SUPPLEMENTARY DATA (SD1): STUDY OF THE RADIO TELEMETRY ERROR IN THE ORGAN MOUNTAINS, NEW MEXICO IN MARCH 2019.

We evaluated the extent and sources of error associated with our telemetry system so that we could exclude excessively imprecise locations and interpret results properly (Withey et al. 2001). We conducted a beacon study within our study area in March 2019 to measure bearing error using transmitters at known locations (White and Garrott 1990). We did this by deploying a radiotransmitter, triangulating its location, and analyzing differences between actual and triangulated locations. A field technician deployed a radiotransmitter by walking in the direction of a random azimuth for a random distance (0 - 100 m) and recorded its location with a handheld GPS unit. Two observers unaware of the radiotransmitter's location attempted to triangulate the location. Observers recorded their location, the compass bearing in the direction of the strongest signal, and their confidence of accuracy of the single triangulation point. We reported confidence of the location as high (> 75%), medium (50-75%), or low (< 50%). We repeated this process 30 times. To determine the radiotransmitter's location via triangulation, we used Location of a Signal (LOAS, Ecological Software Solutions LLC, 2019), which estimates the point of intersection for ≥ 2 locations with bearings.

To determine the radio telemetry error, we calculated linear error (LE), the distance between the true position of the radiotransmitter and the triangulated location for 24 of the 30 trials (Withey et al. 2001). The LOAS software was unable to estimate the point of intersection for six of the 30 trials; therefore, we excluded these trials from analysis. To create a predictive equation to estimate LE of chipmunk telemetry locations, we examined the relationship between LE and greatest receiver distance to the triangulated point, least receiver distance to the triangulated point, deviation from 90°, and lowest recorded confidence of the single triangulation point (Zimmerman and Powell 1995). Deviation from 90° was calculated from the angle at which the observer bearings intersected. We constructed conceptual models for all possible variable combinations and tested using multiple linear regression. We considered the model that included least receiver distance, lowest confidence, and deviation from 90° to be the most competitive model based on Akaike's Information Criterion corrected for small sample sizes (AIC_c; Table SD1.1). We did not consider the second model of lowest receiver distance and lowest confidence to be competitive because the inclusion of the parameter deviation from 90° improved model fit.

After determining the most competitive model, we used the following equation to calculate a linear error for each telemetry location by individual (Fig. SD1.1), ($F_{3,19} = 129.2$, $P \leq 0.0001$):

Equation 1: LE = 26.95 + 0.90(least receiver distance) – 9.50(lowest confidence) – 0.37(deviation from 90°)

Based on the predicted linear error for each telemetry location, the mean LE of the study area was 26.09 m ± 24.96 *SD* ($n = 24$; Fig. SD1.1). We considered a linear error of ≤ 30 m be reasonable for excluding erroneous triangulated locations based on the relationship between calculated linear error and the number of telemetry locations (Fig. SD1.1).

Table SD1.1. Results of multiple linear regression based on AICc examining the relationship between linear error and the variables greatest receiver distance to the triangulated point, least receiver distance to the triangulated point, deviation from 90°, and lowest recorded confidence for the single triangulation point for a beacon study conducted within the Organ Mountains in March 2019 (*n* = 24). Model variables, number of parameters in the model (K), difference in Akaike's information criterion corrected for small sample sizes (ΔAIC_c), Akaike weights (w_i = estimated probability of model *i* being the best model given data and model set), and measure of model fit (R^2) for models.

Model	K	ΔAIC_c	w_i	R^2
Least Receiver Distance + Lowest Confidence + Deviation from 90°	4	0.00	0.49	0.95
Least Receiver Distance + Lowest Confidence	3	0.95	0.31	0.94
Greatest Receiver Distance + Least Receiver Distance + Lowest Confidence + Deviation from 90°	5	3.38	0.09	0.95
Greatest Receiver Distance + Least Receiver Distance + Lowest Confidence	4	4.25	0.06	0.94
Least Receiver Distance	2	6.04	0.02	0.94
Least Receiver Distance + Deviation from 90°	3	6.98	0.01	0.95
Greatest Receiver Distance + Least Receiver Distance	3	8.93	0.01	0.94
Greatest Receiver Distance + Lowest Confidence	3	9.48	0.00	0.92
Greatest Receiver Distance + Least Receiver Distance + Deviation from 90°	4	10.01	0.00	0.95
Greatest Receiver Distance	2	14.85	0.00	0.92
Greatest Receiver Distance + Deviation from 90°	3	15.79	0.00	0.92
Lowest Confidence + Deviation from 90°	3	57.35	0.00	0.35
Lowest Confidence	2	59.27	0.00	0.19
Deviation from 90°	2	64.83	0.00	0.33

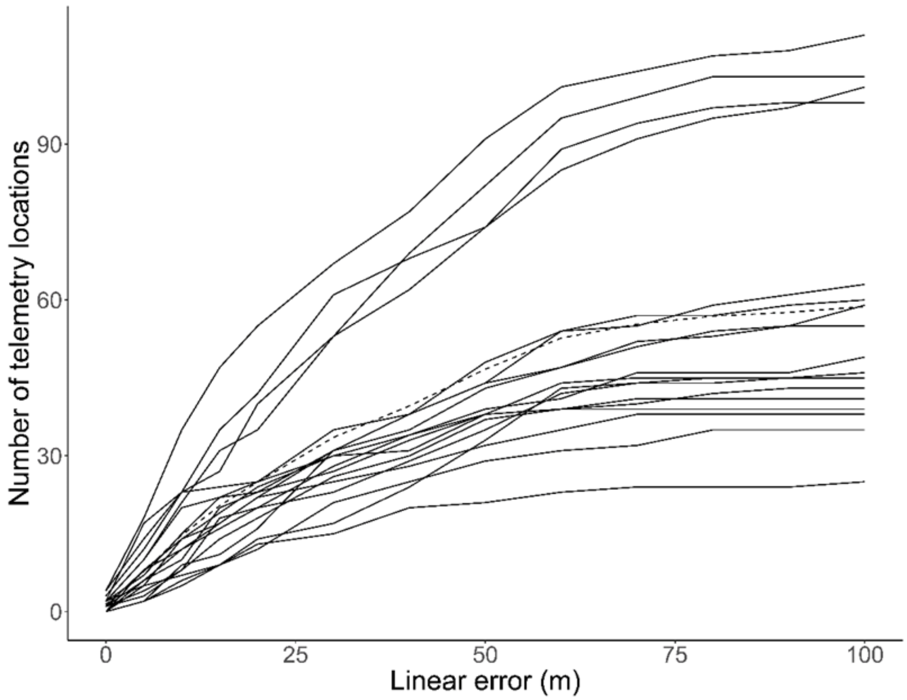

Figure SD1.1. Relationship between the estimate of linear error (m), the distance between the true position and the triangulated position, and the number of radio-telemetry locations for *Neotamias quadrivittatus australis* within the Aguirre Springs Recreation Area, Organ Mountains-Desert Peaks National Monument, New Mexico October 2018 – July 2019 (n = 18). Solid lines represent collared chipmunks; dotted line represents the mean.

LITERATURE CITED

ZIMMERMAN, J. W., AND R. A. POWELL. 1995. Radiotelemetry error: location error method compared with error polygons and confidence ellipses. Canadian Journal of Zoology 73:1123–1133.