Tethinidae					
<i>Dasyrhicnoessa</i> sp. A	ind?	A?	G, H	Common	2B, 4A-MV bulb
<i>Dasyrhicnoessa</i> sp. B	ind?	C	J	?	4A-General
<i>Pelomyia steyskali</i> Hardy & Delfinado, 1980	adv	C	J	?	4A-General
<i>Tethina willistoni</i> (Melander, 1913)	adv	C	J	?	4A-General
Tipulidae					
Genus species A	adv	NSR	H	Scarce	KA-0124 fog
Order: EMBIIDINA (webspinners)					
Oligotomidae					
<i>Oligotoma saundersii</i> (Westwood, 1837)	adv	-	B	Common	Many MV Bulb

Table 3 continued

ARTHROPOD FAUNA	Status in	Status on	Status and Distribution within Kahului Airport Environs		
	Hawai'i ¹	Maui ²	Veg Type ³	Relative ⁴ Abundance	Collection sites and Methods ⁵
Order: HEMIPTERA: Suborder Heteroptera (true bugs)					
Alydidae (big-headed bugs)					
<i>Alydus pilosulus</i> Herrich-Schaeffer, 1848	adv	-	C	Local	3B-Gas aspirator
Anthocoridae (minute pirate bugs)					
<i>Physopleurella mundula</i> (White, 1877)	adv	-	B,C	Common	2B-MV light, 3C-Gas aspir., KA-0170 – MV light
Cydnidae (burrowing bugs)					
<i>Geotomus pygmaeus</i> (Dallas 1851)	adv	-	B, D	Common	3C-MV light, 2B-MV light, KA-0170 – MV light
<i>Microporus shiromai</i> Froeschner 1977	adv	A	B	Local	3C-MV light
<i>Rhytidoporus indentatus</i> Uhler 1877	adv	-	B	Scarce	3C-MV light
genus & sp. ?	adv	B?	D	Scarce	4A-MV bulb
Lygaeidae (seed bugs)					
<i>Appoloniuss ? sp. A</i>	adv	A	B	Common	3B-fogging <i>Causurina</i>
<i>Botocudo marianensis</i> (Usinger, 1946)	adv	-	B	Common	3C-MV bulb
<i>Clerada apicornis</i> Signoret, 1862	adv	A	G	Local	2B-MV bulb
<i>Geocoris punctipes</i> (Say, 1832)	adv	C	D	Scarce	4A, Gas aspirator
<i>Graptostethus manillensis</i> (Stål, 1859)	adv	-	H	Common	3B-MV bulb
<i>Nysius coenosulus</i> Stal, 1859	end	NTL			KA-0176- Gas aspirator
<i>Nysius terrestris</i> Usinger, 1942	end	NTL			KA-0173-Malaise trap, KA-0174-general
<i>Nysius sp. A</i>	end	-	B, D, A.	Common	2B,4A-Gas aspirator, 3B-host search- <i>Chenopodium</i> , , KA-0170/0177 – MV light KA-0171-Malaise trap
<i>Nysius sp. B</i>	adv?	-	B, D, A.	Common	4A-Gas aspirator, 3B-host search- <i>Chenopodium</i> , KA-0173-Malaise trap, KA-0175- Gas aspirator
<i>Pseudopachybrachius vinctus</i> (Say, 1832)	adv	-	B,H,F	Common	Sites 78, 2C, 3B-Gas aspirator & MV bulb
<i>Remaudiereana nigriceps</i> (Dallas, 1852)	adv	-	G, D	Common	4A-MV bulb, 2B-Gas aspirator
<i>Tempyra biguttula</i> Stal, 1874	adv	A	B	Uncommon	2C-MV bulb
Mesovelidae (water treaders)					
<i>Mesovelia amoena</i> Uhler, 1894	adv	NTL	G	Scarce	wetland KA-0124 fog
<i>Mesovelia mulsanti?</i> White, 1879	adv	-	G	Scarce	1B, In pond (nymph)

Table 3 continued

ARTHROPOD FAUNA	Status in Hawai'i ¹	Status on Maui ²	Status and Distribution within Kahului Airport Environs		
			Veg Type ³	Relative Abundance ⁴	Collection sites and Methods ⁵
Miridae (leaf bugs)					
<i>Coridromus variegatus</i> (Montrouzier, 1861)	adv	A	A	Local	4A-host search
<i>Cyrtorhinus fulvus</i> Knight, 1935	pur	E	B	Scarce	2B, MV Bulb
<i>Engytatus modestus</i> (Distant, 1893)	adv	E	B	Scarce	2B, MV Bulb
<i>Opuna</i> sp. A	end	NSR	J	Local	undescribed, KA-0018 MV
<i>Rhinacloa forticornis</i> Reuter, 1876	adv	-	B	Common	2C-MV/black light
<i>Spanagonicus albofasciatus</i> (Reuter, 1907)	adv	E	C	Scarce	3B-Gas aspirator
<i>Stenotus binotatus</i> (Fabricius, 1794).	adv	NIR	G	scarce	KA-0168– MV light
<i>Stenotus</i> sp. A	adv	NIR	B	Uncommon	KA-0170 – MV light
<i>Taylorilygus apicalis</i> (Fieber, 1861)	adv	-	D	Common	4A-MV bulb
<i>Trigonotylus tenuis</i> (Reuter, 1895)	adv	A	H	Common	3C-Gas aspirator
<i>Tythus mundulus</i> (Breddin, 1896)	pur	-	B	Common	2B-MV bulb
Nabidae (damselflies)					
<i>Nabis capsiformis</i> (Germar, 1837)	adv	-	F	Common	4A, 3B-Gas aspirator, Malaise, KA-0042 – MV light
<i>Nabis</i> sp. A	adv	NSR	B,J	Scarce	KA-0018 – MV light
Notonectidae (backswimmers)					
<i>Anisops kuroiwaie</i> Matsumura, 1915	adv	-	H, G	Local	1B, In pond, KA-0170 – MV light
Pentatomidae (stink bugs)					
<i>Brochymena quadripustulata</i> (Fabricius, 1775)	adv	A	J	Common	2B, 4A-general & gas aspirator
<i>Eysarcoris ventralis</i> (Westwood, 1837)	adv	A	A, F	Common	3B-general, 4A- sweep net
<i>Nezara viridula</i> (Linnaeus, 1758)	adv	-	B,D	Common	3C-Gas aspirator, 2B-MV bulb
<i>Oechalia</i> cf <i>pacifica</i> (Stål, 1859)	end	-	B, D	Local	2B-MV bulb
<i>Piezodorus</i> sp A	adv	NSR	D	Scarce	KA-0022 fogging. KA02xx, sticky trap
<i>Plautia stali</i> Scott, 1874)	adv	-	F, H	Common	4A-Malaise #1, 3B-MV bulb, KA-0168- MV light
<i>Thyanta custator accerra</i> McAtee, 1919	adv	A	A	Common	4A-host search
Plataspidae (black stink bugs)					
<i>Coptosoma xanthogramma</i> (White, 1842)	adv	-	B,H	Uncommon	4A-Malaise #1

Table 3 continued

ARTHROPOD FAUNA	Status in	Status on	Status and Distribution within Kahului Airport Environs		
SCIENTIFIC NAME	Hawai'i ¹	Maui ²	Veg Type ³	Relative ⁴ Abundance	Collection sites and Methods ⁵
Reduviidae (assassin bugs)					
<i>Empicoris rubromaculatus</i> (Blackburn, 1889)	adv	-	B	Scarce	4A-Malaise #1
<i>Gallobelgicus saevus</i> Bergroth, 1913	adv	A	B	Local	3C-MV bulb
<i>Oncocephalus pacificus</i> Kirkaldy	adv	-	G	Local	4A-Malaise #1, 2B-MV bulb
<i>Sinea rileyi</i> Montandon,	adv	B	B, D, I	Local	3A-Gas aspirator, 4A-Malaise #1, KA-0171-Malaise trap KA-0170 MV
<i>Zelus renardii</i> Kolenati, 1856	adv	-	B, D, I	Common	3A,4A-Gas aspirator, KA-0171-Malaise trap, KA-0178/0183- Malaise
Rhopalidae (scentless plant bugs)					
<i>Liorhyssus hyalinus</i> (Fabricius, 1794)	adv	-	B, D, I	Common	4A, 3A-Gas aspirator
<i>Niesthrea louisianica</i> Sailer, 1961	adv	A	B	Common	2B-general, Gas aspirator
Saldidae (shore bugs)					
<i>Micracanthia humilis</i> (Say, 1832)	adv	A	F	Local	2A, 2B-Gas aspirator
Scutelleridae (shield-backed bugs)					
<i>Coleotichus blackburniae</i> White, 1881 (Koa bug)	end	-	F	Uncommon	2C-host search - <i>Acacia</i>
Tingidae (lace bugs)					
<i>Corythuca gossypii</i> (Fabricius, xxx)	adv	E	K, E	Common	2B, Host search, <i>Erethrina</i>
<i>Corythucha morrilli</i> Osborn & Drake, 1917	adv	A	H	Common	3B-Gas aspirator, KA-0014-gas aspirator
<i>Leptodictya tabida</i> (Herrich-Schaeffer, 1840)	adv	-	D, H	Common	4A-Malaise #1, 3B-Gas aspirator, KA-0171-Malaise trap
Order: HEMIPTERA: suborders Auchenorrhyncha & Sternorrhyncha (hoppers, aphids, & scales) [formerly "Order HOMOPTERA"]					
Aleyrodidae (whiteflies)					
<i>Aleurocanthus woglumi</i> Ashby, 1915 (citrus blackfly)	adv	NTL		Local	KA-0017 <i>Citrus</i>
<i>Aleurodicus dispersus</i> Russell, 1965	adv	-	B	Common	3C-Gas aspirator
<i>Aleurodicus dugesii</i> Cockerell, 1896	adv	NTL	B	common	KA-0065 malaise
Aphididae (aphids)					
<i>Aphis</i> sp. A	adv	-	F	Common	2C-Gas aspirator
<i>Sipha flava</i> (Forbes, 1884)	adv	E	C, B	Local	3A, Host search, <i>Panicum maximum</i>

Table 3 continued

ARTHROPOD FAUNA	Status in Hawai'i ¹	Status on Maui ²	Status and Distribution within Kahului Airport Environs		
			Veg Type ³	Relative Abundance ⁴	Collection sites and Methods ⁵
Cercopidae (spittlebugs)					
<i>Clastoptera xanthocephala</i> Germar 1839	adv	-	D	Common	4A-Malaise #1, KA-0013,0014-gas aspirator
Cicadellidae (leafhoppers)					
<i>Balclutha incisa hospes</i> (Kirkaldy, 1910)	adv	-	G	Common	2B-MV bulb
<i>Balclutha</i> sp. near <i>rubrostriata</i> (Melichar, 1903)	adv	A	B	Local	3C-Gas aspirator
<i>Balclutha</i> sp. A	end?	-	B	Local	2B-MV bulb
<i>Carneocephala sagittifera</i> (Uhler, 1895)	adv	-	F	Common	3B-Gas aspirator
<i>Circulifer tenellus</i> (Baker, 1896)	adv	-	B	Common	2B-Gas aspirator
<i>Draeculacephala minerva</i> Ball, 1927	adv	-	B	Common	3B-Gas aspirator
<i>Empoasca solana</i> DeLong, 1931	adv	-	B	Common	3C- MV bulb, KA-0170 – MV light
<i>Graminella sonora</i> (Ball, 1900)	adv	A	B	Common	3B-Gas aspirator
<i>Gyponana germari</i> (Stal, 1864)	adv	A	B,F,D	Common	2B-fogging
<i>Penestrangia robusta</i> (Uhler, 1877)	adv	-	D	Common	4A-MV bulb
<i>Scaphytopius loricatus</i> (Van Duzee, 1894)	adv	A	B, D	Local	2B-fogging
<i>Sophonia orientalis</i> (Matsumura, 1912) 2-spotted leafhopper	adv	-	J	Common	2B-general
<i>Spanbergiella quadripunctata</i> Lawson, 1932	adv	A	B	Common	2B-Gas aspirator, KA-0170 – MV light
Also about 6 unidentified spp. of leafhoppers					
Coccidae (soft scales)					
<i>Ceroplastes cirripediformis</i> Comstock, 1881 (Barnacle scale)	adv	-	F	Scarce	3B-host search
<i>Coccus viridis</i> (Green, 1889)	adv	E	K		2C-Host inspection-Citrus
<i>Pulvinaria urbicola</i> Cockerell, 1893 (Urbicola soft scale)	adv	A	ruderal	Local	2C- host search
Conchaspidae (fly speck scales)					
<i>Conchapis angraeci</i> (Cockerell, 1896)	adv	C	K	Local	E1-Host inspection-bromeliad

