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UC Davis Road Ecology Center

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Wildlife-Vehicle Conflict Hotspots along California Highways (2009-2015): Carcasses

Using data from the California Roadkill Observation System (<http://wildlifecrossing.net/California>), the Road Ecology Center has mapped stretches of highway that are likely to be hotspots for wildlife-vehicle conflicts (WVC).

This Report

This report provides an overview of wildlife-vehicle conflict (WVC) hotspots on California highways, based on carcass observations in the California Roadkill Observation System (<http://wildlifecrossing.net/California>). Analytical details are available from the report author upon request. A subsequent report will focus on WVC hotspots from the point of view of crash and other incident data collected by state safety agencies.

Photo acknowledgements

Mule deer, black bear, river otter – Fraser Shilling
Broad-footed mole – Kathryn Harrold

Data collection acknowledgements

This report and the analyses contained within would not have been possible without the concerted and coordinated efforts of hundreds of volunteer roadkill observers over the last 7 years. Through their endeavors, they have collected >50,000 observations of >410 species, representing one of the largest and most comprehensive wildlife monitoring programs in California. Their accuracy rates for species identification are >93% and have measurably high locational accuracy (<±100 meters).

Special thanks to Dr. David Waetjen who developed the California Roadkill Observation System with me in his spare time, putting in hundreds of hours of programming and his own roadkill observations.

The Author

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UC Davis Road Ecology Center

Third Annual Special Report on Wildlife-Vehicle Conflict

Hotspots along California Highways: Carcasses

Using data from the California Roadkill Observation System (CROS; <http://wildlifecrossing.net/california>), the Road Ecology Center has mapped stretches of California highway that are likely to be hotspots for wildlife-vehicle conflicts (WVC). Animals entering roadways pose a hazard to drivers, who may collide with the animal, or try to avoid the animal and have an accident suffering vehicle damage, injury, and even death. Wildlife populations may suffer significant losses due to collisions and highways with high rates of WVC may cause ripple effects into surrounding ecosystems.

The CROS project includes past and current participation by over 1,000 volunteer-scientists, including several hundred academic, agency, and NGO biologists and natural historians. More than 50,000 WVC observations were contributed to the website by volunteers between August 2009 and the end of 2015. Additional records of carcasses cleaned up by Caltrans Maintenance staff between 1987 and 2007, primarily of mule deer, were obtained using a Public Records Act request. The observations were used in a geographic information system (GIS) to find stretches of highway where WVC occur more frequently (high density) and places where there are statistically-significant clusters of WVC (hotspots).

By identifying stretches of highway where WVC are more likely, the UC Davis Road Ecology Center is assisting Caltrans and other responsible entities to develop mitigation to protect driver safety and wildlife populations. Effective measures include building fencing and underpasses along priority highways to allow the safe passage of wildlife across highways. According to Caltrans and California Highway Patrol statistics, there are >4,000 reported accidents per year on California highways involving deer, other wildlife, and livestock (in that order of importance). Despite the statewide collection of WVC observations by CROS, we know that our ~7,000 observations per year represent only a small fraction of the total animals killed due to collisions with vehicles. At the request of Caltrans HQ wildlife staff, we also repeatedly request additional WVC data from Caltrans under the California Public Records Act to improve the current hotspot analysis.

For the first time, we also include here a preliminary look at where there are both high rates of animal carcasses and high rates of reported traffic incidents. These incidents could be reports of animals running across the road, collisions with animals (primarily deer), or accidents resulting from people swerving to avoid a collision with an animal in the road. A follow-up report will include analyses of the rates of accidents between wildlife and vehicles on state highways,

including hotspots and calculated costs to the public from vehicle damage, injury and even death. This information hopefully will show where we know there are problems and help in development of safety projects to fix these known problem areas.

