**Preliminary report on radio tracking coconut rhinoceros beetles in Guam**

**Objective:** This pilot project was designed to provide a proof of concept for the idea that radio tagged coconut rhinoceros beetles (CRB) could be used to detect cryptic breeding sites. Using tagged beetles in this way could lead to improvements in the effectiveness of late stage CRB eradication programs. Our minimum success level for this study was to track at least one CRB to a cryptic breeding site.

**Results:** Two locations were used in this study, each representing a different topographies and with differing vegetation cover. Approximately 20 CRB were tracked to specific locations during the course of the study. Tracked CRB were found in a number of microhabitats including coconut trees, around CRB barrel traps, and several breeding sites. Interesting observations included,

* One CRB visited a breeding site in a recently typhoon damaged branch on a breadfruit tree. Three other beetles were observed in the breeding site.
* Two CRB were observed *under* barrel traps (one of which was a breeding site)
* Three CRB were tracked to the same tree
* Four CRB were found burrowed into soil or sand.
* The majority of CRB were tracked to coconut trees (many of which were severely damaged)



**Figure 1.** The two locations used for in this study. On the left is Asan Beach Park, a relatively open area bordered by an elevated forest, the ocean, and swampy scrubland. On the right is a University of Guam experiment station, which had mixed forested and agriculture areas bordered by residential areas and more forest. \*Preliminary GPS data used, not all locations have been vetted at this time.

While the line-of-sight range of the transmitters used was determined to be ~1 km, is practice most beetles were located no further than ~300 m from the release point due to interference from topography, vegetation, and power lines. Techniques related to tracking were refined including transmitter attachment and tracking protocols. Our results suggest that tracking tagged beetles can lead to the discovery of cryptic breeding sites. Of particular interest may be the fact breeding sites were discovered in trees, sites which might prove very difficult to pinpoint using tracking dogs.

**Future study:** Technology developed in the course of this research may be quite helpful to the CRB eradication program in Hawaii as they look to identify and remove cryptic CRB breeding sites. The technique could be further refined by the following,

* Develop better transmitter attachment protocols (perhaps using UV cured dental adhesives)
* Further define the relationship between number of tagged CRB released and breeding sites found (“x” number of CRB are needing to detect “y” number of breeding sites)
* Develop SOP and best practices for tagging, releasing, tracking, and recovering CRB

While the transmitters used in this study did allow us to tracking CRB over a somewhat limited range, techniques such as harmonic radar may make the tracking of beetles more feasible over longer ranges and it is hoped that this technology may be employed in future projects.