2023

California Wildlife-Vehicle Conflict Report
P-22 Edition

ROAD ECOLOGY CENTER
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California Wildlife-Vehicle Conflict Report: P-22 Edition

In previous reports we have focused on collisions between vehicles and **all California wildlife** species, this report focuses on impacts of vehicle collisions on **mountain lions**. We have previously estimated the **total cost** of reported (large) wildlife-vehicle collisions in California for 2016 to 2020, inclusive, to be **at least $1 billion**. When including crashes with mule deer that are claimed to insurance companies but un-reported to police, the estimated cost could be **as high as $2 billion** for 2016-2020. This report focuses on mountain lion mortality observations reported by California Highway Patrol, California Department of Fish and Wildlife, Caltrans, UCD scientist Winston Vickers, and others, as well as observations reported to the California Roadkill Observation System (CROS, https://wildlifecrossing.net/california). This report includes **statewide and regional maps of mountain lion mortality on state highways** and discusses impacts to regional populations. California has been increasing its funding support for wildlife crossing project, including ones that could be effective at reducing mountain lion mortality.

Data Sharing/Collaboration: We frequently receive requests from highway planners, fish and wildlife scientists, academic faculty, students, and non-governmental organizations. We can typically meet data requests within CA for specific highways, counties, etc., but please keep in mind that this is an unfunded effort of people working at the Road Ecology Center, so give us a few days. Also keep in mind that our data are managed in a private, non-University system and our efforts are voluntary.

Our re-vamped California Roadkill Observation System app supports "one-click" reporting (https://wildlifecrossing.net/california) –take a picture of a roadkilled animal with your smartphone and upload with one click (which automatically creates a database record).

Contributors:

Fraser Shilling (REC Director), David Waetjen (REC Analyst/Programmer)

Other Contributors:

Winston Vickers (UC Davis), hundreds of CHP officers, Caltrans Maintenance staff, and state and federal Fish and Wildlife agency staff.

Cover photo credit. Mountain lion mortality reported by P Congdon to the California Roadkill Observation System

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Mountain lion near I-15 in Riverside County (Photo credit: Winston Vickers, UC Davis)

Top 5 Talking Points

1. At least one to two "P-22s" (mountain lions) die on state highways per week in California. The data assembled here show two things: that about 70 mountain lions are hit on state highways per year in California and that the rate appears to have declined by about 10% over the last 7 years. This decline suggests populations may be gradually declining as rates of roadkill match population trends. Because mountain lions are no doubt getting killed on city and county roads, this 70/year is an under-estimate of the true total.

2. Vehicle collisions with mountain lions are widely occurring in California, are also under-reported and may pose a threat to populations especially in Sothern California and the Bay Area. We found mountain lion mortality reports on roads throughout the state, with regional clusters in Southern California, Bay Area and Sierra Nevada foothills

3. Legislative or other support is needed to identify highway/road projects that should be avoided because of impacts to mountain lions. Like many states, California is enjoying an infrastructure boom because of the federal Bipartisan Infrastructure Law. Even though there are requirements in the bill to reduce wildlife impacts, it is not obvious that this always occurs. For those projects proposed or under construction in mountain lion habitat, wildlife crossings and fencing should be included in project planning and implementation, or the projects should be avoided.

4. Target wildlife crossing projects and allocate sufficient funds to build needed WVC-reduction projects. With the passage of SB1, state legislators provided transportation agencies with an increase in funding (>$5 billion/year!) to protect driver safety and the environment. Recently, the state has also allocated some hundreds of millions of dollars to the Wildlife Conservation Board and Caltrans to plan and build wildlife crossings. We know that doing nothing, or very little to reduce WVC is costly – to drivers and to the environment (~$200 - 400 million per year). There are myriad excuses for why "nothing can be done", lack of funding is not one of them. We also know where wildlife, including mountain lions, are dying at high rates on our state highways, which means we can target projects.

5. Improve monitoring and research to make sure we are doing enough. The information here reflects the volunteer effort of many UC Davis students and scientists, agency scientists and staff, and knowledgeable members of the public. The state relies on volunteer effort to support conservation data collection for almost all wildlife species in California. Although the roadkill data collection platform California Roadkill Observation System (https://wildlifecrossing.net/california) has been available since 2009 and can be used on any smartphone, the state hasn't officially recognized it, though state scientists use its data.

Introduction to Report

Using California state data on traffic incidents and roadkill observations, the Road Ecology Center has mapped mountain lion collisions on ~15,000 miles of California state highways. Animals entering roadways are often killed and pose a hazard to drivers, who may collide with the animal, or try to avoid the animal, suffering vehicle damage, injury, and even death. Wildlife populations may suffer significant losses from highways with high rates of WVC, which may cause ripple effects into surrounding ecosystems up and down the food chain. In addition, animals are injured during collisions, which is damaging to the animal and traumatic to drivers.

