

Modeling and mapping mesocarnivore abundance in the Prairie Pothole Region of Minnesota



The Prairie Pothole Region is often referred to as the ‘duck factory’ of North America. This region is named for the small scattered wetlands, or potholes, that provided critical habitat for nesting waterfowl.

Agricultural development has significantly reduced the amount of wetland habitat available to waterfowl in the Prairie Pothole Region. The wetland habitat that remains plays an important role in determining the abundance of many waterfowl species in North America. Because the Prairie Pothole Region is of critical importance to waterfowl populations in North America, understanding factors limiting successful breeding in remaining wetland habitat is a high priority for natural resource managers.

Predation by mammals such as the coyote, raccoon, striped skunk, red fox, and badger can limit the breeding success of nesting waterfowl. The species of predator present and the size of the predator population can determine the amount of waterfowl nest predation occurring in an area.

Conservation of waterfowl species nesting in the Prairie Pothole Region can be achieved through management actions that protect and restore nesting habitat, isolate nests from predators, or through the direct removal of predators. However, natural resource managers require information that will help them prioritize where to carry out these different actions. Information about the location and density of different predator species will aid managers by helping them select the best locations for different types of conservation actions.



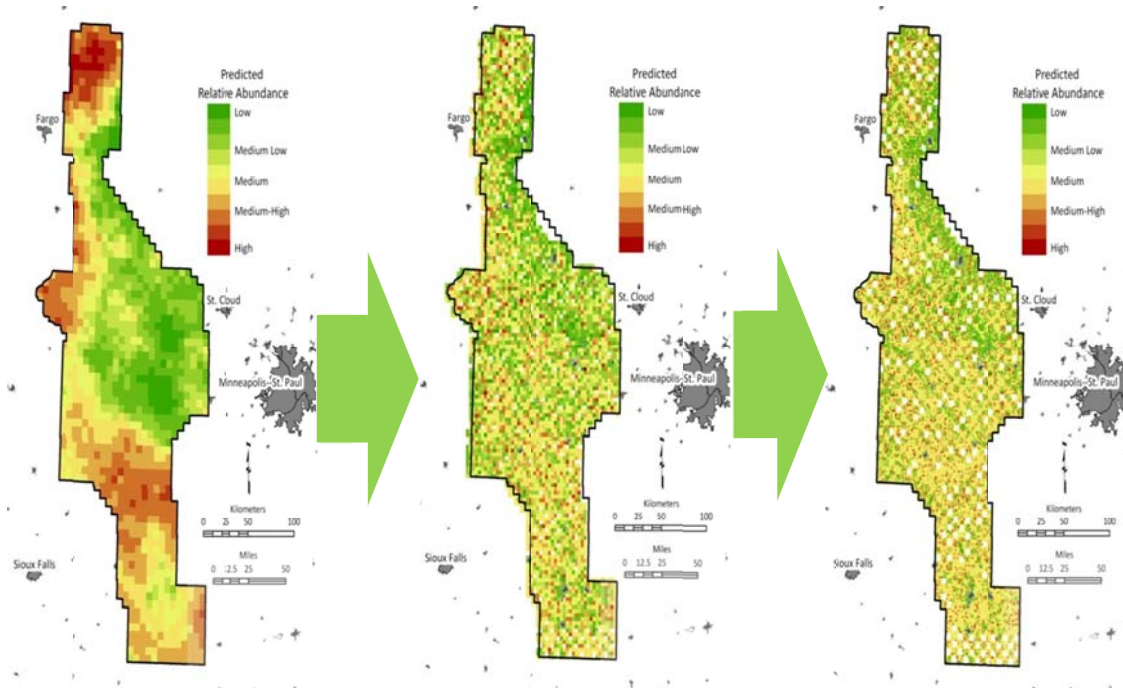
Our Approach



This study was conducted in a portion of the Prairie Pothole region extending across western Minnesota and into northern Iowa. Land cover in this region historically consisted of tall-grass prairie and wetlands. Today the area is dominated by row-crop agriculture and current land cover includes less than 1% of intact prairie habitat.

To identify the best locations to carry out different types of predator control actions, scientists at the USGS Upper Midwest Environmental Sciences Center (UMESC) developed statistical models to predict where waterfowl nest predators may be found. These models are based on information from surveys of mammal tracks and landscape characteristics conducted in the Prairie Pothole Region.