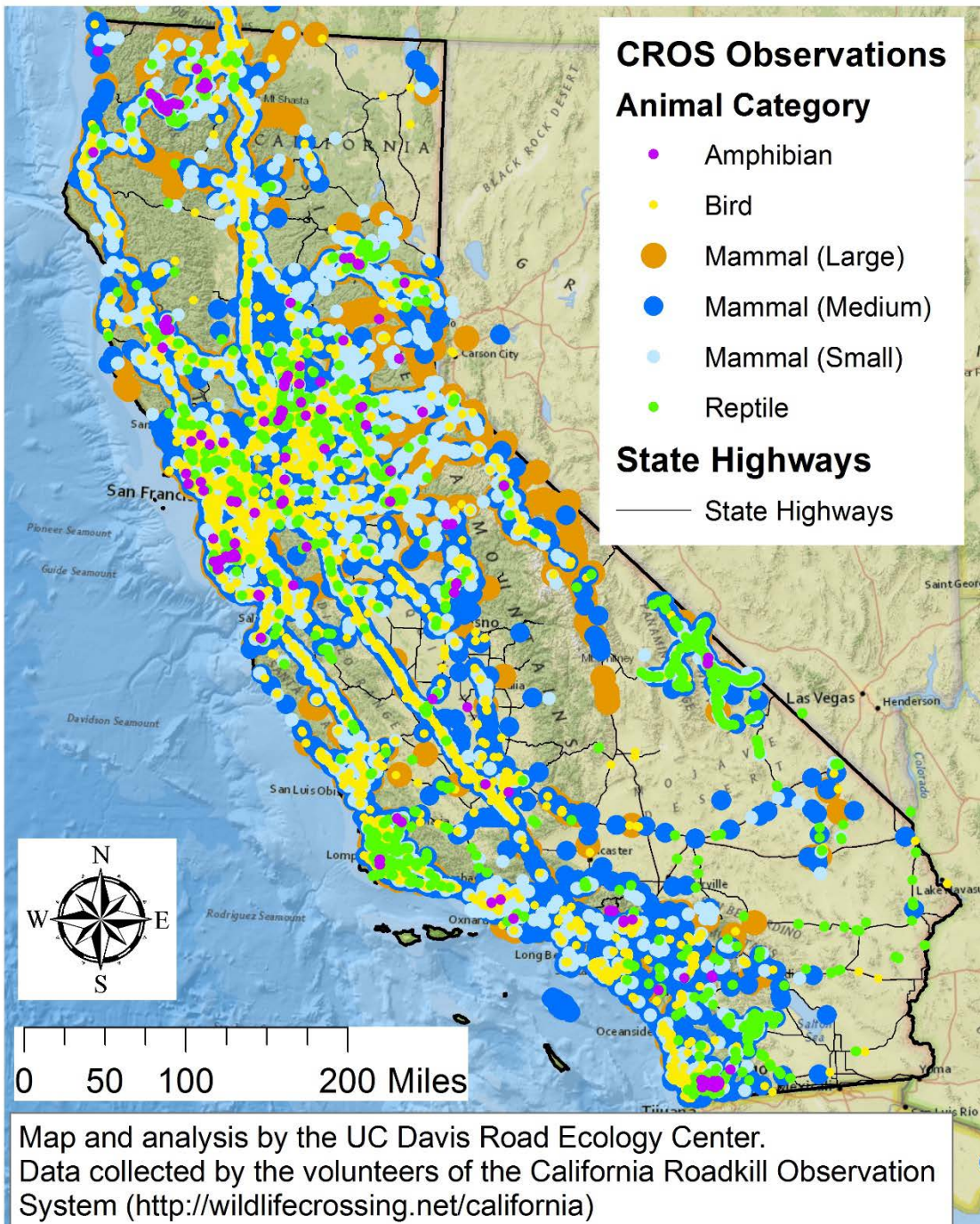
The following maps show the distribution of WVC densities along select state highways. The densities of WVC reported are the minimum for each highway segment and do not represent actual rates, which are likely to be much higher. Also highlighted are WVC hotspots, which are stretches of highway that are statistically different from neighboring stretches. By significantly increasing the systematic treatment of these hotspots and stretches of highway with high rates of collisions, Caltrans and other entities can contribute to driver safety and improve the environmental sustainability of the state highway system.

Special Note:

Our analyses rely primarily on data collected by the volunteer-scientists of the California Roadkill Observation System. We have included older data obtained from Caltrans using a Public Records Act request. Although Caltrans Maintenance staff pick up hundreds of thousands of animal carcasses from state highways every year, it has become increasingly unclear whether or not Caltrans keeps track of carcass locations anymore. Some have speculated that this is because of concerns about liability. In other words, if Caltrans leadership can claim not to know where collisions between animals and vehicles are occurring, then they can also claim not to be liable for damages that drivers suffer from collisions. It is difficult to see how this approach is consistent with the idea of sustainable transportation, or of protecting safety, environment, and economy. We offer the California Roadkill Observation System as a solution to this problem, both as a free system for Caltrans to use to collect data and as a source of data for those wishing to reduce conflict between wildlife and vehicles on California's highways.