By identifying stretches of highway where mountain lion mortalities are more likely to occur, we are assisting responsible entities in developing mitigation to protect both drivers and wildlife populations. Measures with proven effectiveness include 1) building fencing and over/under-passes along priority highways to allow the safe passage of wildlife across highways and 2) reducing speed limits in protected wildlife habitat. Caltrans staff and Districts are ramping up their construction of mitigation solutions to WVC. To provide state and local agencies information to aid their decisions, we collated CHP, Caltrans, CDFW and scientist-collected data, Data like these allow state and local agencies to prioritize stretches of highway for mitigation of conflicts with particular species or groups (Shilling and Waetjen, 2015).

Statewide Mortalities and Priorities

We have collected over 600 reports of mountain lion mortalities on state highways, with 535 in the last 8 years (2015-2022, inclusive). There are several major regional clusters evident in the maps below, including in parts of Southern California, the entire Bay Area, the Sierra Nevada foothills and to a lesser extent the central Coast and parts of Northern California.

This map also shows the locations of priority barriers for wildlife movement identified by California Department of Fish and Wildlife (blue lines, obtained from https://data.cnra.ca.gov/dataset/wildlife-movement-barrier-priorities-cdfw-2022-ds3025) and the priority barriers where mountain lions were listed as a reason for the barrier to be identified (green lines). In a few cases, the clusters of mountain lion mortalities line up with the priority barriers: a) I-5 near the OR border, b) state highways 12, 17, and 152 in the Bay Area, and c) I-5/Grapevine, I-15 near Temecula and in the San Gabriel Mtns, and small clusters on other state highways. For other clusters, there is no “priority barrier”, including I-280 and SR-92 south of San Francisco, hwy 1 in Monterey, several Sierra Nevada foothill highways, hwy 241 in Orange County, and I-8 in San Diego County. Further, for several priority barriers where mountain lions are listed as a reason for the identification, no mountain lion mortalities have been recorded.

When posed with this issue, some have suggested that “roadkill data don’t tell the whole story” and that mountain lions may be successfully crossing these highways through structures, or are wary of trying to cross the highway. It is true that roadkill observations don’t tell the whole story, but they definitely tell the story of where mountain lions are dying. In addition, many of the priority highway segments are similar in structure and traffic to nearby highways that have mortalities, but no identified barrier. It seems possible that the priority barrier set needs to be expanded to include highways that have demonstrable lethal impacts on mountain lions.

