Gregariousness leads to level-dependent core habitats in eastern copperheads (*Agkistrodon contortrix*)

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Appendix A: Supplementary Analyses

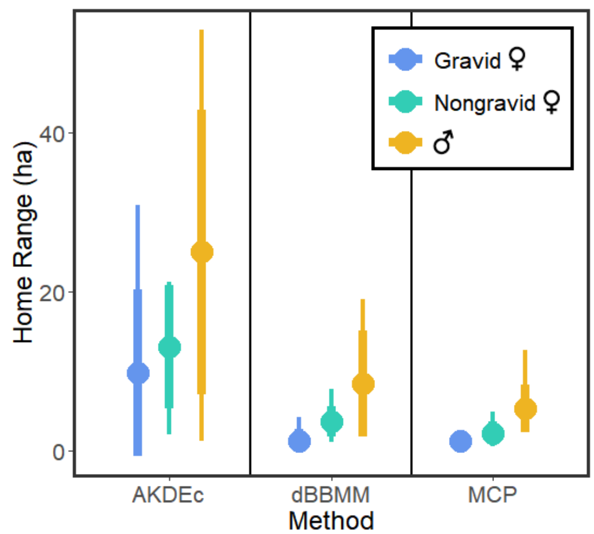

Figure A.1. Comparison between autocorrelated kernel density estimation (AKDEc, Fleming et al. 2015), dynamic Brownian bridge movement models (dBBMM, Kranstauber et al. 2012), and minimum convex polygon (MCP, Worton 1995) home range estimation methods. While AKDEc is less likely to underestimate the lifelong space requirements of animals (Fleming et al. 2015), dBBMM and MCP appeared more appropriate for depicting observed copperhead space use.

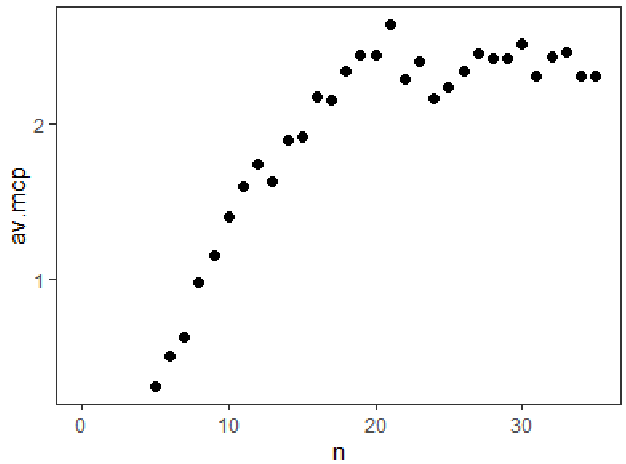

Figure A.2. Results of simulations testing the effect of number of observations on MCP home range area. For each sample size from 5 to 35 we randomly selected a snake-season, randomly selected observations within that snake.season, then calculated the 95% MCP home range area using those observations. We repeated this process for 100 iterations at each sample size. We then averaged across iterations to obtain an average MCP area for each sample size. The MCP area stabilized at 20 observations.

