

Supplementary material 1 to:

Hanslowe EB, Yackel Adams AA, Nafus NG, Page DA, Bradke DR, Erickson FT, Bailey LT (2022) Chew-cards can accurately index invasive rat densities in Mariana Island forests. *NeoBiota* 74: 29-56. <http://doi.org/10.3897/neobiota.74.80242>

Appendix 1. Model selection results.

We modeled potential heterogeneity in capture probabilities (p) among sampling occasions and/or individuals in our spatially explicit Huggins' closed-capture conditional likelihood analyses of live-trapped rats (*Rattus* spp.) in forest habitats on Guam (G1–4) and Rota (R1–5) in the Mariana Islands during June 2018–August 2019. For Rota grids with higher rat captures (R4–5) we used spatially explicit models and a two-step approach. First (Step 1), we accounted for all hypothesized sources of individual variation in capture probability by including sex, body condition index (BCI), and age (juvenile or adult) while exploring models with additive combinations of temporal covariates, including daily rainfall amount (when available; rain), a two-night neophobic response (neophobia2), a behavioral response (behavior), a time trend (Time), and no temporal variation (.). We did not include neophobia2 with either rain or Time in the same model. We retained the best-supported temporal variation structure(s) in Step 2 where we tested all possible additive combinations of individual covariates (sex, BCI, age, and no individual heterogeneity). For Rota grids R1–3 we used a single-step approach to compare models with temporal covariates only, excluding rainfall. For all Guam grids, data were too sparse (< 10 total captures per grid) to use spatially explicit models or support covariates. We modeled all Guam data together (with grids differentiated by group) using Huggins' closed-capture conditional likelihood models and compared a null model (constant capture probability) to a model with a behavioral effect, as this was all these data could support. We ranked models using Akaike's Information Criterion with a small sample size correction (AIC_c) and used cumulative variable weights (w) to identify important covariates within each step. We also include the number of parameters (K) and log-likelihood ($\log Lik$) for each model (Tables S1–4).

Table S1. Guam: Huggins' closed-capture conditional likelihood model selection results for combined Guam grids sampled during June 2018–February 2019.

Guam model structures	AIC_c	w	K	$\log Lik$
p (behavior)	132.371	0.995	2	-64.154
p (.)	143.079	0.005	1	-70.014

Table S2. R1–3: Model selection results for spatially explicit models fit to data collected during June 2019 from grids for which we did not collect individual covariates. Results from the temporal models only (Step 1) are provided by grid.

R1 model structures	AIC_c	w	K	logLik
<i>p</i> (behavior)	310.710	0.587	3	-151.605
<i>p</i> (behavior + Time)	312.293	0.266	4	-150.813
<i>p</i> (behavior + neophobia2)	313.543	0.142	4	-151.438
<i>p</i> (Time)	320.225	0.005	3	-156.362
<i>p</i> (neophobia2)	321.498	0.000	3	-156.999
<i>p</i> (.)	322.631	0.000	2	-158.963
R2 model structures	AIC_c	w	K	logLik
<i>p</i> (behavior)	132.464	0.415	3	-61.732
<i>p</i> (.)	132.845	0.343	2	-63.756
<i>p</i> (Time)	135.440	0.094	3	-63.220
<i>p</i> (neophobia2)	136.175	0.065	3	-63.587
<i>p</i> (neophobia2 + behavior)	137.026	0.042	4	-61.656
<i>p</i> (Time + behavior)	137.112	0.041	4	-61.699
R3 model structures	AIC_c	w	K	logLik
<i>p</i> (behavior)	236.974	0.592	3	-114.564
<i>p</i> (Time + behavior)	238.413	0.288	4	-113.540
<i>p</i> (neophobia2 + behavior)	240.378	0.108	4	-114.522
<i>p</i> (Time)	246.079	0.006	3	-119.116
<i>p</i> (neophobia2)	246.123	0.006	3	-119.139
<i>p</i> (.)	249.898	0.000	2	-122.521

Table S3. R4: Spatially explicit model selection for rats sampled during June–July 2019. Step 1 models include all hypothesized sources of individual variation in capture probability (sex + age + BCI + *temporal structures*) listed below. We retained the best-supported temporal structure (behavior) when testing all possible additive combinations of individual covariates in Step 2 (sex, BCI, age, and no individual heterogeneity).

