



**Results of the 2007-2008 Alien Arthropod
Species and Wēkiu Bug Monitoring
on Mauna Kea, Hawai'i Island**

**Hawaii
Biological
Survey**

Final Report

December 2009

**RESULTS OF THE 2007–2008 ALIEN SPECIES AND WĒKIU BUG (*NYSIUS WEKIUCOLA*)
SURVEYS ON THE SUMMIT OF MAUNA KEA, HAWAI'I ISLAND**

FINAL REPORT

Prepared for:

Office of Mauna Kea Management

University of Hawaii at Hilo

200 W. Kawili Street,

Hilo, Hawai'i 96720

Prepared by:

R.A. Englund, D.J. Preston, A.E. Vorsino, N.L. Evenhuis, S. Myers, and L. L. Englund

Hawaii Biological Survey

Bishop Museum

Honolulu, Hawai'i 96817

December 2009

Contribution No. 2009-004 to the Hawaii Biological Survey

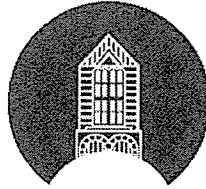
Published by

BISHOP MUSEUM

The State Museum of Natural and Cultural History

1525 Bernice Street

Honolulu, Hawai'i 96817-2704, USA



Copyright © 2009 Bishop Museum

All Rights Reserved

Printed in the United States of America

ISSN 1085-455X

EXECUTIVE SUMMARY

As part of a continuing long-term study, the Hawaii Biological Survey of the Bishop Museum was contracted by the Office of Mauna Kea Management (OMKM) to monitor for alien arthropod species and to continue monitoring populations of the wēkiu bug (*Nysius wekiuicola* Ashlock & Gagné), which is endemic to the Mauna Kea summit area. Ten day field trips were conducted in June 2007 and July 2008 to provide a baseline of introduced arthropod species found at the Mauna Kea summit, and to continue monitoring wēkiu bug populations within critical core habitats. Forty-seven data loggers that were placed at the summit in 2006 to monitor soil temperatures and relative humidities were removed in July 2008. Data were successfully downloaded from 24 operating loggers that provided new information related to wēkiu bug soil temperature preferences.

The objective of the alien arthropod baseline and monitoring surveys was to provide information to managers on any potential threats to endemic Mauna Kea arthropod species such as the wēkiu bug. Intensive surveys for ants were conducted to assess if any populations are currently found within any areas in close proximity to wēkiu bugs. Ants are already well-established at the summit regions of Haleakalā National Park, and this elevational range is well-within that of lowest elevation that wēkiu bugs have been found. Because of the predatory and social nature of ants, and because ants have caused the extinction and decline of native arthropods throughout Hawai'i, it was imperative to search high risk areas around the Mauna Kea summit region. This included public roadways, picnic areas, and around buildings. During the course of this study we did not see or collect any ants at the summit region, and in fact obtained the highest wēkiu bug captures since the 1997–1998 field season during trapping in the 2007 field season. Of concern was the finding of several predatory species of alien beetles, with the major new finding of a predatory carabid beetle that so far appears to be restricted to just around the Lake Waiau shoreline area.

Data downloaded from temperature loggers was analyzed using the GIS ArcMap Inverse Distance Weighted model that predicted mean yearly soil surface temperatures. The upper regions of all slopes on Pu'u Hau Oki and the north slope of Pu'u Hau Kea were predicted to have the coldest annual temperatures of less than 5° C, and these two areas also generally have the highest wēkiu bug captures at the summit. The warmest region was found to be the Lake Waiau area, where wēkiu bugs have not been captured during the past ten years of study.

Hawaii Biological Survey Report on the 2007–2008 Mauna Kea Alien Arthropod Sampling

Table 5. Wēkiu bug capture data from surveyed Mauna Kea cinder cones using visual collections, shrimp pitfall, and ethylene glycol pitfall traps in June 2007.

