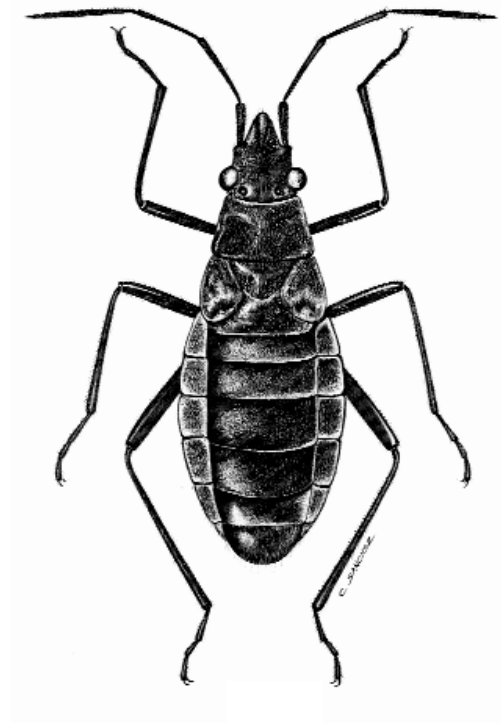


WĒKIU BUG
BASELINE MONITORING

QUARTERLY REPORT
1st QUARTER 2005



Pacific Analytics, L.L.C.

**Cover : Wēkiu Bug drawn by Mr. C. Sanchez of the University of the
Philippines College of Science and Humanities.**

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Prepared for

The Outrigger Telescopes Project
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WĒKIU BUG BASELINE MONITORING

QUARTERLY REPORT 1st QUARTER 2005

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IV. QUESTIONS OF INTEREST

Important Questions of Interest are those with answers that can be efficiently estimated and that yield the information necessary for management decision-making. The following Questions of Interest were developed in the Baseline Monitoring Plan and are the focus of this report.

Question 1

How, where and when are the Wēkiu bug populations changing? Locations of interest include current habitat on Pu’u Hau’oki crater and undisturbed Wēkiu bug habitat at Pu’u Wēkiu (for comparison).

Justification:

Baseline monitoring of Wēkiu bugs will yield reliable scientific information about the current status of Wēkiu bugs, and trends in their population. The information will be useful to compare to status and trends during construction of the proposed Outrigger Telescopes.

Monitoring goals:

- 1) To provide historical records of change in Wēkiu bug population attributes, and characteristics,
- 2) To detect trends, periodicities, cycles, and/or other patterns in those changes, and
- 3) To associate auxiliary phenomena, attributes, and characteristics with trends and patterns of change in Wēkiu bug population attributes, and characteristics.

Wēkiu Bug Baseline Monitoring
QUESTIONS OF INTEREST

Question 2

Are weather phenomena, human activities, and/or other factors associated with Wēkiu bug and/or other resident arthropod population change?

Justification:

Snow, rain, day/night temperatures, and other weather phenomena may be associated with Wēkiu Bug population change. Monitoring these indirect factors will aid in understanding trends in Wēkiu Bug population change.

Monitoring goals:

To associate environmental phenomena and attributes, and characteristics of human activities with trends and patterns of change in Wēkiu Bug populations.



A storm on March 29, 2005 left ice frozen to the guard rails along the summit roads.
Picture taken on March 30, 2005.

Wēkiu Bug Baseline Monitoring
METHODS

Setting a Wēkiu Bug Live-Trap



Step 1
Dig Trap Hole



Step 2
Install Wire Tube



Step 3
Create Trap Apron



Step 4
Fill Reservoir



Step 5
Bait Trap



Step 6
Add Cinder Habitat



Step 7
Distribute Chum Bait



Step 8
Emplace Cap Rock

VI. RESULTS

SAMPLING

During the 1st Quarter 2005 baseline monitoring session severe weather delayed deployment at the start of the sampling session. There were a total of seventeen sampling nights, make of one 2-day sampling period and five 3-day sampling periods. Snow covered five trap locations on Pu'u Hau'oki and four monitoring stations on Pu'u Wēkiu. These monitoring stations were unavailable for monitoring.