Table 3 continued

ARTHROPOD FAUNA	Status in Hawai'i ¹	Status on Maui ²	Status and Distribution within Kahului Airport Environs		
			Veg Type ³	Relative Abundance ⁴	Collection sites and Methods ⁵
Delphacidae (delphacid planthoppers)					
<i>Emoloana sporobolicola</i> (Kirkaldy, 1910)	end	-	H	Locally Common	2B-Gas aspirator
<i>Perkinsiella saccharicida</i> Kirkaldy, 1903 (sugarcane planthopper)	adv	-	B, D, H	Common	3B-MV bulb, 2B-MV bulb, KA-0170 – MV light
<i>Sardia rostrata pluto</i> (Kirkaldy, 1906)	adv	A	B, D	Common	2B,2C,3C-MV bulb, 2C,3A-Gas aspirator, KA-0168-MV light
<i>Sogatella kolophron</i> ? (Kirkaldy, 1907)	adv	-	B	Local	pan trap
Derbidae (derbid planthoppers)					
<i>Cedusa</i> sp. A	adv	NIR	B	Scarce	KA-0171 malaise
Diaspididae (hard scales)					
<i>Aspidiotus destructor</i> Signoret, 1869 (Coconut scale)	adv	E	K, F	Common	2B-Host inspection on coconut
<i>Ischnaspis longirostris</i> (Signoret, 1882) (Black thread scale)	adv	E	K, F	Common	2B-Host inspection on Keawe
<i>Pseudaulacaspis cockerelli</i> (Colley, 1897) (Oleander scale)	adv	-	K	Common	3B-host search on oleander
Flatidae (flatid planthoppers)					
<i>Melormenis basalis</i> (Walker, 1851)	adv	-	H	Common	Most MV bulbs, Malaise traps, gas aspirators, etc., KA-0040,0037,0039-fogging, KA-0008,0038-gas aspirator, KA-0171-Malaise
Halimococcidae (palm scales)					
<i>Thysanococcus pandani</i> Stickney, 1934	adv	E	G	Local	1B, Host search on <i>Pandanus</i>
Margarodidae					
<i>Icerya purchasi</i> Maskell, 1878 cottony cushion scale	adv	-	E	Common	2C-host search-tree tobacco
Membracidae (treehoppers)					
<i>Spissistilus festinus</i> (Say, 1830)	adv	-	B	Common	3C-Gas aspirator
<i>Vanduzeeia segmentata</i> (Fowler, 1895)	adv	-	B	Common	3B,3C-Gas aspirator, KA-0170 – MV light
Pseudococcidae (mealybugs)					
<i>Maconellicoccus hirsutus</i> (Green, 1908) (Pink hibiscus mealybug)	adv	E	K, F	Common	2B-Host inspection on <i>Hibiscus</i> .
<i>Nipaecoccus nipae</i> (Maskell, 1893)	adv	E	K	Common	2C-Host inspection-coconut palm
<i>Saccharicoccus sacchari</i> (Cockerell, 1895) (Pink sugarcane mealybug)	adv	-	E	Common	2C-host search Sugar cane
<i>Palmicultor palmarum</i> (Ehrhorn, 1916)	adv	E	K, F		3B-Host inspection on palm

Table 3 continued

ARTHROPOD FAUNA	Status in	Status on	Status and Distribution within Kahului Airport Environs		
	Hawai'i ¹	Maui ²	Veg Type ³	Relative ⁴ Abundance	Collection sites and Methods ⁵
Psyllidae (plant lice)					
<i>Heteropsylla cubana</i> Crawford, 1914	adv	-	B, D	Common	4A,4B-Malaise
Tropiduchidae					
<i>Kallitaxila granulata</i> (Stal, 1870)	adv	C	B,D,J	Common	4A,3B, Malaise, General.
Order: HYMENOPTERA bees and wasps					
 Agaonidae (fig wasps)					
<i>Eupristina verticillata</i> Waterston	pur	A	B	Local	KA-0171 malaise
<i>Josephiella</i> sp. A	adv.	A	B	Uncommon	KA-0171 malaise
Unidentified genus species A	adv	NTL	B	Uncommon	KA-0171 malaise
Anthophoridae (carpenter bees)					
<i>Ceratina arizonensis</i> Cockerell, 1898	adv	A	J	Uncommon	4A Sweeping. KA-0171 malaise
<i>Ceratina (Pithitis) smaragdula</i> (Fabricius, 1787)	adv	NIR	B	Scarce	KA-0064 window trap
<i>Xylocopa sonorina</i> Smith, 1874	adv	-	D, B	Common	4A, 4B-Malaise & seen , KA-0171-Malaise trap
Aphelinidae					
<i>Aphidius gifuensis</i> Ashmead, 1906	adv	A			
<i>Aphytis hispanicus</i> ? Mercet, 1912	adv	NIR	D	Scarce	KA-0179-Malaise trap,
<i>Encarsia</i> sp. A	adv/ pur?	-	D	Uncommon	4B Malaise trap # 2
Aphidiidae					
<i>Lysiphlebus testaceipes</i> (Cresson, 1880)	pur	-	B, D	Common	4A-Malaise #1
Apidae (honey bees)					
<i>Apis mellifera</i> Linnaeus, 1758 (Honey bee)	pur	-	D	Common	4A, 4B-Malaise & seen, KA-0171-Malaise trap
Bethylidae					
<i>Epyris extraneus</i> Birdwell, 1917	adv	E	B	Scarce	B2-Gas aspirator
<i>Epyris</i> sp. A	adv	A	B	Scarce	KA-0171 malaise
<i>Goniozus emigratus</i> Rower	adv	NIR	B	Common	KA-0178- Malaise,
<i>Goniozus</i> sp. possibly <i>columbianus</i> Ashmead	adv	B			
unidentified genus species	adv	NTL	B	Scarce	KA-0171-Malaise trap
Braconidae (braconid wasps)					
<i>Acrophasmus immigrans</i> (Beardsley , 1961)	adv	A			
<i>Agathis</i> sp. A	adv	A	D	Common	4A-Malaise #1
<i>Apanteles opacus</i> (Ashmead, 1905)	adv	A	D	Common	4B-Malaise trap
<i>Apanteles</i> sp. nr. <i>carpatius</i>	adv	NSR	D	Scarce	KA-0178- Malaise,
<i>Ascogaster</i> sp. A	adv?	B	D	Scarce	MV-5X99
<i>Cotesia</i> sp A	pur?	NTL	B	Scarce	KA-0171-Malaise trap

Table 3 continued

ARTHROPOD FAUNA	Status in	Status on	Status and Distribution within Kahului Airport Environs		
	Hawai'i ¹	Maui ²	Veg Type ³	Relative ⁴ Abundance	Collection sites and Methods ⁵
Braconidae (continued)					
<i>Glyptapanteles militaris</i> (Walsh, 1861)	pur		D	Common	4B-Malaise trap
<i>Glyptapanteles</i> sp. A	adv	B	D	Common	4A,4B-Malaise trap
<i>Glyptocolastes texanus</i> Ashmead, 1900	adv	A			
<i>Heterospilus prosopidis</i> Viereck	pur	-	B,H	Common	3B-sweep net, 4A,4B-Malaise, KA-0171-Malaise
<i>Heterospilus</i> sp. A	adv	A			
<i>Parallorhogas pallidiceps</i> (Perkins, 1910)	adv	-			
<i>Phanerotoma</i> sp. A	adv	A			
? <i>Phanerotoma</i> sp. B	adv	A			
<i>Spathius prusias</i> Nixon, 1943	adv	A	K	Common	2B-Black light, 4A-Malaise #1
<i>Stenocorse bruchivora</i> (Crawford, 1910)	pur	-	D	Common	4A-Malaise #1
<i>Urosigalphus bruchi</i> Crawford, 1907	adv	-	D,H	Common	3B-sweep net, 4A-Malaise #1, KA-0171-Malaise trap
unidentified genus nr. <i>Opius</i>	?	NTL	D	Scarce	KA-0178- Malaise,
unidentified genus nr. <i>Rhacontus</i>	?	NTL	D	Scarce	KA-0178- Malaise,
unidentified genus nr. <i>Orgilus</i>	?	NTL	D	Scarce	KA-0178- Malaise
unidentified genus species A	?	NTL	D	Scarce	KA-0179- Malaise,
unidentified genus species B	?	NTL	D	Local	KA-0171 – Malaise Trap
Chalcididae (chalcids)					
<i>Brachymeria discreta</i> Gahan, 1942	adv	NIR	B	Scarce	KA-0180- general,
<i>Brachymeria obscurata</i> (Walker, 1874)	adv	-	A	Common	4A-general
<i>Brachymeria podagrica</i> (Fabricius, 1787)	adv	A			
<i>Dirhinus</i> sp. A	?	NIR/NSR?	H	Uncommon	KA-0181- Malaise, KA-0182- yellow pan trap
<i>Invreia</i> sp. near <i>philippiensis</i> Masi, 1929	adv	A			
Chrysididae					
<i>Trichrysis</i> probably <i>luzonica</i> (Mocsary, 1889)	adv	NTL	D	Scarce	4A-Malaise #1.
Diapriidae					
<i>Trichopria drosophilae</i> (Perkins, 1910)	end	A			
undetermined genus/sp. (unreported)	?	B			KA-0178/0183- Malaise
Dryinidae					
<i>Anteon coriaceus</i> (Perkins, 1905)	adv	A			
Encyrtidae					
genus species A	adv?	-	D	Uncommon	4A-Malaise trap # 1

Table 3 continued

ARTHROPOD FAUNA	Status in Hawai'i ¹	Status on Maui ²	Status and Distribution within Kahului Airport Environs		
			Veg Type ³	Relative ⁴ Abundance	Collection sites and Methods ⁵
Eucoilidae					
<i>Eucoila impatiens</i> (Say, 1836)	pur	NTL	B	Scarce	KA-0171 malaise
<i>Ganaspidium utilis</i> Beardsley, 1988	pur	-			
Eulophidae					
<i>Euplectrus</i> sp. A	adv?	B?	D, H	Local	3B-Gas aspirator
<i>Horismenus</i> sp. A	adv	B	D	Common	4A-Malaise #1, KA-0171 malaise
<i>Quadrastichus erythrinae</i> Kim	adv	NTL	K	Common	KA-0014 – Gas aspirator Ka-0271 Sticky trap
<i>Tetrastichinae</i> genus sp. A	adv	NSR?	E	Scarce	4A reared ex mantis egg case. 2June 2000
<i>Zagrammosoma</i> possibly <i>multilineatum</i> (Ashmead, 1888)	adv	NSR	B	Scarce	KA-0065 malaise trap
Eupelmidae					
<i>Brasema cushmani</i> (Crawford, 1908)	pur	-	D	Common	4B-Malaise #2
<i>Eupelmus swezeyi</i> (Crawford, 1915)	adv	A ¹	G	Common	1B-Gas aspirator, 3B-Malaise trap
Eurytomidae					
? <i>Eurytoma</i> sp. A (unreported)	adv?	B	D	Local	4A-Malaise #1
Evaniidae (ensign wasps)					
<i>Evania appendigaster</i> Linnaeus, 1758	adv	A	B,F, D	Common	Airport Nursery, 4A-Malaise #1, KA-0171-Malaise trap
<i>Szepligetella sericea</i> (Cameron, 1883)	adv	NIR	B	Scarce	KA-0171-Malaise trap
Formicidae (ants)					
<i>Anoplolepis gracilipes</i> (F. Smith, 1857)	adv	-	B	Common	2C-Gas aspirator
<i>Camponotus variegatus</i> (F. Smith, 1858)	adv	-	D	Common	2C-Ant bait, KA-0171-Malaise trap
<i>Ochetellus glaber</i> (Mayr, 1862)	adv	-			
<i>Paratrechina bourbonica</i> (Forel, 1886)	adv	-	H	Local	3B-Gas aspirator
<i>Paratrechina longicornis</i> (Latreille, 1802)	adv	-	H	Common	3C-Gas aspirator, 2C-Ant bait, 4A-1 st Malaise trap north of bike path.
<i>Pheidole megacephala</i> (Fabricius, 1793)	adv	-	H	Common	3B-MV bulb
<i>Plagiolepis alluaudi</i> Emery, 1894	adv	-	E	Common	2C-Ant bait
<i>Solenopsis geminata</i> (Fabricius, 1804)	adv	-	E	Common	2C-Ant bait
<i>Tapinoma melanocephalum</i> (Fabricius, 1793)	adv	-	E	Common	2C-Ant bait
<i>Technomyrmex albepes</i> (F. Smith, 1861)	adv	-	E	Common	2C-Ant bait