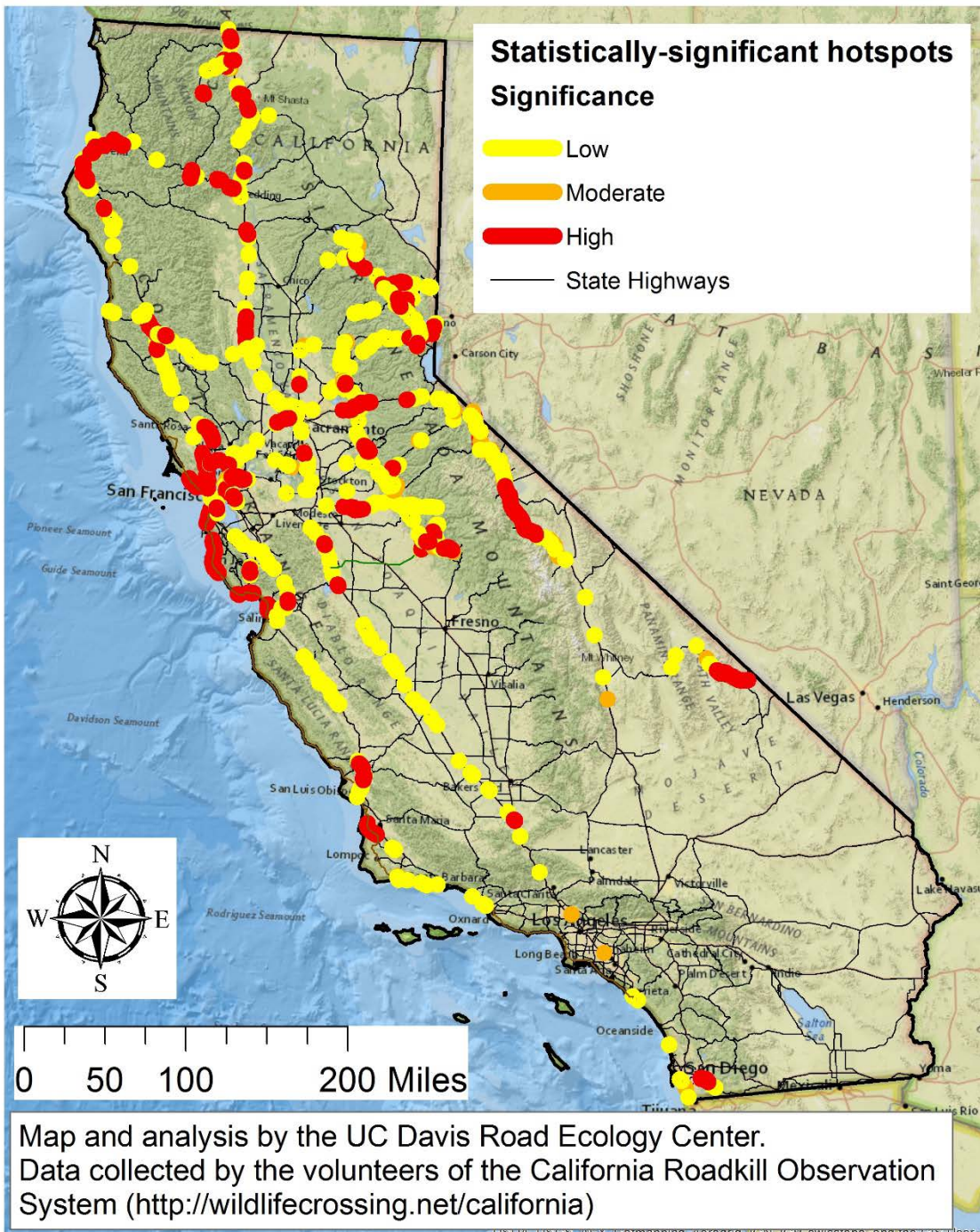
Statewide Carcass Observations

The map below shows >50,000 observations of animal carcasses on local roads and state highways. These are not all the roadkill that occurred, just the ones that people saw and reported in the California Roadkill Observation System (CROS) between 2009 and 2015, as well as older data from Caltrans' records. The observations are used to inform modeling of distribution of wildlife species and risks to wildlife and drivers from collisions.

