

California Roadkill Observation System



Performance Report (August 2010)

Summary

Roadkill occurs constantly on California roads and highways, affecting individual animals, populations, and species, as well as the people involved in the wildlife-vehicle collision (WVC). The California Roadkill Observation System (CROS, <http://www.wildlifecrossing.net/california>) is the first statewide roadkill reporting web site and is a way for people throughout the state to record their observations of the dead animals and of their environmental context. By recording these roadkills, we collectively increase our knowledge of the potential and actual impacts of WVC and how we might reduce these impacts. Over the last year, more than 250 observers recorded over 6,000 observations of roadkills from one end of the state to the other. Roadkills from 196 species were reported on all types of roads and highway. Some observers only recorded a single observation, others recorded hundreds. Intensive studies of individual roads and highways provided estimates of the number of animals killed per mile and per year.

Recently, we also developed a similar web site for the state of Maine, in partnership with Maine Audubon and their state agency collaborators (<http://www.wildlifecrossing.net/maine/>). One goal of the Maine program is to report live and roadkill animals along roads and highways and to compare these occurrences to a statewide connectivity model that was recently constructed. California also has the opportunity to test the hypothetical connections that have been proposed in regional connectivity studies (e.g., Sierra Nevada, Shilling et al, 2002) and the first and second (Girvetz et al., 2008 and Spencer et al., 2010, respectively) statewide studies of connectivity.

By combining roadkill data with wildlife occurrence and movement information and geographic information systems (GIS) modeling, we hope to provide both accurate assessments of the impact of roadkill and approaches for reducing the impact. Roadkill occurrences are one source of data for determining which species are most susceptible to impacts, what habitat and road characteristics contribute to collisions, and what effective mitigation and other approaches there are to reduce collisions.

"This [roadkill] is a relatively new source of fatality; and if one were to estimate the entire mileage of such roads in the state, the mortality must mount into the hundreds and perhaps thousands every 24 hours."
(Grinnell, 1920)