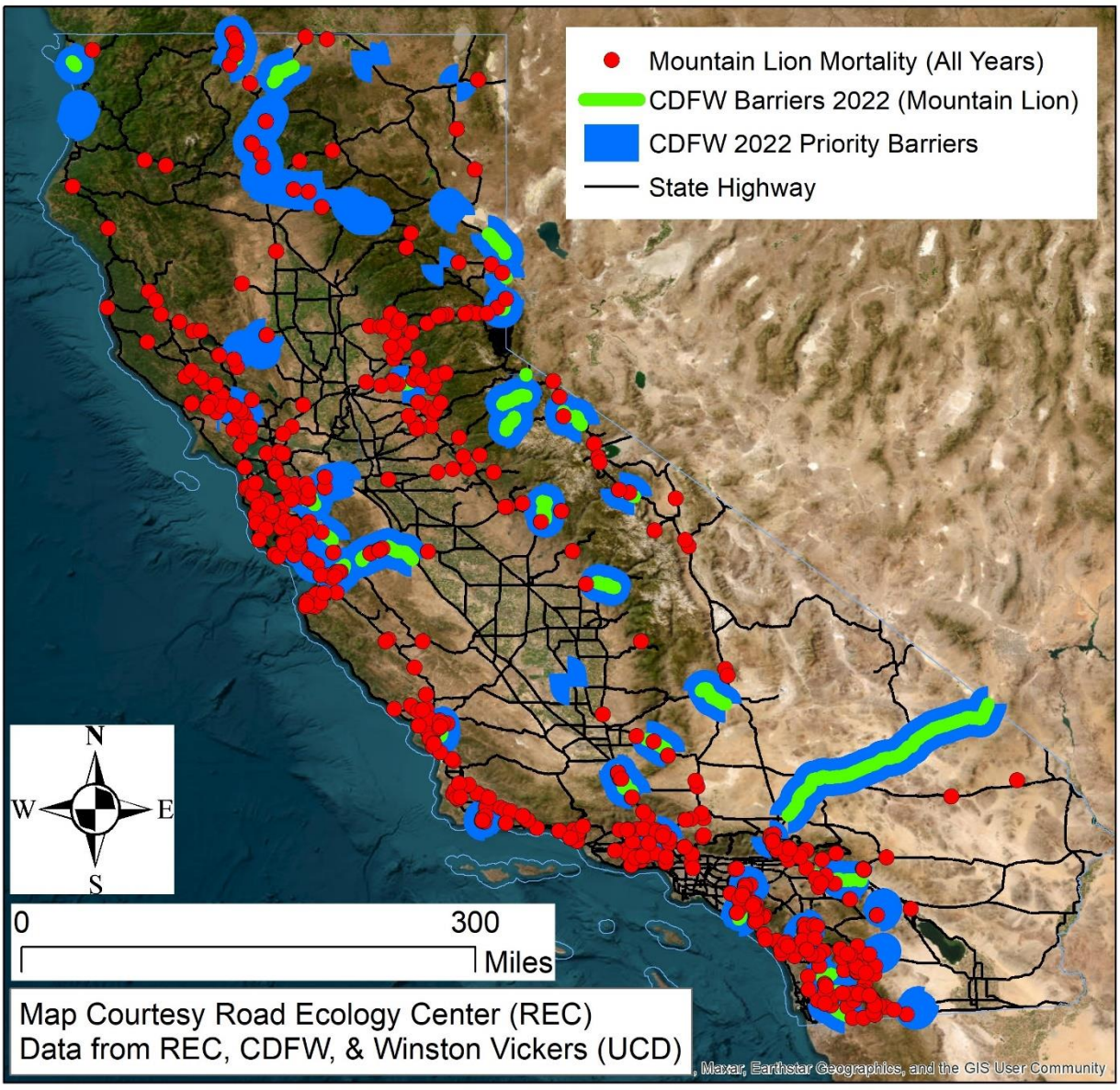

Figure 1. Mountain lion mortalities on state highways for all years of reporting.

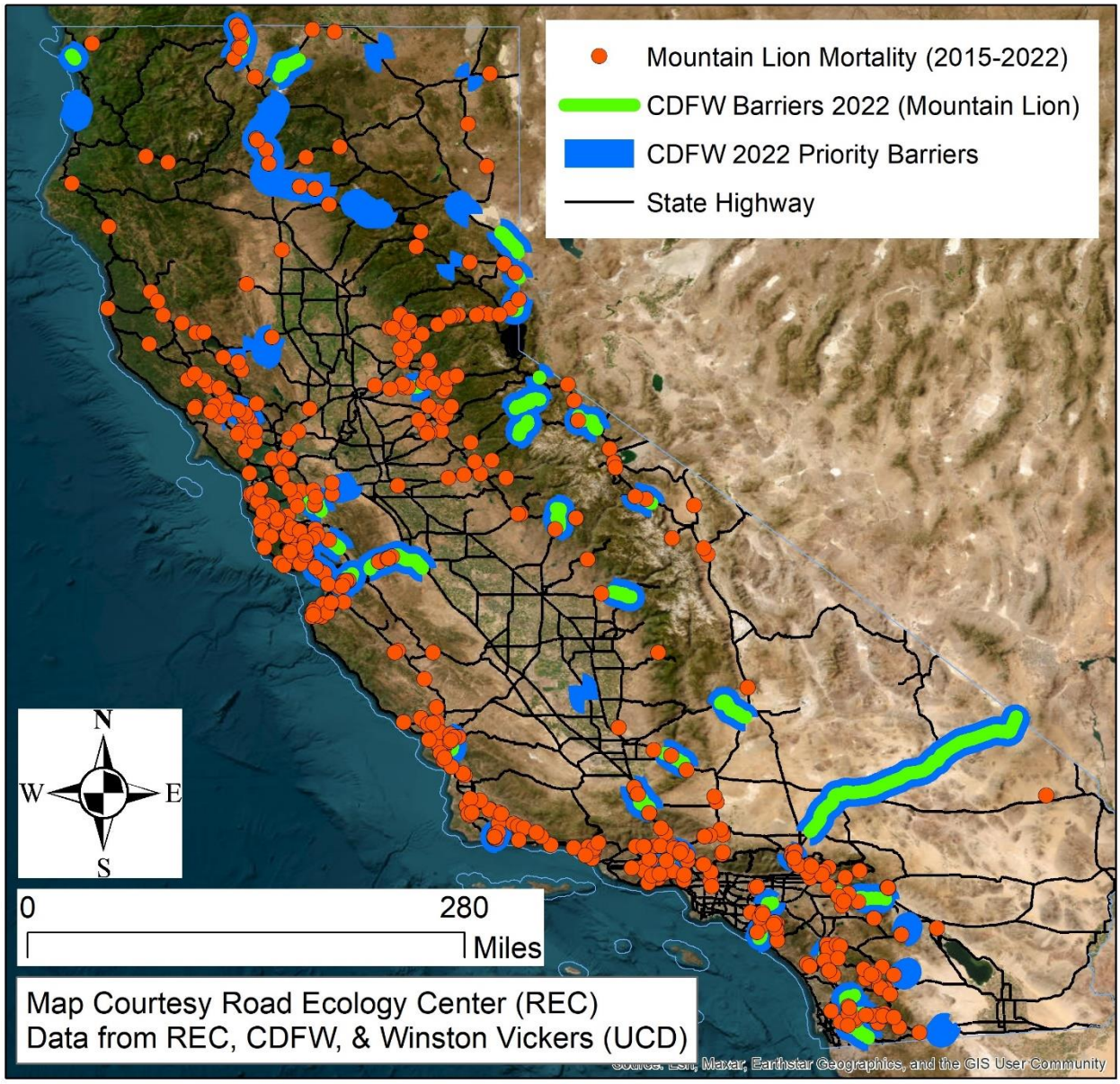

Figure 2. Mountain lion mortalities on state highways for 8 years of reporting (2015-2022).