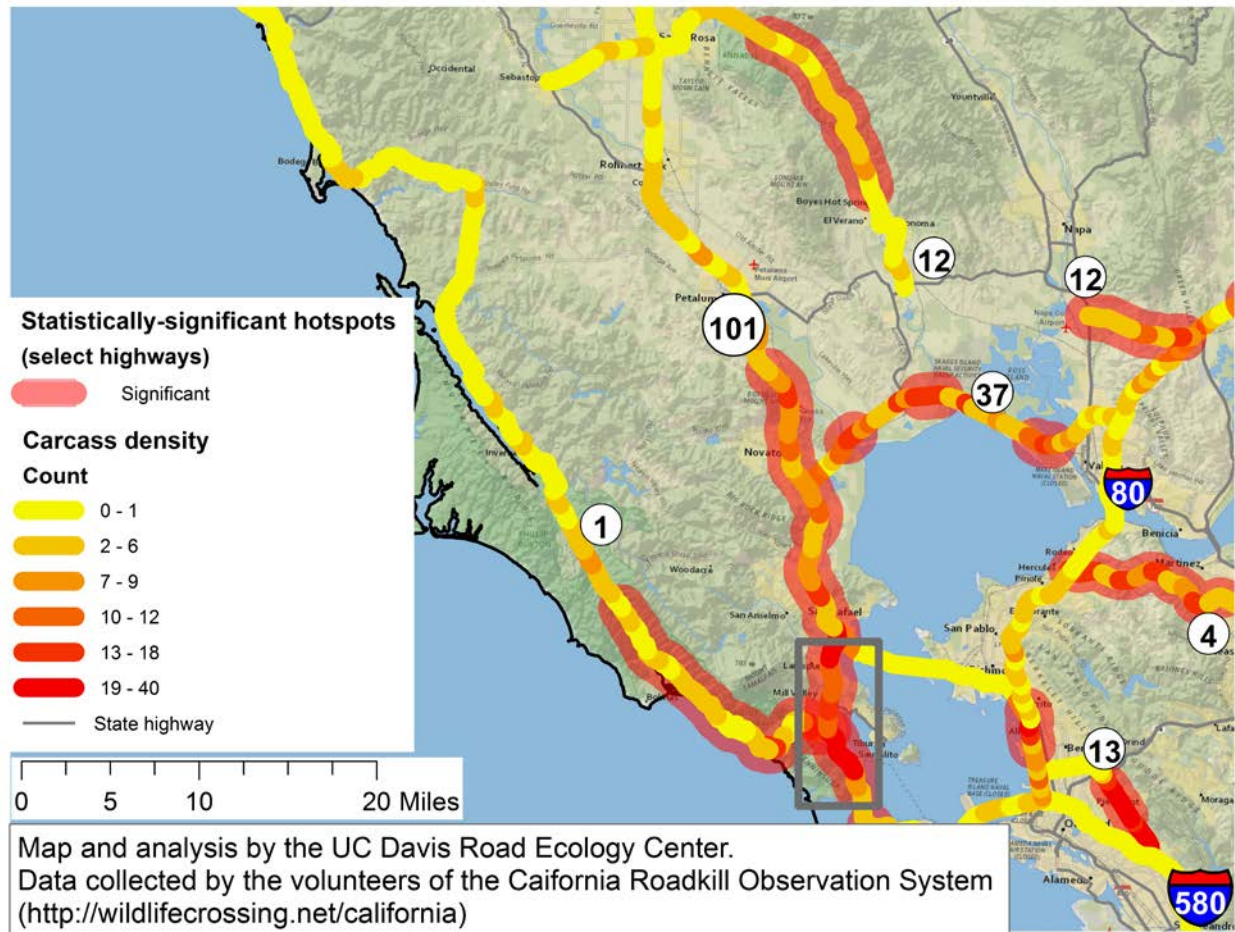


Statewide Highway Roadkill Hotspots

The map below shows the statistically-significant roadkill hotspots for select state highways throughout the state. This map does not show all hotspots, nor does it show hotspots on non-state roadways. More detailed maps and explanations are given on the following pages.