Table 3 continued

ARTHROPOD FAUNA	Status in Hawai'i ¹	Status on Maui ²	Status and Distribution within Kahului Airport Environs		
			Veg Type ³	Relative Abundance ⁴	Collection sites and Methods ⁵
Halictidae (sweat bees)					
<i>Dialictus</i> sp. near <i>navadensis</i> (Crawford, 1907)	adv	-	B, D	Common	2B-Black light, 4A-Malaise #1. KA-0171-Malaise trap KA-0064 window trap
Ichneumonidae (ichneumonids)					
<i>Anomalon californicum</i> (Cresson, 1879)	adv	A	D	Common	4A,4B-Malaise trap
<i>Barichneumon californicus</i> Heinrich, 1971	adv	A	D	Common	4A-Malaise #1. KA-0171-Malaise trap
<i>Casinarina infesta</i> (Cresson, 1872)	adv	-			
Cremastini: undetermined genus/sp.	adv	D	D	Common	4A-Malaise #1
<i>Diplazon laetatorius</i> (Fabricius, 1781)	adv	-	D	Common	4B-Malaise trap. KA-0171-Malaise trap
<i>Echthromorpha agrestoria fuscator</i> (Fabricius, 1793)	end	-	D	Common	4A,4B-Malaise trap
<i>Gelis albipalpus</i> [sp. near?] (Thomson, 1884)	adv	A			
<i>Hypsicera</i> sp. A not <i>H. femoralis</i> (Fourcroy)	adv	B	D		4B-Malaise trap
<i>Hypsicera</i> sp. B different from above	adv	B			
<i>Pimpla punicipes</i> Cresson, 1873	adv	-	D	Common	4A,4B-Malaise trap
Pimplinae: Genus sp. A	adv	D		Scarce	4A-General
<i>Pristomerus hawaiiensis</i> Perkins, 1910	end?	-	D	Common	4A,4B-Malaise trap
<i>Trathala flavoorbitalis</i> (Cameron, 1907)	adv	-			
<i>Venturia</i> sp. not <i>canescens</i> (Gravenhorst, 1829)	adv	A			
Leucospidae					
<i>Leucospis</i> sp. A not <i>affinis</i> Say, 1824	adv	NSR		Scarce	KA-0109- general
Megachilidae (leaf cutter bees)					
<i>Chalicodoma umbripennis</i> (F. Smith 1853)	adv	-			
<i>Megachile timberlakei</i> Cockerell, 1920	adv	-	B,H	Local	3B-Malaise trap
Mymaridae (fairyflies)					
<i>Gonatocerus californicus</i> Girault, 1911	adv	-			
<i>Gonatocerus dolichocerus</i> Ashmead, 1887	adv	-			
<i>Gonatocerus</i> sp. A	adv	B			
<i>Stephanodes reduvioli</i> (Perkins, 1905)	adv	-			

Table 3 continued

ARTHROPOD FAUNA	Status in Hawai'i ¹	Status on Maui ²	Status and Distribution within Kahului Airport Environs		
			Veg Type ³	Relative ⁴ Abundance	Collection sites and Methods ⁵
Pompilidae (spider wasps)					
<i>Anoplius toluca</i> (Cameron, 1893)	adv	-			
<i>Paracyphononyx pedestris</i> (F. Smith, 1855)	adv	A			
Pteromalidae					
<i>Lariophagus texanus</i> Crawford, 1910	pur	-	D	Common	4A-Malaise #1
<i>Pachyneuron</i> sp. possibly <i>aphidis</i> (Bouché)	adv	B			
<i>Callocleonymus swezeyi</i> (Yoshimoto & Ishii, 1965)	adv	D	D	Scarce	4A-Malaise #1
Scelionidae					
<i>Telenomus vulcanus</i> Perkins, 1910	end?	A	D	Common	4A-Malaise #1
<i>Baeus</i> sp. A	adv	NSR	B	Scarce	KA-0171 Malaise
Scoliidae					
<i>Campsomeris marginella modesta</i> (F. Smith,)	pur	-	B,D, E	Common	4B-Malaise #2; General on bare ground, KA-0171-Malaise trap
Sphecidae (thread-waisted wasps)					
<i>Ampulex compressa</i> (Fabricius,1781)	pur	-	B,D	Common	2C,3A-general, KA-0171-Malaise trap
<i>Chalybion bengalense</i> (Dahlbom, 1845)	adv	A			
<i>Dolichurus stantoni</i> (Ashmead, 1904)	pur	-	B	Common	2B-Night fogging & yellow pan trap
<i>Dryudella immigrans</i> (Williams, 1946)	adv	A	D	Common	4A-Malaise #1
<i>Ectemnius mandibularis</i> (F. Smith, 1879)	end	-	H	Common	3B,4A-sweep net
<i>Ectemnius molokaiensis</i> (Perkins, 1899)	end	-	D	Local	4A,4B-Malaise
<i>Isodontia mexicana</i> (Sausure, 1867)	adv	A	D	Common	3B-Gas aspirator
<i>Nitela</i> sp. A	adv	A			
<i>Pison hospes</i> F. Smith, 1879	adv		D	Common	4A-Malaise #1
<i>Pison iridipenne</i> Smith, 1879	adv	E	D	Common	4A-MV bulb
<i>Polemistis luzonensis</i> (Rohwer, 1919)	adv	A	D	Scarce	KA-0184- Malaise
<i>Rhopalum</i> sp. A	adv	A			
<i>Sceliphron caementarium</i> (Drury, 1770)	adv	-			
<i>Sceliphron madraspatanum</i> (Fabricius, 1781)	adv	A			
<i>Tachysphex morosus</i> (F. Smith, 1859)	adv	A	H	Common	4B-Malaise #2
<i>Tachysphex</i> sp. A	adv	D	A,J		3B, General.

Table 3 continued

ARTHROPOD FAUNA	Status in	Status on	Status and Distribution within Kahului Airport Environs		
	Hawai'i ¹	Maui ²	Veg Type ³	Relative ⁴ Abundance	Collection sites and Methods ⁵
Sphecidae (continued)					
<i>Trypoxylon bicolor</i> F. Smith, 1856	adv	-	B,D, F	Common	2C-sweep net, 4A-Malaise #1, KA-0171-Malaise trap
<i>Trypoxylon philippinensis</i> Ashmead, 1904	adv	-			KA-0171-Malaise trap
Unidentified genus species A	adv	NSR	B	Scarce	KA-0171 Malaise
Torymidae					
<i>Megastigmus transvaalensis</i> (Hussey, 1956)	adv	A			
<i>Podagrion mantis</i> Ashmead, 1886	adv	A			
Vespidae (hornets)					
<i>Delta campaniforme esuriens</i> (Saussure, 1852)	adv	A	B, D	Common	4A-Gas aspirator 4B-Malaise #2
<i>Delta curvatum</i> (Saussure, 1854)	adv	-	F	Uncommon	4B-Malaise #2
<i>Delta pyriforme philippinense</i> (Bequaert, 1928)	adv	A	F	Uncommon	2C-Ag. Offices (observed only).
<i>Pachodynerus nasidens</i> (Latreille, 1832)	adv	-	D, H	Common	3B-general
<i>Polistes aurifer</i> Saussure, 1853	adv	-	B, D	Common	4A-Malaise #1,
<i>Polistes exclamans</i> Viereck, 1906	adv	A	B, D, H	Common	4A-Gas aspirator KA-0171-Malaise trap
<i>Polistes olivaceus</i> (DeGeer, 1773)	adv	-	B, D	Scarce	2B-general
<i>Vespula pensylvanica</i> (Saussure, 1857) (Western yellow jacket)	adv	-	D	Transient visitor	4B-Malaise #2
Order ISOPTERA (termites)					
Kalotermitidae					
<i>Cryptotermes brevis</i> (Walker, 1853) (drywood termite)	adv	-	B, D	Common	3B-MV bulb
<i>Incisitermes immigrans</i> (Snyder, 1922)	adv	E	B	Common	1B, 2B, 3A-MV Bulbs
Rhinotermitidae					
<i>Coptotermes formosanus</i> Shiraki, 1909 (Formosan termite)	adv	-	F	Common	2C-Ag. Lab

Table 3 continued

ARTHROPOD FAUNA	Status in	Status on	Status and Distribution within Kahului Airport Environs		
SCIENTIFIC NAME	Hawai'i ¹	Maui ²	Veg Type ³	Relative ⁴ Abundance	Collection sites and Methods ⁵
Order: LEPIDOPTERA (moths & butterflies)					
Cosmopterigidae					
<i>Anatrachyntis incertulella</i> (Walker 1864) the Pandanus flower moth	adv	-	H,B,D	Scarce	2B,4A- MV light, KA-0169 – MV light
<i>Asymphorodes dimorpha</i> (Busck 1914)	adv	-	B,D,H	Common	3A,3B,3C,4A-Most MV lights
<i>Asymphorodes triaula</i> (Meyrick 1935)	adv	A			Most MV lights
<i>Hyposmocoma</i> sp. A	end	-	B,D,H	Common	Most MV lights, KA-0059/0168/0169/0170-MV light, KA-0171-Malaise trap
<i>Hyposmocoma</i> sp. B	end	-	B, D	Uncommon	2B- MV light
<i>Hyposmocoma</i> sp. C	end	-	H,G	Common	1B,2B,4A- MV light
<i>Hyposmocoma</i> sp. D	end	-	B	Common	3A,3B,3C- MV light, KA-0171-Malaise trap, KA-0169/0170 – MV light
<i>Hyposmocoma</i> sp. E	end	-	B	Scarce	3A-MV light
<i>Hyposmocoma</i> sp. F	end	-	H,D	Scarce	4A- MV light
<i>Ithome concolorella</i> (Chambers 1875) (Keawe flower moth)	adv	-	B	Common	Most MV lights, KA-0171- Malaise trap
<i>Pyroderces badia</i> (Hodges 1962)	adv	A	H,D	Scarce	4A- MV light, KA-0169 – MV light
<i>Pyroderces rileyi</i> (Walsingham 1882) the pink cornworm	adv	-	H,D	Uncommon	2B,4A- MV light, KA-0168/0169 – MV light
Crambidae					
<i>Euchromius ocellus</i> (Haworth, 1811)	adv	A	B, D,H	Uncommon	2B,4A-MV light
<i>Eudonia</i> sp. A	end	-	A, J	Scarce	4A- MV light
<i>Hellula undalis</i> (Fabricius, 1781)	adv	-	B, D,H	Common	3B,3A,3C,4A MV light
<i>Herpetogramma licarsisalis</i> (Walker, 1859) (grass webworm)	adv	-	B,C,D	Common	4A,3B,3A- MV light, KA-0057/0060/0168/0169/0170- MV lights, KA-0171- Malaise trap
<i>Mestolobes minuscula</i> (Butler, 1881)	end	NTL	BDH	Common	KA-0168/0169-MV light
<i>Mestolobes</i> sp. A	end	-	B,D,H	Common	2B,3B,3A,4A- MV light, KA-0057- MV lights, KA-0171-Malaise trap
<i>Nomophila noctuella</i> (Denis & Schiffermueller, 1775)	adv	-	B, D,C	Uncommon	2B,4A- MV light
<i>Omiodes blackburni</i> (Butler, 1877)	end	E	G	Common seasonally	1B, On coconut
<i>Omiodes demaratalis</i> (Walker, 1859)	end	E	G	Scarce	1B, 2B, MV Bulb
<i>Omiodes localis</i> (Butler, 1879)	end	-	B,D,H	Uncommon	3B,4A- MV light, KA-0169 – MV light