A total of four hundred fifty-eight Wēkiu bugs were captured, four hundred seventeen on Pu'u Hau'oki and forty-one on Pu'u Wēkiu. The trap capture rate (number of Wēkiu bugs per trap per 3-days) ranged from 0.0 to 49.2 Wēkiu bugs. The overall trap capture rate during the 3-week sampling session was 15.92 (± 8.7) Wēkiu bugs for Pu'u Hau'oki, and 1.14 (± 1.01) Wēkiu bugs for Pu'u Wēkiu (Table 1). For perspective, average trap capture rates from previous baseline monitoring sessions and the 1982 and 1997/98 Arthropod Assessments are

provided (Table 2 and Table 3). Average trap capture rates reported for the 1982 and 1997/98 arthropod assessments are those measured in comparable locations on Pu'u Hau'oki crater and Pu'u Wēkiu as those measured for Wēkiu Bug Baseline Monitoring. The 1982 measurements were recorded during July and August, and therefore should not be used to compare to the current quarter of baseline monitoring.

Figure 1 graphs the average trap capture rates for all Baseline Monitoring on Pu'u Hau'oki (beginning 1st Quarter 2002). Figure 2 shows the quarterly variation in average trap capture rates for Baseline Monitoring on Pu'u Hau'oki.

Overall mortality was 11% (50 of 458). This mortality rate is significantly less than the 40% experienced with the previous live-trap design used in the 1997/98 arthropod assessment.

Wēkiu Bug Baseline Monitoring
RESULTS

TABLE 1.
1st QUARTER 2005 SAMPLING PERIOD
AVERAGE TRAP CAPTURE RATES
 The average number of Wēkiu bugs per trap per 3-days
 for each sampling period during 1st Quarter 2005 Baseline Monitoring.

Location	3/18/2005	3/21/2005	3/24/2005	3/27/2005	3/30/2005	4/2/2005	AVERAGE ± SE
Pu'u Wēkiu	0.00*	0.20	6.17	0.00	0.17	0.33	1.14 ± 1.01
Pu'u Hau'oki	36.30*	1.80	49.20	0.00	1.80	6.40	15.92 ± 8.7

* - 2-day sampling results adjusted to 3-day average

TABLE 2.
QUARTERLY BASELINE MONITORING
AVERAGE TRAP CAPTURE RATES
 The average number of Wēkiu bugs per trap per 3-days
 for each of the Quarterly Baseline Monitoring Sampling Sessions.
 Yearly average trap capture rates for Baseline Monitoring are in **RED**.

Location	1 st Quarter	2 nd Quarter	3 rd Quarter	4 th Quarter	Year Avg.
Pu'u Wēkiu 2002*	0.03	0.03	0.3	0.2	0.1
Pu'u Wēkiu 2003	2.8	11.5	0.5	0.0	3.7
Pu'u Wēkiu 2004	0.00	2.0	0.03	0.06	0.5
Pu'u Wēkiu 2005	1.14				1.14
Pu'u Hau'oki 2002	1.0	10.3	4.0	4.0	4.8
Pu'u Hau'oki 2003	18.5	90.6	12.4	0.8	30.6
Pu'u Hau'oki 2004	2.1	8.8	0.4	0.21	2.9
Pu'u Hau'oki 2005	15.92				15.92

* - different trap locations on Pu'u Wēkiu in 2002

TABLE 3.
SAMPLING PERIOD AVERAGE TRAP CAPTURE RATES
 The average number of Wēkiu bugs per trap per 3-days
 for each sampling period during the 1982 and 1997/98 Arthropod Assessments.
 Average trap capture rates for the 1997/98 Arthropod Assessment are in **RED**.

