

Sika Deer Occupancy on the Delmarva Peninsula, USA

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The range of non-native sika deer (*Cervus nippon*) is increasing on Maryland's Eastern Shore. We used occupancy modeling to estimate sika occupancy within their known range and to predict the potential range of sika across the Delmarva Peninsula.

Site Selection and Field Methods

Field observations suggest the amount of natural cover* on the landscape plays a role in sika occurrence. We selected survey sites through stratified random sampling scheme based on percent natural cover within 161-ha hexagons. We chose to measure cover at this scale based on sika hind home range estimates from the area. We surveyed 61 sites with baited camera traps from January 11 – March 28, 2022. Each site was surveyed for 15 – 19 days.

*for our purposes: natural cover = forest cover + wetland cover

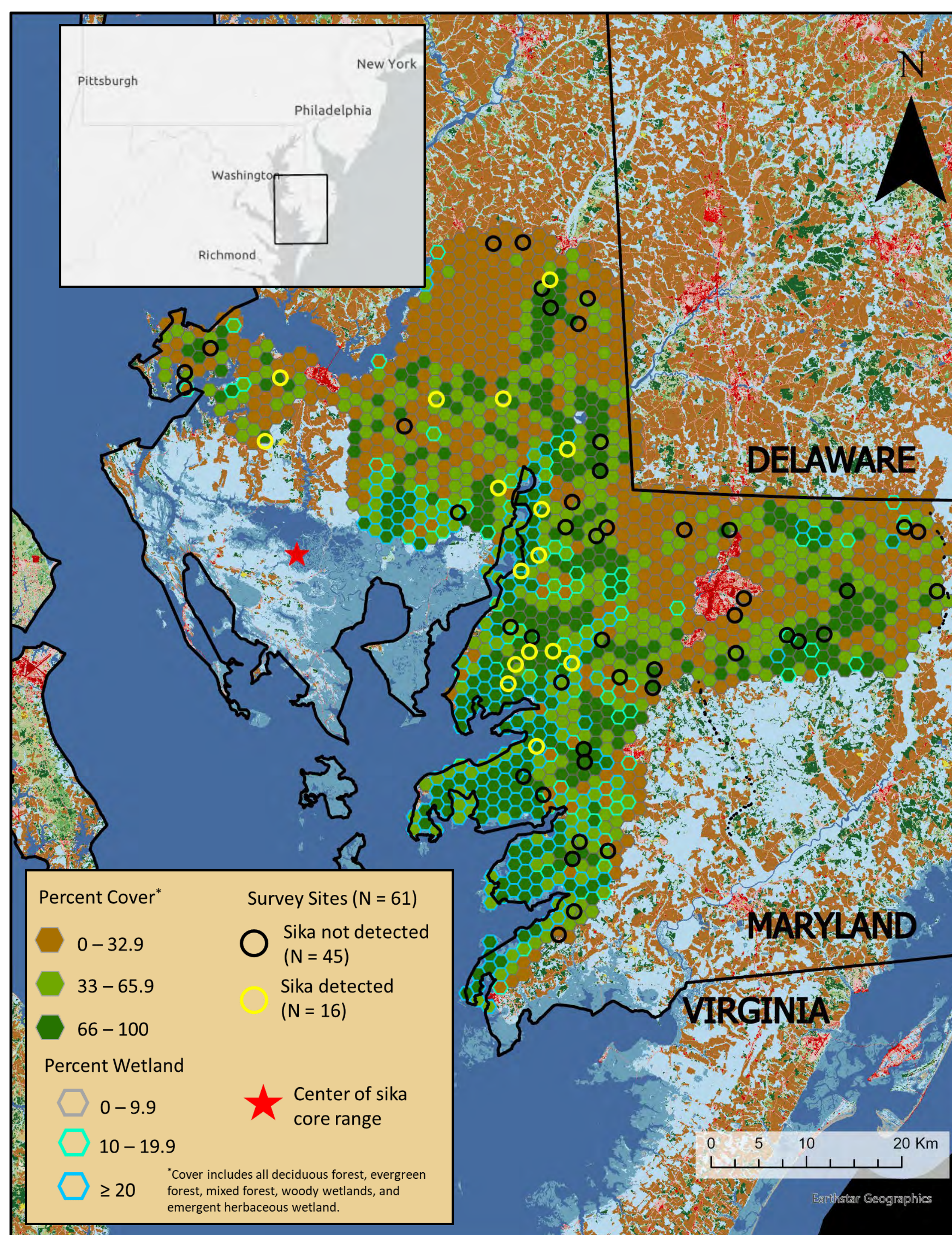


Figure 1. Study area and survey locations in Dorchester, Wicomico, and Somerset counties, Maryland, USA.