North San Francisco Bay Area, Regional Highway Hotspots



This map shows the number of carcasses observed per mile segment of highway (yellow to red scale). It also shows the locations of statistically-significant hotspots (pinkish-red zones) of carcass observations. Finally, it shows the location on state highway 101 of high concentration of deer-vehicle conflict (grey box), including deer standing or moving around next to the highway.

Statistically-significant hotspots (select highways)

Significant

Carcass density Count

- 0 - 1
- 2 - 6
- 7 - 9
- 10 - 12
- 13 - 18
- 19 - 40

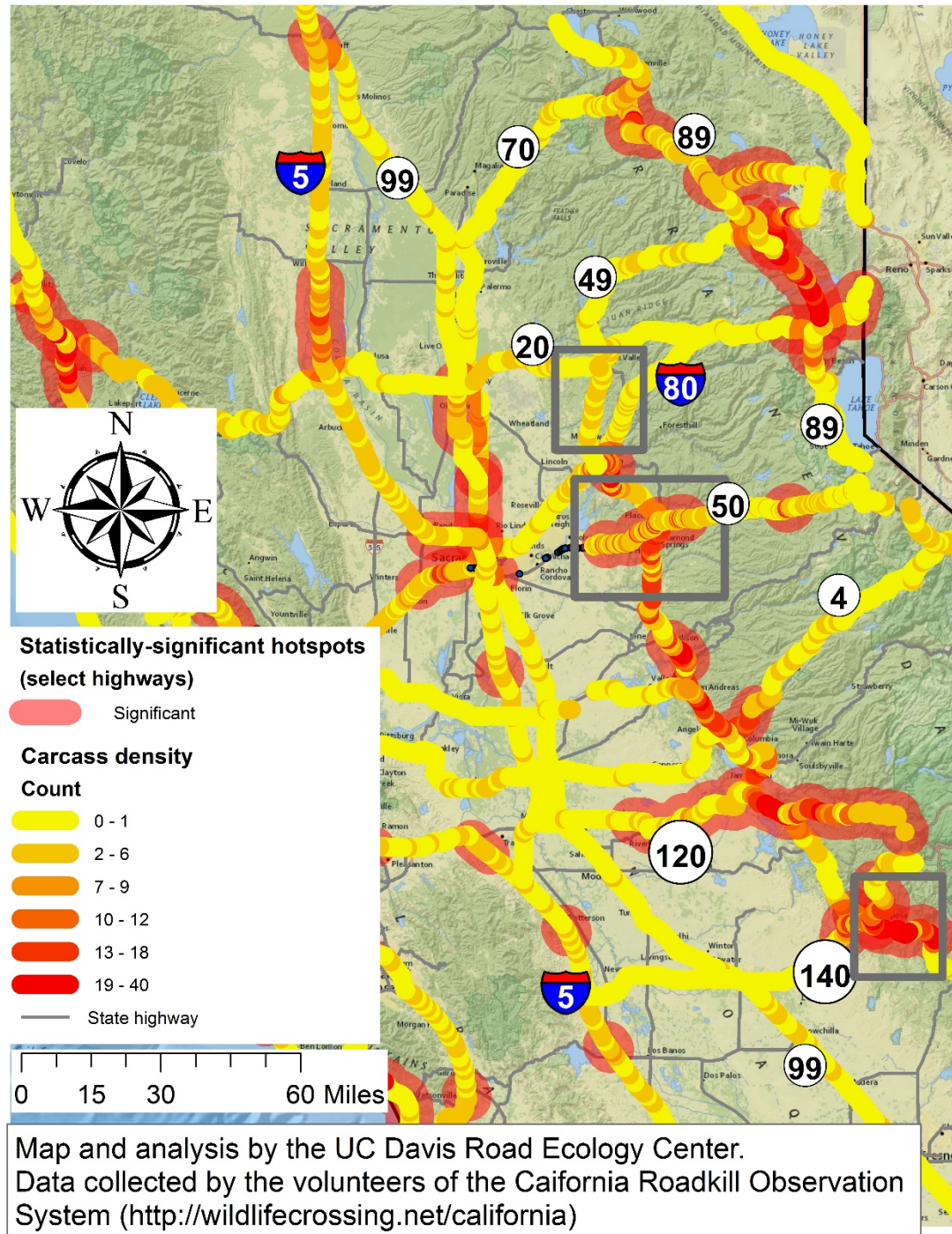
State highway

0 5 10 20 Miles

Map and analysis by the UC Davis Road Ecology Center.
Data collected by the volunteers of the California Roadkill Observation System (<http://wildlifecrossing.net/california>)