Location	Aug. 1997	Jan. 1998	Apr-98	Jul-98	1997/98 Avg.	Jul-82
Pu'u Wēkiu	0.15	0	0.07	0.15	0.11	225
Pu'u Hau'oki	0.2	0	0.2	1.1	0.38	105.6

Wēkiu Bug Baseline Monitoring
RESULTS

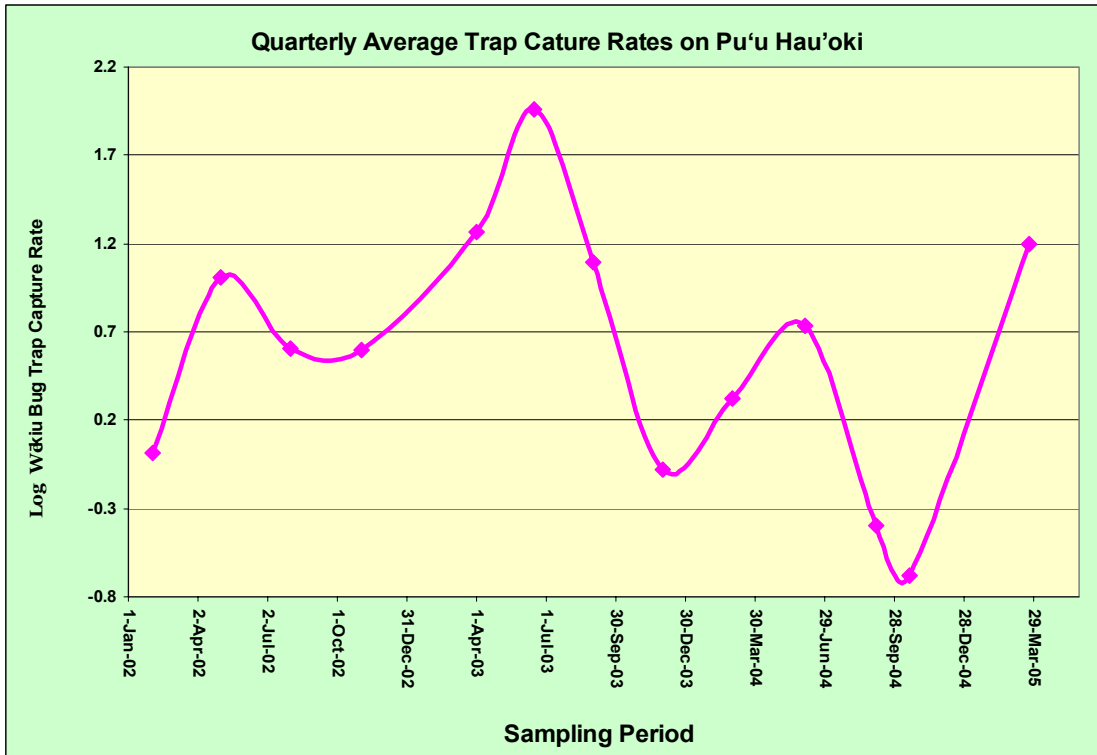


FIGURE 1. Graph of the Log Average Wēkiu Bug Trap Capture Rate per Sampling Period on Pu'u Hau'oki since Wēkiu Bug Baseline Monitoring began in February 2002.