Table 3 continued

ARTHROPOD FAUNA	Status in	Status on	Status and Distribution within Kahului Airport Environs		
	Hawai'i ¹	Maui ²	Veg Type ³	Relative ⁴ Abundance	Collection sites and Methods ⁵
Crambidae (continued)					
<i>Omphisa anastomosalis</i> (Guenee, 1854)	adv	-	B, D	Uncommon	2B-MV light 4A-Malaise #1
<i>Orthomecyna exigua</i> (Butler, 1879)	end	-	H,B, D	Common	Most MV lights, KA-0057,0059,0060,0168/0169/0170-MV light
<i>Spoladea recurvalis</i> (Fabricius,1775) (beet webworm)	adv	-	B, D,	Common	2B,3C,4A- MV light, KA-0168/170-MV light
<i>Synclita oblitalis</i> (Walker, 1859)	adv	A	H,B,D	Uncommon	2B,4A- MV light
<i>Tamsica floricolens</i> (Butler, 1883)	end	A	B,D,H	Common	Most MV lights, KA-0168/170-MV light. KA-0171 malaise
<i>Udea litorea</i> (Butler, 1883)	end	A	A, J	Local	4A- MV light, on <i>Scaevola</i>
genus & species A	adv	B	D	Scarce	3A- MV light, KA-0060 MV light
Gelechiidae					
<i>Autosticha pelodes</i> (Meyrick 1883)	adv	A	B	Uncommon	2B,3B-MV light KA-0170 MV
genus & sp. A (near <i>Autosticha</i>)	adv	B	B	Uncommon	2C,3C-MV light
<i>Dichomeris acuminata</i> (Staudinger 1876)	adv	A	B	Locally Common	3B,3C- MV light
<i>Dichomeris aenigmatica</i> (Clarke 1962) the sourbush moth	pur	-	D,B	Scarce	2B-Fogging
<i>Keiferia lycopersicella</i> (Walsingham 1928) the tomato pinworm	adv	-	B	Scarce	2B-MV light
<i>Pectinophora</i> sp. prob. <i>gossypiella</i> (Saunders, 1843), pink bollworm	adv	-	D,H	Scarce	4A- MV light. KA-0169 MV
<i>Phthorimaea operculella</i> (Zeller 1873) the potato tuberworm	adv	-	B,H	Scarce	2C- MV light
<i>Stoeberhinus testaceus</i> Butler, 1881	adv	-	B,D	Common	1B,3C,3A,4A,2B- MV light, KA-0171-Malaise trap. KA-0169 MV
Geometridae (inchworms)					
<i>Anacamptodes fragilaria</i> (Grossbeck, 1909) (Koa haole moth)	adv	-	B,D	Common	2B,3A,3B,4A- MV light, KA-0169-MV light, KA-0171-Malaise trap
<i>Cyclophora nanaria</i> (Walker, 1861)	adv	-	B,D	Common	3A,3B,3C- MV light, KA-0170/0171-Malaise trap
<i>Disclisioprocta stellata</i> (Guenee 1857) Bouganvillea looper	adv	-	K	Common	2B- larvae on <i>Bouganvillea</i>
<i>Macaria abydata</i> Guenee, 1857 (Koa haole looper)	adv	-	B,D	Common	@ all MV sites, KA-0057/0060/0168/0169/MV light, KA-0171-Malaise trap
<i>Scopula personata</i> ?(Prout,)	adv	A	H,D,B	Common	3A,3C,4A,2B- MV light

Table 3 continued

ARTHROPOD FAUNA	Status in Hawai'i ¹	Status on Maui ²	Status and Distribution within Kahului Airport Environs		
			Veg Type ³	Relative Abundance ⁴	Collection sites and Methods ⁵
Hesperiidae (skippers)					
<i>Hylephila phyleus</i> (Drury, 1770) firey skipper	adv	-	E,C,A	Common	3A,3B,2B-flying
Immidae					
<i>Imma mylias</i> Meyrick, 1906	adv	NIR		Scarce	KA-0185, MV bulb
Lycaenidae (blues)					
<i>Brephidium exilis</i> (Boisduval, 1852)	adv	A	A,C,H, J	Common	3A,3B,2B-flying
<i>Lampides boeticus</i> (Linnaeus, 1767) bean butterfly	adv	-	D	Common	3A,3B,2B-flying
Lyonetidae					
<i>Bedellia cf. orchilella</i> Walsingham 1907; sweet potato leafminer	adv	-	B,D	Scarce	2B-Fogging
Noctuidae (noctuids)					
<i>Achaea janata</i> (Linnaeus, 1758) (Croton moth)	adv	-	B,D,H	Common	2B-4B-Most MV lights, malaise
<i>Agrotis ipsilon</i> (Hufnagel, 1767) (Greasy cutworm)	adv	-	B, D	Common	2B, 3C, 4B- MV lights, malaise
<i>Agrotis</i> sp. near <i>dislocata</i> (Walker, 1856)	end	-	B	Scarce	3C- MV lights
<i>Amyna natalis</i> (Walker, 1858)	adv	A	B, D,	Common	2B, 3B,4B-MV lights, malaise
<i>Anomis flava</i> (Fabricius, 1775)	adv	C	B	Scarce	4A, Malaise, KA-0059-MV light. KA-0065 malaise; KA-0020 general, KA- 0022- fogging
<i>Ascalapha odorata</i> (Linnaeus, 1758) (Black witch)	adv	-	B, D	Uncommon	3A,2C MV light
<i>Athetis thoracica</i> (Moore, 1884)	adv	-	B,D	Common	2B-4B-Most MV lights, malaise, KA-0169-MV light, KA-0022- fogging
<i>Chrysodeixis eriosoma</i> (Doubleday, 1843)	adv	-	B,D	Common	2B-4B-Most MV lights, malaise
<i>Condica dolorosa</i> (Walker, 1865)	adv	C	B	Scarce	4A, Malaise
<i>Condica illecta</i> (Walker, 1865)	adv.	-	B	Uncommon	2B-MV light
<i>Ctenoplusia albostrigata</i> Brener & Gray	adv	B	B	Scarce	2B-MV light
<i>Elaphria nucicolora</i> (Guenee, 1852)	adv	-	B, D	Common	2B,3C,3A-MV lights, KA- 0169-MV light
<i>Eublemma accedens</i> (Felder & Rogenhofer, 1874)	adv	A	B, D	Common	4A-Malaise #1, 1B,3A,3C,4A- MV lights, KA-0059/170 - MV light

Table 3 continued

ARTHROPOD FAUNA	Status in Hawai'i ¹	Status on Maui ²	Status and Distribution within Kahului Airport Environs		
			Veg Type ³	Relative Abundance ⁴	Collection sites and Methods ⁵
Noctuidae (continued)					
<i>Hypena laceratalis</i> Walker, 1858 (lantana looper)	pur	-	B, D	Common	2B,3A,3C,4A- MV I KA-0170-MV light most MV lights
<i>Hypocala deflorata</i> (Fabricius, 1793)	adv	NTL		Scarce	KA-0059 MV
<i>Leucania loreyimima</i> Rungs, 1953	adv	A	B	Uncommon	1B,2B-MV light
<i>Leucania cf. scottii</i> Butler, 1886	adv	A	B	Uncommon	2B-MV light
<i>Leucania cf. striata</i> Leech, 1900	adv	-	B	Uncommon	2B-MV light
<i>Lycophotia porphyrea</i> (Denis & Schiffermueller, 1775) (black cutworm))	adv	-	B	Uncommon	4A- On <i>Chenopodium</i> at night
<i>Melipotis indomita</i> (Walker, 1857)	adv	-	B,D	Common	2B,2C,3A,3B-MV lights, 4A-malaise, KA-0057/0060/0169-MV light, KA-0171-Malaise trap
<i>Polydesma boarmoides</i> Guenee, 1852	adv	-	B	Scarce	2C-MV light
<i>Pseudaletia unipuncta</i> (Haworth, 1809)	adv	-	B, D	Common	2B-4B-Most MV lights, malaise, KA-0168-MV light
<i>Schrankia</i> sp. A	end	-	B	Local	2B,2C-MV light
<i>Simplicia caeneusalis</i> (Walker, 1858)	adv	-	B,D	Common	2B,3B- MV light, KA-0168-MV light
<i>Spodoptera mauritia</i> (Boisduval, 1833)	adv	-	B	Scarce	2B-MV light
<i>Trichoplusia ni</i> (Huebner 1802) (cabbage looper)	adv	-	B	Uncommon	2B-MV light
Nymphalidae (brush-footed butterflies)					
<i>Agraulis vanillae</i> (Linnaeus, 1758) (gulf fritillary)	adv	-	B, D, E	Uncommon	3B,2C-observed only
<i>Danaus plexippus</i> (Linnaeus, 1758) (monarch)	adv	-	B,K	Common	2C,3A (observed only)
<i>Vanessa cardui</i> (Linnaeus, 1758) (painted lady)	adv	-	D,E	Common	2C,4A-General
Oecophoridae					
<i>Ethmia nigroapicella</i> (Saalmueller,1880) (kou moth)	adv	-	K,B	Uncommon	2B- MV light. KA-0057-MV light
<i>Thyrocopa</i> sp. A	end	-	B	Local	3B,3C- MV light
<i>Thyrocopa</i> sp. B	end	-	B,D	Local	3B,2B,4A,3A- MV light

Table 3 continued

ARTHROPOD FAUNA	Status in Hawai'i ¹	Status on Maui ²	Status and Distribution within Kahului Airport Environs		
			Veg Type ³	Relative Abundance ⁴	Collection sites and Methods ⁵
Olethreutidae (leafrollers)					
<i>Crocidosema blackburni</i> ? (Butler, 1910)	end?	-	B,H	Scarce	2B,4A- MV light
<i>Crocidosema lantana</i> Busck 1910	pur	-	B	Uncommon	2B,3C- MV light, KA-0169/170-MV light
<i>Crocidosema</i> sp. near <i>leprara</i> (Walsingham 1907)	end	A	H,F	Common	1B,2B,4A-MV light KA-0168/0169/170-MV light
<i>Cryptophlebia illepida</i> (Butler, 1882)	end?	-	B, D	Common	2B,4A-MV bulb, KA-0168/0169/170-MV light
<i>Cryptophlebia ombrodelta</i> (Lower, 1898)	adv	-	B,D	Common	2B,3B,3C- MV light, KA-0169/170-MV light
Papilionidae (swallowtails)					
<i>Papilio xuthus</i> Linnaeus, 1767) (citrus swallowtail)	adv	-	K	Common	2C-On host (citrus)
Pieridae Whites)					
<i>Pieris rapae</i> (Linnaeus, 1758) (cabbage white)	adv	-	B	Common	2C- Flying
Plutellidae					
<i>Plutella xylostella</i> (Linnaeus, 1758) (diamond-back moth)	adv	-	D,H	Scarce	4A- MV light
Psychidae (bagworms)					
<i>Brachycyttarus griseus</i> De Joannis, 1929	adv	A	F	Common	2C-Larval cases on lawn
Pterophoridae (plume moths)					
<i>Stenoptiloides</i> sp. A	adv	-	B, D	Uncommon	2B,3C-MV light
Pyralidae					
<i>Elasmopalpus lignosellus</i> (Zeller, 1848)	adv	-	E	Scarce	2C-General collecting
<i>Ephesiodes gilvescentella</i> Ragonot 1887	adv	-	B,D	Common	Most MV lights, KA-0057/0060/0168/0169/0170-MV light, KA-0171-Malaise trap
<i>Galleria mellonella</i> (Linnaeus, 1758) greater wax moth	adv	NTL		Scarce	KA-0057, MV light