The following maps show regional locations of mountain lion mortalities on state highways.

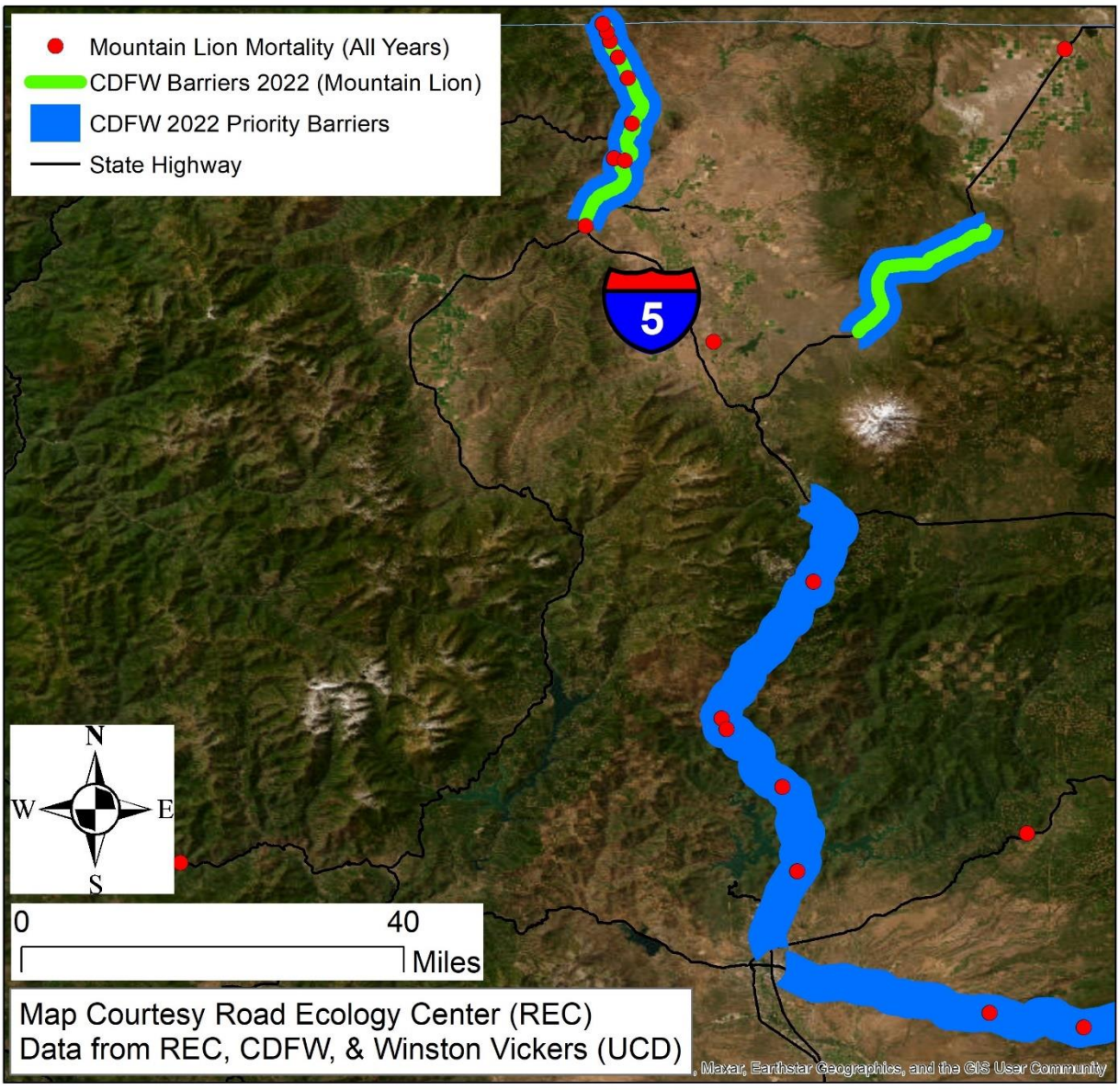

Figure 3. Mountain lion mortalities on north-state highways for all years of reporting.

Interstate 5 near the Oregon border has a distinct cluster of mountain lion mortalities and has also been identified by CDFW as a priority barrier for mountain lions and other wildlife (e.g., deer and elk).