**Wēkiu Bug Baseline Monitoring
RESULTS**

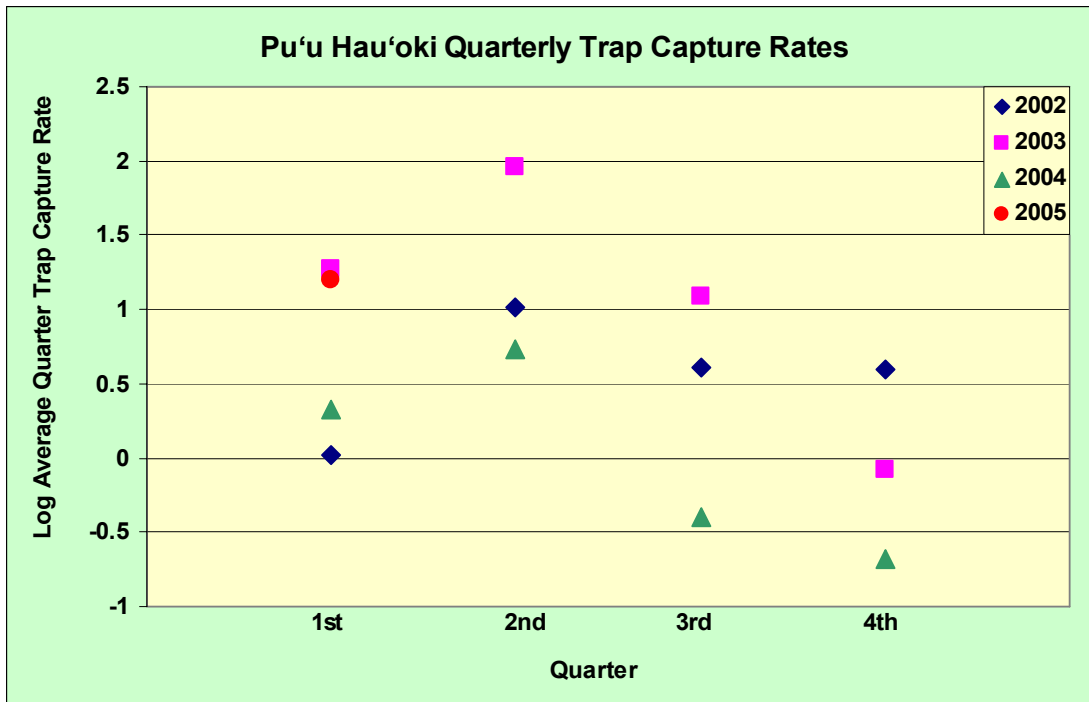


Figure 2. Pu'u Hau'oki Quarterly Average Trap Capture Rates.
The log average quarterly trap capture rate of Wēkiu bugs on Pu'u Hau'oki
for four years of Wēkiu Bug Baseline Monitoring.

**Wēkiu Bug Baseline Monitoring
RESULTS**

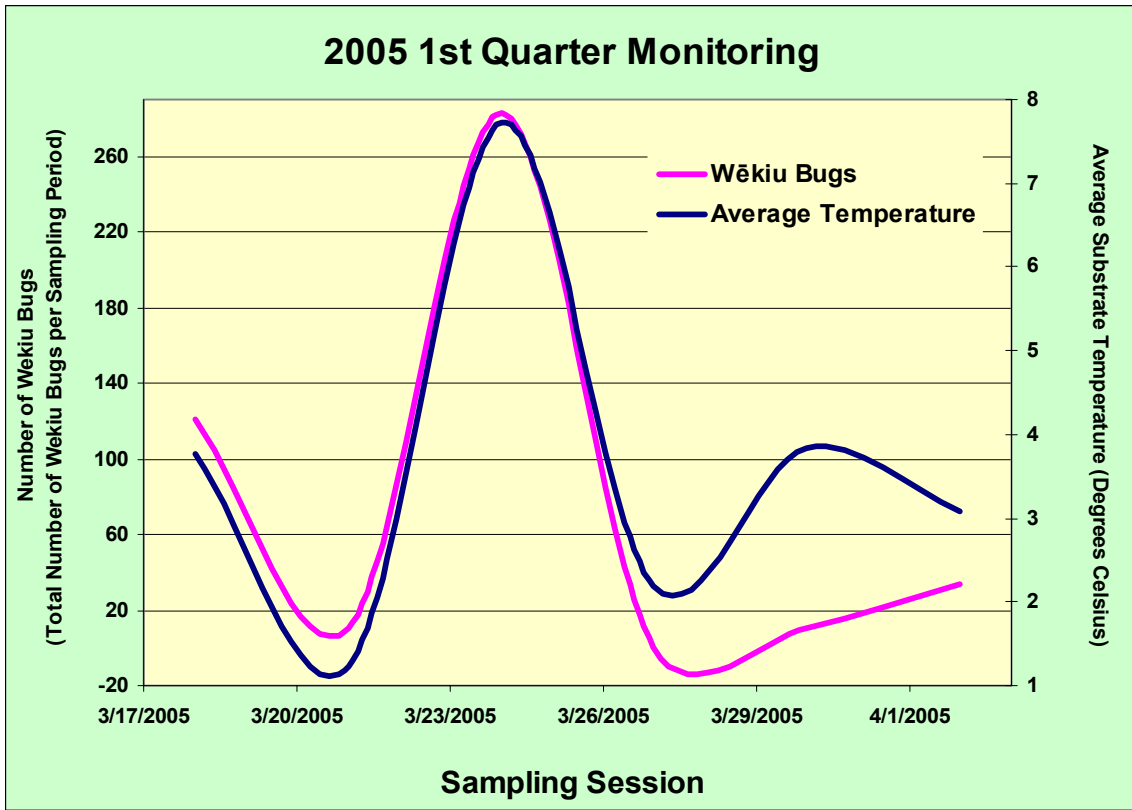


FIGURE 3. Plot of Average Temperature (Celsius) and Total Number of Wēkiu Bugs Captured per Sampling Period at all sampling locations during the 1st Quarter 2005 sampling session.