Covariate Selection

COVER COVARIATES

Forest: Percent cover classes deciduous forest, mixed forest, evergreen forest, and woody wetland within hexagon

Wetland: Percent cover class emergent herbaceous wetland within hexagon

NUISANCE COVARIATE

Distance: Distance (km) of each camera to the centroid point of sika core range.

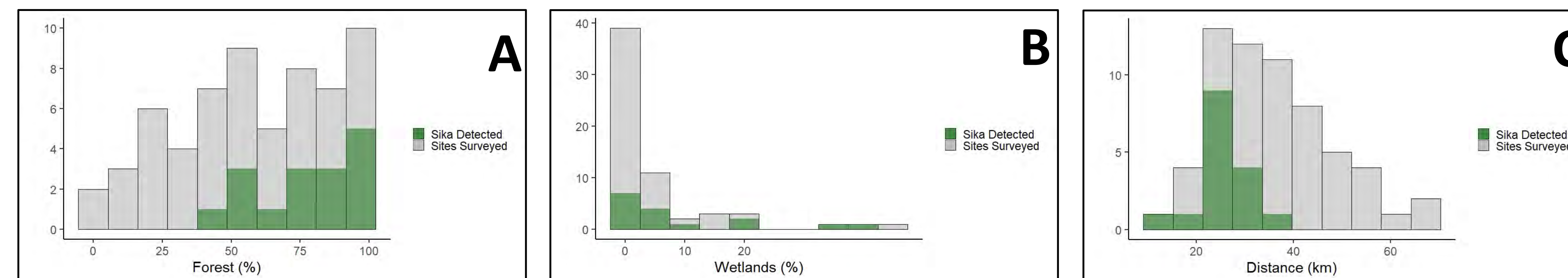


Figure 2. Covariate distributions of all surveyed sites (grey) with covariate distributions for sites where sika were detected (green) for Forest (A), Wetland (B), and Distance (C).

Models	k	ΔAIC	AICw
Forest + Wetland + Distance	8	0	0.97
Forest + Distance	7	7.23	1
Distance	6	18.87	1
Wetland + Distance	7	20.27	1
null	5	35.9	1

Forest + Wetland + Distance				
	Estimate	SE	z	P(> z)
(Intercept)	-3.717	3.41	-1.09	0.275
Forest	0.123	0.04	2.95	0.003
Wetland	0.177	0.08	2.31	0.021
Distance	-0.222	0.08	-2.77	0.006