Table 3 continued

ARTHROPOD FAUNA	Status in Hawai'i ¹	Status on Maui ²	Status and Distribution within Kahului Airport Environs		
			Veg Type ³	Relative Abundance ⁴	Collection sites and Methods ⁵
Sphingidae (hawk moths)					
<i>Agrius cingulata</i> (Fabricius, 1775) (sweet potato hornworm)	adv	-	J,B	Uncommon	2B-MV light, 4A-larva on <i>Ipomea</i> , KA-0169-MV light
<i>Deilephila nerii</i> (Linnaeus, 1758) (oleander hawk moth)	adv	-	K	Local	3B-reared Oleander hedge
<i>Hippotion rosetta</i> (Swinhoe, 1892)	adv	A	A, B, D	Common	D – H Malaise traps 1 & 2 KA-0019 general, KA-0065 malaise
<i>Hyles lineata</i> (Fabricius 1775) (white-lined sphinx)	ind /adv?	-	A,J	Scarce	4A-At night
<i>Manduca blackburni</i> (Butler, 1880) (Blackburn's sphinx)	end	-	A,J	U.S.A. Endangered species	4A-Larvae on tree tobacco (not collected), KA-0170-MV light
Tineidae (clothes moths)					
<i>Dryadaula terpsichorella</i> (Busck 1910)	adv	-	B,D	Common	4A,3A-MV light, KA-0171-Malaise trap
<i>Erechthias minuscula</i> (Walsingham, 1907)	adv	-	B, D	Common	4A,2B,3A- MV light, KA-0169/0170-MV light, KA-0171-Malaise trap
<i>Erechthias simulans</i> (Butler, 1882)	adv	A	B, D	Uncommon	4A,3A,2B,3C- MV light; 2C-In HDOA Quarantine room, KA-0169/170-MV
<i>Monopis meliorella</i> (Walker 1863)	adv	A	B	Scarce	3C- MV light
<i>Opogona aurisquamosa</i> (Butler 1881)	adv	-	D	Uncommon	3A- MV light, KA-0169-MV light
<i>Opogona omoscopa</i> (Meyrick, 1893)	adv	-	B	Local	2B,3C- MV light, KA-0168-MV light
<i>Phereoeca allutella</i> (Rebel 1892)	adv	-	F	Uncommon	2C, 3B- In buildings
<i>Trichophaga mormopis</i> Meyrick, 1935	adv	-	B, D	Uncommon	2B-MV bulb
Genus & sp. A	adv	D	B	Common	1B,3A-MV light, KA-0171-Malaise trap
Tortricidae (leafrollers)					
<i>Amorbia imigratella</i> Busck, 1910	adv	NTL		Scarce	KA-0057 MV light
<i>Bactra venosana</i> (Zeller, 1847)	pur	-	H,G	Common	1B,2B,4A-MV bulb, KA-0170 – MV light, KA-0171-Malaise trap
<i>Episimus utilis</i> Zimmerman, 1978	pur	-	B	Scarce	4A- MV light
<i>Lorita scarificata</i> (Meyrick, 1917)	adv	A	B,D	Common	Most MV lights, KA-0057/0168/0169-MV light, KA-0171-Malaise trap
<i>Platynota stultana</i> Walsingham, 1884	adv	A	B,D	Common	Most MV lights, KA-0059/0169/0170-MV light
Unknown Family					
Unidentified genus species A	adv	NSR		Scarce	KA-0020 host search night Hibiscus

Table 3 continued

ARTHROPOD FAUNA	Status in	Status on	Status and Distribution within Kahului Airport Environs		
SCIENTIFIC NAME	Hawai'i ¹	Maui ²	Veg Type ³	Relative ⁴ Abundance	Collection sites and Methods ⁵
Order: MANTODEA (mantids)					
Mantidae					
<i>Hierodula patellifera</i> (Serville, 1839)	adv	-	D	Common	2B-MV Bulb
<i>Tenodera australasiae</i> (Leach, 1815)	adv	-	D, A	Common	4A-Egg cases on fence, General collecting KA-0171-Malaise trap
Order: NEUROPTERA (lacewings)					
Chrysopidae (green lacewings)					
<i>Chrysoperla comanche</i> (Banks, 1938)	adv	-	H	Common	3B-MV bulb
Coniopterygidae (dusty-wings)					
<i>Coniocompsa zimmermani</i> Kimmins, 1953	adv	-	B	Scarce	Gas aspirator KA-0065 malaise trap. KA-0265 Sticky trap
Hemerobiidae (brown lacewings)					
<i>Micromus timidus</i> Hagen, 1853	pur	-	B, H	Local	2B-MV bulb
<i>Symphorobius barberi</i> (Banks, 1903)	pur	-	B	Uncommon	4A, Malaise
Order: ODONATA (dragonflies and damselflies)					
Aeshnidae (darners)					
<i>Anax junius</i> (Drury, 1770) (Green darner)	ind	-	D, H	Common	3B, 1B, 2B-sweep net
Coenagrionidae (narrow-winged damselflies)					
<i>Ischnura ramburii</i> (Selys-Longchamps, 1850)	adv	-	H	Common	2B-Gas aspirator, sweep net
Libellulidae (skimmers)					
<i>Orthemis ferruginea</i> (Fabricius, 1775)	adv	-	H	Common	3B-sweep net
<i>Pantala flavescens</i> (Fabricius, 1798) (Globe skimmer)	ind	-	H	Common	Commonly observed

Table 3 continued

ARTHROPOD FAUNA	Status in	Status on	Status and Distribution within Kahului Airport Environs		
	Hawai'i ¹	Maui ²	Veg Type ³	Relative ⁴ Abundance	Collection sites and Methods ⁵
Order: ORTHOPTERA (grasshoppers & crickets)					
Acrididae (short-horned grasshoppers)					
<i>Oedaleus abruptus</i> (Thunberg, 1815)	adv	-	C	Common	3B, 4B-gas aspirator, sweep net
<i>Schistocerca nitens</i> (Thunberg, 1815)	adv	-	C, I	Common	3B, 4B-gas aspirator, sweep net
Gryllidae (crickets)					
<i>Gryllus bimaculatus</i> DeGeer, 1773	adv	-	C,H	Scarce	3B-General
<i>Modicogryllus siamensis</i> Chopard, 1961	adv	-	H,C,D	Common	2B,3A,3B,4A- MV light, KA-0168/0170-MV light
<i>Trigonidomorpha sjostedti</i> Chopard 1926	adv	-	D	Scarce	Gaspirator, irrigated sites.
Pyrgomorphidae					
<i>Atractomorpha sinensis</i> Bolivar, 1905	adv	-	J	Common	4A-Gas aspirator
Tetrigidae					
<i>Paratettix mexicanus</i> (Saussure, 1861)	adv	C	H	Scarce	3A, Sweeping wetspot
Tettigoniidae (katydids)					
<i>Conocephalus saltator</i> (Saussure, 1859)	adv	E	B, H	Uncommon	3A, 2B, Sweeping herbs at wetspots, KA-0171-Malaise trap
<i>Elimaea punctifera</i> (Walker, 1869)	adv	A	D	Common	4A-Malaise #1, KA-0171-Malaise trap
<i>Euconocephalus nasutus</i> (Thunberg, 1815)	adv	-	C	Common	3B-MV bulb
<i>Phaneroptera furcifera</i> Stal, 1874	adv	NIR			KA-0169- MV light
Order: PSOCOPTERA (bark & book lice)					
Archipsocidae					
<i>Archipsocus</i> sp. A	adv	D		Local	1B, Host search (keawe)
Elipsocidae					
<i>Palistrepus inconstans</i> (Perkins, 1899)	end	E	D	?	4A, Malaise Trap 1.
Hemipsocidae					
<i>Hemipsocus roseus</i> (Hagen, 1859)	adv	E	B	?	2B, MV Bulb

Table 3 continued

ARTHROPOD FAUNA	Status in	Status on	Status and Distribution within Kahului Airport Environs		
	Hawai'i ¹	Maui ²	Veg Type ³	Relative ⁴ Abundance	Collection sites and Methods ⁵
Lepidopsocidae					
<i>Lepidopsocus maculatus</i> Thornton, Lee & Chui, 1972	adv	NTL	B	Local	KA-0048-general
<i>Lepidopsocus</i> sp. A	adv	C?	B	Scarce	4A, Malaise
Liposcelidae					
<i>Liposcelis</i> cf <i>divinatorius</i> (Mueller, 1776) book louse	adv	A	B,F	Common	2C-in HDOA Insectary.
Psocidae					
<i>Ptycta</i> sp. A	end	NTL	B	Common	KA-0171 Malaise; KA-0064 window trap; Keawe bark at night
Order: SIPHONAPTERA (fleas)					
Pulicidae (common fleas)					
<i>Ctenocephalide felis</i> (Bouche, 1835)	adv	-	F	Scarce	2C-in HDOA Insectary.
Order: STREPSIPTERA (twisted-wing parasites)					
Stylopidae					
<i>Xenos auriferi</i> Pierce, 1911	adv	-	B,D,H	Common	4A-recovered from <i>Polistes aurifer</i>
Order: THYSANOPTERA (thrips)					
Phlaeothripidae					
<i>Gynaikothrips ficorum</i> (Marchal, 1908)	adv	E	B	Uncommon	3C-Host search- <i>Ficus</i>
Thripidae					
<i>Heliothrips heamorrhoidalis</i> (Bouche, 1833)	adv	-	K	Common	2C-Gas aspirator
Order: THYSANURA (silverfish)					
Lepismatidae					
<i>Ctenolepisma longicaudatum</i> Escherich, 1905	adv	A	F	Common	2C-in buildings
Order: TRICHOPTERA (caddisflies)					
Hydropsychidae					
<i>Cheumatopsyche pettiti</i> (Banks, 1908)	adv	-	H	Common	3B-MV bulb @ all MV sites KA-0170-MV light
Hydroptilidae					
<i>Oxyethira maya</i> Denning, 1947	adv	-	G	Uncommon	2B-MV bulb

Table 3 continued

ARTHROPOD FAUNA	Status in	Status on	Status and Distribution within Kahului Airport Environs		
SCIENTIFIC NAME	Hawai'i ¹	Maui ²	Veg Type ³	Relative ⁴ Abundance	Collection sites and Methods ⁵
Class: CRUSTACEA					
Order: AMPHIPODA (sandhoppers, scuds)					
Talitridae					
Genus & sp. A	?	-	H	Local	4A-On ground
Order: ISOPODA (sowbugs & pillbugs)					
Armadillididae (pillbugs)					
<i>Armadillidium vulgare</i> (Latreille, 1804)	adv	C	K	Uncommon	2C-General @night
Ligiidae					
<i>Ligia hawaiiensis</i> Dana, 1853	end	NTL	coast	Uncommon	KA-0047, general
Porcellionidae (sowbugs)					
<i>Porcellio laevis</i> Latreille, 1804	adv	-	A, B	Common	2B, 4A-On ground. KA-0064 window trap
<i>Porcellionides pruinosus</i> (Brandt, 1833)	adv	E	B, K	Scarce	2B-Gas aspirator, 2C-General @night, KA-0014-gas aspirator, KA-0056-pitfall, KA-0058-general KA-0064 window trap
Scyphacidae					
<i>Alloniscus oahuensis</i> Budde-Lund, 1879	adv	-	H, I	Local	4A-pan trap
Class: CHILOPODA (centipedes)					
Order: GEOPHILOMORPHA (soil centipedes)					
Mecistocephalidae					
<i>Mecistocephalus spissus?</i> Wood, 1862	adv	NTL	K	Scarce	KA-0117 soil sample
Order: SCOLOPENDROMORPHA (giant centipedes)					
Scolopendridae					
<i>Scolopendra subspinipes</i> Leach, 1815 giant centipede	adv	-	B	Common	3B-On ground at night
Class: DIPLOPODA (millipedes)					
Order: Polydesmida (flat-backed millipedes)					
Paradoxosomatidae					
<i>Oxidus gracilis</i> (C.L. Koch, 1847)	adv	E	K	Scarce	2C, General, in plant nursery
Order: Polyxenida					
Polyxenidae					
<i>Polyxenus</i> sp. A	end?	C/ D?	J/K	Local	3A, Sifting

Table 3. cont.