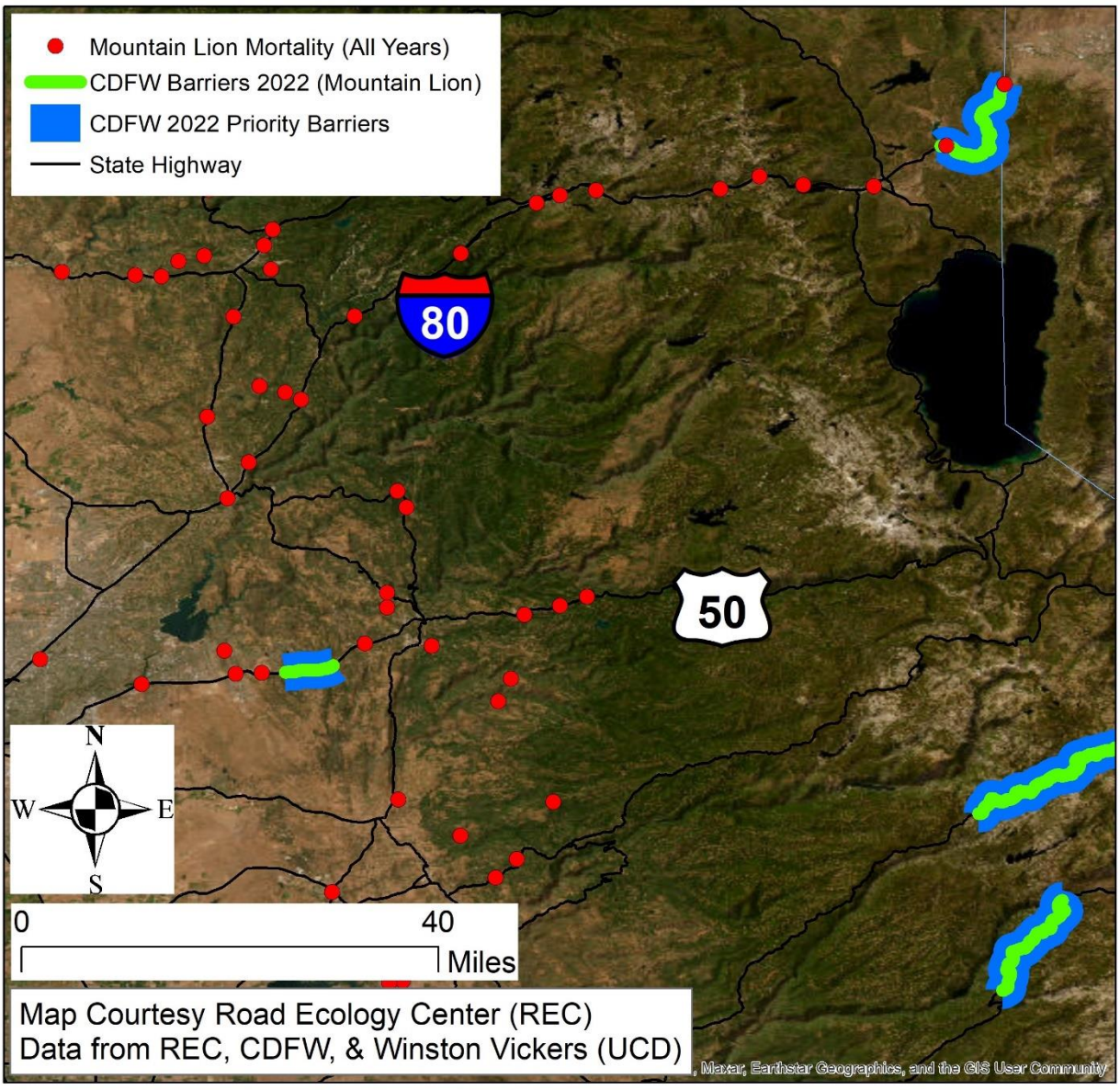

Figure 4. Mountain lion mortalities on Central Sierra Nevada foothill state highways and certain major county roads for all years of reporting.

Mountain lion mortalities are widely distributed, with US 50, I-80, and SR-20 having the most locations.

