

The background image shows a rugged, eroded landscape following a wildfire. The hills are brown and tan, with visible erosion patterns. In the foreground, there are numerous charred, blackened tree trunks and branches, some standing upright and others lying on the ground. The overall scene is desolate and highlights the impact of the fire on the environment.

Post-wildfire erosional hazards

Jimmy Guilinger, Ph.D.

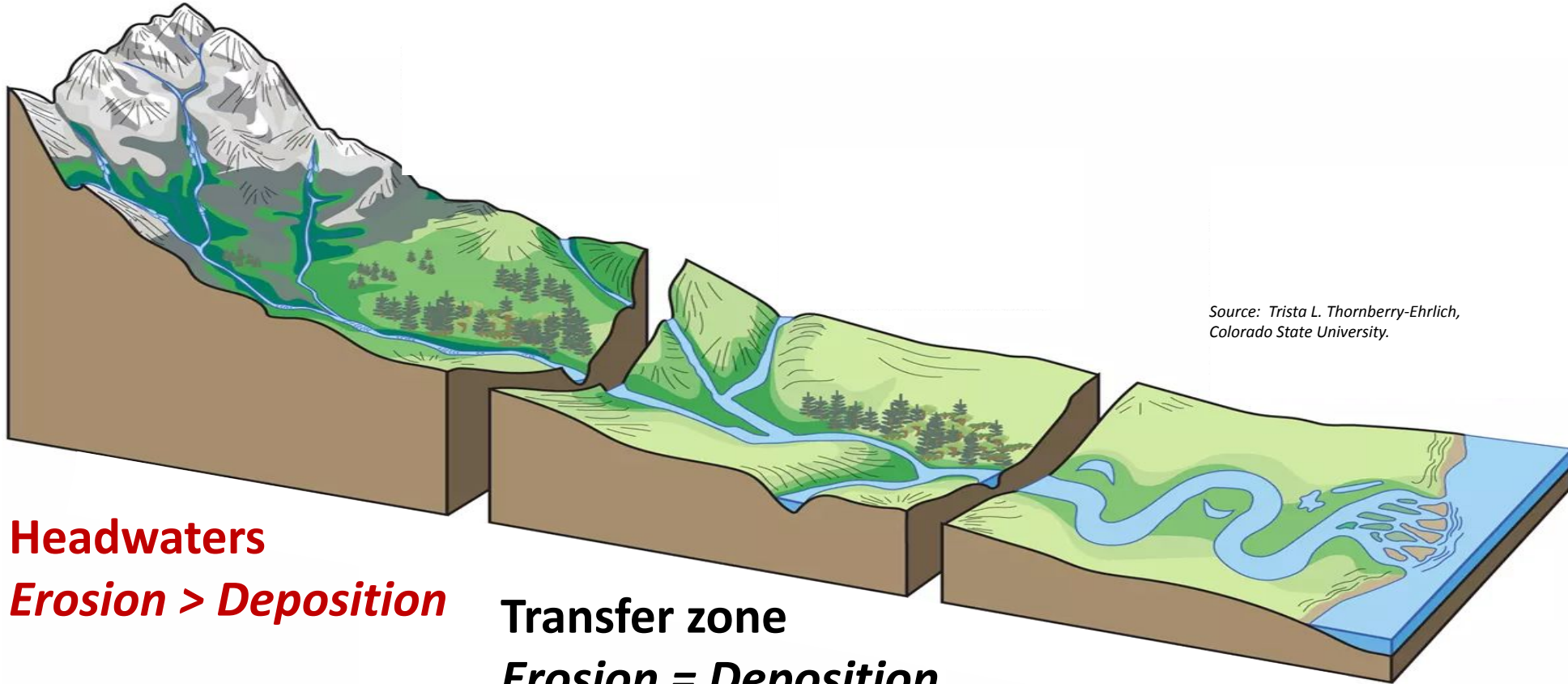
Watershed Geology Lab

Dept of Applied Environmental Science

California Wildlife Day Wildfire Panel

3/26/2023

Research interests: sediment dynamics



Source: Trista L. Thornberry-Ehrlich,
Colorado State University.

Headwaters

Erosion > Deposition

Transfer zone

Erosion = Deposition

Depositional zone

Erosion < Deposition

Post-fire sediment dynamics in steep mountainous environments



Soil water repellency



Dry ravel

Canopy/litter consumption

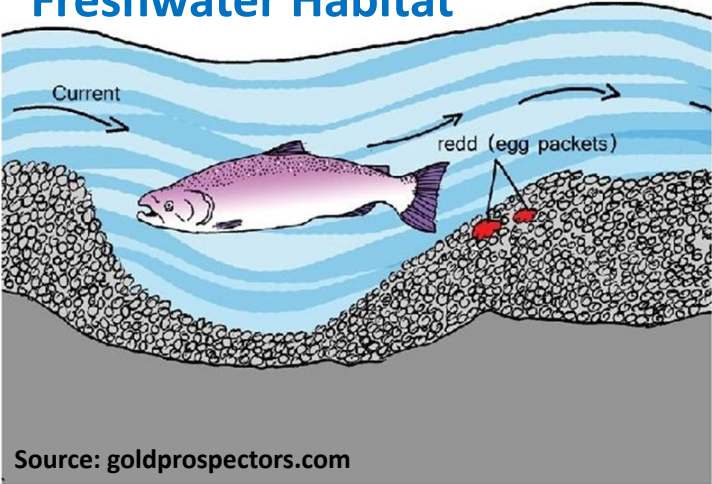
Ash/erodible surface horizons



Sediment as an important variable

Benefits

Freshwater Habitat

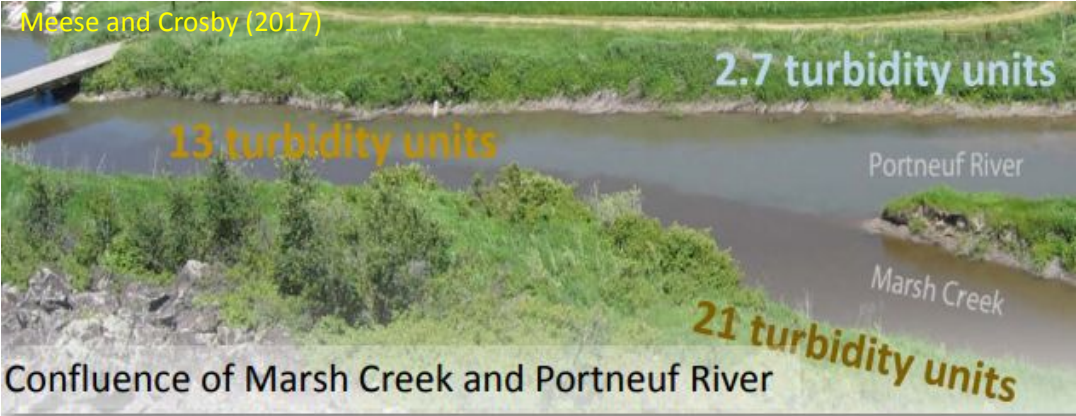


Shoreline maintenance



Harms

Water quality, reservoir sedimentation



Landslides and debris flows



Post-fire debris flows (PFDFs)

