Notes on Partulid Snail Locations on Rota, CNMI
November 2014

Jill Liske-Clark, Robert Uchoa, Lainie Zarones, and Tyler Willsey
Division of Fish and Wildlife, Commonwealth of the Northern Mariana Islands
Lower Base, Box 10007 Saipan, MP 96950

Introduction

Over 100 land snails of the family Partulidae are widely distributed across the Pacific islands and are known for their remarkable evolutionary radiation, i.e. most are single island endemics (Cowie 1992). Three partulid snail species are known from the island of Rota. One long extinct species, *Partula desolata*, is described only from shells recovered from Late Holocene subfossil cave deposits (Bauman and Kerr 2013). The two extant species known from Rota, *Partula gibba* and *Samoana fragilis*, are listed as Endangered under the U.S. Endangered Species Act (Department of the Interior 2015) and are identified as Species of Greatest Conservation Need in the CNMI Wildlife Action Plan (Berger et al. 2005; Liske-Clark, in prep).

Samoana fragilis is known to occur on Guam and Rota, though it was last observed on Rota in 1996 (Bauman 1996). *Partula gibba* is known from Guam, Rota, Aguiguan, Tinian, Saipan, Anatahan, Sarigan, Alamagan, and Pagan (Hadfield 2015). However, recent genetic analyses have called into question the taxonomic status of the Rota snail. Genetic evidence indicates that the species long identified as *P. gibba* on Rota is instead a previously undescribed *Partula* species, more closely related to *P. radiolata* from Guam (Sischo and Hadfield, in prep).

Bauman (1996) conducted snail surveys at 26 locations on Rota in 1996, finding live *Partula* at 5 locations (4, 6, 8, 20, and 24). We conducted surveys of *P. gibba* on Rota during November 17-20, 2014. In a very limited time available, our aim was to assess the current status (presence/absence) of three of Bauman's (1996) *P. gibba* colonies last observed in 2010. Although a targeted search for *Samoana fragilis* or new *P. gibba* colonies was not a goal, we remained observant while conducting other unrelated forest projects during the period November 17-20, 2014.

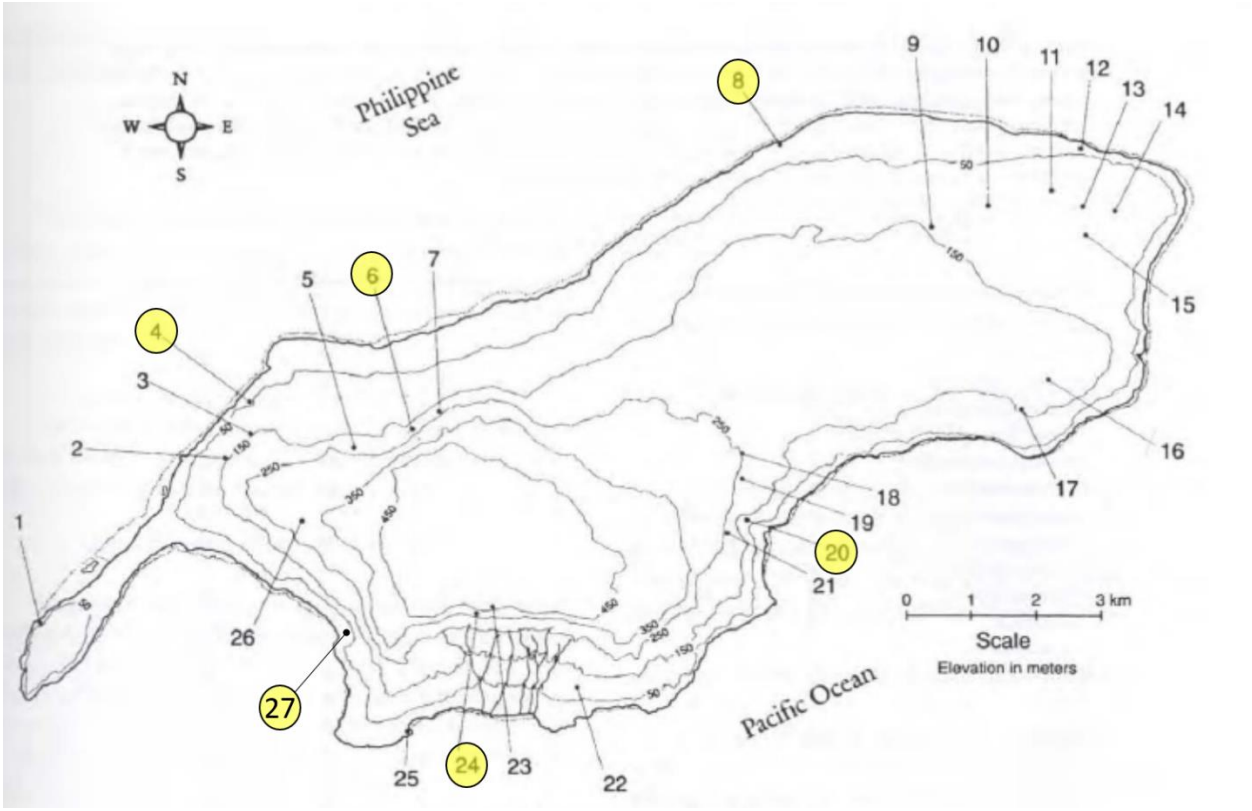

Figure 1. Locations searched for partulid snails by Bauman (1996), and a new location where Partula was recently found (#27). Locations where Bauman found live partulid snails and the new location (#27) are highlighted in yellow. Adapted from Bauman 1996.

