

Background

Under the legislated Virginia Wildlife Corridor Action Plan (WCAP), the Virginia Department of Transportation and other state agencies are directed to identify wildlife corridors, identify areas with a high risk of wildlife-vehicle collisions, and recommend wildlife crossing projects. The first version of WCAP was released in 2023 and listed several “recommendations for future actions” for its next iteration in 2027. Two of these recommendations include identifying (1) habitat corridors for at-risk small terrestrial species and (2) wildlife crossing concern areas (i.e., high-risk road segments) for these species.

Research Objectives

The purpose of this study was to advance the objectives of the legislated WCAP by developing species-specific road risk models and identifying road segments that pose a high risk to small priority species.

The study also highlighted potential approaches to improving road-crossing connectivity based on species-specific movement corridors and road risk areas. These mitigation strategies can help inform future prioritization efforts and decision-making.

Approach

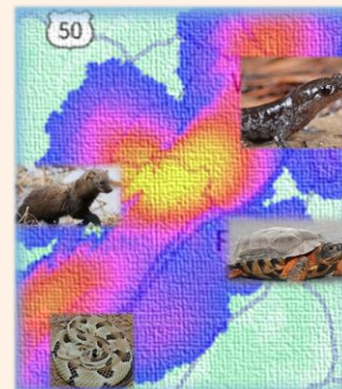
To identify high-risk road segments, the authors used species occurrence records, literature findings, and input from 29 species experts to develop maps of “landscape resistance” for 12 species on the state’s Species of Greatest Conservation Need list. The species included one amphibian (salamander), eight reptiles (five turtles and three snakes), and three mammals. These resistance maps represent how different landscape features likely affect species movement by increasing mortality risk, influencing movement speed, acting as physical barriers, or causing behavioral avoidance. Species-specific connectivity analyses were used to generate maps of predicted movement intensity for each species and to identify areas where roads were expected to cause the greatest reductions in movement.

Outcomes

This project provides connectivity map outputs and road risk areas for all 12 priority species as geographic information system raster data. The variation in species distributions and the extent of mapped movement corridors resulted in three general groupings of species outputs from the connectivity modeling process: species with (1) spatially compact movement zones; (2) regionally concentrated movement corridors; and (3) spatially diffuse movement corridors. For species that fall into these different categories, the report recommends different management strategies for maintaining corridor connectivity and mitigating road impacts.

Research Benefits

Incorporating the findings from this study into the updated WCAP will help satisfy the legislative mandate to list habitat identified as high quality for priority species, identify high road risk areas, and use that information to prioritize and recommend wildlife crossing projects that promote wildlife connectivity. In addition to advancing the WCAP, other agencies and states will benefit from this study’s application of a novel spatial analysis workflow to identify areas of suitable habitat and high-risk road segments for species with limited road mortality data or specialized habitat requirements, or both.



Principal Research Scientists

Thomas Akre
*Conservation Ecologist,
Smithsonian’s National
Zoo and Conservation
Biology Institute*

Grant Connette
*Ecologist,
Smithsonian’s National
Zoo and Conservation
Biology Institute*

Craig Fergus
*Spatial Analyst,
Smithsonian’s National
Zoo and Conservation
Biology Institute*

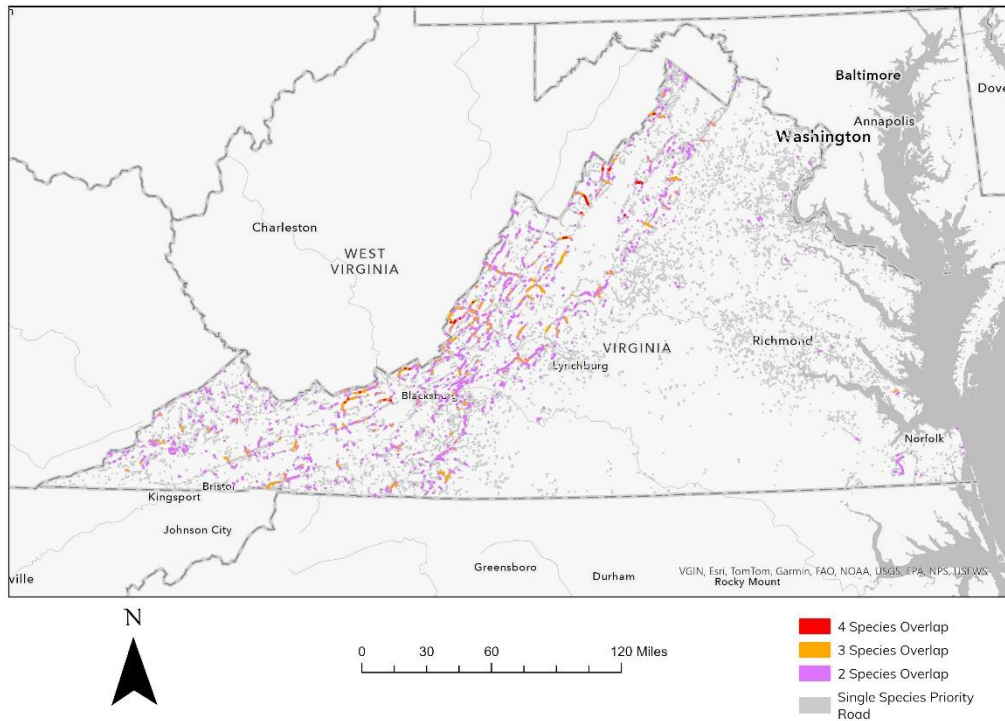
David Luther
*Associate Professor of
Biology,
George Mason University*

**Jonathan Drescher-
Lehman**
*Analyst (Contractor),
George Mason University*

Bridget Donaldson
*Associate Principal
Research Scientist,
Virginia Transportation
Research Council*

Research Findings

Species Priority Road Overlaps



Priority Species

- Mabee’s salamander
- Bog turtle
- Wood turtle
- Diamondback terrapin
- Box turtle
- Spotted turtle
- Mud snake
- Rainbow snake
- Timber/canebrake rattlesnake
- Fisher
- Spotted skunk
- Alleghany woodrat

Priority Road Segments

The map above overlays priority road segments for the 12 priority species. It identifies road segments that are in the top 5% of segments predicted to cause the largest reductions in movement levels for either one, two, three, or four species across the state. This identification indicates several areas where high-risk road segments coincide across multiple species.