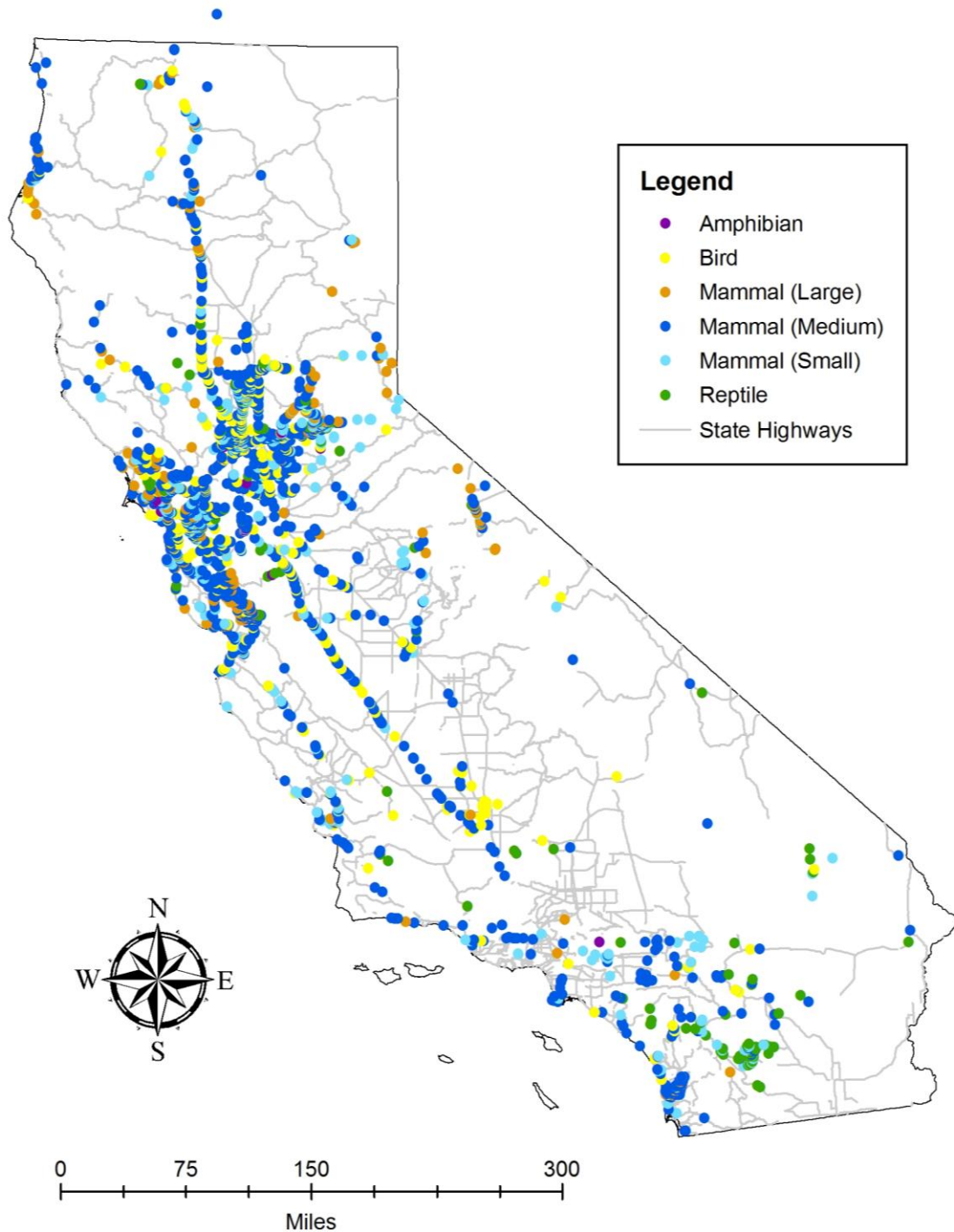
How the System Works

To use the system, observers register on the website (<http://www.wildlifecrossing.net/california/>) and start entering their observations. Entries are made using an online form and include information about the type of animal, location, time of observation, approximate age of the carcass, and the environmental context of the carcass (e.g., type of road, nearby landscape). Registered users have the ability to store their own observation data online--as part of the greater study--and download it anytime as a comma-delimited textfile (.csv). They have the ability to generate a map of their own observations, to see the spatial distribution across the state, or map all roadkill occurrences in the system.

Results to Date

When all observations to date are mapped, it is obvious that there are areas where there are many reported roadkills and others where there are few reports. This represents a combination of heterogeneous distribution of observers and of roadkills. We invite individuals and organizations in the areas with few reports to participate.

California Roadkill Occurrences



Top 20 Species Observed

Not surprisingly, the most common animals killed on California roads and highways are also some of the most common species in California, at least among those tolerant of road-side environments. The high numbers of 4 amphibian/reptile species (indicated with an *) are the result of an intensive monitoring program along one road in eastern Contra Costa County. These high numbers are unlikely to be particular to this road and are more likely a result of intensive effort. This means that large numbers of certain species of concern may be affected by roads every day and this impact should be remedied.

Scientific Name	Common Name	Observations
<i>Procyon lotor</i>	Raccoon	628
<i>Mephitis mephitis</i>	Striped Skunk	395
<i>Spermophilus beecheyi</i>	California Ground Squirrel	381
<i>Didelphis virginiana</i>	Virginia Opossum	366
<i>Odocoileus hemionus</i>	Mule (or Black tailed) Deer	273
<i>Lepus californicus</i>	Black-Tailed Jackrabbit	181
<i>Bufo boreas</i>	Western Toad*	179
<i>Tyto alba</i>	Barn Owl	159
<i>Sylvilagus audubonii</i>	Desert Cottontail	158
<i>Sylvilagus bachmani</i>	Brush Rabbit	147
<i>Pseudacris regilla</i>	Pacific Chorus Frog*	138
<i>Pituophis catenifer</i>	Gopher Snake	131
<i>Sciurus griseus</i>	Western Gray Squirrel	121
<i>Rana draytonii</i>	California Red-Legged Frog*	120
<i>Peromyscus maniculatus</i>	Deer Mouse	115
<i>Canis latrans</i>	Coyote	110
<i>Sciurus niger</i>	Eastern Fox Squirrel	104
<i>Sceloporus occidentalis</i>	Western Fence Lizard	53
<i>Ambystoma californiense</i>	California Tiger Salamander*	50
<i>Euphagus cyanocephalus</i>	Brewer's Blackbird	49

* -- Vasco Road study in eastern Contra Costa county, survey conducted by Condor Consulting.

Top 20 observers list

Several individuals and organizations supplied us with intense effort and large amounts of data and we salute and appreciate their efforts. Their efforts on individual roads approach a complete census of all roadkill on these roads, which is useful for starting to understand the degree of impact to animals from wildlife-vehicle collisions and to help calibrate and interpret results from more lightly-visited sites. Observers come from dozens of agencies, institutions, and organizations throughout the state, and some have no affiliation. With their continuing commitment, it will become much easier to get a handle on how many animals are dying on our roads and when/where they are doing so.

We especially thank Dr. Ron Ringen, who made it his mission over the last 10 months to census roads and highways for roadkill whenever he traveled in the Central Valley and foothills, collecting over 1,000 records. His extraordinary efforts are a reminder for all of us as we drive down the road that sustainability means we give something back, even if its data about our own impacts.