**Wēkiu Bug Baseline Monitoring
RESULTS**

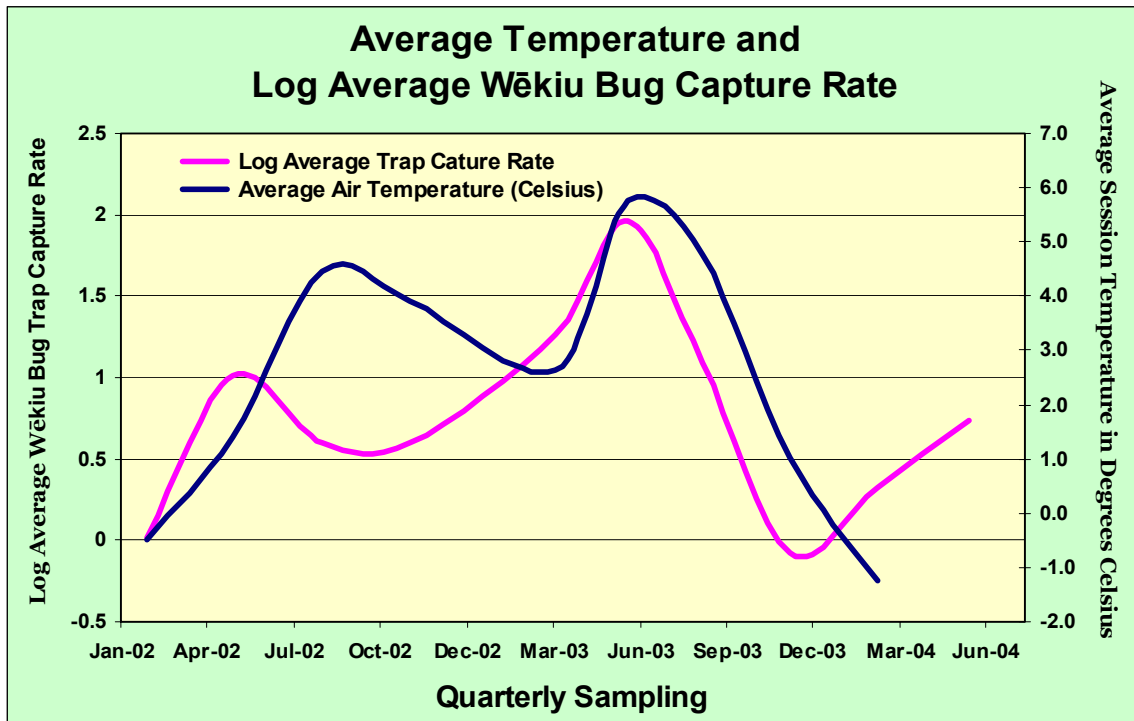


FIGURE 4. Plot of Baseline Monitoring Session Average Temperature (Celsius) and Natural Log Average Number of Wēkiu Bug Trap Capture Rate per Session on Pu'u Hau'oki.

Pu'u Wēkiu Photographic Archive

MARCH 2005
TRAPS 1 - 5



Pu'u Wēkiu inner slope
March 16, 2005



Pu'u Wēkiu inner slope
March 18, 2005



Pu'u Wēkiu inner slope
March 21, 2005



Pu'u Wēkiu inner slope
March 24, 2005

Wēkiu Bug Baseline Monitoring
RESULTS

Pu'u Wēkiu and Pu'u Hau Kea Photographic Archive

MARCH 2005



Pu'u Wēkiu and Pu'u Hau Kea
March 16, 2005



Pu'u Wēkiu and Pu'u Hau Kea
March 18, 2005



Pu'u Wēkiu and Pu'u Hau Kea
March 21, 2005



Pu'u Wēkiu and Pu'u Hau Kea
March 24, 2005