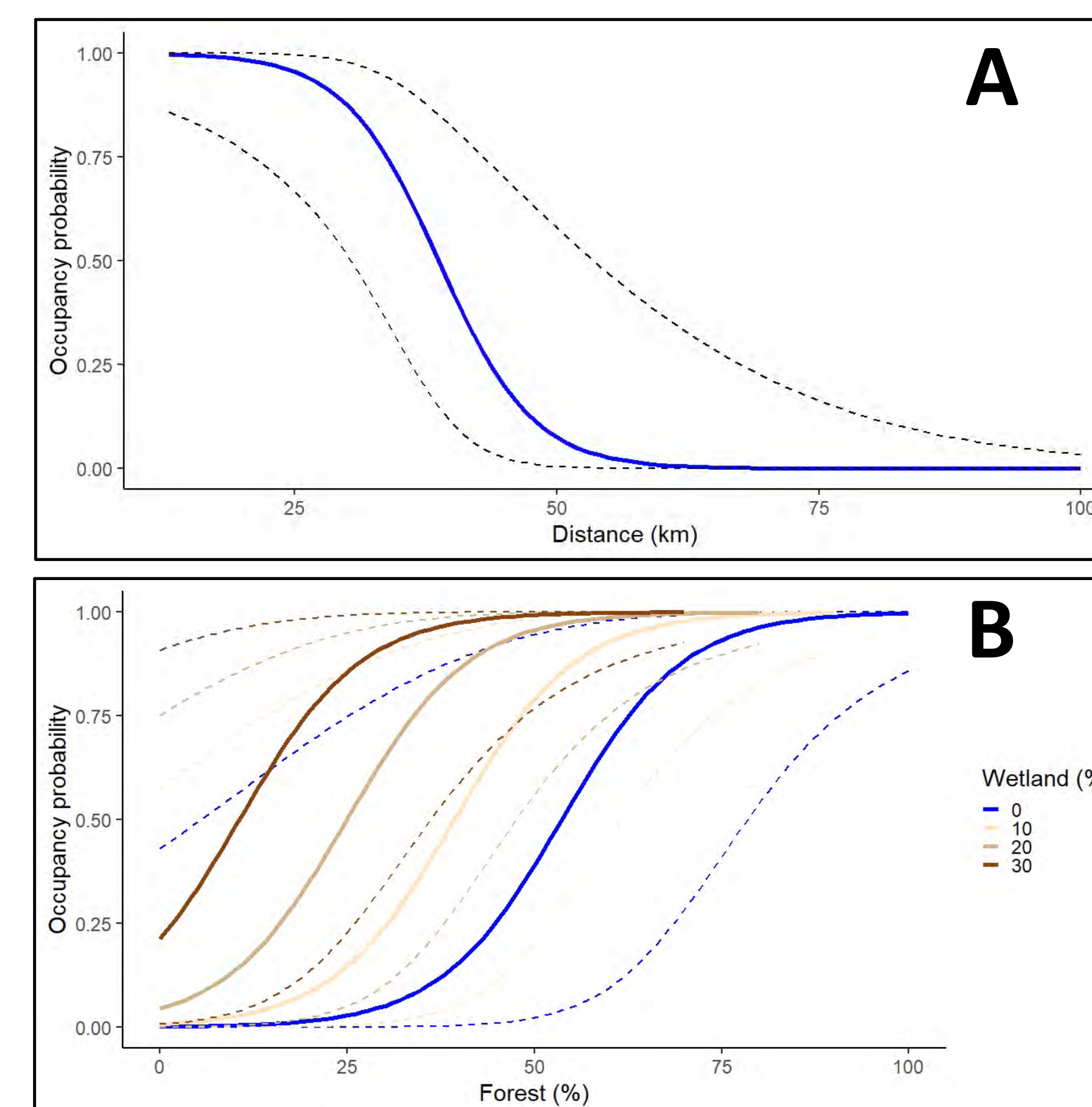


Figure 3. Effect of distance on occupancy probability holding Forest constant at 100% and EHV constant at 0% (A), effect of forest at varying percentages of wetland (0, 10, 20, 30) holding distance constant at 13km (B).