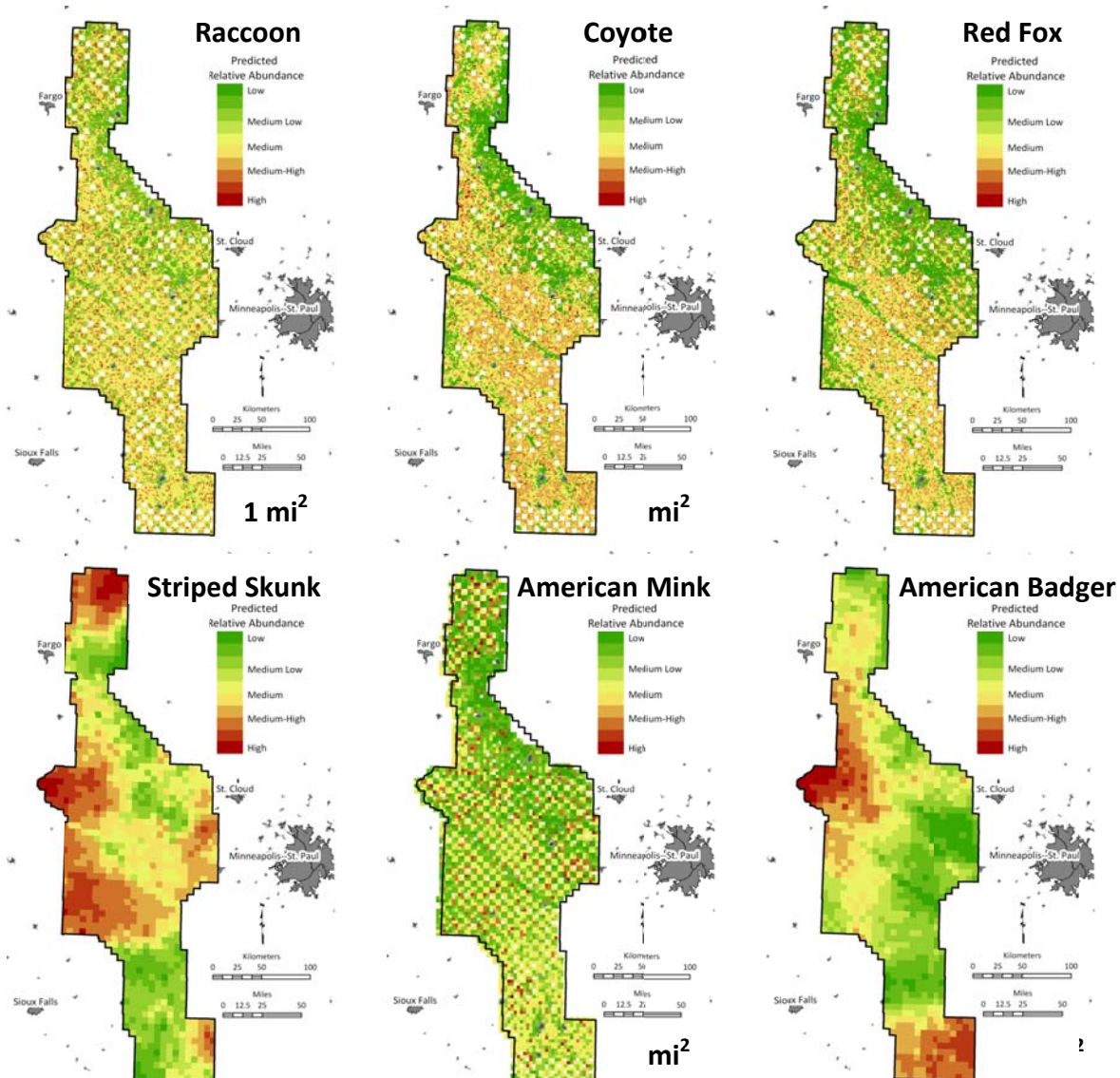
These models account for sources of error commonly encountered in survey data. For example, proper analysis of mammal track surveys requires a statistical framework that accounts for how the spatial arrangement of study sites or variation in tracking skill among observers might affect model results. The models can also be used to predict predator densities in small blocks of land from mammal tracking data collected over much larger areas. This is a key feature of the models because management actions are more effectively applied and monitored over smaller areas of land. Results summarized in maps such as those below allow managers to compare the costs and benefits of conservation actions in different locations.



Accomplishments

The models predict and map abundances of six mammalian predators (next page). These analyses yielded important information about the ecological conditions existing where tracks of coyote, raccoon, striped skunk, red fox, American badger, and American mink were frequently observed during mammal track surveys. Insight into how landscape features, such as the abundance of agricultural crops, may affect the ability of predators to move among wetland and upland habitats are of critical importance to nesting waterfowl. Such information will help managers consider alternative predator control and avoidance strategies and evaluate effects these strategies may have on nesting waterfowl. Future research efforts will focus on refining these models to improve their utility in guiding conservation actions.

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Standardized parameter estimates (with 95% confidence interval) describing relationship between species abundance and proportion of land cover.

Species	Cropland	Grassland	Hayland	Road	Wetland	Woodland
Raccoon	0.54 (0.37, 0.70)	0.31 (0.20, 0.40)	0.18 (0.12, 0.25)	0.15 (0.07, 0.22)	0.22 (0.13, 0.31)	0.16 (0.07, 0.25)
Coyote	1.24 (0.94, 1.57)	0.75 (0.58, 0.94)	0.09 (-0.01, 0.20)	0.11 (-0.03, 0.22)	0.44 (0.29, 0.61)	0.05 (-0.14, 0.24)
Red Fox	0.43 (0.30, 0.55)	NA	NA	NA	NA	NA
Striped Skunk	0.34 (0.06, 0.63)	0.04 (-0.13, 0.21)	0.29 (0.15, 0.44)	-0.19 (-0.35, -0.03)	0.10 (-0.06, 0.27)	-0.12 (-0.30, 0.06)
American Mink	0.23 (-0.25, 0.78)	0.15 (-0.14, 0.44)	0.13 (-0.07, 0.31)	-0.08 (-0.31, 0.13)	0.23 (-0.02, 0.49)	-0.33 (-0.67, -0.01)
American Badger	0.33 (-0.37, 1.05)	0.29 (-0.12, 0.69)	0.13 (-0.21, 0.46)	-0.18 (-0.56, 0.19)	-0.17 (-0.58, 0.24)	-0.41 (-1.02, 0.13)