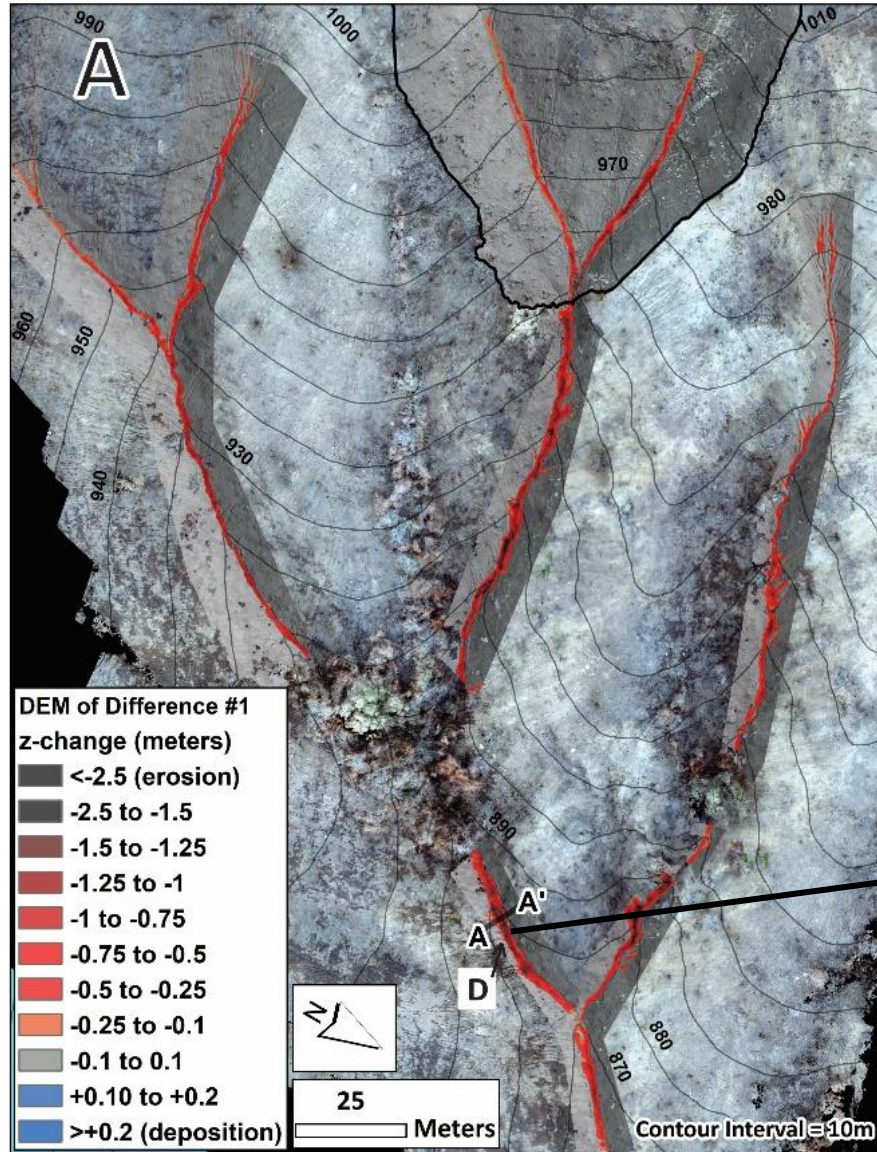


Like fast-moving cement –
very hazardous!

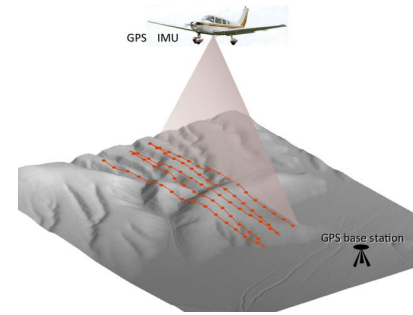
Triggered by intense
rainfall over *steep terrain*
recently **burned at**
mod/high severity

Fish Fire, San Gabriel Foothills, southern CA (USGS, 2017)

A few slides about my work...



drones



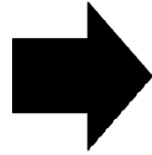
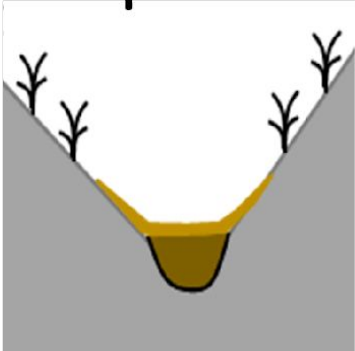
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Conceptual model of postfire erosion in steep terrain

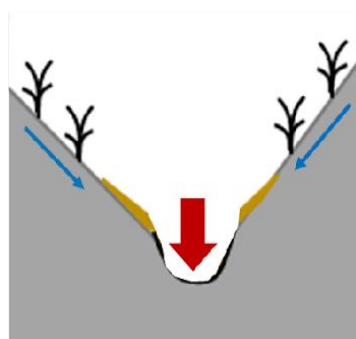
1. Postfire dry phase:

Incipient **dry ravel loading of channels**, heightened rainfall-runoff partitioning



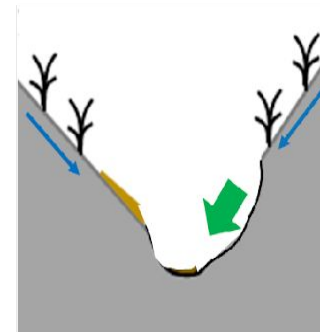
2. Channel first-flush

Channel evacuation to bedrock by debris flows and floods, **distributed hillslope erosion by runoff**



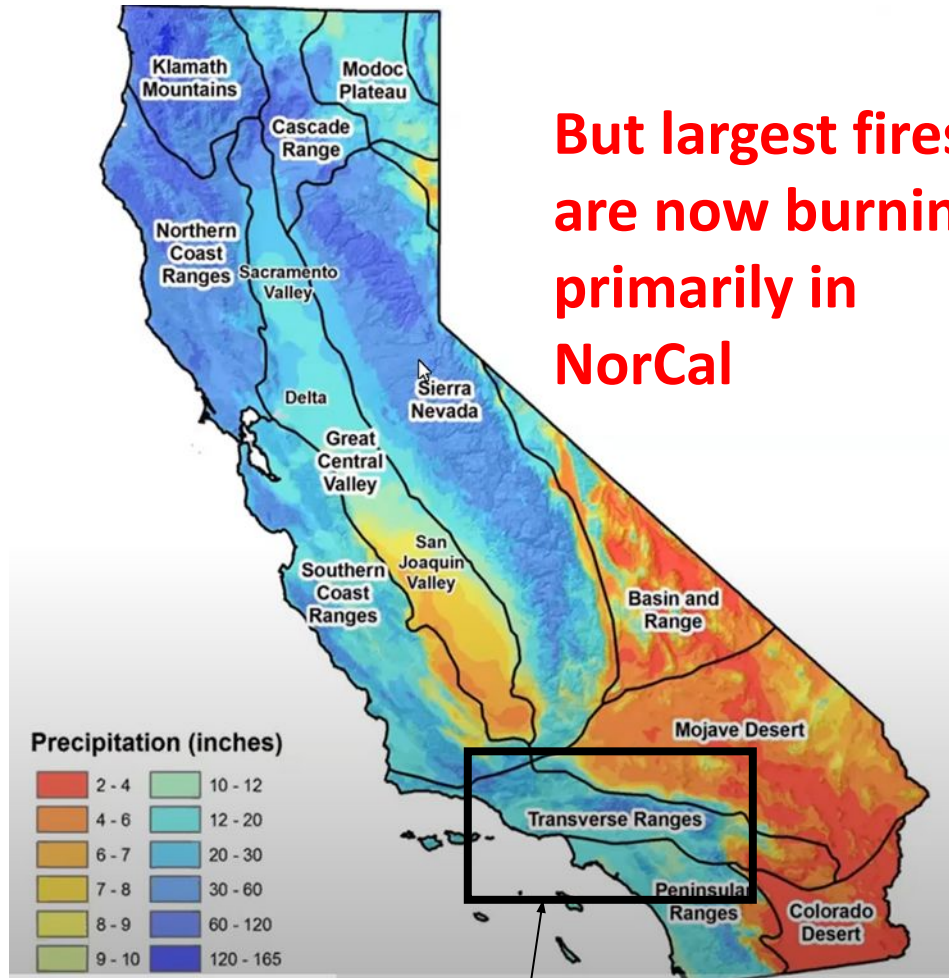
3. Hillslope erosion and instabilities

Subdued channel erosion, in-channel deposition but **persistent hillslope erosion** and patchy high-magnitude sediment yield from **sideslope and hillslope failures**