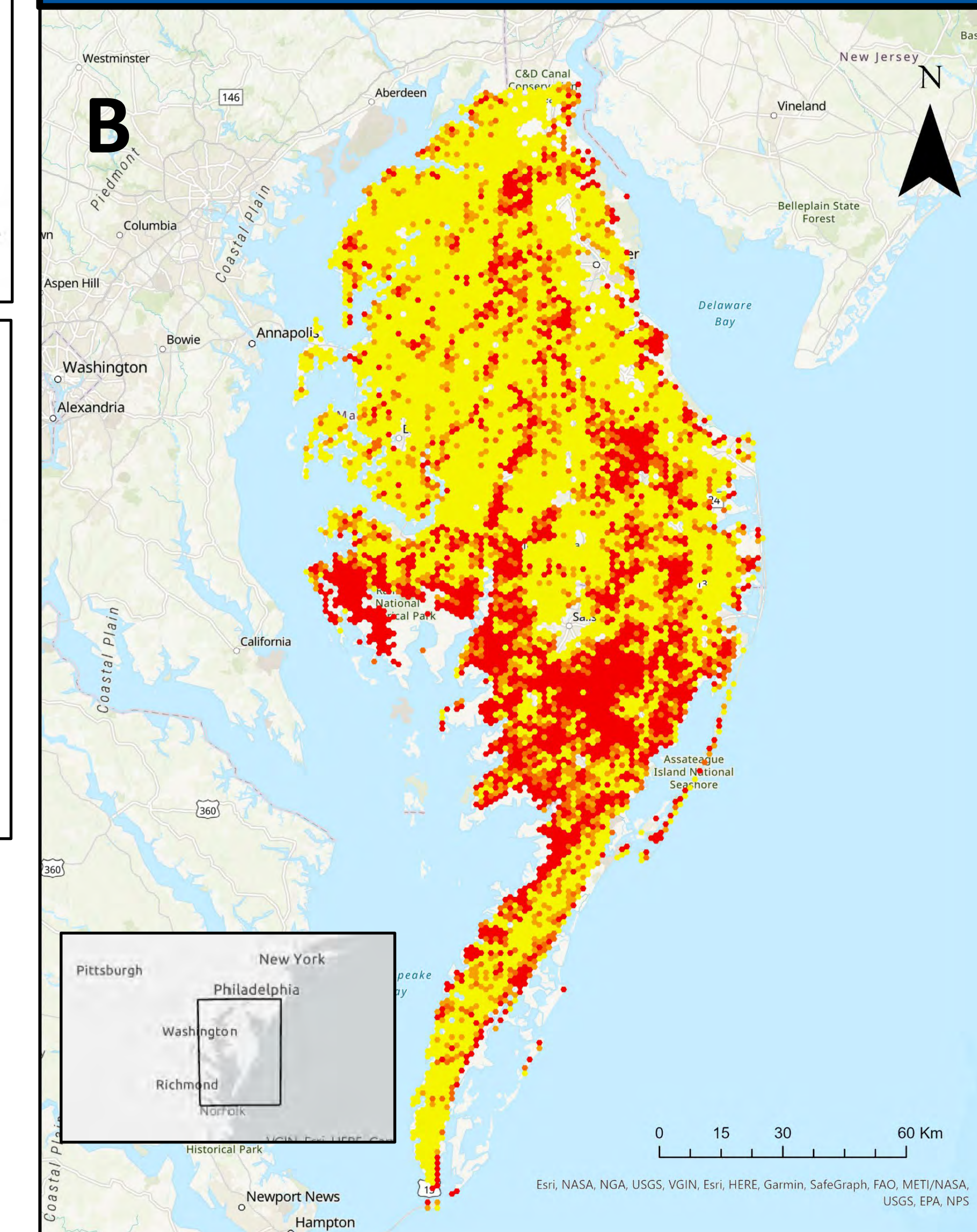
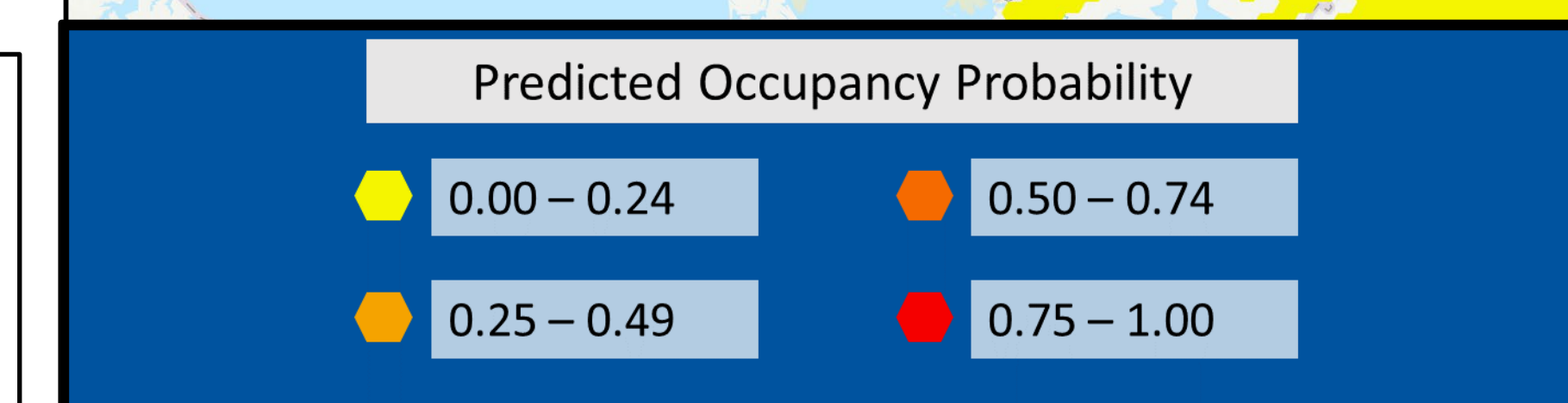