Cinder Cone	2007 Capture Date	Trap #	Elevation	GPS Coordinates	Wēkiu #'s	Trap Type
Pu'u Hau Kea	June 8, 2007	1-1	4014 m	19.81622°N 155.47388°W	2	Shrimp
Pu'u Hau Kea	June 8, 2007	2	4042 m	19.81572°N 155.47350°W	61	Shrimp
Pu'u Hau Kea	June 8, 2007	3	4087 m	19.81480°N 155.47304°W	9	Shrimp
Pu'u Hau Kea	June 5, 2007	4	4084 m	19.81489°N 155.47247°W	50	Shrimp
Pu'u Hau Kea	June 5, 2007	5	4090 m	19.81448°N 155.47321°W	18	Shrimp
Pu'u Hau Kea	June 8, 2007	6	4090 m	19.81407°N 155.47345°W	10	Shrimp
Pu'u Wēkiu	June 7, 2007	T1	4188 m	19.82273°N 155.46902°W	9	Shrimp
Pu'u Wēkiu	June 1-7, 2007	T5B	4185 m	19.81862°N 155.46933°W	58	Shrimp
Pu'u Wēkiu	June 7, 2007	T6	4179 m	19.82238°N 155.46922°W	1	Shrimp
Pu'u Wēkiu	June 7, 2007	T6B	4211 m	19.8223564°N 155.46922°W	21	Shrimp
Pu'u Wēkiu	June 7, 2007	T7	4164 m	19.82192°N 155.46880°W	30	Shrimp
Pu'u Wēkiu	June 7, 2007	T8-1	4173 m	19.82142°N 155.46848°W	23	Shrimp
Pu'u Wēkiu	June 7, 2007	T9-1	4,133 m	19.82104°N 155.46840°W	1	Shrimp
Pu'u Wēkiu	June 7, 2007	T11-1	4,134 m	19.82069°N 155.47105°W	1	Shrimp
Pu'u Wēkiu	June 7, 2007	T20	4170 m	19.82273°N 155.46902°W	21	Shrimp
Pu'u Wēkiu	June 7, 2007	T 21	4185 m	19.82064°N 155.46878°W	27	Shrimp
Pu'u S. of VLBA	June 9, 2007	S1	3746 m	19.80001°N 155.45598°W	2	Shrimp
Pu'u S. of VLBA	June 9, 2007	S2	3761 m	19.79964°N 155.45605°W	3	Shrimp
Pu'u S. of VLBA	June 9, 2007	S3	3780 m	19.79921°N 155.45590°W	2	Shrimp
Pu'u S of VLBA	June 9, 2007	S5	3786 m	19.79904°N 155.45512°W	4	Shrimp
Pu'u N. of VLBA	June 9, 2007	N1	3752 m	19.80234°N 155.45738°W	1	Shrimp
Pu'u Hau Oki	June 1-7, 2007	T1	4168 m	19.82720°N 155.47475°W	35	Shrimp
Pu'u Hau Oki	June 1-7, 2007	T2	4158 m	19.82722°N 155.47493°W	6	Shrimp
Pu'u Hau Oki	June 1-7, 2007	T3	4147 m	19.82707°N 155.47507°W	15	Shrimp
Pu'u Hau Oki	June 1-7, 2007	T4	4159 m	19.82693°N 155.47502°W	40	Shrimp
Pu'u Hau Oki	June 1-7, 2007	T5	4149 m	19.82720°N 155.47523°W	8	Shrimp
Pu'u Hau Oki	June 1-7, 2007	T6B-1	4170 m	19.82590°N 155.47539°W	3	Shrimp
Pu'u Hau Oki	June 1-7, 2007	T7B	4174 m	19.82614°N 155.47519°W	38	Shrimp
Pu'u Hau Oki	June 1-7, 2007	T8B-1	4161 m	19.82628°N 155.47527°W	8	Shrimp
Pu'u Hau Oki	June 1-7, 2007	T9B	4158 m	19.82645°N 155.47527°W	30	Shrimp
June 2007 Total					537	

Hawaii Biological Survey Report on the 2007–2008 Mauna Kea Alien Arthropod Sampling

Table 6. Wēkiu bug capture data from surveyed Mauna Kea cinder cones using shrimp pitfall traps in July 2008.