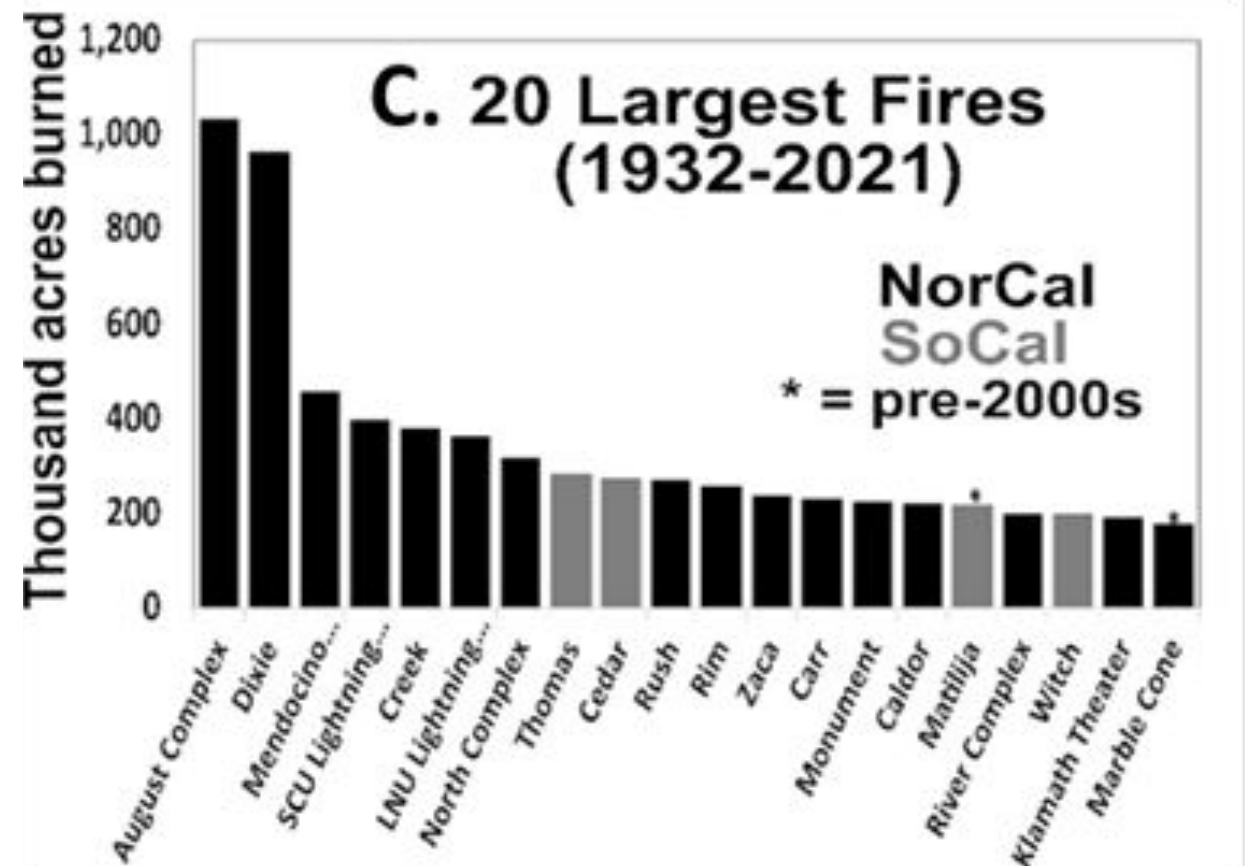


Fire is expanding into modern “uncharted territory”

But largest fires are now burning primarily in NorCal

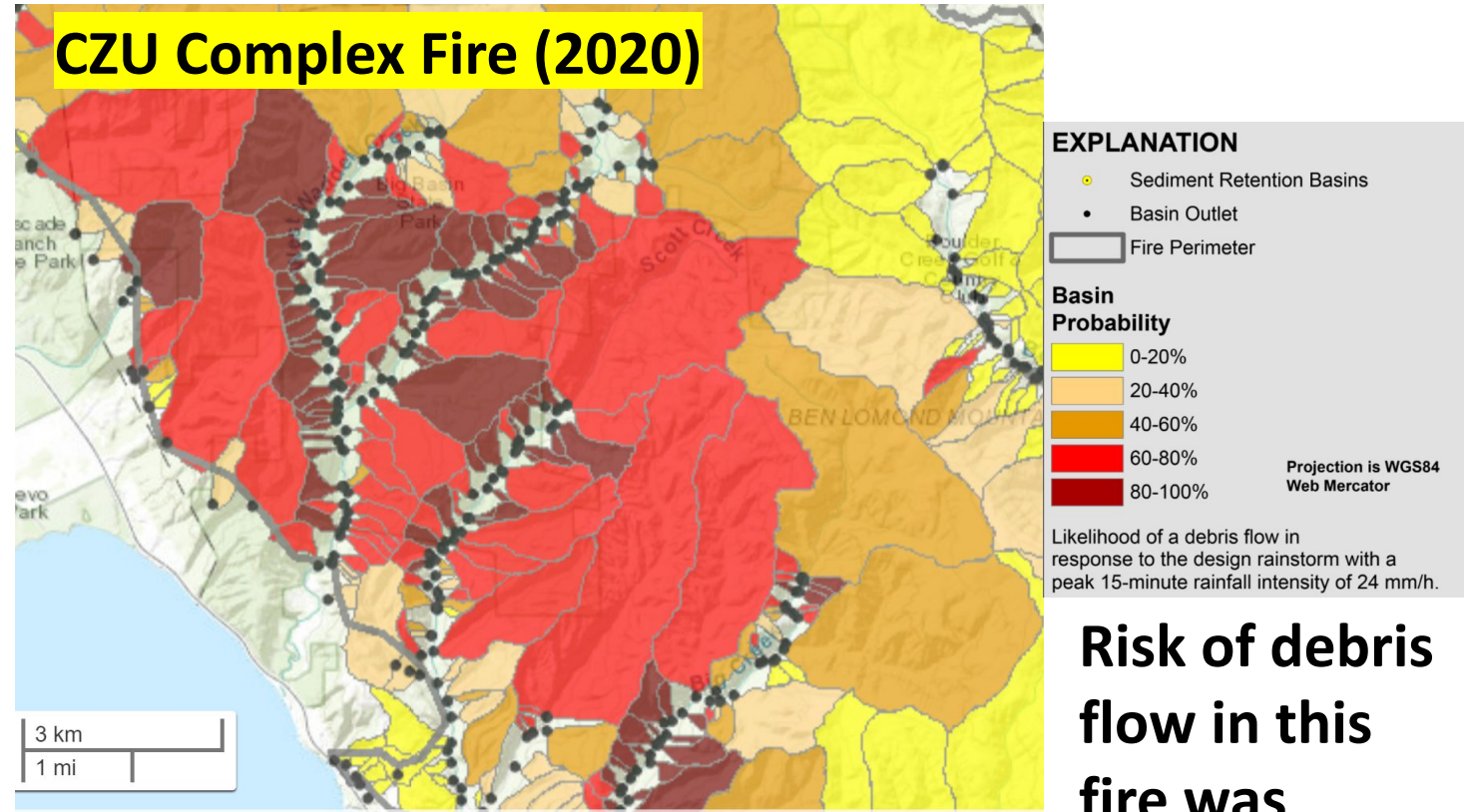
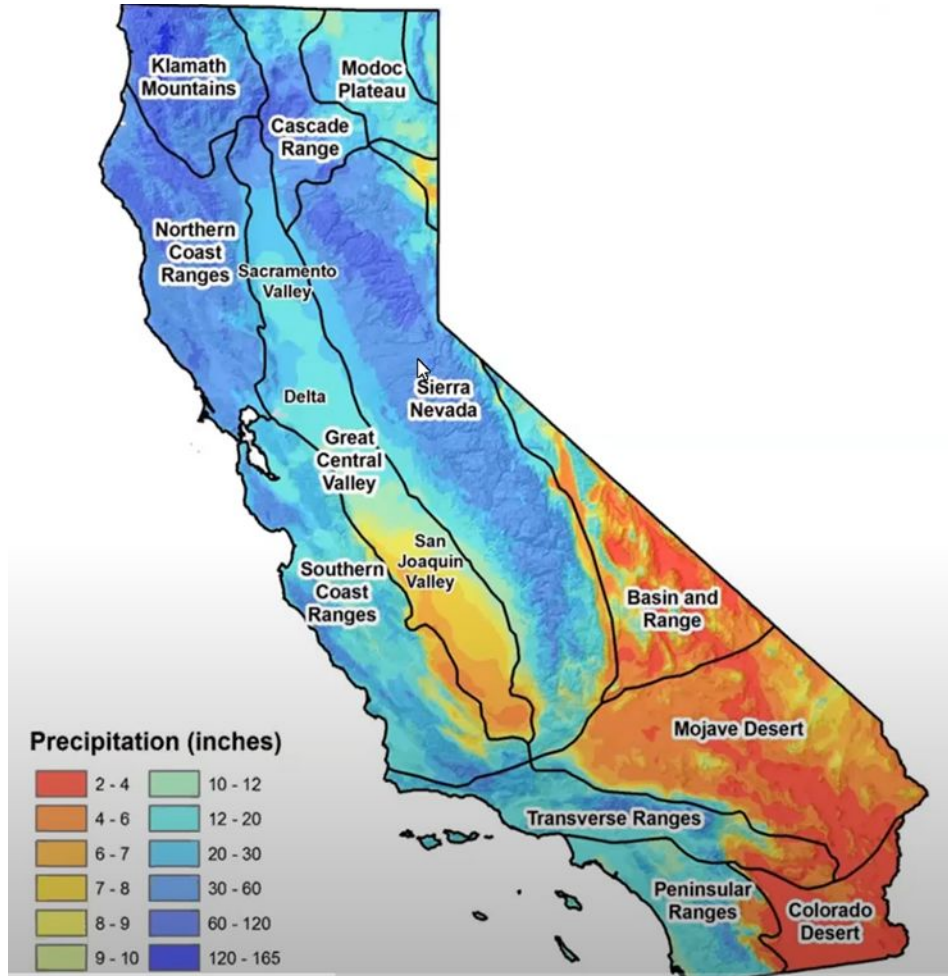


Models based on data from SoCal



Solutions and paths forward...

