Honuea Trial Rat Eradication
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Summary

Three scientists visited Tetiaroa from January 18 to February 5. The goal of this scientific mission was to trial eradication methods on motu Honuea and obtain information on the population dynamics of rodents on the island. Both *Rattus exulans* and *R. rattus* were present on Honuea. An island wide grid of 117 stations at 50 m × 50 m was established and alternating snap and live traps were deployed. Trapping was undertaken for seven nights. All rats captured were measured and genetic and stable isotope samples (fur, muscle and liver) taken for future analysis. Rat capture declined markedly over the seven nights from 50 rats per 100 corrected trap nights to less than 10 rats per 100 corrected trap nights. A total of 125 rats were trapped. After trapping had reduced rat density, a ground-based poison campaign was initiated with 50 ppm brodifacoum (30 g chocolate blocks) at 1 kg/ha (two blocks every 25 m, tethered every 50 m to allow monitoring). The number of rats remaining prior to poisoning was estimated from interference on baits as between 10-15. The original density of rats on Honuea was therefore around 5 rats per hectare. Cyclone Oli struck Tetiaroa two days after poison was laid, and may have affected the longevity of poison on the island and compromised the eradication. Reinvasion from Onetahi or Tiaraunu is likely without adequate biosecurity measures, although the population of introduced rats on northern Onetahi is reduced and dominated by *R. exulans* following a failed eradication in 2009.

Introduction

Tetiaroa atoll (3366 ha; ; 17°05’S, 149°30’W), lies 50 km north of Moorea and Tahiti in the Society Islands of French Polynesia (Fig. 1). The atoll consists of 12 vegetated motu (Fig. 2) and an emerging sandbank (Motu One) east of Tahuna Iti, circling a large lagoon. The history of Tetiaroa is detailed in a previous report (Russell and Faulquier 2009).

As part of ongoing research currently based at the University of California – Berkeley, we wished to trial on Honuea (28.0 ha) an efficient low-cost eradication method for tropical islands. Honuea is well suited for such a trial given its small size and accessibility. Both *R. rattus* and *R. exulans* were present on Honuea. Trapping was used to obtain scientific samples, gain an accurate estimate of population size, while simultaneously reducing the population size of rats. Overall this meant that much less poison would be required to complete the eradication. We wanted to trial hand-spread poison deployment with reduced follow-up monitoring to save labour costs for future eradications on tropical islands.

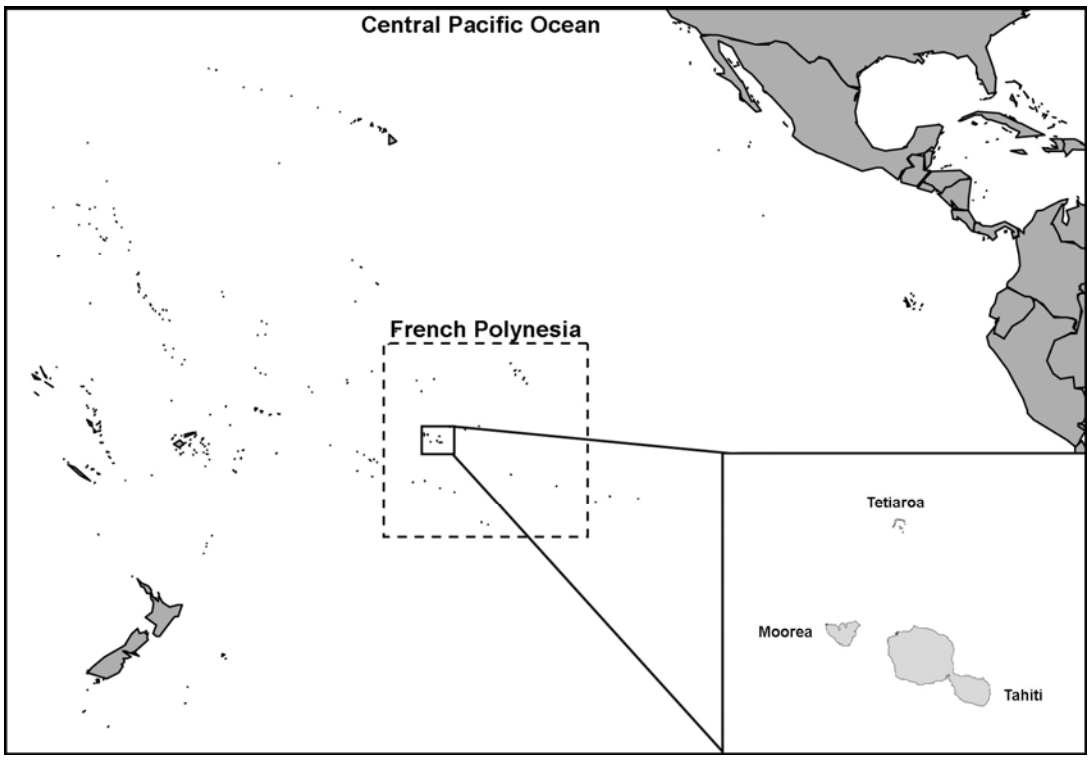

Figure 1: Tetiaroa 50 km north of Moorea and Tahiti in the Society Islands of French Polynesia.