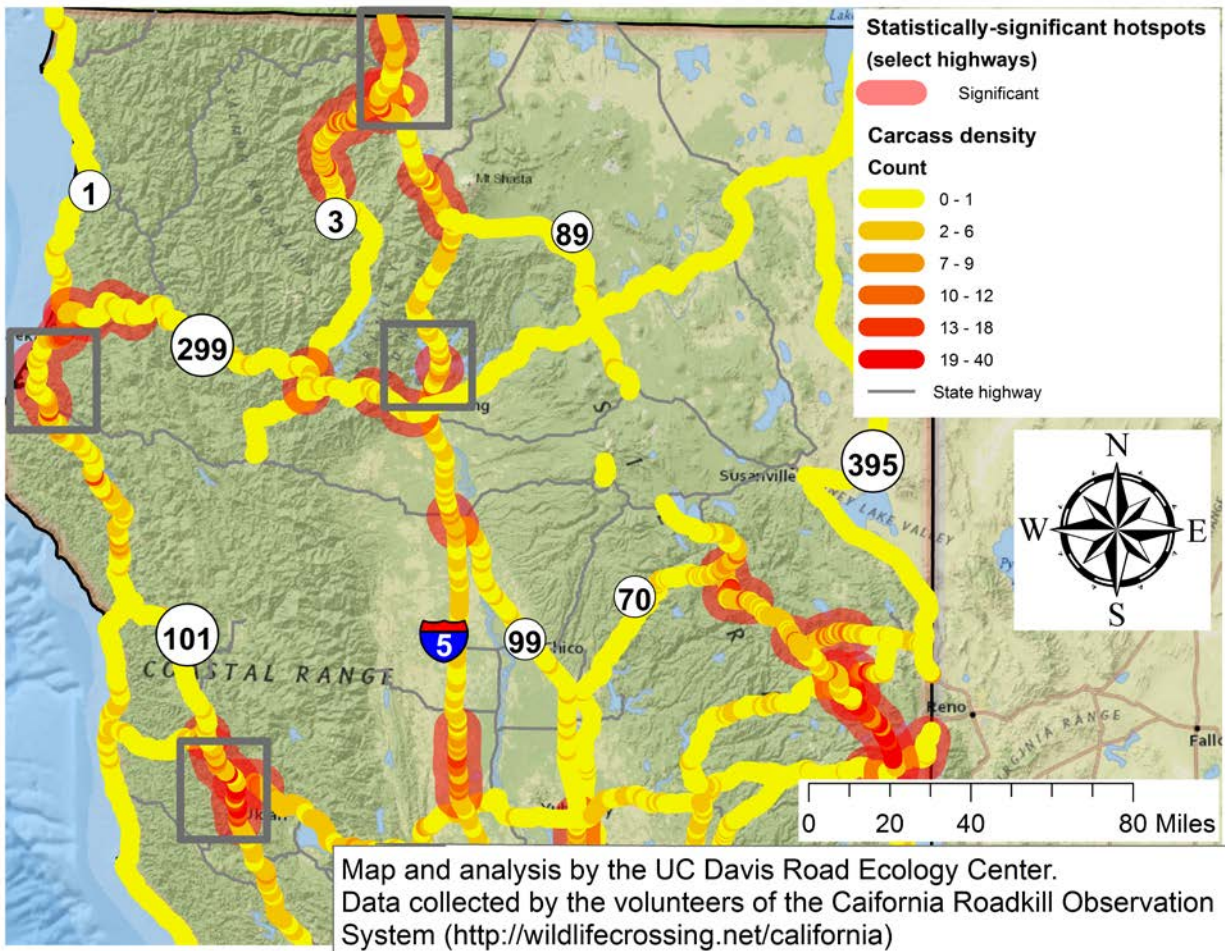
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Sacramento/Central Valley and Mountain Areas, Regional Highway Hotspots