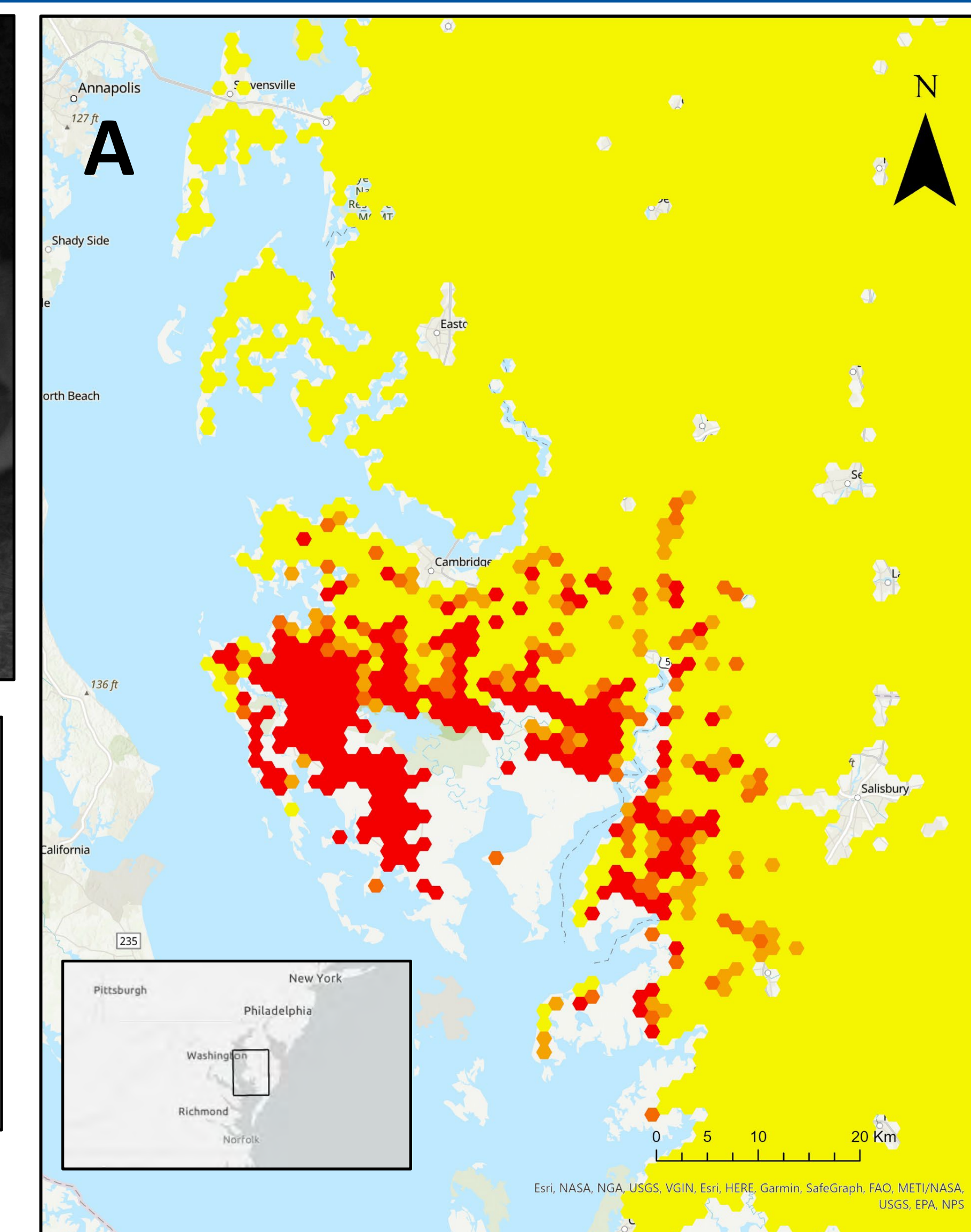