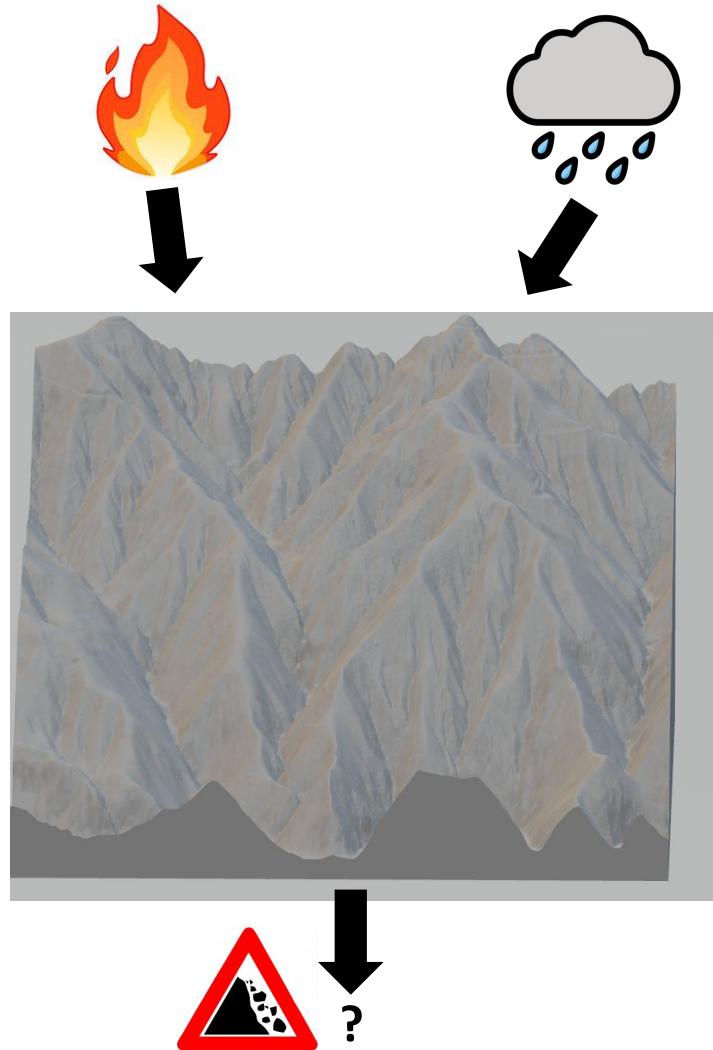
Continued research following fires in northern 2/3 of state – better models!



Risk of debris flow in this fire was over-stated during WY2021

Solutions and paths forward...

Proactive modeling approaches



Prescribed fire/fuels treatment in fuel-dominated fire regimes



Thank you!

Questions?

Contact: jguilinger@csumb.edu



Wildlife Connectivity and State Highways

Partnerships Pave the Way



Morgan Robertson,
Caltrans District 5, San Luis Obispo
Senior Environmental Scientist