¹ = **Biogeographic Status:** end=endemic to HIs, ind=indigenous to HIs, adv=adventive, pur=purposefully introduced, ?=Unknown,

² = **Status on Maui:** **NIR** = new island record, **NSR** = new state record and **NTL** = new to list for current study.
A = new island record in 2002 report;
B = new state record in 2002 report;
C = new island record in 2006 report;
D = new state record in 2006 report.
E = new to list in 2006 report.

³ = **Habitat-Vegetation Types :**

- A = Wind sheared dune vegetation.
- B = Keawe/mixed understory.
- C = Open grassland.
- D = Koa Haole shrub/mixed understory.
- E = Cane fields and ruderal borders.
- F = Airfield /terminal/industrial.
- G = Kanaha Pond (water area).
- H = Wetlands.
- I = Unvegetated littoral.
- J = Native beach strand.
- K = Non-native ornamentals

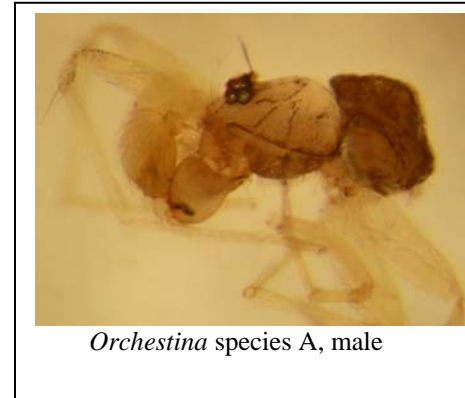
⁴ = A subjective measure of abundance within the airport environs:

- 'Common' = found at many sites or commonly seen;
- 'Local' = common but restricted to one or few areas;
- 'Uncommon' = only one or few specimen but found at multiple sites;
- 'Scarce' = only one or a few specimens seen.

⁵ = See **Table 1** for collection sites for new records in the current study. These are indicated by the 6-digit alpha numeric code. The 2-digit alpha-numeric codes refer to areas where specimens reported in the 2002 and 2006 studies were collected.

TABLE 4. – List of species of terrestrial arthropods collected in a Malaise trap at the Kahului Airport during the period from 21 October 2006 to 13 November 2006 [KA-0171]. Names and arrangement follow Nishida (2002), except as noted in Table 2.

ARTHROPOD FAUNA		
SCIENTIFIC NAME	Quantity	Status ¹
Phylum: ARTHROPODA		
Class: ARACHNIDA:		
Subclass: ARANEAE (spiders)		
Clubionidae		
<i>Clubiona</i> sp. A	10	NSR
Oonopidae (6-eyed jumping spiders)		
<i>Orchestina</i> sp. A?	5	NIR
<i>Orchestina</i> sp. B	1	NSR
Salticidae (jumping spiders)		
Unidentified immatures	3	
Scytodidae (spitting spiders)		
<i>Scytodes fusca?</i> Walckenaer, 1837	1	
Family?		
Unidentified immatures (1 species)	10	
Class: INSECTA (insects)		
Order: BLATTODEA (cockroaches)		
Blatellidae		
<i>Blatella lituricolis</i> (Walker) false German cockroach	1	
Polyphagidae		
<i>Euthyrrhapha pacifica</i> (Coquebert, 1804) (Pacific cockroach)	2	
Order: COLEOPTERA		
Anthribidae (fungus weevils)		
<i>Araecerus constans</i> Perkins, 1900	1	
Cerambycidae (long-horned wood boring beetles, longicorn beetles)		
<i>Ceresium unicolor</i> (Fabricius, 1787)	2	
<i>Placosternus crinicornis</i> (Chevrolat, 1860)	6	
<i>Sybra alternans</i> (Wiedemann, 1825)	5	
Chrysomelidae (leaf & seed beetles)		
<i>Acanthoscelides macrophthalmus</i> (Schaeffer, 1907)	1	
<i>Algarobius bottimeri</i> Kingslover, 1972. kiawe bean weevil	4	
<i>Carydon serratus</i> (Oliver, 1790) Tamarind seed weevil	1	
<i>Mimosestes amicus</i> (Horn, 1873)	2	



¹ = **Status:** NSR= new state record, NIR= new island record, NTL= new to list.

TABLE 4. (continued)

SCIENTIFIC NAME	Quantity	Status ¹
Coccinellidae (lady beetles, ladybugs)		
<i>Diomus</i> species A	1	NTL
Curculionidae (weevils)		
<i>Asynonychus godmanni</i> Crotch, 1867	3	
Elateridae (click beetles)		
<i>Conoderus exsul</i> (Sharp, 1877)	6	
<i>Conoderus pallipes</i> (Eschscholtz, 1830)	12	
<i>Melanotus punctosus</i> (Walker,)	1	
<i>Melanoxanthus melanocephalus</i> (Fabricius, 1781)	1	
<i>Prodrasterius collaris</i> (Candeze, 1859)	1	NIR
<i>Simodactylus cinnamomeus</i> (Boisduval, 1835)	1	
Nitidulidae		
<i>Carpophilus humeralis</i> (Fabricius, 1798)	3	
<i>Carpophilus marginellus</i> Motschulsky, 1858	1	
Rhipiphoridae		
<i>Rhipidius pectinicornis</i> Thunberg, 1806	1	NIR
Scarabaeidae (scarabs)		
<i>Adoretus sinicus</i> Burmeister, 1855 (Chinese rose beetle)	2	
Staphylinidae (rove beetles)		
<i>Anotylus</i> sp. A	1	
<i>Atheta</i> sp. A	10 +	NTL
<i>Coproporus</i> sp. B	1	NTL
Order: DIPTERA (flies)		
Agromyzidae (agromyzid leaf miners)		
<i>Melanagromyza splendida</i> Frick, 1953	1	
Asteiidae (asteiid flies)		
<i>Loewimyia orbiculata</i> Hardy, 1980	2	
Cecidomyiidae (gall gnats)		
<i>Lestremia</i> sp. A	20 +	NTL
<i>Lestremia leucophaea</i> (Meigen, 1818)	25+	NIR
genus & sp. A	10	
Unidentified genus species B	5	
Unidentified genus species C	10	






Rhipidius pectinicornis



Lestremia species

TABLE 4. (continued)





SCIENTIFIC NAME	Quantity	Status ¹	
Ceratopogonidae (biting midges)			
<i>Atrichopogon jacobsoni</i> (Meijere, 1907)	5		
<i>Dasyhelea</i> sp. D	10	NTL	
<i>Dasyhelea excellentis</i> Borkent, 1996	1	NIR	
<i>Forcipomyia biannulata</i> Ingram & Macfie, 1924	25 +	NSR	
<i>Forcipomyia brevis</i> (Johannsen, 1927)	10		
<i>Forcipomyia chrysolopha</i> (Kieffer, 1911)	50 +	NSR	
<i>Forcipomyia hardyi</i> Wirth & Howarth, 1982	20		
<i>Forcipomyia</i> cf. <i>quasiingrami</i> Macfie, 1939	50	NSR	
Chironomidae (non-biting midges)			
<i>Chironomus hawaiiensis</i> Grimshaw, 1901	1		
<i>Chironomus</i> sp. nr. <i>hawaiiensis</i> Grimshaw, 1901	25 +	NTL	
<i>Thalassomya setosipennis</i> Wirth, 1947	1	NTL	
Chloropidae (eye gnats)			
<i>Cadrema pallida</i> (Loew, 1865)	1		
<i>Conioscinella formosa</i> (Becker, 1911)	10+	NTL	
<i>Rhodesiella scutellata</i> (Meijere, 1908)	2	NTL	
Chyromyidae			
<i>Nannodastia horni</i> Hendel, 1930	2	NIR	
Cryptochetidae			
<i>Cryptochetum iceryae</i> (Williston, 1888) cottony cushion scale fly	1		
Culicidae (mosquitoes)			
<i>Culex quinquefasciatus</i> Say, 1823	10		
Dolichopodidae (long-legged flies)			
<i>Amblypsilopus pallidicornis</i> (Grimshaw, 1901)	1		
<i>Chrysosoma globiferum</i> (Wiedemann, 1830)	2		
<i>Chrysotus longipalpus</i> Aldrich, 1896	3	NIR	
<i>Condylostylus longicornis</i> (Fabricius, 1775)	1	NIR	
Drosophilidae (pomace flies)			
<i>Cacoxenus perspicax</i> (Knab, 1914)	5		
<i>Chymomyza procnemis</i> (Williston, 1896)	25		
<i>Drosophila simulans</i> Sturtevant, 1919	10	NTL	
<i>Drosophila suzukii</i> (Matsumura, 1931)	1	NIR	

Forcipomyia biannulata

Forcipomyia chrysolopha

Forcipomyia cf. *quasiingrami*

TABLE 4. (continued)

SCIENTIFIC NAME	Quantity	Status ¹	
Ephydriidae (shore flies)			
<i>Brachydeutera hebes</i> Cresson, 1926	10	NTL	
<i>Donaceus nigronotatus</i> Cresson, 1943	1		
<i>Scatella sexnotata</i> (Cresson, 1926)	1		
<i>Scatella stagnalis</i> (Fallen, 1813)	25		
genus and sp. A	10	NTL	
Heleomyzidae			
<i>Spilochroa ornata</i> (Johnson, 1895)	50		
Keroplastidae			
<i>Tylparua hawaiiensis</i> (Grimshaw, 1901)	1	NTL	
Limoniidae (limoniid crane flies)			
<i>Dicranomyia hawaiiensis</i> Grimshaw, 1901	2		
<i>Styringomyia didyma</i> Grimshaw, 1901	25		
Lonchaeidae			
<i>Lamprolonchaea metatarsata</i> (Kertész, 1901)	2		
<i>Lonchaea polita</i> Say, 1830	4		
Micropezidae (stilt-legged flies)			
<i>Taeniptera</i> cf <i>angulata</i> (Loew, 1866)	1		
Milichiidae			
<i>Desmometopa</i> cf <i>tarsalis</i> Loew, 1865	1	NTL	
<i>Milichiella lacteipennis</i> (Loew, 1865)	1		
Muscidae (house flies)			
<i>Atherigona orientalis</i> Schiner, 1868	50+		
<i>Atherigona reversura</i> Villeneuve, 1936	50+		
<i>Haematobia irritans</i> (Linnaeus, 1758) (horn fly)	1		
<i>Lispe</i> sp. A	1		
Mycetophilidae (fungus gnats)			
<i>Sciophila</i> sp. A	1		
Otitidae (picture-winged flies)			
<i>Acrosticta apicalis</i> (Williston, 1896)	1		
<i>Euxesta anonnae</i> (Fasbricius, 1794)	25 +		
<i>Notogramma cimiciforme</i> Loew, 1867	3	NTL	
<i>Physiphora</i> sp. A	2	NSR	
Phoridae (scuttle flies)			
<i>Chonocephalus</i> sp. A	1		
<i>Dohrniphora cornuta</i> (Bigot, 1857)	25	NIR	
<i>Megaselia scalaris</i> (Loew, 1866)	1		
<i>Megaselia</i> species (unidentified)	10		
<i>Metopina ventralis</i> Schmitz, 1927	10	NIR	

Spilochroa ornata

Physiphora sp. A

TABLE 4. (continued)