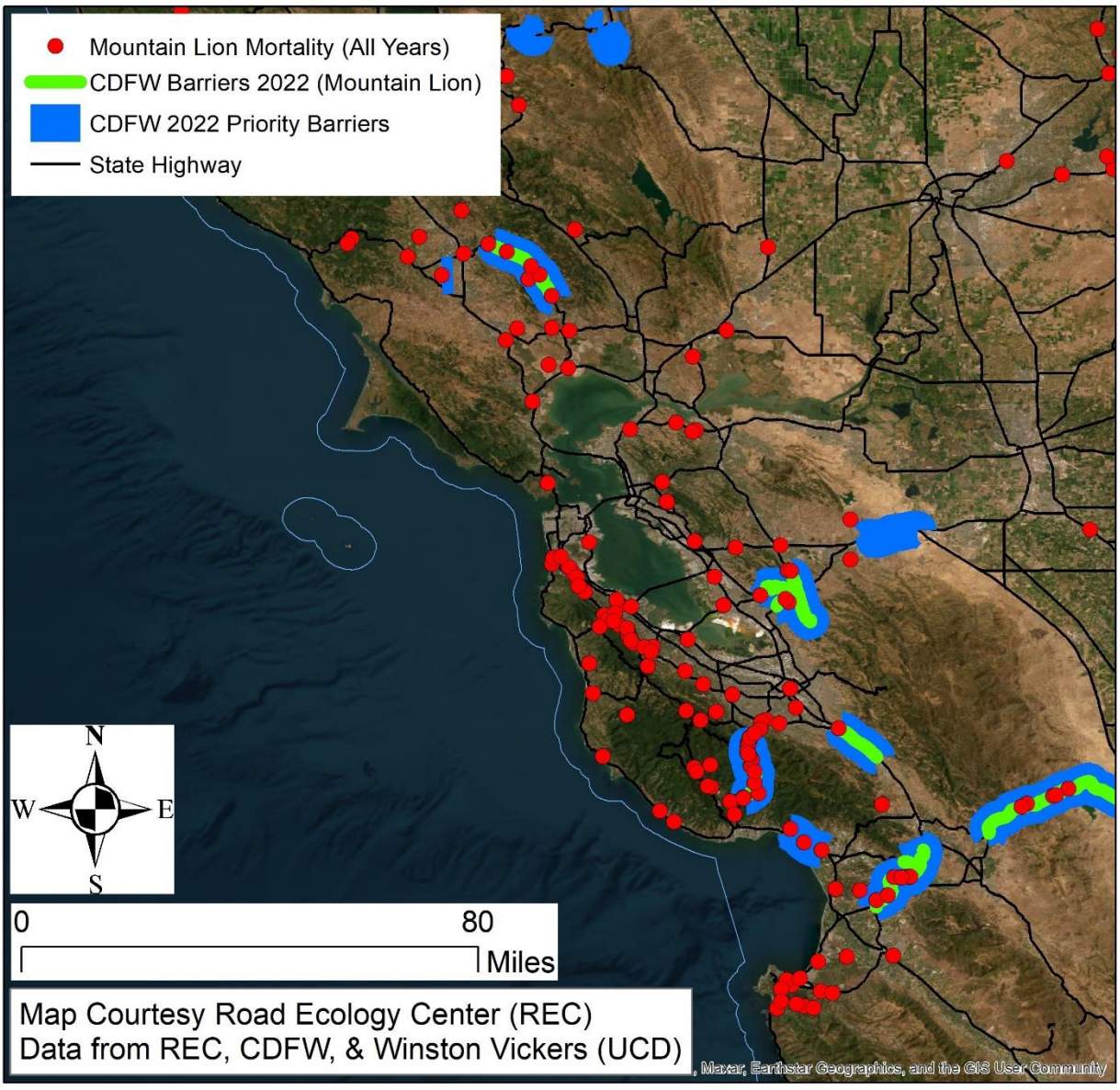

Figure 5. Mountain lion mortalities on Bay Area state highways for all years of reporting.

The Bay Area mountain lion populations may be threatened by the high rates of mortality on various highways (e.g., I-280, SR-12, SR-17, SR-1). The actual trend in the regional population is unknown, though anecdotally some local agencies report fewer mountain lion sightings than in previous decades.