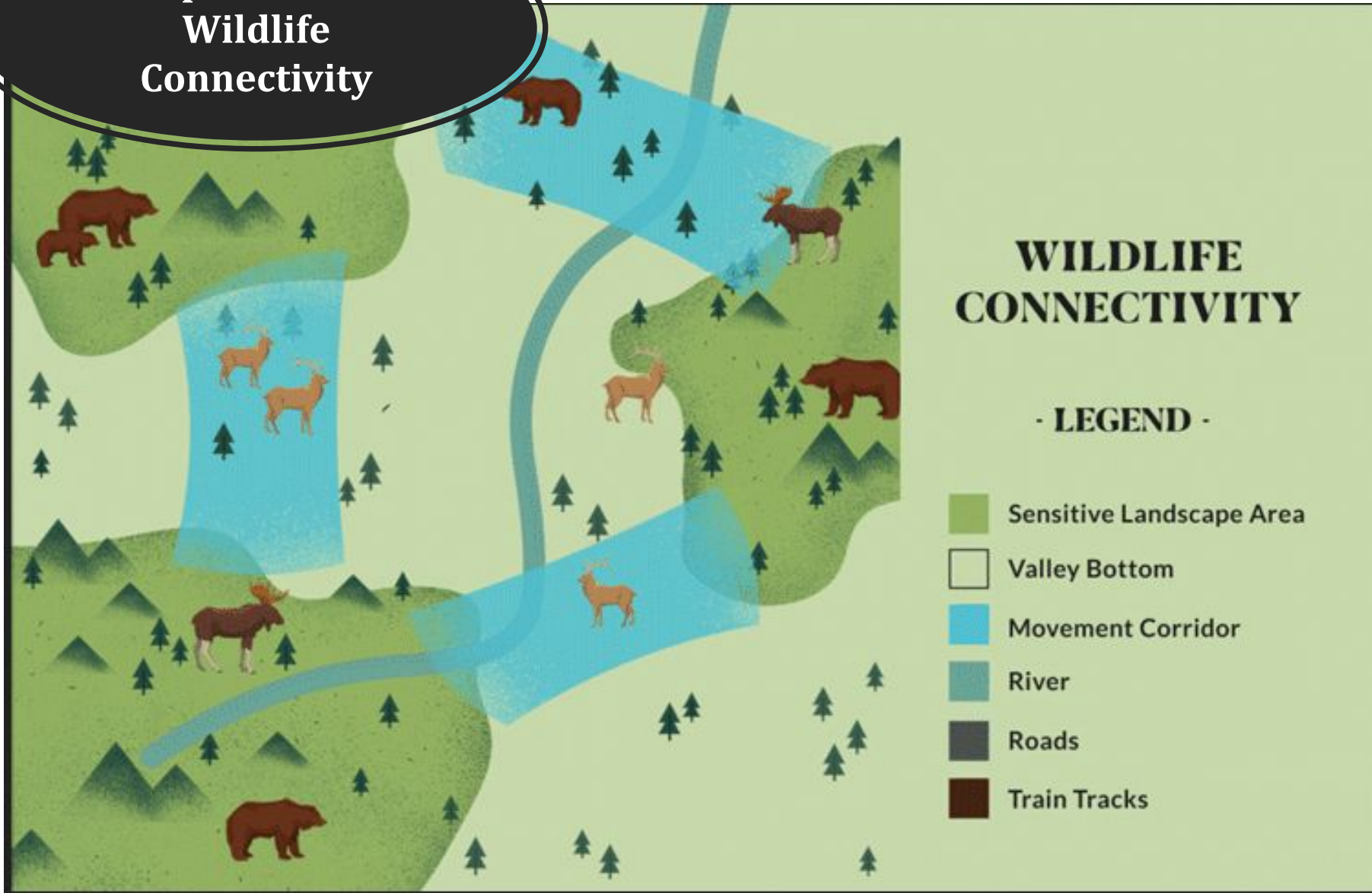


Caltrans District 5 – Central Coast

-Counties: Monterey, Santa Cruz, San Benito, San Luis Obispo, Santa Barbara



Transportation and Wildlife Connectivity



Wildlife will sometimes use existing bridges and culverts



- Black bear & mountain lion using box culvert within the project limits

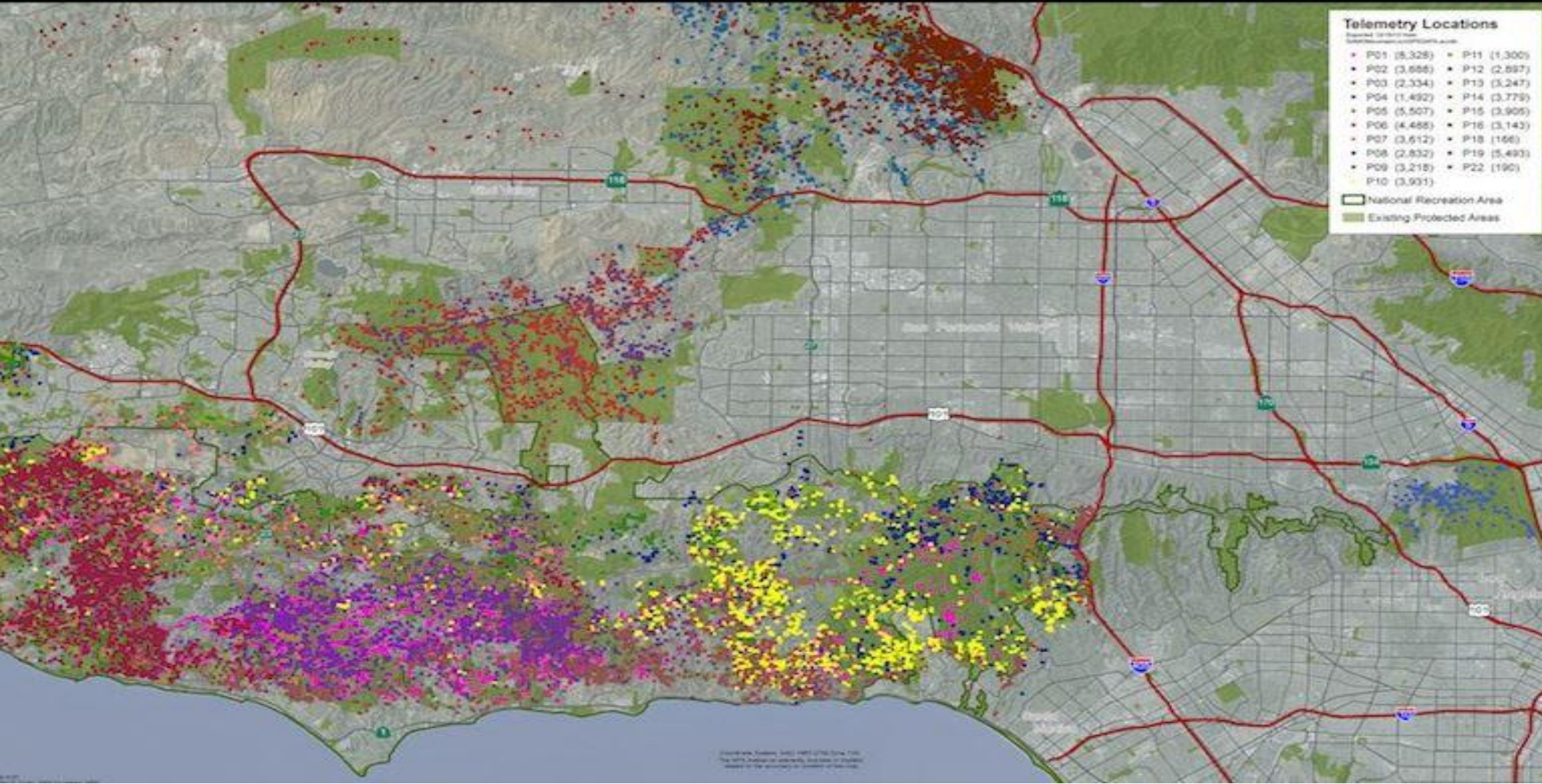


- Mule deer, feral pigs and black bear using large undercrossings either end of project.

Mountain Lion Locations

Santa Monica Mountains National Recreation Area

National Park Service
U.S. Department of the Interior



National Park Service: mountain lion study in Southern California

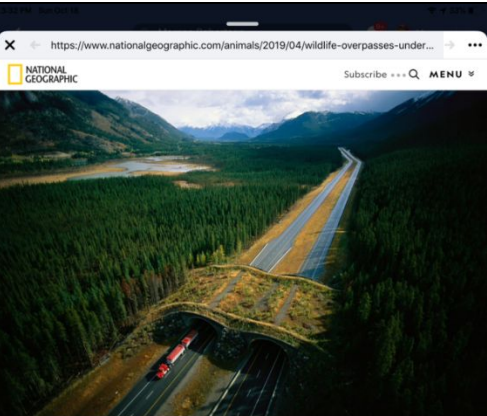


Growing public interest in Wildlife Crossings

<https://www.nationalgeographic.com/animals/2019/04/wildlife-overpasses-under...>

NATIONAL GEOGRAPHIC

Subscribe MENU



The Trans-Canada Highway wildlife crossings in Banff National Park have served as science-based inspiration for averting animal deaths on roads all over the globe.

PHOTOGRAPH BY JOEL SARTORE, NAT GEO IMAGE COLLECTION

ANIMALS

How wildlife bridges over highways make animals—and people—safer

Bridges for bears and tunnels for tortoises have significantly reduced the number of wildlife-car collisions worldwide.



Examples of Constructed Wildlife Crossings



Wildlife Undercrossing



Wildlife Overcrossing

Caltrans District 5 Wildlife Connectivity Studies

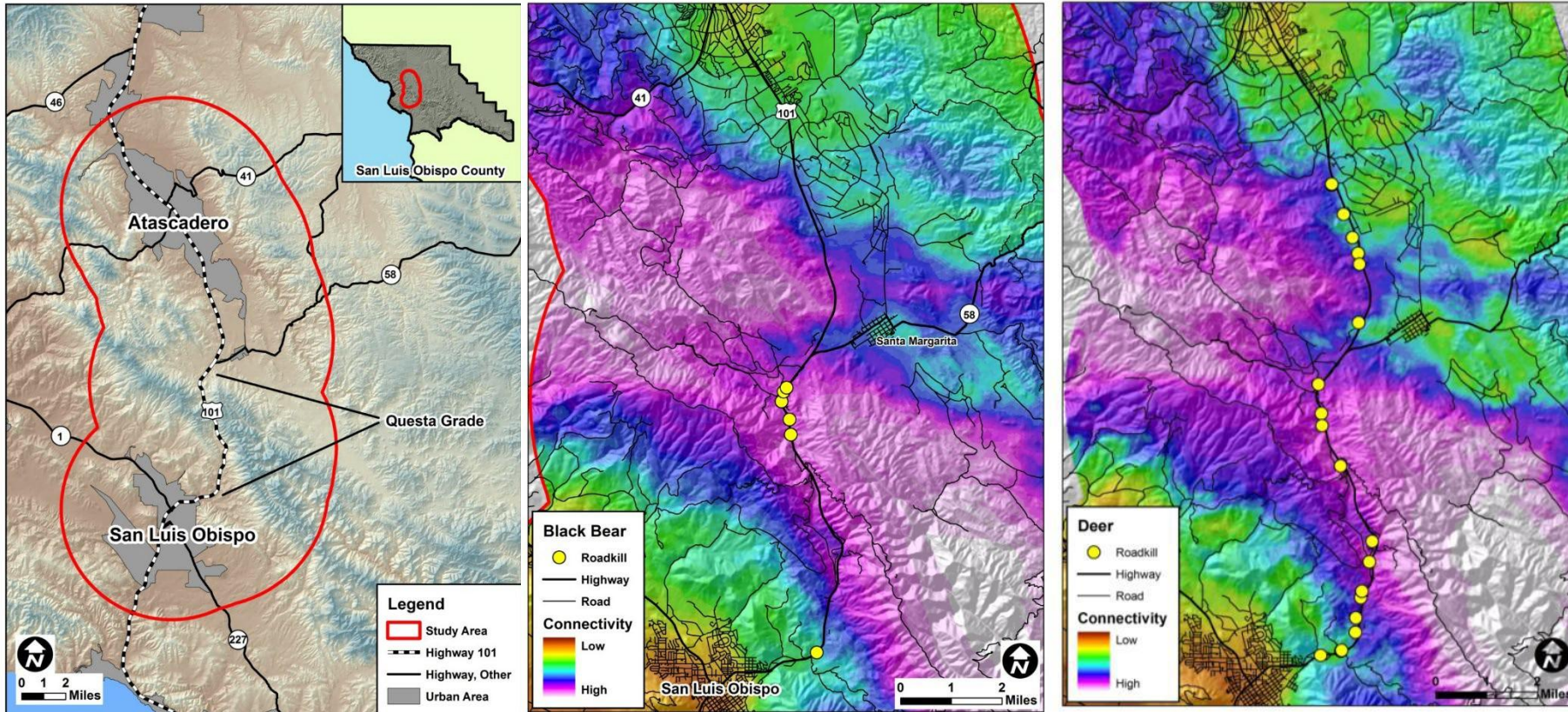


Highway 101 Wildlife Fencing Project



- Highway 101
- North of the City of San Luis Obispo

- Pre-construction wildlife corridor modeling study



- Study Area

- Landscape scale modeling for black bear and mule deer habitat connectivity with roadkill data overlay