SCIENTIFIC NAME	Quantity	Status ¹	
Psychodidae (moth flies)			
<i>Clogmia albipunctata</i> (Williston, 1893)	5		
<i>Psychoda alternata</i> Say, 1824	5		
<i>Psychoda pseudalternata</i> Williams, 1946	20+	NIR	
<i>Psychoda savaiiensis</i> Edwards, 1928	10	NIR	
<i>Trichopsychoda insulicola</i> (Quate, 1954)	2		
Sarcophagidae (flesh flies)			
<i>Helicobia morionella</i> (Aldrich, 1930)	10+		
<i>Sarcophaga dux</i> Thomsen, 1869	1		
genus ? & species ?	2		
Scatopsidae (minute black scavenger flies)			
<i>Rhegmoclemina parvula</i> Hardy, 1956	20	NTL	
<i>Scatopse</i> sp. A	10	NTL	
Scenopinidae (window flies)			
<i>Scenopinus adventicius</i> Hardy, 1960	2		
<i>Scenopinus</i> ? sp.	1	NTL	
Sciaridae (black fungus gnats)			
<i>Bradysia molokaiensis</i> (Grimshaw, 1901)	10+		
<i>Bradysia tritici</i> (Coquillett, 1895)	5		
<i>Hyperlasion?</i> species A	5	NSR?	
<i>Corynoptera latistylata?</i> (Hardy, 1956)	2	NIR?	
Sphaeroceridae (small dung flies)			
<i>Leptocera abdominiseta</i> (Duda, 1925)	2		
<i>Leptocera</i> sp. A	10		
Syrphidae (hover & flower flies)			
<i>Allograpta obliqua</i> (Say, 1823)	10+		
<i>Copestylum</i> cf. <i>tamaulipanum</i> (Townsend, 1898)	3	NTL	
<i>Simosyrphus grandicornis</i> (Macquart, 1942)	10+		
Tachinidae			
<i>Eucelatoria armigera</i> (Coquillett, 1889)	1		
<i>Euvespivora decipiens</i> (Walker, 1859)	1		
Unidentified genus and species	10		
Tephritidae (fruit flies)			
<i>Acinia picturata</i> (Snow, 1894)	1		
<i>Bactrocera dorsalis</i> (Hendel, 1912)	1		
			<i>Corynoptera latistylata?</i>

TABLE 4. (continued)

SCIENTIFIC NAME	Quantity	Status ¹
Order: HEMIPTERA: suborder HETEROPTERA (true bugs)		
Lygaeidae (seed bugs)		
<i>Nysius</i> species A	15	
Reduviidae (assassin bugs)		
<i>Sinea rileyi</i> Montandon,	2	
<i>Zelus renardii</i> Kolenati, 1856	2	
Tingidae (lace bugs)		
<i>Corythuca</i> species	2	
<i>Leptodictya tabida</i> (Herrich-Schaeffer, 1840)	2	
Order: HEMIPTERA: suborders Auchenorrhyncha & Sternorrhyncha (hoppers, aphids, & scales) [formerly "Order HOMOPTERA"]		
Cicadellidae (leafhoppers)		
<i>Gyponana germari</i> (Stal, 1864)	3	
Plus 2-3 unidentified spp.	4+	
Delphacidae (delphacid planthoppers)		
<i>Perkinsiella saccharicida</i> Kirkaldy, 1903 (sugarcane planthopper)	2	
Derbidae (derbid planthoppers)		
<i>Cedusa</i> sp. A	2	NIR
Flatidae (flatid planthoppers)		
<i>Melormenis basalis</i> (Walker, 1851)	40+	
Tropiduchidae		
<i>Kallitaxila granulata</i> (Stal, 1870)	1	
Order: HYMENOPTERA		
Agonidae (fig wasps)		
<i>Eupristina verticillata</i> Waterston	3	
<i>Josephiella</i> sp. A	4	
Unidentified genus species	3	NTL
Anthophoridae (carpenter bees)		
<i>Xylocopa sonorina</i> Smith, 1874	1	
<i>Ceratina arizonensis</i> Cockerell, 1898	1	
Apidae (honey bees)		
<i>Apis mellifera</i> Linnaeus, 1758 (Honey bee)	5	
Bethylidae (bethylid wasps)		
<i>Epyris</i> species A	1	
Unidentified genus species		NTL
Braconidae (braconid wasps)		
<i>Cotesia</i> species A	1	NTL
<i>Heterospilus prosopidis</i> Viereck	5	
<i>Urosigalphus bruchi</i> Crawford, 1907	5	
Unidentified genus species B	10	NTL



Sinea rileyi



Urosigalphus bruchi

TABLE 4. (continued)

SCIENTIFIC NAME	Quantity	Status ¹	
Chalcidae			
<i>Dirhinus</i> species A	3	NIR	
Eucoilidae			
<i>Ecoila impatiens</i> (Say, 1836)	1	NTL	
Eulophidae			
<i>Horismenus</i> sp. A	1		
Evaniidae (ensign wasps)			
<i>Evania appendigaster</i> Linnaeus, 1758	4		
<i>Szepligetella sericea</i> (Cameron, 1883)	1	NIR	
Formicidae (ants)			
<i>Camponotus variegatus</i> (F. Smith, 1858)	5		
<i>Paratrechina longicornis</i> (Latreille, 1802)	5		
<i>Pheidole megacephala</i> (Fabricius, 1793)	20		
Halictidae (sweat bees)			
<i>Dialictus</i> c.f. <i>nevadensis</i> (Crawford, 1909)	1		
Ichneumonidae (ichneumons)			
<i>Barichneumon californicus</i> Heinrich, 1971	5		
<i>Diplazon laetatorius</i> (Fab., 1781)	3		
Scelionidae			
<i>Baeus</i> species A	1	NSR	
Scoliidae			
<i>Campsomeris marginella modesta</i> (F. Smith,)	1		
Sphecidae (thread-waisted wasps)			
<i>Ampulex compressa</i> (Fabricius, 1781)	1		
<i>Trypoxylon bicolor</i> F. Smith, 1856	10		
<i>Trypoxylon philippinensis</i> Ashmead, 1904	1		
Unidentified genus and species	1	NSR	
Torymidae			
<i>Podagrion mantis</i> Ashmead, 1886	10		
<i>Megastigmas transvaalensis</i> (Hussey, 1956)	1		
Vespidae (hornets)			
<i>Polistes exclamans</i> Viereck, 1906	5		
Family?			
Unidentified parasitic wasps (5 species)	20+	?	



Ecoila impatiens



Zagrammosoma possibly *multilineatum*



Polistes exclamans

TABLE 4. (continued)

SCIENTIFIC NAME	Quantity	Status ¹
Order: ISOPTERA		
Kalotermitidae		
<i>Cryptotermes brevis</i> (Walker, 1853) (drywood termite)	2	
Order: LEPIDOPTERA		
Cosmopterigidae		
<i>Hyposmocoma</i> sp. A	2+	
<i>Hyposmocoma</i> sp. D	2	
<i>Ithome concolorella</i> (Chambers 1875) (Keawe flower moth)	10	
Crambidae		
<i>Herpetogramma licarsisalis</i> (Walker, 1859) (grass webworm)	2+	
<i>Mestolobes</i> sp. A	2	
<i>Tamsica floricolens</i> (Butler, 1883)	10	
Gelechiidae		
<i>Stoeberhinus testaceus</i> Butler, 1881	5	
Geometridae (inchworms)		
<i>Anacamptodes fragilaria</i> (Grossbeck, 1909) (Koa haole moth)	50 +	
<i>Cyclophora nanaria</i> (Walker, 1861)	1	
<i>Macaria abydata</i> Guenee, 1857 (Koa haole looper)	60	
Noctuidae (noctuids)		
<i>Melipotis indomita</i> (Walker, 1857)	10-20	
Pyralidae		
<i>Ephesiodes gilvescentella</i> Ragonot 1887	10	
Tineidae (clothes moths)		
<i>Dryadaula terpsichorella</i> (Busck 1910)	3	
<i>Erechthias minuscula</i> (Walsingham, 1907)	1	
genus ? & species A	1	
Tortricidae (leafrollers)		
<i>Bactra venosana</i> (Zeller, 1847)	1	
<i>Lorita scarificata</i> (Meyrick, 1917)	5	
Family?		
Unidentified microlepidoptera (5 species)	15+	



Ithome concolorella



Lorita scarificata



Unidentified tineid

TABLE 4. (continued)

SCIENTIFIC NAME	Quantity	Status ¹	
Order: MANTODEA (mantids)			
Mantidae			
<i>Tenodera australasiae?</i> (Leach, 1815)	5 (nymphs)		
Order: ORTHOPTERA (grasshoppers & crickets)			
Tettigoniidae (katydids)			
<i>Conocephalus saltator</i> (Saussure, 1859)	1		
<i>Elimaea punctifera</i> (Walker, 1869)	1		
Order: PSOCOPTERA (bark lice)			
Psocidae			
<i>Ptycta</i> sp. A	5	NTL	
Family?			
Unidentified genera and species (5 species)	50	?	



Ptycta sp. A

¹ = **Status:** NSR= new state record, NIR= new island record, NTL= new to list.

TABLE 5. – List of species of terrestrial arthropods collected with sticky trap KA-0265 during the period from 28 August to 18 November 2006. Names and arrangement follow Nishida (2002), except as noted in Table 2.

ARTHROPOD FAUNA		
SCIENTIFIC NAME	Quantity	Notes
Class: ARACHNIDA (spiders & relatives)		
Order: ACARI (mites)		
Unidentified	2	
Class: ARANAE (spiders)		
Oonopidae		
<i>Orchestina</i> sp. ?	2	New island record
Family?		
Unidentified 2-3 spp	5	Immatures or abdomen decomposed
Order: BLATTODEA (cockroaches)		
Blatellidae		
<i>Symploce pallens</i> (Stephens, 1835)	3	
Order: COLEOPTERA		
Coccinellidae		
<i>Curinus coeruleus</i> (Mulsant, 1850)	4	
<i>Diomus</i> ? possibly <i>D. notesens</i> (Blackburn, 1889)	10+	
<i>Diomus</i> ? sp.	5	
Order: DIPTERA		
Ceratopogonidae		
<i>Forcipomyia</i> sp nr <i>quasiingrami</i> Macfie, 1939	1	New state record
Chloropidae		
<i>Cadrema pallida</i> (Loew, 1865)	3	
Dolichopodidae		
<i>Amblypsilopus pallidicornis</i> (Grimshaw, 1901)	3	
<i>Condylostylus longicornis</i> (Fabricius, 1775)	3	New island record
Limoniidae		
<i>Styringomyia didyma</i> Grimshaw, 1901	10	
Order: HEMIPTERA: suborders Auchenorrhyncha & Sternorrhyncha [formerly "Order HOMOPTERA" (aphids, scales & hoppers)]		
Aleyrodidae		
Unidentified	4	
Cicadellidae		
Unidentified	5	

TABLE 5. Continued

ARTHROPOD FAUNA		
SCIENTIFIC NAME	Quantity	Notes
Order: HYMENOPTERA (wasps, ants, and bees)		
Bethylidae		
Unidentified	2	
Eulophidae		
<i>Quadrastichus erythrinae</i> Kim,	20	New to list
Eupelmidae		
<i>Brasema cushmani</i> (Crawford, 1908)	1	
Formicidae		
<i>Anoplolepis gracilipes</i> (F. Smith, 1857)	2	
Unidentified	5	
Sphecidae		
<i>Pison hospes</i> F. Smith, 1879	1	
Family?		
Several unidentified genera & species	25+	
Order: ISOPTERA		
Kalotermitidae		
<i>Cryptotermes brevis</i> (Walker, 1853)	1	
Order: NEUROPTERA		
Chrysopidae		
<i>Chrysoperla comanche</i> (Banks, 1938)		
Coniopterygidae		
<i>Coniocompsa zimmermani</i> Kimmins, 1953		
Order: PSOCOPTERA		
Lepidopsocidae		
<i>Lepidopsocus</i> sp.	5	
Family?		
Unidentified genus species	5	
Order: THYSANOPTERA		
Family?		
Unidentified genus species	5	New to list

TABLE 6. – List of species of Lepidoptera collected at MV bulb at Airport during 2006 from collections KA-0168 and KA-0169. Names and arrangement follow Nishida (2002), except as noted in Table 2.