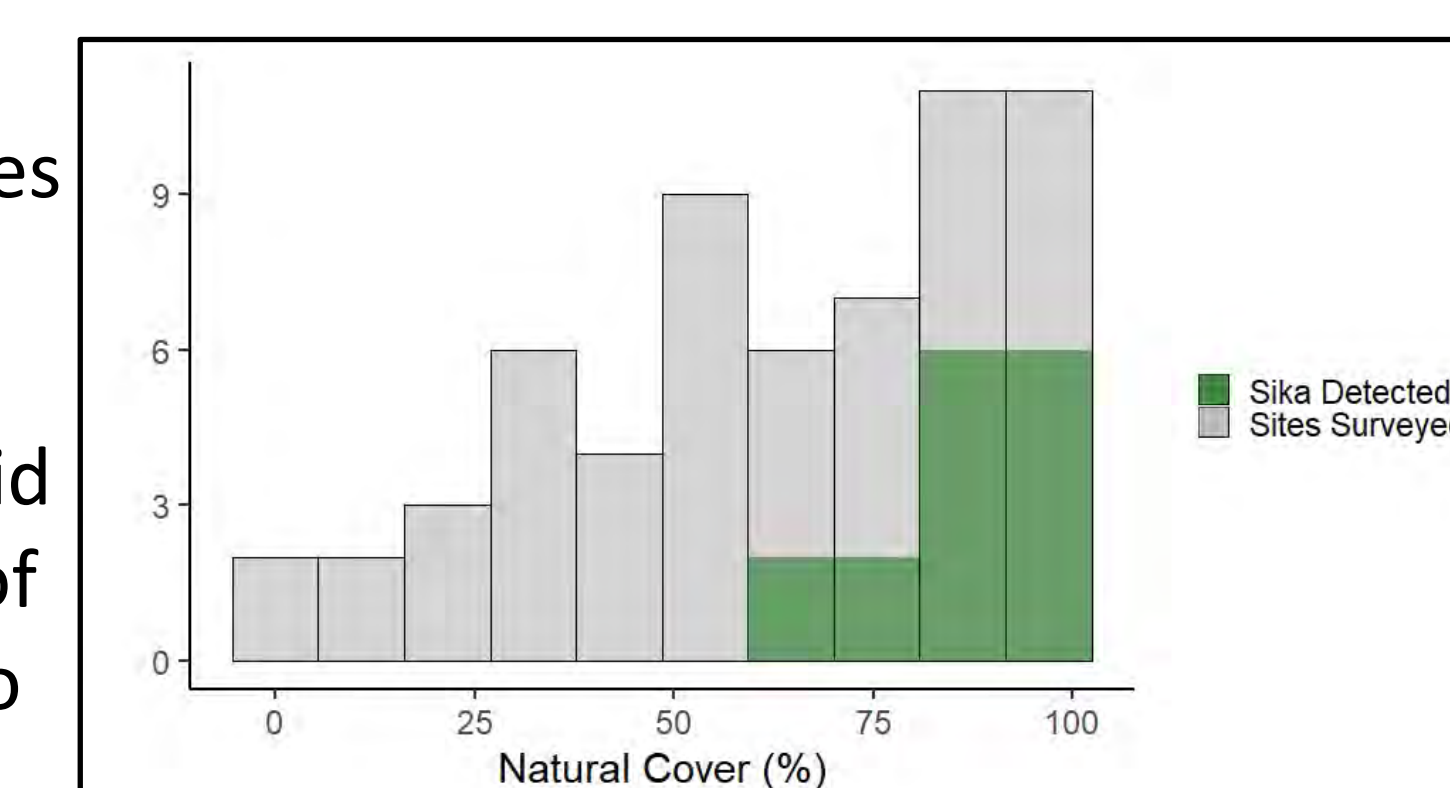
Figure 4. Predicted occupancy of sika deer in their current range (A) and predicted occupancy probability extrapolated across the Delmarva Peninsula, holding distance constant (B; potential future range).



Discussion

Natural cover at the home range scale seems to impact sika occupancy. We did not detect sika at sites with less than 60% natural cover. Occupancy probability at sites with both forest and wetland increase faster than at sites with forest alone. We did not survey sites where natural cover was made up of wetland cover alone or sites > 50% wetland cover so this model should not be applied in those cases.

We will continue to investigate the relationship of sika to forest and wetland cover using baited camera trap surveys in February and March 2023.



Acknowledgements