Dr. James Thorne and Dr. Patrick Huber
Information Center for the Environment, U.C. Davis



US 101 Cuesta Grade Wildlife Study



- Pre-construction camera and roadkill study provided preliminary data



Mountain lion using game trail



Students checking wildlife cameras



Black bear highway bridge undercrossing

**Dr. John Perrine Biological Science
Department
California Polytechnic State University**



Installation of 2.5 Miles of Wildlife Exclusion Fence



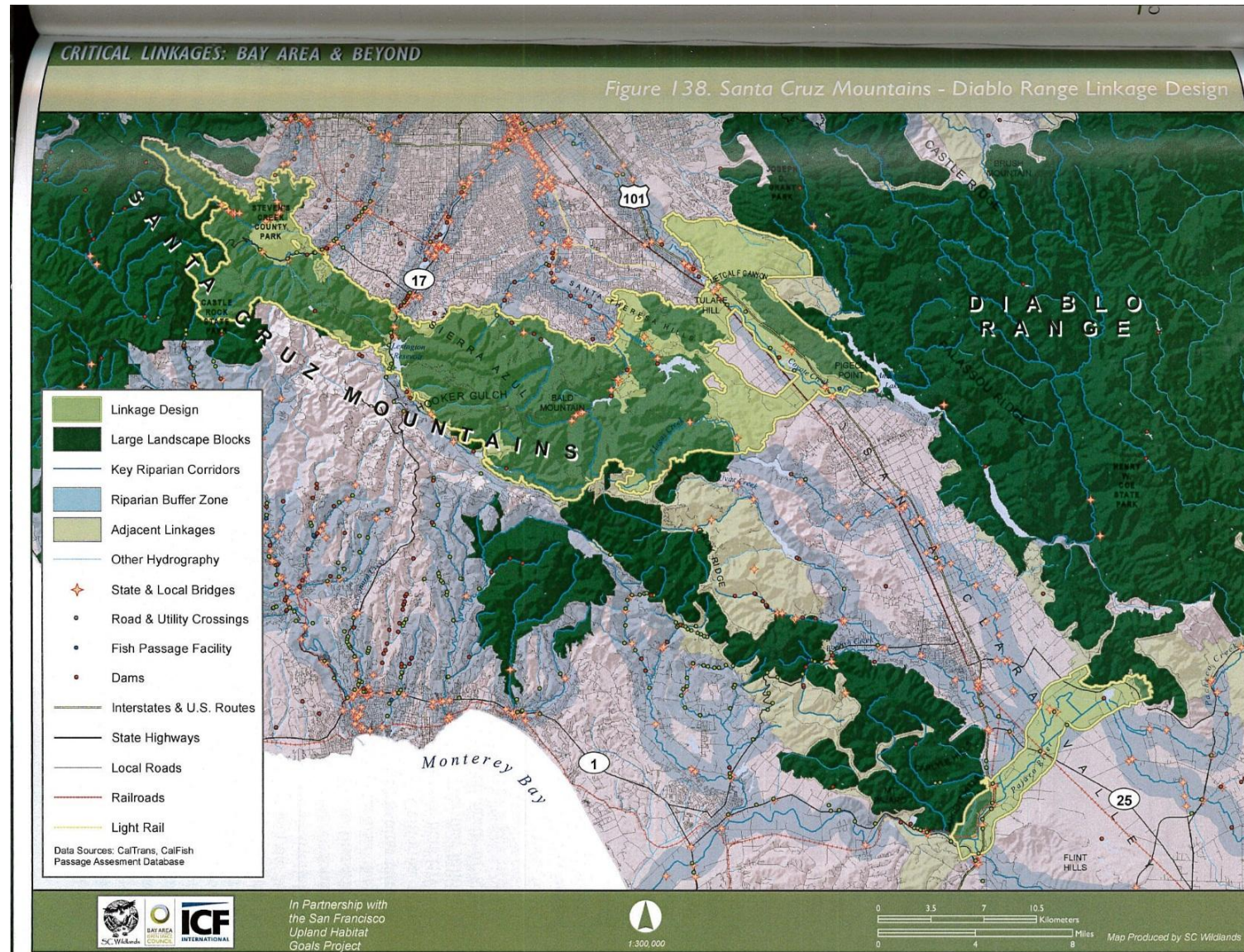
Bushnell M N_3.1 53°F11°C ●

10-13-2012 02:19:5 Bushnell M N_3.1 57°F13°C ○

10-04-2012 23:14:22

- California Conservation Corps (CCC) began construction fall 2010
- Construction completed spring 2012
- 2.5 miles of Fence guides wildlife to existing undercrossings

Santa Cruz Mountains Critical Linkage



Puma and cubs overlooking Santa Cruz

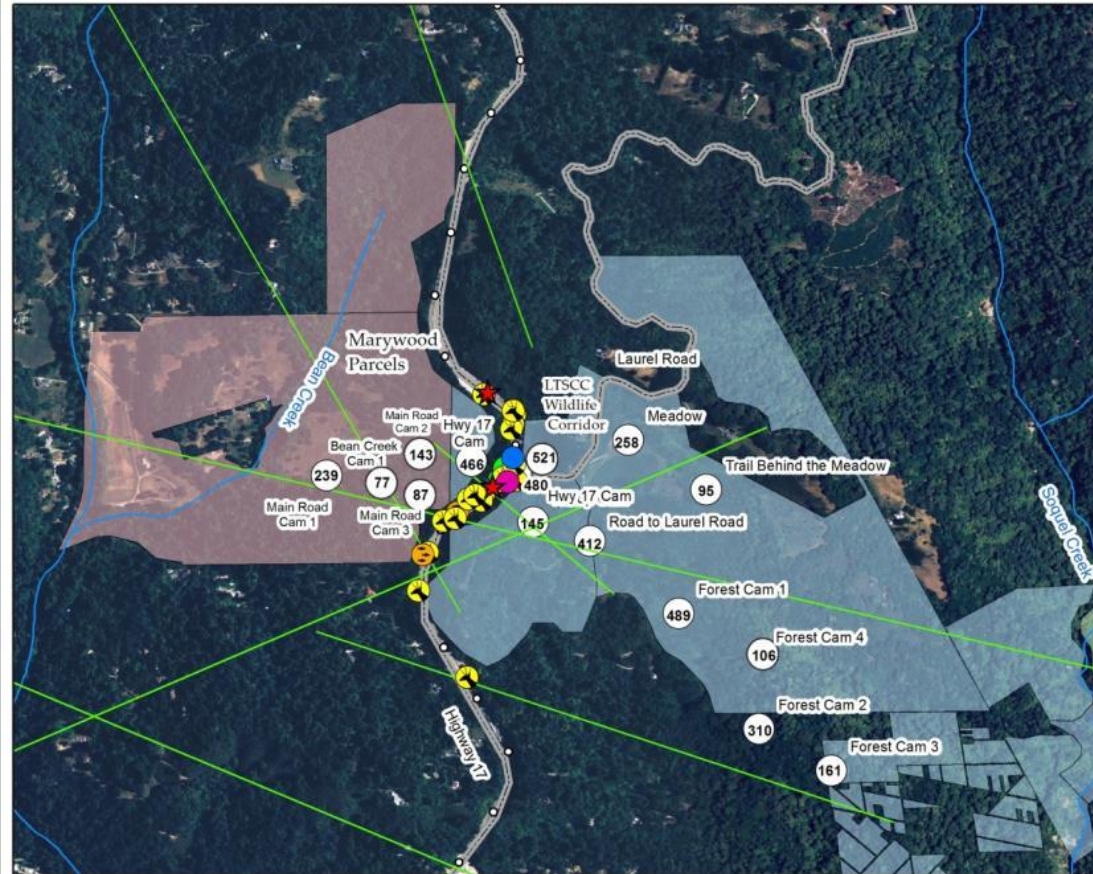


Photo: Santa Cruz Puma Project

Highway 17 Laurel Curve Data

- ❑ Roadkill Data
- ❑ UCSC Puma Satellite Collar data (**green lines**)
- ❑ Land Protection

