



**Results of 2004 Wēkiu Bug
(*Nysius wekiuicola*) Surveys on
Mauna Kea, Hawai‘i Island**

**Hawaii
Biological
Survey**

Final Report

February 2005

**RESULTS OF 2004 WĒKIU BUG (*NYSIUS WEKIUCOLA*) SURVEYS
ON MAUNA KEA, HAWAI'I ISLAND**

FINAL REPORT

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EXECUTIVE SUMMARY

In 2004, surveys for wēkiu bug distribution and abundance at the summit area of Mauna Kea occurred in April and July, while data loggers recording microhabitat parameters such as relative humidity and temperature were installed in July and December. This study builds upon research conducted by the Hawaii Biological Survey of the Bishop Museum that began in the early 1980s, resumed in 1997, and continued in 2002. The objectives of this study were to 1) survey for the presence or absence of wēkiu bugs at the summits of various pu'ū's (cinder cones) located in the alpine zone of Mauna Kea, 2) determine the elevational and microhabitat distribution of wēkiu bugs on Mauna Kea, 3) assess whether different pitfall trapping methods used in earlier Bishop Museum studies provide comparable data in regard to wēkiu bug captures, 4) assess habitats among different elevations and cinder cone areas, and 5) obtain microhabitat data on wēkiu bug habitat using temperature and relative humidity loggers.

This study began in April 2004 with three days of sampling for wēkiu bugs took at Pu'ū Hau Oki, and continued in July 2004 with more intensive sampling. Because it is such a vast area, previous information regarding the overall elevational range and distribution of the wēkiu bug throughout the entire alpine zone of Mauna Kea was largely lacking. Thus, wēkiu bug sampling efforts were concentrated in areas not previously sampled such as the remote cinder cone area of Red Hills. Areas surveyed during this study ranged from Pu'ū Kanakaleonui at 9,200 ft (2,800 m) to Pu'ū Hau Oki at 13,70 ft (4,177 m). A total of 55 baited shrimp pitfall traps were installed in April and July, with 10 wēkiu bug captures in April and only one in July. Seasonal activity differences are the likely explanation for so few wēkiu bugs being captured in the 50 traps installed during the July assessment as compared to 5 traps installed in April. Although attempted, a test of trapping efficiency with different types of pitfall traps failed in July because neither trap collected wēkiu bugs.

A total of 45 relative humidity and temperature data loggers were installed and are currently collecting data in a variety of locations throughout the Mauna Kea study area. A preliminary set of 8 data loggers were installed in July, with the remaining loggers installed in December 2004. In December 2004, data from the loggers installed in July were successfully downloaded and provided interesting new findings on the extreme conditions that wēkiu bugs must survive in areas of their most favored habitat. These findings provided valuable new information on wēkiu bug seasonal abundance, microhabitat climate data, as well as their overall range on Mauna Kea that will assist in conserving and managing this rare species.

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(5 cm), and 100% fine ash at 4 in (10 cm). Interestingly, the substrate was dry until the 4 in (10 cm) level, and thereafter the fine ash was moist. Other species in the pitfall trap with the wēkiu bug included staphylinid and coccinellid beetles (see Beetle section), and several species of muscid, sciarid, and linyphiid flies.

Ethylene Glycol versus Shrimp Paste Pitfall Trapping Test

Because of seasonal factors, wēkiu bugs were not collected either in shrimp paste pitfall or ethylene glycol during the July 2004 pitfall trapping test at the summit of Pu'u Hau Kea, with both sets of traps running for 9 nights. Clearly these inconclusive results indicate that a test of trapping efficiency will only be effective when wēkiu bug activity is great enough to allow some moderate level of catch, which appears to be earlier in the spring season such as June or earlier.

Table 3. 2004 Summary of sample effort and wēkiu bug captures from surveyed Mauna Kea cinder cones using both shrimp pitfall and ethylene glycol pitfall traps in April and July.

Cinder Cone	Highest Elevation	Total Traps	Wēkiu bugs in traps	Wēkiu bugs observed only ¹	Trap Dates	Total Trap Days ²
Pu'u Hau Oki	13,701 ft	5	10	4	19-21 Apr	10
Pu'u Pohaku	13,252 ft	18	1	0	8-13 July	90
Pu'u Hau Kea	13,511 ft	10	0	0	6-15 July	90
Lake Waiau	13,248 ft	6	0	0	9-15 July	36
Red Hill	11,957 ft	10	0	0	7-10 July	30
Pu'u Kanakaleonui	9,716 ft	6	0	0	10-13 July	18
Totals		55	11	4		274

¹ Number of wēkiu bugs hand collected or observed while setting traps, but not collected in traps. ²Trap days = total nights x total traps per cinder cone.



Photos of substrate and pitfall trap from Pu'u Pohaku (12,770 ft) where an individual wēkiu bug was collected in July 2004.

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Table 4. Wēkiu bug capture data from surveyed Mauna Kea cinder cones using visual collections, shrimp pitfall, and ethylene glycol pitfall traps in April and July.

Cinder Cone	Trap #	Trap Elevation ¹	GPS Coordinates	Wēkiu #/s ²	Trap Type
Pu'u Hau Oki	1	13,605 ft	19.82734°N, 155.47537°W	4	shrimp
Pu'u Hau Oki	3	13,649 ft	19.82693°N, 155.47508°W	3	shrimp
Pu'u Hau Oki	4	13,701 ft	19.82681°N, 155.47487°W	1	shrimp
Pu'u Hau Oki	5	13,594 ft	19.82663°N, 155.47565°W	2	shrimp
Pu'u Hau Oki	Vis	13,641 ft	19.82595°N, 155.47549°W	2	hand collect
Pu'u Hau Oki	Vis	13,636 ft	19.82603°N, 155.47548°W	2	hand collect
Pu'u Pohaku	16	12,883 ft	19.82974°N 155.49900°W	1	shrimp
Totals				15	

¹Two mortalities in Pu'u Hau Oki trap #1 frozen to wick, water frozen in all traps.

Beetle Species Bycatch and Potential Impacts

Several new records of introduced beetle species collected during wēkiu bug trapping were made during this study. The following is a list of beetle species collected in July 2004 at various elevations on the summit, and a brief discussion of their potential impacts on wēkiu bugs.

STAPHYLINIDAE

Aleochara verna (Say)

New state record

Status: Adventive.

Notes: Adults are known to be predators of the eggs, larvae and pupae of various Diptera, particularly several species of Anthomyiidae (Klimaszewski 1984). Larvae are ectoparasitoids of the pupae of cyclorrhous Diptera (Klimaszewski 1984). All life stages frequent microhabitats with suitable concentrations of hosts and prey, such as decaying plants, vertebrate dung and carrion (Klimaszewski 1984). *Aleochara verna* is native to North America (Klimaszewski 1984).

Material examined: HAWAII: Mauna Kea Ice Age NAR, Pu'u Pohaku, 19.82485°N, 155.49089°W, 13186 ft., 11Jul 2004, Englund, Montgomery & Ramsdale leg., shrimp baited pitfall (15 BPBM).