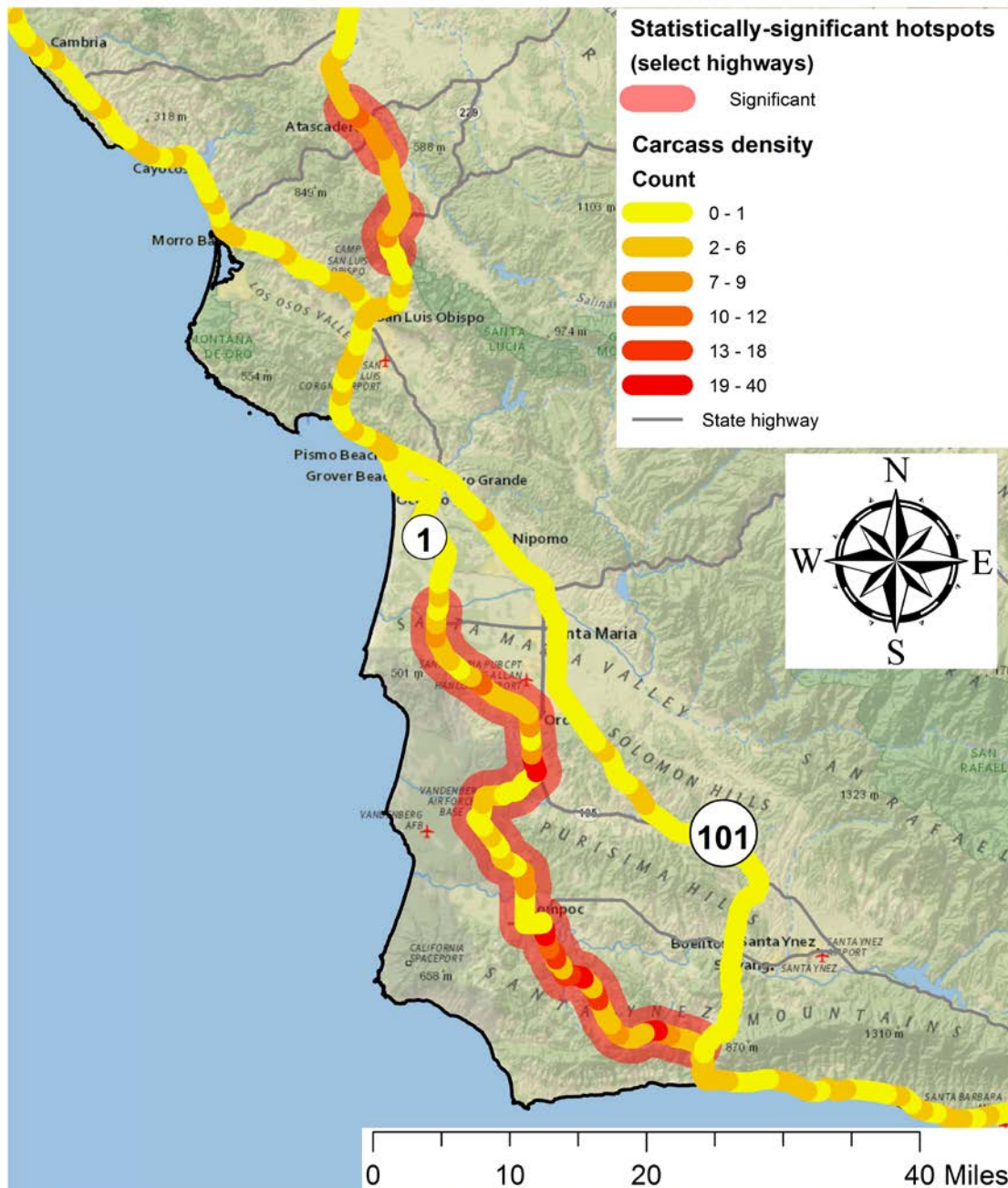
This map shows the number of carcasses observed per mile segment of highway (yellow to red scale). It also shows the locations of statistically-significant hotspots (pinkish-red zones) of carcass observations. Finally, it shows the locations of exceptionally high concentrations of deer-vehicle conflict (grey boxes), which are primarily collisions between vehicles and deer.

North Coast and Mountains, Regional Highway Hotspots



This map shows the number of carcasses observed per mile segment of highway (yellow to red scale). It also shows the locations of statistically-significant hotspots (pinkish-red zones) of carcass observations. Finally, it shows the locations of high concentrations of deer-vehicle conflict (grey boxes), which are primarily collisions between vehicles and deer.

South-Central Coast Regional Highway Hotspots



This map shows the number of carcasses observed per mile segment of highway (yellow to red scale). It also shows the locations of statistically-significant hotspots (pinkish-red zones) of carcass observations.