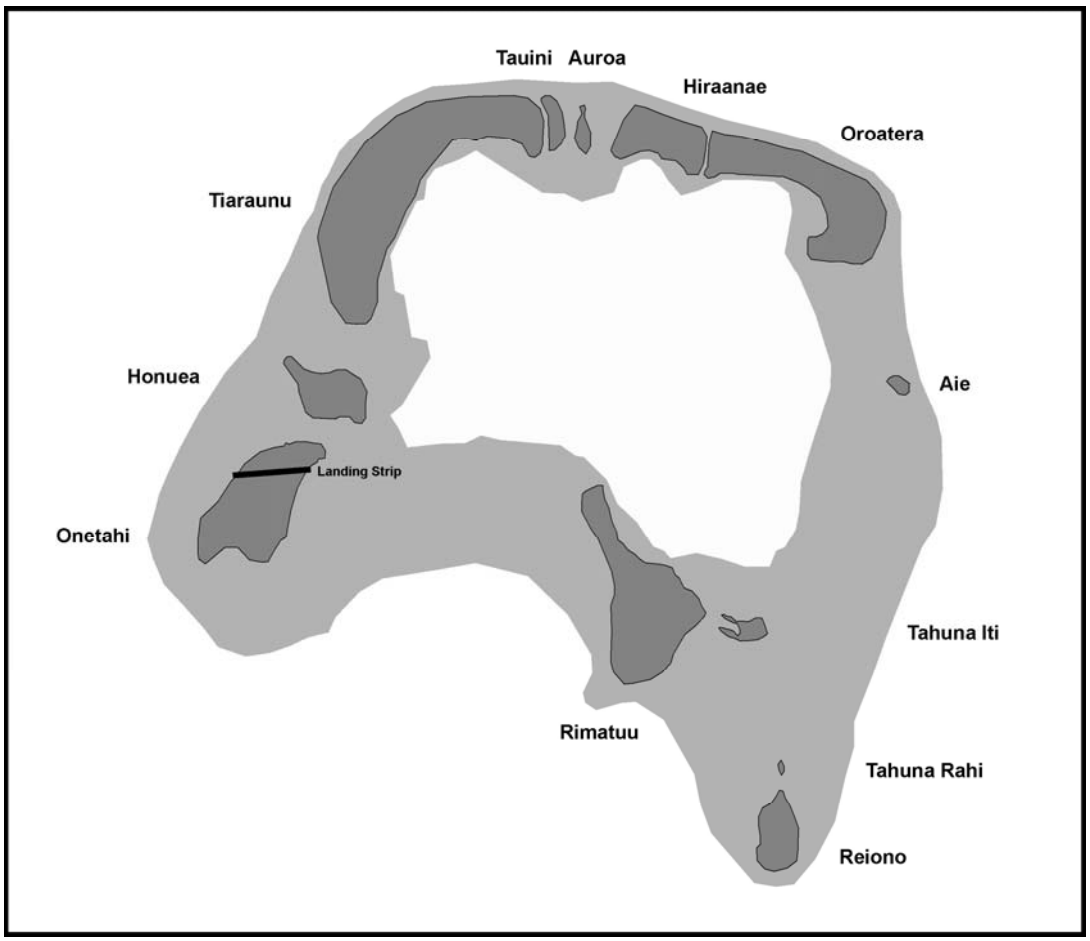

Figure 2: The 12 motu of Tetiaroa. Tahuna Iti is colloquially named the ‘bird island’.

Trial Eradication

We established an island-wide 50 m × 50 m grid of 117 trapping stations (Fig. 3). Dense pandanus (*Pandanus tectorius*) in the centre of the island made access difficult. We alternated snap-traps (Victor Professional) and live-traps (Manu France) across the grid, and checked traps daily for seven days. We captured a total of 125 rats, comprising 82 *R. rattus*, 35 *R. exulans* and 8 unidentified. We estimated captures per 100 corrected trap nights using the formula for both rats and crabs as the focal species of interest. Rat captures declined markedly over the seven nights of trapping, whereas crab captures remained constant around 27 crabs per 100CTN (Table 1). The most commonly caught crab species was *Coenobita brevimanus*. *R. rattus* captures peaked on the first day, whereas *R. exulans* captures peaked on the third day.

Table 1: Trapping data

	21-Jan	22-Jan	23-Jan	24-Jan	25-Jan	26-Jan	27-Jan
R. rattus	24	21	16	11	3	3	4
R. exulans	3	7	13	4	2	2	4
rats 100CTN	46	46	47	21	9	8	12
crabs 100CTN	26	24	31	26	20	29	35

We recorded sex, weight, head-body length and tail length (Table 2). Adult *R. exulans* were >40 g and adult *R. rattus* >90 g. Missing tail tips were prevalent (*n* = 11) amongst adult male *R. rattus*, but otherwise uncommon for other species, sex and age classes. All three colour morphs were found on Honuea (frugivorous brown over white *n* = 63; alexandrinus brown over grey *n* = 11; rattus black over grey *n* = 7).