Name	Organization
Ronald Ringen	UC Davis, School of Veterinary Medicine (Professor Emeritus)
	Condor Country Consulting
Douglas Long	Oakland Museum of California
	Santa Clara County Animal Control
John Cleckler	CH2M Hill and US Fish and Wildlife Service
Fraser Shilling	UC Davis, Environmental Science and Policy
Anne Barker	
Jonathan Hakim	North American Field Herping Association
Peter Maurer	El Dorado County
Betsy Miller	City of San Diego Park and Recreation
Dave Waetjen	UC Davis, Geography Graduate Group
Sheila Larsen	US Fish and Wildlife Service
Annie McNeill	
Chris Nagano	
joel (jeep) pagel	US Fish and Wildlife Service
Samantha Gonzalez	UC Davis
Edward Whisler	Edward D. Whisler Biological
Bartshe Miller	Mono Lake Committee
Joe Zinkl	UC Davis, School of Veterinary Medicine
Kelcey Stricker	San Diego State University

Seasonality in Roadkill

Collisions with mule deer are a major policy concern, both because of the effects on the animals themselves and because of the danger that a collision with a deer can pose to drivers. From the reports of deer roadkill so far, there appear to be two peaks in deer roadkill statewide, one in late spring and the other in the fall (see graph below). This is similar to unpublished data from Caltrans on 14,481 deer carcasses collected from certain state highways over the last 45 years, with peaks in roadkill in May and October. In some areas, these peaks may be related to deer migration. In other areas with resident deer, some of the mortality may be related to a search for open water. Caltrans-reported deer roadkill on state highways alone are equivalent to about 2% of the deer lost to hunting (~15,000/year), but state highways represent a small fraction of the total transportation system miles in the state. The importance of findings like these is that we can start to improve our understanding of impacts to animals like deer, which can lead to targeting specific times of year and places for action. The contribution of the CROS system and its reporters is that we can extend our knowledge well beyond deer and state highways to many more species and roads in the state.



Intersection with Other Roadkill Data and Connectivity Assessments

There are many organizations collecting data about wildlife movement and roadkill. We are exchanging data with these efforts in order to promote collective understanding of the problem and coming up with ways to fix it. Caltrans has a very large dataset of roadkills, primarily deer, spanning the last 45 years. Their staff have been transferring reports of animal carcasses picked up by maintenance crews to a centralized database in order to begin assessing impacts of state highways. Counties have begun doing this too, providing a potentially huge and very important database for future studies.

Over the last 10 years, there have been many regional and statewide assessments of connectivity. Shilling et al (2002) published the first regional assessment of landscape intactness and potential corridors in the Sierra Nevada, Southern Cascades, and Modoc Plateau. Thorne et al (2006) followed up with a similar assessment of the Central Coast range. In 2008, Girvetz et al published the first statewide assessment of connectivity using landscape disturbance and the effective mesh size tool. This was followed in 2010 by another statewide study, which resulted in a “linkage design” (Spencer et al., 2010). In all cases, there was no follow-up investigation of how meaningful the studies were to local planners or how ecologically-relevant each study was using wildlife movement and other tools. Combined with other wildlife movement information, roadkill data are one way to investigate the hypothetical landscape connections that the aforementioned studies propose.

What the Future Holds

We are collaborating with wildlife agencies and advocates in Maine in developing state of the art methods for recording roadkill and live wildlife observations and using these data to evaluate proposed connectivity maps. This effort involves trained citizen scientists, expanding both the number of sites that can be surveyed and the size of constituency interested in solving the problem. We have similar partnerships under development in our home state too, with individuals and non-governmental organizations who recognize the severity of impacts to wildlife from roads and traffic and want to understand how we can reduce these impacts. These exchanges serve to bring new ideas and methods to all of the participants, and may serve as a useful model, with easily-adapted open source web tools available from our current efforts, to help jumpstart comparable citizen-science efforts in other states.

To accomplish some of our goals, we are expanding our wildlife movement studies to include more highways and roads. We are developing “roadkill transects” where people can periodically census all roadkills occurring along specific roadways. Finally and most importantly, we are training observers and reporters to record live and dead wildlife occurrences so that private and public entities have the information needed to plan for reduced wildlife impacts, instead of increased impacts from development.

Our staff, students, and collaborators use computer-based modeling tools to understand and predict wildlife use of habitats and conflicts that can arise with transportation and land-use. We are beginning to combine these modeling efforts with our improving understanding of wildlife occurrence and movement in California to inform smart and environmentally-sustainable land-use and transportation planning.

Join us in our collaborative efforts to measure and reduce the impacts to wildlife from human activity.

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*This system is a collaborative project of the Road Ecology Center &
Information Center for the Environment at UC Davis*