Methods and Results

We will continue to identify *Partula* colonies according to the site numbers assigned by Bauman (Fig 1).

We were very confident in our ability to identify the two partulid snail species based on our study of readily-available descriptions and photos, the lack of other potentially confounding species, and past personal experience with *Partula gibba* live snails and shells from Saipan (Liske-Clark).

On November 17, Liske-Clark, Zarones, and Willsey used a GPS waypoint and location description to re-locate *Partula* sp. colony #8 alongside the road to the Swimming Hole. We spent 5-10 minutes in a cursory search and found at least 10 snails in the leaves of giant taro *Alocasia macrorrhizos*.

On November 18, during the course of other work, Liske-Clark and Zarones located a previously-unknown *Partula* sp. colony, here identified as #27, alongside the road near the Honey Garden tourist attraction on the southwest side of the island. Again, we found at least 10 snails following a brief 5-10 minute search (Figs 2 & 3). Plants on which snails were observed include the naturalized vine *Epipremuum aureum* and the native fern *Tectaria crenata*.

Also on November 18, while hiking from the road below the Water Cave up to the cave, we observed many and collected two *Partula* sp. shells, but did not observe live snails. Snail colony #24 was Bauman's nearest location, approximately 200m from our site.

On November 20, 2014, Liske-Clark and Uchoa used known GPS locations to search for *Partula* sp. colonies #4 and #6. Live snails were not re-located at colony #6 during a 20 minute search, but one shell was found. While pulling off the road near the location of colony #4, we observed the snails on the roadside vegetation prior to exiting our vehicle. In a <5 minute search, we located 4 snails.

We did not search for Bauman's *Partula* sp. colonies #20 or #24. We also did not specifically search for *Samoana fragilis* snails during this four day trip, and none were observed during plant surveys conducted in this area.

Figure 2. *Partula* sp. snails at newly-found colony #27. Note that the site received rain shortly before the photo was taken (*photo credit Lainie Zarones*).