Step 1: Temporal model structures	AIC_c	w	K	logLik
<i>p</i> (... + behavior)	1596.626	0.452	6	-791.819
<i>p</i> (... + behavior + neophobia2)	1598.623	0.167	7	-791.645
<i>p</i> (... + behavior + rain)	1598.646	0.165	7	-791.656
<i>p</i> (... + behavior + Time)	1598.666	0.163	7	-791.666
<i>p</i> (... + behavior + Time + rain)	1600.875	0.053	8	-791.570
<i>p</i> (... + Time + rain)	1630.401	0.000	7	-807.534
<i>p</i> (... + neophobia2)	1630.653	0.000	6	-808.832
<i>p</i> (... + Time)	1633.905	0.000	6	-810.459
<i>p</i> (... + rain)	1653.401	0.000	6	-820.206
<i>p</i> (...)	1655.074	0.000	5	-822.188
Step 2: Individual covariates model structures	AIC_c	w	K	logLik
<i>p</i> (behavior)	1588.893	0.760	3	-791.310
<i>p</i> (BCI + behavior)	1592.397	0.132	4	-791.968
<i>p</i> (BCI + sex + behavior)	1594.427	0.048	5	-791.865
<i>p</i> (BCI + age + behavior)	1594.560	0.045	5	-791.931
<i>p</i> (BCI + age + sex + behavior)	1596.626	0.015	6	-791.819
<i>p</i> (age + behavior)	1599.041	0.000	4	-795.291
<i>p</i> (sex + age + behavior)	1601.083	0.000	5	-795.193
<i>p</i> (sex + behavior)	1601.617	0.000	4	-796.579

Table S4. R5: Spatially explicit model selection for rats sampled during July–August 2019. Step 1 models include all hypothesized sources of individual variation in capture probability (sex + age + BCI + *temporal structures*) listed below. We retained the best-supported temporal structure (behavior + neophobia2) when testing all possible additive combinations of individual covariates in Step 2 (sex, BCI, age, and no individual heterogeneity).

Step 1: Temporal model structures	AIC_c	w	K	logLik
<i>p</i> (... + behavior + neophobia2)	1445.445	0.341	7	-714.847
<i>p</i> (... + behavior)	1445.487	0.334	6	-716.097
<i>p</i> (... + behavior + Time)	1447.621	0.115	7	-715.936
<i>p</i> (... + behavior + rain)	1447.932	0.098	7	-716.091
<i>p</i> (... + neophobia2)	1448.358	0.080	6	-717.533
<i>p</i> (... + behavior + rain + Time)	1450.156	0.032	8	-715.935
<i>p</i> (... + Time)	1456.471	0.000	6	-721.589
<i>p</i> (...)	1457.712	0.000	5	-723.401
<i>p</i> (... + Time + rain)	1458.743	0.000	7	-721.497
<i>p</i> (... + rain)	1460.068	0.000	6	-723.388
Step 2: Individual covariates model structures	AIC_c	w	K	logLik
<i>p</i> (neophobia2 + behavior)	1426.892	1.000	4	-709.147
<i>p</i> (age + neophobia2 + behavior)	1440.812	0.000	5	-714.952
<i>p</i> (BCI + neophobia2 + behavior)	1442.040	0.000	5	-715.565
<i>p</i> (age + sex + neophobia2 + behavior)	1443.069	0.000	6	-714.888
<i>p</i> (age + BCI + neophobia2 + behavior)	1443.134	0.000	6	-714.921
<i>p</i> (sex + neophobia2 + behavior)	1444.407	0.000	6	-715.558
<i>p</i> (sex + BCI + neophobia2 + behavior)	1444.407	0.000	6	-715.558
<i>p</i> (sex + age + BCI + neophobia2 + behavior)	1445.445	0.000	7	-714.847