Hwy 17 Laurel Curve, LTSCC, & Marywood Wildlife Connectivity
Study: Field Camera, Roadkill, & UCSC Mountain lion Radio Collar Data



Legend

Hwy 17 Roadkill Data

Animal

- 🐆 Bobcat
- 🐺 Coyote
- 🐇 Deer
- 🐅 Mountain lion
- 🐼 Raccoon
- 🦨 Skunk

UCSC Radio Collar Data: Mountain lion Crossings at Hwy 17

— Crossing Locations

Camera Monitoring Stations & Number of Animal Detections

- Land Trust of Santa Cruz County Property
- Marywood Parcels

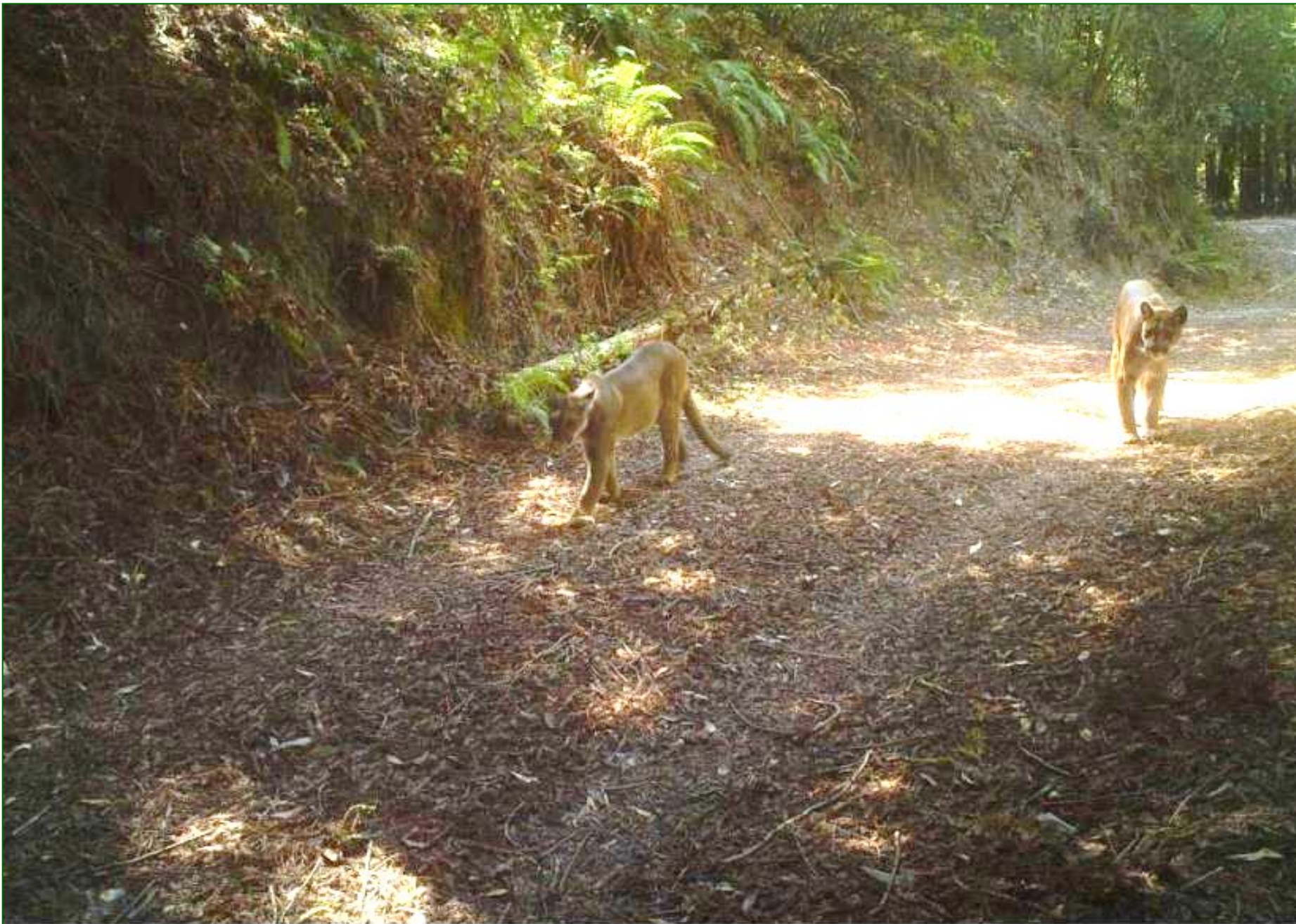
0 0.05 0.1 0.2 0.3 0.4 Miles



Data Collection by:
Pathways for Wildlife
Caltrans
UCSC Puma Project

Map by:
Pathways for Wildlife



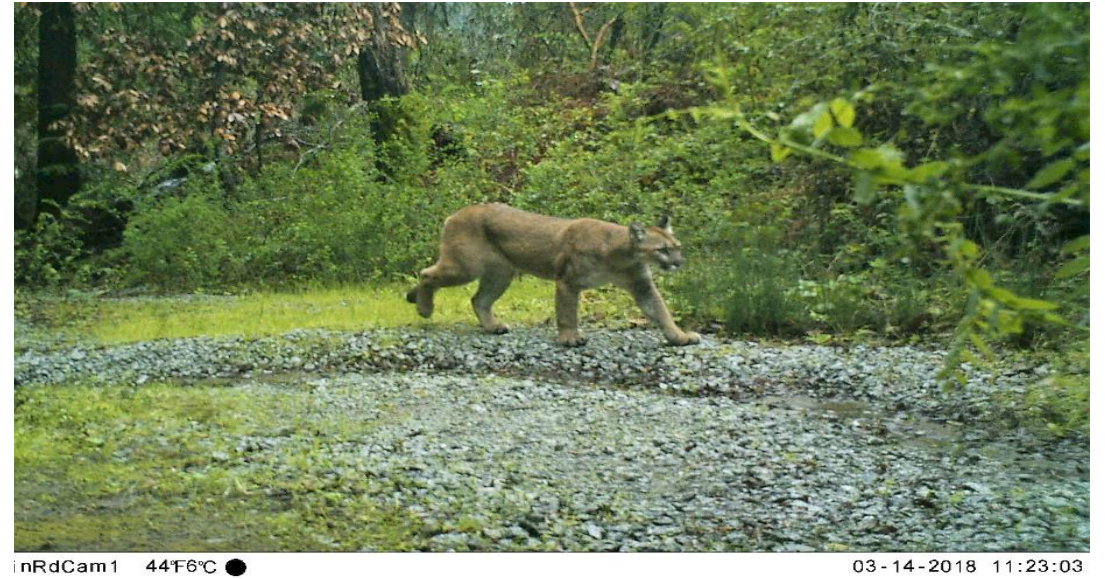
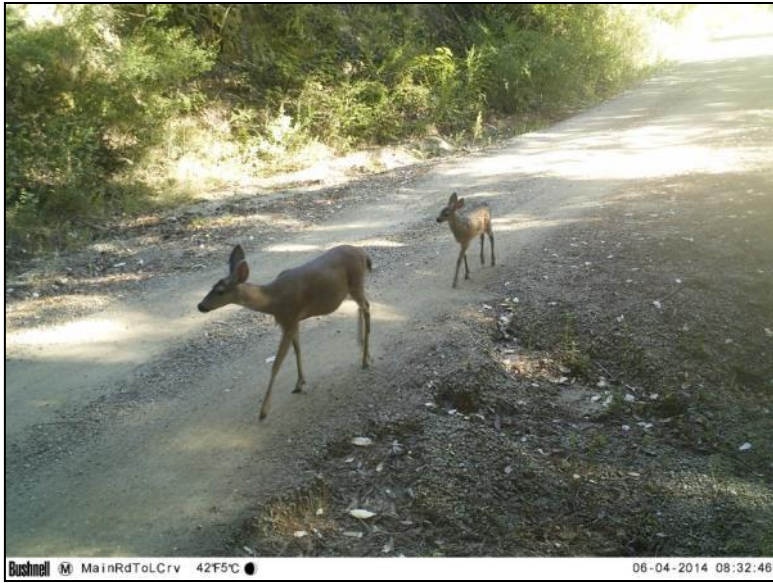