SAMPLE NUMBER	Cinder Cone	2008 Capture Date	Trap #	Elevation	GPS Coordinates (WGS 84)	Wēkiu #'s	Trap Type
226	Pu'u Hau Kea	July 23, 2008	Hau Kea 1A	4122 m	19.81639°N 155.47580°W	4	Shrimp
227	Pu'u Hau Kea	July 26, 2008	Hau Kea 1A	4122 m	19.81639°N 155.47580°W	1	Shrimp
228	Pu'u Hau Kea	July 23, 2008	Hau Kea 2A	4129 m	19.81660°N 155.47606°W	1	Shrimp
229	Pu'u Hau Kea	July 26, 2008	Hau Kea 2A	4129 m	19.81660°N 155.47606°W	1	Shrimp
230	Pu'u Hau Kea	July 23, 2008	Hau Kea 3A	4126 m	19.81698°N 155.47617°W	0	Shrimp
231	Pu'u Hau Kea	July 26, 2008	Hau Kea 3A	4126 m	19.81698°N 155.47617°W	2	Shrimp
232	Pu'u Hau Kea	July 23, 2008	Hau Kea 4A	4126 m	19.81729°N 155.47620°W	0	Shrimp
233	Pu'u Hau Kea	July 26, 2008	Hau Kea 4A	4126 m	19.81729°N 155.47620°W	1	Shrimp
234	Pu'u Hau Kea	July 23, 2008	Hau Kea 5A	4130 m	19.81758°N 155.47606°W	0	Shrimp
235	Pu'u Hau Kea	July 26, 2008	Hau Kea 5A	4130 m	19.81758°N 155.47606°W	1	Shrimp
236	Pu'u Hau Kea	July 23, 2008	1 Hau Kea E	4111 m	19.81339°N 155.47299°W	7	Shrimp
237	Pu'u Hau Kea	July 26, 2008	1 Hau Kea E	4111 m	19.81339°N 155.47299°W	3	Shrimp
238	Pu'u Hau Kea	July 23, 2008	2 Hau Kea E	4116 m	19.81359°N 155.47319°W	1	Shrimp
239	Pu'u Hau Kea	July 26, 2008	2 Hau Kea E	4116 m	19.81359°N 155.47319°W	2	Shrimp
240	Pu'u Hau Kea	July 23, 2008	3 Hau Kea E	4119 m	19.81382°N 155.47328°W	5	Shrimp
241	Pu'u Hau Kea	July 26, 2008	3 Hau Kea E	4119 m	19.81382°N 155.47328°W	1	Shrimp
242	Pu'u Hau Kea	July 23, 2008	4 Hau Kea E	4118 m	19.81420°N 155.47327°W	8	Shrimp
243	Pu'u Hau Kea	July 26, 2008	4 Hau Kea E	4118 m	19.81420°N 155.47327°W	5	Shrimp
244	Pu'u Hau Kea	July 23, 2008	5 Hau Kea E	4123 m	19.81454°N 155.47311°W	0	Shrimp
245	Pu'u Hau Kea	July 26, 2008	5 Hau Kea E	4123 m	19.81454°N 155.47311°W	0	Shrimp
246	Pu'u S. of VLBA	July 21-24, 2008	S. VLBA 1	3775 m	19.79980°N 155.45613°W	7	Shrimp
247	Pu'u S. of VLBA	July 21-24, 2008	S. VLBA 2	3814 m	19.79912°N 155.45572°W	0	Shrimp
248	Pu'u S. of VLBA	July 21-24, 2008	S. VLBA 3	3814 m	19.79909°N 155.45551°W	2	Shrimp
249	Pu'u S. of VLBA	July 21-24, 2008	S.VLBA 4	3814 m	19.79898°N 155.45517°W	0	Shrimp

Hawaii Biological Survey Report on the 2007–2008 Mauna Kea Alien Arthropod Sampling

Table 6 (cont.). Wēkiu bug capture data from surveyed Mauna Kea cinder cones using shrimp pitfall traps in July 2008.

SAMPLE NUMBER	Cinder Cone	2008 Capture Date	Trap #	Elevation	GPS Coordinates (WGS 84)	Wēkiu #'s	Trap Type
250	Pu'u S. of VLBA	July 21-24, 2008	S.VLBA 5	3806 m	19.79847°N 155.45506°W	0	Shrimp
251	Pu'u N. of VLBA	July 21-24, 2008	N/VLBA 1	3807 m	19.80592°N 155.46086°W	0	Shrimp
252	Pu'u N. of VLBA	July 21-24, 2008	N/VLBA 2	3857 m	19.80632°N 155.46164°W	0	Shrimp
253	Pu'u N. of VLBA	July 21-24, 2008	N/VLBA 3	3859 m	19.80647°N 155.46167 W	0	Shrimp
254	Pu'u N. of VLBA	July 21-24, 2008	N/VLBA 4	3852 m	19.80674°N 155.46182 W	0	Shrimp
255	Pu'u N. of VLBA	July 21-24, 2008	N/VLBA 5	3862 m	19.80680°N 155.46208 W	0	Shrimp
256	Pu'u Wēkiu (Bottom of Pu'u Wēkiu)	July 22-25, 2008	Pu'u Wēkiu 1A	4142 m	19.82259°N 155.47234 W	1	Shrimp
257	Pu'u Wēkiu	July 22-25, 2008	Pu'u Wēkiu 2A	4173 m	19.82330°N 155.47229 W	0	Shrimp
258	Pu'u Wēkiu (Top rim)	July 22-25, 2008	Pu'u Wēkiu RS-1	4169 m	19.81855°N 155.46988 W	0	Shrimp
259	Pu'u Wēkiu (Inside Pu'u Wēkiu crater above weather station)	July 22-25, 2008	Pu'u Wēkiu RS-2	4167 m	19.81874°N 155.46965 W	0	Shrimp
260	Pu'u Wēkiu (Near weather station)	July 22-25, 2008	Pu'u Wēkiu RS-3	4157 m	19.81910°N 155.46948 W	3	Shrimp
261	Pu'u Hau Oki (Near Keck)	July 21-24, 2008	Hau Oki 1	4173 m	19.82582°N 155.47520 W	0	Shrimp
262	Pu'u Hau Oki	July 21-24, 2008	Hau Oki 2	4162 m	19.82605°N 155.47525 W	3	Shrimp
263	Pu'u Hau Oki	July 21-24, 2008	Hau Oki 3	4159 m	19.82629°N 155.47527 W	0	Shrimp
264	Pu'u Hau Oki	July 21-24, 2008	Hau Oki 4	4157 m	19.82645°N 155.47525 W	2	Shrimp
265	Pu'u Hau Oki (Lower)	July 21-24, 2008	Hau Oki 5	4150 m	19.82661°N 155.47551 W	9	Shrimp
	Totals (2008)					70	