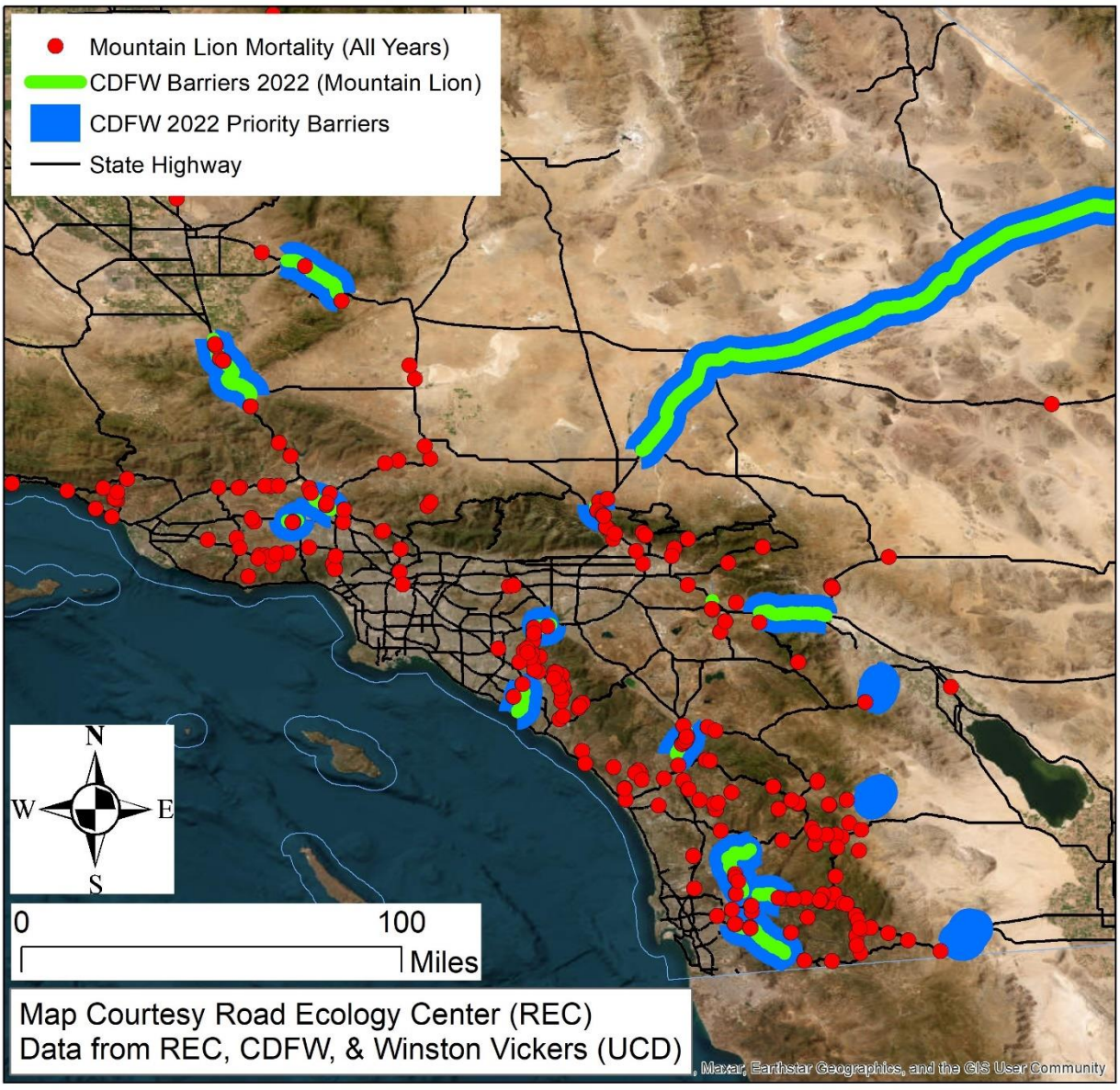

Figure 6. Mountain lion mortalities on Southern California state highways for all years of reporting.

Southern California has deservedly received the lion's share of focus for conservation of the puma. Despite the recent ground-breaking for the Wallis-Annenberg wildlife over-crossing, many other highways in the region need similar structures and, as importantly, fencing to prevent mortality and increase connectivity.

So, how much would it cost to start fixing some of these broken highway segments with high rates of mountain lion and other wildlife mortalities? In California there are 1,275 miles of highway segments where fencing to exclude wildlife would take 10 years to "pay for itself" through reduced crashes. It would cost about $255,000,000 to fence these highest-priority segments (1,275 miles times $200,000/mile). In other words, this cost-effective method to reduce WVC impacts to wildlife and the driving public statewide would cost about the same as adding 1.5 miles of new lane to the I-405 in Los Angeles.

Figure 7. A pair of juvenile mountain lions crossing safely under a state highway in Southern California, through a structure built for another purpose.

The Wildlife Conservation Board has received and is doing its best to release funds to plan wildlife crossings throughout California. Given the legacy effects of past highway and traffic conditions, this program must be expanded in order to not come too late for certain species (such as mountain lions) and regions. Readers of our past reports will recognize the rarity of our giving kudos to a state program, but WCB deserves credit here for doing what it can on very short notice to increase the rate of wildlife crossing planning and construction in California.

Special Case: Deadliest Highway for Mountain Lions in California

One of the more common questions for studies like this is "where is the worst place in California for mountain lion collisions." About one mountain lion has died per mile of I-280 between 2015 and 2022. I-280 is also the same highway that has the highest rate and costs in California of collisions with all wildlife in any given year in the last 5 (Figure 5). Five of the top-20 highest cost, 1-mile segments of highway in CA are on I-280. The total annual cost from WVC on 31 miles of I-280 is $5.8 million, or $187,897/mile-year.