Bushnell

068°F

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Multiple Species Use the Pathways at Laurel Curve





Where we started



Completed December 2022

Partners



Highway 17 Crossing Project at Laurel Curve



Land Tr




Land Trust of Santa Cruz County



SR68

SCENIC HIGHWAY PLAN

 Pathways
for Wildlife



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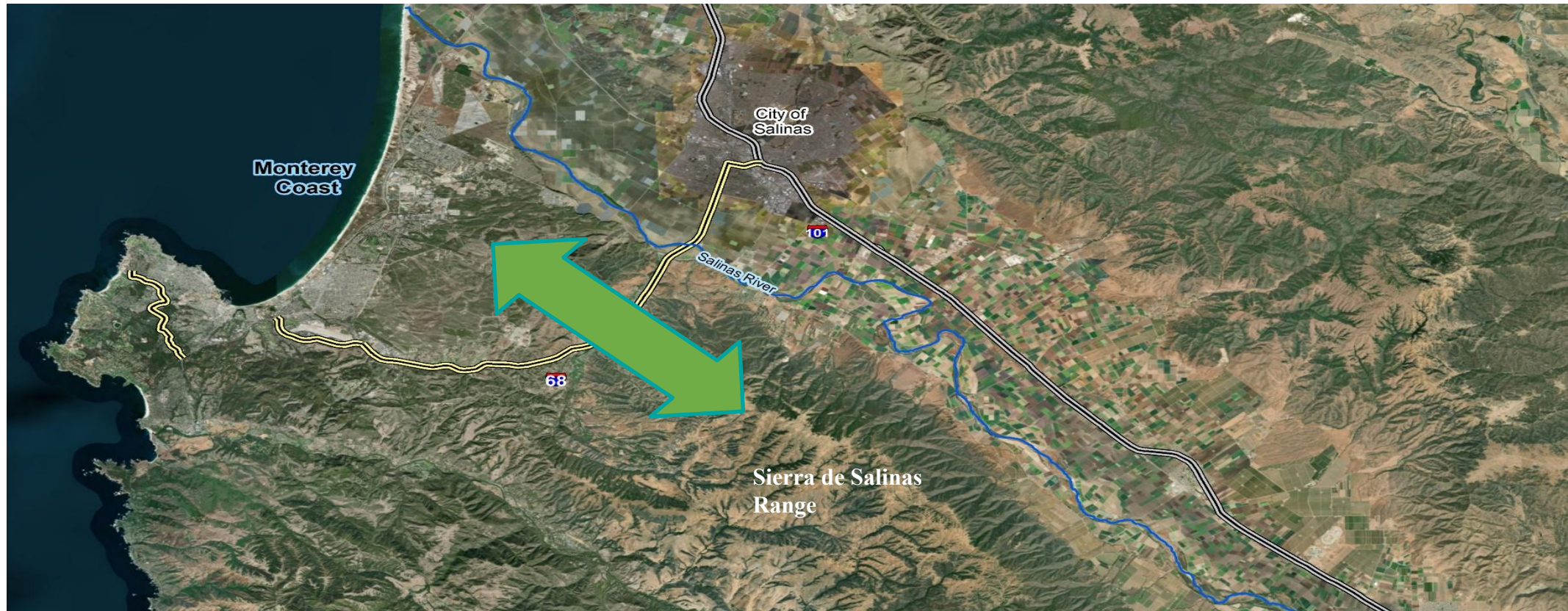


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Caltrans & Transportation Agency of Monterey County

SR-68 Wildlife Connectivity Study Area

Regional Critical Linkage: Monterey Coast to the Sierra de Salinas Range.
SR-68 bisects this linkage



Five Different Bobcat Families Using 6 Different Crossing Structures



M H68eIToroCrk 70°F21°C ●

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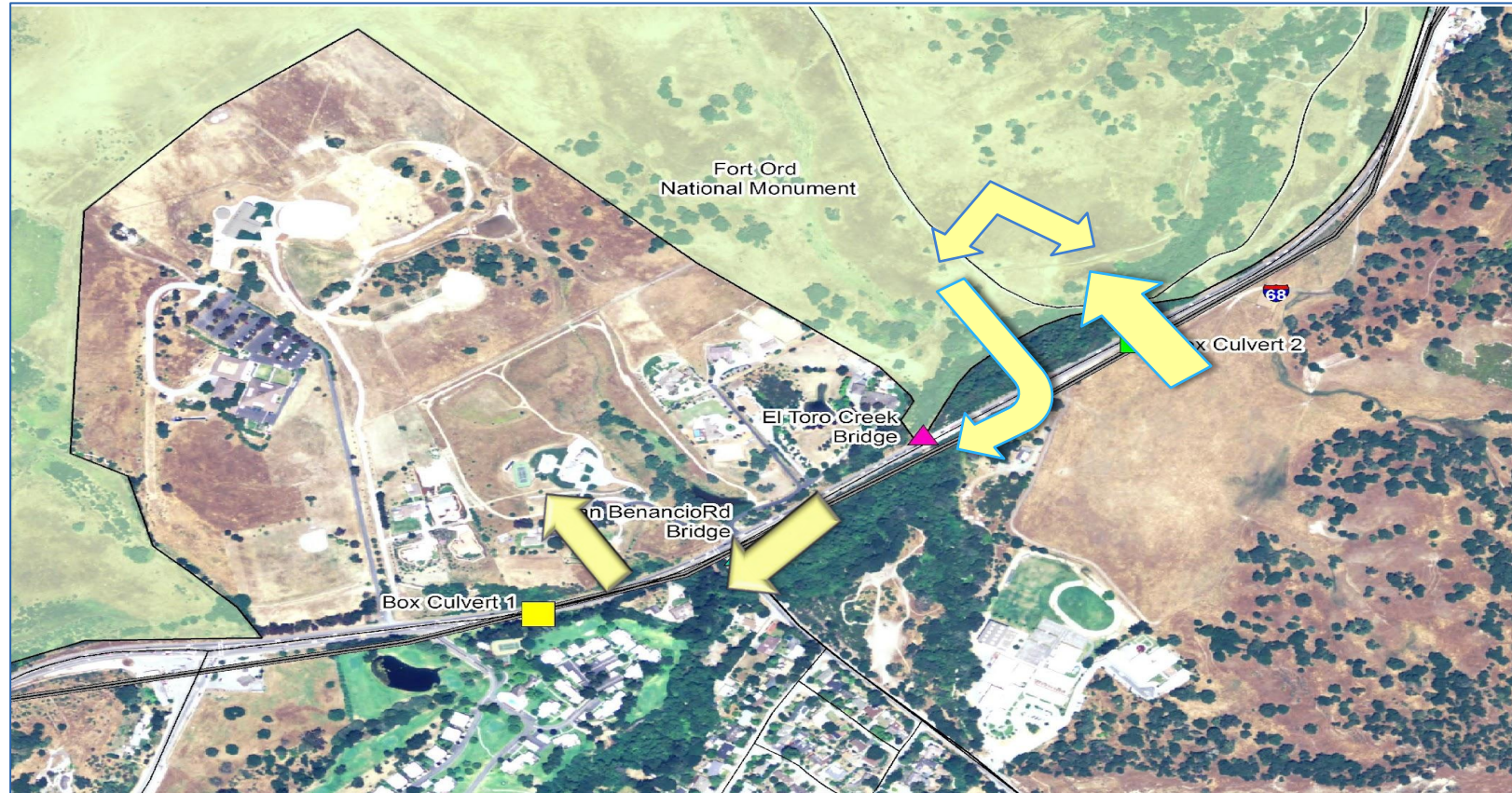
SR-68 San Benancio Bridge



10 S



Routes wildlife traveled under the highway using several culverts and bridges



State Route 68 Study provides a good example of how wildlife connectivity research and recommendations can be integrated into Regional Plans and Projects



Questions?