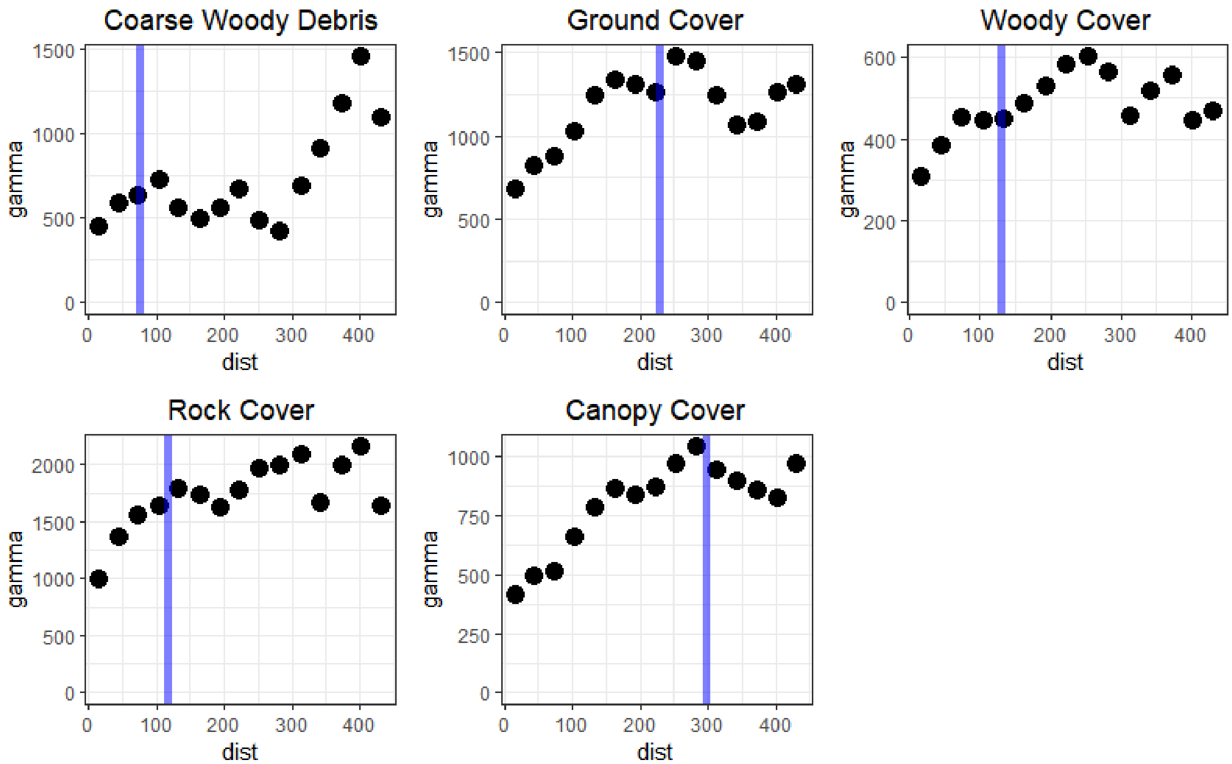

Figure A.3. Semivariograms demonstrating spatial autocorrelation among habitat covariate measurements. Vertical lines indicate the range parameter of best-fit Matern semivariance functions.

Table A.1. Outputs of glm and glmm using a Matern spatial covariance structure. The population-level model included a random effect of snake-season. The only significant effect was canopy cover on individual level use-intensity.

	Parameter	Estimate	Cond. SE	t-value	p-value
Individual	Intercept	-6.11946	1.0133	-6.039	0.00000
	Coarse woody debris	0.4576	0.3257	1.4048	0.16060
	Ground layer vegetation	0.241	0.304	0.7928	0.42820
	Woody vegetation	-0.08753	0.276	-0.3171	0.75130
	Rock cover	0.28498	0.4075	0.6994	0.48460
	Canopy cover	**-0.71622**	**0.2941**	**-2.4349**	**0.01520**
Population	Intercept	-21.0782	11.59	-1.81861	0.06949
	Coarse woody debris	-0.09127	3.796	-0.02404	0.98083
	Ground layer vegetation	1.03404	4.341	0.23821	0.8118
	Woody vegetation	-1.004	3.106	-0.32321	0.74665
	Rock cover	1.5662	3.801	0.41205	0.68045
	Canopy cover	0.82936	3.459	0.23979	0.81058

Table A.2. Principal component variable loadings and proportions of variance explained by each principal component for individual-level core habitats.

	PC1	PC2	PC3	PC4	PC5
CAN	-0.48998112	-0.1413849	-0.5171732	0.6509569	-0.22071654
RCK	-0.56297653	-0.289737	0.1983746	-0.5135581	-0.54407303
CWD	0.04645548	0.8431406	-0.2367666	-0.1271335	-0.46339443
GND	0.58317986	-0.2953326	0.1968039	0.3062217	-0.66345788
WDY	0.31736268	-0.312978	-0.7735562	-0.4500872	-0.01892093
Proportion of variance	0.388	0.2427	0.191	0.1126	0.06571
Cumulative proportion	0.388	0.6307	0.8217	0.9343	1

Table A.3. Results of Tukey-Kramer post-hoc test comparing PCA scores of core habitats of reproductive classes (gravid females, nongravid females, and males), all individuals, and the population, with significance adjusted using Bonferroni correction. Significant pairwise differences are in bold.

PC	comp	p.val
PC1	IND-GVD	1.00000
PC1	**MAL-GVD**	**0.00312**
PC1	NGR-GVD	1.00000
PC1	**POP-GVD**	**0.00137**
PC1	**MAL-IND**	**0.01092**
PC1	NGR-IND	1.00000
PC1	**POP-IND**	**0.00000**
PC1	**NGR-MAL**	**0.00004**
PC1	**POP-MAL**	**0.00000**
PC1	**POP-NGR**	**0.00369**
PC2	**IND-GVD**	**0.00000**
PC2	**MAL-GVD**	**0.00000**
PC2	**NGR-GVD**	**0.00000**
PC2	**POP-GVD**	**0.00000**
PC2	**MAL-IND**	**0.02141**
PC2	NGR-IND	0.20246
PC2	**POP-IND**	**0.00068**
PC2	NGR-MAL	1.00000
PC2	POP-MAL	1.00000
PC2	POP-NGR	1.00000