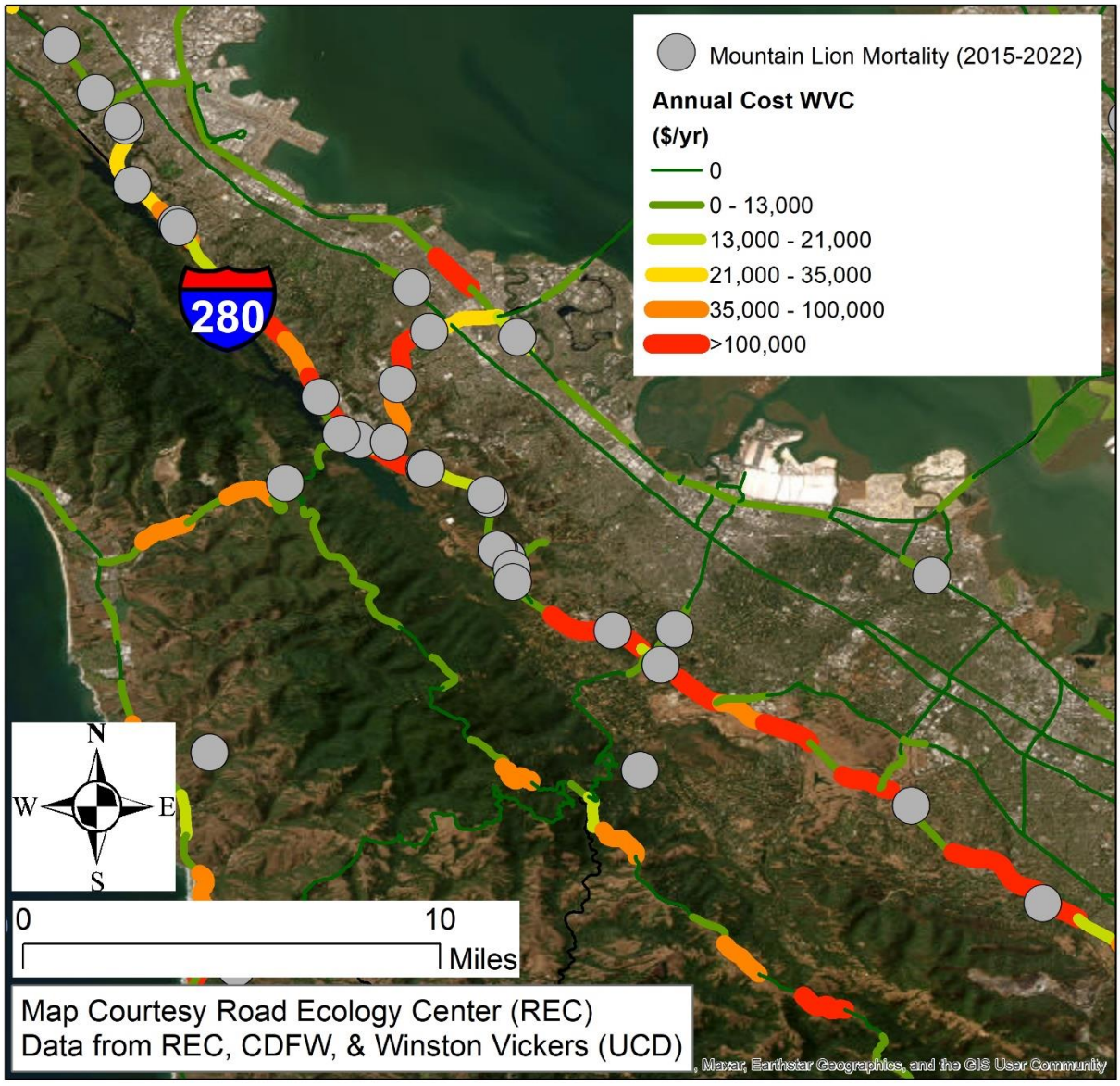

Figure 8. Locations of mountain lion mortalities overlaid on annual cost of WVC ($/mile) on one mile segments of I-280 between San Bruno and Cupertino.

In 2013, the Road Ecology Center reported to Caltrans, under contract, that fencing most of I-280 to prevent wildlife access and reduce WVC would be very cost-effective (https://wildlifeobserver.net/files/projects/732/resources/FINAL_I-280_Report_122013.pdf). This is still true almost ten years later.

Acknowledgements

This and previous reports and the analyses contained within would not have been possible without the careful reporting by CHP officers, CDFW and Caltrans staff, Winston Vickers (UC Davis) and the concerted and coordinated efforts of hundreds of volunteer roadkill observers over the last 10 years who contribute to the California Roadkill Observation System (https://wildlifecrossing.net/california). Through their endeavors, they have collected >90,000 observations of >430 species, representing one of the largest and most comprehensive wildlife monitoring programs in California and the US. Their accuracy rate for species identification is >97% and have high locational accuracy (median <±13 meters). For the scientific article describing CROS, see citation below (you can paste the "doi" value below into a browser and access the papers).

Citation for CROS:
Waetjen DP and Shilling FM (2017) Large Extent Volunteer Roadkill and Wildlife Observation Systems as Sources of Reliable Data. Frontiers in Ecology & Evolution 5:89. doi:10.3389/fevo.2017.00089

Additional CROS citations:
Shilling F., W. Collinson, M. Bil, D. Vercayie, F. Heigl, S.E. Perkins, S. MacDougall (2020). Designing wildlife-vehicle conflict observation systems to inform ecology and transportation studies. Biological Conservation, 251: 108797. https://doi.org/10.1016/j.biocon.2020.108797

Schwartz, A, S. Perkins, F.M. Shilling (2020). The value of monitoring wildlife roadkill. European Journal of Wildlife Research. Volume 66, 18. https://doi.org/10.1007/s10344-019-1357-4

Tiedeman, K., R.J. Hijmans, A. Mandel, D.P. Waetjen, F. Shilling (2019) The quality and contribution of volunteer collected animal vehicle collision data in ecological research. Ecological Indicators. https://doi.org/10.1016/j.ecolind.2019.05.062

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