Supplemental Table 1. Parameter estimates and AIC values from our top fitting occupancy model of black bear expansion in Minnesota, USA. We altered the K value (index of integration) to assess the stability of the estimates.

Parameter	K = 100	K = 200	K = 400
λ (Int)	1.569	1.872	1.873
λ (RangeDist)	-0.970	-0.975	-0.975
λ (RiverDist)	-0.056	-0.050	-0.050
λ (RdDens)	-0.204	-0.236	-0.236
λ (Natural%)	0.548	0.554	0.554
p(Int)	-4.634	-4.945	-4.946
p(Light_monthly)	0.787	0.807	0.807
Ψ (psi)	0.311	0.324	0.324
AIC	9117.5	9115.7	9115.7

Supplemental Table 2. Ranking of six different occupancy models of citizen scientist-collected observations of black bears outside of their primary range in Minnesota, USA using 1-km^2 resolution data. All models contained the same covariates for bear abundance, but each contained a different explanatory variable for the detection process. nPars: number of parameters; AIC: Akaike Information Criterion; ΔAIC: AIC relative to top-ranked model; AICwt: model weight

Model	nPars	AIC	ΔAIC	AICwt
p(ALAN_monthly)	8	15251.9	0.0	1.00
p(ALAN_average)	8	15311.4	59.5	0.00
p(Developed%)	8	15354.4	102.5	0.00
p(HousDen)	8	15455.4	203.5	0.00
p(Null)	7	15459.0	207.1	0.00
p(ImpSurf).	8	15459.2	207.3	0.00

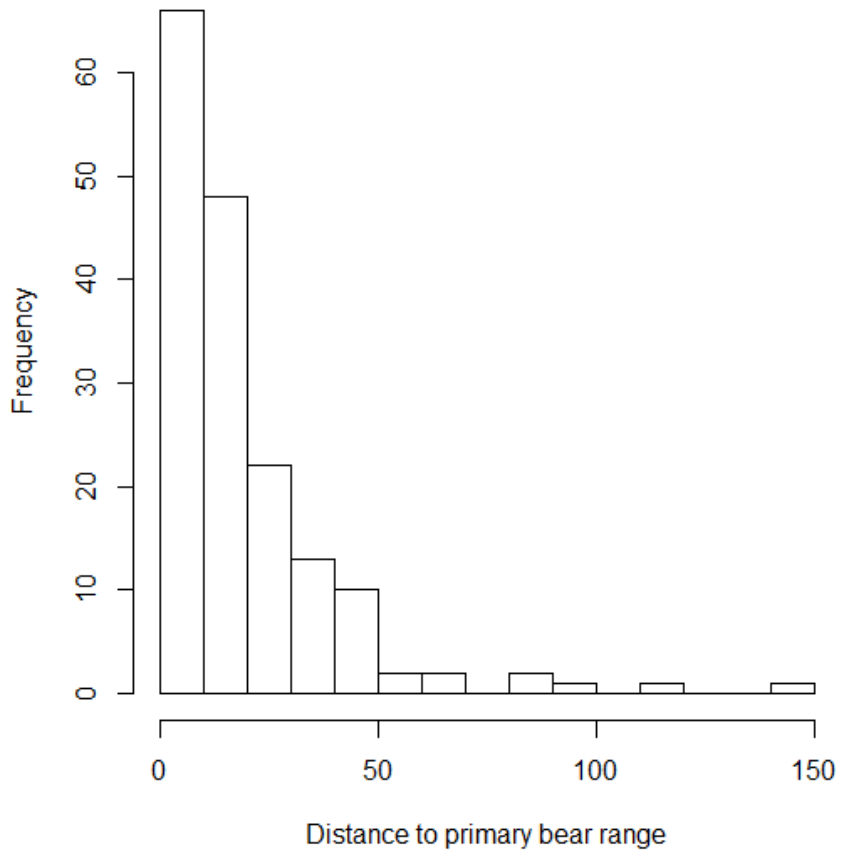
Supplemental Table 3. Parameter estimates from occupancy models fit to citizen scientist-collected observations of black bears outside of their primary range in Minnesota, USA using 1 km^2 resolution data. All models contained the same covariates for bear abundance, but each contained a different explanatory variable for the detection process. p, ψ, λ: influence on detection, occupancy and abundance, respectively.

Model	p: Intercept	ψ	λ: Intercept	Λ: RiverDist	Λ: RdDens	Λ: RangeDist	Λ: Natural%
p(ALAN_monthly)	-6.72 (0.22)	2.19 (0.07)	2.62 (0.23)	0 (0.04)	-0.08 (0.04)	-0.49 (0.04)	0.55 (0.03)
p(ALAN_average)	-6.75 (0.2)	2.2 (0.07)	2.67 (0.21)	-0.01 (0.04)	-0.04 (0.04)	-0.48 (0.04)	0.54 (0.03)
p(Developed%)	-6.39 (0.17)	2.31 (0.07)	2.44 (0.19)	-0.07 (0.04)	-0.1 (0.05)	-0.45 (0.04)	0.62 (0.03)
p(HousDen)	-6.48 (0.36)	2.38 (0.07)	2.66 (0.37)	-0.1 (0.04)	0.29 (0.05)	-0.44 (0.04)	0.55 (0.03)
p(Null)	-6.41 (0.46)	2.38 (0.07)	2.59 (0.47)	-0.1 (0.04)	0.37 (0.03)	-0.44 (0.04)	0.55 (0.03)
p(ImpSurf).	-6.44 (0.4)	2.39 (0.07)	2.63 (0.41)	-0.1 (0.04)	0.34 (0.04)	-0.44 (0.04)	0.55 (0.03)

Supplemental Table 4. Occupancy model summary values from our top model, which included monthly estimates of ALAN and an autocovariate term that is based on residuals from the top model and reduces autocorrelation of model predictions, fit to citizen scientist-collected observations of black bears outside of their primary range in Minnesota, USA using 25 km^2 resolution data.

Model process component	Term	Estimate	SE	z	P(>|z|)
Abundance	Intercept	0.58	0.29	1.99	0.05
	RangeDist	-0.59	0.07	-7.98	< 0.01
	RiverDist	-0.06	0.04	-1.46	0.14
	RdDens	-0.22	0.05	-4.59	< 0.01
	Natural%	0.34	0.04	8.44	< 0.01
	Autovariate	19.38	2.06	9.42	< 0.01
Detection	Intercept	-4.37	0.25	-17.60	< 0.01
	p(ALAN_monthly)	0.67	0.05	13.10	< 0.01
Zero-inflation	Estimate	-0.10	0.12	-0.81	0.42

Supplemental Figure 1. Histogram of the distance from primary bear range of all 1-km^2 BearSight raster cells with multiple bear detections.



Supplemental Figure 2. QQ plots of site-sum randomized quantile residuals from preliminary models using a negative binomial (A) and a zero-inflated Poisson (B) mixture fit to the same data.