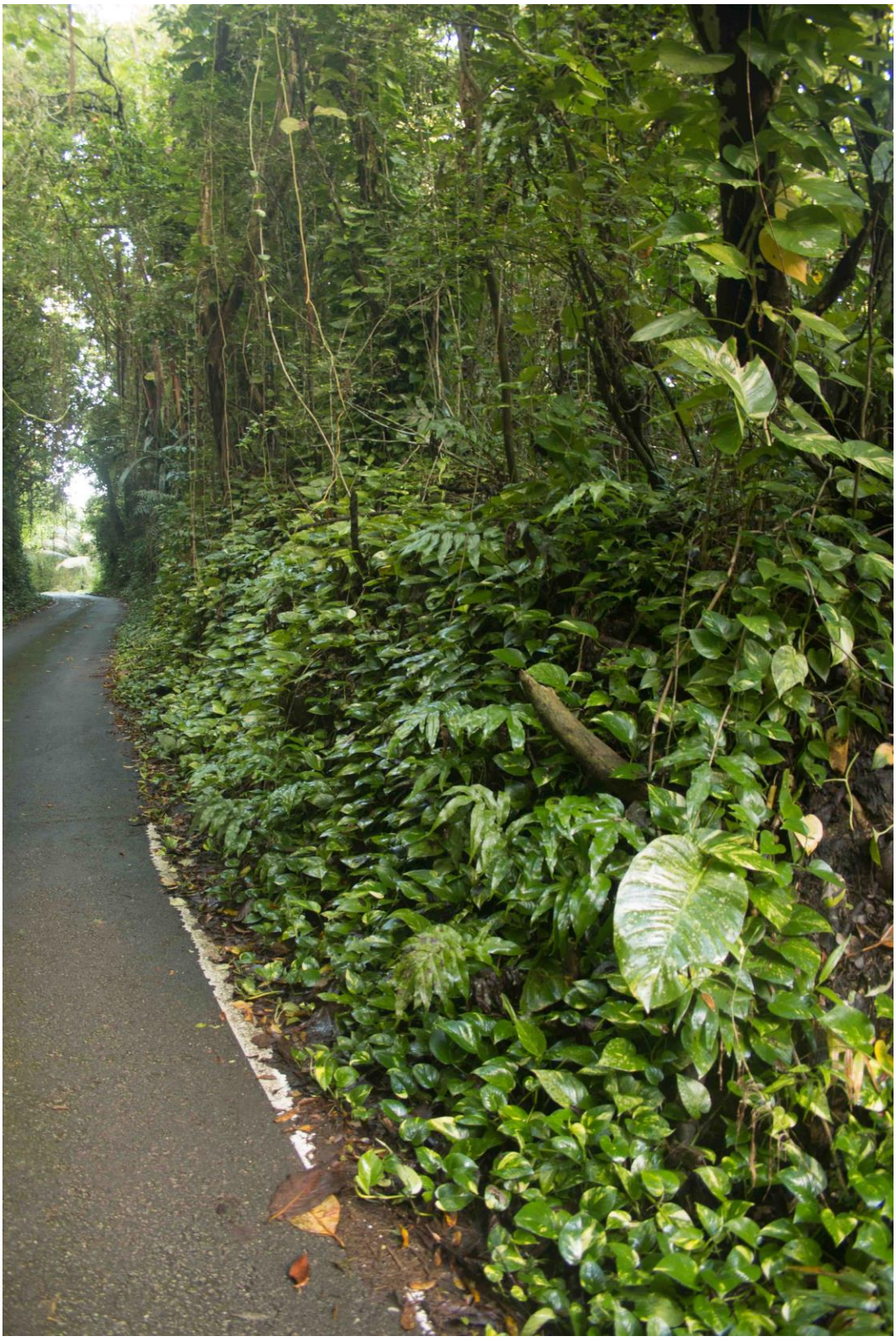

Figure 3. Habitat at newly-found *Partula* sp.colony #27. Note that the site received rain shortly before the photo was taken (*photo credit Lainie Zarones*).

Discussion and Management Implications

We are encouraged by the persistence of *Partula* colonies #4 and #8 since at least 1996. Although we did not locate live snails at colony #6, our brief search (~20 minutes) was not sufficiently thorough to say that colony is extirpated. We are also encouraged by our discovery of a new *Partula* colony, #27. We were not specifically searching for partulids when we located this colony, but we easily found it because we were aware of their possible presence, and because they appear to be relatively numerous and conspicuous when present (or alternatively, large colonies are more likely to be found). *Partula* snails appear to be persisting on Rota, an island with more suitable habitat and fewer threats relative to the other inhabited Mariana Islands.

While it appears that the Rota partulid snail is a long-misidentified cryptic species (Sischo and Hadfield, in prep), we cannot rule out the possibility that *P. gibba* also occurs on Rota. We need to conduct genetic analyses from additional colonies to confirm the presence/absence of *P. gibba* on Rota.

In addition, our general understanding of the relative abundance and distribution of CNMI partulid snails is limited. The within-island distribution of partulids appears to be quite patchy, i.e. large areas of apparently suitable habitat may be unoccupied, but where colonies occur, snails can be quite numerous. This distribution pattern precludes the use of traditional broad-scale wildlife population survey techniques, which would likely be ineffective at producing meaningful abundance estimates. To address this challenge, our next step would be to collect data from existing colonies and work with regional partulid experts to develop a spatially-explicit habitat suitability index (HSI) or other model to identify the site-specific (e.g. canopy cover, plant species composition) and landscape-scale (e.g. elevation, habitat patch size) variables with which partulid snails are associated (e.g. Johnson & Gillingham 2005, Store & Jokimaki 2003). The HSI model would identify the habitat management actions which would most benefit snails, and identify suitable sites for future targeted snail surveys or habitat management actions.

References

Bauman, S. 1996. Diversity and decline of land snails on Rota, Mariana Islands. American Malacological Bulletin 12(1/2): 13-27.

Bauman, S. & A.M. Kerr. 2013. *Partula desolata* sp. nov. (Pulmonata: Partulidae), an extinct land snail from Rota, Mariana Islands, Micronesia. *Micronesica* 2013-05, 12 pp. Published online 24 July 2013. www.uog.edu/up/micronesica/2013. Open access, Creative Commons Attribution-NonCommercial-NoDerivs License.

Berger, G.M., Gourley, J. and G. Schroer. 2005. Comprehensive Wildlife Conservation Strategy for the Commonwealth of the Northern Mariana Islands. 358pp.

Cowie, R.H. 1992. Evolution and extinction of Partulidae, endemic Pacific island land snails. Philosophical Transactions: Biological Sciences 335(1274):167-191.

Johnson, C.J. and M.P. Gillingham. 2005. An evaluation of mapped species distribution models used for conservation planning. Environmental Conservation, pp 117-128. doi:10.1017/S0376892905002171.

Hadfield, M.G. 2015. The occurrence of the endangered tree snail *Partula gibba* in the Mariana Islands, with a focus on Pagan Island. Bishop Museum Bulletin in Zoology 9:147-167.

Liske-Clark, J.J.. In prep. 2015 CNMI Wildlife Action Plan. CNMI Division of Fish and Wildlife, Saipan, MP.

Sischo, D.R. and M.G. Hadfield. In prep. Phylogeographic relationships between multi-island populations of *Partula gibba* in the Mariana Islands; cryptic species and long distance dispersal.

Store, S. and J. Jokimaki. 2003. A GIS-based multi-scale approach to habitat suitability modeling. Ecological Modeling 169(1):1-15.