ARTHROPOD FAUNA			
SCIENTIFIC NAME	Quantity	Collection Number	Notes
Class: INSECTA (insects)			
Order: LEPIDOPTERA (moths and butterflies)			
Cosmopterigidae			
<i>Anatrachyntis incertulella</i> (Walker 1864)	1	KA-0169	The Pandanus flower moth
<i>Hyposmocoma</i> sp. A	2 9	KA-0168 KA-0169	
<i>Hyposmocoma</i> sp. D	7	KA-0169	
<i>Pyroderces badia</i> (Hodges 1962)	1	KA-0169	
<i>Pyroderces rileyi</i> (Walsingham 1882)	2 1	KA-0168 KA-0169	The pink cornworm
Crambidae			
<i>Herpetogramma licarsisalis</i> (Walker, 1859)	many	KA-0168 KA-0169	The grass webworm
<i>Mestolobes minuscula</i> (Butler, 1881)	1 5	KA-0168 KA-0169	
<i>Omiodes localis</i> (Butler, 1879)	1	KA-0169	
<i>Orthomecyna exigua</i> (Butler, 1879)	many	KA-0168 KA-0169	
<i>Spoladea recurvalis</i> (Fabricius, 1775)	1	KA-0168	The beet webworm
<i>Tamsica floricolens</i> (Butler, 1883)	many	KA-0168 KA-0169	
Gelechiidae			
<i>Pectinophora</i> sp. prob. <i>gossypiella</i> (Saunders, 1843), pink bollworm	1	KA-0169	
<i>Stoerberhinus testaceus</i> Butler, 1881	1	KA-0169	
Geometridae (inchworms)			
<i>Anacamptodes fragilaria</i> (Grossbeck, 1909)	1	KA-0169	The koa haole moth
<i>Macaria abydata</i> Guenee, 1857	many	KA-0168 KA-0169	The koa haole looper
Noctuidae (noctuids)			
<i>Athetis thoracica</i> (Moore, 1884)	2	KA-0169	
<i>Elaphria nucicolora</i> (Guenee, 1852)	3	KA-0169	
<i>Melipotis indomita</i> (Walker, 1857)	1	KA-0169	
<i>Pseudaletia unipuncta</i> (Haworth, 1809)	1	KA-0168	
<i>Simplicia caeneusalis</i> (Walker, 1858)	1	KA-0168	

TABLE 6. continued

ARTHROPOD FAUNA			
SCIENTIFIC NAME	Quantity	Collection Number	Notes
Olethreutidae (leafrollers)			
<i>Crocidosema lantana</i> Busck 1910	4	KA-0169	
<i>Crocidosema sp. near leprara</i> (Walsingham 1907)	5 8	KA-0168 KA-0169	
<i>Cryptophlebia illepida</i> (Butler, 1882)	1 7	KA-0168 KA-0169	
<i>Cryptophlebia ombrodelta</i> (Lower, 1898)	3	KA-0169	
Pyralidae			
<i>Ephesiodes gilvescentella</i> Ragonot 1887	many	KA-0168 KA-0169	
Sphingidae (hawk moths)			
<i>Agrius cingulata</i> (Fabricius, 1775)	1	KA-0169	The sweet potato hornworm
Tineidae (clothes moths)			
<i>Erechthias minuscula</i> (Walsingham, 1907)	3	KA-0169	
<i>Erechthias simulans</i> (Butler, 1882)	2	KA-0169	
<i>Opogona omoscopa</i> (Meyrick, 1893)	1	KA-0168	
Tortricidae (leafrollers)			
<i>Lorita scarificata</i> (Meyrick, 1917)	4 4	KA-0168 KA-0169	
<i>Platynota stultana</i> Walsingham, 1884	2	KA-0169	

TABLE 7. – List of species of terrestrial arthropods from collection #KA-0170. Collected at MV bulb at Kahului Airport on 17 November 2006. Names and arrangement follow Nishida (2002), except as noted in Table 2.

ARTHROPOD FAUNA		
SCIENTIFIC NAME	Quantity	Notes
Class: INSECTA (insects)		
Order: BLATTODEA (cockroaches)		
Blaberidae		
<i>Pycnoscelus indicus</i> (Fabricius, 1775)	1	The Surinam cockroach
Blatellidae		
<i>Blatella lituricolis</i> (Walker)	1	The false German cockroach
Blattidae		
<i>Periplaneta americana</i> (Linnaeus)	1	The American cockroach
Order: COLEOPTERA		
Anobiidae (death-watch beetles)		
<i>Tricorynus sharpi</i> (Pic, 1912)	1	
Carabidae (ground beetles)		
<i>Bembidion niloticum batesi</i> (Putzeys, 1875)	1	
<i>Perigona nigriceps</i> (Dejean, 1831)	1	
<i>Gnathaphanus upolensis</i> (Csiki, 1915)	1	
<i>Stenolophus ?limbalis</i> LeConte, 1860	2	
Cerambycidae (long-horned wood boring beetles, longicorn beetles)		
<i>Sybra alternans</i> (Wiedemann, 1825)	1	
Chrysomelidae (leaf & seed beetles)		
<i>Mimosestes amicus</i> (Horn, 1873)	2	
<i>Mimosestes insularis</i> Kingsolver & Johnson, 1978	3	
Curculionidae (weevils)		
<i>Asynonychus godmanni</i> Crotch, 1867	1	
<i>Myllocerus</i> sp. A [Beardsley & Kumashiro, et al., 1990,	6	
Elateridae (click beetles)		
<i>Cardiophorus stolatus</i> Erichson, 1840	3	
<i>Conoderus exsul</i> (Sharp, 1877)	2	
<i>Conoderus pallipes</i> (Eschscholtz, 1830)	4	
<i>Prodrasterius collaris</i> (Candeze, 1859)	4	New island record
<i>Melanotus punctosus</i> (Walker,)	2	
<i>Simodactylus cinnamomeus</i> (Boisduval, 1835)	2	
Hydrophilidae (water scavengers)		
<i>Cercyon</i> sp. nr. <i>fimbriatus</i> Mannerheim, 1852	10+	
<i>Enochrus sayi</i> Gundersen, 1977	1	
<i>Tropisternus salsamentus</i> Fall, 1901	1	

TABLE 7. (continued)

ARTHROPOD FAUNA		
SCIENTIFIC NAME	Quantity	Notes
Nitidulidae (sap beetles)		
<i>Haptoncus luteolus</i> (Erichson, 1843)	2	
<i>Phenolia tibialis</i> (Boheman, 1851)	7	
<i>Stelidota geminata</i> (Say, 1825)	12	The strawberry sap beetle
Scarabaeidae (scarabs)		
<i>Adoretus sinicus</i> Burmeister, 1855 (Chinese rose beetle)	4	
<i>Larrus lividus</i> (Olivier, 1789)	3	
<i>Ataenius cognatus</i> (Le Conte, 1859)	6	
Staphylinidae (rove beetles)		
<i>Anotylus</i> sp. A	2	
<i>Coproporus</i> sp. A	2	
<i>Philothalpus analis</i> (Erichson, 1848)	1	
<i>Philonthus</i> near <i>discoideus</i> (Gravenhorst, 1802)	1	
Xantholinini: Genus? species?	1	
Tenebrionidae (darkling beetles)		
<i>Lobometopon diremptus</i> (Karsch, 1881)	11	
Genus species ?	1	Already on list?
Order: DIPTERA (flies)		
Diptera identifications not yet completed.		
Calliphoridae (blow flies)		
<i>Chrysomya megacephala</i> (Fabricius, 1774)	1	
Ceratopogonidae (biting midges)		
<i>Atrichopogon jacobsoni</i> (Meijere, 1907)	3	
<i>Forcipomyia biannulata</i> Ingram & Macfie, 1924	2	
Culicidae		
<i>Aedes albopictus</i> (Skuse, 1984)	5	
<i>Culex quinquefasciatus</i> Say, 1823	3	
Chironomidae (non-biting midges)		
<i>Chironomus hawaiiensis</i> Grimshaw, 1901	many	
<i>Cricotopus bicinctus</i> (Meigen, 1818)	many	
<i>Polypedilum nubiferum</i> (Skuse, 1889)	10+	
Limoniidae (limoniid crane flies)		
<i>Styringomyia didyma</i> Grimshaw, 1901	1	
Psychodidae (moth flies)		
<i>Clogmia albipunctata</i> (Williston, 1893)	2	
Syrphidae		
<i>Eristalinus aeneus</i> (Scopoli, 1763)	1	New to list
Tachinidae		
<i>Trichopoda pilipes</i> (Fabricius, 1805)	1	

TABLE 7. (continued)

ARTHROPOD FAUNA		
SCIENTIFIC NAME	Quantity	Notes
Order: EMBIIDINA (webspinners)		
Oligotomidae		
<i>Oligotoma saundersii</i> (Westwood, 1837)	5	
Order: HEMIPTERA: suborder Heteroptera: (true bugs)		
Anthocoridae (minute pirate bugs)		
<i>Physopleurella mundula</i> (White, 1877)	1	
Cydnidae (burrowing bugs)		
<i>Geotomus pygmaeus</i> (Dallas 1851)	1	
Miridae		
<i>Stenotus</i> sp. A	6	New island record
Lygaeidae (seed bugs)		
<i>Nysius</i> sp. A	1	
Notonectidae (backswimmers)		
<i>Anisops kuroiuae</i> Matsumura, 1915	1	
Reduviidae (assassin bugs)		
<i>Sinea rileyi</i> Montandon,	1	
Order: HEMIPTERA: suborders Auchenorrhyncha & Sternorrhyncha (hoppers, aphids, & scales) [formerly "Order HOMOPTERA"]		
Cicadellidae (leafhoppers)		
<i>Empoasca solana</i> DeLong, 1931	3	
<i>Spanbergiella quadripunctata</i> Lawson, 1932	2	
Also about 3 unidentified spp. of leafhoppers	6	
Delphacidae (planthoppers)		
<i>Perkinsiella saccharicida</i> Kirkaldy, 1903	2	The sugarcane planthopper
<i>Sardia pluto</i> (Kirkaldy, 1906)	1	
Membracidae (treehoppers)		
<i>Vanduzeeia segmentata</i> (Fowler, 1895)	2	
Order: ISOPTERA		
Kalotermitidae		
<i>Cryptotermes brevis</i> (Walker, 1853)	10	
Order: HYMENOPTERA		
Hymenoptera identifications are not yet completed.		
Apidae (honey bees)		
<i>Apis mellifera</i> Linnaeus, 1758	1	The honey bee – seen, not collected

TABLE 7. (continued)

ARTHROPOD FAUNA		
SCIENTIFIC NAME	Quantity	Notes
Order: LEPIDOPTERA (moths and butterflies)		
Cosmopterigidae		
<i>Hyposmocoma</i> sp. A	7	
<i>Hyposmocoma</i> sp. D	2	
Crambidae		
<i>Herpetogramma licarsisalis</i> (Walker, 1859)	many	The grass webworm
<i>Orthomecyna exigua</i> (Butler, 1879)	2	
<i>Spoladea recurvalis</i> (Fabricius, 1775)	2	The beet webworm
Gelechiidae		
<i>Autosticha pelodes</i> (Meyrick 1883)	1	
Geometridae (inchworms)		
<i>Cyclophora nanaria</i> (Walker, 1861)	2	
Noctuidae (noctuids)		
<i>Eublemma accedens</i> (Felder & Rogenhofer, 1874)	2	
<i>Hypena laceratalis</i> Walker, 1858	1	The lantana looper
Olethreutidae (leafrollers)		
<i>Crociosema lantana</i> Busck 1910	4	
<i>Crociosema</i> sp. near <i>leprara</i> (Walsingham 1907)	1	
<i>Cryptophlebia illepida</i> (Butler, 1882)	2	
<i>Cryptophlebia ombrodelta</i> (Lower, 1898)	4	
Pyralidae		
<i>Ephesiodes gilvescentella</i> Ragonot 1887	many	
Sphingidae (hawk moths)		
<i>Manduca blackburni</i> (Butler, 1880)	1	Blackburn's sphinx moth; photographed, not collected
Tineidae (clothes moths)		
<i>Erechthias minuscula</i> (Walsingham, 1907)	3	
<i>Erechthias simulans</i> (Butler, 1882)	2	
Tortricidae (leafrollers)		
<i>Bactra venosana</i> (Zeller, 1847)	5	
<i>Lorita scarificata</i> (Meyrick, 1917)	2	
<i>Platynota stultana</i> Walsingham, 1884	3	
Order: ORTHOPTERA (grasshoppers & crickets)		
Gryllidae (crickets)		
<i>Modicogryllus siamensis</i> Chopard, 1961	3	
Order: Trichoptera		
Hydropsychidae		
<i>Cheumatopsyche pettiti</i> (Banks, 1908)	many	