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Authors

Kline, Natasha C.
Pokorny, Martin

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A MATHEMATICAL MODEL FOR ESTIMATING WILDLIFE MORTALITY ON ROADS, AND ITS IMPLICATIONS FOR MITIGATION AND MANAGEMENT

Natasha C. Kline (Phone: 520-733-5171, Email: natasha_kline@nps.gov), Biologist, and Don E. Swann (Phone: 520-733-5177, Email: don_swann@nps.gov), Biologist, Saguaro National Park, Saguaro National Park, 3693 South Old Spanish Trail, Tucson, AZ 85730, Fax: 520-733-5188

Martin Pokorny (Phone: 520-322-0801, Email: Mpokorny@nrao.edu), Mathematician, The National Radio Astronomy Observatory, Tucson, AZ

Abstract

In an attempt to understand the effects that roads were having on wildlife in Saguaro National Park, weekly wildlife mortality surveys were conducted from 1994-1999. From our weekly surveys, and additional data we collected, we developed a mathematical model to estimate the average annual number of animals killed on roads in and adjacent to the Park. This model accounts for variables (i.e., observer error, scavenging, episodic events, and taxonomic differences in activity periods) that we knew existed and affected the interpretation of our weekly survey data. We believe the model is broadly applicable given certain classes of data. Our model is very conservative in that effects not captured by the data or not included in the model (such as animals that are hit, but killed off the road) would tend to increase the total mortality figures. Similarly, estimates of model parameters based on the data also tend to lower the mortality estimate. Nevertheless, the model more than doubled our previous estimates of annual roadkill in the Park. Based on our model, we estimate that about 51,000 animals are killed annually on the 50 miles of roads that lie in or adjacent to both districts of Saguaro National Park, including about 17,000 amphibians, 27,000 reptiles, 1,000 birds and 6,000 mammals. The implications of these numbers to local wildlife populations varies, but some species (i.e., the Colorado River toad) appear to be impacted at a population level. Along with spatial analysis of the data, these figures enabled us to identify locations and types of mitigation that might be most useful to wildlife in the Park.

Biographical Sketch: Natasha Kline is the wildlife program manager at Saguaro National Park in Tucson, Arizona, where she has worked for ten years. She has also worked as a biologist for the Air Force, the Fish and Wildlife Service, and at other national parks. Natasha has a B.S. in zoology and an M.S. in biology.