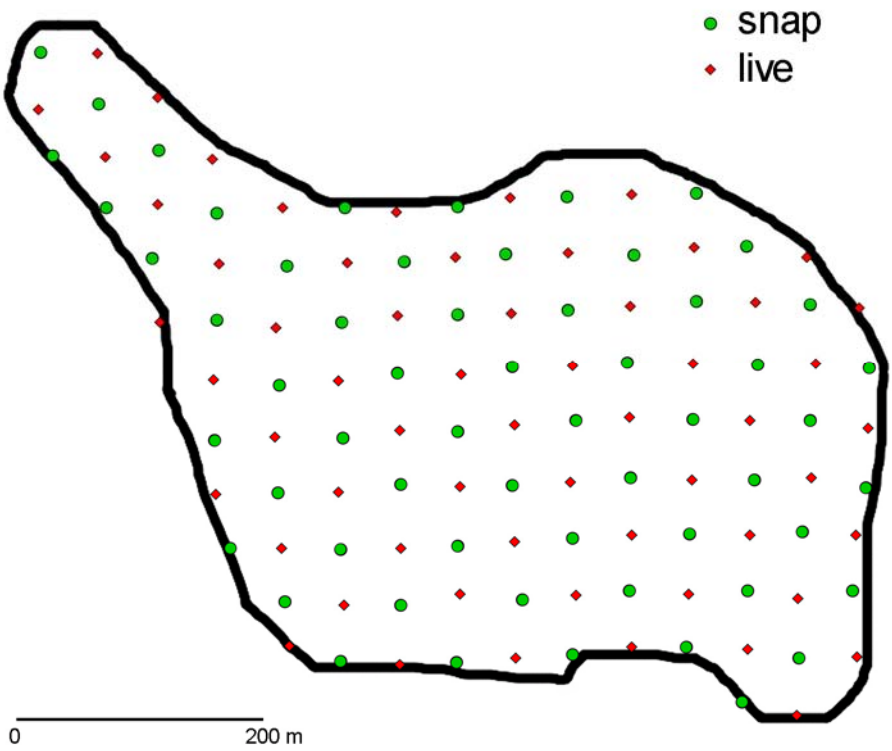

Figure 3: Trapping grid on Honuea (*n* = 117)

Table 2: Average morphological measurements of adult *R. exulans* and *R. rattus* on Honuea. HBL = head-body length, TL = tail length.

Species	Sex	*n*	Weight (g)	HBL (mm)	TL (mm)
R. exulans	M	10	67	137	143
	F	11	60	128	138
R. rattus	M	33	166	190	219
	F	32	158	187	215

On February 1, five days after trapping was ceased, poison was laid across the island with two 30 g PestOff 50 ppm brodifacoum chocolate blocks every 25 m by GPS. At each 50 m bait station both blocks were pinned to allow monitoring of bait-take. The following day bait-take indicated rodent gnawing sign at 20% of stations. We defined rodent sign as greater than half a block eaten, and were confident that this was distinct from crab interference, which appeared minimal. The following day all operations ceased with the onset of Cyclone Oli as all team members were air lifted to Papeete by the French airforce.

Two or three pairs of white terns (*Gygis alba*) were nesting on the island in pandanus (*Pandanus tectorius*), and greater crested terns (*Thalasseus bergii*) roosted on the south-eastern beach.

Discussion

Until the outcome of the eradication is known, it is not possible to draw too many conclusions from the approach used here to eradicate introduced rats. The rat density on Honuea was surprisingly low, and the high captures per 100 corrected trap nights, initially near 50%, is very misleading. A high index capture rate reflects better the catchability of the rats, rather than their density. In this case rats on Honuea were easily caught, and at a low density. Trapping was surprisingly efficient and very few rats were probably left once capture rates had fallen below 10%. *R. rattus* was clearly the dominant species, dominating captures for the first two nights until their density was reduced and *R. exulans* could be captured.

Live-traps were preferred as crabs could be released safely, however some crabs did die in snap-traps. Despite this their capture rate did not decline over the course of the study, suggesting their population size was not impacted by trapping. Land crabs are not affected by the anticoagulant poison used for rodent eradications (Pain et al. 2000). No other non-target impacts from trapping or poisoning were detected.

R. exulans had typical morphology compared to previous trapping (including Honuea) on Tetiaroa (Russell and Faulquier 2009). *R. rattus* were noticeably smaller however, although this may be a seasonal effect. The prevalence of missing tail tips among adult male *R. rattus* is most likely attributable to antagonistic intra-specific interactions.

Acknowledgements

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References

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